# CONTENTS

## Figures

<table>
<thead>
<tr>
<th>Figures</th>
<th>15</th>
</tr>
</thead>
</table>

## Preface

<table>
<thead>
<tr>
<th>Preface</th>
<th>17</th>
</tr>
</thead>
</table>

## Revision history

<table>
<thead>
<tr>
<th>Revision history</th>
<th>19</th>
</tr>
</thead>
</table>

## Chapter 1

### adminaccess

<table>
<thead>
<tr>
<th>adminaccess</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>adminaccess change history</td>
<td>22</td>
</tr>
<tr>
<td>adminaccess guidelines and restrictions</td>
<td>22</td>
</tr>
<tr>
<td>adminaccess add</td>
<td>22</td>
</tr>
<tr>
<td>adminaccess authentication</td>
<td>22</td>
</tr>
<tr>
<td>adminaccess certificate</td>
<td>23</td>
</tr>
<tr>
<td>adminaccess del</td>
<td>31</td>
</tr>
<tr>
<td>adminaccess disable</td>
<td>31</td>
</tr>
<tr>
<td>adminaccess enable</td>
<td>31</td>
</tr>
<tr>
<td>adminaccess ftp</td>
<td>32</td>
</tr>
<tr>
<td>adminaccess ftps</td>
<td>32</td>
</tr>
<tr>
<td>adminaccess http</td>
<td>33</td>
</tr>
<tr>
<td>adminaccess option</td>
<td>33</td>
</tr>
<tr>
<td>adminaccess reset</td>
<td>35</td>
</tr>
<tr>
<td>adminaccess show</td>
<td>35</td>
</tr>
<tr>
<td>adminaccess ssh</td>
<td>36</td>
</tr>
<tr>
<td>adminaccess telnet</td>
<td>37</td>
</tr>
<tr>
<td>adminaccess trust</td>
<td>38</td>
</tr>
<tr>
<td>adminaccess web</td>
<td>39</td>
</tr>
</tbody>
</table>

## Chapter 2

### alerts

<table>
<thead>
<tr>
<th>alerts</th>
<th>41</th>
</tr>
</thead>
<tbody>
<tr>
<td>alerts change history</td>
<td>42</td>
</tr>
<tr>
<td>alerts clear</td>
<td>42</td>
</tr>
<tr>
<td>alerts notify-list</td>
<td>42</td>
</tr>
<tr>
<td>alerts show</td>
<td>44</td>
</tr>
<tr>
<td>alerts test events</td>
<td>46</td>
</tr>
</tbody>
</table>

## Chapter 3

### alias

<table>
<thead>
<tr>
<th>alias</th>
<th>49</th>
</tr>
</thead>
<tbody>
<tr>
<td>alias change history</td>
<td>50</td>
</tr>
<tr>
<td>alias add</td>
<td>50</td>
</tr>
<tr>
<td>alias del</td>
<td>51</td>
</tr>
<tr>
<td>alias reset</td>
<td>51</td>
</tr>
<tr>
<td>alias show</td>
<td>51</td>
</tr>
</tbody>
</table>

## Chapter 4

### authentication

<table>
<thead>
<tr>
<th>authentication</th>
<th>53</th>
</tr>
</thead>
<tbody>
<tr>
<td>authentication change history</td>
<td>54</td>
</tr>
<tr>
<td>authentication dpc-sso</td>
<td>54</td>
</tr>
<tr>
<td>authentication kerberos</td>
<td>55</td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Chapter 5</th>
<th>authorization</th>
<th>61</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>authorization change history</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>authorization guidelines and restrictions</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>authorization policy</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>authorization show</td>
<td>62</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 6</th>
<th>autosupport</th>
<th>63</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>autosupport change history</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>autosupport guidelines and restrictions</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>autosupport add</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>autosupport del</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>autosupport reset</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>autosupport send</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>autosupport set</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>autosupport show</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>autosupport test</td>
<td>67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 7</th>
<th>boostfs</th>
<th>69</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>boostfs change history</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>boostfs mount</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>boostfs lockbox</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>boostfs kerberos</td>
<td>71</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 8</th>
<th>cifs</th>
<th>73</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cifs change history</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>cifs disable</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>cifs enable</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>cifs local-group</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>cifs option</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>cifs reset</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>cifs restart</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>cifs set</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>cifs share</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>cifs show</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>cifs status</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>cifs troubleshooting</td>
<td>78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 9</th>
<th>client-group</th>
<th>79</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>client-group change history</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>client-group guidelines and restrictions</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>client-group add</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>client-group compression show</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>client-group create</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>client-group data-access-permit-list</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>client-group del</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>client-group destroy</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>client-group rename</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>client-group show</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>client-group stats options</td>
<td>91</td>
</tr>
</tbody>
</table>
client-group stream-limit.................................................................................. 93

Chapter 10  cloud  95
cloud change history.......................................................................................... 96
cloud clean......................................................................................................... 96
cloud enable....................................................................................................... 96
cloud profile...................................................................................................... 96
cloud provider.................................................................................................. 97
cloud status....................................................................................................... 98
cloud unit.......................................................................................................... 98

Chapter 11  compression  99
compression change history............................................................................. 100
compression physical-capacity-measurement............................................... 100

Chapter 12  config  105
config change history....................................................................................... 106
config reset...................................................................................................... 106
config set........................................................................................................ 106
config setup..................................................................................................... 107
config show..................................................................................................... 107

Chapter 13  data-movement  109
data-movement change history....................................................................... 110
data-movement policy...................................................................................... 110
data-movement recall....................................................................................... 110
data-movement resume.................................................................................... 110
data-movement schedule................................................................................ 110
data-movement start......................................................................................... 111
data-movement status...................................................................................... 112
data-movement stop......................................................................................... 115
data-movement suspend.................................................................................. 115
data-movement throttle................................................................................... 115
data-movement watch..................................................................................... 115

Chapter 14  ddboost  117
ddboost change history..................................................................................... 119
ddboost guidelines and restrictions................................................................ 119
ddboost association......................................................................................... 119
ddboost clients................................................................................................. 120
ddboost destroy............................................................................................... 123
ddboost disable............................................................................................... 123
ddboost enable............................................................................................... 123
ddboost event................................................................................................. 123
ddboost fc...................................................................................................... 124
ddboost file-replication................................................................................... 126
ddboost ifgroup............................................................................................... 128
ddboost option............................................................................................... 131
ddboost reset................................................................................................. 132
ddboost set.................................................................................................... 132
ddboost show................................................................................................. 132
ddboost status............................................................................................... 135
<table>
<thead>
<tr>
<th>Chapter 15</th>
<th>disk</th>
<th>143</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>disk change history</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>disk beacon</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>disk fail</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>disk multipath</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>disk port</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>disk release</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>disk rescan</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>disk reset</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>disk set</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>disk show</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>disk status</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>disk unfail</td>
<td>153</td>
</tr>
<tr>
<td>Chapter 16</td>
<td>elicense</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>elicense change history</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>elicense reset</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>elicense show</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>elicense update</td>
<td>157</td>
</tr>
<tr>
<td>Chapter 17</td>
<td>enclosure</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>enclosure change history</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>enclosure guidelines and restrictions</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>enclosure beacon</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>enclosure release</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>enclosure show</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>enclosure test</td>
<td>165</td>
</tr>
<tr>
<td>Chapter 18</td>
<td>filesys</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>filesys change history</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>filesys clean</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>filesys create</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>filesys destroy</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>filesys disable</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>filesys enable</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>filesys encryption</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>filesys expand</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>filesys fastcopy</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>filesys option</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>filesys report</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>filesys restart</td>
<td>181</td>
</tr>
<tr>
<td></td>
<td>filesys show</td>
<td>181</td>
</tr>
<tr>
<td></td>
<td>filesys status</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>filesys sync</td>
<td>184</td>
</tr>
<tr>
<td>Chapter 19</td>
<td>ha</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>ha change history</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>ha guidelines and restrictions</td>
<td>186</td>
</tr>
</tbody>
</table>
Chapter 20  help  191

Chapter 21  ifgroup  193
  ifgroup change history.................................................................194
  ifgroup add..................................................................................194
  ifgroup create.............................................................................195
  ifgroup del.................................................................................195
  ifgroup destroy..........................................................................195
  ifgroup disable.........................................................................195
  ifgroup enable..........................................................................195
  ifgroup option...........................................................................195
  ifgroup rename..........................................................................196
  ifgroup replication assign.........................................................196
  ifgroup replication unassign......................................................197
  ifgroup reset.............................................................................197
  ifgroup show config.................................................................197
  ifgroup show connections..........................................................198

Chapter 22  ipmi  199
  ipmi change history.....................................................................200
  ipmi guidelines and restrictions................................................200
  ipmi config.................................................................................200
  ipmi disable...............................................................................200
  ipmi enable................................................................................200
  ipmi remote...............................................................................200
  ipmi reset..................................................................................201
  ipmi show..................................................................................201
  ipmi user....................................................................................201

Chapter 23  license  203
  license change history...............................................................204
  license guidelines and restrictions............................................204
  license add................................................................................204
  license delete............................................................................204
  license reset..............................................................................205
  license show.............................................................................206

Chapter 24  log  207
  log change history.....................................................................208
  log host......................................................................................208
  log list.......................................................................................208
  log view.....................................................................................208
  log watch..................................................................................210
### Appendix

<table>
<thead>
<tr>
<th>Time Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time zones overview</td>
</tr>
<tr>
<td>Africa</td>
</tr>
<tr>
<td>America</td>
</tr>
<tr>
<td>Antarctica</td>
</tr>
<tr>
<td>Asia</td>
</tr>
<tr>
<td>Atlantic</td>
</tr>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>Brazil</td>
</tr>
<tr>
<td>Canada</td>
</tr>
<tr>
<td>Chile</td>
</tr>
<tr>
<td>Etc</td>
</tr>
<tr>
<td>Europe</td>
</tr>
<tr>
<td>GMT</td>
</tr>
<tr>
<td>Indian (Indian Ocean)</td>
</tr>
<tr>
<td>Mexico</td>
</tr>
<tr>
<td>Miscellaneous</td>
</tr>
<tr>
<td>Pacific</td>
</tr>
<tr>
<td>US (United States)</td>
</tr>
<tr>
<td>Aliases</td>
</tr>
</tbody>
</table>

---

vtl readahead.......................................................... 429  
vtl rename............................................................... 429  
vtl reset................................................................. 429  
vtl show................................................................. 430  
vtl slot........................................................................ 431  
vtl status.................................................................... 431  
vtl tape........................................................................ 431
| FIGURES |
|-----------------|-----------------|
| 1 | Output: net show hardware | 264 |
| 2 | Output: net show settings | 265 |
| 3 | Output: net show settings for HA (active) | 266 |
| 4 | Output: net show settings for HA (standby) | 266 |
| 5 | Output: storage add enclosure 2 tier cache | 351 |
| 6 | Output: storage migration finalize | 352 |
| 7 | Output: storage migration show history | 353 |
| 8 | Output: storage show all | 358 |
| 9 | Output: disk show hardware | 359 |
| 10 | Output: user show list | 399 |
As part of an effort to improve its product lines, Data Domain periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features, software updates, software compatibility guides, and information about Data Domain products, licensing, and service.

Contact your technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. Go to Online Support (https://support.emc.com) to ensure that you are using the latest version of this document.

Purpose

This guide describes the Data Domain operating system (DD OS) commands and provides an overview of how they are used. For more specific, task-based instructions, see the Data Domain Operating System Administration Guide.

Related documentation


Special notice conventions used in this document

Data Domain uses the following conventions for special notices.

NOTICE A notice identifies content that warns of potential business or data loss.

Note: A note identifies information that is incidental, but not essential, to the topic. Notes can provide an explanation, a comment, reinforcement of a point in the text, or just a related point.

Typographical conventions

The following table describes the type style conventions used in this document.

<table>
<thead>
<tr>
<th>Typographical Conventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bold</strong></td>
</tr>
<tr>
<td>Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)</td>
</tr>
<tr>
<td><em>Italic</em></td>
</tr>
<tr>
<td>Use for full titles of publications referenced in text</td>
</tr>
<tr>
<td>Monospace</td>
</tr>
<tr>
<td>Use for:</td>
</tr>
<tr>
<td>• System code</td>
</tr>
<tr>
<td>• System output, such as an error message or script</td>
</tr>
<tr>
<td>• Pathnames, filenames, prompts, and syntax</td>
</tr>
<tr>
<td>• Commands and options</td>
</tr>
<tr>
<td><strong>Monospace italic</strong></td>
</tr>
<tr>
<td>Use for variables</td>
</tr>
<tr>
<td><strong>Monospace bold</strong></td>
</tr>
<tr>
<td>Use for user input</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
<tr>
<td>Square brackets enclose optional values</td>
</tr>
</tbody>
</table>
Table 1 Typographical Conventions (continued)

| Vertical bar indicates alternate selections - the bar means “or”
{ } Braces enclose content that the user must specify, such as x or y or z
...
Ellipses indicate nonessential information omitted from the example

Where to get help
Data Domain support, product, and licensing information can be obtained as follows:

Product information
For documentation, release notes, software updates, or information about Data Domain products, go to Online Support at https://support.emc.com.

Technical support
Go to Online Support and click Service Center. You will see several options for contacting Technical Support. Note that to open a service request, you must have a valid support agreement. Contact your sales representative for details about obtaining a valid support agreement or with questions about your account.

Your comments
Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to: DPAD.Doc.Feedback@emc.com.


### Table 2: Document revision history

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 (7.1.0)</td>
<td>January 2020</td>
<td>This revision includes information about these command changes supporting DD OS 7.1:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• filesystem commands: Four with modified arguments, one with modified output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• system commands: Three new.</td>
</tr>
</tbody>
</table>

**Note:** In this guide, "the protection system" or simply "the system" refers to both Data Domain and PowerProtect DD systems running DD OS 7.0 or later.
Revision history
The `adminaccess` command manages access control and enables users to import host and CA certificates. Command options also enable remote hosts to use the FTP, FTPS, Telnet, HTTP, HTTPS, SSH, and SCP administrative protocols on the protection system. SSH is open to the default user `sysadmin` and to users added by the administrator.

A Certificate Signing Request (CSR) can now be generated for a host certificate. Also, host certificates can now be imported in PKCS12 or PEM formats. The system uses the SHA1 RSA encryption algorithm for a CSR and PBE-SHA1-3DES encryption algorithm for the PKCS12 key and certificate.

This chapter contains the following topics:

- `adminaccess change history` ................................................................. 22
- `adminaccess guidelines and restrictions` .............................................. 22
- `adminaccess add` ........................................................................ 22
- `adminaccess authentication` .............................................................. 22
- `adminaccess certificate` ................................................................. 23
- `adminaccess del` .......................................................................... 31
- `adminaccess disable` .................................................................... 31
- `adminaccess enable` ...................................................................... 31
- `adminaccess ftp` ........................................................................... 32
- `adminaccess ftps` .......................................................................... 32
- `adminaccess http` ......................................................................... 33
- `adminaccess option` ...................................................................... 33
- `adminaccess reset` ........................................................................ 35
- `adminaccess show` ......................................................................... 35
- `adminaccess ssh` ........................................................................... 36
- `adminaccess telnet` ....................................................................... 37
- `adminaccess trust` .......................................................................... 38
- `adminaccess web` .......................................................................... 39
adminaccess change history

There have been no changes to this command in this release.

adminaccess guidelines and restrictions

- FTP and FTPS are mutually exclusive. Only one or the other can be enabled, not both.
- SCP can be enabled only when SSH is enabled.
- The following characters are invalid for SCP:
  - dollar sign ($)
  - parenthesis [(and)]
  - plus sign (+)
  - square brackets ([and])
  - semi-colon (;)
  - comma (,)
  - apostrophe (unslanted single quotation mark)
  - single slanted quotation mark (‘)
  - ampersand (&)
  - number sign (#)
  - less-than sign (<)
  - greater-than sign (>)
  - vertical bar (|)
  - exclamation mark (!)
- FTP and Telnet are disabled by default.

adminaccess add

adminaccess add ssh-keys [user username]
Add an SSH public key to the SSH authorized keys file on the protection system. Admin role users can add and delete ssh-keys for other users. User role users can add or delete ssh-keys for their username only. Specify a username to associate the user with the key. When prompted, enter the key, press Enter, and press Ctrl-D. Role required: admin, limited-admin, security, user, or backup-operator.

Note: For high availability (HA) systems, SSH keys created on the active node take 30 seconds to one minute to propagate to the standby node.

adminaccess authentication

adminaccess authentication add {cifs}
Allow Windows domain users with no local account on the protection system to access the system through SSH, Telnet, and FTP using Windows domain group credentials. For administrative access, the user must be in the standard Windows Domain Admins group or in a group that you create named Data Domain. Users from both group names are always accepted as administrative users. The command also gives user-level access (no administrative operations allowed) to all other users.
from the domain. Users must be from the domain that includes the protection system or a related, trusted domain.

The SSH, Telnet, or FTP command that accesses the protection system must include the domain name, a backslash, and the user name in double quotation marks.

| Note: CIFS must be enabled and the protection system must be part of a Windows domain. |

Role required: admin, limited-admin.

```
adminaccess authentication del {cifs}
```
Prevent authentication of a Windows domain. Allow admin role only for users with local user accounts on the protection system. Role required: admin, limited-admin.

```
adminaccess authentication reset {cifs}
```
Reset the Windows user access to the default of requiring a local account for administrative access to the protection system. Role required: admin, limited-admin.

```
adminaccess authentication show
```
Display whether CIFS authentication is enabled or disabled. Role required: admin, limited-admin, security, user, or backup-operator.

adminaccess certificate

```
adminaccess certificate cert-signing-request delete
```
Delete the certificate signing request. To see if there is a certificate signing request on the system, enter `adminaccess certificate cert-signing-request show`. Role required: admin, limited-admin.

```
adminaccess certificate cert-signing-request generate [key-strength {1024bit | 2048bit | 3072bit | 4096bit}] [country country-code] [state state] [city city] [org-name organization-name] [org-unit organization-unit] [common-name common-name] [basic-constraint {CA:TRUE | CA:FALSE}] [key-usage {all | cRLsign | digitalSignature | keyCertSign | keyEncipherment | nonRepudiation | keyUsage-list}] [extended-key-usage {all | clientAuth | serverAuth}] [subject-alt-name value]
```
Generate a Certificate Signing Request (CSR) file at the following path `/ddvar/certificates/CertificateSigningRequest.csr`. Use SCP, FTP or FTPS to transfer the CSR file from the system to a computer from which you can send the CSR to a Certificate Authority (CA). After you receive a signed CSR file from a CA, you can import the certificate using `adminaccess certificate import`.

If a previously generated CSR exists, the system prompts you to approve or reject certificate regeneration, which replaces the existing CSR.

If the user does not specify values, default values are used.

| Note: You must configure a system passphrase (`system passphrase set`) before you can generate a CSR. |

Role required: admin, limited-admin.

**Argument Definitions**

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

**key strength**

Enumeration values that are allowed are 1024 bit, 2048 bit, 3072 bit, or 4096 bit. Default is 2048 bit.
country
Default is US. Abbreviation for country cannot exceed two characters. No special characters are allowed.

state
Default is California. Maximum entry is 128 characters.

city
Default is Santa Clara. Maximum entry is 128 characters.

org-name
Default is My Company Ltd. Maximum entry is 64 characters.

org-unit
Default value is empty string. Maximum entry is 64 characters.

common name
Default value is the system hostname. Maximum entry is 64 characters.

basic-constraint
Default value is CA:FALSE. If CA:FALSE, certificate that is generated after this CSR is signed by CA can be used as end-user certificate. If CA:TRUE, certificate that is generated after this CSR is signed by CA can be used as CA certificate.

keyUsage
Defines the purpose of public key that is contained in certificate. cRLsign, digitalSignature, keyCertSign, keyEncipherment, and nonrepudiation are supported. Provide one of the options, comma-separated list of options, or all.

extendedKeyUsage
A list of usages indicating purposes for which the certificate public key can be used, clientAuth and serverAuth are supported. Use either of these options or both of them using all.

subjectAltName
Defines one or more alternative names for the identity that can be used by certificate that is generated after this CSR is signed by CA. The alternative name can be in addition to subject name of certificate or it can be replacement to subject-name. These include email (an email address), URI (a uniform resource indicator), DNS (a DNS domain name), RID (a registered ID: OBJECT IDENTIFIER), IP (an IP address), dirName (a distinguished name), and other Name.
One of the examples is: IP:<IP_addr_1>, IP:<IP_addr_2>, DNS:<DNS_name_1>, DNS:<DNS_name_2>

adminaccess certificate cert-signing-request show
Show the certificate signing request stored on the system. Role required: admin, security, user, backup-operator, or none.

adminaccess certificate delete { subject subject-name | fingerprint fingerprint} [application {all | aws-federal | cloud | ddboot | ldap | login-auth | https | keysecure | support | application-list}]
Delete a certificate for the specified application.

Note: Log out from the browser session before deleting an HTTPS host certificate. Otherwise HTTPS browser sessions (using imported host certificates) are closed. After deleting the host certificate, refresh or restart the browser to proceed.
Role required: admin, limited-admin.

**Argument Definitions**

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

```plaintext
all
   Deletes the certificates for all applications.

application-list
   To delete the certificates for multiple applications, replace application-list with the application names, which are separated by commas or spaces (for example, ddboost, keysecure).

cloud
   Deletes the certificate for the cloud application.

ddboost
   Deletes the certificate for the DD Boost application.

https
   Deletes the certificate for the HTTPS application.

keysecure
   Deletes the certificate for the KeySecure application.

ldap
   Deletes the certificate for the LDAP application.

imported-ca application
   Indicates that the certificate to be deleted is a CA certificate for the specified applications.

imported-host application
   Indicates that the certificate to be deleted is a host certificate for the specified applications.

login-auth
   Deletes login authorization.

support
   Deletes the certificate for the support application.
```

```
adminaccess certificate delete { subject subject-name | fingerprint fingerprint} [{all | aws-federal | cloud | ddboost | ldap | login-auth | https | keysecure | support | application-list}]
```

Delete a certificate for the specified subject, fingerprint, or application.

**Note:** Log out from the browser session before deleting an HTTPS host certificate. Otherwise HTTPS browser sessions (using imported host certificates) are closed. After deleting the host certificate, refresh or restart the browser to proceed.

Role required: admin, limited-admin.

**Argument Definitions**

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

```plaintext
all
   Deletes the certificates for all applications.
```
application-list

To delete the certificates for multiple applications, replace application-list with the application names, which are separated by commas or spaces (for example, ddboost, keysecure).

cloud

Deletes the certificate for the cloud application.

ddboost

Deletes the certificate for the DD Boost application.

fingerprint

Specifies the fingerprint of a certificate to be deleted. To display the available certificates and their footprints, enter adminaccess certificate show.

keysecure

Deletes the certificate for the KeySecure application.

ldap

Deletes the certificate for the LDAP application.

login-auth

Deletes login authorization.

https

Deletes the certificate for the HTTPS application.

subject

Specifies the subject name of a certificate to be deleted. To display the available certificates and their subject names, enter adminaccess certificate show.

support

Deletes the certificate for the support application.

adminaccess certificate export imported-ca {subject subject-name | fingerprint fingerprint} [file file-name]

Export a CA certificate for the specified subject name or fingerprint. The certificate appears on screen after the CLI command. Role required: admin, limited-admin.

Argument Definitions

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

file

Saves a copy of the certificate in the /ddvar/certificates directory using the specified filename.

fingerprint

Specifies the fingerprint of a certificate to be exported. To display the available certificates and their footprints, enter adminaccess certificate show.

subject

Specifies the subject name of a certificate to be exported. To display the available certificates and their subject names, enter adminaccess certificate show.

adminaccess certificate export imported-ca-for-host application ddboost [file file-name]
Export a CA certificate for ddboost. The certificate appears on screen after the CLI command. Role required: admin, limited-admin.

**Argument Definitions**

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

- **application-list**
  - To export the certificates for multiple applications, replace `application-list` with the application names, which are separated by commas or spaces (for example, `ddboost, keysecure`).

- **ddboost**
  - Exports the certificate for the DD Boost application.

- **file**
  - Saves a copy of the certificate in the `/ddvar/certificates` directory using the specified filename.

```
adminaccess certificate generate self-signed-cert [regenerate-ca]
```

Generate a self-signed CA certificate and host certificate. The `regenerate-ca` option invalidates existing trust with external systems. Secure communication to trusted hosts is interrupted until mutual trust is reestablished. Role required: admin, limited-admin.

```
adminaccess certificate import {host application {all | aws-fedral | ddboost | https | keysecure | application-list} | ca application {all | cloud | ddboost | ldap | login-auth | keysecure | application-list}} [file file-name]
```

Imports a certificate for one or more applications. You can import only one certificate per application, but you can use the same certificate for multiple applications.

To prepare for importing a certificate, use SCP, FTP, or FTPS to copy the host or CA certificate to the directory: `/ddvar/certificates`. Optionally, you can copy and paste the entire PEM file of the host certificate, and then run the import command without specifying the certificate filename. An error is generated if users mistakenly import a mismatched certificate; for example, importing a host certificate as a CA certificate, or vice versa.

Bulk importing multiple certificates is not supported. After a public host certificate is imported, any related CSR is deleted from the system.

- Users must provide the PKCS12 file and password to decrypt the PKCS12 file.
- CA certificates must be imported in PEM format.

When importing or deleting certificates on an encrypted protection system on which the system passphrase is set, the imported host PKCS12 certificate is reencrypted with the system passphrase. If the system passphrase is not set, an error is generated during the import.

When the system passphrase is changed, the imported host PKCS12 certificate, if present on protection system, is reencrypted using the new system passphrase.

The correct server or client extensions must also be set. See the sections “Basic Constraints,” “Key Usage,” and “Extended Key Usage” in RFC 5280 for details (http://www.ietf.org/rfc/rfc5280.txt). Extensions are provided for host certificates during the certificate signing process.

**Note:** When a certificate is imported for HTTPS (which is used by DD System Manager), running this command closes any current browser sessions. It is a good practice to log out of the DD System Manager sessions prior to running this command.

Role required: admin, limited-admin.
Argument Definitions

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

all
  Imports the same certificate for all applications.

application-list
  To import a certificate for multiple applications, replace application-list with the application names, which are separated by commas or spaces (for example, ddboost, keysecure).

certificate
  Indicate that the certificate to be imported is a certificate.

certificate
  Indicates that the certificate to be imported is a host certificate.

certificate
  Imports the certificate for the cloud application.

certificate
  Imports the certificate for the DD Boost application.

certificate
  Indicates that the certificate to be imported is a host certificate.

certificate
  Imports the certificate for the LDAP application.

certificate
  Imports the certificate for the KeySecure application.

certificate
  Imports login authorization.

certificate
  Specifies a file from which to import the certificate. A copy of the certificate file must be in the /ddvar/certificates directory.

Example 1

On the local system, enter:

# scp host.p12 <administrator_role>@<DD>:/ddvar/certificates

On the protection system, enter:

# adminaccess certificate import host application https file host.p12

adminaccess certificate show [detailed] [imported-host [application {all | aws-federal | ddboost | https | keysecure | application-list}] | imported-ca [application {all | cloud | ddboost | ldap | login-auth | keysecure | support | application-list}] | host | ca | subject subject-name | fingerprint fingerprint

Display certificates for the imported host, CA, imported CA, or support bundle server trusted CA. All users may run this command option. Role required: admin, limited-admin, security, user, backup-operator, or none.
Argument Definitions

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

all
Displays the certificates in use for all applications.

application-list
Specifies a list of applications for which certificates are displayed.

cert
Displays CA certificates for the specified applications.

cloud
Displays the certificate for the cloud application.

ddboost
Displays the certificate for the DD Boost application.

fingerprint
Displays the certificate with the specified fingerprint. To display the available certificates and their footprints, enter adminaccess certificate show.

host application
Displays host certificates for the specified applications.

https
Displays the certificate for the HTTPS application.

imported-ca
Specifies the CA certificates are to be displayed for the specified applications.

imported-host
Specifies the host certificates are to be displayed for the specified applications.

ldap
Displays the certificate for the LDAP application.

keysecure
Displays the certificate for the KeySecure application.

login-auth
Displays login authorizations.

subject
Displays all certificate that uses the specified subject. To display the available certificates and their subject names, enter adminaccess certificate show.

support
Displays the certificate for the support application.

adminaccess certificate cert-revoke-list delete {issuer issuer-name | fingerprint fingerprint} [application {all | cloud | ddboost | login-auth | application-list}]
Deletes the certificate revoke list for the specified issuer, fingerprint, or application.
Role required: admin, limited-admin.
Argument Definitions

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

all
   Remove all CRL related to any application on system.

application-list
   To remove the certificate revoke lists for multiple applications, replace application-list with the application names, which are separated by commas or spaces (for example, ddboost, keysecure).

ddboost
   Remove CRL which are imported for DDBoostr application.

fingerprint
   Specifies the fingerprint of a certificate revoked list to be removed. To display the available certificates and their footprints, enter `adminaccess certificate show`.

issuer
   Specifies the issuer of a certificate on the revoked list to be removed. To display the available certificates and their issuer, enter `adminaccess certificate show`.

login-auth
   Remove CRL which are imported for making decision for certificate based login

adminaccess certificate cert-revoke-list import application {all | cloud | ddboost | login-auth | application-list} [file file-name ]
Import certificate revocation list file for applications.
Can transfer the file first on DD under `/ddr/var/certificates` directory via scp and then import the certificate.

Argument Definitions

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

all
   Import all CRL related to any application on system.

application-list
   To import the certificate revoke lists for multiple applications, replace application-list with the application names, which are separated by commas or spaces (for example, ddboost, keysecure).

ddboost
   Import CRL which are imported for DDBoostr application.

login-auth
   Import CRL which are imported for making decision for certificate based login

adminaccess certificate cert-revoke-list show [detailed] {application {all | cloud | ddboost | login-auth | application-list} | issuer issuer-name | fingerprint fingerprint]
Show the certificate revocation list file present on the system using application, CRL issuer or fingerprint options.
**Argument Definitions**

If the value you set for a variable includes any space characters, enclose the variable string in quotes.

`all`
- Show all CRL related to any application on system.

`application-list`
- To show the certificate revoke lists for multiple applications, replace `application-list` with the application names, which are separated by commas or spaces (for example, `ddboost`, `keysecure`).

`cloud`
- Show CRL which are imported for cloud application.

`ddboost`
- Show CRL which are imported for DDBoostr application.

`fingerprint`
- Specifies the fingerprint of a certificate revoked list to be shown. To display the available certificates and their footprints, enter `adminaccess certificate show`.

`issuer`
- Specifies the issuer of a certificate on the revoked list to be shown. To display the available certificates and their issuer, enter `adminaccess certificate show`.

`login-auth`
- Show CRL which are imported for making decision for certificate based login

### adminaccess del

`adminaccess del ssh-keys lineno [user username]`
Delete an SSH key from the key file. Users may delete their own keys, and users in admin role may delete user keys. Run the command option `adminaccess show ssh-keys` to view line number values. Role required: admin, limited-admin, security, user, backup-operator, or none.

### adminaccess disable

`adminaccess disable {http | https | ftp | ftps | telnet | ssh | scp | web-service | all}`
Disable system access using the specified protocol. Disabling FTP or Telnet does not affect entries in the access lists. If all access is disabled, the protection system is available only through a serial console or keyboard and monitor. Role required: admin, limited-admin.

```bash
#adminaccess disable web-service
Web Service: disabled
```

### adminaccess enable

`adminaccess enable {http | https | ftp | ftps | telnet | ssh | scp | web-service | all}`
Enable a protocol on the protection system. By default, SSH, HTTP, HTTPS, and web-service are enabled and FTP and Telnet are disabled. HTTP and HTTPS allow users to log in from System Manager. The web-service allows the use of REST APIs. To use FTP and Telnet, users with admin role permissions must add host machines to the access lists. Role required: admin, limited-admin.

```
#adminaccess enable web-service
Web Service: enabled
```

### adminaccess ftp

adminaccess ftp add host-list
Add one or more hosts to the FTP list. You can identify a host using a fully qualified hostname, an IPv4 address, or an IPv6 address. Host entries cannot include a space. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

**Note:** Only users who are assigned the admin management role are permitted to access the system using FTP.

adminaccess ftp del host-list
Remove one or more hosts (IP addresses, hostnames, or asterisks) from the FTP list. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

adminaccess ftp option reset [session-timeout]
Reset the FTP options to default values. The default timeout setting never times out a session. Role required: admin, limited-admin.

adminaccess ftp option set session-timeout timeout-in-secs
Set the FTP client session timeout. The timeout range is 60 to 31,536,000 seconds. The default setting never times out a session. Role required: admin, limited-admin.

adminaccess ftp option show
Show the current FTP options. Role required: admin, limited-admin, security, user, backup-operator, or none.

### adminaccess ftpt

adminaccess ftpt add host-list
Add one or more hosts to the FTPS list. You can identify a host using a fully qualified hostname, an IPv4 address, or an IPv6 address. Host entries cannot include a space. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

**Note:** Only users who are assigned the admin management role are permitted to access the system using FTPS.

adminaccess ftpt del host-list
Remove one or more hosts (IP addresses, hostnames, or asterisks) from the FTPS list. Host entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

adminaccess ftpt option reset [session-timeout]
Resets the FTPS options to default values. The default timeout setting never times out a session. Role required: admin, limited-admin.

adminaccess ftpt option set session-timeout timeout-in-secs
Sets the FTPS client session timeout. The timeout range is 60 to 31,536,000 seconds. The default setting never times out a session. Role required: admin, limited-admin.

adminaccess ftpt option show

---

**Dell EMC DD OS Command Reference Guide**
Shows the current FTPS options. Role required: admin, limited-admin, security, user, backup-operator, or none.

**adminaccess http**

`adminaccess http add host-list`
Add one or more hosts to the HTTP/HTTPS list. You can identify a host using a fully qualified hostname, an IPv4 address, or an IPv6 address. Host entries cannot include a space. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

`adminaccess http del host-list`
Remove one or more hosts (IP addresses, hostnames, or asterisk) from the HTTP/HTTPS list. Host entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

**adminaccess option**

`adminaccess option reset [cipher-list | login-max-attempts | login-unlock-timeout | login-max-active | password-hash]`
Resets the specified option to the default value, which is 4 for maximum attempts, 120 seconds for the unlock timeout, and 10 for active sessions. Note that the limit set for active sessions does not apply to the sysadmin user. Role required: admin, limited-admin.

**Example 2**

```
# adminaccess option reset login-max-active
Adminaccess option "login-max-active" is reset to default (10).
```

`adminaccess option reset cipher-list`
Resets the cipher list to be used for server communication. Role required: admin, limited-admin.

`adminaccess option reset password-auth`
Resets password-auth option to default value (enabled). Role required: admin.

`adminaccess option reset password-hash`
Resets the password hash to its default value of MD5. Role required: admin.

`adminaccess option set cipher-list`
Sets the cipher list to be used for server communication. Role required: admin, limited-admin.

`adminaccess option set login-max-active count`
Sets the maximum number of logins for users. The minimum value is 1, and the default value is 10. Note that the limit set for active sessions does not apply to the sysadmin user. Role required: admin, limited-admin.

**Example 3**

```
# adminaccess option set login-max-active 5
Adminaccess option "login-max-active" set to "5".
```

`adminaccess option set login-max-attempts count`
Specifies the maximum number of login attempts before a mandatory lock is applied to an account. The user cannot log in while the account is locked. The range is 4 to 20, and the default value is 4. Role required: admin, limited-admin.

**Example 4**
Example 4 (continued)

# adminaccess option set login-max-attempts 5
Adminaccess option "login-max-attempts" set to "5".

adminaccess option set login-unlock-timeout timeout-in-secs
Specifies how long a user account is locked after the maximum number of login attempts. When the configured unlock timeout is reached, a user can attempt login. The range is 120 to 3600 seconds, and the default period is 120 seconds. Role required: admin, limited-admin.

Example 5

# adminaccess option set login-unlock-timeout 120
Adminaccess option "login-unlock-timeout" set to "120".

adminaccess option set password-auth {enabled | disabled}
Enable or disable password-based authentication. Password-based authentication cannot be disabled unless an SSH key exists for the administrative user. The command will provide a warning if no CA certificates for login authentication are imported, and prompt you to continue with disabling password-based authentication. The CA certificates are required to allow users to login after certificate-based authentication is configured. If a security policy is configured, the command will prompt for security officer credentials before making the configuration change. Role required: admin.

adminaccess option set password-hash {md5 | sha512}
Specifies the hashing algorithm used to store local user passwords. After changing the hashing algorithm, update the passwords for existing local users to be compatible with the new algorithm. Role required: admin.

Example 6

# adminaccess option set password-hash sha512
Adminaccess option "password-hash" set to "sha512".
Please update existing local users' passwords, to hash with "sha512".

adminaccess option show
Shows the current configuration for the adminaccess option command. Role required: admin, limited-admin.

Example 7

# adminaccess option sh
Option                      Value
----------------------------------
login-unlock-timeout         120
login-max-attempts           4
login-max-active             10
cipher-list                  default*
password-auth                enabled
password-hash                md5
----------------------------------
(*) Run 'adminaccess option show cipher-list' for detail.

adminaccess option show cipher-list
Shows the current configuration for the adminaccess option cipher-list command. Role required: admin, limited-admin.
adminaccess reset

adminaccess reset {ftp | ftps | telnet | ssh | http | scp | all}
Reset (to default) the access lists of host entries. Output shows the running state of each protocol. Role required: admin, limited-admin.

**Note:** Because SCP works together with SSH, output appears the same for both. However, due to the registry configuration, output could be misleading. For example, if SSH is disabled, SCP also shows as disabled; however, SCP is enabled at the registry level. This is expected behavior and does not affect functionality. When a user resets SCP, the SCP registry entry changes to enabled and output for SSH shows as enabled.

adminaccess reset ssh-keys [user username]
Remove the authorized SSH keys file for the specified user from the protection system. After removing the file, every SSH connection requires password authentication. Role required: varies as listed below.

- Users may reset their own keys only.
- **Admin** role users may reset the keys of any user.
- **Security** role users and **none** role users may not reset keys.

adminaccess show

adminaccess show
Lists the access services available on a protection system and displays option values for the access services that are enabled. Role required: admin, limited-admin, security, user, backup-operator, or none.

- **N/A** means the service does not use an access list.
- A hyphen means the service can use an access list, but the access list does not contain host names.
- An asterisk means the service allows all hosts.

<table>
<thead>
<tr>
<th>Service</th>
<th>Enabled</th>
<th>Allowed Hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td>ssh</td>
<td>yes</td>
<td>-</td>
</tr>
<tr>
<td>scp</td>
<td>yes</td>
<td>(same as ssh)</td>
</tr>
<tr>
<td>telnet</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>ftp</td>
<td>no</td>
<td>*</td>
</tr>
<tr>
<td>ftps</td>
<td>no</td>
<td>-</td>
</tr>
<tr>
<td>http</td>
<td>yes</td>
<td>-</td>
</tr>
<tr>
<td>https</td>
<td>yes</td>
<td>-</td>
</tr>
<tr>
<td>web-service</td>
<td>yes</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Ssh/Scp options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>session-timeout</td>
<td>default (infinite)</td>
</tr>
<tr>
<td>server-port</td>
<td>default (22)</td>
</tr>
<tr>
<td>ciphers</td>
<td>aes128-cbc,<a href="mailto:chacha20-poly1305@openssh.com">chacha20-poly1305@openssh.com</a>,aes128-ctr,aes192-ctr,aes256-ctr,<a href="mailto:aes128-gcm@openssh.com">aes128-gcm@openssh.com</a>,<a href="mailto:aes256-gcm@openssh.com">aes256-gcm@openssh.com</a></td>
</tr>
</tbody>
</table>
| macs            | umac-64-etc@openssh.com,umac-128-etc@openssh.com,umac-128-sha2-256-etc@openssh.com,umac-128-sha2-512-etc@openssh.com,umac-128-shal-etc@openssh.com,umac-64@openssh.com,umac-128@openssh.com,hmac-
sha2-256, hmac-sha2-512, hmac-sha1
---------------   ------------------
Telnet options:
Option            Value
---------------   ------------------
session-timeout   default (infinite)
---------------   ------------------
Ftp options:
Option            Value
---------------   ------------------
session-timeout   default (infinite)
---------------   ------------------
Ftps options:
Option            Value
---------------   ------------------
session-timeout   default (infinite)
---------------   ------------------
Web options:
Option            Value
---------------   ------------------
http-port         80
https-port        443
session-timeout   10800
---------------   ------------------

adminaccess show ssh-keys [user username]
Displays the authorized SSH key file with a line number for each entry. Admin role users can view the SSH key files of any user. Users in other roles can view only their own SSH key file.

adminaccess ssh

adminaccess ssh add host-list
Add one or more hosts to the SSH list. You can identify a host using a fully qualified hostname, an IPv4 address, or an IPv6 address. Host entries cannot include a space. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

adminaccess ssh del host-list
Remove one or more hosts (IP addresses, hostnames, or asterisks) from the SSH list. Host entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

adminaccess ssh option reset [ciphers | macs | server-port | session-timeout]
Resets the ssh options to their default values. Role required: admin, limited-admin.

Table 3 Default option values

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>session-timeout</td>
<td>default (infinite)</td>
</tr>
<tr>
<td>server-port</td>
<td>default (22)</td>
</tr>
<tr>
<td>ciphers</td>
<td>aes128-cbc, <a href="mailto:chacha20-poly1305@openssh.com">chacha20-poly1305@openssh.com</a>, <a href="mailto:aes256-gcm@openssh.com">aes256-gcm@openssh.com</a>,</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:aes128-gcm@openssh.com">aes128-gcm@openssh.com</a>, aes256-ctr, aes192-ctr, aes128-ctr</td>
</tr>
<tr>
<td>macs</td>
<td>hmac-sha1, <a href="mailto:hmac-sha2-512-etm@openssh.com">hmac-sha2-512-etm@openssh.com</a>, <a href="mailto:hmac-sha2-256-etm@openssh.com">hmac-sha2-256-etm@openssh.com</a>, <a href="mailto:hmac-ripemd160-etm@openssh.com">hmac-ripemd160-etm@openssh.com</a>, umac-128-</td>
</tr>
</tbody>
</table>
Table 3 Default option values (continued)

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="mailto:etm@openssh.com">etm@openssh.com</a>, hmac-sha2-512, hmac-sha2-256, hmac-ripemd160, <a href="mailto:umac-128@openssh.com">umac-128@openssh.com</a></td>
</tr>
</tbody>
</table>

adminaccess ssh option set ciphers cipher-list
Sets the ciphers to be used by SSH daemon.

```bash
# adminaccess ssh option set ciphers "chacha20-poly1305@openssh.com,aes256-gcm@openssh.com,aes128-gcm@openssh.com"
```

Adminaccess ssh option "ciphers" set to "chacha20-poly1305@openssh.com,aes256-gcm@openssh.com,aes128-gcm@openssh.com".

adminaccess ssh option set macs MAC-list
Sets the MACs to be used by SSH daemon.

```bash
# adminaccess ssh option set macs "hmac-sha2-512-etm@openssh.com,hmac-sha2-256-etm@openssh.com,hmac-ripemd160-etm@openssh.com"
```

Adminaccess ssh option "macs" set to "hmac-sha2-512-etm@openssh.com,hmac-sha2-256-etm@openssh.com,hmac-ripemd160-etm@openssh.com".

adminaccess ssh option set server-port port-number
Set the SSH server port. The default port number is 22. Role required: admin, limited-admin.

adminaccess ssh option set session-timeout timeout-in-secs
Set the SSH client timeout options. The timeout range is 60 to 31,536,000 seconds. The default setting never times out a session. Role required: admin, limited-admin.

**Example 8**

Set the SSH session timeout period to 10 minutes:

```bash
# adminaccess ssh option set session-timeout 600
```

adminaccess ssh option show
Display the SSH option configuration. Role required: admin, limited-admin.

**Example 9**

```bash
# adminaccess ssh option show
```

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>session-timeout</td>
<td>default (infinite)</td>
</tr>
<tr>
<td>server-port</td>
<td>default (22)</td>
</tr>
<tr>
<td>ciphers</td>
<td><a href="mailto:chacha20-poly1305@openssh.com">chacha20-poly1305@openssh.com</a>,<a href="mailto:aes256-gcm@openssh.com">aes256-gcm@openssh.com</a>,<a href="mailto:aes128-gcm@openssh.com">aes128-gcm@openssh.com</a></td>
</tr>
<tr>
<td>macs</td>
<td><a href="mailto:hmac-sha2-512-etm@openssh.com">hmac-sha2-512-etm@openssh.com</a>,<a href="mailto:hmac-sha2-256-etm@openssh.com">hmac-sha2-256-etm@openssh.com</a>,<a href="mailto:hmac-ripemd160-etm@openssh.com">hmac-ripemd160-etm@openssh.com</a></td>
</tr>
</tbody>
</table>

adminaccess telnet

adminaccess telnet add host-list
Add one or more hosts to the Telnet list. You can identify a host using a fully qualified hostname, an IPv4 address, or an IPv6 address. Host entries cannot include a space. Multiple entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

adminaccess telnet del host-list
adminaccess

Remove one or more hosts (IP addresses, hostnames, or asterisk) from the Telnet list. Host entries may be separated by commas, spaces, or both. Role required: admin, limited-admin.

\texttt{adminaccess telnet option reset \{session-timeout\}}

Reset the client session timeout period to the default value, which does not time out sessions. Role required: admin, limited-admin.

\texttt{adminaccess telnet option set session-timeout timeout-in-secs}

Set the client session timeout period to the specified number of seconds. If no data is received from a Telnet client within the timeout period, and if the client does not respond to a subsequent prompt message, the session terminates. The valid range is from 60 to 31536000 (365 days).

To configure the protection system to prevent sessions from timing out, use the \texttt{adminaccess telnet option reset} command. Role required: admin, limited-admin.

\textbf{Example 10}

To set the SSH session timeout period to 10 minutes:

\begin{verbatim}
# adminaccess telnet option set session-timeout 600
\end{verbatim}

\texttt{adminaccess telnet option show}

Display the Telnet configuration. Role required: admin, limited-admin.

\textbf{adminaccess trust}

\texttt{adminaccess trust add host hostname \{type mutual\}}

Establishes the (mutual) trust with the specified host. Role required: admin, limited-admin.

\texttt{adminaccess trust copy \{source \mid destination\} hostname}

Copy all trust to or from the specified host. Role required: admin, limited-admin.

\texttt{adminaccess trust del host hostname \{type mutual\}}

Remove the mutual trust from the specified host. Role required: admin, limited-admin.

\texttt{adminaccess trust show \{hostname\}}

Show the list of trusted Certificate Authorities (CAs). Role required: admin, limited-admin, security, user, backup-operator, or none.

\textbf{Example 11} Establishing mutual trust

Establishing mutual trust between two nodes requires the following steps. The example below uses the nodes dd-system-1 and dd-system-2.

1. On dd-system-1, run the \texttt{adminaccess certificate show} command to display the pre-created trusted CA certification.
2. On dd-system-1, run the \texttt{adminaccess trust add host <dd-system-2-hostname>} \texttt{type mutual} command to create trust with the specified host.
3. On dd-system-1, run the \texttt{adminaccess trust show hostname} command to verify the mutual trust relationship is created between the two nodes.
4. On dd-system-2, run the \texttt{adminaccess trust show hostname} command to verify the mutual trust relationship is created between the two nodes.
adminaccess web

adminaccess web option reset [http-port | https-port | session timeout]
Reset the Web options to default values. Role required: admin, limited-admin.

adminaccess web option set http-port port-number
Set the HTTP access port for the Web client. Default is port 80. Role required: admin, limited-admin.

adminaccess web option set https-port port-number
Set the HTTPS access port for the Web client. Default is port 443. Role required: admin, limited-admin.

adminaccess web option set session-timeout timeout-in-secs
Set the Web client session timeout. Range is 300 to 31536000 seconds; the default is 10800 seconds. Role required: admin, limited-admin.

adminaccess web option show
Show the current values for Web options. Role required: admin, limited-admin.
adminaccess
The `alerts` command manages current alerts, alert notification groups, and alerts history. When a user logs in, a message is shown indicating the presence of alerts and instructions on how to proceed.

Command options enable sending email to a designated recipient or notification group when an event occurs within the Data Domain system. Depending on the option, information includes alert type, date posted, and resulting action. More than three months of alert history is retained.

The default alert notification group (“default”) is configured to send alerts for any event class with severity level of Warning or above. Email notifications are sent to Data Domain Support at autosupport-alert@autosupport.datadomain.com. The default alert notification group can only be reset to default values: it cannot be destroyed.

Some event types, such as those in the environment class that pertain to temperature sensors within the chassis, are detected repeatedly if the underlying condition is not corrected.

This chapter contains the following topics:

- `alerts change history` ................................................................. 42
- `alerts clear` .................................................................................. 42
- `alerts notify-list` ........................................................................ 42
- `alerts show` ................................................................................ 44
- `alerts test events` ....................................................................... 46
alerts change history

There have been no changes to this command in this release.

alerts clear

```bash
alerts clear alert-id alert-id-list
```
Clear an active alert or list of alerts. Role required: admin, limited-admin.

**Argument Definitions**

`alert-id-list`
- List of alert identification numbers. To display the alert ID numbers, enter `alerts show all`.

alerts notify-list

```bash
alerts notify-list add group-name {[class class-list [severity severity]] [emails email-addr-list]}
```
Modify a notification group by adding an event class, severity level, or recipient email address. The system does not accept any DD OS reserved email IDs. Role required: admin, limited-admin, tenant-admin.

**Argument Definitions**

`class class-list`
- List of event classes: cifs, cloud, cluster, environment, filesystem, firmware, ha, hardwareFailure, network, replication, security, storage, syslog, and systemMaintenance.

`emails email-addr-list`
- Email addresses of members in an alert notification group.

`group-name`
- Name of alert notification group.

`severity severity`
- Severity level of event class. The severity levels in decreasing order of severity are: emergency, alert, critical, error, warning, notice, info, and debug. Default is warning.

**Example 12**

```bash
# alerts notify-list add eng_lab emails mlee@urcompany.com,
bob@urcompany.com
```

```bash
alerts notify-list create group-name {class class-list [severity severity] | tenant-unit tenant-unit | tenant <tenant> }
```
Subscribe to a notification list, add a class and a severity level to an existing list, or add members to a notification group on a protection system or tenant unit. Role required: admin, limited-admin.
Argument Definitions

class class-list
   List of event classes: cifs, cloud, cluster, environment, filesystem, firmware, ha, hardwareFailure, network, replication, security, storage, syslog, and systemMaintenance.

emails email-addr-list
   Email addresses of members in an alert notification group.

group-name
   Name of alert notification group.

severity severity
   Severity level of event class. The severity levels in decreasing order of severity are: emergency, alert, critical, error, warning, notice, info, and debug. Default is warning.

Example 13

# alerts notify-list create eng_grp class hardwareFailure

alerts notify-list del group-name { [class class-list] [emails email-addr-list]}
Modify an alert notification group by deleting event classes, email recipients, or both. The system does not accept any DD OS reserved email IDs for deletion.

Security officer authorization is required only if the group-name severity level is set to Warning or above and the command is run on a Retention Lock Compliance system. See the DD OS Administration Guide for details on alerts. Role required: admin, limited-admin, tenant-admin.

Argument Definitions

class class-list
   List of event classes: cifs, cloud, cluster, environment, filesystem, firmware, ha, hardwareFailure, network, replication, security, storage, syslog, and systemMaintenance.

emails email-addr-list
   Email addresses of members in an alert notification group.

group-name
   Name of alert notification group.

Example 14

# alerts notify-list del eng_grp class hardwareFailure

alerts notify-list destroy group-name
Delete an alert notification group. Note that the default alert notification group cannot be destroyed.

Security officer authorization is required only if the group-name severity level is set to Warning or above and the command is run on a Retention Lock Compliance system. See the DD OS Administration Guide for details on alerts. Role required: admin, limited-admin.
Argument Definitions

**group-name**
Name of alert notification group.

alerts notify-list reset
Remove all user-created alert notification groups and restore the default notification group email list to factory defaults.


alerts notify-list show [group group-name | email email-addr] | tenant-unit tenant-unit | tenant <tenant>
Display the configuration of all notification lists, or display the lists associated with the specified group, email list, or tenant unit. The system does not accept any DD OS reserved email IDs. Role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

Argument Definitions

**emails email-addr-list**
Email addresses of members in an alert notification group.

**group-name**
Name of alert notification group.

**tenant unit**
The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a Data Domain system. See the *Data Domain Operating System Administration Guide* for more information on SMT.

Example 15

# alerts notify-list show eng_lab mlee@yourcompany.com

alerts notify-list test {group group-name | email email-addr}
Send a test notification to an alert notification group or email address. Role required: admin, limited-admin, tenant-admin, security, user, backup-operator, or none.

Argument Definitions

**emails email-addr-list**
Email addresses of members in an alert notification group.

**group-name**
Name of alert notification group.

Example 16

# alerts notify-list test jsmith@yourcompany.com

alerts show
alerts show all [local]
display details on all alert notification groups. the `local` argument only applies to cluster configurations, which are not supported in this release. the `local` argument will be removed in a future release. role required: admin, limited-admin, security, user, backup-operator, or none.

```
alerts show current [local] [tenant-unit tenant-unit]
```

display a list of currently active alerts on a Data Domain system or tenant unit. the `local` argument only applies to cluster configurations, which are not supported in this release. the `local` argument will be removed in a future release. role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

**Argument Definitions**

`tenant unit`

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a Data Domain system. See the *Data Domain Operating System Administration Guide* for more information on SMT.

```
alerts show current-detailed [local] [alert-id alert-id-list ] [ tenant-unit tenant-unit]
```

display detailed information about currently active alerts on a Data Domain system or tenant unit. role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

**Argument Definitions**

`alert-id-list`

List of alert identification numbers. To display the alert ID numbers, enter `alerts show all`.

`local`

The `local` argument only applies to cluster configurations, which are not supported in this release. The `local` argument will be removed in a future release.

`tenant unit`

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a Data Domain system. See the *Data Domain Operating System Administration Guide* for more information on SMT.

```
alerts show daily [local]
```

display daily alert report, including current alerts and 24-hour alert history. the `local` argument only applies to cluster configurations, which are not supported in this release. the `local` argument will be removed in a future release. role required: admin, limited-admin, security, user, backup-operator, or none.

```
alerts show history [local] [tenant-unit tenant-unit] [last n {hours | days | weeks | months}] [start MMDDhhmm [[CC]YY] end MMDDhhmm [[CC]YY]
```

display alert history on a Data Domain system or tenant unit. default duration spans the last three months. role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

**Argument Definitions**

`alert-id-list`

List of alert identification numbers. To display the alert ID numbers, enter `alerts show all`.
**CC**

Use with `start` or `end` arguments to `show` option. Specify first two digits of year. Default is 20.

**end MMDDhhmm**

Use with `show` option to display alerts for specific interval.

The argument `MMDD` indicates month and day of end date.

The argument `hhmm` indicates hours and minutes of end time (24-hour format). To specify midnight between Sunday night and Monday morning, use `mon 0000`. To specify noon on Monday, use `mon 1200`.

**last n {hours | days | weeks | months}**

Use with `show` option to display alerts for most recent number of `n` (`hours, days, weeks, months`).

**local**

The `local` argument only applies to cluster configurations, which are not supported in this release. The `local` argument will be removed in a future release.

**start MMDDhhmm**

Use with `show` option to display alerts for specific interval.

The argument `MMDD` indicates month and day of start date.

The argument `hhmm` indicates hours and minutes of `start` time (24-hour format). To specify midnight between Sunday night and Monday morning, use `mon 0000`. To specify noon on Monday, use `mon 1200`.

**tenant unit**

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a Data Domain system. See the *Data Domain Operating System Administration Guide* for more information on SMT.

**YY**

Use with `start` or `end` arguments to `show` option. Specify last two digits of year.

alerts show history-detailed [local] [tenant-unit tenant-unit] [last n {hours | days | weeks | months}] [start MMDDhhmm [[CC]YY] end MMDDhhmm [[CC]YY]]

Display detailed information about historic alerts on a Data Domain system or tenant unit. Default duration spans the last three months. The argument descriptions are the same as for `alerts show history`. Role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

### alerts test events

`alerts test events event-id-list [prompt-for-input]`

Generate a test alert on the Data Domain system. The `prompt-for-input` prompts for user input as the command runs. This option requires interactive mode. Role required: admin, limited-admin.
Argument Definitions

*event-id-list*

List of event identification numbers, for example: EVT-STORAGE-00007.
alerts
CHAPTER 3

alias

The **alias** command creates, deletes, and displays command aliases for the Data Domain system command set. Users can manage aliases for only those commands permitted for the user's access role.

This chapter contains the following topics:

- alias change history...............................................................................................................50
- alias add................................................................................................................................ 50
- alias del.................................................................................................................................. 51
- alias reset...............................................................................................................................51
- alias show.............................................................................................................................. 51
alias change history

There have been no changes to this command in this release.

alias add

```
alias add alias-name "command"
```

Add a command alias. Enter the alias name and command, and enclose the command name in quotation marks. The new alias is available only to the user who created it. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Default Command Aliases**

The following command aliases are included with the system and available to all users.

```
date
  system show date

df
  filesys show space

hostname
  net show hostname

ifconfig
  net config

iostat
  system show stats

netstat
  net show stats

nfsstat
  nfs show stats

passwd
  user change password

ping
  net ping

poweroff
  system poweroff

reboot
  system reboot

sysstat
  system show stats

traceroute
  route trace
```
### alias del

**alias del alias-name**
Delete an alias by name. Role required: admin, limited-admin, security, user, backup-operator, or none.

### alias reset

**alias reset**
Remove user-created aliases and restore defaults. Role required: admin, limited-admin, security, user, backup-operator, or none.

### alias show

**alias show**
Display all aliases and command definitions. Role required: admin, limited-admin, security, user, backup-operator, or none.
alias
CHAPTER 4

authentication

The *authentication* command manages NIS users, domains, groups and servers. Command options enable the protection system to participate in an active Network Information Service (NIS) domain, which maintains a centralized repository of users, groups, and server names. NIS adds a global directory that authenticates users from any host on the network.

This chapter contains the following topics:

- **authentication change history**................................................................. 54
- **authentication dpc-sso**........................................................................... 54
- **authentication kerberos**........................................................................ 55
- **authentication ldap**................................................................................ 56
- **authentication nis**.................................................................................. 59
authentication change history

There have been no changes to this command in this release.

authentication dpc-sso

authentication dpc-sso disable
Disable Single Sign-On with DPC. Role required: admin, limited admin.

# authentication dpc-sso disable
DPC SSO is disabled.

authentication dpc-sso enable
Enable SSO with DPC. The system displays a warning if SSO is enabled while the protection system is not registered with a DPC server. Role required: admin, limited admin.

# authentication dpc-sso enable
DPC SSO is enabled.

authentication dpc-sso groups add group-list [domain domain-name] role {user | admin | backup-operator | limited-admin}
Create a Data Protection Central (DPC) user group on the protection system and specify a role for users in the group. Role required: admin, limited-admin.

# authentication dpc-sso groups add grp1i domain abc.com role admin
If a group was already added, adding again will override the existing association.
Do you want to continue? (yes|no) [yes]:
DPC group(s) "grp1i" associated to role "admin".

authentication dpc-sso groups del group-list [domain domain-name]
Remove DPC user groups from the specified domain. Role required: admin, limited-admin.

# authentication dpc-sso groups del grp1i domain abc.com
DPC group(s) "grp1i" unassociated from role "admin".

authentication dpc-sso groups reset
Remove all DPC user groups from the protection system. Role required: admin, limited-admin.

# authentication dpc-sso groups reset
Removed all DPC groups to role associations on the system.

authentication dpc-sso groups show [domain domain-name] [role {user | admin | backup-operator | limited-admin}]
Display the roles associated with the DPC user groups configured on the protection system. Role required: admin, limited-admin, security, user.

# authentication dpc-sso groups show
DPC Group   Domain    Role
---------   -------   -----  
grp1i       abc.com   admin  
mygrp       abc.com   user  
---------   -------   -----  

**authentication dpc-sso status**
Display the DPC SSO server status. Role required: admin, limited-admin, security, user.

**authentication kerberos**

**authentication kerberos keytab import**
Imports the krb5.keytab file from /ddvar to /ddr/etc. If the file is not present in /ddvar, then the command returns an error. Role required: admin, limited-admin.

**authentication kerberos reset**
Resets the realm, KDC, and so on, to default configuration. Unjoins a DDR from the domain and unjoins a DDR from a Linux KDC and a Windows KDC. Role required: admin, limited-admin.

*Note:* To make a DDR part of Windows AD, first unjoin the DDR from the Linux KDC using this command.

**authentication kerberos set realm**

*home-realm*  
The Kerberos realm.

*kdc-type*  
Key Distribution Center type - Windows or UNIX.

*kdc-list*  
List of KDCs.

**authentication kerberos show config**
Displays Kerberos configuration. Role required: admin, limited-admin.

**Example 17**

```
authentication kerberos show config

| Home Realm: | abc.com |
| KDC List:    | 10.10.10.10 10.10.10.11 |
| KDC Type:    | windows |
```

**Output definitions**

*Home Realm*  
The Kerberos Realm.

*KDC List*  
List of KDCs.

*KDC Type*  
Key Distribution Center type - Windows or UNIX.
**authentication ldap**

authentication ldap base reset
Reset the LDAP base suffix. Role required: admin, limited-admin.

```
# authentication ldap base reset
LDAP base-suffix reset to empty.
```

authentication ldap base set basename
Set the LDAP base suffix. Role required: admin, limited-admin.

```
# authentication ldap base set "dc=anvil,dc=team"
LDAP base-suffix set to "dc=anvil,dc=team".
```

authentication ldap client-auth reset
Reset the LDAP client authentication configuration. Role required: admin, limited-admin.

```
# authentication ldap client-auth reset
LDAP client authentication configuration reset to empty.
```

authentication ldap client-auth set binddn dn-name
Set the account name to authenticate with the LDAP server. Role required: admin, limited-admin.

```
# authentication ldap client-auth set binddn "cn=Manager,dc=u2,dc=team"
Enter bindpw:
LDAP client authentication binddn set to "cn=Manager,dc=u2,dc=team".
```

**Note:** If the **bindpw** is not specified, the system requests unauthenticated access.

**Argument Definitions**

**binddn**
Account name to use to authenticate with the LDAP server.

authentication ldap disable
Disable LDAP authentication. Role required: admin, limited-admin.

authentication ldap enable
Enable LDAP authentication. A file system restart is required the first time LDAP is enabled for
NFS authentication. Enabling LDAP for user authentication on the protection system does not
require a file system restart. LDAP and NIS cannot be enabled at the same time. Role required:
admin, limited-admin.

authentication ldap groups add group-list role {user | admin | limited-admin | backup-operator}
Associates the specified LDAP groups with a user role on the protection system. Role required:
admin, limited-admin.

**Add a group**

```
# authentication ldap groups add ldapuser7 role admin
LDAP Group  Role
-----------  --------
```


Add a second group

```
# authentication ldap groups add ldapuser6 role user
LDAP Group    Role
----------    -------------
Ldapuser6    user

authentication ldap groups del group-list role {user | admin | limited-admin | backup-operator}
Deletes the LDAP users in the group. Role required: admin, limited-admin.
```

```
# authentication ldap groups del ldapuser7 role admin
LDAP Group    Role
----------    -------------
ldapuser6    user

authentication ldap groups reset
Deletes all the LDAP groups that were added. Role required: admin, limited-admin.
```

```
authentication ldap groups show [role {user | admin | limited-admin | backup-operator}]
Shows the list of LDAP groups with a specific role. Role required: admin, limited-admin.
```

```
# authentication ldap groups show
LDAP Group    Role
----------    -------------
ldapuser6    user
ldapuser7    admin

No existing groups
```

```
# authentication ldap groups show
There are no configured LDAP Groups.
```

```
authentication ldap reset
Delete the LDAP configuration and set it to the default. Role required: admin, limited-admin.
```

```
authentication ldap servers add server-list
Add LDAP servers to the server-list. Role required: admin, limited-admin.

| Note: | If you add an invalid server name and enable LDAP authentication, the system will continue to use the first valid server in the list, based on the set domain. |
```

```
LDAP server(s) added
LDAP Server(s): 2
# IP Address/Hostname
--- ---------------
1. 10.26.16.250 (primary)
2. 10.26.16.251:400
```

```
authentication ldap servers del server-list
```

Delete LDAP servers from the *server-list*. Role required: admin, limited-admin.

```shell
# authentication ldap servers del 10.26.16.251:400
LDAP server(s) deleted.
LDAP Servers: 1
# Server
- ------------ ---------
1 10.26.16.250 (primary)
```

```
authentication ldap servers reset
Reset the LDAP server configuration to an empty server list. Role required: admin, limited-admin.

# authentication ldap servers reset
LDAP server list reset to empty.
```

```
authentication ldap show
Display the LDAP configuration. Role required: admin, limited-admin, security, user, backup-operator, or none.

# authentication ldap show
LDAP configuration
 Enabled:         yes (*)
 Base-suffix:     dc=u2,dc=team
 Binddn:          (anonymous)
 Server(s):       1
# Server
- ------------ ---------
1 10.207.86.160 (primary)
```

Secure LDAP configuration
 - SSL Enabled:     no
 - SSL Method:      off
 - tls_reqcert:     demand

(*) Requires a filesystem restart for the configuration to take effect.

```
authentication ldap ssl disable
Disable SSL for LDAP. Role required: admin, limited-admin.

# authentication ldap ssl disable
Secure LDAP is disabled.
```

```
authentication ldap ssl enable [method {ldaps | start_tls}]
Enable SSL for LDAP, and set the SSL method as ldaps or start_tls. The default is ldaps. Role required: admin, limited-admin.

⚠️ Note: Run the adminaccess certificate import command to import the LDAP CA certificate before enabling LDAP SSL.

# authentication ldap ssl enable
Secure LDAP is enabled with ‘ldaps’ method.
```

```
authentication ldap ssl reset tls_reqcert
Reset the tls_reqcert option to the default value of demand. Role required: admin, limited-admin.
```
## authentication

**authentication ldap ssl reset tls_reqcert**

Note: Resetting tls_reqcert to demand requires importing the LDAP CA certificate before enabling LDAP SSL. Run the adminaccess certificate import command to import the LDAP CA certificate.

```bash
# authentication ldap ssl reset tls_reqcert
tls_reqcert has been set to "demand". LDAP Server certificate will be verified with imported CA certificate. Use "adminaccess" CLI to import the CA certificate.
```

```bash
authentication ldap ssl set tls_reqcert {never | demand}
Specify the checks to perform on the server certificate. The default is demand. Role required: admin, limited-admin.
```

Note: The default value for tls_reqcert is demand, which requires importing the LDAP CA certificate before enabling LDAP SSL. Run the adminaccess certificate import command to import the LDAP CA certificate.

```bash
# authentication ldap ssl set tls_reqcert never
"tls_reqcert" set to "never". LDAP server certificate will not be verified.
```

```bash
authentication ldap status
Display the LDAP status. Role required: admin, limited-admin, security, user, backup-operator, or none.
```

```bash
# authentication ldap status
Status: good (enabled)
```

## authentication nis

**authentication nis disable**
Disable the NIS client. Role required: admin, limited-admin.

**authentication nis domain reset**
Reset the NIS domain name. Role required: admin, limited-admin.

**authentication nis domain set domain [servers server-list]**
Set the NIS domain name and optionally add NIS servers to the server-list by specifying the server hostnames. Role required: admin, limited-admin.

**authentication nis domain show**
Display the configured NIS domain name. Role required: admin, limited-admin, security, user, backup-operator, or none.

**authentication nis enable**
Enable the NIS client. Role required: admin, limited-admin.

**authentication nis groups add group-list role {user | admin | backup-operator | limited-admin}**
Add a role-based access control (RBAC) role for NIS users in the group-list. You cannot add an existing tenant-admin group or tenant-user group to an NIS group. See the **DD OS Administration Guide** for role definitions. Role required: admin, limited-admin.

**Example 18**
Example 18 (continued)

```
# authentication nis groups add "tu1_user group1" role admin
**** "tu1_user group1" is currently an tenant-user group.
```

authentication nis groups del group-list role {user | admin | backup-operator | limited-admin}
Delete a role-based access control (RBAC) role for NIS users in the group-list. See the DD OS Administration Guide for role definitions. Role required: admin, limited-admin.

authentication nis groups reset
Delete all added NIS groups. Role required: admin, limited-admin.

authentication nis groups show [role {user | admin | backup-operator | limited-admin}]
Display lists of NIS user groups and NIS admin groups. Role required: admin, limited-admin, security, user, backup-operator, or none.

Example 19

```
# authentication nis groups show
NIS Group   Role
---------   ------------------
group1      user, tenant-admin
group2      user, tenant-user
---------   ------------------
```

authentication nis reset
Delete the NIS configuration and set it to the default. Role required: admin, limited-admin.

authentication nis servers add server-list
Add NIS servers to the server-list. Role required: admin, limited-admin.

Note: If you add an invalid server name and enable NIS authentication, the system will continue to use the last valid NIS server name, based on the set domain.

authentication nis servers del server-list
Delete NIS servers from the server-list. Role required: admin, limited-admin.

authentication nis servers reset
Reset the NIS servers to their default settings. Role required: admin, limited-admin.

authentication nis servers show
Display a list of NIS servers. Role required: admin, limited-admin, security, user, backup-operator, or none.

authentication nis show
Display the NIS configuration. Role required: admin, limited-admin, security, user, backup-operator, or none.

authentication nis status
Display the NIS status. Role required: admin, limited-admin, security, user, backup-operator, or none.
The authorization command, which is available only to security officers, establishes or modifies runtime authorization policy. Command options enable security-based functions such as managing filesystem encryption and enabling or disabling authorization policy.

All authorization tasks are logged automatically. The log file includes a timestamp, the identities of the security officer and administrative user, and the Data Domain system on which the task was performed. This log file serves as the audit trail, or “authorization history,” for each action.

This chapter contains the following topics:

- authorization change history ................................................................. 62
- authorization guidelines and restrictions ............................................. 62
- authorization policy ............................................................................. 62
- authorization show .............................................................................. 62
authorization change history

There have been no changes to this command in this release.

authorization guidelines and restrictions

- Procedures requiring authorization must be dual-authenticated by the security officer and the user in the admin role. For example, to set encryption, the admin enables the feature and the security officer enables runtime authorization.

authorization policy

authorization policy reset security-officer
Reset runtime authorization policy to defaults. Resetting authorization policy is not allowed on Retention Lock Compliance systems. Role required: security.

authorization policy set security-officer {enabled | disabled}
Enable or disable runtime authorization policy. Disabling authorization policy is not allowed on Retention Lock Compliance systems. Role required: security.

Example 20

# authorization policy set security-officer enabled

authorization policy show
Show the current authorization policy configuration. Role required: security.

authorization show

authorization show history [last n { hours | days | weeks }]
View or audit past authorizations according to the interval specified. Role required: security.
The `autosupport` command manages system reports. Command options enable administrative users to manage two reports that describe the state of a Data Domain system: the `autosupport` report and the daily alert summary. By default, both reports are emailed to the Support address only, but users with admin role permissions may configure additional addresses and designate a subject tag keyword to bypass filtering that may block email delivery. For details on configuring `autosupport` notifications, see the *Data Domain Initial Configuration Guide*.

This chapter contains the following topics:

- `autosupport change history` ................................................................. 64
- `autosupport guidelines and restrictions` ........................................... 64
- `autosupport add` .............................................................................. 64
- `autosupport del` .............................................................................. 64
- `autosupport reset` ............................................................................ 64
- `autosupport send` ............................................................................ 65
- `autosupport set` ............................................................................... 65
- `autosupport show` ............................................................................ 66
- `autosupport test` .............................................................................. 67
**autosupport change history**

There have been no changes to this command in this release.

**autosupport guidelines and restrictions**

- Use the up and down arrow keys to move through the log. Use the q key to exit. Enter a forward slash and a pattern to search for dates.

**autosupport add**

`autosupport add {alert-summary | asup-detailed} emails email-list`

Add entries to the email list for the daily alert summary or the autosupport report. The system does not accept DD OS reserved email IDs. Role required: admin, limited-admin.

**Example 21**

```
# autosupport add asup-detailed emails djones@company.com
```

**Argument Definitions**

- **alert-summary**
  - Adds the specified emails to the list for daily alert distribution.

- **asup-detailed**
  - Adds the specified emails to the list for daily autosupport report distribution.

- **email-list**
  - Specifies the emails to be added to the specified list. Separate the list items with commas, spaces, or both.

**autosupport del**

`autosupport del {alert-summary | asup-detailed} emails email-list`

Delete entries from the email list for the daily alert summary or the autosupport report. The system does not delete DD OS reserved email IDs. Role required: admin, limited-admin.

**Argument Definitions**

- **alert-summary**
  - Deletes the specified emails from the list for daily alert distribution.

- **asup-detailed**
  - Deletes the specified emails from the list for daily autosupport report distribution.

- **email-list**
  - Specifies the emails to be deleted from the specified list. Separate the list items with commas, spaces, or both.
autosupport reset

autosupport reset {alert-summary | asup-detailed}
Reset asup-detailed email list or alert-summary email list to the default value. Role required: admin, limited-admin.

autosupport reset all
Reset all autosupport command options to the default values. Output includes details on where autosupport reports and alert summaries are sent and the related schedules. Role required: admin, limited-admin.

autosupport reset schedule {alert-summary | asup-detailed}
Reset the schedules of the daily alert summary and the autosupport report to the default values.

- By default, the schedule for the daily alert summary is configured with the daily and 0600 options.
- By default, the schedule for the autosupport report is configured with the daily and 0800 options.

Role required: admin, limited-admin.

autosupport reset subject-tag
Clear the configured subject tag for the autosupport report and daily alert summary. Role required: admin, limited-admin.

autosupport send

autosupport send [email-addr] [cmd "cmd"]
Email an autosupport report or execute a command and send the output to the autosupport report email list or to the address specified. Role required: admin, limited-admin, security, user, backup-operator, or none.

Example 22

To run the net show stats command and email the results to djones@yourcompany.com:

```bash
# autosupport send djones@yourcompany.com cmd "net show stats"
```

Argument Definitions

“cmd”
Run the specified DD OS command. Enclose the command in double quotation marks.

email-addr
Enter the email address to which you want to send the report.

autosupport set

autosupport set schedule {alert-summary | asup-detailed} {{[daily | day(s)] time} | never}
Schedule the daily alert summary or the autosupport report. For either report, the most recently configured schedule overrides the previously configured schedule. Role required: admin, limited-admin.
Argument Definitions

alert-summary
   Specifies that the schedule defined in the command is for the alert summary.

asup-detailed
   Specifies that the schedule defined in the command is for the detailed autosupport report.

daily
   Specifies that the selected report is sent daily.

day(s)
   Specifies the days on which the report is sent. Valid entries are Mon, Tue, Wed, Thu, Fri, Sat, and Sun. Enter multiple days as needed and separate the days with spaces or commas.

time
   Specifies the scheduled time in the HHMM format.

Example 23

To schedule the daily alert summary for 2 p.m. Monday and Friday:

```
# autosupport set schedule alert-summary mon,fri 1400
```

Example 24

To schedule the autosupport report for Tuesday at 4 a.m:

```
# autosupport set schedule asup-detailed tue 0400
```

Example 25

To schedule the autosupport report for Tuesday at 3 p.m.:

```
# autosupport set schedule asup-detailed tue 1500
```

autosupport set subject-tag tag
Specify the text that is inserted in the subject line of autosupport report and daily alert summary emails. This allows the recipients to filter the emails based on subject. Maximum number of characters is 64. Role required: admin, limited-admin.

autosupport show

autosupport show {all | alert-summary | asup-detailed}
Displays the entire autosupport configuration when the all is specified. The alert-summary option lists the emails that receive the alert summaries, and the asup-detailed option lists the emails that receive detailed autosupport reports. Role required: admin, limited-admin, security, user, backup-operator, or none.

Example 26

```
# autosupport show all
The Admin email is:
Detailed autosupport and alert summary to <protection system>
```
Example 26  (continued)

Currently enabled.
Detailed autosupport is scheduled to run "daily" at "0600".
Detailed autosupport is sent to:
  myemail1@abc.com
  myemail2@abc.com
  autosupport@autosupport.<protection system>.com

Alert summary is scheduled to run "daily" at "0800".
Alert summary is sent to:
  myemail1@abc.com
  myemail2@abc.com
  autosupport@autosupport.<protection system>.com

autosupport show history
Display the event history file, which includes the date for each autosupport report. Message
system logs are retained for 10 weeks. Role required: admin, limited-admin, security, user, backup-
operator, or none.

autosupport show report
Generate an autosupport report without sending the results to the autosupport report email list.
Role required: admin, limited-admin, security, user, backup-operator, or none.

autosupport show schedule [alert-summary | asup-detailed]
Displays the email schedule for either the alert summary or the detailed autosupport report. Role
required: admin, limited-admin, security, user, backup-operator, or none.

autosupport show subject-tag
Show the configured subject-tag that is inserted in the subject of autosupport report and daily
alert summary emails. Role required: admin, limited-admin, security, user, backup-operator, or
none.

autosupport test
autosupport test {alert-summary | asup-detailed | support-notify} | email email-addr
Send a test email to the email addresses in the specified list or to a specific email address. Role
required: admin, limited-admin, security, user, backup-operator, or none.

Argument Definitions

alert-summary
  Specifies the alert summary email list, which is created with the autosupport add alert-
  summary command.

asup-detailed
  Specifies the detailed autosupport email list, which is created with the autosupport add
  asup-detailed command.

e-mail-addr
  Specifies an email address to which the test email is sent.

support-notify
  Specifies the support notify email list, which is created with the alerts notify-list add
  command.
The `boostfs` command enables you to perform operations using the BoostFS software option. BoostFS provides a virtual file system that enables you to increase the number of backup applications that integrate with Data Domain and PowerProtect systems. It can also help improve backup time, load balancing, and in-flight encryption. These capabilities enable BoostFS to reduce bandwidth usage.

The `boostfs lockbox set` command enables you to store user credentials in RSA Lockbox. The `boostfs lockbox` includes arguments that let you specify the hostname of the Data Domain system, the storage-unit name, and the storage-unit user.

The `boostfs mount` command enables you to mount storage units on a Data Domain or PowerProtect system as a file system and access files from the mounted file system. This command also enables you to add and manage credentials for access.

- `boostfs change history` ........................................................................................................ 70
- `boostfs mount` ..................................................................................................................... 70
- `boostfs lockbox` .................................................................................................................. 70
- `boostfs kerberos` .................................................................................................................. 71
boostfs change history

There have been no changes to this command in this release.

boostfs mount

The `boostfs mount` command allows you to establish the BoostFS FUSE mount.

```
boostfs mount [-d|--data-domain-system] <data-domain-system>
[-s|--storage-unit] <storage-unit>
[-o|--option <param>=<value>] ... <mount-point>
```

Mount the BoostFS file system. Role required: none.

```
boostfs umount <mount-point>
```

Unmount the BoostFS file system. Role required: none.

**Argument Definitions**

- **mount-point**
  - The mount-point for the BoostFS system.

- **storage-unit**
  - The target storage-unit on the protection system.

boostfs lockbox

The `boostfs lockbox` command allows you to set the RSA lockbox values.

```
boostfs lockbox add-hosts hostname [hostname]
```

Adds clients that can access the shared lockbox. When you are adding and removing access to the shared lockbox, you must do so from the machine where the lockbox was initially created. Role required: admin.

```
boostfs lockbox delete-hosts all
```

Deletes all client access to the shared lockbox. Role required: admin.

```
boostfs lockbox delete-hosts hostname [hostname]
```

Deletes specific client access to the shared lockbox. Role required: admin.

```
boostfs lockbox {remove | query} [-d | --data-domain-system] <data-domain-system>
[-s | --storage-unit] <storage-unit-name>
```

If the credentials have been stored in an RSA lockbox, this command returns the username after the query is submitted with the specified protection system hostname and storage-unit. Role required: admin.

```
boostfs lockbox set [-d | --data-domain-system] <data-domain-system>
[-u | --storage-unit-username] <storage-unit-username>
[-s | --storage-unit] <storage-unit-name>
```

To store credentials in an RSA lockbox, the user specifies the protection system hostname, the storage-unit name, and the storage-unit user. After providing that information, the user is prompted for the password. Role required: admin.

**Note:** The command `boostfs lockbox set` fails if there is an existing Lockbox file in the same location. This includes Lockbox files generated with older versions of BoostFS. For example, the existence of a BoostFS 1.1 Lockbox causes the creation of a Lockbox with BoostFS 1.2 to fail.
boostfs lockbox remove [-d | --data-domain-system] data-domain-system
[-s | --storage-unit] storage-unit-name
Removes the stored RSA lockbox credentials in the specified protection system and storage-unit.
Role required: admin.

boostfs lockbox show-hosts
Shows all clients that can access the shared lockbox. Role required: admin.

boostfs kerberos

The boostfs kerberos command allows you to add, verify, and remove Kerberos credentials.

boostfs kerberos set [-u <storage-unit-username> | -m <kerberos-username>]
Allows you to add Kerberos credentials. Role required: admin.

boostfs kerberos query [-u <storage-unit-username> | -m ]
Checks for Kerberos credentials. Role required: admin.

boostfs kerberos remove [-u <storage-unit-username> | -m ]
Removes Kerberos credentials. Role required: admin.
CHAPTER 8

The `cifs` command manages CIFS data access between a protection system and Windows clients. Command options enable and disable access to a protection system from media servers and other Windows clients that use the CIFS protocol. The `cifs` command sets the authentication mode, share management, and administrative access, and displays status and statistics for CIFS clients.

This chapter contains the following topics:

- `cifs change history` ................................................................. 74
- `cifs disable` ........................................................................ 74
- `cifs enable` ........................................................................ 74
- `cifs local-group` ................................................................. 74
- `cifs option` .......................................................................... 74
- `cifs reset` ........................................................................... 75
- `cifs restart` .......................................................................... 75
- `cifs set` ............................................................................... 75
- `cifs share` ........................................................................... 76
- `cifs show` ............................................................................ 77
- `cifs status` ........................................................................... 78
- `cifs troubleshooting` ............................................................ 78
cifs change history

There have been no changes to this command in this release.

cifs disable

cifs disable
The CIFS server stops listening on port 445. Role required: admin, limited-admin.

cifs enable

cifs enable
The CIFS server starts listening on port 445. Role required: admin, limited-admin.

cifs local-group

cifs local-group add group-name members member-list
Add a domain user or domain group to the cifs local group using a comma separated list. Role required: admin, limited-admin.

⚠️ Note: Do not use cifs local-group add when an F5 option has already been set using the cifs option set f5 command.

CIFS local-group del group-name members {all | member-list}
Delete a domain user or domain group from the cifs local group using the word all or a comma separated list. Role required: admin, limited-admin.

cifs local-group show list [group-name]
Display brief information about the cifs local group, for example: group name and number of members present in this group. Role required: admin, limited-admin.

cifs local-group show detailed [group-name]
Display detailed information about the cifs local group, for example: group name, group SID (security identifier), and group ID as well as the group member names and their SIDs. Role required: admin, limited-admin.

cifs option

cifs option reset name
Reset a CIFS option to default value. Name field will support group name "dd limited-admin group1" to " dd limited-admin group50." Role required: admin, limited-admin, user.

cifs option reset f5 name
Reset a CIFS option to default value. For use with protection systems using F5 Network's tiered storage solution ARX. Role required: admin, limited-admin.

cifs option set name value
Validates and sets the option name and value only if both are within the supported range. Name field will support group name "dd limited-admin group1" to " dd limited-admin group50." Role required: admin, limited-admin, user.

cifs option set f5 name value
Set a CIFS option. For use with protection systems using F5 Network's tiered storage solution ARX. Role required: admin, limited-admin.
**cifs**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>**cifs option show [current</td>
<td>all]**</td>
</tr>
<tr>
<td><strong>cifs option reset server-signing</strong></td>
<td>Resets server signing to disabled, which is the default. Role required: admin, limited-admin.</td>
</tr>
<tr>
<td>**cifs option set server-signing [enabled</td>
<td>disabled</td>
</tr>
<tr>
<td><strong>cifs reset</strong></td>
<td>Reset the CIFS authentication to the default: workgroup. Role required: admin, limited-admin.</td>
</tr>
<tr>
<td><strong>cifs reset nb-hostname</strong></td>
<td>Reset the NetBIOS hostname to the default: none. Role required: admin, limited-admin.</td>
</tr>
<tr>
<td><strong>cifs reset stats</strong></td>
<td>Reset cifs statistics. Role required: admin, limited-admin.</td>
</tr>
<tr>
<td><strong>cifs restart [force]</strong></td>
<td>Restart all CIFS services. Role required: admin, limited-admin.</td>
</tr>
<tr>
<td>**cifs set authentication active-directory realm { [dc1 [dc2 ...]]</td>
<td>* }**</td>
</tr>
</tbody>
</table>

**Note:** Do not use `cifs option set f5` when a CIFS local group has been set using the `cifs local-group add` command.

**Argument definitions**

- **current**
  - Display only currently set options. Default is current if option not specified.

- **all**
  - Display all options except the undocumented options that are not set by user.

**cifs set authentication active-directory realm { [dc1 [dc2 ...]] | * }**

Set authentication to Active Directory (AD). The realm must be a fully qualified name. Use commas, spaces, or both to separate entries in the domain controller list. Security officer authorization is required for systems with Retention Lock Compliance enabled. Role required: admin, limited-admin.

**Note:** Dell EMC recommends using the asterisk to set all controllers instead of entering them individually.
Argument definitions

realm
The Windows Active Directory realm.

dc1, dc2
Domain Controller 1, Domain Controller 2. You can use the * wildcard character in the string.

When prompted, enter a name for a user account. The type and format of the name depend on if the user is inside or outside the company domain.

- For user “Administrator” inside the company domain, enter the name only: administrator.
- For user “Jane Doe” in a trusted domain, enter the user name and domain: jane.doe@trusteddomain.com. The account in the trusted domain must have permission to join the protection system to your company domain.

The protection system automatically adds a host entry to the DNS server. It is not necessary to create the entry manually.

If you set the NetBIOS hostname using the command cifs set nb-hostname, the entry is created for NetBIOS hostname only, not the system hostname. Otherwise, the system hostname is used.

cifs set authentication workgroup workgroup
Set the authentication mode to workgroup for the specified workgroup name. Role required: admin, limited-admin.

Argument definitions

workgroup
Workgroup name.

cifs set nb-hostname nb-hostname
Set the NetBIOS hostname. Role required: admin, limited-admin.

cifs share

cifs share create share path path {max-connections max connections | clients clients | users users | comment comment}
Create a new share. Role required: admin, limited-admin.

Note: This command accepts the /backup alias for the default (backup) MTree in addition to /data/coll/backup. For paths in all other MTrees, use /data/coll/mtree-name.

Argument Definitions

share
A descriptive name for the share.

path
The path to the target directory.

max-connections
The maximum number of connections to the share allowed at one time.

clients
A comma-separated list of clients allowed to access the share. Specify the clients by hostname or IP address. No spaces or tabs are allowed and the list must be enclosed in double quotes. If the clients argument is not specified when creating the share, the share is not
accessible by any client. To make the share accessible for all clients, enter the clients argument and precede client name by an ampersand.

**users**
A comma-separated list of user names. Other than the comma delimiter, spaces (blank or tab) are treated as part of the user name because a Windows user name can have a space in the name.

The user names list can include group names. Group names must be preceded by the symbol for the word at (@).

All users in the client list can access the share unless one or more user names are specified, in which case only the listed names can access the share. Separate group and user names by commas only. Spaces may be included within a group name but are not allowed as delimiters for group names.

**comment**
A descriptive comment about the share.

cifs share destroy share
Delete a share. Role required: admin, limited-admin.

cifs share disable share
Disable a share. Role required: admin, limited-admin.

cifs share enable share
Enable a share. Role required: admin, limited-admin.

cifs share modify share {max-connections max connections | clients clients | users users | comment comment}
Modify a share configuration with the same configuration options as the cifs share create option, except for its path. You cannot change the path for an existing share. Modifications apply to new connections only. Role required: admin, limited-admin.

See the share create command option for a description of the command variables. To remove a user list for the share, specify users.

cifs share show [share]
Display share configurations for all shares, or for a specified or custom share, as well as shared access control lists. Role required: admin, limited-admin, user, backup-operator, security, none.

cifs show

cifs show active
Display all active CIFS clients. The system displays the computer, the user, opens, connection time, and idle time for each session. The system also displays the user, mode, locks, and file for each open file. A summary of sessions and open files is also displayed. Role required: admin, limited-admin, user, backup-operator, security, none.

cifs show config
Displays the CIFS configuration and whether the DDR is in workgroup mode or active directory mode as well as the maximum open files. Role required: admin, limited-admin, user, backup-operator, security, none.

**Note:** In the command output, "Max open files per connection" displays the maximum number of open files on a protection system, not the number of open files per connection.

cifs show detailed-stats
cifs show stats
Display basic statistics on CIFS activity and performance. Role required: admin, limited-admin, user, backup-operator, security, none.

cifs status

cifs status
Show status of CIFS: enabled or disabled. Role required: admin, limited-admin, user, backup-operator, security, none.

cifs troubleshooting
cifs troubleshooting domaininfo
Report domain information; for example, to check the connectivity between the protection system and the domain. Also to confirm if authentication issues are due to domain connectivity. Role required: admin, limited-admin.
cifs troubleshooting group groupname | gid | SID
List details for a specified group. Role required: admin, limited-admin.
cifs troubleshooting list-groups
List all CIFS groups. Role required: admin, limited-admin.
cifs troubleshooting list-users
List all CIFS users. Role required: admin, limited-admin.
cifs troubleshooting performance
Collect tcpdump and ddfs traces for CIFS performance analysis. Role required: admin, limited-admin.

Example 27
To troubleshoot performance problems:

Enter: cifs troubleshooting performance

Enter: support bundle upload

cifs troubleshooting user username | uid | SID
Display details on a specified user.
The `client-group` command lets you configure and monitor external clients in groups, independent of protocol used.

Client Group monitoring provides stream counting, stream limit checks, and access checks against an allowed MTree list. Client Group displays show read and write stream counters, incoming and outgoing byte counts and network usage, and active stream file activity with duration and image name. Client Group history provides the history of every image written or read as well as historical statistics for each group, collected at a specified interval.

Client Group supports both IP and Fibre Channel transport types.

⚠️ Note: The Client Group feature does not support vDisk clients.

This chapter contains the following topics:

- `client-group change history` ................................................................. 80
- `client-group guidelines and restrictions` .................................................. 80
- `client-group add`.................................................................................. 80
- `client-group compression show` ............................................................. 81
- `client-group create`............................................................................. 81
- `client-group data-access-permit-list` ..................................................... 81
- `client-group del`................................................................................. 82
- `client-group destroy` ......................................................................... 82
- `client-group rename` ......................................................................... 82
- `client-group show`............................................................................... 82
- `client-group stats options` .................................................................. 91
- `client-group stream-limit` .................................................................. 93
client-group change history

There have been no changes to this command in this release.

client-group guidelines and restrictions

- A group of hosts is added to a client group in order to monitor and control the group as an entity. The monitoring captures the read/write bytes and concurrent active streams per group. This monitoring information is periodically written to clients_stats.log.
- The control takes the form of stream limit checks and permission validation against the allowed MTree (storage-unit).
- For NFS streams, near-line access is assumed when write or read requests are sent with block sizes of less than 4K bytes.
- When Client Group is used with BoostFS with Kerberos authentication, the hostname field in output screens and log files shows the client’s IP address, not the hostname.

client-group add

client-group add group-name host host-list
Add a host or a list of hosts to a client group. A client group must have been created before you can add a host to a client group. To create a client group, use the client-group create command.

**Note:** Host names must be entered using all lowercase characters. Using uppercase characters results in the client being put in the "unassigned" group.

**Note:** For VTL, the host name is the VTL pool name.

Hosts do not move between groups while they have active streams. A host can only be in one group at any given time, so a host finds its group on its first stream activity. Once a host starts a read/write operation, it remains in the group it started on, independent of any add commands. The add for host only takes effect when the read/write starts. If additional streams are active concurrently, they will all belong to the same group. When you move a host to another group, the host must not be active with any streams, or it will not start in the next group.

The search priority for the host-list in identifying a group-name is:

1. IP address of the client. The IP address is entered as a range—for example, host 10.30.2.28/32
   - For IPv4, you can select five different range masks, based on network.
   - For IPv6, fixed masks /64 /112 and /128 are available.
2. Hostname. The hostname must match the client-sent name in protocol communication. This can be verified with ddboost show connections for DD Boost or nfs show active for NFS.
3. Partial FQDN.

The first match is used.

The "unassigned" group, which is the default group for all clients not added to a specific group, does not allow host-list (that is, the command checks and does not allow specification of host-list).
client-group compression show

client-group compression show accumulated [group-name] [view {both | log-interval | reset-interval}]
View accumulated compression statistics and deduplication ratio for groups of clients to detect and isolate poor deduplication.

client-group compression show accumulated-history {all | group-name} view {log-interval | performance-interval | reset-interval} [end MMDDhhmm[[CC]YY]] [last n {mins | hours | days}] [count n] [display-unit {Bytes | KiB | MiB | GiB}]
View historical group compression statistics for groups of clients over multiple log or reset intervals to detect and isolate poor deduplication.

The value for count must be less than or equal to 100.

client-group compression show detail-history {all | group-name} [host hostname] [mtree mtree-name] [min-size bytes] [end MMDDhhmm[[CC]YY]] [last n {min | hours | days}] [count n]
View detailed history per file, including compression statistics and deduplication ratio for specific groups of clients.

The value for min-size must be less than 1073741823.

The value for count must be less than or equal to 100.

The performance-interval option is only supported when a single client-group name is specified.

client-group create

client-group create group-name
Create a client group.

You can create a maximum of 64 groups; the "unassigned" group is created automatically. Clients are mapped to the "unassigned" group until configured for another group. The group-name cannot exceed 24 alphanumeric characters; the hyphen (-) and underscore (_) characters are also allowed. The group-name cannot be any of the following: all, no, none, limit, group, client, view.

client-group data-access-permit-list

client-group data-access-permit-list add group-name mtree mtree-name-list
Add a list of MTrees (/data/coll/mtree-name OR mtree-name) or storage units that should be validated at the start of a read/write operation. Each client group must check against the allowed MTree list. No checking is done when there is no configured MTree or storage unit. If the access check against any specified MTrees or storage unit fails, a permission error is returned. The application then deletes the empty file created by the failed read/write operation and lets you correct the MTree used in the policy.

If a group does not have any data-access-permit settings, permission checks will not be performed. The check is only performed one time at the start of a read or write stream operation.

The command accepts a list of MTree names or a single MTree name.
When a storage-unit is deleted or renamed, the client-group MTree is removed or renamed accordingly.
The MTree is not exclusive to a client-group--the same MTree or storage-unit can be specified for multiple client-groups.

The command allows both the full `mtree /data/coll/mtree-name` and the short version `mtree-name`, but all displays show only the short version `mtree-name`.

**Note:** This command is not supported for VTL.

### client-group del

**client-group del group-name host host-list**
Delete a host from a client group.

**Note:** For VTL, the host name is the VTL pool name.

You can delete a host-list from a client group at any time, but the change does not take effect until the all active read/write jobs complete on the group-name started.

When a stream starts, using the priority search order described in client group add, the host finds its client-group. A host will not check its client-group association until all its current streams complete and it starts a new read or write stream.

### client-group destroy

**client-group destroy group-name**
Destroy an empty client group.

Remove all configured hosts from the client group before issuing the destroy command. The group must not have active client streams. The "unassigned" group cannot be destroyed.

When a client-group is destroyed, all statistics information for this client-group is cleared, except for the information in the clients_stats.log file.

### client-group rename

**client-group rename group-name new-group-name**
Rename a client group.

You can rename a client group at any time. The `group-name` cannot exceed 24 alphanumeric characters; the hyphen (-) and underscore (_) characters are also allowed. The group-name cannot be any of the following: all, no, none, limit, group, client, view.

The client-group name is also used by both log files, clients_history.log and clients_stats.log. The new name will be used as new log entries are written.

### client-group show

**client-group show config [ group-name ] [view {summary | hosts | stream-limit | mtree}]**
Show configuration of all client groups, a particular group or selected configuration.

**summary**
- View summary is part of ASUP
- Shows Boost, NFS, CIFS, and/or VTL start time as applicable
- Shows all the statistics options settings
- Shows the stream limits, number of hosts, and Mtree configured

hosts
- List of every host and its associated group
- Can list only hosts for a particular group
- Host configured may be subnet or a domain

stream-limit

mtree
- List of every group MTree or storage-unit
- Select a specific group for MTree or storage-unit

The first protocol read or write of a stream will set the protocol started time. This time is refreshed when the file-system restarts such as on an upgrade or reboot process.

| Note: ASUPs will have the output of client-group show config view summary, which includes the protocol started time. |

Example 28

```
# client-group show config

<table>
<thead>
<tr>
<th>Group-name</th>
<th>Client</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stream</td>
<td>Stream</td>
</tr>
<tr>
<td></td>
<td>Limit</td>
<td>Limit</td>
</tr>
<tr>
<td>unassigned</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>group2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>group3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group-name</th>
<th>Host-name</th>
</tr>
</thead>
<tbody>
<tr>
<td>group2</td>
<td>ddboost-dl.datadomain.com</td>
</tr>
<tr>
<td>group2</td>
<td>10.4.5.0/24</td>
</tr>
<tr>
<td>group3</td>
<td>*.emc.com</td>
</tr>
</tbody>
</table>

Stats options: log-interval = 60, log-condition = updated, reset-interval = 60

Boost started: 2016/05/01 20:48:03
NFS started: 2016/05/01 18:19:08
```

Example 29

```
# client-group show config view summary

<table>
<thead>
<tr>
<th>Group-name</th>
<th>Client</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stream</td>
<td>Stream</td>
</tr>
<tr>
<td></td>
<td>Limit</td>
<td>Limit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group-name</th>
<th>MTree-name</th>
</tr>
</thead>
<tbody>
<tr>
<td>group2</td>
<td>DDBOOST_STRESS</td>
</tr>
<tr>
<td>group2</td>
<td>STU3</td>
</tr>
</tbody>
</table>

Stats options: log-interval = 60, log-condition = updated, reset-interval = 60

Boost started: 2016/05/01 20:48:03
NFS started: 2016/05/01 18:19:08
```
Example 29 (continued)

unassigned        6       18      -      0
group2            8       10      3      2
group3            0        0      1      0

Stats options: log-interval = 60, log-condition = updated, reset-interval = 60

Boost started: 2016/05/01 20:48:03
NFS started:   2016/05/01 18:19:08

client-group show file-history {all | group-name} [last n {mins | hours | days}] [end MMDDhhmm[CCYY]] [count n] [host hostname] [mtree mtree-name] [min-size bytes]

Display the file history of a specified client group, or all client groups. Filtering options include specifying a time period, a host, an MTree, or a minimum file size.

Example 30

# sysadmin@rtp-ost-arch2# client-group show files-history all host 10.6.109.203 last 2 hours min-size 4096

<table>
<thead>
<tr>
<th>Client</th>
<th>Client</th>
<th>Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Path</td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>Last</td>
<td>Duration</td>
</tr>
<tr>
<td>Group-Name</td>
<td>Hostname</td>
<td>Interface</td>
</tr>
<tr>
<td>Interface</td>
<td>Offset</td>
<td>Offset</td>
</tr>
<tr>
<td>Throughput</td>
<td></td>
<td>(MB/s)</td>
</tr>
<tr>
<td></td>
<td>-----------------</td>
<td>---------</td>
</tr>
<tr>
<td>BLUE_GROUP</td>
<td>10.6.109.203</td>
<td>10.25.25.133</td>
</tr>
<tr>
<td></td>
<td>-----------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

client-group show files [ group-name | host hostname | mtree mtree-name ]

List active stream files.

All the information displayed for this command is placed in clients_history.log when a file completes. The clients_history.log defaults to rotate at 100 MiB and keeps nine zip files. The hostname is as reported from the host, so DD Boost and NFS send the FQDN.

**Note:** The /data/col1/ is stripped out of the path display.

**Group-Name**

Client group-name with active streams

**Client Hostname**

FQDN or short-name sent by client

**Client Interface**

IP address of Client (or FC indication)
Server Interface
IP of DD side (or FC indication)

Operation
- dsp-write or syn-dsp-write – Boost DSP write with synthetic if specified
- bst-write or nfs-write – non DSP write for either DD Boost or NFS protocol
- bst-read or nfs-read – Read for either DD Boost or NFS protocol
- cifs-write – Write for CIFS protocol
- cifs-read – Read for CIFS protocol
- vtl-write – Write for VTL protocol
- vtl-read – Read for VTL protocol
- vtl-rd-w – Read or write for VTL protocol

Path
Full path not including “/data/col1”

Start Offset
Start offset written or read

Last Offset
Last offset written or read

Duration
Duration active in read/write state

Example 31

```
# client-group show files

<table>
<thead>
<tr>
<th>Client</th>
<th>Client</th>
<th>Server</th>
<th>Operation</th>
<th>Path</th>
<th>Start Offset</th>
<th>Last Offset</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-Name</td>
<td>Hostname</td>
<td>Interface</td>
<td>Interface</td>
<td></td>
<td>Offset</td>
<td>Offset</td>
<td>hh:mm:ss</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
<td>------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>group5</td>
<td>bst.emc.com</td>
<td>192.168.1.203</td>
<td>192.168.1.98</td>
<td>dsp-write</td>
<td>STU/wr_0</td>
<td>0</td>
<td>515,899,392</td>
</tr>
<tr>
<td>group5</td>
<td>bst.emc.com</td>
<td>192.168.1.203</td>
<td>192.168.1.98</td>
<td>bst-read</td>
<td>STU/wr_0</td>
<td>0</td>
<td>515,899,392</td>
</tr>
</tbody>
</table>

Example 32 Log view

```

```
# log view debug/clients_history.log

HEADER V1 < date > < time > group=< groupname > host=< FQDN > cl-if=< IP | FC > dd-if=< IP | FC > op=< read/write > path=< mtree-name/file > s_off=< bytes > l_off=< bytes > dur=< hh:mm:ss >
```
Example 32  Log view (continued)

2015/08/28 17:41:09 group=group5 host=ddboost-dl.datadomain.com cl-if=192.168.1.203
dd-if=192.168.1.98 op=dsp-write path=DDBOOST_STRESS_SU/write_000 s_off=0
l_off=5368709120 dur=00:00:22

2017/04/04 07:13:32 group=High_DP_G host=wangy34-dl.datadomain.com cl-
if=128.222.90.222 dd-if=10.25.17.53 op=nfs-write path=backup/test.0000.0000 s_off=0
l_off=107374182584 size=107374182584 orig=107734373224 g_comp=105588162404
l_comp=48956463624 dur=00:17:38

client-group show host-stats {all | hostname} view {current-hour | last-24-hours | daily-total} [display-unit {Bytes | KiB | MiB | GiB}]
Displays data sent and received by a specified host for the last hour, the last 24 hours, or a total
daily summary. The system stores 24 hours worth of statistics per host for average daily
calculations. Daily statistics tracking for a host starts with the first read/write stream processed
by that host, and ends when the host is inactive for 24 hours.
If a display unit is not specified, the output shows bytes by default.
All the information displayed by this command is stored in memory, and is overwritten after 24
hours.

Write
Amount of incoming data

Filtered
Boost DSP mode duplicate data

Post_lc
Boost DSP mode compressed data

Read
Amount of outgoing data

Network
Amount of data on the network (IP or FC)

Pre–Comp
Data written before compression.

Post-Comp
Storage used after compression.

Global-Comp
Amount of data compressed.

Write Stream
Number of write streams, displayed as the number active or an average per hour.

Write Stream Max
Maximum number of write streams, displayed as the number active or an average per hour.

Read Stream
Number of read streams, displayed as the number active or an average per hour.

Read Stream Max
Maximum number of read streams, displayed as the number active or an average per hour.
Client Stream Reject
Number of client streams rejected by the system.

Example 33

```javascript
# client-group show host-stats all view total-24-hours display-unit GiB
```

<table>
<thead>
<tr>
<th>Hostname</th>
<th>Timestamp</th>
<th>Write</th>
<th>Filtered</th>
<th>Post_lc</th>
<th>Read</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>h1.emc.com</td>
<td>2017-05-02 06:00:00</td>
<td>84.14</td>
<td>84.14</td>
<td>19.80</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3/4</td>
<td>6</td>
<td>2/1</td>
</tr>
<tr>
<td>h2.emc.com</td>
<td>2017-05-02 06:00:00</td>
<td>51.32</td>
<td>51.32</td>
<td>16.29</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10/5</td>
<td>10</td>
<td>0/0</td>
</tr>
</tbody>
</table>

client-group show performance {group-name} {start MMDDhhmm[[CC]YY]} [end MMDDhhmm[[CC]YY]] [display-unit {Bytes | KiB | MiB | GiB}]

Display the performance history for a specific client-group, or all client groups in 10 minute intervals within the specified time range.

Filtered
Boost DSP mode duplicate data

Post_lc
Boost DSP mode compressed data

Read
Amount of outgoing data

Network
Amount of data on the network (IP or FC)

Pre-Comp
Data written before compression.

Post-Comp
Storage used after compression.

Global-Comp
Amount of data compressed.

Client Steam Max
Maximum stream count a single client reaches in the log-interval.

Client Stream Limit
Stream limit that may be configured against each client in the client-group.
Client Stream Reject
Number of streams rejected due to the client exceeding the stream limit.

Group Stream Active
Number of active streams at the time the log history is written.

Group Stream Max
Maximum stream count the client-group reaches in the log-interval.

Group Stream Limit
Stream limit that may be configured against the entire client-group.

Group Stream Reject
Number of streams rejected due to the client exceeding the group limit.

Mtree Stream Reject
Number of streams rejected beyond a DD Boost storage stream limit setting.

client-group show stats [ group-name ] [interval seconds]
Shows data sent and received for a specified interval for each client group.

All the information displayed for this command is periodically written to clients_stats.log. The clients_stats.log defaults to rotate at 100 MiB and keeps nine zip files.

Group-Name
Client group-name

Write (GiB)
byte count of incoming data

Filtered (GiB)
Boost DSP mode duplicate data

Post lc (GiB)
Boost DSP mode compressed data

Read (GiB)
byte count of outgoing data

Network (GiB)
byte count on the network (IP or FC)

Client Stream Max-count
Maximum seen for a client

Group Stream Max-count
Maximum seen for group

Recent Stream Rejected
Rejected due to limits exceeded

Client Stream Limit
Configured client stream limit

Group Stream Limit
Configured group stream limit
Group Stream active

Active running streams on group

Limit checks include client limit, group limit, and storage-unit limit (if storage-unit). Limit violations cause the job to fail, and the exceeded count in the log is incremented.

These statistics are reset with the log interval (default 1 hour):

- Recent stream rejected (count of rejected streams due to limit violations)
- Stream max-count per client in group within interval
- Stream max-count for group within interval

The data statistics are reset based on the reset interval (default 12 hours)

Example 34

```bash
#client-group show stats

<table>
<thead>
<tr>
<th>Client</th>
<th>Write</th>
<th>Filtered</th>
<th>Post lc</th>
<th>Read</th>
<th>Network</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Group</td>
<td>Group</td>
<td>Group</td>
<td>Recent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>GiB</td>
<td>GiB</td>
<td>GiB</td>
<td>GiB</td>
<td></td>
<td>GiB</td>
</tr>
<tr>
<td>Stream</td>
<td>Stream</td>
<td>Stream</td>
<td>Stream</td>
<td></td>
<td></td>
<td>Stream</td>
</tr>
<tr>
<td>Limit</td>
<td>Active</td>
<td>Max-count</td>
<td>Limit</td>
<td>Rejected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unassigned</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>group3</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>group2</td>
<td>9.32</td>
<td>3.81</td>
<td>0.60</td>
<td>4.92</td>
<td>10.44</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example 35

```bash
# client-group show stats dpstest interval 2

02/01 10:59:09

02/01 10:59:09

-----------Written MiB/s------ Network MiB/s Read MiB/s -- Stream Counters in Interval -- -Stream Limits-

<table>
<thead>
<tr>
<th>Data</th>
<th>Filtered</th>
<th>Post lc</th>
<th>In/Out</th>
<th>Data</th>
<th>Max-clnt</th>
<th>Max-grp</th>
<th>Curr-grp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reject</td>
<td>Client</td>
<td>Group</td>
<td>Stream</td>
<td>Reject</td>
<td>Client</td>
<td>Group</td>
<td>Stream</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-----</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td>9.38</td>
<td>0.00</td>
<td>0.00</td>
<td>9.38</td>
<td>0.00</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5.50</td>
<td>0.00</td>
<td>0.00</td>
<td>5.50</td>
<td>0.00</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12.00</td>
<td>0.00</td>
<td>0.00</td>
<td>12.00</td>
<td>0.00</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15.00</td>
<td>0.00</td>
<td>0.00</td>
<td>15.00</td>
<td>0.00</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5.50</td>
<td>0.00</td>
<td>0.00</td>
<td>5.50</td>
<td>0.00</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Example 36 Log view

```bash
# log view debug/clients_stats.log

HEADER_V3 {date time} group_name= write= filtered= post_lc= read= network= max-client-

stream= max-client-limit= active-group-stream= max-group-stream= max-group-limit= 
Example 36  Log view (continued)

client-group show stream-history {all | group-name} view {log-interval | performance-interval} [last n {mins | hours | days}] [end MMDDhhmm[CCYY]] [count n]

Display the stream usage by a specific group, or all groups, for a specified time period.

Client Steam Max

Maximum stream count a single client reaches in the log-interval.

Client Stream Limit

Stream limit that may be configured against each client in the client-group.

Client Stream Reject

Number of streams rejected due to the client exceeding the stream limit.

Group Stream Active

Number of active streams at the time the log history is written.

Group Stream Max

Maximum stream count the client-group reaches in the log-interval.

Group Stream Limit

Stream limit that may be configured against the entire client-group.

Group Stream Reject

Number of streams rejected due to the client exceeding the group limit.

Mtree Stream Reject

Number of streams rejected beyond a DD Boost storage stream limit setting.

Example 37

# client-group show stream-history unassigned view performance-interval end 04242000 last 1 hours count 2

<table>
<thead>
<tr>
<th>Group-Name</th>
<th>End Time</th>
<th>Duration</th>
<th>Client Group</th>
<th>Client Group</th>
<th>MTree Stream</th>
<th>Stream Max</th>
<th>Stream Limit</th>
<th>Stream Reject</th>
<th>Stream Reject</th>
</tr>
</thead>
<tbody>
<tr>
<td>unassigned</td>
<td>2017-04-24 19:10:00</td>
<td>00:10:00</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unassigned</td>
<td>2017-04-24 19:40:00</td>
<td>00:10:00</td>
<td>19</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reached specified count.

client-group show streams [ group-name | host hostname ]

List streams for each active group. The Stream limits per group and per client are also shown.
Group-Name
Client group-name with active streams

Client Hostname
FQDN or short-name sent by client

DSP-Write Stream Count
DD Boost only write streams

Data-Write Stream Count
Boost Write or NFS Write

Meta-Read Stream Count
Synthetic Write operation, the read stream

Data-Read Stream Count
Boost or NFS Read

Example 38

# client-group show streams

<table>
<thead>
<tr>
<th>Client</th>
<th>Group Name</th>
<th>DSP-Write</th>
<th>Data-Write</th>
<th>Meta-Read</th>
<th>Data-Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read Stream</td>
<td>Count</td>
<td>Stream</td>
<td>Stream</td>
<td>Stream</td>
<td>Stream</td>
</tr>
<tr>
<td>Group-Name</td>
<td>Limit</td>
<td>Limit</td>
<td>Limit</td>
<td>Limit</td>
<td>Limit</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>group2</td>
<td>ddboost-dl.datadomain.com</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Example 39

# client-group show streams

** Failed to get list: No active clients in list
DD_ERR_EMPTY = 5006

client-group stats options

client-group stats options set [log-interval mins ] [log-condition {updated | always}] [reset-interval mins ]

Configure optional settings for logging.

- These settings are for all groups. The reset-interval needs to be a multiple of the log interval.
- These options control the logging to debug/clients_stats.log.
- You can view the log using log view debug/clients_stats.log.
- Once over 24 hours of log data is collected, this header is put into the log:
  HEADER_V3 {date time} group= write= filtered= post_lc= read= network= max-client-stream= max-client-limit= active-group-stream= max-group-
stream= max-group-limit= exceed_client_limit= exceed_group_limit=
exceed_mtree_limit=

log-interval
- Debug/clients_stats.log file update interval
- Default value is 60 min.
- When statistics are written to file, these per-group counters are reset:
  - Client stream Max-count: maximum stream count seen for a client in group during log period
  - Group Stream Max-count: maximum stream count seen on entire group during log period
  - Recent Stream Rejected: Number of streams rejected due to stream limit exceeded in group

The log file shows the exact stream limit exceeded: exceed_client_limit= 
exceed_group_limit= exceed_mtree_limit=.

log-condition
- Only log groups with updated states, or log all groups

reset-interval
- Debug/clients_stats.log file reset data counters interval
- Default value is one day
- Maximum value can be set for seven days
- On the reset interval, after statistics are written to file, these per-group counters are reset:
  - Write – byte count of incoming data
  - Filtered – Boost DSP mode filtered duplicate data
  - Post_lc – Boost DSP mode sent compressed incoming data
  - Read – byte count of outgoing data
  - Network – byte count on the network (IP or FC)

When a reset occurs, a record of every group is written to clients_stats.log.

client-group stats options reset [log-interval] [log-condition] [reset-interval]
Reset logging options to their default values.

log-interval
- Debug/clients_stats.log file update interval
- Default value is 60 minutes

log-condition
- Debug/clients_stats.log file update groups with updated states or always
- Default is only when states have been updated
reset-interval
- Debug/clients_stats.log file reset data counters interval
- Default value is one day

client-group stream-limit

client-group stream-limit set group-name [client n ] [group n ]
Set stream limits per client in the group and/or for the entire group. Stream limits are only checked when the stream starts.
- The client limit must be within the group limit if a group limit is specified. The group limit or client limit cannot exceed the maximum combined limit for the protection system type.
- When the stream limit is set to zero (the default), no checking is done.
- Storage-unit stream limits are checked together with client-group limits.
- The first stream limit settings to exceed will fail stream limit check.
- At the start of a read or write, a failed stream limit check results in an error.
- Once a host starts a read or write operation, limits are not rechecked.
- Statistics kept for client-group show the rejected count due to stream limits.

Note: This command is not supported for VTL.

client-group stream-limit reset group-name [client] [group]
Reset stream limit setting to zero.

Note: This command is not supported for VTL.
client-group
CHAPTER 10

cloud

The `cloud` command is used only on systems licensed to run the Cloud Tier software option. Command options let you enable the feature and configure a profile. See the *DD OS Administration Guide* for details on using the DD OS System Manager user interface.

This chapter contains the following topics:

- cloud change history ................................................................. 96
- cloud clean .............................................................................. 96
- cloud enable ........................................................................... 96
- cloud profile .......................................................................... 96
- cloud provider ......................................................................... 97
- cloud status ........................................................................... 98
- cloud unit ............................................................................... 98
cloud change history

There have been no changes to this command in this release.

cloud clean

cloud clean frequency reset
Set the cloud tier cleaning frequency to the default value of one DD Cloud Tier cleaning for every four Active Tier cleanings. Role required: admin and limited-admin.

ccloud clean frequency set interval
Set the frequency for cloud tier cleaning. Role required: admin and limited-admin.

ccloud clean frequency show
Show the cloud tier cleaning frequency. Role required: admin and limited-admin.

ccloud clean show config
Show the cloud tier cleaning configuration.

ccloud clean start unit-name
Start cloud tier cleaning on the cloud unit unit-name. Role required: admin.

ccloud clean status
Show cloud tier cleaning status.

ccloud clean stop
Stop the cloud tier cleaning process. Role required: admin and limited-admin.

ccloud clean throttle reset
Reset throttle percentage for cloud tier cleaning to the default value of 50 percent. Role required: admin and limited-admin.

ccloud clean throttle set percent
Set throttle percentage for cloud tier cleaning (100 is fastest, 0 is slowest). Role required: admin and limited-admin.

ccloud clean throttle show
Show throttle percentage for cloud tier cleaning.

ccloud clean watch
Monitor the cloud tier cleaning process.

cloud enable

ccloud enable
Enable the Cloud Tier software option. If a file system already exists, you can enable the cloud tier for that system. If you are creating a new file system, you can enable the cloud tier at the time you create the file system. Role required: admin and limited-admin.

Note: The file system must be disabled before enabling Cloud Tier.

cloud profile

ccloud profile add profile-name
Add a new cloud profile to the system. Role required: admin and limited-admin.

Note: Before adding the first cloud profile, be sure to import root CA certificates of the cloud provider or any proxy using adminaccess certificate import ca application
cloud file file-name. Certificates should be stored in /ddr/var/certificates before you run the adminaccess command. Cloud provider certificates are imported automatically while adding cloud profile.

- ECS requires access key, secret key, and endpoint.
- AWS S3 requires access key, secret key, storage class, and region. For enhanced security, the Cloud Tier feature uses Signature Version 4 for all AWS requests. Signature Version 4 signing is enabled by default.
- Azure requires account name, whether the account is an Azure Government account, primary key, secondary key, and storage class.
- S3 Flexible providers require the provider name, access key, secret key, region, endpoint, and storage class.
- Alibaba Cloud requires access key, secret key, storage class, region, and real-name registration.
  
  | Note: The Cloud Tier feature uses Signature Version 2 for Alibaba requests.

cloud profile del profile-name
Delete an existing cloud profile. Role required: admin and limited-admin.

cloud profile modify profile-name
Modify an existing cloud profile, including provider credentials. The system prompts you to modify individual details of the cloud profile.

The profile details that can be modified depend on the cloud provider:

- ECS supports modification of the secret key.
- AWS S3 supports modification of the access key and secret key.
- Azure supports modification of the access key, secret key, and primary key.
- S3 Flexible modification of the access key, secret key, and provider name.
- Alibaba supports modification of the access key and secret key.
- Google Cloud Provider modification access key and secret key.

Role required: admin and limited-admin.

cloud profile show [all | profile-name]
Show details for all cloud profiles or for a specific cloud profile.

cloud provider

cloud provider verify
Validates the Cloud Tier configuration by performing the following validation steps:

- Cloud enablement check: Verifies that Cloud Tier is enabled on the protection system, and the appropriate license, passphrase, and configuration are set.
- Connectivity check: Verifies the existence of the correct certificate, and tests the connection to the cloud provider endpoint.
- Account validation: Creates a test cloud profile and bucket based on the specified configuration values.
- S3 API validation: Verifies the cloud provider supports the S3 operations required for Cloud Tier.
- Cleaning up: All test data, including the test bucket, created by this command is automatically deleted when the cloud provider verification is complete.
Role required: admin and limited-admin.

Depending on the cloud provider configured, this command requires the following information:

- ECS requires access key, secret key and endpoint.
- AWS S3 requires access key, secret key, storage class, and region.
  For enhanced security, the Cloud Tier feature uses Signature Version 4 for all AWS requests. Signature Version 4 signing is enabled by default.
- Azure requires account name, whether or not the account is an Azure Government account, primary key, secondary key, and storage class.
- S3 Flexible providers require the provider name, access key, secret key, region, endpoint, and storage class.
- Alibaba Cloud requires access key, secret key, storage class, region, and real-name registration.
- Google Cloud Provider requires access key, secret key, and region. (Storage class is Nearline by default.)

cloud status

cloud status
Displays whether the Cloud Tier is enabled or not.

cloud unit

cloud unit add unit-name profile profile-name
Add a cloud unit using the specified profile. Role required: admin and limited-admin.

cloud unit del unit-name
Delete the specified cloud unit. A cloud unit cannot be deleted when the file system is running.
Role required: admin and limited-admin.

Note: The cloud unit del command is not allowed on Retention Lock Compliance systems.

cloud unit disable unit-name
Disable the specified cloud unit. Role required: admin and limited-admin.

cloud unit enable unit-name
Enable the specified cloud unit. Role required: admin and limited-admin.

cloud unit list [unit-name]
List a specific cloud unit or all cloud units. Output includes the unit's name, profile, and status. No authorization information is listed. Role required: admin and limited-admin.
CHAPTER 11

compression

Physical capacity measurement (PCM) provides space usage information for a sub-set of storage space. From the command line interface you can view space usage information for MTrees, tenants, tenant units, and pathsets.

This chapter contains the following topics:

- compression change history ................................................................. 100
- compression physical-capacity-measurement .................................. 100
compression change history

There have been no changes to this command in this release.

compression physical-capacity-measurement

Physical capacity measurement commands.

compression physical-capacity-measurement disable
Disable physical capacity measurement. Role required: admin and limited-admin.

compression physical-capacity-measurement enable [and-initialize]
Enable physical capacity measurement. Role required: admin and limited-admin.

compression physical-capacity-measurement pathset add pathset-name paths pathlist
Add paths to an existing pathset.

Note: Once a path is selected for PCM, all paths underneath it are automatically included. Do not select a child path after its parent path is already selected. For example, if /data/coll/mtree3 is selected, do not select any subdirectories under mtree3.

Role required: admin and limited-admin.

Argument definitions

Note: Argument definitions for the compression commands are interchangeable. If an argument is not defined under the command you are looking at, you will find it under another command in the compression section.

pathset-name
Specify the name of a pathset.

paths pathlist
Specify a list of pathnames.

compression physical-capacity-measurement pathset create pathset-name paths pathlist [measurement-retention {days | default}]
Add a new pathset. A pathset is a container that holds a collection of directory or file paths.

Note: Once a path is selected for PCM, all paths underneath it are automatically included. Do not select a child path after its parent path is already selected. For example, if /data/coll/mtree3 is selected, do not select any subdirectories under mtree3.

Role required: admin and limited-admin.

Argument definitions

measurement-retention {days | default}
Specify the number of days for retention of measurement reports. The default is 180 days.

compression physical-capacity-measurement pathset del pathset-name paths pathlist
Delete paths from an existing pathset. Role required: admin and limited-admin.

compression physical-capacity-measurement pathset destroy pathset-name
Destroy a pathset. Role required: admin and limited-admin.
**Argument definitions**

**pathset-name**

Specify the name of a pathset.

```
compression physical-capacity-measurement pathset modify pathset-name
  [measurement-retention {days | default}]
```

Modify an existing pathset. Role required: admin and limited-admin.

```
compression physical-capacity-measurement pathset show detailed [all | pathset-name]
```

Detailed list of pathsets. Role required: admin and limited-admin.

**Argument definitions**

**all**

Shows all information about the object specified by the command option.

```
compression physical-capacity-measurement pathset show list [all | pathset-name]
```

List pathsets. Role required: admin and limited-admin.

```
compression physical-capacity-measurement sample show current [all | user user | task-id id | pathsets pathset-list tenants tenant-list | tenant-units tenant-unit-list | mtrees mtree-list]
```

Show the status of specified tasks. Role required: admin and limited-admin.

**Argument definitions**

**user user**

Specify a username.

**task-id id**

Specify a task id for a physical capacity measurement task.

**pathsets pathset-list**

Specify the name of a list of pathsets.

**tenants tenant-list**

Specify the list of tenant names.

**tenant-units tenant-unit-list**

Specify the list of tenant unit names.

**mtrees mtree-list**

Specify certain MTrees.

```
compression physical-capacity-measurement sample show detailed-history
  [all | user user | task-id id | pathsets pathset-list | tenants tenant-list | tenant-units tenant-unit-list | mtrees mtree-list] [last n {hours | days | weeks | months | measurements} | start MMDDhhmm[CCYY] [end MMDDhhmm[CCYY]]]
```

Show the detailed history of compression physical capacity measurement samples. Role required: admin and limited-admin.
**Argument definitions**

[\(last \ n \ \{hours \ | \ days \ | \ weeks \ | \ months \ | \ measurements\}\) \ start \ \text{MMDDhhmm \ [CCYY]} \ [end \ \text{MMDDhhmm \ [CCYY]}]

Specify the timeframe (last hours, days, and so on) to display statistics for. And, or, you can specify a beginning and ending date.

**start \ \text{MMDDhhmm[CCYY]} \ [end \ \text{MMDDhhmm[CCYY]}]**

Specify starting and ending dates and times for reporting.

**compression physical-capacity-measurement sample show error-history \ [all \ | \ task-id \ id \ | \ pathsets \ pathset-list \ | \ tenants \ tenant-list \ | \ tenant-units \ tenant-unit-list \ | \ mtrees \ mtree-list] \ [last \ n \ \{hours \ | \ days \ | \ weeks \ | \ months \ | \ errors\}\) \ start \ \text{MMDDhhmm[CCYY]} \ [end \ \text{MMDDhhmm[CCYY]}]**

Show the error history for compression physical capacity measurement samples. Role required: admin and limited-admin.

**Argument definitions**

[\(last \ n \ \{hours \ | \ days \ | \ weeks \ | \ months \ | \ measurements\}\) \ start \ \text{MMDDhhmm} \ [CCYY] \ [end \ \text{MMDDhhmm[[CCYY]}}]

Specify the timeframe (last hours, days, and so on) to display statistics for. And, or, you can specify beginning and ending dates.

**compression physical-capacity-measurement sample show history \ [all \ | \ user \ user \ | \ task-id \ id \ | \ pathsets \ pathset-list \ | \ tenants \ tenant-list \ | \ tenant-units \ tenant-unit-list \ | \ mtrees \ mtree-list] \ [last \ n \ \{hours \ | \ days \ | \ weeks \ | \ months \ | \ measurements\}\) \ start \ \text{MMDDhhmm[CCYY]} \ [end \ \text{MMDDhhmm[CCYY]}]}]

Show the history of compression physical capacity measurement samples. Role required: admin and limited-admin.

**Note:** The DD System prunes the historical physical capacity measurement samples on a daily basis and keeps the following distribution of historical samples: for MTrees, tenant units, and tenants, no more than 1 sample per hour for the last 90 days, then no more than 1 per day for the last year, then no more than 1 per week for the last 10 years. For pathsets, the historical samples are kept according to the measurement-retention specified (the default is 180 days) when the pathset was created or modified.

**compression physical-capacity-measurement sample start \ {pathsets \ pathset-list \ | \ tenants \ tenant-list \ | \ tenant-units \ tenant-unit-list \ | \ mtrees \ mtree-list} \ [priority \ \{normal \ | \ urgent\}]**

Start the compression physical capacity measurement sample tasks. Role required: admin and limited-admin.

**WARNING** When multiple objects are specified by this command, the system attempts to start measurement samples for each object. However, the command succeeds only if measurement samples actually start for all specified objects. Otherwise, the system does not start samples for any of the specified objects and the command fails.

**Argument definitions**

**priority \ \{normal \ | \ urgent\}**

Specify normal or urgent. Normal priority submits a measurement task to the processing queue. Urgent priority submits a measurement task to the front of the processing queue.

**compression physical-capacity-measurement sample stop \ {all \ | \ task-id \ id \ | \ pathsets \ pathset-list \ | \ tenants \ tenant-list} \ [tenant-units \ tenant-unit-list \ | \ mtrees \ mtree-list}**
Stop the compression physical capacity measurement sample tasks. Role required: admin and limited-admin.

⚠️ **CAUTION** The system stops the specified object's measurement task(s), but not measurement tasks active for any objects contained in the specified object.

```
compression physical-capacity-measurement schedule add name {pathsets pathset-list | tenants tenant-list | tenant-units tenant-unit-list | mtrees mtree-list}
```

Add objects to a compression physical capacity measurement schedule. Role required: admin and limited-admin.

⚠️ **NOTICE** If multiple objects are present in a schedule, the system attempts to start a measurement sample for each object. When the system cannot start a measurement sample for an object, an alert is generated.

**Argument definitions**

**name**

Specify a schedule name.

```
compression physical-capacity-measurement schedule create name {pathsets pathset-list | tenants tenant-list | tenant-units tenant-unit-list | mtrees mtree-list} [priority {normal | urgent}] time time [day days | monthly days, last-day]
```

Add a new compression physical capacity measurement schedule. Role required: admin and limited-admin.

**Example 40**

Add the schedule sched1 to pathsets ps1, ps2, and ps3.

```
# compression physical-capacity-measurement schedule add sched1 pathsets ps1 ps2 ps3
```

**Argument definitions**

**time**

Specify the time for a schedule using the following 24-hour formats: 0000 or 00:00

**day**

With the keyword day, specify days as the days of the week using either lowercase, three letter abbreviations for the days of the week: mon, tue, wed, thu, fri, sat, sun, or as integers: 0 = Sunday, 1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday.

**monthly**

Specify the days of the month using integers (1-31) and, optionally, use the word "last-day" to include the last day of every month in the year.

**Example 41**

Create a schedule named sched1 at 4 p.m.

```
# compression physical-capacity-measurement schedule create sched1 pathset psl 16:00
```
Delete objects from a compression physical capacity measurement schedule. Role required: admin and limited-admin.

Disable a physical capacity measurement schedule. Role required: admin and limited-admin.

Destroy a physical capacity measurement schedule. Role required: admin and limited-admin.

Example 42

Destroy the schedule named sched1.

```
# compression physical-capacity-measurement schedule destroy sched1
```

Enable a physical capacity measurement schedule. Role required: admin and limited-admin.

Add a new compression physical capacity measurement schedule. Role required: admin and limited-admin.

Show the compression physical capacity measurement schedules. Role required: admin and limited-admin.

Show the physical capacity measurement status (enabled or disabled). Role required: admin and limited-admin.

Reset the throttle percentage for physical capacity measurement to the default value: 20 percent. Role required: admin and limited-admin.

Set the throttle percentage for physical capacity measurement. Role required: admin and limited-admin.

Show the throttle percentage for physical capacity measurement. Role required: admin and limited-admin.

**Note:** The throttle default setting is 20 percent.
The `config` command manages protection system configuration settings. Command options include changing individual configuration parameters and viewing the configuration setup. For information on how to configure the system, see the `DD OS Initial Configuration Guide` and the `DD OS Administration Guide`.

This chapter contains the following topics:

- `config change history` .......................................................... 106
- `config reset` .................................................................. 106
- `config set` ...................................................................... 106
- `config setup` .................................................................. 107
- `config show` ................................................................... 107
config change history

There have been no changes to this command in this release.

config reset

config reset admin-email
Delete the administrator email address configured with the config set admin-email command. Role required: admin and limited-admin.

config reset admin-host
Delete the administrator host system configured with the config set admin-host command. Role required: admin and limited-admin.

config reset location
Delete the location configured with the config set location command. Role required: admin and limited-admin.

config reset mailserver
Delete the mail server configured with the config set mailserver command. Role required: admin and limited-admin.

config reset timezone
Reset the time zone to the default, which is US/Pacific. Role required: admin and limited-admin. This command option requires security officer authorization if Retention Lock Compliance is enabled on any MTrees.

config set

config set admin-email email-addr
Set the email address for the administrator who should receive system alerts and autosupport reports. The system requires one administrative email address. Use the autosupport and alerts commands to add other email addresses. To check the current setting, use config show admin-email. Role required: admin and limited-admin.

config set admin-host host
Set the machine from which you can log in to the protection system to view system logs and use system commands. The hostname can be a simple or fully qualified hostname or an IP address. The specified host is also added to the FTP and Telnet lists configured with the adminaccess command and to the CIFS and NFS lists created with the cifs share create and nfs add commands. This command provides a quick way to add authentication privileges to multiple lists. To check the current setting, use config show admin-host. Role required: admin and limited-admin.

Example 43

# config set admin-host admin12.yourcompany.com

config set location "location"
Configure a description of a protection system’s location. A description of a physical location helps identify the machine when viewing alerts and autosupport emails. If the description contains one or more spaces, the description must be in double quotation marks. To check the current setting, use config show location. Role required: admin and limited-admin.
Example 44

# config set location "row2-num4-room221"

config set mailserver host [user user]
Configure the SMTP mail server used by the protection system. The user parameter supports specifying a username and password on the mail server to improve security. To check the current setting, use config show mailserver. Role required: admin and limited-admin.

Example 45

# config set mailserver mail.yourcompany.com

config set timezone zonename
Set the system clock to a specific time zone. The default setting is US/Pacific. Do any of the following to see the time zone name options.

- Enter config set timezone ? to display a list of regional zone names.
- Enter config set timezone region_zonename to display zone names for cities and areas in the specified region.
- Enter config set timezone etc to display valid GMT zone names.
- See Appendix A in the DD OS Command Reference.

Note: For additional time zone names that are not displayed in DD OS, see the "Miscellaneous" section of Appendix A in the DD OS Command Reference.

Changes to the time zone require a system reboot. Role required: admin. This command option requires security officer authorization if any MTrees are enabled with Retention Lock Compliance.

config setup

config setup
Launch a utility program that prompts you to configure settings for the system, network, filesystem, CIFS, NFS, and licenses. Press Enter to cycle through the selections and confirm any changes when prompted. Choices include Save, Cancel, and Retry.

This command option is unavailable on Retention Lock Compliance systems. Use System Manager to change configuration settings. Role required: admin and limited-admin.

config show

config show admin-email
Display the administrator email address to which alert summaries and autosupport reports are sent. Role required: admin, limited-admin, security, user, backup-operator, or none.

config show admin-host
Display the administrative host from which you can log into the protection system to view system logs and use system commands. Role required: admin, limited-admin, security, user, backup-operator, or none.

config show all
Display all config command settings. Role required: admin, limited-admin, security, user, backup-operator, or none.

config show location
Display the protection system location description, if you set one. Role required: admin, limited-admin, security, user, backup-operator, or none.

`config show mailserver`
Display the name of the mail server that the protection system uses to send email, and the mail server username if one is configured. Role required: admin, limited-admin, security, user, backup-operator, or none.

`config show timezone`
Display the time zone used by the system clock. Role required: admin, limited-admin, security, user, backup-operator, or none.
The `data-movement` command is used only on systems licensed to run the Cloud Tier software option. Command options let you configure data movement policies and options. See the *DD OS Administration Guide* for details on using the DD OS System Manager user interface.

This chapter contains the following topics:

- `data-movement change history` ................................................................................. 110
- `data-movement policy` .............................................................................................. 110
- `data-movement recall` .............................................................................................. 110
- `data-movement resume` ........................................................................................... 110
- `data-movement schedule` ......................................................................................... 110
- `data-movement start` ............................................................................................... 111
- `data-movement status` .............................................................................................. 112
- `data-movement stop` ................................................................................................. 115
- `data-movement suspend` .......................................................................................... 115
- `data-movement throttle` ........................................................................................... 115
- `data-movement watch` ............................................................................................. 115
There have been no changes to this command in this release.

**data-movement policy**

```bash
data-movement policy reset {age-range | age-threshold} mtrees mtree-list
```
Resets the data-movement policy for the specified MTrees. Role required: admin and limited-admin.

**Note:** This command cannot be run when data movement is in progress on the specified MTree.

```bash
data-movement policy set age-range min-age days max-age days to-tier cloud cloud-unit unit-name mtrees mtree-list
```
Set the age range policy for the specified MTrees. The value for `days` must be from 14 days to 18250 days (approximately 50 years). Role required: admin and limited-admin.

```bash
data-movement policy set age-threshold days to-tier cloud cloud-unit unit-name mtrees mtree-list
```
Set the age threshold policy for the specified MTrees. The value for `days` must be from 14 days to 18250 days (approximately 50 years). Role required: admin and limited-admin.

```bash
data-movement policy show [all | to-tier cloud [cloud-unit unit-name] | mtrees mtree-list]
```
View the data-movement policy for all MTrees, the specified MTrees, or the specified cloud units.

**data-movement recall**

```bash
data-movement recall path pathname
```
Recall a file from the cloud tier to the active tier. The maximum number of files that can be recalled at one time depends on the system memory configuration:

- Systems with more than 256 GB of memory can recall up to 16 files at one time.
- Systems with less than 256 GB of memory can recall up to 8 files at one time.
- DD VE instances can recall up to 4 files at one time.

Once a file is recalled, its aging is reset and will start again from 0, and the file will be eligible based on the age policy set. Role required: admin or limited-admin.

**Note:** If a cloud file is not present in the MTree and only exists in a snapshot, it cannot be recalled. The only way to recall cloud files that only exist in snapshots is to do a fastcopy operation to copy the files from the snapshot back to the MTree.

**data-movement resume**

```bash
data-movement resume
```
Resume data movement to the cloud. Role required: admin and limited-admin.

**data-movement schedule**

```bash
data-movement schedule set to-tier cloud {never | days days time time [every n wks]}
```

Set the schedule for data movement to the cloud. Note that the days argument accepts the following range (and can be either a space- or comma-separated list, or arbitrary text): Day of the week (Monday–Sunday).

Any value outside of the range generates an error message. Data movement occurs no more frequently than weekly. Role required: admin and limited-admin.

**Example 46**

To schedule data movement to occur each Tuesday at 6:00 a.m., enter:

```
# data-movement schedule set to-tier cloud days "tue" time "06:00"
```

**Example 47**

To schedule data movement to occur on alternate Tuesdays at 6:00 a.m., enter:

```
# data-movement schedule set to-tier cloud days "tue" time "06:00" every 2 wks
```

data-movement schedule show
Show the schedule for data movement to the cloud.

data-movement start

data-movement start [eligibility-check [age-threshold <days>]] [[to-tier cloud [cloud-unit unit-name]] | [mtrees mtree-list]]

Starts eligibility check for the specified cloud-unit or for the specified list of MTree(s). Role required: admin and limited-admin.

**Example 48** With a specified MTree as input

```
# data-movement start eligibility-check mtrees /data/coll/mtree-1
```

Started eligibility-check for data-movement.

Run the status command to monitor its progress.

**Example 49** With cloud-unit as input

```
# data-movement start eligibility-check to-tier cloud cloud-unit
cloud_cp2
```

Started eligibility-check for data-movement.

Run the status command to monitor its progress.

data-movement start [[to-tier cloud [cloud-unit unit-name]] | [mtrees mtree-list]]

Starts data movement to the cloud. You can start data movement to the specified cloud unit, for all MTrees with configured data-movement policies, or for specified MTrees. Role required: admin and limited-admin.

```
# data-movement start
Data-movement started.
Run "data-movement watch" to monitor progress.
```
data-movement status

data-movement status [path {pathname | all | [queued] [running]
[completed] [failed]}] | to-tier cloud [detailed] | all]
Show the status of data movement as well as recall.

The detailed option displays data movement statistics for the MTrees, and information about the files for which data movement is currently in progress.

Note: If a protection system has been upgraded to DD OS version 6.1.1.5 or later from an older version of the software, this command will display 0 files inspected and 0 files eligible until the next data movement operation starts.

The detailed option is not supported when the Cloud Tier cloud seeding feature is active.

Example 50

```bash
# data-movement status
Data-movement to cloud tier:
----------------------------
Data-movement:
100% complete; time: 0:01:18
Moved (post-comp): 94.24 MiB, (pre-comp): 1.33 GiB,
Files inspected: 29, Files eligible: 29, Files moved: 29, Files failed: 0
```

When data-movement is in progress:

```bash
===================data-movement In-Progress====================
# data-movement status to-tier cloud detailed
Data-movement to cloud tier:
----------------------------
Data-movement:
61% complete; Elapsed time: 0:07:22
Moved (post-comp): 8.20 GiB, (pre-comp): 44.02 GiB,
Files inspected: 142, Files eligible: 42, Files moved: 18, Files failed: 0
```

Data-movement status for MTrees:

<table>
<thead>
<tr>
<th>MTrees</th>
<th>Files Moved</th>
<th>Files Destination</th>
<th>Files Inspected</th>
<th>Files Eligible</th>
<th>Files Moved</th>
<th>Files Failed</th>
<th>Bytes Moved (Pre-comp)</th>
<th>Bytes Moved (Post-comp)</th>
<th>Cloud Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data/col1/stu-test1</td>
<td>10</td>
<td>vsc_unit</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.49 GiB</td>
<td>3.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/data/col1/stu-test2*</td>
<td>10</td>
<td>vsc_unit</td>
<td>10</td>
<td>8</td>
<td>0</td>
<td>15.45 GiB</td>
<td>3.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/data/col1/stu-test3*</td>
<td>10</td>
<td>vsc_unit</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>15.44 GiB</td>
<td>2.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/data/col1/stu-test4*</td>
<td>10</td>
<td>vsc_unit</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) Data-movement is in progress for the marked MTrees.

Files currently being moved:

<table>
<thead>
<tr>
<th>Path Name</th>
<th>File Size</th>
<th>Logical</th>
<th>Destination</th>
<th>Bytes Moved</th>
<th>Cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit: hh:mm:ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Example 50 (continued)

<table>
<thead>
<tr>
<th>Path Name</th>
<th>File Size</th>
<th>Logical Bytes Moved</th>
<th>Cloud Unit</th>
<th>Elapsed Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data/coll/stu-test3/FILE115113.0001.0008</td>
<td>2.04 GiB</td>
<td>2.03 GiB</td>
<td>vsc_unit</td>
<td>00:00:32</td>
</tr>
<tr>
<td>/data/coll/stu-test3/FILE115113.0001.0009</td>
<td>2.22 GiB</td>
<td>461.37 MiB</td>
<td>vsc_unit</td>
<td>00:00:02</td>
</tr>
<tr>
<td>/data/coll/stu-test4/FILE115114.0001.0000</td>
<td>1.00 GiB</td>
<td>300.00 MiB</td>
<td>vsc_unit</td>
<td>00:00:01</td>
</tr>
<tr>
<td>/data/coll/stu-test3/FILE115113.0001.0007</td>
<td>1.86 GiB</td>
<td>1.86 GiB</td>
<td>vsc_unit</td>
<td>00:00:32</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------</td>
<td>---------------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
</tbody>
</table>

When data-movement is complete:

=== data-movement Complete ===

# data-movement status to-tier cloud detailed

Data-movement to cloud tier:

Data-movement was started on Dec 5 2018 01:23 and completed on Dec 5 2018 01:58
Moved (post-comp): 31.60 GiB, (pre-comp): 154.08 GiB,
Files inspected: 200, Files eligible: 100, Files moved: 100, Files failed: 0

Data-movement status for MTrees:

<table>
<thead>
<tr>
<th>MTree</th>
<th>Moved Files</th>
<th>Files Eligible</th>
<th>Files Moved</th>
<th>Files Failed</th>
<th>Bytes Moved (Pre-comp)</th>
<th>Bytes Moved (Post-comp)</th>
<th>Cloud Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data/coll/stu-test1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.49 GiB</td>
<td>3.22</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test2</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.45 GiB</td>
<td>3.20</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test3</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.44 GiB</td>
<td>2.73</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test4</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.45 GiB</td>
<td>3.23</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test5</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.44 GiB</td>
<td>3.39</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test6</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.48 GiB</td>
<td>3.28</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test7</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.42 GiB</td>
<td>2.79</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test8</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.51 GiB</td>
<td>3.47</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test9</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.41 GiB</td>
<td>3.11</td>
<td>vsc_unit</td>
</tr>
<tr>
<td>/data/coll/stu-test10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>15.48 GiB</td>
<td>3.18</td>
<td>vsc_unit</td>
</tr>
</tbody>
</table>

(*) Data-movement is in progress for the marked MTrees.

Example 51 Outputs for data-movement in Seeding mode
Example 51  Outputs for data-movement in Seeding mode (continued)

Immediately after starting data-movement in Seeding mode:

```sh
# data-movement status
Data-movement to cloud tier:
-----------------------------
Data-movement is initializing..
Data-movement recall:
----------------------
No recall operations found.
```

Phase 1 of data-movement in Seeding mode:

```sh
# data-movement status
Data-movement to cloud tier:
-----------------------------
Data-movement (Seeding): phase 1 of 18 (pre-merge)
Phase: 0% complete; Elapsed time: 0:00:06, total 0:01:32 ( Phase goes 0% to 100% per phase).
Moved (post-comp): None; Total (pre-comp): None,
Files inspected: 0, Files eligible: 0, Files moved: 0, Files failed: 0
Data-movement recall:
----------------------
No recall operations found.
```

The copy phase of Seeding mode, when actual data migration to cloud starts:

```sh
# data-movement status
Data-movement to cloud tier:
-----------------------------
Data-movement (Seeding): phase 11 of 18 (copy)
Phase: 2% complete; Elapsed time: 0:49:15, total 1:49:19
Moved (post-comp): 16.23 GiB; Total (pre-comp): 22.28 TiB,
Files inspected: 1770, Files eligible: 409, Files moved: 0, Files failed: 0
Data-movement recall:
----------------------
No recall operations found.
```

When migrating in Seeding mode, cleaning on active tier or UNAVAIL or moving to next cloud-unit:

```sh
# data-movement status
Data-movement to cloud tier:
-----------------------------
Data-movement (Seeding):
  Transitioning; Elapsed time: 0:00:01
Moved (post-comp): None; Total (pre-comp): None,
Files inspected: 0, Files eligible: 0, Files moved: 0, Files failed: 0
Data-movement recall:
----------------------
No recall operations found.
```

The suspended state of data-movement:

```sh
# data-movement status
Data-movement to cloud tier:
-----------------------------
Data-movement was started on Aug 30 2018 12:33 and suspended by active tier cleaning.
Data-movement recall:
----------------------
No recall operations found.
Use 'path all' option to list all recall jobs (up to the maximum supported limit).
```
**data-movement stop**

`data-movement stop [path pathname | to-tier {active | cloud} | all]`

Stop data movement as specified. Stop a running recall job or remove a queued recall job. All data movement to the active tier or to the cloud tier, or for the specified file can be stopped. Role required: admin and limited-admin.

**data-movement suspend**

`data-movement suspend`

Suspend data movement to the cloud. Role required: admin and limited-admin.

**data-movement throttle**

`data-movement throttle reset`

Reset the throttle value to 100 percent (no throttle). The throttle value takes effect without restarting data movement if it is running. Role required: admin and limited-admin.

`data-movement throttle set {25 | 50 | 75 | 100 }`

Set the throttle value to 25, 50, 75, or 100, where 25 is the slowest, and 100 is the fastest. The throttle value takes effect without restarting data movement if it is running. Role required: admin and limited-admin.

**Note:** The throttle is for adjusting resources for internal protection system processes; it does not affect network bandwidth.

`data-movement throttle show`

Show the current throttle value. Role required: admin and limited-admin.

**data-movement watch**

`data-movement watch`

View data movement progress while the operation is running. If the operation has completed or is not running, output shows current status only.

**Example 52**

```
# data-movement watch
Data-movement:
  97% complete; time: 0:02:03
  Moved (post-comp): 94.26 MiB, (pre-comp): 1.33 GiB,
  Files inspected: 29, Files eligible: 29, Files moved: 29, Files failed: 0
```

Data-movement was started on Nov 15 2017 06:02 and completed on Nov 15 2017 06:05
Moved (post-comp): 94.26 MiB, (pre-comp): 1.33 GiB,
Files inspected: 29, Files eligible: 29, Files moved: 29, Files failed: 0

**Example 53** data-movement watch in Seeding mode

The output of data-movement watch command differs when in Seeding mode. For larger workloads, it is recommended to monitor progress using the data-movement status command since migration cycles can take a long time to complete.
Example 53  data-movement watch in Seeding mode (continued)

Data-movement (Seeding): phase 1 of 18 (pre-merge)
  Phase: 100% complete; Elapsed time:  0:02:29, total  0:02:24
  Moved (post-comp): None; Total (pre-comp): None,
  Files inspected: 0, Files eligible: 0, Files moved: 0, Files failed: 0

Data-movement (Seeding): phase 2 of 18 (pre-analysis)
  Phase: 100% complete; Elapsed time:  0:14:47, total  0:17:16
  Moved (post-comp): None; Total (pre-comp): None,
  Files inspected: 0, Files eligible: 0, Files moved: 0, Files failed: 0

Data-movement (Seeding): phase 3 of 18 (pre-enumeration)
  Phase: 100% complete; Elapsed time:  0:00:27, total  0:17:47
  Moved (post-comp): None; Total (pre-comp): None,
  Files inspected: 0, Files eligible: 0, Files moved: 0, Files failed: 0

Data-movement (Seeding): phase 5 of 18 (pre-select)
  Phase: 100% complete; Elapsed time:  0:02:48, total  0:20:31
  Moved (post-comp): None; Total (pre-comp): 20.00 GiB,
  Files inspected: 3786, Files eligible: 20, Files moved: 0, Files failed: 0

Data-movement (Seeding): phase 11 of 18 (copy)
  Phase: 100% complete; Elapsed time:  0:04:44, total  0:25:18
  Moved (post-comp): 21.25 GiB; Total (pre-comp): 20.00 GiB,
  Files inspected: 3786, Files eligible: 20, Files moved: 0, Files failed: 0

Data-movement (Seeding): phase 13 of 18 (install)
  Phase: 100% complete; Elapsed time:  0:00:03, total  0:25:18
  Moved (post-comp): 21.25 GiB; Total (pre-comp): 20.00 GiB,
  Files inspected: 3786, Files eligible: 20, Files moved: 0, Files failed: 0

Finalizing data movement – Metadata copy in progress
  100% complete; Elapsed time:  0:09:43

Data-movement was started on Sep 5 2018 03:12 and completed on Sep 5 2018 04:13
  Moved (post-comp): 42.51 GiB; Total (pre-comp): 40.00 GiB,
  Files inspected: 5574, Files eligible: 40, Files moved: 40, Files failed: 0
CHAPTER 14

ddboost

The ddboost command manages the integration of protection systems and disk backup devices. Command options create and delete storage units on the storage server, and display the disk space usage of each storage unit. The DD Boost software option also supports advanced load balancing and failover, distributed segment processing, encryption, and low-bandwidth optimization.

Quotas provision the system storage among different backup applications. Quotas restrict the logical (uncompressed and undeduplicated) storage capacity for each storage unit. DD Boost storage unit quota limits (hard or soft) can be set or removed dynamically. Quotas may also be used to provision various DD Boost storage units with different sizes, enabling an administrative user to monitor the usage of a particular storage unit over time. Note that it is possible to configure quotas on a system and run out of storage before quota limits are reached.

Like MTree quota limits, the ddboost storage-unit create command includes optional arguments to specify quota limits at the time the storage unit is created. Output of the ddboost storage-unit show command indicates if a quota is defined for the storage unit.

Fibre Channel transport is available for DD Boost via the DD Boost over Fibre Channel service. Automatic Image Replication (AIR) is supported for Veritas NetBackup.

The Multiuser Storage Unit Access Control feature enhances the user experience by supporting multiple usernames for the DD Boost protocol, providing data isolation for multiple users sharing a protection system. Using the DD Boost protocol, the backup application connects to the protection system with a username and password to support this feature. Both the username and password are encrypted using public key exchange. The tenant-unit keyword is introduced to the ddboost storage-unit command for integration with the Secure Multi-Tenancy feature. One storage unit must be configured for each tenant unit. Each tenant unit can be associated with multiple storage units.


This chapter contains the following topics:

- ddboost change history .......................................................... 119
- ddboost guidelines and restrictions ........................................ 119
- ddboost association .............................................................. 119
- ddboost clients ................................................................. 120
- ddboost destroy ............................................................... 123
- ddboost disable ............................................................... 123
- ddboost enable .............................................................. 123
- ddboost event ............................................................... 123
- ddboost fc ................................................................. 124
- ddboost file-replication .................................................... 126
- ddboost ifgroup ............................................................ 128
- ddboost option ............................................................ 131
- ddboost reset .............................................................. 132
- ddboost set ............................................................... 132
- `ddboost show` ............................................................. 132
- `ddboost status` .......................................................... 135
- `ddboost storage-unit` .................................................. 135
- `ddboost streams` ........................................................ 138
- `ddboost user` .............................................................. 139
ddboost change history

There have been no changes to this command in this release.

ddboost guidelines and restrictions

- DD Boost is a licensed software option. If basic options do not work, verify that the proper licensing has been implemented on your protection system.
- Quota limits are enforced only if MTree quotas are enabled. A message displays in the output notifying users if the quota feature is disabled.
- When a storage unit is created, quota limits are set to the default MTree quota size.
- If MTree quotas are enabled and hard limits are defined, backups are stopped if a hard limit is reached.
- Enabling quotas may cause OpenStorage backup applications to report non-intuitive sizes and capacities. See Knowledge Base article 85210, available on the Support portal, for details.
- Do not use DD Boost Fibre Channel server names to create AIR associations. Use IP server names only.
- DD Boost-over-Fibre Channel operation is expected to continue without user intervention when the Fibre Channel endpoints failover.

ddboost association

ddboost association create local-storage-unit [{replicate-to} remote-hostname remote-storage-unit | {replicate-from} remote-hostname remote-storage-unit [{import-to} client-hostname}]

Create a storage unit association between the specified storage unit and the target protection system storage unit and optionally, the import-to target client. The import-to client option is applicable when the AIR filecopy feature has been configured to run, and it lets you specify a single NetBackup media server client to receive AIR filecopy events from the target protection system. Role required: admin and limited-admin.

Note: When the AIR import-to client option is used in an environment where multiple media servers could be used to connect to the AIR filecopy target protection system, the import-to client specified in this command is the one and only NetBackup media server client able to receive AIR filecopy event notifications.

If the connected client has a hostname that does not match the defined hostname in the registry, this ddfs.info log message is generated: DDDBoost association replication-from has import-to client [<client-name>] specified and a mismatch was found for client requesting events: <client>

Example 54

```
# ddboost association create feature2 replicate-to ddboost11.company.com feature2
DDBoost association created.
```

Example 55
Example 55  (continued)

```
# ddboost association create TEST_LSU7a replicate-from localhost TEST_LSU8a import-to nbu-client.datadomain.com
DDBoost association created.
```

ddboost association destroy local-storage-unit {replicate-to | replicate-from} remote-hostname remote-storage-unit
Destroy the storage unit association for the specified storage unit. Role required: admin and limited-admin.

![Note:](Note.png) This command option deletes unprocessed events in the local storage unit if the association specified is {replicate-from}. It does not delete user data in the local storage unit.

ddboost association show [all | storage-unit storage-unit]
Show the storage unit association list for a specified local storage unit or all local storage units with an association. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 56

```
# ddboost association show
Local Storage Unit   Direction        Remote Host   Remote Storage Unit   Import To
------------------   --------------   -----------   -------------------   ---------
TEST_LSU1a.          replicate-from   localhost     TEST_LSU2a..          -
TEST_LSU2a..         replicate-to     localhost     TEST_LSU1a.           -
------------------   --------------   -----------   -------------------   ---------
```

Example 57

```
# ddboost association show
Local Storage Unit   Direction        Remote Host   Remote Storage Unit   Import To
------------------   --------------   -----------   -------------------   ---------
-------------------
TEST_LSU1a.          replicate-from   localhost     TEST_LSU2a..          -
TEST_LSU2a..         replicate-to     localhost     TEST_LSU1a.           -
TEST_LSU7a           replicate-from   localhost     TEST_LSU8a            nbu-client.datadomain.com
------------------   --------------   -----------   -------------------   ---------
```

ddboost clients

ddboost clients add client-list [encryption-strength {none | medium | high} authentication-mode {one-way | two-way | two-way-password | anonymous | kerberos}]

![Note:](Note.png) The maximum length for a client hostname is 63 characters.

Add clients to the DD Boost client list and enable encryption for those clients. Use the authentication-mode option to configure the minimum authentication requirement. A client attempting to connect using a weaker authentication setting is blocked. The global authentication mode and the global encryption strength options override any client-specific values if the global values are higher. In that case, a client attempting to connect using a weaker authentication or encryption setting than the global settings is blocked. Both one-way and two-way authentication require the client to be knowledgeable of certificates. If the encryption strength is none, only kerberos authentication-mode is supported. Kerberos is only available to clients running BoostFS. Role required: admin and limited-admin.
Argument definitions

These are the valid encryption strength values, which are shown in order of increasing strength:

**none**
This encryption strength can only be applied if the authentication mode is Kerberos.

**medium**
Use the AES128-SHA cipher suite.

**high**
Use the AES256-SHA cipher suite.

These are the valid authentication mode values, which are shown in order of increasing strength:

**none**
This is the least secure but most backwards-compatible option.

You can select none if your system has crucial performance requirements and you do not need protection from man-in-the-middle (MITM) attacks. Your system can operate in the same manner and avoid suffering performance degradation due to TLS. However, pre-shared key (PSK) authentication is not employed.

When encryption is set to none, authentication must also be set to none.

**anonymous**
No certificates are exchanged. After the SSL handshake, the communication channel between the DD Boost client and the protection system server is encrypted.

**one-way**
The DD Boost client requests authentication from the protection system server, and the protection system server sends the appropriate certificate to the DD Boost client. The DD Boost client verifies the certificate. The communication channel between the DD Boost client and the protection system server is encrypted.

**two-way-password**
Two-way authentication is provided by having each side encrypt a value provided by the other side. Both sides prove knowledge of the user password, resulting in each proving its identity to the other side.

Authentication is completed using an SSL handshake. Once the handshake is completed, the communication channel between the DD Boost client and the protection system server is encrypted.

**two-way**
The DD Boost client requests authentication from the protection system server using the server certificate. The protection system server also requests authentication from the DD Boost client using the client certificate. After authentication through an SSL handshake, the communication channel between the DD Boost client and the protection system server is encrypted.

This is the most strongest level of authentication.

Kerberos authentication is as strong as two way authentication, but Kerberos authentication in DD Boost does not currently support encryption.

**kerberos**
The DD Boost client requests a Kerberos Ticket Granting Ticket (TGT) from the Key Distribution Center (KDC). When the client credentials are verified, the KDC sends a TGT to the DD Boost client. The DD Boost client then requests a Kerberos Ticket Granting Service...
(TGS) for the desired service. The KDC grants the TGS for the requested service to the DD Boost client.

ddboost clients del client-list
Delete clients from DD Boost client list. Role required: admin and limited-admin.

ddboost clients modify client-list [encryption-strength {none | medium | high} authentication-mode {one-way | two-way | two-way-password | anonymous | kerberos}]
Modify clients in the DD Boost client list. See the ddboost clients add command for a description of the command variables. If the encryption strength is none, only kerberos authentication-mode is supported. Kerberos is only available to clients running BoostFS. Role required: admin and limited-admin.

ddboost clients reset
Reset DD Boost client list to factory default. Role required: admin and limited-admin.

ddboost clients show active [all | client hostname | storage-unit | tenant-unit tenant-unit]
Show DD Boost client activity. Information displayed includes client hostname, client and server interface IP addresses, operation (read or write), mode, storage-unit, and tenant-unit. For read operations, mode can be compressed. For write operations, mode can be dsp and/or synthetic. Role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

Example 58

```
# ddboost clients show active all

<table>
<thead>
<tr>
<th>Client</th>
<th>Client</th>
<th>Server</th>
<th>Operation</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostname</td>
<td>Interface</td>
<td>Interface</td>
<td>---------</td>
<td>----</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------</td>
<td>------</td>
</tr>
<tr>
<td>ddboost-dl.datadomain.com</td>
<td>192.A.B.C</td>
<td>192.X.Y.Z</td>
<td>write</td>
<td>dsp</td>
</tr>
<tr>
<td><strong>NEW</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

ddboost clients show config
Show DD Boost client list. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 59

```
# ddboost clients show config

<table>
<thead>
<tr>
<th>Client</th>
<th>Encryption Strength</th>
<th>Authentication Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>bu_srv_1</td>
<td>high</td>
<td>one-way</td>
</tr>
<tr>
<td>bu_srv_2</td>
<td>high</td>
<td>two-way</td>
</tr>
<tr>
<td>bu_srv_3</td>
<td>high</td>
<td>anonymous</td>
</tr>
<tr>
<td><strong>NEW</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

See the ddboost clients add command for a description of Encryption Strength and Authentication Mode.
**ddboost destroy**

```
ddboost destroy
```
Delete all storage units from the protection system. The command permanently removes all data (files) contained in the storage units. You must also manually remove (expire) corresponding catalog entries in the backup software. Role required: admin.

**ddboost disable**

```
ddboost disable
```
Disable DD Boost. During the process of disabling DD Boost, all file replication transfers and read/write jobs are also disabled. Role required: admin, limited-admin, and security.

**ddboost enable**

```
ddboost enable
```
Enable DD Boost. If the user, user ID (UID), or group ID (GID) changes, the protection system updates all files and storage units the next time this command is run. Role required: admin and limited-admin.

**ddboost event**

```
ddboost event show [all | storage-unit storage-unit]
```
Show the event list for the specified local storage unit or all local storage units with a {replicate-from} association. Role required: admin, limited-admin, security, user, backup-operator, none.

Events formatted with the suffix `.event.nnnnnnn` have been processed but not yet deleted. Events formatted with the suffix `.imgset` have not yet been processed.

**Example 60**

```
# ddboost event show
DDBoost events:
test2:    bluemedia.emc.com_31234_6589_1.event.0000000000000006
192:rtp-ost-sparc1.emc.com_rtp-ost-dd670c2.emc.com_1328637954_1.imgset
```

**Output definitions (event.nnnnnnn)**

- **first media server**
  Hostname of the media server to which the event is first delivered. In the example: bluemedia.emc.com.

- **proc_id**
  Process identifier on the first media server to which the event is initially delivered. In the example: 31234.

- **thread_id**
  Thread identifier on the first media server to which the event is first delivered. In the example: 6589.
# images
Number of images contained in event. In the example: 1. Typically this number is 1 because only the IM image file is contained in an event.

**event**
Image set identifier. In the example: 0000000000000006.

**Output definitions (imgset)**

**job #**
NetBackup duplication job identifier. In the example: 192.

**source server**
Hostname of the NetBackup server. In the example: rtp-ost-sparc1.emc.com.

**source <protection> system**
Hostname of the protection system from where event originated. In the example: rtp-ost-dd670c2.emc.com.

**image date**
NetBackup image time stamp. In the example: 1328637954.

# images
Number of images contained in event. In the example: 1. Typically this number is 1 because only the IM image file is contained in an event.

**imgset**
Image set identifier.

### ddboost fc

**ddboost fc dfc-server-name reset**
Reset DD Boost Fibre Channel server name. Role required: admin and limited-admin.

**ddboost fc dfc-server-name set server-name**
Set DD Boost Fibre Channel server name. The default dfc-server-name has the format DFC-<base hostname>. Role required: admin and limited-admin.

**ddboost fc dfc-server-name show**
Show DD Boost Fibre Channel server name. Role required: admin, limited-admin, security, user, backup-operator, none.

**ddboost fc dump start logfile-id logfile-id [formatted] [snaplen bytes] [logfile-count-limit count] [logfile-size-limit bytes] [virtual-connection virtual-connection-id] [client-hostname hostname] [initiator initiator] [target-endpoint endpoint] [destination-tcp-port tcp-port]**
Start DD Boost Fibre Channel message tracing. Role required: admin and limited-admin.

**ddboost fc dump status**
Show DD Boost Fibre Channel message tracing. Role required: admin, limited-admin, security, user, backup-operator, none.

**ddboost fc dump stop**
Stop DD Boost Fibre Channel message tracing. Role required: admin and limited-admin.

**ddboost fc group add group-name initiator initiator-spec**
Add one or more initiators to a DD Boost Fibre Channel group. Role required: admin and limited-admin.
ddboost fc group add group-name device-set [count count] [endpoint {all | none | endpoint-list}] [disk]
Add one or more DD Boost devices to a DD Boost Fibre Channel group; if "disk" is not specified, then the default DFC device type ("Processor") is added. Valid range for count argument is 1-64. Role required: admin and limited-admin.

ddboost fc group create group-name
Create a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group del group-name initiator initiator-spec
Remove one or more initiators from a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group del group-name device-set {count count | all}
Remove one or more DD Boost devices from a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group destroy group-name
Destroy a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group modify group-name device-set [count count] [endpoint {all | none | endpoint-list}]
Modify a device set for a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group rename src-group-name dst-group-name
Rename a DD Boost Fibre Channel group. Role required: admin and limited-admin.

ddboost fc group show detailed group-spec [initiator initiator-name]
Show details of DD Boost Fibre Channel groups. Output includes information on device names, system addresses, LUNs, and endpoints. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost fc group show list [group-spec] [initiator initiator-name]
Display a list of configured DD Boost Fibre Channel groups. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost fc show detailed-stats
Show DD Boost Fibre Channel detailed statistics. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost fc show stats [endpoint endpoint-spec | initiator initiator-spec] [interval interval] [count count]
Show DD Boost Fibre Channel detailed statistics periodically based on filter. The interval is an optional number of seconds with a minimum of 1 and a maximum of 4294967295. The count is an optional ordinal value with a minimum of 1 and a maximum of 4294967295. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost fc status
Show DD Boost Fibre Channel status. Output includes information on admin state and process state. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost fc trace disable [component {all | component-list}]
Disable DD Boost Fibre Channel tracing. Role required: admin and limited-admin.

ddboost fc trace enable [component {all | component-list}] [level {all | high | medium | low}]
Enable DD Boost Fibre Channel tracing. Role required: admin and limited-admin.

ddboost fc trace show [component {all | component-list}]
Show DD Boost Fibre Channel trace status. Role required: admin, limited-admin, security, user, backup-operator, none.
ddboost file-replication

ddboost file-replication option reset {low-bw-optim | encryption | ipversion}
Reset to default file-replication options. Reset low-bandwidth optimization or encryption to the
default value (disabled). Reset IP version to the default value (ipv4). Role required: admin and
limited-admin.

ddboost file-replication option set encryption {enabled [authentication-mode {one-way | two-way | anonymous}] | disabled}
Enable or disable encrypted data transfer for DD Boost file-replication. This command must be
tered on both systems—the source system and the destination (target) system.
The authentication-mode parameter is optional. If encryption is enabled, the default
authentication mode is anonymous.

One-way and two-way authentication require the configuration of mutual trust on both the source
and destination systems. Run the adminaccess trust add host hostname[type mutual] command to configure mutual trust.
Role required: admin and limited-admin.

ddboost file-replication option set ipversion {ipv4 | ipv6}
Set the preferred IP version for DD Boost file-replication. If the ipversion option is ipv6, IPv6 is the
preferred IP address type for managed file-replication. If the ipversion option is ipv4, then IPv4 is
the preferred IP address type for managed file-replication. If a preferred IP address is not
specified, the default is IPv4. Role required: admin and limited-admin.

Note: If necessary, check the IP version of the destination system to ensure that it is set as
desired.

ddboost file-replication option set low-bw-optim {enabled | disabled}
Enable or disable low bandwidth optimization for DD Boost. This command must be entered on
both systems—the source system and the destination (target) system. Default setting is disabled.
Role required: admin and limited-admin.

ddboost file-replication option show [encryption]
Show state of encryption: enabled or disabled. Role required: admin, limited-admin, security, user,
backup-operator, none.

ddboost file-replication option show [ipversion]
Show IP version options: IPv4 or IPv6. Role required: admin, limited-admin, security, user, backup-
operator, none.

ddboost file-replication option show [low-bw-optim]
Show state of low bandwidth optimization: enabled or disabled. Role required: admin, limited-
admin, security, user, backup-operator, none.

ddboost file-replication reset stats
Clear file-replication statistics when DD Boost is enabled. Role required: admin and limited-admin.

ddboost file-replication show active [all | storage-unit storage-unit | tenant-unit tenant-unit]
Show the status of a DD Boost file-replication to destination protection systems. Output for low-
bandwidth optimization shows the function as enabled and running, or as enabled/off which means
a configuration mismatch with the other side. In addition, the output shows the filenames for both
the source and destination. Role required: admin, limited-admin, security, user, backup-operator,
none, tenant-admin, tenant-user.

ddboost file-replication show detailed-file-history [all | storage-unit storage-unit | tenant-unit tenant-unit] [duration duration(day | hr)]
Show a detailed, file-based replication history. Data for each file name is organized by date, time, and direction (outbound or inbound). The remote hostname is included in the output. The duration of the day and hour must be entered without a space, for example, 10day or 5hr. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

```
ddboost file-replication show detailed-history [all | storage-unit storage-unit] [duration duration{day | hr}] [interval interval {hr}]
```

Show a detailed, cumulative view of file-replication history. Data is organized by date, time, and direction (outbound or inbound). The duration of the day and hour must be entered without a space, for example, 10day or 5hr. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

```
ddboost file-replication show file-history [all | storage-unit storage-unit | tenant-unit tenant-unit] [duration duration{day | hr}]
```

Show the data-transfer history of inbound and outbound traffic for files in the system. The remote hostname is included in the output. The duration of the day and hour must be entered without a space, for example, 10day or 5hr. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

```
Note: There is a discrepancy between the network bytes output of the CLI and the network bytes output of the GUI. This is because the CLI reports only one direction of network bytes for Network (KB) and the GUI reports the sum of network_bytes_in + network_bytes_out for Network Bytes (MiB).
```

```
ddboost file-replication show history [all | storage-unit storage-unit] [duration duration{day | hr}] [interval interval [hr]]
```

Show the data transfer history between the source and destination protection systems. The duration of the day and hour must be entered without a space, for example, 10day or 5hr. The output shows the filenames for both the source and destination. Role required: admin, limited-admin, security, user, backup-operator, none.

```
ddboost file-replication show performance [interval sec] [count count]
```

Show in real time the amount of pre-compressed outbound and inbound data compared to network throughput or post-compressed data. The count displays the number of lines equal to the count value. Output is shown for the specified interval. If no count is specified, the output continues indefinitely until interrupted by ^C. If no interval is specified, the output is updated every 2 seconds. Role required: admin, limited-admin, security, user, backup-operator, none.

**Example 61**

The following example displays the output of a protection system which is the source and is replicating to another protection system. Therefore, the source is set only for outgoing replication. For some of the time periods shown, no data was actually sent. If inbound replication traffic was set, then the columns under inbound would be filled in similarly. The `ddboost file-replication show performance` command is used without any options:

```
# ddboost file-replication show performance
01/14 08:48:05

<table>
<thead>
<tr>
<th></th>
<th>Outbound</th>
<th>Inbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-comp (KB/s)</td>
<td>Network (KB/s)</td>
<td>Pre-comp (KB/s)</td>
</tr>
<tr>
<td>165521</td>
<td>442</td>
<td>-</td>
</tr>
<tr>
<td>2245638</td>
<td>6701</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>906275</td>
</tr>
<tr>
<td>1280554</td>
<td>3801</td>
<td>-</td>
</tr>
</tbody>
</table>
```
Example 61 (continued)

Note: Managed file replication statistics are populated under the `ddboost file-replication show performance` command and kept separate from the backup and restore stream stats.

```
ddboost file-replication show stats
```
Monitor outbound and inbound traffic on a protection system during replication. Compression ratio increases when low-bandwidth optimization is enabled. Role required: admin, security, user, backup-operator, none.

**Note:** Managed file replication statistics are populated under the `ddboost file-replication show stats` command and kept separate from the backup and restore stream stats.

Example 62

The following example displays the output of a protection system which is logging the inbound replication traffic:

```
# ddboost file-replication show stats
Direction:                                Outbound
Network bytes sent:                       0
Pre-compressed bytes sent:                0
Bytes after synthetic optimization:       0
Bytes after filtering:                    0
Bytes after low bandwidth optimization:   0
Bytes after local compression:            0
Compression ratio:                        0

Direction:                                Inbound
Network bytes received:                   292,132,082,144
Pre-compressed bytes received:            36,147,804,001,570
Bytes after synthetic optimization:       36,147,804,001,570
Bytes after filtering:                    1,664,434,329,750
Bytes after low bandwidth optimization:   1,664,434,329,750
Bytes after local compression:            179,887,419,678
Compression ratio:                        123.7
```

**ddboost ifgroup**

```
ddboost ifgroup add group_name {interface {ipaddr | ipv6addr} | client host}
```

Dell EMC DD OS Command Reference Guide
Add an interface, client, or both to group-name or to the default group. Prior to adding an interface you must create the group-name unless the group name is the default group. Role required: admin, limited-admin.

This command provides full ifgroup support for static IPv6 addresses, providing the same capabilities for IPv6 as for IPv4. Concurrent IPv4 and IPv6 client connections are allowed. A client connected with IPv6 sees IPv6 ifgroup interfaces only. A client connected with IPv4 sees IPv4 ifgroup interfaces only. Individual ifgroups include all IPv4 addresses or all IPv6 addresses. The default group behaves in the same manner as any other group.

- The group-name “default” is created during an upgrade of a fresh install and is always used if group-name is not specified.
- You can enforce private network connectivity, ensuring that a failed job does not reconnect on the public network after network errors. When interface enforcement is enabled, a failed job can only retry on an alternative private network IP address. Interface enforcement is only available for clients that use ifgroup interfaces.

Interface enforcement is off (FALSE) by default. To enable interface enforcement, you must add the following setting to the system registry:

```system.ENFORCE_IFGROUP_RW=TRUE```

After you've made this entry in the registry, you must do a `filesys restart` for the setting to take effect. For more information, see the DD Boost for Partner Integration Administration Guide or the DD Boost for OpenStorage Administration Guide.

- An ifgroup client is a member of a single ifgroup group-name and may consist of a fully qualified domain name (FQDN) such as `ddboost.datadomain.com`, wild cards such as `*.datadomain.com` or `*`, a short name such as `ddboost`, or IP range of the client (`xx.xx.xx.0/24` for IPv4 or `xxxx::0/112` for IPv6, for example). When a client's source IP address is evaluated for access to the ifgroup, the order of precedence is:
  1. IP address of the connected protection system
  2. Connected client IP range. This host-range check is useful for separate VLANs with many clients where there isn't a unique partial hostname (domain). For IPv4, 16, 20, 24, 28, and 32 bit masks are supported. For IPv6, 64, 112, and 128 bit masks are supported.
  3. Client Name: `abc-11.dl.com`
  4. Client Domain Name: `*.dl.com`
  5. All Clients: `*`

If none of these checks find a match, ifgroup interfaces are not used for this client.

For detailed information about this order of precedence, see the DD Boost for Partner Integration Administration Guide or the DD Boost for OpenStorage Administration Guide.

- By default, the maximum number of groups is eight. It is possible to increase this number by editing the system registry and rebooting.

Additionally, the IP address must be configured on the protection system and its interface must be enabled. You can add public or private IP addresses for data transfer connections. After adding an IP address as an interface, you can enable advanced load balancing and link failover.

See the DD Boost for Partner Integration Administration Guide or the DD Boost for OpenStorage Administration Guide, and the DD OS Administration Guide for more information on interface groups.
and wildcard hostnames indicated by an asterisk may also be used. Reserved group names that
cannot be used are default, all, or none. Role required: admin, limited-admin.

damoto ifgroup del group_name {interface (ipaddr | ipv6addr) | client host}

| Note: This command is deprecated. An alternative command is ifgroup del group_name. |

Remove an interface, client, or both from group_name or default group. Deleting the last IP
address interface disables the ifgroup. If this is the case, you have the option of terminating this
command option. Role required: admin, limited-admin.

damoto ifgroup destroy group-name

| Note: This command is deprecated. An alternative command is ifgroup destroy group_name. |

Destroy the group name. Only empty groups can be destroyed. Interfaces or clients cannot be
destroyed but may be removed sequentially or by running the command option ddamoto ifgroup
reset group-name. Role required: admin, limited-admin.

| Note: The group-name “default” cannot be destroyed. |

damoto ifgroup disable group-name

| Note: This command is deprecated. An alternative command is ifgroup disable group_name. |

Disable a specific group by entering the group-name. If group-name is not specified, the command
applies to the default group. Role required: admin, limited-admin.

damoto ifgroup enable group-name

| Note: This command is deprecated. An alternative command is ifgroup enable group_name. |

Enable a specific group by entering the group-name. If group-name is not specified, the command
applies to the default group. Role required: admin, limited-admin.

damoto ifgroup rename source-group-name destination-group-name

| Note: This command is deprecated. An alternative command is ifgroup rename. |

Rename the ifgroup source-group-name to destination-group-name. This command option does
not require disabling the group. The default group cannot be renamed. Role required: admin,
limited-admin.

damoto ifgroup reset group-name

| Note: This command is deprecated. An alternative command is ifgroup reset group_name. |

Reset a specific group by entering the group-name. If group-name is not specified, the command
applies to the default group. Role required: admin, limited-admin.

damoto ifgroup show config {interfaces | clients | groups | all} [group-name]

| Note: This command is deprecated. An alternative command is ifgroup show config. |

Display selected configuration options. If no selection is made, all information about the specified
group-name is shown. Role required: admin, limited-admin, security, user, backup-operator, none.

If group-name is not specified, information for all the groups is shown. Select the all argument to
view configuration options of all groups. All users may run this command option.

damoto ifgroup status group-name

| Note: This command is deprecated. |
Show status of the specified group-name: enabled or disabled. Role required: admin, limited-admin, security, user, backup-operator, none.

If group-name is not specified, status for the default group is shown. All users may run this command option.

ddboost option

ddboost option reset {distributed-segment-processing | virtual-synthetics | fc | global-authentication-mode | global-encryption-strength}
Reset distributed segment processing and virtual synthetics to the default option of enabled. Reset Fibre Channel to the default option of disabled. Reset global authentication mode and global encryption strength to the default value "none." Due to dependencies between these two global values, both global values are reset to "none" when either is reset. Role required: admin, limited-admin.

ddboost option set distributed-segment-processing {enabled | disabled}
Enable or disable the distributed segment processing feature on DD Boost. Role required: admin, limited-admin.

ddboost option set fc {enabled | disabled}
Enable or disable Fibre Channel for DD Boost. Role required: admin, limited-admin.

ddboost option set global-authentication-mode {none | two-way | two-way-password} global-encryption-strength {none | medium | high}
Enables and sets global authentication and encryption mode and strength. Due to dependencies, both options must be set at once. Encryption can be “none” only if authentication is “none.” Setting the global authentication mode and encryption strength establishes minimum levels of authentication and encryption that all connection attempts by all clients must meet or surpass. Clients attempting to connect at levels less than either of these values will be blocked.

You should also note the following:

- The global authentication mode and the global encryption strength options override any client specific values if the global values are higher.
- If client settings are defined for a particular client or group of clients and the client settings are stronger than the global settings, the client settings will be the minimum required in order to make a connection.
- If the client settings are lower than the global values, the global values will be required in order to make a connection.

ddboost option set virtual-synthetics {enabled | disabled}
Enable or disable the virtual synthetics feature on the DD Boost. Role required: admin, limited-admin.

ddboost option show [distributed-segment-processing | virtual-synthetics | fc | global-authentication-mode | global-encryption-strength]
Show status of distributed segment processing, virtual synthetics, Fibre Channel, global authentication, or global encryption. If no argument is specified, status for all arguments are shown. Status is enabled or disabled. Default is enabled for distributed segment processing and virtual synthetics. Default is disabled for Fibre Channel. All users may run this command. Default is "none" for both global authentication mode and global encryption strength. Role required: admin, limited-admin, security, user, backup-operator, none.

ddboost option show global-authentication-mode | global-encryption-strength
Shows global authentication and encryption mode and strength.
ddboost reset

**ddboost reset stats**
Reset statistics when DD Boost is enabled, or as a network recovery procedure to clear job connections after the network connection is lost. Role required: admin, limited-admin.

**ddboost reset user-name user-name**
This command is deprecated. Use `ddboost user unassign` command instead. Role required: admin, limited-admin.

ddboost set

**ddboost set user-name user-name**
This command is deprecated. Use `ddboost user assign` command instead. Role required: admin, limited-admin.

**Note:** The `ddboost user assign` command will be the default command to create users for DD Boost storage units.

ddboost show

**ddboost show connections [detailed]**
Show DD Boost active clients and client connections. Client information includes name, idle status, plug-in version, OS version, application version, encryption, DSP, and transport. Using the detailed option provides CPU and memory data. Role required: admin, limited-admin, security, user, backup-operator, none.

**Note:**
- When DD Boost Fibre Channel is enabled, connections are listed in the category Interfaces and are named DDBOOST_FC. The ifgroup Group Name category does not apply to DD Boost Fibre Channel; therefore, the group name is listed as n/a.
- AIR replication job count will be displayed as a Src-repl job in the output of a `ddboost show connections` command, the same as other NetBackup and Backup Exec optimized duplication jobs.
- Both the control connection for file replication and the actual replication interfaces are displayed.

**ddboost show histogram**
Display a DD Boost histogram for the protection system. Role required: admin, security, user, backup-operator, none.

The DD Boost histogram table lists the set of protocol requests sent from a DD Boost client to the protection system. The table shows how many of each request were sent from the client, how many were responded to with an error code, and the processing time broken down in specific intervals. This table is used primarily by Dell EMC field engineers to isolate configuration or performance issues.

**Note:** A protocol message with an error count may not indicate a problem. For example, a DDP_LOOKUP with a high error count may just mean that the application issued a request to find a file before creating it simply to verify that the file didn't already exist.
Output definitions

mean
   The mathematical mean time for completion of the operations, in milliseconds.

std-dev
   The standard deviation for time to complete operations, derived from the mean time, in milliseconds.

<1ms
   The number of operations that took less than 1 millisecond.

<5ms
   The number of operations that took between 1 milliseconds and 5 milliseconds.

<10ms
   The number of operations that took between 5 milliseconds and 10 milliseconds.

<100ms
   The number of operations that took between 10 milliseconds and 100 milliseconds.

<1s
   The number of operations that took between 100 milliseconds and 1 second.

<10s
   The number of operations that took between 1 second and 10 seconds.

>10s
   The number of operations that took more than 10 seconds.

total
   The total time taken for a single operation, in milliseconds.

max
   The maximum time taken for a single operation, in milliseconds.

min
   The minimum time taken for a single operation, in milliseconds.

Example 63

```bash
# ddboost show histogram
07/23 09:43:16

--------------------------------------------------------------
OPER        mean    std-dev   <1ms    <5ms   <10ms  <100ms ...
--------------------------------------------------------------
...          
DDP_GETATTR 0.00ms   0.00ms      0       0       0       0 ... 
DDP_LOOKUP  3.34ms  29.17ms  13389     126     137     617 ... 
DDP_WRITE   0.30ms   4.98ms  125...   5048    1776    1502 ...
...          

ddboost show stats [ interval seconds ] [count count]
Show DD Boost statistics. The interval is an optional number of seconds with a minimum of 1 and a maximum of 4294967295. The count is an optional ordinal value with a minimum of 1 and a
maximum of 4294967295. Role required: admin, limited-admin, security, user, backup-operator, none.

Output varies depending on which options are specified.

**Example 64**

This example shows the default output when neither interval nor count is specified:

```
# ddboost show stats
07/08 14:54:09

DD Boost statistics:

<table>
<thead>
<tr>
<th>OPER</th>
<th>Total</th>
<th>Failed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDP_GETATTR</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_LOOKUP</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_ACCESS</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_READ</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_WRITE</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_CREATE</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_REMOVE</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_READDIR</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_FSSTAT</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_REPL_START</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_REPL_STOP</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_REPL_STATUS</td>
<td>0</td>
<td>[0]</td>
</tr>
<tr>
<td>DDP_QUERY</td>
<td>12</td>
<td>[0]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Count</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image creates</td>
<td>0</td>
</tr>
<tr>
<td>Image deletes</td>
<td>0</td>
</tr>
<tr>
<td>Pre-compressed bytes received</td>
<td>0</td>
</tr>
<tr>
<td>Bytes after filtering</td>
<td>0</td>
</tr>
<tr>
<td>Bytes after local compression</td>
<td>0</td>
</tr>
<tr>
<td>Network bytes received</td>
<td>0</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>0.0</td>
</tr>
<tr>
<td>Total bytes read</td>
<td>0</td>
</tr>
<tr>
<td>Token Access</td>
<td>Count</td>
</tr>
<tr>
<td>Connected using secure token</td>
<td>0</td>
</tr>
<tr>
<td>Exceptions</td>
<td>Count</td>
</tr>
<tr>
<td>Key Not Found</td>
<td>0</td>
</tr>
<tr>
<td>Failed to Decrypt</td>
<td>0</td>
</tr>
<tr>
<td>Version Failure</td>
<td>0</td>
</tr>
<tr>
<td>UID Failure</td>
<td>0</td>
</tr>
<tr>
<td>GID Failure</td>
<td>0</td>
</tr>
<tr>
<td>Invalid Start Time</td>
<td>0</td>
</tr>
<tr>
<td>Expired Token</td>
<td>0</td>
</tr>
<tr>
<td>Invalid Client</td>
<td>0</td>
</tr>
<tr>
<td>Invalid Serial Number</td>
<td>0</td>
</tr>
<tr>
<td>Path Failure</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**Example 65**
Example 65 (continued)

This example shows the output when both interval and count are specified:

```
# ddboost show stats interval 10 count 5
08/11 06:13:34
Backup  Post-comp  Network  Restore  Network  Backup
Restore KB/s Written KB/s In KB/s KB/s Out KB/s Conn Conn
------ --------------- -------- -------- ------------- ------- -------
0      0             0        0        0             0        0
0      0             0        0        0             0        0
0      0             0        0        0             0        0
0      0             0        0        0             0        0
0      0             0        0        0             0        0
```

ddboost show user-name

This command is deprecated. Use ddboost user show command instead. Role required: admin, limited-admin, security, user, backup-operator, none.

The output will display the default DD Boost user if one is configured, otherwise, the output will display that there is no default user.

ddboost status

ddboost status

Display status of DD Boost: enabled or disabled. Role required: admin, limited-admin, security, user, backup-operator, none.

Note: A special license, BLOCK-SERVICES-PROTECTPOINT, is available to enable clients using ProtectPoint block services to have DD Boost functionality without a DD Boost license. If DD Boost is enabled for ProtectPoint clients only—that is, if only the BLOCK-SERVICES-PROTECTPOINT license is installed—the output of the ddboost status command is: DD Boost status: enabled for ProtectPoint only. If both licenses are installed, the output is unchanged: DD Boost status: enabled.

ddboost storage-unit

ddboost storage-unit create storage-unit user user-name [tenant-unit tenant-unit] [quota-soft-limit n MiB|GiB|TiB|PiB] [quota-hard-limit n MiB|GiB|TiB|PiB] [report-physical-size n MiB|GiB|TiB|PiB] [write-stream-soft-limit n] [read-stream-soft-limit n] [repl-stream-soft-limit n] [combined-stream-soft-limit n] [combined-stream-hard-limit n]

Create a storage unit, assign tenant, and set quota and stream limits. Role required: admin, limited-admin.

Note: If the quota feature is not enabled, the quota is created but a message appears stating the feature is disabled and quota limits are not enforced.
Note: The tenant-unit option is introduced for integration with the Secure Multi-Tenancy (SMT) feature. If a tenant-unit is specified, and the storage-unit user has a role other than none, the command fails. To remove a user's association with a tenant-unit, use the `ddboost storage-unit modify` command and set the tenant-unit value to none. For more information about SMT, refer to the DD OS Administration Guide.

Storage unit names can be up to 50 characters. Naming conventions for creating storage units include uppercase and lowercase letters—A-Z and a-z, numbers 0–9, embedded space, comma, period, exclamation mark, hash mark, dollar sign, percent sign, plus sign, at sign, equal sign, ampersand, semi colon, caret, tilde, left and right parentheses, left and right brackets, left and right braces.

You can assign four types of soft stream warning limits against each storage-unit (read, write, replication, and combined), and you can assign a combined hard stream limit. Assigning a hard stream limit per storage-unit enables you to fail new DD Boost streams when the limit is exceeded, including read streams, write streams, and replication streams. The hard stream limit is detected before the stream operation starts. The hard stream limit cannot exceed the capacity of the protection system model, and it cannot be less than any other single limit (read, write, replication, or combined).

The following example shows how to create a storage unit with stream limits:

```
# ddboost storage-unit create NEW_STU0 user user2 write-stream-soft-limit 5
read-stream-soft-limit 1 repl-stream-soft-limit 2 combined-stream-hard-limit 10
Created storage-unit "NEW_STU0" for "user2".
Set stream warning limits for storage-unit "NEW_STU0".
```

Quotas may cause OpenStorage backup applications to report unexpected sizes and capacities. See Knowledge Base article 85210, available on the Online Support website.

```
ddboost storage-unit delete storage-unit
Delete a specified storage unit, its contents, and any DD Boost associations. The deleted storage-unit retains its old name and is shown as deleted in the MTree list. Role required: admin.

This command fails to delete the specified storage-unit if there is a data movement policy that is configured on the storage-unit, or a data movement operation is in progress when the delete command is issued. Abort the data movement operation, remove the data movement policy, then delete the storage-unit.
```

Note: You must also manually remove (expire) corresponding catalog entries from the backup application.

```
ddboost storage-unit modify storage-unit [user user-name] [tenant-unit [tenant-unit | none]] [quota-soft-limit {n {MiB|GiB|TiB|PiB} | none}] [quota-hard-limit {n {MiB|GiB|TiB|PiB} | none}] [report-physical-size {n {MiB|GiB|TiB|PiB} | none}] [write-stream-soft-limit {n | none}] [read-stream-soft-limit {n | none}] [repl-stream-soft-limit {n | none}] [combined-stream-soft-limit {n | none}] [combined-stream-hard-limit {n | none}]
Modify storage-unit user, tenant, and quota and stream limits. Specifying none for any parameter disables that parameter. Role required: admin, limited-admin.
```

Note: If a tenant-unit value other than none is specified, and the storage-unit user has a role other than none, the command fails. To remove a user's association with a tenant-unit, set the tenant-unit value to none.

The following example shows how to modify the stream limits for a storage unit:

```
# ddboost storage-unit modify NEW_STU1 write-stream-soft-limit 3
read-stream-soft-limit 2 repl-stream-soft-limit 1 combined-stream-hard-limit 8
NEW_STU1: Stream soft limits: write=3, read=2, repl=1, combined=none
```
If DD Boost storage units are replicated with MTree or collection replication, each storage unit on the target must have the DD Boost user added with the command `ddboost storage-unit modify` before being accessed by the Boost backup software. The following example sets the user of the storage unit `STU1` to `ostuser`.

```
# ddboost user show
ostuser
Assuming storage-unit STU1
# ddboost storage-unit modify STU1 user ostuser
```

The example below shows that a nonexistent storage-unit cannot be modified:

```
# ddboost storage-unit modify hello user user5
**** Failed to find storage-unit
```

```
ddboost storage-unit rename storage-unit new-storage-unit
```

Rename a storage-unit while maintaining its:

- Username ownership
- Stream limit configuration
- Capacity quota configuration and physical reported size
- AIR association on the local protection system

Role required: admin, limited-admin.

**Note:**
- A DD Boost association on a remote host must be modified manually.
- You cannot use this command to rename an MTree.

The example below shows the renaming of a storage-unit:

```
# ddboost storage-unit rename task1 tasking1
storage-unit "task1" renamed to "tasking1".
```

```
ddboost storage-unit show [compression] [storage-unit] [tenant-unit]
```

List storage-units assigned to tenant-unit and images in a storage-unit. Displays the compression for all storage units (the original byte size, global and local compression) or the filenames in a specified storage unit. The list of files in a storage unit is shown in the output only if a storage unit name is specified. This command can filter on a specific storage-unit or tenant-unit. Deleted storage-units have a status of `D`. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

The example below displays the list of storage-units:

```
# ddboost storage-unit show
Name               Pre-Comp (GiB) Status   User       Report Physical
-----------------   -------------   ------   --------   ---------------
backup                         3.0   RW       sysadmin                 -
DDBOOT_STRESS_SU             60.0   RW       sysadmin                 -
task2                          0.0   RW       sysadmin                 -
tasking1                       0.0   RW       sysadmin                 -
DD1                            0.0   RW       sysadmin                 -
D6                             5.0   RW       sysadmin                 -
TEST_DEST                      0.0   D        sysadmin                 -
STU-NEW                        0.0   D        ddu1                     -
getevent                       0.0   RW       ddu1                     -
DDP-5-7                        120.0  RW       sysadmin                 -
TESTME                        150.0  RW       sysadmin                 -
DDP-5-7-F                     100.0  RW       sysadmin                 -
testSU                         0.0   RW       sysadmin               200
-----------------   -------------   ------   --------   ---------------
D    : Deleted
Q    : Quota Defined
```
ddboost storage-unit undelete storage-unit

Recover a deleted storage-unit including its:

- Username ownership
- Stream limit configuration
- Capacity quota configuration and physical reported size
- AIR association on the local protection system

Role required: admin, limited-admin.

**Note:**
- Deleted storage units are available until the next `filesys clean` command is run.
- You cannot use this command to restore an Mtree.
- You cannot use this command to restore a storage unit that is deleted using the DD Boost SDK. To recover a storage unit that is deleted using the DD Boost SDK:
  
  1. Type `mtree show` to determine which deleted MTree is the storage unit to be undeleted. To help identify it, the first 32 characters of the original storage unit name are included in MTree name, in the following format: `deleted-original-su-name-xxxxxxxxxx`, where `xxxxxxxxxx` is a timestamp in ms. If this is not sufficient, look in `messages.engineering` to find the renamed value.
  
  2. Type `ddboost storage-unit undelete deleted-mtree-name`, using the mtree name identified in step 1.
  
  3. Type `ddboost rename deleted-mtree-name original-su-name`.

The example below shows the recovery of a deleted storage-unit:

```
# ddboost storage-unit undelete task1
Storage-unit "task1" undeleted successfully.
```

### ddboost streams

ddboost streams show active [all | storage-unit storage-unit | tenant- unit tenant-unit]

Display active streams per storage-unit. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

```
# ddboost streams show active storage-unit STU-1

<table>
<thead>
<tr>
<th>Name</th>
<th>Read</th>
<th>Write</th>
<th>Repl-out</th>
<th>Repl-in</th>
<th>Read</th>
<th>Write</th>
<th>Repl</th>
<th>Combined</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>STU-1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

DD System Stream Limits: read=30 write=90 repl-in=90 repl-out=82 combined=90
```

**Note:** The DD system stream limits above are based on the type of the DD system.

You can assign four types of soft stream warning limits against each storage-unit (read, write, replication, and combined), and you can assign a combined hard stream limit. Assigning a hard stream limit per storage-unit enables you to fail new DD Boost streams when the limit is exceeded, including read streams, write streams, and replication streams. The hard stream limit is detected before the stream operation starts. The hard stream limit cannot exceed the capacity of the
A protection system model, and it cannot be less than any other single limit (read, write, replication, or combined).

When any stream count exceeds the warning limit quota, an alert is generated. The alert automatically clears once the stream limit returns below the quota for over 10 minutes.

**Note:** DD Boost users are expected to reduce the workload to remain below the stream warning quotas or the system administrator can change the warning limit configured to avoid exceeding the limit.

To create a storage unit with stream limits, enter:
```
# ddboost storage-unit create NEW_STU0 user user2 write-stream-soft-limit 5 read-stream-soft-limit 1 repl-stream-soft-limit 2 combined-stream-hard-limit 10
Created storage-unit "NEW_STU0" for "user2".
```

Set stream warning limits for storage-unit "NEW_STU0".

To modify the stream limits for storage units, enter:
```
# ddboost storage-unit modify NEW_STU1 write-stream-soft-limit 3 read-stream-soft-limit 2 repl-stream-soft-limit 1 combined-stream-hard-limit 8
NEW_STU1: Stream soft limits: write=3, read=2, repl=1, combined
```

```
ddboost streams show history {storage-unit storage-unit | tenant-unit tenant-unit} [interval {1 | 10 | 60 | 1440}] [lastn {hours | days | weeks | months} | start MMDDhhmm[[CC]YY] [end MMDDhhmm[[CC]YY]]]
```

Display streams history per storage-unit or a list of storage-units associated with a tenant-unit. The interval is expressed in minutes, and it must be 1, 10, 60, or 1440. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

**Example 66**
```
# ddboost streams show history storage-unit stu1 interval 10 last 1hours
INTERVAL: 10 mins
"-" indicates that the data is not available for the intervals

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>read</th>
<th>write</th>
<th>repl-out</th>
<th>repl-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013/08/29</td>
<td>12:00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>12:10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>12:20</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>12:30</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>12:40</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>12:50</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013/08/29</td>
<td>13:00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

```
# ddboost streams show history storage-unit stu12
Storage-unit /data/col1/stu12 not configured
```

**ddboost user**

```
ddboost user assign user-name-list
```

Assign protection system users to the list of recognized DD Boost users. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

This command is typically used for applications that create storage-units through the DD Boost SDK APIs.
Note: When a storage-unit is created with a valid protection system local user that is not assigned to DD Boost, the user is automatically added to the DD Boost user list.

Example 67

```bash
# ddboost user assign user1 user2
User "user1" assigned to DD Boost.
User "user2" assigned to DD Boost.

# ddboost user show
DD Boost user
------------
user1
user2
------------

# ddboost user unassign user1
User "user1" unassigned from DD Boost.
```

ddboost user option reset user-name [default-tenant-unit]

Unassign DD Boost user user-name from default tenant-unit. This command removes DD Boost user user-name from the list of valid users for DD Boost. However, this command does not unassign a user if the user is still the owner of a storage-unit. Role required: admin, limited-admin.

ddboost user option set user default-tenant-unit tenant-unit

Set the default tenant-unit for the specified DD Boost user. When a storage-unit is created with a user, the tenant-unit is automatically associated with that user. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

Note: The role of the user must be none.

Example 68

The following output displays how to set the tenant-units when working with SMT. (The default tenant-unit is displayed only when SMT is enabled.)

```bash
# smt tenant-unit create tu2
Tenant-unit "tu2" created.

# ddboost user option set user2 default-tenant-unit tu2
Default-tenant-unit is set to "tu2" for user "user2".

# ddboost user show
DD Boost user  Default tenant-unit
------------   -------------------
user2          tu2
------------   -------------------

# ddboost user option reset user2
Default-tenant-unit is reset for user "user2".
```
ddboost user revoke token-access user-name-list
Revoke the token-key for users on the list. Role required: admin, limited-admin.

Example 69

```bash
# ddboost user revoke token-access boostuser1 boostuser2
Revoked token access for user "boostuser1".
Revoked token access for user "boostuser2".
```

ddboost user show user [default-tenant-unit tenant-unit]
List DD Boost users and, if SMT is enabled, their default tenant-units. This command also shows whether users have token access. You can use the ddboost user assign command or the ddboost storage-unit create user command to assign users. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

Example 70

```bash
# ddboost user show

<table>
<thead>
<tr>
<th>DD Boost user</th>
<th>Default tenant-unit</th>
<th>Using Token Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>ddbu1</td>
<td>Unknown</td>
<td>Yes</td>
</tr>
<tr>
<td>ddbu2</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>ddbu3</td>
<td>Unknown</td>
<td>Yes</td>
</tr>
<tr>
<td>ddbu4</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>ddbu5</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>ddbu6</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>ddbu7</td>
<td>Unknown</td>
<td>Yes</td>
</tr>
<tr>
<td>ddbu8</td>
<td>Unknown</td>
<td>-</td>
</tr>
</tbody>
</table>
```

ddboost user unassign user-name
Unassign a user from the DD Boost user list. This command deletes the user from the DD Boost users list. A user can only be deleted when it does not own any storage-units. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

Note: The ddboost user unassign command does not validate the DD Boost user, it only looks to see if the user has been previously assigned to the DD Boost users list.

Example 71

If the administrator is trying to delete a specific user named user4, who has not been previously assigned to the users list, by either using the ddboost user unassign or ddboost user option reset command, then the following output will display that this user is not assigned to the DD Boost users list:

```bash
# ddboost user unassign user4
*** User "user4" is not assigned to DD Boost.

# ddboost user option reset tenant4
*** User "tenant4" is not assigned to DD Boost.
```
CHAPTER 15
disk

The disk command manages disks and displays disk locations, logical (RAID) layout, usage, and reliability statistics. Each protection system reports the number of disks in the system. For a protection system with one or more external disk shelves, commands also include entries for enclosures and disks.

This chapter contains the following topics:

- disk change history ................................................................. 144
- disk beacon ........................................................................... 144
- disk fail .................................................................................. 144
- disk multipath ......................................................................... 145
- disk port ................................................................................ 145
- disk release ............................................................................ 146
- disk rescan ............................................................................ 146
- disk reset ............................................................................... 146
- disk set .................................................................................. 147
- disk show ............................................................................... 147
- disk status ............................................................................. 152
- disk unfail ............................................................................. 153
**disk change history**

There have been no changes to this command in this release.

**disk beacon**

disk beacon (enclosure-id.disk-id | serialno)

Cause the LEDs associated with the specified disk to flash. Use this command to verify communications with a disk or to identify which physical disk corresponds to a disk ID.

The LEDs that flash are the LEDs that signal normal operation on the target disk and the IDENT LEDs for the enclosure and the controller. The power supply IDENT LEDs also flash on DS60 enclosures. Press Ctrl-C to stop the flash. To display disk identification information, enter disk show hardware. To beacon all disks in an enclosure, type enclosure beacon. Role required: admin, limited-admin.

**disk fail**

disk fail enclosure-id.disk-id

Fail a disk and force reconstruction. To display disk identification information, enter disk show hardware. Role required: admin, limited-admin.
disk multipath

disk multipath option reset {monitor}
Disable multipath configuration monitoring. When disabled, failures in paths to disk devices do not
generate alerts. Multipath configuration monitoring is disabled by default. Role required: admin,
limited-admin.

disk multipath option set monitor {enabled | disabled}
Enable multipath configuration monitoring. When enabled, failures in paths to disk devices
generate alerts and log multipath events. If monitoring is disabled, multipath event logging is not
performed, meaning disk multipath show history is not updated. Multipath configuration
monitoring is disabled by default. Role required: admin, limited-admin.

disk multipath option show
Show the configuration of multipath monitoring. Role required: admin, limited-admin, security,
user, backup-operator, or none.

disk multipath reset stats
Clear statistics of all disk paths in expansion shelves. Role required: admin, limited-admin.

disk multipath resume port port
Allow I/O on specified initiator port. Use disk multipath status to display the available
ports. Role required: admin, limited-admin.

disk multipath show history
Show the history of multipath events. Role required: admin, limited-admin, security, user, backup-
operator, or none.

disk multipath show stats [enclosure enc-id]
Show statistics for all disk paths or for the specified enclosure only. To view the enclosure IDs,
enter enclosure show summary.

disk multipath status [port-id]
Show multipath configurations and runtime status. To view the port IDs, enter the command
without the port ID. Role required: admin, limited-admin, security, user, backup-operator, or none.

disk multipath suspend port port
Disallow I/O on the specified initiator port, and stop traffic on particular ports during scheduled
maintenance of a SAN, storage array, or system. This command does not drop a Fibre Channel link.
To view the ports, enter disk multipath status. Role required: admin, limited-admin.

disk port

disk port enable port-id
Enable the specified initiator port. To display the disk ports, enter disk port show summary.
Role required: admin, limited-admin.

disk port show {stats | summary}
Show disk port statistics or configuration and status. When the disabled status appears without
an asterisk, the port is administratively disabled. When the disabled status appears with an
asterisk and an error message below the report, the system has disabled the port. Role required:
admin, limited-admin, security, user, backup-operator, or none.
Example 72

```plaintext
# disk port show stats

<table>
<thead>
<tr>
<th>Port</th>
<th>Command</th>
<th>Target</th>
<th>Bus</th>
<th>Host</th>
<th>Device</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aborts</td>
<td>Resets</td>
<td>Resets</td>
<td>Resets</td>
<td>Additions</td>
<td>Removals</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>1a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1b</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1c</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1d</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>2b</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>2c</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>2d</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>3a</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>3b</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>3c</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>3d</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>32</td>
<td>0</td>
</tr>
</tbody>
</table>
```

Example 73

```plaintext
# disk port show summary

<table>
<thead>
<tr>
<th>Port</th>
<th>Connection</th>
<th>Link</th>
<th>Connected Enclosure IDs</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
<td>Speed</td>
<td>Enclosure IDs</td>
<td>------</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>------</td>
<td>-------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1a</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>1b</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>1c</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>1d</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>2a</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>2</td>
<td>online</td>
</tr>
<tr>
<td>2b</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>2c</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>3</td>
<td>online</td>
</tr>
<tr>
<td>2d</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>4</td>
<td>online</td>
</tr>
<tr>
<td>3a</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>2</td>
<td>online</td>
</tr>
<tr>
<td>3b</td>
<td>SAS</td>
<td></td>
<td></td>
<td>offline</td>
</tr>
<tr>
<td>3c</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>3</td>
<td>online</td>
</tr>
<tr>
<td>3d</td>
<td>SAS</td>
<td>12 Gbps</td>
<td>4</td>
<td>online</td>
</tr>
</tbody>
</table>
```

disk release

disk release persistent-id {persistent-id | all}

Releases the disk's persistent ID and enables persistent ID to be assigned on the next boot. Role
required: admin, limited-admin.

disk rescan

disk rescan [enclosure-id disk-id]

Rescan all disks or a specified disk to look for newly removed or inserted disks or LUNs or power
on a drive. To view disk IDs with both enclosure ID and disk ID, enter disk show hardware.
Role required: admin, limited-admin.

disk reset

disk reset performance

Reset disk performance statistics to zero. Role required: admin, limited-admin.
**disk set**

```
disk set dev disk-id spindle-group 1-16
```
Assign a LUN group to the disk. To display the disk IDs, enter `disk show hardware`. You must restart the file system after adding the LUN. Role required: admin, limited-admin.

**disk show**

```
disk show failure-history
```
Display a list of disk failure events, which include the date, time disk ID, enclosure serial number, and disk serial number. Role required: admin, limited-admin, security, user, backup-operator, or none.

```
disk show hardware
```
Display disk hardware information. The output includes a column for slot identification. The identification displayed in the Slot column is based on the type of enclosure that contains each disk.

- Slot numbering begins at 0 for system controllers, ES30, ES40, FS15, and FS25 shelves.
- Slot numbering for DS60 enclosures uses a letter and a number to define the row and column location of each disk.

Role required: admin, limited-admin, security, user, backup-operator, or none.

**Output Definitions (Disk Information)**

**Disk (enc/disk)**
- The enclosure and disk ID numbers.

**Slot**
- The slot number for the disk.

**Manufacturer/Model**
- The manufacturer model designation.

**Firmware**
- The firmware revision on each disk.

**Serial No.**
- The manufacturer serial number for the disk.

**Capacity**
- The data storage capacity of the disk when used in a protection system. The protection system convention for computing disk space defines one gigabyte as $2^{30}$ bytes, giving a different disk capacity than the manufacturer’s rating.

**Type**
- The type of disk drive.

**Output Definitions (System Information)**

**Disk**
- Each LUN accessed by the protection system as a disk.

**LUN**
- The LUN number given to a LUN on the third-party physical disk storage system.
Port WWN
The world-wide number of the port on the storage array through which data is sent to the protection system.

Manufacturer/Model
A label that identifies the manufacturer. The display may include a model ID, RAID type, or other information depending on the vendor string sent by the storage array.

Firmware
The firmware level used by the third-party physical disk storage controller.

Serial No.
The serial number from the third-party physical disk storage system for a volume that is sent to the protection system.

Capacity
The amount of data in a volume sent to the protection system. GiB = Gibibytes, the base-2 equivalent of Gigabytes. MiB = Mebibytes, the base-2 equivalent of Megabytes. TiB = Tebibytes, the base-2 equivalent of Terabytes.

disk show performance [interval {5min [count 1-12] | 1hour [count 1-24] | 1day [count 1-7] | cumulative}] [enclosure-id | enclosure-id.disk-id | devn]
Display disk performance statistics for each disk. Each column displays statistics averaged since the last disk reset performance command or the last system power cycle. Role required: admin, limited-admin, security, user, backup-operator, or none.

Argument Definitions

interval
Use the interval argument to display performance data that can indicate trends in disk performance. The data interval, 5 minutes, 1 hour, 1 day, or cumulative, defines the period for which data is reported. The count defines how many of the most recent intervals you want to display.

enclosure-id
Specify an enclosure number to display the performance data for only the disks in that enclosure. To display the enclosure IDs, enter enclosure show summary.

enclosure-id.disk-id
Specify an enclosure number and disk number to display the performance data for a specific disk. To display the available disks, enter disk show performance.

devn
Specify a SCSI target or vdisk device to display the performance data for the device. To display the available devices, enter disk show performance.

Output Definitions

Disk (enc/disk)
The enclosure and disk numbers.

Read
Disk access statistics for read operations.
**Read+Write**
Disk access statistics for total (read +write) operations.

**Write**
Disk access statistics for write operations.

**KiB/sec**
The average data transfer speed in KiB/second.

**IOPs**
The average number of read, write, or total (read +write) input/output operations per second (IOPs).

**Resp(ms)**
The average response time in milliseconds.

**Ops >1s**
The number of operations that required more than 1 second for processing.

**MiB/sec**
The average number of mebibytes per second (MiB/s) written to storage. Mebibytes are the base-2 equivalent of Megabytes.

**Random**
The percentage of random IOPs.

**Busy**
The average percent of time that at least one command is queued for storage access.

disk show reliability-data
View details of the hardware state of each disk. Output also includes the operational state of drives and if the drive is present or absent. Output is typically used by Dell EMC Support for troubleshooting assistance. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Output Definitions**

**Disk**
The enclosure.disk-id disk identifier.

**Slot**
The disk slot number.

**ATA Bus CRC Err**
The uncorrected raw UDMA CRC errors.

**Reallocated Sectors**
The number of mapped-out defective sectors.

**Temperature**
The current temperature of each disk in Celsius and Fahrenheit. The allowable case temperature range for disks is from 5 degrees centigrade to 55 degrees centigrade.

disk show reservation
Display all existing reservation information within attached disks.

disk show state
Display state information for all disks in a protection system. If a RAID disk group reconstruction is underway, columns for the disk identifier, progress, and time remaining are included in command output. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Disk State Definitions**

The following describes the symbols that define the state of each disk:

- (Period) In-Use. The disk is being used for backup data storage.
- (Dash) Not installed. The enclosure firmware has determined that no disk is installed.

A

Absent. DD OS does not detect a disk in the indicated location, and no firmware status is available. The disk may be absent, or there may be some condition that makes the disk appear to be absent.

C

Copy Recovery. The disk has a high error rate but is not failed. RAID is currently copying the contents onto a spare drive and will fail the drive once the copy reconstruction is complete.

d

Destination. The disk is in use as the destination for storage migration.

E

Error. The disk has a high error rate but is not failed. The disk is in the queue for copy reconstruction. The state will change to Copy Recovery when copy reconstruction begins.

K

Known. The disk is a supported disk that is ready for allocation.

m

Migrating. The disk is in use as the source for storage migration.

O

Foreign. The disk has been assigned to a tier, but the disk data indicates the disk may be owned by another system.

P

Powered Off. The disk power has been removed.

R

Reconstruction. The disk is reconstructing in response to a `disk fail` command or by direction from RAID/SSM.

s

Spare. The disk is available for use as a spare.

U

Unknown. An unknown disk is not allocated to the active or retention tier. It might have been failed administratively or by the RAID system.

v

Available. An available disk is allocated to the active or retention tier, but it is not currently in use.
System. System disks store DD OS and system data. No backup data is stored on system disks.

Example 74

The following example shows the output.

```
# disk show state
Enclosure Disk
--------- ---------------------------------------------
1        .  .  .
2        s . . . . . . . . . . . . . . . . .
--------- ---------------------------------------------
Legend   State          Count
------   ------------   -----
.        In Use Disks   17
s        Spare Disks    1
------   ------------   -----
Total 18 disks
```
Example 75

The following example shows the output for a system with 2 15-disk enclosures and 2 60-disk enclosures.

```
# disk show state
Enclosure        Disk
Row(Disk-id)    1  2  3  4  5  6  7  8  9  10 11 12 13 14 15
--------------   ---------------------------------------------
1    1  2  3  4  5  6  7  8  9  10 11 12 13 14 15
2    |--------|--------|--------|--------|
    | Pack 1 | Pack 2 | Pack 3 | Pack 4 |
    E(49-60) |.  .  s |.  .  s |.  .  s |-  -  - |
    D(37-48) |.  .  . |.  .  . |.  .  . |-  -  - |
    C(25-36) |.  .  . |.  .  . |.  .  . |-  -  - |
    B(13-24) |.  .  . |.  .  . |.  .  . |-  -  - |
    A( 1-12) |.  .  . |.  .  . |.  .  . |-  -  - |
    |--------|--------|--------|--------|
3    s  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15
4    |--------|--------|--------|--------|
    | Pack 1 | Pack 2 | Pack 3 | Pack 4 |
    E(49-60) |.  .  s |.  .  s |.  .  s |-  -  - |
    D(37-48) |.  .  . |.  .  . |.  .  . |-  -  - |
    C(25-36) |.  .  . |.  .  . |.  .  . |-  -  - |
    B(13-24) |.  .  . |.  .  . |.  .  . |-  -  - |
    A( 1-12) |.  .  . |.  .  . |.  .  . |-  -  - |
    |--------|--------|--------|--------|
Legend   State          Count
------   ------------   -----  
.        In Use Disks   59
s        Spare Disks    4
-        Not Installed  15
------   ------------   -----  
Total 138 disks
```

disk show stats
Provides a dynamic display of the default output for the disk show performance command. Press Ctrl + C to terminate the dynamic display. Role required: admin, limited-admin, security, user, backup-operator, or none.

disk status

View details on the protection system disk status. Output includes the number of disks in use and failed, the number of spare disks available, and if a RAID disk group reconstruction is underway.

**Note:** The RAID portion of the display could show one or more disks as Failed while the Operational portion of the display could show all drives operating nominally. A disk can be physically functional and available, but not in use by RAID, possibly because of user intervention.

Reconstruction is done per disk. If more than one disk is to be reconstructed, the disks queued for reconstruction show as spare or hot spare until reconstruction begins.

In the first line of output, disk status is indicated by one of the following, high-level states.

**Destination**
The disk is in use as the destination for storage migration.
Error
A new head unit is in this state when Foreign storage is present. For a system configured with some storage, the error indicates that some or all of its own storage is missing.

Migrating
The disk is in use as the source for storage migration.

Normal
The system is operational and all disks are available and ready for use.

Warning
One or more of the following conditions require user action.

- RAID system degraded
- Foreign storage
- Failed or Absent disks

Role required: admin, limited-admin, security, user, backup-operator, or none.

disk unfail

disk unfail enclosure-id.disk-id
This command attempts to make a disk previously marked Failed or Foreign usable to the system. To display the enclosure and disk ID for each disk, enter disk show hardware. Role required: admin, limited-admin.
disk
CHAPTER 16

eicense

The elicense command manages electronic licenses generated by the Electronic License Management System (ELMS)

This chapter contains the following topics:

- elicense change history ........................................................................................................156
- elicense reset .......................................................................................................................156
- elicense show ....................................................................................................................156
- elicense update ..................................................................................................................157
elicense change history

There have been no changes to this command in this release.

elicense reset

elicense reset [restore-evaluation]

- Use elicense reset to delete all existing licenses.
- Use restore-evaluation to reset DD VE to its factory default licenses.

Role required: admin, limited-admin.

Note: When features such as HA, vdisk, VTL, or DD Boost are in use, elicense reset returns an error message. Disable any such features before issuing the elicense reset command.

elicense show

elicense show [licenses | locking-id | software-id | scheme | all]

Show current license information. Specify locking-ID to display the serial number on a physical system, licenses to display all licenses installed, and all to display licenses, locking-ID, and last modified.

The software-id option is only available for DDVE.

Issuing elicense show is the same as issuing elicense show all. The scheme parameter shows the licensing used. For example, the scheme for a physical system is EMC Electronic License Management System (ELMS) node-locked mode. Supported schemes for DDVE include node-locked mode and served mode. Role required: admin, limited-admin, security, backup-operator, user.

Example 76

The following output shows elicense show.

```
# elicense show
System locking-id: 1CEXYV7RNJ55ZVR9R5GHBA14KJ8DEK8RJTJ3NB7DT34A21TX6F5ECMTDHGYDGR9A.J2FZUJGTG3U2FX5PZ32G6 2HBMZL5JEF2FMWA67RXBFYG
System software-id: ELMDDV01188LXW
Instance software-id: Not available
Licensing scheme: EMC Electronic License Management System (ELMS) node-locked mode

Capacity licenses:
## Feature   Capacity    Type           State        Expiration Date  Note
--   --------   ------------   -------     ---------------    ------
1    CAPACITY  18.18 TiB  subscription grace         2018-01-28       License

```
elicense update

elicense update [check-only] [license-file]

- Use `elicense update` to cut and paste elicense codes. When finished pasting, enter `CTRL +D`.
- Use `elicense update filename` to transfer a .lic file to /ddvar.
- Use the `check-only` option to validate the evaluation license file content, including:
  - Signature
  - Feature name
  - Capacity values
  - Capacity units
  - Expiration date

Role required: admin, limited-admin.

**Note:** All licenses for the system have to be put in a single file. Every time that elicenses are updated, the previous licenses are overwritten.
CHAPTER 17

enclosure

The `enclosure` command identifies and displays information about protection system enclosures and attached expansion shelves.

This chapter contains the following topics:

- enclosure change history ..................................................................................................... 160
- enclosure guidelines and restrictions .................................................................................... 160
- enclosure beacon ............................................................................................................... 160
- enclosure release ................................................................................................................. 160
- enclosure show .................................................................................................................... 160
- enclosure test ...................................................................................................................... 165
**enclosure change history**

There have been no changes to this command in this release.

**enclosure guidelines and restrictions**

- Enclosure numbers are not static and may change when the system is rebooted. (Numbers are generated according to when the shelves are detected during system startup.)
- If a protection system or a previously installed shelf, or both, require spare disks and none are available, disks from a newly installed shelf are allocated to the existing RAID groups (disk groups) when the new shelf is recognized by the `disk rescan` command. The shelf allocating the disks requires at least 14 disks available for its own RAID group.

**enclosure beacon**

```
enclosure beacon enclosure
```

Cause the LEDs associated with the specified enclosure to flash. Use this command to verify communications with an enclosure or to identify which physical enclosure corresponds to an enclosure ID.

The LEDs that flash are the LEDs that signal normal operation on all enclosure disks and the IDENT LEDs for the enclosure and the controller. The power supply IDENT LEDs also flash on DS60 enclosures. Press Ctrl-C to stop the flash. Role required: admin, limited-admin.

**enclosure release**

```
enclosure release persistent-id {serialno | persistent-id | all}
```

Remove the persistent ID assignment of an enclosure from the system. This removal becomes complete when the system is restarted. Use `enclosure show persistent-id` to display the serial numbers and IDs for persistent enclosures. Role required: admin, limited-admin.

**Example 77**

```
# enclosure release persistent-id US1V4100200097
```

**enclosure show**

```
enclosure show all [enclosure]
```

Display detailed information about the installed components and component status for all enclosures. The controller is enclosure 1. To see the IDs for all enclosures, enter `enclosure show summary`. Role required: admin, limited-admin, security, user, backup-operator, or none.

```
enclosure show chassis [enclosure]
```

Show part numbers, serial numbers, and component version numbers for one or all enclosures. To see the IDs for all enclosures, enter `enclosure show summary`. Role required: admin, limited-admin, security, user, backup-operator, or none.

```
enclosure show controllers <enclosure>
```

Display the controller model number and related information for a system controller or expansion shelf. To see the IDs for all enclosures, enter `enclosure show summary`. Role required: admin, limited-admin, security, user, backup-operator, or none.
enclosure show firmware
Display the versions of all the firmware components on a DD3300 system. This command works on the DD3300 only, and will not run on any other protection system. Role required: admin, limited-admin, security, user, backup-operator, or none.

<table>
<thead>
<tr>
<th>Device</th>
<th>Current Firmware</th>
<th>Required Firmware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulcand</td>
<td>6.2.0-1</td>
<td>6.2.0-1</td>
</tr>
<tr>
<td>Configure</td>
<td>6.2.1-0</td>
<td>6.2.1-0</td>
</tr>
<tr>
<td>Powertools</td>
<td>6.2.0-0</td>
<td>6.2.0-0</td>
</tr>
<tr>
<td>BIOS</td>
<td>1.4.8</td>
<td>1.4.8</td>
</tr>
<tr>
<td>PERC H730</td>
<td>25.5.5.0005</td>
<td>25.5.5.0005</td>
</tr>
<tr>
<td>Backplane Expander</td>
<td>2.25</td>
<td>2.25</td>
</tr>
<tr>
<td>Backplane Non-Expander</td>
<td>4.26</td>
<td>4.26</td>
</tr>
<tr>
<td>NIC (Intel X710)</td>
<td>18.5.17</td>
<td>18.5.17</td>
</tr>
<tr>
<td>NIC (Intel X550)</td>
<td>n/a</td>
<td>18.8.9</td>
</tr>
<tr>
<td>NIC (Broadcom)</td>
<td>20.8.4</td>
<td>20.8.4</td>
</tr>
<tr>
<td>iDRAC</td>
<td>3.21.21.21</td>
<td>3.21.21.21</td>
</tr>
</tbody>
</table>

**n/a** - error retrieving data or device not present.

enclosure show persistent-id
The command enables persistent enclosure numbering management method. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Controller Definitions (Physical Enclosure Shell)**

**Enclosure**
The number listed here is the enclosure number assigned by the DD OS. (Enclosure 1 is the system controller.) This number is the argument passed to the command.

**Model**
The product name, such as DD6900 or ES30.

**Capacity**
The number of usable drive slots in the enclosure.

**Serial No.**
The serial number of the physical enclosure. As with the WWN, this describes the enclosure and does not change if components are swapped. Depending on when the enclosure was manufactured, this may be the same value as the WWN. This value matches the serial number printed on the label on the back of the enclosure.

**Number of Controllers**
The number of shelf controllers currently inserted into the enclosure.

**Output Definitions (Controller Modules)**

**Controller 1**
Identifies which shelf controller module the block of information is for. If both shelf controllers are installed, there are blocks for Controller 1 and Controller 2.

**Firmware**
The revision level of the firmware that resides on the shelf controller. This value can be different for each shelf controller.

**Serial #**
The serial number for the shelf controller. The serial number is different for each shelf controller and differs from the enclosure serial number.
Part #  
The part number for the shelf controller.

Status  
The current status of the shelf controller.

Type  
The type of shelf controller.

enclosure show cpus [enclosure]  
Display CPU information, such as the number of CPUs, type, and speed for one or all enclosures.  
To see the IDs for all enclosures, enter enclosure show summary. Role required: admin, limited-admin, security, user, backup-operator, or none.

enclosure show fans [enclosure]  
Display the current status of fans in one or all enclosures. To see the IDs for all enclosures, enter enclosure show summary. Role required: admin, limited-admin, security, user, backup-operator, or none.

Output Definitions

Enclosure  
The enclosure number, starting from 1, for the protection system.

Description  
The ID for each power or cooling unit.

Level  
The fan speed. This value depends on the internal temperature and amount of cooling required.

Status  
The fan status: OK or Failed.

enclosure show io-cards [enclosure]  
Display I/O card information such as the device type, firmware revision, and address for one or all enclosures. To see the IDs for all enclosures, enter enclosure show summary. Role required: admin, limited-admin, security, user, backup-operator, or none.

enclosure show memory [enclosure]  
Show the current DIMM inventory, speed, size, and ID numbers for one or all enclosures. To see the IDs for all enclosures, enter enclosure show summary. Memory size is calculated in base-2 Mib. Role required: admin, limited-admin, security, user, backup-operator, or none.

enclosure show misconfiguration [enclosure]  
Displays any misconfigurations detected on a controller.

Example 78

```bash
# enclosure show misconfiguration
Memory DIMMs:
   No misconfiguration found.
IO Cards:
Slot   Device       Status
----   ----------   -------
0      NVRAM        missing
9      NVRAM        misplaced
CPUs:
   No misconfiguration found.
```
Example 78 (continued)

Disks:
   No misconfiguration found.

enclosure show nvram [enclosure]
Displays NVRAM ID information, component temperatures, and locations for one or all enclosures.
If output indicates one or more component errors, an alerts notification is sent to the designated
group and the Daily Alert Summary email includes an entry citing details of problem. To see the IDs
for all enclosures, enter enclosure show summary. Role required: admin, limited-admin,
security, user, backup-operator, or none.

closure show persistent-id
Display the online enclosures with persistent identification numbers. To identify offline enclosure
numbers, enter enclosure show summary.
A persistent enclosure ID is assigned to the enclosure serial number and remains assigned after
power cycles, reboots, and cable changes. If the enclosure is removed, the persistent ID remains
assigned until cleared with the enclosure release persistent-id command. The system
controller is always assigned enclosure ID 1. Each new enclosure is assigned to the lowest
unreserved ID number.

Example 79

# enclosure show persistent-id

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Model No.</th>
<th>Persistent ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM00120502639</td>
<td>ES30</td>
<td>2</td>
</tr>
<tr>
<td>APM00120502638</td>
<td>ES30</td>
<td>3</td>
</tr>
<tr>
<td>APM00120600566</td>
<td>ES30</td>
<td>4</td>
</tr>
<tr>
<td>APM00120503381</td>
<td>ES30</td>
<td>5</td>
</tr>
<tr>
<td>APM00120600565</td>
<td>ES30</td>
<td>6</td>
</tr>
<tr>
<td>APM00120503377</td>
<td>ES30</td>
<td>7</td>
</tr>
<tr>
<td>APM00120600563</td>
<td>ES30</td>
<td>8</td>
</tr>
<tr>
<td>APM00120503378</td>
<td>ES30</td>
<td>9</td>
</tr>
<tr>
<td>US1V4100200126</td>
<td>ES30</td>
<td>10</td>
</tr>
<tr>
<td>US1V4100200097</td>
<td>ES30</td>
<td>-</td>
</tr>
</tbody>
</table>

9 enclosure(s) persisted.

(-) Persistent id will be assigned on next boot.
(*) Does not match existing enclosure id until next boot.

closure show powersupply [enclosure]
Displays power supply ID and status information for one or all enclosures. To see the IDs for all
closures, enter enclosure show summary. Role required: admin, limited-admin, security,
user, backup-operator, or none.
enclosure show summary
List enclosures, model and serial numbers, state, OEM names and values, and capacity (number of disks in the enclosure). The serial number for an expansion shelf is the same as the chassis serial number, which is the same as the enclosure WWN and the OPS panel WWN. Role required: admin, limited-admin, security, user, backup-operator, or none.

Enclosure states may be one of the following:

**Offline**
- No connectivity to shelf. Shelf was connected previously. Also occurs if there is no power to the enclosure following startup.

**Online**
- Operating as expected. No problems detected.

**Found**
- Enclosure detected. This transition state is very brief and rarely seen.

**Error**
- Hardware or software error.

**Software Error**
- Typically means busy. Try again later.

enclosure show temperature-sensors [enclosure]
Lists the temperatures for monitored components in one or all enclosures. To see the IDs for all enclosures, enter enclosure show summary.

protection systems and some components are configured to operate within a specific temperature range, which is defined by a temperature profile that is not configurable. If the system temperature drops below or rises above the parameters defined in the profile, the system shuts down. For example, the temperature profile for some system models shuts down the system when the temperature drops below 0 degrees Celsius or rises above 80 degrees Celsius.

Role required: admin, limited-admin, security, user, backup-operator, or none.

**Output Definitions**

**Enclosure**
- The enclosure number, starting from 1, for the protection system.

**Description**
- The ID for each monitored component. The components listed depend on the model and are often shown as abbreviations. Some examples are:
  - CPU 0 Temp (Central Processing Unit)
  - MLB Temp 1 (main logic board)
  - BP middle temp (backplane)
  - LP temp (low profile of I/O riser FRU)
  - FHFL temp (full height full length of I/O riser FRU)
  - FP temp (front panel)

**C/F**
- Ambient readings are displayed as positive numbers and indicate the approximate component temperature in Celsius and Fahrenheit. CPU temperatures may be shown in relative or ambient readings. Relative readings are displayed as negative numbers and indicate the difference between the current temperature and the CPU throttling point, when the CPU reduces its power consumption.
**Status**

If temperature thresholds are defined for a component, the Status column displays the component status determined by the threshold configuration. If the component temperature is within the configured thresholds, the status is OK. Warning status indicates the temperature is above the acceptable threshold, and Critical status indicates the temperature is above the shutdown threshold. When no thresholds are defined for a component, the Status column displays a dash (-).

**Example 80**

```bash
# enclosure show temperature-sensors

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Description</th>
<th>C/F</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MLB TEMP 1</td>
<td>43/109</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>MLB TEMP 2</td>
<td>33/91</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>FP TEMP</td>
<td>30/86</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>BP LEFT TEMP</td>
<td>34/93</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>BP MIDDLE TEMP</td>
<td>31/88</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>BP RIGHT TEMP</td>
<td>30/86</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>LP TEMP</td>
<td>42/108</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>FHFL TEMP</td>
<td>46/115</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>CPU 0 TEMP</td>
<td>42/108</td>
<td>OK</td>
</tr>
</tbody>
</table>
```

**Example 81**

```bash
# enclosure show temperature-sensors 2

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Description</th>
<th>C/F</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>LCC A</td>
<td>26/79</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>LCC B</td>
<td>27/81</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Internal ambient</td>
<td>21/70</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>PSU A Temp #1</td>
<td>27/81</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>PSU A Temp #2</td>
<td>22/72</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>PSU B Temp #1</td>
<td>26/79</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>PSU B Temp #2</td>
<td>22/72</td>
<td>-</td>
</tr>
</tbody>
</table>
```

cellsclosure show topology

Show the layout of the SAS enclosures attached to a system. Role required: admin, limited-admin, security, user, backup-operator, or none.

**enclosure test**

`enclosure test topology port duration minutes`

Test communications with the specified port for the specified number of minutes. To display the port IDs, enter `enclosure show io-cards`. Role required: admin, limited-admin.
The `filesys` command displays statistics, capacity, status, and use of the filesystem. Command options also clear the statistics file, and start and stop filesystem processes. The `filesys clean` command options reclaim physical storage within the filesystem. Command output for disk space or the amount of data on disks is computed using base-2 calculations. See the *DD OS Administration Guide* for details.

This chapter contains the following topics:

- `filesys change history` ........................................................................................................ 168
- `filesys clean` ..................................................................................................................... 168
- `filesys create` .................................................................................................................... 170
- `filesys destroy` .................................................................................................................. 170
- `filesys disable` .................................................................................................................. 170
- `filesys enable` .................................................................................................................... 170
- `filesys encryption` .......................................................................................................... 171
- `filesys expand` .................................................................................................................... 177
- `filesys fastcopy` ................................................................................................................. 177
- `filesys option` .................................................................................................................... 178
- `filesys report` ..................................................................................................................... 180
- `filesys restart` .................................................................................................................... 181
- `filesys show` ..................................................................................................................... 181
- `filesys status` ................................................................................................................... 184
- `filesys sync` ....................................................................................................................... 184
filesys change history

Modified arguments in DD OS 7.1

filesys encryption key-manager set {server server-name | port port-number | key-class key-class | server server-name port port-number | server-type keysecure | kmip-user user-id key-class key-class} server-type keysecure kmip-user user-id
  The fips-mode parameter has been removed.

filesys encryption keys delete muid key-muid [tier active]
  The key-id parameter has been removed.

filesys encryption keys destroy muid key-umid [tier active]
  The key-id parameter has been removed.

filesys encryption key-manager keys modify muid key-muid state {deactivated}
  The key-id parameter has been removed.

Modified output in DD OS 7.1

filesys encryption key-manager show
  The fips-mode parameter has been removed from the output.

filesys clean

filesys clean reset {schedule | throttle | all}
Reset the clean schedule to the default of Tuesday at 6 a.m. (tue 0600), the default throttle of 50 percent, or both. Role required: admin, limited-admin.

filesys clean set schedule { never | daily time | <day(s)> time | biweekly day time | monthly <day(s)> time }
Set schedule for the clean operation to run automatically. Dell EMC recommends running the clean operation once a week to maintain optimal availability of the file system. However, if there is no shortage of disk space you may clean less often. Role required: admin, limited-admin.

Argument Definitions

never
  Turn off the clean schedule.

daily
  Run command every day at the set time.

time
  Time is 24-hour format and must be specified by four digits. The time mon 0000 is midnight between Sunday night and Monday morning. 2400 is not a valid time. A new set schedule command cancels the previous setting.

biweekly
  Run command on alternate weeks.
monthly
Starts command on the day or days specified at the set time. Days are entered as integers from 1 to 31.

day(s)
Runs on the day or days specified. Days are entered as integers from 1 to 31.

Example 82
To run the clean operation automatically every Tuesday at 4 p.m.: 
```
# filesys clean
set schedule tue 1600
```

Example 83
To set file system cleaning to run on alternate Tuesdays at 6:00 a.m., enter: 
```
# filesys clean set schedule biweekly "tue" "06:00"
```

Example 84
To run the operation more than once in a month, set multiple days in a single command. For example, to clean the file system on the first and fifteenth day of the month at 4 p.m., enter: 
```
# filesys clean set schedule monthly 1,15 1600
```

filesys clean set throttle percent
Set clean operations to use a lower level of system resources when the protection system is busy. At zero percent, cleaning runs slowly or not at all, depending on how busy the system is. At 100 percent, cleaning uses system resources in the standard way. Default is 50 percent. When the protection system is not running backup or restore operations, cleaning runs at 100 percent. Range: max: 100, min: 0. Role required: admin.

Example 85
To set the clean operation to run at 30 percent of its potential speed: 
```
# filesys clean set throttle 30
```

filesys clean show config
Display settings for file system cleaning. All users may run this command option. Role required: admin, limited-admin, user, backup-operator, security, none.

filesys clean show schedule
Display the scheduled date and time for file system cleaning. All users may run this command option. Role required: admin, limited-admin, user, backup-operator, security, none.

filesys clean show throttle
Display throttle setting for cleaning. All users may run this command option. Role required: admin, limited-admin, user, backup-operator, security, none.

filesys clean start
Start clean process manually. When the process finishes, a message is sent to the system log citing the percentage of available storage space. Role required: admin, limited-admin.

filesys clean status
Display status of the clean process. The system displays a message if cleaning was aborted because collection replication is initializing. Role required: admin, limited-admin.
Stop the clean process. Stopping the process means all progress is lost. Restarting the process means starting from the beginning. Role required: admin, limited-admin.

If the clean process slows down the system, run the `filesys clean set throttle` command to change the amount of system resources used by the clean process. Changes to system resource usage take effect immediately. Role required: admin, limited-admin.

`filesys clean watch`
Monitor the `filesys clean` process. Output of this command continuously updates as the `filesys clean` operation progresses. Reporting concludes after the final phase. Role required: admin, limited-admin.

Press Ctrl-C to stop monitoring. Note the `filesys clean` process continues to run. All users may run this command.

Note: Because some files may be dropped during verification, output of the percent completion phase may not reach 100 percent. This is expected behavior.

**filesys create**

`filesys create`
Create a file system or associated RAID disk group with available and spare storage in the active tier. Change the state from Available to In Use. Role required: admin, limited-admin.

Note: If file system creation fails, and the system is unusable, the system displays the following message: "File system creation failed. Contact Dell EMC Support."

**filesys destroy**

`filesys destroy [and-zero]`
Delete all data in the protection system file system including data configured with Retention Lock Governance, remove Replicator configuration settings, and return file system settings to defaults. When this process is finished, NFS clients connected to the protection system may require a remount. Role required: admin.

Note: This command option is not available on a Retention Lock Compliance system.

Note: All cloud units on the protection system must be deleted before running the `filesys destroy` command.

By default, this command only marks the file system data as deleted. Disks are not overwritten with zeroes unless you specify the and-zero option. file system data marked deleted cannot be recovered, even if the disks have not been overwritten with zeroes. The `and-zero` option adds several hours to the destroy operation.

**filesys disable**

`filesys disable`
Stops file system operations. If no file system exists, the system displays a message confirming that there is no file system to disable. Role required: admin, limited-admin.

**filesys enable**

`filesys enable`
Start the file system operations. On systems configured with Retention Lock Compliance, security officer authorization is required if there is time skew in the system clock. See the section on...
Retention Lock Compliance in the *DD OS Administration Guide* for details. Role required: admin, limited-admin.

**filesys encryption**

`filesys encryption abort-apply-changes`
Abort a previously issued apply-changes request. If an apply-changes operation is already in progress, the abort request will *not* abort the running operation, which will be allowed to finish. Role required: admin.

`filesys encryption algorithm reset`
Reset the algorithm to the default (aes_256_cbc). After running this command, you must restart the file system with `filesys restart` for the change to take effect. Role required: admin, limited-admin.

`filesys encryption algorithm set {aes_128_cbc | aes_256_cbc | aes_128_gcm | aes_256_gcm}`
Select the encryption algorithm. The `aes_256_gcm` option (AES in the Galois/Counter mode) is the most secure algorithm, but is significantly slower than Cipher Block Chaining (CBC) mode. After running this command, you must restart the file system with `filesys restart` for the change to take effect. Role required: admin, limited-admin.

`filesys encryption algorithm show`
Display the encryption algorithm. Output indicates changes are pending, if applicable. Role required: admin, limited-admin, user, backup-operator, security, none.

`filesys encryption apply-changes`
Update the file system with the current encryption configuration. Encryption changes are applied to all data in the file system *active* tier during the next *cleaning cycle*. This command does not affect cloud units. Role required: admin, limited-admin.

> Note: This process can take a long time to complete depending on the size of the data to be re-encrypted.

`filesys encryption disable [tier active | cloud-unit {unit-name | all}]`
Deactivate encryption. Disabling encryption means that new data does not get encrypted. You can then run `apply-changes` to decrypt the existing encrypted data. After running this command, you must restart the file system with `filesys restart` for the change to take effect. Role required: admin, limited-admin.

> Note: This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
    # authorization policy set security-officer enabled
```

`filesys encryption embedded-key-manager keys create`
Create a new key. An alert is raised when the new key is generated and is used to encrypt/decrypt any new data that is ingested. Role required: admin, limited-admin.

> Note: This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
    # authorization policy set security-officer enabled
```

`filesys encryption embedded-key-manager reset key-rotation-policy`
Reset key rotation policy of the embedded key manager. The `reset` command resets the key rotation policy to none. The new keys are not created automatically. Role required: admin.

**Note:** This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
# authorization policy set security-officer enabled
```

```
filesys encryption embedded-key-manager set key-rotation-policy {months | none}
```

Set the key rotation policy of the embedded key manager. The embedded key manager supports a maximum of 254 keys. The argument `months` is an integer between 1 and 12, which is the key rotation period. Each rotation creates a new key, which takes effect after the file system is restarted. If specifying `none`, the results are the same as those of `filesys encryption embedded-key-manager reset key-rotation-policy`. Role required: admin, limited-admin.

**Note:** This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
# authorization policy set security-officer enabled
```

```
filesys encryption embedded-key-manager show
```

Show the configuration of both the running and the configured embedded key manager. Role required: admin, limited-admin, user, backup-operator, security, none.

```
filesys encryption enable [tier active | cloud-unit {unit-name | all}]
```

Activate encryption for new data written to the file system. After running this command, you must restart the file system with `filesys restart` for the change to take effect. Role required: admin, limited-admin.

```
filesys encryption key-manager disable
```

Stops the protection system from using an external server for key management. The file system continues to use the latest Activated-RW key for encrypting the data. Role required: admin, limited-admin.

**Note:** This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
# authorization policy set security-officer enabled
```

```
filesys encryption key-manager enable
```

Enable key management. The KeySecure key manager is available for external encryption key management. The local encryption key (which is the embedded key manager) administration method is also available. See the *DD OS Administration Guide* for additional information. Role required: admin, limited-admin.

```
filesys encryption key-manager keys create
```

Creates a new active key in the KeySecure external key manager. The KeySecure key manager enables the use of multiple, rotating keys on a protection system. See the *DD OS Administration Guide* for additional information. Role required: security.
filesys encryption key-manager keys modify {<key-id> | muid <key-muid>} state {deactivated}
Modify the state of an existing key in the KeySecure key manager to a deactivated state. See the *DD OS Administration Guide* for a description of key states. Role required: security.

filesys encryption key-manager reset
Clear the attributes of the key-manager. Role required: admin, limited-admin.

filesys encryption key-manager reset [key-rotation-policy]
Change the existing KeySecure external key manager key rotation policy. See the *DD OS Administration Guide* for more information. Role required: security.

filesys encryption key-manager set {server server-name | port port-number | key-class key-class | server server-name port port-number | server-type keysecure | kmip-user user-id key-class key-class} server-type keysecure kmip-user user-id
Specify the attributes of the key-manager. Role required: admin, limited-admin.

filesys encryption key-manager set key-rotation-policy {every <n> {weeks | months} | none}
Set a key rotation policy on the KeySecure external key manager. Note that the rotation policy is specified in weeks and months. The minimum key rotation policy increment is one week, and the maximum key rotation policy increment is 52 weeks (or 12 months). See the *DD OS Administration Guide* for more information. Role required: security

filesys encryption key-manager show
Display details about the key manager. See the *DD OS Administration Guide* for descriptions of key states. Role required: admin, limited-admin, user, security none.

The current key-manager configuration is:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Manager:</td>
<td>Enabled</td>
</tr>
<tr>
<td>Server Type:</td>
<td>KeySecure</td>
</tr>
<tr>
<td>Server:</td>
<td>&lt;IP address of KMIP server&gt;</td>
</tr>
<tr>
<td>Port:</td>
<td>5696</td>
</tr>
<tr>
<td>Status:</td>
<td>Online</td>
</tr>
<tr>
<td>Key-class:</td>
<td>&lt;key-class&gt;</td>
</tr>
<tr>
<td>KMIP-user:</td>
<td>&lt;KMIP username&gt;</td>
</tr>
<tr>
<td>Key rotation period:</td>
<td>2 months</td>
</tr>
<tr>
<td>Last key rotation date:</td>
<td>03:14:17 03/19 2018</td>
</tr>
<tr>
<td>Next key rotation date:</td>
<td>01:01:00 05/17 2018</td>
</tr>
</tbody>
</table>

`filesys encryption keys delete muid key-muid tier active`

Delete a specified encryption key from the file system, tier. Only a Destroyed-Compromised key or a Destroyed key can be deleted. A key can be deleted only if no data is currently encrypted with the key. By default, the key is deleted from entire system. Role required: admin, limited-admin.

ℹ️ **Note:** This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```text
# authorization policy set security-officer enabled
```

`filesys encryption keys destroy muid key-umid tier active`

Mark a specified encryption key, from the file system, tier to be destroyed. After an encryption key is destroyed, the system creates a flag for a re-encrypt operation and it is carried out the next time `filesys clean` runs. By default, the key is marked for destroy from the entire system.

The key destroy operation simply flags a key to be destroyed, but it will not take effect right away because there is still data encrypted with it. There is no explicit re-encryption command; that job is scheduled when a key is marked to be in the compromised or destroyed state. Role required: admin, limited-admin.

ℹ️ **Note:** The re-encryption operation may start in the future and may take a long time depending on how much data needs to be re-encrypted. Use `filesys encryption status` to check the status.

`filesys encryption keys export`

Export encryption keys. This applies to keys in the active tier. All encryption keys in the file system are exported to a file that can recover encryption keys in the system if required. The key file is passphrase encrypted, and you will be prompted for a passphrase. To protect the key file, you may enter a new passphrase that differs from the protection system passphrase. Lost or forgotten passphrases cannot be recovered.

If possible:

- Run this command when a new key is created or when a change of state occurs to any of the existing keys.
- Send the exported file via FTP for storage in a secure location, accessible to authorized users only.

Role required: admin, limited-admin.
filesys encryption keys show [tier {active | cloud} | cloud-unit cloud-unit-name]
Display information about encryption keys, from the file system, cloud tier, or cloud unit, including key id, key MUID, key state, and the amount of data encrypted with each key. Information about all keys in the system is displayed by default. Role required: admin, limited-admin.

Note: This command cannot display key information for an offline unit.

filesys encryption keys show summary
Display summary information for keys on the system. Role required: admin, limited-admin, security.

filesys encryption keys sync
Synchronize the key manager encryption keys. An alert is generated if a new key is detected. When the file system is restarted, the new key is used for reading and writing. Role required: admin, limited-admin.

filesys encryption lock
Lock the system by creating a new system passphrase and destroying the cached copy of the current passphrase. This command is useful when preparing a protection system and its external storage devices for shipment. There is only one passphrase for each protection system. After running this command, the system encryption keys are unrecoverable until the system is unlocked with the system passphrase. A new system passphrase is not stored and can be forgotten. It is recommended that you keep a record of the passphrase in a safe location. Data cannot be recovered without the new passphrase. Role required: admin, limited-admin.

Note: This command requires security officer authorization. To enable run-time security officer authorization, login as a security officer, and then enter:

```
# authorization policy set security-officer enabled
```

filesys encryption show
Check the status of the encryption feature. The system displays the configured key-manager if it is different than the currently running key-manager. Role required: admin, limited-admin, user, backup-operator, security, none.

Example 86 Encryption enabled – no key-manager configured
### Example 86  Encryption enabled – no key-manager configured (continued)

```bash
# filesys encryption show
```

Encryption is enabled
The filesystem is unlocked
Algorithm: aes_256_cbc

Key manager in use: Embedded Key Manager
Key rotation period: not-configured
Last key rotation date: N/A
Next key rotation date: N/A

### Example 87  Key rotation policy set for embedded key manager

```bash
# filesys encryption show
```

Encryption is enabled
The filesystem is unlocked
Algorithm: aes_256_cbc

Key manager in use: Embedded Key Manager
Key rotation period: 2 months
Last key rotation date: N/A

---

**filesys encryption status**

Display status of apply-changes and re-encryption operations. The status is displayed for any enabled tiers. The re-encryption operation is performed when a key is destroyed or marked as compromised, and the data encrypted with such a key needs to be encrypted with the current active key. The operation status can be *none* (no operation is needed), *pending, running* (in progress), or *done*. Role required: admin, limited-admin.

**Note:**
- Apply-changes and re-encryption operations are not supported on cloud units.
- This command does not show the status of system-level encryption. It is possible for system-level status to be enabled while active tier and cloud tier encryption are disabled. In this situation, issuing the `filesys encryption enable` command indicates that the encryption feature is already enabled.

### Example 88

```bash
# filesys encryption status
```

**Active Tier:**
- Encryption enabled: no
- Apply-changes status: none
- Re-encryption status (for compromised or destroyed keys): none

**Cloud Tier:**
- Cloud unit: cloud_unit_1
- Encryption enabled: no

---

**filesys encryption unlock**

Unlock the file system. The system could be locked for several reasons: it is locked automatically after a headswap or chassis swap, or it could have been locked using `filesys encryption lock`. The system will prompt you for a passphrase. Role required: admin, limited-admin.
Note: This command requires security officer authorization. To log in as a security role, enter:

```
# authorization policy set security-officer enabled
```

**Argument Definitions**

- **fips-mode**
  Indicates whether the imported certificate for key management is FIPS (Federal Information Processing Standards) compliant. The default is enabled.

- **key-id**
  The identifier for a specific key.

- **muid**
  The MUID (manufacturer unique identifier) for a specific key.

**filesys expand**

```
filesys expand
```
Increase the file system by using all available space in the active tier. Role required: admin, limited-admin.

Note: This command fails if the user tries to expand the file system beyond the maximum supported active tier size.

**filesys fastcopy**

```
filesys fastcopy [retention-lock] source src destination dest
```
Copy a file, an MTree, or directory tree from a protection system source directory to another destination on the protection system. Role required: admin, limited-admin, backup-operator, security.

Note: Backup-operators cannot copy an MTree using `filesys fastcopy`.

Source names `src` that include spaces or special characters must be entered according to the following conventions.

- Enclose the entire source pathname with double quotation marks:

  ```
  filesys fastcopy source "/data/coll/mtree name/fast copy" destination /data/mtree name/dir
  ```

  OR

- Enter a backslash before the space. Do not add quotation marks:

  ```
  filesys fastcopy source /data/coll/mtree name/fast\ copy destination /data/mtree name/dir2
  ```

**Argument Definitions**

- **retention-lock**
  Use this argument to propagate the retention lock attributes (worm attributes) for files. Use the retention-lock argument when Retention Lock is required on the destination, if the destination file exists (and cannot be overwritten), and when Retention Lock attributes are set per file. When you use the retention-lock argument, the command output varies in the following situations:
When both the source and destination MTrees are Retention Lock enabled, Retention Lock attributes are copied. When the source MTree is not Retention Lock enabled, the system displays a warning message but allows the file copy. When the destination MTree is not Retention Lock enabled, the system displays a warning message but still allows the file to copy, and the Retention Lock attributes are not copied.

DD Retention Lock Governance Edition is supported for on-premises and cloud-based DD VE instances. DD Retention Lock Compliance Edition is not supported for on-premises or cloud-based DD VE instances.

**source** src

The location of the directory or file to copy. The first part of the path must be /data/col1/.

**destination** dest

The destination for the directory or file being copied. The first part of the path must be /data/col1/. If the destination already exists, you will be asked if you want to overwrite it.

**filesys option**

**filesys option disable report-replica-as-writable**

Set the reported read/write status of a replication destination file system to read-only. Use the `filesys disable` command before changing this option and use the `filesys enable` command after changing the option. Role required: admin, limited-admin.

With CIFS, use the `cifs disable` command before changing the option and use the `cifs enable` command after changing the option. Role required: admin, limited-admin.

**filesys option enable report-replica-as-writable**

Enable the filesys option. Role required: admin, limited-admin.

Set the reported read/write status of a replication destination file system to read/write. Use the `filesys disable` command before changing this option and use the `filesys enable` command after changing the option.

With CIFS, use the `cifs disable` command before changing the option and use the `cifs enable` command after changing the option.

**filesys option reset {local-compression-type | low-bw-optim | marker-type | report-replica-as-writable | staging-reserve | staging-clean | staging-delete-suspend | compute-segfeatures | app-optimized-compression | warning-space-usage <50-90> | critical-space-usage <75-98>**

Return file system compression to the default settings on the destination protection system. Role required: admin, limited-admin.

**Argument Definitions**

**local-compression-type**

Reset the compression algorithm to the default of Gzfast.

**low-bw-optim**

This option is available only to authorized Dell EMC and partner support personnel.

**marker-type**

Return the marker setting to the default of auto.

**report-replica-as-writable**

Reset the file system to read-only.
staging-clean
Staging-clean: Controls the automatic start of a cleaning operation after files have been deleted. Specify this as a percentage of the reserve. For example, if the staging reserve is 20% and staging-clean is 80%, then the system will start a cleaning operation when the space to be recovered from deleted files exceeds 16% of the total space. Default 0, range 0-200.

staging-delete-suspend
Intended to prevent runaway deletions. For example, when no more reserve is available to increase available space and the client software keeps deleting files hoping to free up space. Specify as a percentage of the reserve. When the specified amount of space has been freed by deletions, the system allows no further deletions until after a clean is started. Default 0, range 0-400.

compute-segfeatures
This option is available only to authorized Dell EMC and partner support personnel.

staging-reserve
Set staging reserve percentage from 0 to 90.

app-optimized-compression
Reset the Oracle Optimized Deduplication to none.

warning-space-usage 50-90
The system can alert you with a warning message when a percentage (50-90%) of the available space is used. Set the percentage using this argument.

critical-space-usage 75-98
The system can alert you with a critical message when a percentage (75-98%) of the available space is used. Set the percentage using this argument.

filesys option set app-optimized-compression {none | oracle1}
When set to "oracle1", the system enables Oracle Optimized Deduplication for Oracle Incrementally Updated backups and RMAN multiplexed backups. Please refer to the Data Domain and Oracle Incrementally Updated Backup Integration Guide and the Data Domain Storage Best Practice Guide: Optimized Oracle Incrementally Updated Backup documents before changing this setting. Role required: admin.

filesys option set critical-space-usage 75-98
Set critical space usage percentage. Role required: admin, limited-admin.

Note: It is recommended that you set the critical-space-usage percentage higher than the warning-space-usage percentage.

filesys option set local-compression-type {none | lz | gzfast | gz}
Set compression type. Role required: admin, limited-admin.

filesys option set staging-reserve percent
Reserve a percentage of total disk space for disk staging. Range: 0 to 90. Role required: admin, limited-admin.

filesys option set warning-space-usage 50-90
Set warning space usage percentage. Range: 50 to 90. Role required: admin, limited-admin.

Note: It is recommended that you set the warning-space-usage percentage lower than the critical-space-usage percentage.

filesys option show [local-compression-type | low-bw-optim | marker-type | report-replica-as-writable | staging-reserve | staging-clean | staging-delete-suspend | compute-segfeatures | app-optimized-compression | warning-space-usage | critical-space-usage]
Show the file system option settings. By default, all file system options are displayed. To limit the output to a single system option, specify one of the system options. Role required: admin, limited-admin, user, backup-operator, security, none.

**Argument Definitions**

- **local-compression-type**
  
  Display the current compression algorithm.

- **marker-type**
  
  Display the current marker setting.

- **low-bw-optim**
  
  This option is available only to authorized Dell EMC and partner support personnel.

- **report-replica-as-writable**
  
  Display the current reported setting on the destination protection system.

- **staging-reserve**
  
  Set staging reserve percentage from 0 to 90.

- **staging-clean**
  
  This option is available only to authorized Dell EMC and partner support personnel.

- **staging-delete-suspend**
  
  This option is available only to authorized Dell EMC and partner support personnel.

- **compute-segfeatures**
  
  This option is available only to authorized Dell EMC and partner support personnel.

- **app-optimized-compression**
  
  Display the Oracle Optimized Deduplication settings enabled.

- **warning-space-usage 50-90**
  
  The system can alert you with a warning message when a percentage (50-90%) of the available space is used. Set the percentage using this argument.

- **critical-space-usage 75-98**
  
  The system can alert you with a critical message when a percentage (75-98%) of the available space is used. Set the percentage using this argument.

**filesys report**

```
filesys report generate file-location path {path-name | all} [output-file filename]
```

Create a report showing the name and location of each file under the specified path. If you specify `output-file filename`, the report is saved in this file under the fixed directory `/ddvar`. If the output file argument is not specified, the report is displayed in standard output. The command returns before the entire report is generated, and a footer indicates that the report is complete. Each line in the report contains a file name and its location. The location is shown as *Active* if the file completely resides in the active tier. If the file resides partially or completely in the retention tier or cloud tier, the retention unit or cloud unit name is shown for its location. An asterisk is appended to the line if the file contents span the active tier and retention unit or cloud unit. Role required: admin, limited-admin.

**Example 89**
Example 89

To report files in a directory:

# filesys report generate file-location path /backup/dir1 output-file report.txt

or

# filesys report generate file-location path /data coll/mtree-2/dir3 output-file report.txt

To report files in an MTree:

# filesys report generate file-location path /data coll/mtree-2 output-file report.txt

To report files in the entire namespace:

# filesys report generate file-location path all output-file report.txt

filesys restart

Disable and enable the file system in a single operation. The system displays a message that the file system will be restarted and that applications may experience interruptions. Role required: admin, limited-admin, user, backup-operator.

filesys show

filesys show compression [filename] [recursive] [last n {hours | days}] [no-sync]
filesys show compression [tier {active | cloud}] summary | daily | daily-detailed {[last n {hours | days | weeks | months}] | start date [end date]}

These command options display the space used by, and compression achieved for, files and directories in the file system. Information is also shown for the tiers supported by the system. Values are reported in Gigabytes (GiB). See the DD OS Administration Guide for details. Role required: admin, user, backup-operator, security, none.

In general, the more often a backup procedure is run on a file or file system, the higher the compression. The output does not include global and local compression factors for the Currently Used table, but uses a dash instead. Output for a busy system may not return for several hours, depending on the number of files. Other factors may influence the output display.

Running the command without arguments generates default output that shows a summary of compression statistics for all files and directories in the file system for the last 7 days and the last 24 hours.

Argument Definitions

recursive (Optional)

Display all files in all subdirectories as well as compression information for each file.
filename (Optional)
Synchronize all modified files to disk and then display compression statistics for the specified file or directory only. To display compression statistics for a specific file or directory without first synchronizing all modified files to disk, include the no-sync option.

Depending on the number of files in the file system, specifying a file name could cause this command to process for several hours before completing.

no-sync (Optional)
Use to not sync the file system prior to getting compression information.

tier {active | cloud} (Optional)
Display results for the specified tier.

last n {hours | days | weeks | months} (Optional)
In the summary portion of the output, display file system compression statistics for the specified time frame instead of the past 7 days. The statistics for the last 24 hours remain in the summary output. If you specify a file or directory name, you cannot use this option with the weeks keyword or the months keyword.

summary (Optional)
Display all compression statistics, summarized in the following categories:
- Storage currently used.
- Data written in the last 7 days. By including the last n option or the start date option, you can display statistics for a different time frame.
- Data written in the last 24 hours.

daily (Optional)
In addition to the summary output, display the following information for each day, over the previous four full weeks, plus the current partial week. This option is not available if you specify a file or directory name.

daily-detailed (Optional)
Display the daily output, but also include the following information for each day. This option is not available if you specify a file or directory name.

start date (Optional)
In the summary portion of the output, display file system compression statistics for the time frame that begins on the specified day instead of the past 7 days. The statistics for the last 24 hours remain in the summary output. If you specify a time frame less than the previous 4 weeks, plus the current full week, the daily or daily-detailed output (if specified) is truncated to the shorter time frame.

Specify date using the format yyyy-mm-dd. By default, the last day of the time frame specified with this argument is the most recent, full day elapsed.

end date (Optional)
Valid only if the start option is used. In the summary portion of the output, display file system compression statistics for the time frame that ends on the specified day. In general, the more often a backup is done for a particular file or file system, the higher the compression. On a busy system, this process may not complete for several hours, depending on the number of files. Other factors may also affect results.

On a standard protection system, output includes information on active tier only.
Output Definitions

Pre-Comp
Data written before compression.

Post-Comp
Storage used after compression.

Global-Comp Factor
Ratio of Pre-Comp / (size after global compression). Not applicable to the storage currently used.

Local-Comp Factor
Ratio of (size after global compression)/Post-Comp. Not applicable to the storage currently used.

Total-Comp Factor
Ratio of Pre-Comp / Post-Comp.

Reduction %
Percentage value (Pre-Comp - Post-Comp) / Pre-Comp) * 100. This is the default output format.

Example 90

filesys show compression absolute path of file [recursive]
Displays all files in all subdirectories and prints compression information for each file as well as the summary for filename.
ilesys show file-info absolute path of file
Display detailed information about the specified file. Specify the fully qualified path to the file. Role required: admin, limited-admin.
ilesys show space [tier {active | cloud} | cloud-unit {all | unit-name}]
Displays the space available to and used by file system resources, including per-unit space usage statistics. Values are reported in gigabytes (GiB). Role required: admin, limited-admin, user, backup-operator, security, none. Output includes:

- If the tier option is specified, the system shows a summary for the entire tier.
- If none is specified, the system shows summary tables for the active tier, cloud tier, and total.
- A line displays space information on '/ddvar/core' if a separate partition is mounted there.
- For DD Cloud Tier storage, post-comp size is based on the CLOUDTIER-CAPACITY license and might not match what is reported by the cloud storage provider.

Output Definitions

Size GiB
Total storage capacity of a file system resource.

Used GiB
Amount of data stored on a file system resource.

Avail GiB
Amount of free space on a file system resource.
Use%  
Ratio of data stored to total capacity, multiplied by 100.

Cleanable GiB  
Estimated amount of recoverable free space. Command output displays space availability and usage information for the following file system components:

/data: pre-comp  
Amount of virtual data stored on the protection system. Virtual data is the amount of data sent to the protection system from backup servers.

/data: post-comp  
Amount of total physical disk space available for data, actual physical space used for compressed data, and physical space still available for data storage. For DD Cloud Tier storage, post-comp size is based on the CLOUDTIER-CAPACITY license and might not match what is reported by the cloud storage provider. Warning messages go to the system log and an email alert is generated when the Use% figure reaches 90%, 95%, and 100%. At 100%, the protection system stops accepting data from backup servers.

/ddvar  
Approximate amount of space used by and available to the log and core files. Use this directory to free space in this area, remove old logs and core files. You can also delete core files from the /ddvar/core directory or the /ddvar/ext directory if it exists.

The total amount of space available for data storage can change because an internal index may expand as the protection system fills with data. The index expansion takes space from the Avail GiB amount.

If Use% is always high, use the command option `filesys clean show-schedule` to see how often the cleaning operation is scheduled to run automatically. Use `filesys clean schedule` to run the operation more often.

filesys show uptime  
Display the amount of time passed since the file system was last enabled. The display is in days, hours, and minutes. Role required: admin, limited-admin, user, backup-operator, security, none.

filesys status  
Display the state of the filesystem process. If the filesystem was shut down with a protection system command, such as filesys disable, the output display includes the command name in square brackets. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.

filesys sync  
Synchronize modified files to disk. Role required: admin, limited-admin, backup-operator, security.
High availability (HA) is a licensed feature that allows one protection system controller to failover to a second controller connected to it, and to the same sets of disks if the primary controller experiences a failure. The `ha` command creates, manages, modifies, and removes the HA configuration. See the *DD OS Administration Guide* for details.

This chapter contains the following topics:

- `ha change history` ................................................................................................................. 186
- `ha guidelines and restrictions` ............................................................................................... 186
- `ha create` ............................................................................................................................... 187
- `ha destroy` .............................................................................................................................. 187
- `ha failover` ............................................................................................................................ 188
- `ha offline` ............................................................................................................................... 188
- `ha online` ............................................................................................................................... 188
- `ha status` ............................................................................................................................... 188
ha change history

There have been no changes to this command in this release.

ha guidelines and restrictions

- HA is supported on the following protection systems:
  - DD6800
  - DD9300
  - DD9500
  - DD9800
- Both nodes in the HA pair must have the same model number, memory configuration, I/O module configuration, and software version.
- Use fixed IP addresses for node management.
- Use floating IP addresses for data access.
- Clean up unused fixed interfaces on standby node, to allow floating address configuration on the same interface as on the active node.
- When configuring a floating IP address, the links on both nodes must be up and running, or the HA pair go into a degraded state and be unable to fail over. If the switch port connected to the floating IP port is disabled, or if the floating IP link has no carrier, the HA pair remains in a degraded state. The HA pair comes back online automatically after the floating IP link is recovered.
- The DD file system (DDFS) only exists on the node that is originally designated as the primary node.
- The system times on each node must be within 10 seconds of each other.
- The HA configuration must be in the highly available state to failover.
- After it is initiated, the failover process may take up to 10 minutes to complete.
- After a failover, the following protocols require a manual restart of any jobs that were in progress at the time of the failover:
  - CIFS
  - NDMP
  - VTL
- After a failover, jobs that were in progress at the time of the failover using the following will resume automatically after the failover:
  - DD Boost over FC
  - DD Boost over IP
  - NFS
  - Replication
  - Data movement to Cloud Tier.
- Run the ha offline command on the standby node when performing maintenance or rebooting to avoid disruption of FC traffic on the active node. Once the operation for the passive node is complete, run the ha online command.
When the standby node reboots, FC I/O on the active node can be disrupted for up to 10 seconds if the **ha offline** and **ha online** commands are not run on the standby node. Active VTL backup and restore operations may fail and need to be restarted. DFC operations are expected to recover without user intervention.

The active node reboots if the release resource cannot be delivered or processed within 10 seconds in situations where scsitgtd is in the middle of configuration changes. Performing multiple failover or failback endpoints, or vport disable operations hang because of pending I/O on the VHBA queue.

When removing an HA configuration in FC environments:

1. Disable all ports and endpoints before running the **ha destroy** command.
2. After the former standby node reboots, run the **scsitarget endpoint modify all wwpn auto** command to change the WWPNs on the node so they are not the same as the WWPNs on the former active node.
3. Zone the newly generated WWPNs to the FC fabric.

**ha create**

Create the HA relationship between two protection systems.

```
ha create peer {<ipaddr> | <hostname>} [ha-name <hostname>]
```

Create an HA relationship between the local system, and the specified peer system. Optionally specify a hostname to use as the top-level HA system name. The local system becomes the primary node, and the specified peer becomes the standby node. This command prompts the user for the sysadmin password of the peer system. Both nodes automatically reboot after the command completes successfully. Role required: admin, limited-admin.

If the **ha-name <hostname>** parameter is not specified, the hostname of the local system becomes the HA system name, and the hostnames of the two nodes are assigned as follows:

- Local node: `<ha-system-name>-p0`
- Peer node: `<ha-system-name>-p1`

The HA name, whether specified with the **ha-name <hostname>** parameter, or generated from the hostname of the local system, must be associated with a valid floating IP address to provide access to the system over the network.

To change the HA name, manually update the new HA name for all backup, recovery, and replication operations that identify the system by the HA name. Complete the following sequence to change the HA name:

1. Run the **net set hostname <host>** command to set the hostname on the local system to the desired HA name.
2. Run the **net set hostname ha-system** command to promote the new local system hostname to become the HA name.

**Argument definitions**

**ha-name**

The top-level hostname for the HA pair. This hostname is used to access the HA pair, and is not tied to a specific physical node.

**ha destroy**

Remove the HA relationship between two protection systems to use each system independently.

```
ha destroy
```
Remove the HA relationship between the primary and secondary nodes to use each system independently. Run this command on the same system where the HA pair was first created. After the destroy operation, the HA pair is broken down into two single-node systems. The file system is preserved on the node where it resides.

After this command is successful, complete the following sequence to use both nodes as independent systems:

1. Disconnect the node without the file system from the storage and the HA interconnect.
2. Disable and reenable the file system on the node where it resides to resume activity on the file system.
3. Connect the node without the file system to new storage.
4. Run the GUI or CLI Configuration Wizard on the node without the file system to configure it with its own storage and file system.

Role required: admin, limited-admin.

**ha failover**

Manually initiate a failover from the current active node to the standby node.

`ha failover [go-offline]`

Manually initiate a failover from the current active node to the standby node. The node being switched from active to standby reboots after the command completes successfully. This command can be run from either node. The `go-offline` option can be run on the current active node to take the node offline after failing over to the standby node. Role required: admin, limited-admin.

**ha offline**

Take the standby node offline.

`ha offline`

Take the standby node offline. This command takes the system out of the highly available state, therefore a failover cannot occur if the primary node suffers a failure. This command can only be run on the standby node. Role required: admin, limited-admin.

**ha online**

Bring an offline standby node back online.

`ha online`

Bring the standby node back online. The standby node reboots after this command completes successfully. This command returns the system to the highly available state, allowing for failover if the primary node suffers a failure. This command can only be run on the standby node. Role required: admin, limited-admin.

**ha status**

View details of the HA configuration.

`ha status [detailed]`

View the details of the HA configuration.

<table>
<thead>
<tr>
<th>HA System Name: ha3a.company.com</th>
<th>HA System Status: highly available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node Name</td>
<td>Node ID</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
</tbody>
</table>

Dell EMC DD OS Command Reference Guide
ha3a-p0.company.com       0       active    online
ha3a-p1.company.com       1       standby   online

The detailed option provides the following additional information:

- **Heartbeat**: A protocol between the two nodes to provide realtime status of the HA state and individual node health status.
- **Mirroring**: The process of copying all configuration information to the standby node to make sure it is ready for a failover.
- **Node health**: Summary of the health of the ports and I/O modules on the nodes.

---

HA System name:               ha3a.company.com
HA System Status:             highly available
Interconnect Status:          ok
Primary Heartbeat Status:     ok
External LAN Heartbeat Status: not ok
Hardware compatibility check: ok
Software Version Check:       ok
Highly Availability Ratio:    98.5%

Node ha3a-p0.company.com:
  Role:          active
  HA State:      online
  Node Health:  ok

Node ha3a-p1.company.com:
  Role:          standby
  HA State:      online
  Node Health:  ok

Mirroring Status:
Component Name   Status
---------------   ------
nvram            ok
registry         ok
sms              ok
ddboost          ok
cifs             ok
---------------   ------

**Note**: The Mirroring Status information only displays when the `ha status detailed` command is run on the active node.

Role required: admin, limited-admin.
The Command Line Interface (CLI) displays two types of help, syntax-only help and command-description help that includes the command syntax.

The following guidelines describe how to use syntax-only help.

- To list the top-level CLI commands, enter a question mark (?), or type the command `help` at the prompt.
- To list all forms of a top-level command, enter the command with no options at the prompt or enter `command ?`.
- To list all commands that use a specific keyword, enter `help keyword` or `? keyword`. For example, `? password` displays all protection system commands that use the password argument.

The following guidelines describe how to use command-description help.

- To list the top-level CLI commands, enter a question mark (?), or type the command `help` at the prompt.
- To list all forms of a top-level command with an introduction, enter `help command` or `? command`.
- The end of each help description is marked END. Press Enter to return to the CLI prompt.
- When the complete help description does not fit in the display, the colon prompt (:) appears at the bottom of the display. The following guidelines describe what you can do when this prompt appears.
  - To move through the help display, use the up and down arrow keys.
  - To quit the current help display and return to the CLI prompt, press q.
  - To display help for navigating the help display, press h.
  - To search for text in the help display, enter a slash character (/) followed by a pattern to use as search criteria and press Enter. Matches are highlighted.

To exit the CLI session, type `exit` or `logout`.

Dell EMC DD OS Command Reference Guide  191
help
The `ifgroup` command configures and displays information about dynamic interface groups. Command options create interface groups, add and delete interfaces and clients, enable and disable interface groups, assign and unassign replication Mtrees and remote hosts, and display configuration and connection information.

This chapter contains the following topics:

- `ifgroup change history`............................................................... 194
- `ifgroup add`........................................................................... 194
- `ifgroup create`........................................................................ 195
- `ifgroup del`............................................................................. 195
- `ifgroup destroy`........................................................................ 195
- `ifgroup enable`......................................................................... 195
- `ifgroup disable`....................................................................... 195
- `ifgroup option`......................................................................... 195
- `ifgroup rename`....................................................................... 195
- `ifgroup replication assign`.......................................................... 196
- `ifgroup replication unassign`......................................................... 197
- `ifgroup reset`........................................................................... 197
- `ifgroup show config`................................................................. 197
- `ifgroup show connections`........................................................... 198
ifgroup change history

There have been no changes to this command in this release.

ifgroup add

ifgroup add group_name \{interface {ipaddr | ipv6addr} | client host\}
Add an interface, client, or both to group-name or to the default group. Prior to adding an interface you must create the group-name unless the group name is the default group. Role required: admin, limited-admin.

This command provides full ifgroup support for static IPv6 addresses, providing the same capabilities for IPv6 as for IPv4. Concurrent IPv4 and IPv6 client connections are allowed. A client connected with IPv6 sees IPv6 ifgroup interfaces only. A client connected with IPv4 sees IPv4 ifgroup interfaces only. Individual ifgroups include all IPv4 addresses or all IPv6 addresses. The default group behaves in the same manner as any other group.

- The group-name “default” is created during an upgrade of a fresh install and is always used if group_name is not specified.
- You can enforce private network connectivity, ensuring that a failed job does not reconnect on the public network after network errors. When interface enforcement is enabled, a failed job can only retry on an alternative private network IP address. Interface enforcement is only available for clients that use ifgroup interfaces.

Interface enforcement is off (FALSE) by default. To enable interface enforcement, you must add the following setting to the system registry:

```
system.ENFORCE_IFGROUP_RW=TRUE
```

After you've made this entry in the registry, you must do a `filesys restart` for the setting to take effect. For more information, see the DD Boost for Partner Integration Administration Guide or the DD Boost for OpenStorage Administration Guide.

- An ifgroup client is a member of a single ifgroup group-name and may consist of a fully qualified domain name (FQDN) such as ddboost.datadomain.com, wild cards such as *.datadomain.com or "*", a short name such as ddboost, or IP range of the client (xx.xx.xx.0/24 for IPv4 or x:xx::0/112 for IPv6, for example). When a client's source IP address is evaluated for access to the ifgroup, the order of precedence is:
  1. IP address of the connected protection system
  2. Connected client IP range. This host-range check is useful for separate VLANs with many clients where there isn't a unique partial hostname (domain).
     - For IPv4, you can select five different range masks, based on network.
     - For IPv6, fixed masks /64, /112, and /128 are available.
  3. Client Name: abc-11.d1.com
  4. Client Domain Name: *.d1.com
  5. All Clients: *

If none of these checks find a match, ifgroup interfaces are not used for this client.

For detailed information about this order of precedence, see the DD Boost for Partner Integration Administration Guide.
- By default, the maximum number of groups is eight. It is possible to increase this number by editing the system registry and rebooting.
Additionally, the IP address must be configured on the protection system and its interface must be enabled. You can add public or private IP addresses for data transfer connections. After adding an IP address as an interface, you can enable advanced load balancing and link failover.

See the *DD Boost for Partner Integration Administration Guide* or the *DD Boost for OpenStorage Administration Guide*, and the *DD OS Administration Guide* for more information on interface groups.

**ifgroup create**

```
ifgroup create group-name
```

Create a group with the name `group-name` for the interface. Group names may contain alphanumeric characters, hyphens, and underscores. System hostnames, fully qualified hostnames, and wildcard hostnames indicated by an asterisk may also be used. Reserved group names that cannot be used are default, all, or none. Role required: admin, limited-admin.

**ifgroup del**

```
ifgroup del group_name {interface {ipaddr | ipv6addr} | client host}
```

Remove an interface, client, or both from `group_name` or default group. Deleting the last IP address interface disables the ifgroup. If this is the case, you have the option of terminating this command option. Role required: admin, limited-admin.

**ifgroup destroy**

```
ifgroup destroy group-name
```

Destroy the group name. Only empty groups can be destroyed. Interfaces or clients cannot be destroyed but may be removed sequentially or by running the command option ddboost ifgroup reset `group-name`. Role required: admin, limited-admin.

*Note:* The group-name “default” cannot be destroyed.

**ifgroup disable**

```
ifgroup disable group-name
```

Disable a specific group by entering the `group-name`. If `group-name` is not specified, the command applies to the default group. Role required: admin, limited-admin.

**ifgroup enable**

```
ifgroup enable group-name
```

Enable a specific group by entering the `group-name`. If `group-name` is not specified, the command applies to the default group. Role required: admin, limited-admin.

**ifgroup option**

```
ifgroup option reset {disable-file-replication | enforce-client-interface}
```

Reset replication permissions for ifgroups and interface enforcement settings to their default settings. Role required: admin, limited-admin.
ifgroup

Changed settings impact all interface groups, but they do not impact in-progress jobs. Changed settings take effect during the ifgroup query at the start of a job.

Example 91

```
# ifgroup option reset disable-file-replication
File replication is allowed on ifgroup.
```

Example 92

```
# ifgroup option reset enforce-client-interface
Client may use any interface.
```

ifgroup option set \{disable-file-replication | enforce-client-interface\}
Set replication permissions for ifgroups and interface enforcement settings. By default, ifgroup is enabled for file replication, and interface enforcement is disabled. Role required: admin, limited-admin.

Changed settings impact all interface groups, but they do not impact in-progress jobs. Changed settings take effect during the ifgroup query at the start of a job.

Example 93

```
# ifgroup option set disable-file-replication
File replication is not allowed on ifgroup.
```

Example 94

```
# ifgroup option set enforce-client-interface
Client must use interfaces configured in ifgroup.
```

ifgroup rename

```
ifgroup rename group-name new-group-name
```
Rename the ifgroup group-name to new-group-name. This command option does not require disabling the group. The default group cannot be renamed. Role required: admin, limited-admin.

ifgroup replication assign

```
ifgroup replication assign group_name \{mtree mtree-path | remote hostname | mtree mtree-path remote hostname\}
```
Assign a replication MTree and remote host to group-name. The full MTree path is required. Role required: admin, limited-admin.

⚠️ Note: The hostname configuration is case-sensitive; however, this command automatically converts input entered as uppercase to lowercase. At upgrade, all previously configured hostnames are automatically converted to lowercase.

Example 95

```
# ifgroup replication assign 10GLab mtree /data/coll/REPLX remote ddp-880-1.datadomain.com
```
ifgroup replication unassign

ifgroup replication unassign group_name {mtree mtree-path | remote hostname | mtree mtree-path remote_hostname}

Unassign a replication MTree and remote host from group-name. Role required: admin, limited-admin.

Example 96

# ifgroup replication unassign 10GLab mtree /data/coll/REPLX remote ddp-880-1.datadomain.com 10GLab
Unassigned replication mtree "/data/coll/REPLX" with remote "ddp-880-1.datadomain.com" from ifgroup "10GLab".

ifgroup reset

ifgroup reset [group_name] {all | interfaces | clients | replication}
Reset all, interfaces, clients, or replication for group-name. If group-name is not specified, the command applies to the default group. Role required: admin, limited-admin.

Example 97

# ifgroup reset 10GLab replication
ifgroup "10GLab" is enabled with 3 replication assignments.
This command will remove all replication assignments from the group.
    Are you sure? (yes|no|?) [no]: yes
ok, proceeding.
Reset ifgroup "10GLab".

ifgroup show config

ifgroup show config [group_name] {all | summary | interfaces | clients | replication}
Display the configuration of interfaces, clients, or replication for group-name. If group-name is not specified, information for all groups is shown. Select the all argument to view all configuration options for the selected group. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 98

# ifgroup show config summary

<table>
<thead>
<tr>
<th>Group-name</th>
<th>Status</th>
<th>Interface</th>
<th>Clients</th>
<th>Replication</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>enabled</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>v6default</td>
<td>enabled</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10GLab-192</td>
<td>enabled</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
### Example 98  (continued)

<table>
<thead>
<tr>
<th>Group-name</th>
<th>Status</th>
<th>Port</th>
<th>Interface</th>
<th>Client Write</th>
<th>Client Read</th>
<th>Repl-out</th>
<th>Repl-in</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GLab-172</td>
<td>enabled</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10GLab-192-REPL</td>
<td>disabled</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10GV6-2000</td>
<td>enabled</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10GV6-3000</td>
<td>enabled</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10Lab-172-REPL</td>
<td>enabled</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

File replication is allowed on ifgroup.  
Client must use interfaces configured in ifgroup.

### ifgroup show connections

**ifgroup show connections**

Show connections activity for interface groups. Role required: admin, limited-admin, security, user, backup-operator, none.

**Example 99**

```bash
# ifgroup show connections
Group-name   Status    Port         Interface   Client Write   Client Read   Repl-out   Repl-in   Total
----------   -------   ----------   ----------   ------------   -----------   --------   -------   -----
--------   -------   -------   ---------   -------   -------   ------
(null)     disable   eth0a       10.6.109.41  0             0             0         0
0         0         0
default   enabled   eth0a       10.6.109.40  0             0             0         0
0         0         0
10GLab     enabled   eth4a:1   192.168.1.230  0             0             0         0
0         0         0
10GLab     enabled   eth4b:1   192.168.1.231  0             0             0         0
0         0         0
----------   -------   -------   ---------   ------------   -----------   --------   -------   -----  
# ifgroup show connections
Group-name   Status    Port   Interface   Client Write   Client Read   Repl-out   Repl-in   Total
----------   -------   -------   ----------   ------------   -----------   --------   -------   -----
--------   -------   -------   ---------   -------   -------   ------
(null)     disable   eth0a     2620::eaf4  0             0             0         0
0         0         0
default   disable   eth0b     2620::eaf5  0             0             0         0
0         0         0
10GLab     disable   eth4a     3000::230  0             0             0         0
0         0         0
10GLab     disable   eth4b     3000::231  0             0             0         0
0         0         0
----------   -------   -------   ---------   ------------   -----------   --------   -------   -----  
```

ifgroup
The `ipmi` command monitors and manages a protection system deployed remotely. Command options enable administrators to monitor remote systems and to power the systems on or off as required. The Serial-Over-LAN (SOL) feature is used to view the serial output of a remote system boot sequence. For more information, including the list of supported models, see the *DD OS Offline Diagnostics Suite User’s Guide*.

This chapter contains the following topics:

- `ipmi change history` ................................................................. 200
- `ipmi guidelines and restrictions` ......................................................... 200
- `ipmi config` ...................................................................................... 200
- `ipmi disable` ................................................................................... 200
- `ipmi enable` ................................................................................... 200
- `ipmi remote` .................................................................................. 200
- `ipmi reset` ...................................................................................... 201
- `ipmi show` ...................................................................................... 201
- `ipmi user` ...................................................................................... 201
ipmi change history

There have been no changes to this command in this release.

ipmi guidelines and restrictions

- Users cannot log in to IPMI via SSH. See the DD OS Administration Guide for instructions on managing remote systems.
- Users cannot log in to BMC instead of IPMI.
- IPMI (on/off/cycle/status) and SOL are not supported on models DD140, DD610, and DD630.

ipmi config

```
ipmi config port {dhcp | ipaddress ipaddr netmask mask gateway ipaddr}
```
Configure an IPMI port to get its IPv4 configuration from DHCP, or configure static IP address information. If configuring a static IP address, you must provide the BMC IP address, netmask, and gateway address. To display a list of IPMI ports, enter `ipmi show hardware` or `ipmi show config`. See the DD OS Administration Guide for details. Role required: admin, limited-admin.

**Note:** If the IPMI port also supports IP traffic (for administrator access or backup traffic), the interface port must be enabled with the `net enable` command before you configure IPMI.

**Note:** The BMP port and IPMI implementation do not support IPv6 in this release.

ipmi disable

```
ipmi disable {port | all}
```
Disable IPMI remote access through one or all IPMI ports. To display a list of IPMI ports, enter `ipmi show hardware` or `ipmi show config`. Role required: admin, limited-admin.

ipmi enable

```
ipmi enable {port | all}
```
Enable IPMI remote access through one or all IPMI capable ports. To display a list of IPMI capable ports, enter `ipmi show hardware`. Role required: admin, limited-admin.

ipmi remote

```
ipmi remote console ipmi-target {ipaddr | hostname} user user
```
Activates the Serial-Over-Lan (SOL) feature, which enables viewing text-based serial output of a remote protection system without a serial server. SOL is used in combination with the remote power cycle command to view the remote system’s boot sequence.

Specify the IP address or hostname of the remote system, and specify an IPMI username that is configured on the remote system. For more information, see the DD OS Administration Guide. Role required: admin, limited-admin.

```

ipmi remote power {on | off | cycle | status} ipmi-target {ipaddr | hostname} user user
```

Power on, power off, or power cycle a remote target system from an initiator system. Specify the IP address or hostname of the remote system. Role required: admin, limited-admin.

**ipmi reset**

`ipmi reset`

Resets the LAN configuration for all IPMI ports, and clears the SOL configuration. Role required: admin, limited-admin.

**ipmi show**

`ipmi show config`

View the configuration of local IPMI interfaces. Output includes the dynamic or static IP address, gateway, netmask, and MAC address. Role required: admin, limited-admin.

`ipmi show hardware`

View the port names and firmware version of the local BMC. Output also includes the IPMI version, manufacturer, MAC addresses. The Link Status column shows if the LAN cable is connected to the LAN-IPMI shared port.

Link status cannot be determined on the following protection systems: DD640, DD2200, and DD2500. Role required: admin, limited-admin.

**ipmi user**

`ipmi user add user [password password]`

Add a new local IPMI user. The specified username and password are used by remote systems to access the local system. Role required: admin, limited-admin.

This command is not supported on DD6900, DD9400, and DD9900 systems with DD OS 7.0 and later.

**Note:** User root is not supported for IPMI connections on DD160 systems.

`ipmi user change user [password password]`

Change the password of a locally defined IPMI user. Role required: admin, limited-admin.

This command is not supported on DD6900, DD9400, and DD9900 systems with DD OS 7.0 and later.

`ipmi user del user`

Delete a locally defined IPMI user. Role required: admin, limited-admin.

This command is not supported on DD6900, DD9400, and DD9900 systems with DD OS 7.0 and later.

`ipmi user list`

View a list of locally-defined IPMI users, including names, IDs, and permissions. Role required: admin, limited-admin.

`ipmi user reset`

Clear all locally-defined IPMI users. If you are enabling IPMI for the first time, we recommend running this command to clear IPMI users who may be out of synch between two ports, and to disable default users. Role required: admin, limited-admin.
CHAPTER 23

license

The `license` command adds, deletes, and resets keys for licensed features and storage capacity.

This chapter contains the following topics:

- license change history ............................................................... 204
- license guidelines and restrictions ............................................. 204
- license add .................................................................................. 204
- license delete ........................................................................... 204
- license reset ............................................................................... 205
- license show ............................................................................. 206
license change history

There have been no changes to this command in this release.

license guidelines and restrictions

Note: Use the license commands for any operations on licenses which were added prior to the DD OS 6.0 release.

- License codes are case-insensitive. Include the hyphens when entering codes.
- The license add command is not supported on DD6900, DD9400, and DD9900 systems.
- These commands are not supported on PowerProtect DD Virtual Edition.
- The following software options require separate licenses. See the Online Support site for details.
  - DD Boost
  - Cloud Tier
  - Encryption
  - Expanded Storage
  - High Availability
  - I/OS
  - Replication
  - Retention Lock Compliance
  - Retention Lock Governance
  - Shelf Capacity
  - SMT
  - Storage Migration
  - Virtual Tape Library (VTL)

license add

license add license-code [license-code ...]
Add one or more licenses for features and storage capacity. Enter the license code exactly as provided by Dell EMC, including the dashes.
This command is not supported on DD6900, DD9400, and DD9900 systems.
Role required: admin, limited-admin.

license delete

license del license-feature [license-feature ...] | license-code [license-code ...]
Delete one or more licenses for features or storage capacity. To display the license codes and license feature names, enter license show. Role required: admin, limited-admin. Security officer authorization is required to delete Retention Lock Compliance licenses.
license reset

license reset
Remove all licenses. Requires confirmation before deletion. Role required: admin, limited-admin. Security officer authorization is required to delete Retention Lock Compliance licenses.
**Example 100**

```
#license reset
This will delete all added licenses.
    Do you want to continue? (yes|no) [no]: yes

All licenses deleted.
```

**license show**

```
license show [scheme]
View license codes, which are also called license keys. Feature licenses also display a feature name, which you can use instead of the code when deleting a feature license. The `scheme` argument displays unknown, DD licensing, or elicensing. Role required: admin, limited-admin, security, backup-operator, user.
```
CHAPTER 24

log

The log command manages and displays the protection system log file. Messages from the alerts feature, the autosupport reports, and general system messages are sent to the log directory (/ddvar/log). A log entry appears for each protection system command given on the system.

Protection systems can send network log messages to other systems enabled to listen. The protection system sends the log in the standard syslog format. When remote logging is enabled, all messages in the messages and kern.info files are exported.

Message selectors include:

* .notice
  Send all messages at the notice priority and higher.

* .alert
  Send all messages at the alert priority and higher (alerts are included in *.notice).

kern.*
  Send all kernel messages (kern.info log files).

This chapter contains the following topics:

- log change history ................................................................. 208
- log host ............................................................................... 208
- log list ................................................................................. 208
- log view ............................................................................. 208
- log watch .......................................................................... 210
**log change history**

There have been no changes to this command in this release.

**log host**

- `log host add host`
  Add a remote system hostname to the list of hosts to which system log messages are sent. Role required: admin, limited-admin.

  **Note:** If using three or more remote log hosts, they must be added by entering the IP address in the *host* argument instead of the host name.

- `log host del host`
  Remove a hostname from the list of systems that receive system log messages. Role required: admin, limited-admin.

- `log host disable`
  Disable sending log messages to other systems. Role required: admin, limited-admin.

- `log host enable`
  Enable sending log messages to other systems. Role required: admin, limited-admin.

- `log host reset`
  Disable log sending and clear the list of destination hostnames. Role required: admin, limited-admin.

- `log host show`
  Display whether logging is enabled or disabled and the list of destination hostnames. Role required: admin, limited-admin, security, user, backup-operator, or none.

**log list**

- `log list`
  List the files in the log directory with the date each file was last modified and the size of each file. For information on the log files, see the *DD OS Administration Guide*. Role required: admin, limited-admin, security, user, backup-operator, or none.

**log view**

- `log view [filename]`
  Display the specified log file. To display the available log files, enter `log list`. If a filename is not specified, the command displays the current messages file.

  When viewing the log, use the up and down arrows to scroll through the file. Use the q key to quit. Enter a forward slash to search forward or a question mark to search backward for a pattern such as a date. Role required: admin, limited-admin, security, user, backup-operator, or none.

  - `log view access-info [authentication-failures {all | known-users | unknown-users} | access-history {all | logins | logouts} | user-management] [user <user-name>] [last <n> {hours | days | weeks | months} | start <MMDDhhmm[[CC][YY]]> [end <MMDDhhmm[[CC][YY]]]]`

    Displays a history of user logins and logouts on the system, including both successful and unsuccessful attempts to log in.
log view audit-info [authorization-errors | all-errors] [user <user-name>] | user-role {admin | security | user | backup-operator | none}] [tenant-unit <tenant-unit>] [host <host>] [application {CLI | REST | GUI | VDISK}] [string <str>] [last <n> {hours | days | weeks | months}] [start <MMDDhhmm[[CC]YY]> [end <MMDDhhmm[[CC]YY]>]]

Displays a list of all system management configuration changes, and provides the following the following details:

- Username of the user who initiated the configuration change
- Timestamp
- Requested operation
- Operation outcome
log watch

log watch [filename]
View new log entries for the specified log file as they occur. To display the available log files, enter log list. If a filename is not specified, the command displays the messages file entries.

Use Ctrl-C to stop the display. Role required: admin, limited-admin, security, user, backup-operator, or none.
The `migration` command copies all data from one DD system to another. Use this command when upgrading to a larger capacity DD system. Migration is typically performed in a LAN environment.

Migration may also be used to copy replication configurations, known as “contexts.” See the *DD OS Administration Guide* for instructions.

This chapter contains the following topics:

- migration change history................................................................. 212
- migration abort........................................................................... 212
- migration commit......................................................................... 212
- migration receive......................................................................... 213
- migration send........................................................................... 214
- migration show stats................................................................. 216
- migration status......................................................................... 216
- migration watch......................................................................... 216
migration change history

There have been no changes to this command in this release.

migration abort

m}igration abort
Stop a migration process and return the DD system to its previous state. If the migration source is part of a replication pair, you must run migration abort on the source, and replication will be restarted. You cannot run this command on the migration destination. After you run migration abort on the destination, you must also run filesys destroy on the destination before the file system can be reenabled. After running migration abort, the password on the destination will be the same as the password on the source. Role required: admin, limited-admin.

migration commit

migration commit
Limit migration to data received by the source at the time the command is entered. You can use this command anytime after entering migration send. After migration commit, all data on the source, including new data for contexts migrated to the destination, is sent only to the destination. Write access to the source is blocked after you enter migration commit and during the time required to complete migration. After the migration process is finished, the source is opened for write access, but new data is not migrated to the destination. Role required: admin, limited-admin.

Example 101

To migrate data from source hostA to destination hostB (no replication):

1. On hostB (destination), enter:
   ```bash
   # filesys disable
   # filesys destroy
   # filesys create
   # migration receive source-host hostA
   ```
2. On either host, enter:
   ```bash
   # migration send /backup destination-host hostB
   ```
3. At the appropriate time for your site, create a migration end point. The three migration phases may take many hours. During that time, new data sent to the source is also marked for migration.
4. After the three migration phases are finished, enter the following command on hostA first, and then on destination hostB:
   ```bash
   # migration commit
   ```

Example 102

To migrate data and a context from source hostA to destination hostC, when hostA is also a directory replication source for hostB:

1. On hostC (migration destination), enter:
Example 102 (continued)

```bash
# filesys disable
# filesys destroy
# filesys create
# migration receive source-host hostA
```

2. On hostA (migration and replication source), enter:

```bash
# migration send dir://hostB/backup/dir2 destination-host hostC
# migration watch
```

3. First on hostA and then on hostC, enter (this command also disables the file system):

```bash
# migration commit
```

4. On hostB (replication destination), enter the following to change the replication source to hostC:

```bash
# filesys disable
# replication modify dir://hostB/backup/dir2
# source-host hostC
# filesys enable
```

---

**migration receive**

```bash
migration receive source-host src-hostname
```

Prepare a DD system to be a migration destination. This migration destination:

- Must have an empty file system
- Must have equal or larger capacity than the used space on the migration source (with the exception of collection replication)
- Must have a replication and/or encryption license if the source is licensed for those software options

This command should be run:

- Only on the migration destination
- After running `filesys destroy` and `filesys create` on the migration destination
- Before entering `migration send` on the migration source

Role required: admin, limited-admin.

**Example 103**

To prepare a destination for migration from the source hostA:

```bash
# filesys destroy
# filesys create
# migration receive source-host hostA
```

**Argument Definitions**

**src-hostname**

The migration source host, which can be a simple host name, an IP address, a partially qualified domain name, or a fully qualified domain name.
migration send

migration send \{obj-spec-list | all\} destination-host dst-hostname

Start migration, which will continue until you run migration commit.

This command should be run:

- Only on the migration source
- Only when no backup data is being sent to the migration source
- After running migration receive on the migration destination

New data written to the source is marked for migration until you run migration commit (which should be run first on the source, then the destination). New data written to the source after migration commit is not migrated. Write access to the source is blocked from the time you run migration commit until the migration process concludes.

Any setting of the system's replication throttle also applies to migration. If the migration source has throttle settings, use replication throttle set override to set the throttle to the maximum (unlimited) before starting migration.

With the exception of licenses and key-manager settings, all data on the migration source is always migrated, even when a single directory replication context is specified. Role required: admin, limited-admin.

Note: After you run migration send, the migration source remains in read-only mode until all replication contexts are synchronized. To avoid excessive time in this mode, it is recommended that you first synchronize these contexts by running replication sync and then run migration send immediately after synchronization concludes.

Example 104

To start migration of data only (excluding replication contexts, even if replication contexts are configured) to a migration destination hostC:

```
# migration send /backup destination-host hostC
```

Example 105

To start a migration that includes a collection replication context (replication destination string) of col://hostB:

```
# migration send col://hostB destination-host hostC
```

Example 106

To start migration with a directory replication context of dir://hostB/backup/dir2:

```
# migration send dir://hostB/backup/dir2 destination-host hostC
```

Example 107

To start migration with two replication contexts using context numbers 2 and 3:
Example 107 (continued)

```
# migration send rctx://2 rctx://3 destination-host hostC
```

Example 108

To migrate all replication contexts:

```
# migration send all destination-host hostC
```

Example 109

If a migration source has encryption enabled, you must do the following on the destination before starting the migration process.

1. Add the encryption license.
   
```
# elicense update license-file
```

2. Enable encryption. This command prompts you for a passphrase. Use the same passphrase as the migration source.
   
```
# filesys encryption enable
```

3. Restart the file system.
   
```
# filesys restart
```

4. If the migration source has an external key manager configured and enabled, clear the external key manager attributes on the destination.
   
```
# filesys disable
# filesys encryption key-manager reset
# filesys restart
```

5. After migration concludes, configure the external key manager attributes on the destination to be the same as the external key manager attributes on the source, and then enable the external key manager.

Argument Definitions

data-hostname

The migration destination, which can be a simple host name, an IP address, a partially qualified domain name, or a fully qualified domain name.

obj-spec-list

The specified replication contexts or paths, which can be one of the following:

- For systems that do not have a replication license:
  
```
/backup
```

- For systems with replication, this argument represents one or more contexts from the migration source. After you migrate a context, all data from the context remains on the source, but the context configuration is moved to the destination. Thus, this argument can be:
  
```
- The destination string, as defined when setting up replication, for example:
  
```
dir://hostB/backup/dir2col://hostBpool://hostB/pool2
```
- The context number, such as `rctx://2`, as shown in the output from `replication status`
- The keyword `all`, which migrates all contexts from the migration source to the destination

**migration show stats**

`migration show stats`
Display migration statistics during the migration process. Role required: admin, limited-admin.

**Output Definitions**

- **Bytes Received**
  The total number of bytes received at the destination. On the destination, this value includes data, overhead, and network overhead. On the source, this value includes overhead and network overhead. Use this value (and the **Bytes Sent** value) to estimate network traffic generated by migration.

- **Bytes Remaining**
  The total number of bytes remaining to be sent. This information is shown only on the migration source.

- **Bytes Sent**
  The total number of bytes sent from the migration source. This value includes backup data, overhead, and network overhead. On the destination, this value includes overhead and network overhead. Use this value (and the **Bytes Received** value) to estimate network traffic generated by migration.

- **Sync'ed-as-of Time**
  The last time stamp for which data has been synchronized between the two systems.

**migration status**

`migration status`
Display the status of migration at the time the command is run. Role required: admin, limited-admin.

**migration watch**

`migration watch`
Track the initial phase of migration (when write access is blocked). The command output shows the percentage of the migration process that has been completed. Role required: admin, limited-admin.
CHAPTER 26

mtdag

File or object tags are a class of metadata that is managed using the generic metadata tag and search (MDTAG) subsystem. The MDTAG subsystem is distinct from, but integrated with, the protection file system. The integration allows tags to be created for file system objects and queried using REST or retrieved (for a single file object) using the DD Boost SDK. Tags are stored in a database that is indexed and can be queried.

The `mtdag` commands are used to manage the state of the MDTAG daemon, which provides generic metadata tagging support.

This chapter contains the following topics:

- `mtdag change history`...
- `mtdag restart`...
- `mtdag show`...
- `mtdag status`...
mdtag change history

There are no changes to this command for this release.

mdtag restart

mdtag restart
Restart the generic metadata tag subsystem. If the generic metadata tag subsystem is disabled, use this command to re-enable it. Role required: admin.

mdtag show

mdtag show detailed-stats
Show detailed statistics for the generic metadata tag subsystem. Role required: admin, limited-admin.

mdtag status

mdtag status
Show the generic metadata tag subsystem status. The output shows whether the generic metadata tag subsystem is enabled or disabled. The generic metadata tag service cannot be used when the MDTAG daemon is stopped. Role required: admin.

Note: By default, the generic metadata tag subsystem is enabled.
The mtree command enables operations on a single “managed tree” (MTree) of a filesystem. An MTree is a logical partition of the namespace in the file system that can group together a set of files for management purposes; for example, snapshot schedules, replication, or retention locking.

This chapter contains the following topics:

- mtree change history .......................................................... 220
- mtree create .............................................................................. 220
- mtree delete ............................................................................. 221
- mtree list ................................................................................... 221
- mtree modify ............................................................................. 222
- mtree option ............................................................................. 222
- mtree rename ........................................................................... 223
- mtree retention-lock ................................................................. 223
- mtree show ................................................................................ 225
- mtree undelete ......................................................................... 228
**mtree change history**

There are no changes to this command for this release.

**mtree create**

```
mtree create mtree-path [tenant-unit tenant-unit-name] [quota-soft-limit n {MiB|GiB|TiB|PiB}] [quota-hard-limit n {MiB|GiB|TiB|PiB}]
```

Create an MTree under the specified path. The format of the `mtree-path` is `/data/coll/mtree-name`. An error message notifies you to enter a different name if another MTree with the same name exists. Role required: admin, limited-admin.

Naming conventions for creating MTrees include uppercase and lowercase letters (A-Z, a-z), numbers 0-9, single, non-leading embedded space, exclamation point, hash, dollar sign, ampersand, caret, tilde, left and right parentheses, left and right brackets, left and right braces (!, #, $, &, ^, ~, (, ), [ , ]). The maximum length for an MTree name is 50 characters.

If no quota option is specified, the default is unlimited for both soft and hard limits, meaning there are no quota limits.

When setting quota limits, a warning appears if the new limit is lower than the current space usage of the MTree. The command does not fail, but subsequent writes to the MTree are rejected. An error message appears if you are setting a soft limit that is greater than or equal to the hard limit.

When the hard limit is reached for an MTree quota, write operations stop and no more data can be written to the MTree. Data can be deleted.

**Argument Definitions**

`mtree-path`

Displays MTrees under a specified path only.

`tenant-unit` (Optional)

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

**Example 110**

To create MTree `/data/coll/backup1` with no quota limits:

```
# mtree create /data/coll/backup1
```

**Example 111**

To set a soft limit quota of 10 GiB on MTree `/data/coll/backup1`:

```
# mtree create /data/coll/backup1 quota-soft-limit 10 GiB
```

**Example 112**

To set a hard limit quota of 10 TiB on MTree `/data/coll/backup2`:

```
# mtree create /data/coll/backup2 quota-hard-limit 10 TiB
```
Example 113

To set a tenant-unit on /data/coll/backup3:

```
# mtree create /data/coll/backup3 tenant-unit tenant1
```

**mtree delete**

```
mtree delete mtree-path
```

Delete the specified MTree (denoted by the pathname). MTrees marked for deletion remain in the file system until the filesys clean command is run. This command option is not allowed on Retention Lock Governance or Retention Lock Compliance MTrees unless they are empty. You can revert the marked-for-deletion state of that MTree by running the mtree undelete command. See the **DD OS Administration Guide** for details on Retention Lock Compliance and Governance. If the MTree is a storage unit, the system returns an error. Role required: admin.

This command will fail to delete the specified MTree if there is a data movement policy configured on the MTree, or a data movement operation is in progress when the delete command is issued.

**Note:** For systems that use the DD Boost protocol, you can use the ddboost storage-unit delete command to delete a storage unit.

Effects of deleting an MTree include:

- The MTree appears in the output of the mtree list command option and is marked with the status value D.
- File service to a deleted MTree is rejected. Deleted MTrees are not visible through NFS or CIFS clients.
- When an MTree is removed from the file system, snapshots associated with that MTree are also deleted from the /data/coll/mtree-name/.snapshot/ directory.

**mtree list**

```
mtree list [mtree-path] [tenant-unit tenant-unit-name]
```

Display the list of MTrees. When Secure Multi-tenancy (SMT) is not enabled, the system displays three columns: Name, Pre-Comp (GiB), and Status. When SMT is enabled, the system also displays Tenant Unit. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.

**Argument Definitions**

**mtree-path (Optional)**

Display MTrees under the specified path only. This command supports the asterisk (*) wildcard character in the MTree pathname. Values include:

- /data/coll/mtree1
- /data/coll/mtree*
- *mtree*

**tenant-unit (Optional)**

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.
**Output Definitions**

When SMT is enabled, tenant-unit will be displayed if it is configured. If it is not configured, the system will display "-". Output includes the MTree pathname, pre-compression, and status. Status is based on pre-defined values:

- **D**
  - Marked for deletion. MTree will be removed from the file system by the filesys clean command. Can be unmarked for deletion by using the mtree undelete command only if the filesys clean command has not been run.

- **Q**
  - Quota defined.

- **RO**
  - Read-only access.

- **RW**
  - Read/write access.

- **RD**
  - Replication destination.

- **RLCE**
  - Retention Lock Compliance enabled.

- **RLGE**
  - Retention Lock Governance enabled.

- **RLGD**
  - Retention Lock Governance disabled.

**mtree modify**

```
mtree modify mtree-path tenant-unit tenant-unit-name
```

Assign an MTree to a tenant-unit. If the MTree is a storage unit, the system returns an error. Role required: admin, limited-admin.

**Note:** For systems that use the DD Boost protocol, you can use the ddboost storage-unit modify command to modify a storage unit.

**Argument Definitions**

- **mtree-path**
  - Display MTrees under the specified path only.

- **tenant-unit (Optional)**
  - The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

- **tenant-unit name**
  - The name of the tenant-unit you want to associate with the MTree.

**mtree option**

```
mtree option reset app-optimized-compression mtree mtree_path
```

Assign an MTree to a tenant-unit. If the MTree is a storage unit, the system returns an error. Role required: admin, limited-admin.

**Note:** For systems that use the DD Boost protocol, you can use the ddboost storage-unit modify command to modify a storage unit.

**Argument Definitions**

- **mtree-path**
  - Display MTrees under the specified path only.

- **tenant-unit (Optional)**
  - The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

- **tenant-unit name**
  - The name of the tenant-unit you want to associate with the MTree.
Reset the Oracle Optimized Deduplication setting on the specified MTree to its default value, none. Role required: admin, limited-admin.

```
mtree option set app-optimized-compression {none | global | oracle1}
```

Set Oracle Optimized Deduplication on the specified MTree.

**Argument Definitions**

- **none**
  - Oracle Optimized Deduplication is disabled.

- **global**
  - The MTree uses the system-level app-optimized-compression value (none or oracle).

- **oracle1**
  - Oracle Optimized Deduplication is enabled.

```
mtree option show [mtree mtree_path]
```

Display option values for the MTree found at the `mtree_path`. If no MTree is specified, the system displays option values for all MTrees. Role required: admin, limited-admin.

**Argument Definitions**

- **mtree_path**
  - The full path of the MTree in the file system.

### mtree rename

```
mtree rename mtree-path new-mtree-path
```

Rename the specified MTree. Note that `/data/coll/backup` cannot be renamed. Retention Lock Governance or Retention Lock Compliance MTrees can only be renamed if they are empty. Role required: admin, limited-admin.

This command option requires security officer authorization if Retention Lock Compliance is enabled on the specified MTree.

### mtree retention-lock

```
mtree retention-lock disable mtree mtree-path
```

Disable Retention Lock for the specified MTree. This command option is allowed on Retention Lock Governance MTrees only. It is not allowed on Retention Lock Compliance MTrees. See the `DD OS Administration Guide` for details on Retention Lock Compliance and Governance. Role required: admin, limited-admin.

```
mtree retention-lock enable mode {compliance | governance} mtree mtree-path
```

Enable Retention Lock for the specified MTree. Use the compliance argument to meet the strictest data permanence regulatory standards, such as those of SEC17a-4f. Enabling Retention Lock Compliance requires security officer authorization. Role required: admin, limited-admin.

Use the governance argument to propagate the same protection provided in the previous release of DD OS. The level of security protection is lower than Retention Lock Compliance.

When Retention Lock is enabled on an MTree, any file in the MTree may become locked by setting its `atime` to the future. Additionally, renaming a non-empty directory in the MTree is disabled. See the `DD OS Administration Guide` for details on Retention Lock Compliance and Governance, and for instructions on setting retention time.
To enable Retention Lock Compliance on an MTree, enter:

```
# mtree retention-lock enable
```

mode compliance mtree /data/col1/mtree_name

Note that /data/col1/backup cannot be configured for Retention Lock Compliance.

Enabling Retention Lock Compliance on a DD6900, DD9400, or DD9900 system locks down the iDRAC GUI and SSH interfaces. Do not use the iDRAC interfaces to create additional iDRAC users because DD OS automatically disables those new users and reboots the system. Use the `user idrac create` command to create new iDRAC users after enabling Retention Lock Compliance.

```
mtree retention-lock reset {min-retention-period | max-retention-period | automatic-retention-period | automatic-lock-delay} mtree mtree-path
```

Reset the minimum or maximum retention period, the automatic retention period, or the automatic lock delay time for the specified MTree to its system default value. The minimum retention period cannot be greater than the current maximum retention period. The command option is allowed on MTrees with Retention Lock Governance enabled. Role required: admin, limited-admin.

If automatic retention lock is enabled, resetting the automatic retention period without specifying a new value results in automatic retention lock being disabled. Resetting the automatic lock delay without specifying a value causes the system to use the default value of 120 minutes as the value for automatic lock delay.

See the *DD OS Administration Guide* for details on Retention Lock Compliance and Governance and for instructions on setting retention time.

```
mtree retention-lock report generate retention-details mtrees {mtree-list | all} [format {text | tsv | csv}] [output-file filename]
```

Lists all retention-lock files in one or multiple mtrees, their expiration time, mode of retention, and size. If the output-file `filename` option is specified, then the report will be written to `/ddvar/log/debug/retention-lock-reports/filename`, otherwise, the report will go to standard output. The report includes a timestamp indicating the time it was generated. The default output format is text. If the file already exists, an error is generated. Role required: admin, limited-admin.

**Note:** In Automatic Retention Lock, for the files which are being ingested, the `mtree retention-lock report generate` command may incorrectly report those files as locked as well report an incorrect cooling off period.

```
mtree retention-lock revert path
```

Revert all Retention Lock files in a specified path to non-Retention Lock files. If the path points to an MTree, all files within the MTree will be reverted. Note that directories and files within Retention Lock Compliance MTrees cannot be reverted. Role required: admin, limited-admin.

The base of the path must be `/data/col1/mtree-name/` or `/data/col1/backup/`.

Retention lock must be re-applied manually to any files reverted when automatic retention lock is in use.

Reverting Retention Lock Governance generates a protection system alert (at the Alert severity level) and logs the names of the reset files. Dell EMC recommends that when a recipient receives the alert, he or she confirms the reset operation was intended.

**Note:** For Retention Lock Governance files (only), you can delete retention locked files using a two step process: First use the `mtree retention-lock revert path` command to revert the retention locked file. Next, delete the file on the client system using the `rm filename` command.

```
mtree retention-lock set {min-retention-period | max-retention-period | automatic-retention-period | automatic-lock-delay} period mtree mtree-path
```

Set the minimum or maximum retention period for the specified MTree. This command option requires security officer authorization if Retention Lock Compliance is enabled on the MTree. Role required: admin, limited-admin.
Users cannot set the minimum retention period to fewer than 12 hours. Doing so generates a message notifying the user that the entry was invalid and stating the minimum retention period allowed.

When setting the lock period for Retention Lock Compliance MTrees, users cannot set the period to be less than the current minimum or maximum period allowed. Doing so generates a message notifying the user that the entry was invalid and stating the minimum or maximum retention period allowed.

The retention period is specified in the format [number] [unit]. Possible unit values are:

- min
- hr
- day
- mo
- year

The retention period cannot exceed 70 years. Setting a value greater than 70 years results in an error.

The automatic-retention-period option allows you to set a default retention period for new files added to the specified MTree. The value must be between the minimum retention period and the maximum retention period.

The automatic-lock-delay option allows you to specify a default value for the amount of time that will be allowed to pass before a new file on the specified MTree is locked. The value must be between five minutes and seven days. The default is 120 minutes. If a file is modified before the automatic lock delay has elapsed, the lock delay time starts over when the file modification is complete. For example, if the lock delay is 120 minutes and the file is modified after 60 minutes, the lock delay will start again at 120 minutes after the file is modified.

**Example 114**

To set the min-retention-period to 24 months for mtree1: # mtree retention-lock

```
set min-retention-period 24mo mtree /data/coll1/mtrie1
```

```
mtree retention-lock show {min-retention-period | max-retention-period | automatic-retention-period | automatic-lock-delay} mtree mtree-path
```

Show the minimum or maximum retention period, the automatic retention period, or the automatic lock delay time for the specified MTree. Role required: admin, limited-admin, user, backup-operator, security, none.

```
mtree retention-lock status mtree mtree-path
```

Show Retention Lock status for the specified MTree. Possible values are enabled, disabled, previously enabled, and MTree Retention Lock mode: Compliance or Governance. Role required: admin, limited-admin, user, backup-operator, security, none.

**mtree show**

```
mtree show compression {mtree-path | tenant-unit tenant-unit-name} [tier {active | cloud}] [summary | daily | daily-detailed] [last n {hours | days | weeks | months} | start date [end date]]
```

Display compression statistics for a specific MTree. Values are reported in Gibibytes (GiB). Running the command without arguments generates default output that displays a summary of compression statistics for all files and directories in the file system for the last 7 days and the last 24 hours. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.
Argument Definitions

**mtree-path**
- The pathname of the MTree for which to display compression statistics.

**tenant-unit**
- The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

**tier {active | cloud} (Optional)**
- Display results for the specified tier.

**summary (Optional)**
- Display all compression statistics, summarized as:
  - Data written in the last 7 days. By including the last n option or the start date option, you can display statistics for a time frame other than the last 7 days.
  - Data written in the last 24 hours.

**daily (Optional)**
- In addition to the summary output, display detailed information for each day, over the previous four full weeks, plus the current partial week. This option is not available if you specify a file or directory name.

**daily-detailed (Optional)**
- Display the daily output and include the following information for each day. This option is not available if you specify a file or directory name.

**last n {hours | days | weeks | months} (Optional)**
- In the summary portion of the output, display file system compression statistics for the specified time frame instead of for the past 7 days. The statistics for the last 24 hours remain in the summary output. If you specify a file or directory name, you cannot use this option with the weeks keyword or the months keyword.

**start date (Optional)**
- In the summary portion of the output, display file system compression statistics for the time frame that begins on the specified day instead of the past 7 hours. The statistics for the last 24 hours remain in the summary output. If you specify a time frame less than the previous four weeks, plus the current full week, the daily or daily-detailed output (if specified) is truncated to the shorter time frame.

  Specify **date** in the format **yyyy-mm-dd** (for example, **2013-04-07**). By default, the last day of the time frame specified with this argument is the most recent, full day elapsed.

**end date (Optional)**
- Valid only if the start option is used. In the summary portion of the output, display file system compression statistics for the time frame that ends on the specified day.

Example 115 Output

```
# mtree show compression /data/col1/mtree-13

<table>
<thead>
<tr>
<th></th>
<th>Pre-Comp (GiB)</th>
<th>Post-Comp (GiB)</th>
<th>Global-Comp Factor</th>
<th>Local-Comp Factor</th>
<th>Total-Comp Factor (Reduction %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last 7 days</td>
<td>820.3</td>
<td>802.9</td>
<td>1.0x</td>
<td>1.0x</td>
<td>1.0x (2.1)</td>
</tr>
</tbody>
</table>
```
Example 115 Output (continued)

<table>
<thead>
<tr>
<th>Last 24 hrs</th>
<th>--------</th>
<th>--------</th>
<th>--------</th>
<th>--------</th>
<th>--------</th>
<th>--------</th>
</tr>
</thead>
</table>

$mtree$ show performance \{ $mtree-path \mid tenant-unit tenant-unit-name \}$

$[interval \ n \ {mins \mid hours}] \ [last \ n \ {hours \mid days \mid weeks \mid months}] \ [start \ MMDDhhmm\{\{CC\}YY\} \ [end \ MMDDhhmm\{\{CC\}YY\}] ]$

Displays MTree performance statistics. Replicate write data is not included in the output. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.

Example 116 Output

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Throughput</th>
<th>Streams</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>YYYY-MM-DD</td>
<td>HH:MM</td>
<td>read</td>
<td>write</td>
<td>rs/ws/rr/wr/r+/w+</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>-------------------</td>
</tr>
<tr>
<td>2015-04-22</td>
<td>21:10</td>
<td>0.00</td>
<td>0.00</td>
<td>0/0/0/0/0/0</td>
</tr>
<tr>
<td>2015-04-22</td>
<td>21:20</td>
<td>0.00</td>
<td>0.00</td>
<td>0/0/0/0/0/0</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>2015-04-23</td>
<td>20:30</td>
<td>0.00</td>
<td>0.00</td>
<td>0/0/0/0/0/0</td>
</tr>
<tr>
<td>2015-04-23</td>
<td>20:40</td>
<td>0.00</td>
<td>0.00</td>
<td>0/0/0/0/0/0</td>
</tr>
</tbody>
</table>

Where:

- rs: read sequential access streams
- ws: write sequential access streams
- rr: read random access streams
- wr: write random access streams
- r+: reopened read streams in last 30 seconds
- w+: reopened write streams in last 30 seconds

Argument Definitions

$mtree-path$

The pathname of the MTree for which to display performance statistics.

tenant-unit

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

interval mins or hours (Optional)

The interval is an optional number of minutes or hours.

last n {hours | days | weeks | months}

In the summary portion of the output, display file system performance statistics for the specified time frame instead of for the past 7 days. The statistics for the last 24 hours remain in the summary output. If you specify a file or directory name, you cannot use this option with the weeks keyword or the months keyword.

start (Optional)

In the summary portion of the output, display file system performance statistics for the time frame that begins on the specified day instead of the past 7 hours. The statistics for the last
24 hours remain in the summary output. If you specify a time frame less than the previous four weeks, plus the current full week, the daily or daily-detailed output (if specified) is truncated to the shorter time frame. Specify the starting date in the format: MMDDhhmm[(C)CYY]

end (Optional)
Valid only if the start option is used. In the summary portion of the output, display file system performance statistics for the time frame that ends on the specified day. Specify the ending date in the format: MMDDhhmm[(C)CYY]

Example 117

```
# sysadmin@ddr9# mtree show performance /data/coll/55_source
INTERVAL: 10 mins
"-" indicates that the data is not available for the intervals

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Throughput</th>
<th>Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>YYYY/MM/DD</td>
<td>HH:MM</td>
<td>read</td>
<td>write</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB/s</td>
<td>MB/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014/01/09</td>
<td>15:10</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2014/01/09</td>
<td>15:20</td>
<td>0.00</td>
<td>41.66</td>
</tr>
<tr>
<td>2014/01/09</td>
<td>15:30</td>
<td>0.00</td>
<td>49.85</td>
</tr>
<tr>
<td>2014/01/09</td>
<td>15:40</td>
<td>0.00</td>
<td>23.04</td>
</tr>
</tbody>
</table>
```

**mtree undelete**

**mtree undelete mtree-path**
Mark as not deleted the marked-for-deletion MTree at the specified path. This command reverses a previous mtree delete command. Role required: admin, limited-admin.

**Note:** To undelete an MTree, cleaning must not have run before executing the undelete command.

**Note:** If a user tries to undelete a storage unit, the system displays the following message: "MTree 'mtree-path' contains a DD Boost storage unit and cannot be undeleted."

Example 118

To reverse a previous mtree delete command request that included the MTree at /data/coll/myMTree:

```
# mtree undelete /data/coll/myMTree
```
The `ndmpd` command is the top-level command for the NDMP (Network Data Management Protocol) daemon running on a DD system. The NDMP daemon provides access to VTL-created devices using the NDMP version 4 protocol. Use of this command requires a VTL license. A VTL used by the NDMP tapeserver must be in the TapeServer access group.

This chapter contains the following topics:

- `ndmpd change history` .......................................................... 230
- `ndmpd disable` ................................................................... 230
- `ndmpd enable` ................................................................... 230
- `ndmpd option` .................................................................... 230
- `ndmpd show` ....................................................................... 230
- `ndmpd status` ..................................................................... 231
- `ndmpd stop` ....................................................................... 231
- `ndmpd user` ....................................................................... 231
**ndmpd change history**

There have been no changes to this command in this release.

**ndmpd disable**

```
ndmpd disable
```

Disable the NDMP (Network Data Management Protocol) daemon. Role required: admin, limited-admin.

**ndmpd enable**

```
ndmpd enable
```

Enable the NDMP (Network Data Management Protocol) daemon. Role required: admin, limited-admin.

**ndmpd option**

```
ndmpd option reset option-name | all
```

Reset all NDMP (Network Data Management Protocol) daemon options or just a specific option. Role required: admin, limited-admin.

```
ndmpd option set option-name value
```

Set a specific NDMP daemon option. Role required: admin, limited-admin.

```
ndmpd option show option-name | all
```

Show the values for all NDMP daemon options or just for a specific option. Role required: admin, limited-admin.

**Argument Definitions**

- **option-name**
  
  The NDMP daemon option, which can be authentication, debug, port, or preferred-ip.

- **value**
  
  The value for the particular NDMP daemon option.

**ndmpd show**

```
ndmpd show devicenames
```

View the device name, VTL virtual name, SCSI vendor and product code, and the serial numbers of devices controlled by the NDMP (Network Data Management Protocol) daemon. Typically, this information is displayed during device discovery and configuration. However, you can use this command to verify the VTL TapeServer group configuration and perform a manual configuration, if required.

If there is no output in the NDMP Device column, either the VTL service is not running or there are no devices registered with the VTL TapeServer. A series of hyphens in the NDMP Device column means the VTL service is running on the system, but has not registered the devices. Restart the VTL service to correct this behavior. If this problem persists, go to the Online Support website for assistance. Role required: admin, limited-admin.

```
ndmpd show sessions
```

230   Dell EMC DD OS Command Reference Guide
View active sessions. Role required: admin, limited-admin.

```
ndmpd show stats session-id | all
```

View statistics of a single session or all sessions. Session numbers are displayed by `ndmpd show sessions`. Role required: admin, limited-admin.

**ndmpd status**

```
ndmpd status
```

Display the NDMP (Network Data Management Protocol) daemon status. Role required: admin, limited-admin.

**ndmpd stop**

```
ndmpd stop session session-id | all
```

Stop all NDMP (Network Data Management Protocol) daemon sessions or stop a single session. Role required: admin, limited-admin.

**ndmpd user**

```
ndmpd user add user-name
```

Add (only) one user name and password for NDMP (Network Data Management Protocol) daemon MD5 authentication. Role required: admin, limited-admin.

```
ndmpd user del user-name
```

Delete the configured NDMP daemon MD5 user name and password. Role required: admin, limited-admin.

```
ndmpd user modify user-name
```

Set the password for the NDMP daemon MD5 user name. Role required: admin, limited-admin.

```
ndmpd user show
```

Show the NDMP daemon MD5 user name. Role required: admin, limited-admin.
ndmpd
The **net** command manages the use of all IP network features and displays network information and status.

Federal certification requirements state that the DD OS must be IPv6-capable and that interoperability with IPv4 be maintained in an heterogeneous environment. As a result, several net command options include arguments for both versions of Internet Protocol. Collection, directory, and MTree replication are supported over IPv6 networks, which allows you to take advantage of the IPv6 address space. Simultaneous replication over IPv6 and IPv4 networks is also supported, as is Managed File Replication using DD Boost.

If you do not specify an IP version, the default is IPv4 to maintain compatibility with DD OS versions prior to 5.2. The exception is `show` commands. If the version is not specified in the `show` command option (as in `route show table`), both address versions are displayed. To view the IPv4 routes only, you must specify the IPv4 argument.

For some commands, you must include the IPv6 command argument if the host is to be accessed using its IPv6 address. This is required when a hostname is specified and the host name format resembles an IPv4 address.

This chapter contains the following topics:

- **net change history** ................................................................. 234
- **net guidelines and restrictions** ............................................... 234
- **net aggregate** .................................................................. 234
- **net config** ...................................................................... 237
- **net congestion-check** .......................................................... 240
- **net create** ...................................................................... 243
- **net ddns** .................................................................. 244
- **net destroy** .................................................................... 245
- **net disable** .................................................................... 245
- **net enable** ..................................................................... 245
- **net failover** .................................................................... 247
- **net filter** ...................................................................... 247
- **net hosts** ........................................................................ 250
- **net iperf** ...................................................................... 251
- **net lookup** ..................................................................... 254
- **net modify** ..................................................................... 254
- **net option** ..................................................................... 254
- **net ping** ........................................................................ 254
- **net reset** ........................................................................ 255
- **net route** ....................................................................... 255
- **net set** ........................................................................... 261
- **net show** ....................................................................... 262
- **net tcpdump** ................................................................... 268
- **net troubleshooting** ........................................................... 268
net change history

There have been no changes to this command in this release.

net guidelines and restrictions

- Changes made by the net command to disabled Ethernet interfaces flush the routing table. If possible, make interface changes only during scheduled downtime. After changing disabled interfaces, you must ensure that all routing rules and gateways are correct.
- IPv4 is the default IP version.
- The output of the net show settings command displays `!!` for a failed slave, but the net aggregate show command will not display the failed slave under the bonded interface. The `!!` disappears after the failed slave is replaced.
- When creating network filters, some system rules supersede any user-created filters:
  - There is no blocking for outbound network traffic. When the protection system initiates outbound network traffic, the responses to it are considered established and are enabled, even if the response comes from a blocked address or interface.
  - If a network address of interface is blocked after a connection between it and the protection system is already established, traffic will continue over that connection. After that connection is dropped, new inbound connections from that address or interface are blocked.
  - SSH and HTTPS connections to the admin interface from a blocked address are enabled. **Note:** The default port numbers for SSH (port 22) and HTTPS (port 443) can be changed, and the admin interface access can be reserved for specific clients.
- The net alias cannot be added to the net filter function or iptables rules.

net aggregate

```
net aggregate add virtual-ifname interfaces physical-ifname-list [mode (roundrobin | balanced hash (xor-L2 | xor-L3L4 | xor-L2L3) | lacp hash [xor-L2 | xor-L3L4 | xor-L2L3] [rate {fast | slow}]) [up {time | default}] [down {time | default}]]
```

Add physical interfaces to an aggregate virtual interface. Setting the mode is required on initial configuration and when there is no default aggregate mode, but optional when adding interfaces to an existing aggregate interface. Choose the mode compatible with the specifications of the system to which the ports are attached. Balanced and LACP modes require a hash selection.

The up/down delay is rounded down to the nearest 900 millisecond interval. Don't set it lower than 9000 (9 seconds) without a good reason. LACP "fast" sends a query out every second and "slow" sends a query every 30 seconds.

**Note:** The rate argument can only be used with LACP mode.

Role required: admin, limited-admin.

**Argument Definitions**

`interfaces physical-ifname-list`

Specifies the physical interfaces to be added to the aggregate virtual interface. To display the physical interfaces on the system, enter `net show hardware`. The interface names appear in the Port column. For information about supported interfaces, see the *DD OS Administration Guide*. 
mode {roundrobin | balanced hash {xor-L2 | xor-L3L4 | xor-L2L3} | lacp hash {xor-L2 | xor-L3L4 | xor-L2L3} 
Specifies how traffic is routed over the aggregate interfaces.

balanced hash {xor-L2 | xor-L3L4 | xor-L2L3} 
Data is sent over interfaces as determined by the hash method selected. Balanced mode requires a hash configuration.

lacp hash {xor-L2 | xor-L3L4 | xor-L2L3} 
LACP is a link aggregation mode based on the Link Aggregation Control Protocol (LACP, IEEE 802.3ad). From a switch perspective, this configuration is always an active LACP configuration; it cannot be set to passive. When the this mode is selected, both ends must be configured with LACP. LACP mode requires a hash configuration.

For successful communication, an interface must be able to communicate with its directly attached partner, and carrier must be up. The switch LACP ports must reside on a single switch except for special cases of virtual switch ports. To fail across switches, failover bonding must be used.

roundrobin 
Packets are transmitted sequentially, beginning with the first available link and ending with the last link in the aggregated group.

xor-L2 
Transmission of packets from a specific slave interface is based on static balanced mode or LACP mode aggregation with an XOR based on a hash policy. An XOR of source and destination MAC addresses is used to generate the hash.

xor-L2L3 
Transmission of packets from a specific slave interface is based on static balanced and LACP mode aggregation with an XOR based on a hash policy. An XOR of source and destination's upper layers (L2 and L3) protocol information is used to generate the hash.

xor-L3L4 
Transmission of packets from a specific slave interface is based on static balanced and LACP mode aggregation with an XOR based on a hash policy. An XOR of source and destination's upper layers (L3 and L4) protocol information is used to generate the hash.

rate {fast | slow} 
Specifies how often an LACP message is sent to the switch or system that is connected to the protection system. The message identifies the aggregated interface and serves as a type of heartbeat. The rate determines how fast LACP recognizes when an interface can and cannot be used.

Slow is the default setting, which sends the message once every 30 seconds. Fast sends the message every second. The Fast setting generates more traffic comprised of small packets (100 bytes or less) across all aggregated LACP interfaces, but it can detect data transfer failures faster and might be better for faster 10 Gb interfaces.

up {time | default}, down {time | default} 
The length of delay allowed before the link is considered up or down. When interface carrier is present for the interval that is configured in up time, the interface is considered up. When interface carrier is absent for the interval that is configured in down time, the interface is considered down and not available. The up and down times are rounded down to a multiple of
900 milliseconds. For example if 10,000 milliseconds is configured, 9,900 milliseconds is used. The default up and down times are 29,700 milliseconds.

When the link is down:
- Data is no longer sent to the interface.
- For aggregation bonding, aggregation is recalculated.
- For failover bonding, if the affected interface is the active interface, then the active interface is switched to another interface that is running in the same state.

When the link is up:
- Data can be sent over it.
- For aggregation bonding, aggregation is recalculated to include the up link.

**virtual-ifname**

Specifies a virtual interface to create or modify. The virtual-name must be in the form vethx where x is a number. The recommended maximum number is 99 because of name size limitations. To display a list of aggregate virtual interfaces, enter `net aggregate show`.

Example 119

The following command enables link aggregation on virtual interface veth1 to physical interfaces eth1a and eth2a in mode lacp hash xor-L2.

```
# net aggregate add veth1 interfaces eth1a eth2a mode lacp hash xor-L2
```

Example 120

To delete physical interfaces eth2a and eth3a from the aggregate virtual interface veth1:

```
# net aggregate del veth1 interfaces eth2a,eth3a
```

Example 121

Use the following command to change link aggregation on virtual interface veth1 to mode lacp hash xor-L2. Stating the previous configuration is not required.

```
# net aggregate modify veth1 mode lacp hash xor-L2
```
Display basic information on the aggregate setup. If there are no slave interfaces in the up state, the output displays **No interface in the aggregate mode**. Role required: admin, limited-admin, security, user, backup-operator, or none.

>Note: With the exception of `net aggregate show`, `net aggregate` commands control link aggregation. The recommended and supported maximum is four ports, but there are no restrictions on the protection system for having more aggregate slaves.

### net config

Bulk convert IP addresses on the protection system to the specified type. The system prompts for each IP address individually. This command only works on HA systems. Role required: admin.

```
net config addresses type {fixed | floating}
```

Display the physical interface configuration or configure a base interface or an alias interface. A base interface is a physical interface to which an IP address is assigned. An alias interface is used to add an additional IP address to a base interface, and you can create multiple alias interfaces to add multiple IP addresses to a base interface.

>Note: An alias interface does not operate as an independent interface. DD OS generates statistics and supports additional configuration settings only for a base interface. The only function of an alias interface is to add an additional IP address to the base interface.

To create an alias interface, enter the base interface and alias name in the following format: `base_interface:alias_name` and specify an IPv4 or IPv6 address. The following are some sample alias names.

- `eth5a:35`—The base interface is physical interface `eth5a`, and the alias name is 35.
- `veth4:26`—The base interface is virtual interface `veth4`, and the alias name is 26.
- `eth5a.82:162`—The base interface is VLAN interface `eth5a.82`, and the alias name is 162.

To delete an alias interface, assign the 0 value to the IP address as follows:

```
net config eth0a:200 0
```

Role required: admin, limited-admin.

#### Argument Definitions

- **autoneg**
  
  Specify this option to configure the interface to autonegotiate the duplex and speed settings with the remote interface.

- **dhcp {yes [ipversion {ipv4 | ipv6}] | no}**
  
  Set the `dhcp` option to yes to configure the interface to receive the IP address configuration from a DHCP server, and set this option to no when you want to manually configure the IP address. The default option requests an IPv4 address from DHCP, but you can select either IPv4 or IPv6 when you enable DHCP. When you use DHCP, the IP address delivered by DHCP replaces any static IP address previously configured for the base interface.

>Note: DHCP over IPv6 does not supply a host name. If you set an interface to use DHCP over IPv6, complete the configuration, run `net show hostname`, and verify that the hostname is correct. If there is no host name or if it is no longer correct, configure the hostname using `net set hostname` or with DD System Manager at Hardware > Network > Settings.
**duplex {full | half} speed {10|100|1000|10000}**

Specify this option when you want to manually configure the duplex setting or speed. The speed settings are 10, 100, 1,000, or 10,000 Mbps. This option automatically disables autonegotiation on the interface. If speed is set but duplex is not, the option defaults to full duplex. Half duplex can only be used for 10 Mbps and 100 Mbps.

**ifname**

Specify the interface to configure and one or more arguments to change the configuration. If you omit the interface name, the command lists the configuration for all the interfaces. If you specify an interface without any additional arguments, the command lists the configuration for the interface.

To create an alias interface, enter the alias in the following format: `base_interface:alias_name`. The alias name must be a number in the range of 1 to 9999.

**type { fixed | floating}**

HA systems use two types of IP addresses. Use the `fixed` IP option for node-specific configuration/management, which can be static or DHCP, IPv6 SLAAC, or IPv6 Link Local.

**Note:** The IPv6 SLAAC and IPv6 Link Local addresses cannot be configured. They are automatically configured when the interface is brought up. The SLAAC addresses are generated based on the response from the router and is based on the mac address. The Link Local is also based on the mac address but is generated whenever the physical, bonded, or VLAN is brought up to the running state.

Use the `floating` IP option for file system access and most configuration. The `floating` IP is static.

**Note:** Floating IP addresses only exist on an HA system and must be configured on the active node. When upgrading from a single node, the `fixed` IP will need to be manually converted to a `floating` IP address and requires the `type floating` argument. During failover, the IP will "float" to the new active node. When the HA configuration is destroyed, all floating IPs convert to fixed IPs.

**ipaddr [netmask mask]**

Specify an IPv4 address for the interface. The `dhcp` option should not be set or should be set to "no." The manual IP address configuration will turn off dhcp for the interface being configured.

Use the `netmask` option to specify a network mask that is different from the default netmask. The `netmask` can only be specified when an IPv4 address is specified.

**ipv6addr/prefix**

Specify an IPv6 address for the interface. The `dhcp` option must be set to no to support manual IP address configuration. The `dhcp` option is automatically set to no if a static address is set.

If an IPv6 address is specified, there is no associated netmask. Instead, a prefix length is used to determine the subnet. The default prefix length is 64. To use a prefix length different from 64, it must be specified with the address by adding a forward slash followed by a number. For example, if the prefix length is 52, the notation is: 2026:3456:cafe::f00d:1/52.

**mtu {size | default}**

The range for the MTU size is 350 - 9000 for IPv4 and 1280 - 9000 for IPv6. To ensure backward compatibility DD OS accepts an MTU size of 9014, but sets it to 9000 if the MTU requested is greater than 9000 and less than or equal to 9014.
txqueuelen size
Specify the transmit queue length. The range is 500 to 10,000 packet pointers, and the default value is 1000.

up | down
Use the up argument to bring up an interface with or without an IP address. (Using net enable fails if no IP address is configured on the interface.) Use the down argument to bring down an interface.

Note: If no address is given, the up option might fail because there is no registry entry for an IP address. This typically occurs after a fresh install. If this occurs, specify an address of 0 to allow a registry address location to be created.

Example 122
The following example shows an excerpt from the net config display when no arguments are entered.

```
eth1d     Link encap:Ethernet  HWaddr 00:1B:21:5F:E2:4D
inet6 addr: 2100:bad:dead:f00d::e4b:100/64 Scope:Global
inet6 addr: 2100:dead:f00d:cafe::deed:3e1d/64 Scope:Global
inet6 addr: 2100:bad:dead:f00d::e4b:210/64 Scope:Global
inet6 addr: fe80::21b:21ff:fe5f:e24d/64 Scope:Link
UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:37274 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 b)  TX bytes:2431901 (2.3 MiB)
eth1d:10  Link encap:Ethernet  HWaddr 00:1B:21:5F:E2:4D
inet addr:192.168.141.20  Bcast:192.168.141.255  Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
eth1d:100 IPv6 alias address, 2100:bad:dead:f00d::e4b:100/64, is on the interface
eth1d when up
eth1d:200 Link encap:Ethernet  HWaddr 00:1B:21:5F:E2:4D
UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
eth1d:210 IPv6 alias address, 2100:bad:dead:f00d::e4b:210/64, is on the interface
eth1d when up
```

Interface eth1d represents the physical interface. Interfaces eth1d:10 and eth1d:200 are alias interfaces that each add an IPv4 address to the base interface, and eth1d:100 and eth1d:210 are alias interfaces that add IPv6 addresses to the same base interface. The IPv6 alias addresses are available when the base interface is in the running state and the alias interface state is up. Notice that the IPv6 alias addresses in the example above are displayed with the alias interfaces and the base interface.

Example 123
The following example adds an alias named 200 to the eth0a interface and assigns an IPv6 address to it.

```
# net config eth0a:200 2620:0:170:1a04:28c:fafe:e05:6c91/64
Creating interface ...
Done.
```
Example 123 (continued)

Configuring interface...
done.

Example 124

The following example deletes alias 200 from the eth0a interface.

# net config eth0a:200 0
Alias is destroyed.

**net congestion-check**

```
net congestion-check modify [sample-intervalsecs] [capture-windowsecs] [everymins] [detailed {on | off}] [logfilefilename] [logfilev6filename] [iperf-client {none | iperf-server-host | iperf-server-ipaddr} [nodelay {on | off}] [port {port | default}] [window-size bytes] [connections count] [data {random | default}]]
```

Congestion data is collected during a period of time defined by the *capture window* argument. Within the capture window, data is captured at intervals defined by the *sample-interval* argument. If the *every* argument is non-zero, a new capture window starts at intervals determined by the *every* argument. For example, if the capture window is 60 seconds, the sample interval is 5 seconds, and the *every* argument is set to 60, data is collected every 60 minutes for a period of 60 seconds at 5 second intervals. The output displays as one line per remote IP address.

This command modifies options for the congestion monitor whether or not the monitor program is activated. (The congestion monitor is activated by the `net congestion-check start` command.) The settings configured with this command are stored in the registry and replace the default values used by `net congestion-check start` command. If the congestion monitor is scheduled, the new registry values are used when it runs. If the monitor is not scheduled, the values are used as defaults when it is started. Typically this command option is used after the monitor is scheduled to run and the user does not want to stop and restart the monitor.

Output values for rates and error numbers are added together. Values that may increase or decrease, such as the capture-window, are averaged over time. Role required: admin, limited-admin.

**Argument Definitions**

The argument definitions are the same as described for the `net congestion-check start` command.

```
net congestion-check run [sample-intervalsecs] [capture-windowsecs] [everymins] [detailed {on | off}] [logfilefilename] [{iperf-client {none | iperf-server-host | iperf-server-ipaddr} [nodelay {on | off}] [port {port | default}] [window-size bytes] [connections count] [data {random | default}]}
```

Run the congestion check program with the *run* option to display the results as screen output when the *capture-window* time is complete. When the command option is entered without arguments, defaults are used. When the command option includes arguments, the arguments override the defaults during the procedure but return to the configured defaults after the procedure concludes. Default values for the *run* command are always the same and are not affected by the `net congestion-check modify` or the `net congestion-check start` commands.
Argument Definitions

The following argument definitions are unique to this command. The rest of the argument definitions are the same as described for the `net congestion-check start` command.

`port {port | default}`

The TCP port number for the target iperf server. The default is 5002, which is one more than the iperf default, 5001.

`net congestion-check start [sample-interval secs] [capture-window secs] [every mins] [detailed {on | off}] [logfile filename] [{iperf-client {none | {iperf-server-host | iperf-server-ipaddr} [nodelay {on | off}] [port {port | default}] [window-size bytes] [connections count] [data {random | default}]}}]

Start the congestion monitor and schedule when it is to be run using the time arguments: sample-interval, capture-window, and every. Command output is stored in the congestion.log and congestion6.log files, unless the names are changed from the command line. When the command option is run with arguments, the arguments override the defaults and become the new default values. The remaining arguments of `net congestion-check start` command are used to configure in detail how the monitor is run.

**Note:** After entering the command, there is a slight delay during which the process actually starts the monitor. After the monitor is started, the specified time arguments take over. To get information immediately, use the `net congestion-check run` command instead.

Output is one line per external destination. All connections to and from an external address are merged into a single line of data.

Value types from the output vary. Amounts of data or packets increase. These amounts are added together across all connections to a specific IP address to give the total value to or from the external location. Rates are relatively constant but are also added together to give the total flow rate to the pipe at the remote location. Other values are relatively static across all connections, such as the mss, rtt, window scale factor, or congestion window. These are given as an average with the minimum and maximum. Errors and loses are treated the same as rates and are added across all interfaces. Role required: admin, limited-admin.

Argument Definitions

`capture-window secs`

Specify the period during which data is captured. The initial value is 60 seconds; the range is 10 to 3600 seconds. The configured value must be less than the `every` argument and greater than the `sample-interval` argument.

`connections count`

The `connections` argument determines how many parallel TCP connections to establish between the iperf client and server. The default value is 1, which is typically satisfactory if the window size is set appropriately. Larger values are supported between DD OS iperf clients and servers, but are not supported by all iperf servers. Increasing the connection count can improve performance, but too many connections will negatively impact network performance. This argument is equivalent to the Linux argument for parallel tests: `-p number`.

`data {random | default}`

The `data` argument allows iperf to send "normal" data and uses fewer system resources than the `data random` argument. If you suspect that WAN accelerators are contributing to artificially high performance statistics, you can use the `data random` argument to have iperf use random data that is difficult for WAN accelerators to accelerate. This argument is equivalent to the Linux argument: `-R`
detailed

By default, detailed information is saved, but setting the argument to off saves basic information. The basic setting is mainly for replication on the source system and focuses on congestion conditions between the source and destination. The detailed on argument adds receive information and other entries useful for the general network environments of the protection system. The initial value is off.

every mins

Specify the period between the start of each capture window. The initial period is 60 minutes. The range is 10 to 60 minutes. The configured period must be greater than that for the capture-window argument. Because this command configures an ongoing monitor, value 0 is not supported.

iperf-client {none | iperf-server-host | iperf-server-ipaddr} [nodelay {on | off}] [port {port | default}] [window-size bytes] [connections count] [data {random | default}]

The iperf-client argument can be used to generate network traffic for throughput testing. This argument is typically used when there is insufficient normal traffic for a capacity test. This argument should be used with caution on production networks because iperf is disruptive to the network. Consider using iperf for brief periods, especially if there is other traffic using the network.

The iperf client requires an iperf server to communicate with. You can use net iperf server to start an iperf server on a remote system.

When the congestion monitor is configured to use the iperf client, iperf starts at the beginning of a capture window. If you want to control iperf operation manually, you can start an iperf client with the net iperf client command before the congestion check is performed. The advantage of letting the congestion-check manage iperf operation is that the iperf client runs only when the congestion-check requires it. Otherwise iperf does not run.

Iperf is an open-source utility. For more information on iperf, search for iperf on the World Wide Web.

iperf-server-host | iperf-server-ipaddr

The iperf-server-host and iperf-server-ipaddr arguments enable the iperf client to run during congestion checks and specify a target iperf server hostname or IP address.

logfile

Set the log file name used to save the IPv4 data collected. The initial default is /ddvar/log/default/congestion.log.

Do not change the file name unless absolutely required. The default file name is on a rotation system where the file size cannot exceed 10 MB, and up to 10 files are saved for a maximum of 100 MB of disk space. Changing the file name voids the space restrictions, meaning there is no limit to the space the files may consume.

logfilev6 filename

Set the log file name used to save the IPv6 data collected. The initial default is /ddvar/log/default/congestion.log.

Do not change the filename unless absolutely required. The default file name is on a rotation system where the file size cannot exceed 10 MB, and up to 10 files are saved for a maximum of 100 MB of disk space. Changing the file name voids the space restrictions, meaning there is no limit to the space the files may consume.
**nodelay**

The `nodelay` on argument eliminates the wait time between sends. The `nodelay` off argument requires iperf to wait for an ACK message after each send. This argument is equivalent to the Linux argument: `-N`.

**none**

The none argument prevents the iperf client from running during a network congestion check. If iperf was previously enabled and is no longer needed, use the none argument to disable iperf use by the congestion monitor. The initial value is none.

**port {port | default}**

The TCP port number for the target iperf server. The initial default number is 5002. If a different port number is specified with this command, that port number becomes the new default value. If the port number is changed with `net congestion-check modify`, the new port number is used the next time a congestion check is scheduled to run.

**sample-interval secs**

Specify the sample period within the capture window. The initial value is 4 seconds; the range is 2 to 3600 seconds. The value of the `sample-interval` argument must be less than the value of the `capture-window` argument.

**window-size bytes**

The size of the socket buffer to use. The default is 32,000; the range is 8,000 to 10,000,000. For long latencies, this size may be too small. Consider setting the size to 250,000 or 10,000,000.

**net congestion-check status**

Display the state of the congestion monitor. The congestion monitor is started when the `net congestion-check start` command is issued. The `status` argument displays the configured timings, the level of logging, the log file, the monitored connections, if the monitor is actually running or scheduled to run, and if iperf is specified to run. It also shows if iperf is currently running and which connections are being monitored. Role required: admin, limited-admin, security, user, backup-operator, or none.

**net congestion-check stop**

If the congestion monitor is running, this command stops the monitor. If the congestion monitor is scheduled to run, this command option unschedules the monitor. A message notifies you if the congestion monitor is not scheduled and no action is taken. Role required: admin, limited-admin.

---

**net create**

**net create interface {physical-ifname | virtual-ifname} {vlan vlan-id**

Create a VLAN interface on the specified physical or virtual interface. A VLAN is created immediately in the kernel, and the number given must be between 1 and 4094 inclusive. Role required: admin, limited-admin.

**net create virtual vethid**

Create a virtual interface. The virtual interface name `vethid` must begin with `veth`. The remainder of the name is a decimal number. Interface names must be unique.

There are no restrictions except for the size and the number. The maximum size for an interface name is 15 characters, which includes VLAN, alias names, and the associated dot and colon. The virtual interface name must be kept at a minimum. If possible, use a number in the range of 0 to 99. However, the maximum value is 9999.
The number of virtual interfaces cannot exceed the number of physical interfaces. For example, if there are 10 physical interfaces there can be no more than 10 virtual interfaces. Role required: admin, limited-admin.

net ddns

net ddns add {ifname-list | all | ifname interface-hostname hostname}
Add interfaces to the Dynamic DNS (DDNS) registration list. Role required: admin, limited-admin.

**Note:** When DDNS is configured for UNIX mode, this feature supports physical interfaces and aliases for physical interfaces. In this release, VLAN and virtual interfaces (and any aliases for those interfaces) are not supported in DDNS UNIX mode.

**Argument Definitions**

- **all**
  When DDNS is enabled for the Windows environment, this option is enabled and specifies that host names be registered for all interfaces.

- **ifname-list**
  When DDNS is enabled for the Windows environment, this option is enabled and specifies that host names be registered for the specified interfaces.

- **ifname interface-hostname**
  When DDNS is enabled for the UNIX environment, this option is enabled and specifies an interface and hostname to be registered with DDNS.

net ddns del {ifname-list | all}
Remove one or all interfaces from the DDNS registration list. To display the list entries, enter `net ddns show`. Role required: admin, limited-admin.

net ddns disable
Disable DDNS updates. Role required: admin, limited-admin.

net ddns enable [windows | unix [TSIG-key key]]
Enable DDNS updates for either Windows or UNIX environments. The transaction signature key option (TSIG-key) is for secure connections to the server where the key and a secret are defined. If you enter a TSIG key, the system prompts you to enter the corresponding secret. Role required: admin, limited-admin.

**Note:** If DDNS is already enabled, you must disable DDNS before selecting a different mode.

net ddns register
Register configured interfaces with DNS. Role required: admin, limited-admin.

net ddns reset
Clear the DDNS interface list and disable registration. In Windows mode, the registration list is set to auto. In UNIX mode, the TSIG key is also deleted. Role required: admin, limited-admin.

net ddns reset TSIG-key
Clear the TSIG key and secret. Role required: admin, limited-admin.

net ddns set TSIG-key key
Set the TSIG key and secret. The system will prompt you for the secret. Role required: admin, limited-admin.

net ddns show
In Windows mode, display the enabled interfaces. In UNIX mode, display the UNIX mode status and the enabled interfaces. Role required: admin, limited-admin, security, user, backup-operator, or none.
**net ddns status**
Display only the DDNS status, which can be enabled in Windows mode, enabled in UNIX mode, or disabled. Role required: admin, limited-admin, security, user, backup-operator, or none.

**net destroy**
```
net destroy {virtual-ifname | vlan-ifname | ipalias-ifname}
```
Remove a VLAN, IP alias, or virtual interface. If VLANs and aliases are associated with a virtual interface, or if aliases are associated with a VLAN, these entities are also destroyed when the virtual interface or VLAN interface is destroyed. Role required: admin, limited-admin.

**Note:** Setting the address to zero for an alias will also cause it to be destroyed.

**Example 125**
The following commands remove a VLAN named eth1a.35, an alias on a virtual interface named veth23:2, and the alias interface eth1b:57.

```
# net destroy eth1a.35
# net destroy veth23:2
# net config eth1b:57 0
```

**net disable**
```
net disable ifname
```
Disable an Ethernet interface on the protection system. Role required: admin, limited-admin.

**net enable**
```
net enable ifname
```
Enable or reenable an Ethernet interface on the protection system, where ifname is the name of an interface. An IP address must be assigned to the interface. When the interface is configured properly, this command brings up the interface to the RUNNING state. If the interface does not go into the RUNNING state, the command fails, the interface is set to the DOWN state, and then set to disabled. Role required: admin, limited-admin.

**net failover**
```
net failover add virtual-ifname interfaces ifname-list [primary ifname] [up {time | default}] [down {time | default}]
```
Add interfaces to a failover virtual interface. Note that you can add an aggregated interface to a failover interface. Role required: admin, limited-admin.

**Argument Definitions**

**interfaces ifname-list**
Specifies one or more slave interfaces to be added to the failover virtual interface. The slave interfaces must be in a down (disabled) state when added to the virtual interface. (Use `net show settings` to view the link state of all interfaces.)
**virtual-ifname**

Specifies a virtual interface to modify. To display a list of failover virtual interfaces, enter `net failover show`.

**primary ifname**

Specifies an interface as the primary failover slave interface.

**up {time | default}, down {time | default}**

The length of delay allowed before the link is considered up or down. When interface carrier is present for the interval configured in `up` time, the interface is considered `up`. When interface carrier is absent for the interval configured in `down` time, the interface is considered `down` and not available. The up and down times are rounded down to a multiple of 900 milliseconds. For example if 10,000 milliseconds is configured, 9,900 milliseconds is used. The default up and down times are 29,700 milliseconds.

When the link is down:
- Data is no longer sent to the interface.
- For failover bonding, if the affected interface is the active interface, then the active interface is switched to another interface that is up.

When the link is up:
- Data can be sent over it.
- If the interface is the primary interface or the sole slave interface, it becomes the active interface and traffic is diverted to it. Any other slave interface is added into the failover interface pool.

**Example 126**

The following command example associates a failover virtual interface named `veth1` with the physical interfaces `eth2a` and `eth3a` and designates `eth2a` as the primary interface.

```
# net failover add veth1 interfaces eth2a eth3a primary eth2a
```

**net failover del virtual-ifname interfaces {ifname-list | all}**

Delete slave interfaces from a failover interface. The freed interface remains disabled after being removed from the virtual interface. Use commas, spaces, or both to separate list entries, or specify `all` to delete all slave interfaces. To delete a primary interface, use `net failover modify` to specify another interface as primary or set the primary to `none`. The argument definitions are the same as for `net failover add`. Role required: admin, limited-admin.

**Example 127**

The following command removes `eth2a` from the virtual interface `veth1`, for which `eth2a` and `eth3a` are slaves and `eth3a` is the primary interface.

```
# net failover del veth1 interfaces eth2a
```

**net failover modify virtual-ifname [primary {ifname | none}] [up {time | default}] [down {time | default}]**

Modify the primary network interface, the up/down times for a failover interface, or both. A down interface must transition and stay up for the amount of `time` to be designated up. An up interface must transition and stay down for the amount of `time` to be designated down.
The up and down time is given in milliseconds and is adjusted internally to the largest multiple of 900, less than or equal to the specified value. For example, if the time you want is 10 seconds and 10000 is specified, the actual value is 9900. The default value is 30 seconds but the actual resulting value is 29.7 seconds.

A primary interface cannot be removed from failover. To remove a primary use `primary ifname none first`. The argument definitions are the same as for `net failover add`. Role required: admin, limited-admin.

**Example 128**

```bash
# net failover modify veth1 up 5000 down 10000
```

The up time value used is 4500 (4.5 seconds) and the down time value is 9900 (9.9 seconds).

**net failover show**

Display the full configuration details for each of the failover interfaces for which at least one of the physical interfaces are up. The displayed information includes the MAC address, the list of configured interfaces, the primary interface (if any), and the up and down delays. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Warning:** If a physical interface is down, none of the associated failover interfaces appear in this list. To see all failover interfaces, regardless of the states of the physical interfaces, use `net show settings`.

### net filter

**net filter add [seq-id n] operation {allow | block} [protocol {tcp [portport] [except-ports port] src-port port] [except-src-ports port] | [udp [portport] [except-ports port] src-port port] [except-src-ports port] | iana-protocol}] [clients {host-list | ipaddr-list}] [except-clients {host-list | ipaddr-list}] [interfaces {ifname-list | ipaddr-list}] [except-interfaces {ifname-list | ipaddr-list}] [ipversion {ipv4 | ipv6}]

Add a set of rules to the iptables; service names are restricted to what is supported. Role required: admin, limited-admin.

**Note:** The net alias cannot be added to the net filter function or iptables rules.

**Argument definitions**

**seq-id n**

The sequence number of where to add the function into the current filter functions. If it is not specified, it will be appended to the end of the user-generated filter functions but before the default functions.

**operation {allow | block}**

This option determines if the packets with the specified information will be allowed to be further process the packet or to discard the packet if it contains the specified information.

**protocol {tcp, udp, iana-protocol}**

Type of protocol, tcp with ports, udp with ports, and other iana protocol like icmp.

**ports n**

List of destination port numbers (local to the protection system) associated with the protocol.
src-protocol \( n \)
List of source port numbers (on the client systems) associated with the protocol.

except-ports \( n \)
List of destination port numbers (local to the Date Domain system) associated with the protocol to perform the reverse of the operation.

except-src-ports \( n \)
List of source port numbers (on the client systems) associated with the protocol to perform the reverse of the operation.

clients \{host-list | ipaddr-list\}
Either a list of client host names or client addresses (is the source address in the packet) on which the operation is to be performed. No more than 25 IPs, host names, or interfaces are allowed.

except-clients \{host-list | ipaddr-list\}
Either a list of client host names or client addresses (is the source address in the packet) on which the reverse of the operation is to be performed. No more than 25 IPs, host names, or interfaces are allowed.

interface \{interface-list | ipaddr-list\}
Either a list of client local interfaces or local addresses (is the destination of the packet) on which the operation is to be performed. No more than 25 IPs, host names, or interfaces are allowed.

except-interface \{interface-list | ipaddr-list\}
Either a list of client local interfaces or local addresses (is the destination of the packet) on which the opposite of the operation is to be performed. No more than 25 IPs, host names, or interfaces are allowed.

ipversion \{ipv4 | ipv6\}
This option indicates whether the address is to be applied to IPv4 or IPv6 filter functions. The default is IPv4 if none is given.

net filter auto-list add ports \{all\}
Configures the net filter to allow connections to the system only from ports with a listen thread. When the auto-list function is on, the default net filter functions are disabled except for functions specifically enabled by the user. There is no way to configure this functionality for individual ports, it is either enabled or disabled for all ports. Role required: admin, limited-admin.

net filter auto-list delete ports \{all\}
Configures the net filter to allow connections to the system from all supported ports. When the auto-list function is off, the default net filter functions are enabled. There is no way to configure this functionality for individual ports, it is either enabled or disabled for all ports. Role required: admin, limited-admin.

net filter clear stats
Clear all iptables rules statistics.

net filter config reset \[admin-interface\] \[ipversion \{ipv4 | ipv6\}\]
Set the net filter configuration option to the default value; reset all if no options specified. Role required: admin, limited-admin.

net filter config set admin-interface <ifname> \[client \{<hostname> | <ipaddr>\}\] \[ports <port-list>\] \[ipversion \{ipv4 | ipv6\}\]
Set a net filter option. Role required: admin, limited-admin.
Argument definitions

**admin-interface**
Set the admin interface to the specified name if it is available and in a running state. If an alias is given, the immediate base interface is used. For example, if eth0a:55 is given, then eth0a is used. If eth4b.67:22 is used, eth4b.67 is used. The alias cannot be specified as an admin-interface.

```bash
net filter config show [admin-interface] [ipversion {ipv4 | ipv6}]
```
Displays the net filter configuration option value; displays all if no options specified. Role required: admin, limited-admin.

Argument definitions

**admin-interface**
Shows what the admin interface is set to. If not specified, all configurations are shown.

```bash
net filter delete {seq-id | all} [ipversion {ipv4 | ipv6}]
```
Delete one net filter command or all of them. A default function cannot be deleted. Role required: admin, limited-admin.

Argument definitions

**seq-id**
The sequence number of functions that are being deleted. The default functions cannot be deleted.

**all**
Delete all functions. The default functions cannot be deleted.

```bash
net filter disable {seq-id | all} [ipversion {ipv4 | ipv6}]
```
Disable one net filter command or all of them. Role required: admin, limited-admin.

Argument definitions

**seq-id**
The sequence number of functions that are being disabled except the default functions. Only one default function can be disabled per command.

**all**
Disable all functions. Only one default function can be disabled per command.

```bash
net filter enable {seq-id | all} [ipversion {ipv4 | ipv6}]
```
Enable one net filter command or all of them. Role required: admin, limited-admin.

Argument definitions

**seq-id**
The sequence number of functions you want to enable.

**all**
Enable all functions.

```bash
net filter log start
```
Start writing to the net filter log. Role required: admin, limited-admin.

```bash
net filter log stop
```
Stop writing to the net filter log. Role required: admin, limited-admin.

```bash
net filter move seq-id new-seq-id [ipversion {ipv4 | ipv6}]
```
Move command at `seq-id` to `new-seq-id`. Role required: admin, limited-admin.
Argument definitions

seq-id
The sequence number of functions you want to move.

new-seq-id
The sequence number indicating where the function is to be moved.

net filter show kernel [ipversion {ipv4 | ipv6}] [chain {chain-name | all}]
Show iptable rules configured. If a chain is given only the rules for that chain are displayed. If all is given then all the rules for all of the chains are displayed. The format is the same format used by iptables to display the rules. Role required: none.

Argument definitions

ipversion {ipv4 | ipv6}
Both are displayed unless one of the protocols is specified.

chain {chain-name | all}
Displays only the specified chain. If none are specified, all are shown.

net filter show map {ids | all} [ipversion {ipv4 | ipv6}] [chain {chain-name | all}]
Show the net filter functions configured and the iptable rules associated with each function. One id or a list of ids can be given. Role required: none.

Argument definitions

ids
The sequence numbers of the functions to display. If none are specified, all are displayed.

ipversion {ipv4 | ipv6}
If one of the protocols is not specified, both are displayed.

chain {chain-name | all}
If one of the chains is not specified, all are displayed.

net filter show seq-id-list {ids | all} [ipversion {ipv4 | ipv6}] [chain {chain-name | all}]
Show the net filter commands configured. One id or a list of ids can be given. Role required: none.

Argument definitions

ipversion {ipv4 | ipv6}
If one of the protocols is not specified, both are displayed.

chain {chain-name | all}
If one of the chains is not specified, all are displayed.

net filter start
Load the iptables module and add required default commands. Role required: none.

net hosts

c250

net hosts add {ipaddr | ipv6addr} host-list
Add a host list entry. Associate an IP address with a hostname. The address can be an IPv4 or an IPv6. The hostname is a fully qualified domain name, a hostname, or an alias. The entry is added to
the /etc/hosts file. Entries in the list can be separated by commas, spaces, or both. Role required: admin, limited-admin.

**Example 129**

To associate the fully qualified domain name bkup20.yourcompany.com and the hostname of bkup20 with an IP address of 192.168.3.3, enter the following command.

```
# net hosts add 192.168.3.3 bkup20.yourcompany.com bkup20
```

net hosts del {ipaddr | ipv6addr}
Delete a host list entry from the /etc/hosts file. Role required: admin, limited-admin.

net hosts reset
Clear the hosts list from the /etc/hosts file. Role required: admin, limited-admin.

net hosts show
Display hostnames and IP addresses from the /etc/hosts file. Role required: admin, limited-admin, security, user, backup-operator, or none.

**net iperf**

net iperf client {ipaddr | ipv6addr | hostname [ipvversion {ipv4 | ipv6}]} [port port] [window-size bytes] [data {random | default}] [interval secs] [{transmit-size bytes | duration secs}] [connections count] [nodelay]
This command starts iperf client software, which can be used to generate network traffic and display throughput test results. This command should be used with caution on production networks because iperf is disruptive to the network. Consider using iperf for brief periods, especially if there is other traffic using the network.

The iperf client requires an iperf server to communicate with. You can use net iperf server to start an iperf server on a remote system. Role required: admin, limited-admin.

**Argument Definitions**

**connections count**

The connections argument determines how many parallel TCP connections to establish between the iperf client and server. The default value is 1, which is typically satisfactory if the window size is set appropriately. Larger values are supported between DD OS iperf clients and servers, but are not supported by all iperf servers. Increasing the connection count can improve performance, but too many connections will negatively impact network performance. This argument is equivalent to the Linux argument for parallel tests: `-p number`.

**data {random | default}**

The data default argument performs a less-stringent test and uses fewer system resources than the data random argument. The data random argument performs a more stringent test for traffic optimized and accelerated networks.

**duration secs**

The duration argument indicates how many seconds iperf transmits packets. This argument is equivalent to the Linux argument: `-t secs`.
interval **secs**

This argument indicates the time between reports. If this is not given, one is reported at the end. If this is given, a progress report is displayed every "secs" (seconds). Equivalent to the Linux argument: `-i secs`.

**ipaddr | ipv6addr | hostname [ipversion {ipv4 | ipv6}]**

Identifies the iperf server host. If a hostname is given and the hostname translates to an IPv6 address, the `ipversion` argument must also be specified. The default is an IPv4 address.

**nodelay**

The `nodelay` argument eliminates the wait time between sends. If `nodelay` argument is not specified, iperf will wait for an ACK message after each send. This argument is equivalent to the Linux argument: `-N`.

**port** *port*

The `port` argument can be used to specify the TCP port number for the target iperf server. The default port number is 5001, which is the default value for iperf. The port number used by the iperf client must match the port number used by the iperf server. Typically, you might change the port number to bypass network filters or test specific ports. This argument is equivalent to the Linux argument: `-p port`.

**transmit-size** *bytes*

The `transmit-size` argument defines how much data iperf will send before closing. This is equivalent to the Linux argument: `-n num`.

**window-size** *bytes*

The `window-size` argument increases the amount of data sent at one time (socket buffer size). This is equivalent to the Linux argument: `-w iperf-bytes`.

**net iperf server [run] [ipversion {ipv4 | ipv6}] [port {port | congestion-check-port}] [window-size bytes]**

Starts iperf in server mode. Role required: admin, limited-admin.

**Argument Definitions**

**ipversion {ipv4 | ipv6}**

Specifies the type of addressing.

**port {port | congestion-check-port}**

The `port` argument specifies the TCP port number to use instead of the iperf default, which is 5001. Use this argument to specify a port number or the keyword `congestion-check-port`. The congestion-check-port keyword selects port 5002. This argument is equivalent to the Linux argument: `-p port`.

**window-size** *bytes*

The `window-size` argument specifies the amount of data sent at one time. This is equivalent to the Linux argument: `-w iperf-bytes`.

**net iperf server start [port {port | congestion-check-port}] [ipversion {ipv4 | ipv6}] [window-size bytes]**

Runs iperf in the background in server (-s) mode until stopped with `net iperf server stop`. This command enables the terminal to be used for other operations, such as a network congestion check, while iperf is running. Do not use this command except when running in conjunction with `net congestion-check start iperf-client`. Role required: admin, limited-admin.
Argument Definitions

ipversion {ipv4 | ipv6}
Specifies the type of addressing.

port {port | congestion-check-port}
The port argument specifies a port number to use instead of the default. The initial default port number is 5002. If the port number is changed, the default becomes the last port number specified. Use this argument to specify a port number or the keyword congestion-check-port. The congestion-check-port keyword selects port 5002. This argument is equivalent to the Linux argument: -p port.

window-size bytes
The window-size argument specifies the amount of data sent at one time (socket buffer size). This is equivalent to the Linux argument: -w iperf-bytes.

net iperf server status
When the iperf server is running in the background (as invoked by net_server start), this command option displays the iperf server status and what connections the server is using. Role required: admin, limited-admin, security, user, backup-operator, or none.

net iperf server stop
When the iperf server is running in the background (as invoked by net_server start), this command option stops iperf. Role required: admin, limited-admin.
net lookup

net lookup {ipaddr | ipv6addr | hostname}
Search DNS entries. This command may be used with IPv4 or IPv6 addresses. Role required: admin, limited-admin, security, user, backup-operator, or none.

net modify

net modify virtual-ifname bonding {aggregate | failover}
Change the behavior of the specified virtual interface from aggregate to failover or from failover to aggregate. Role required: admin, limited-admin.

The result is the default's value target function with the same slaves. The default for failover is no primary and up-and-down delays of 29,700 milliseconds. The default for link aggregation is LACP with hash of L3L4, and a rate of slow and up/down times of 29,700 milliseconds.

net option

net option show
Display settings for network options. Role required: admin, limited-admin, security, user, backup-operator, or none.

net ping

net ping {ipaddr | ipv6addr | hostname [ipversion {ipv4 | ipv6}]}
[broadcast] [count n] [interface ifname] [packet-size bytes] [path-mtu {do | dont | want}] [pattern pattern] [numeric] [verbose]
Verify that the protection system can communicate with a remote host. Role required: admin, limited-admin, security, user, backup-operator, or none.

Argument Definitions

broadcast
Enable pinging a broadcast address (available for IPv4 only).

count n
Number of pings to issue.

interface ifname
Name of interface from which to send the ping. You can ping from physical, virtual, and VLAN interfaces.

ipaddr | ipv6addr | hostname [ipversion {ipv4 | ipv6}]
Identifies the host to ping. Specify an IPv4 or IPv6 address or a hostname. If a host name is entered without specifying an IP version, IPv4 is used. To ping an IPv6 host using the hostname, you must specify ipversion ipv6 after the hostname.

numeric
Ping the IP address, not the hostname.

packet-size bytes
Set packet size.
path-mtu {do | dont | want}
Define the MTU discovery and packet fragmentation strategy.

- Select do when you do want to drop packets that are too large (no fragmentation).
- Select dont when you don't want to drop oversize packets. Some packets may be dropped during path MTU discovery, but once the path MTU is determined, packets are fragmented locally for the entire path. Fragmentation is not supported after the packet leaves the local system.
- Select want when you want the packets delivered and not dropped. Fragmentation can take place locally or at any device along the path.

pattern pattern
Send packets with the specified pattern.

verbose
Display expanded output.

net reset

net reset {domainname | searchdomains}
Reset protection system DNS servers or domain names to the default settings. This usually clears any static settings and ensures DNS addresses provided by DHCP are used. If DHCP is not being used or DHCP does not supply any DNS servers or domain names, then no DNS addresses are used. Role required: admin, limited-admin.

net reset dns
Reset DNS list to default values. This usually clears any static settings and ensures DNS addresses provided by DHCP are used. If DHCP is not being used or DHCP does not supply any DNS servers or domain names, then no DNS addresses are used. Role required: admin, limited-admin.

net reset hostname
Reset the hostname to the default value. This usually clears any static settings and ensures DNS addresses provided by DHCP are used. If DHCP is not being used or DHCP does not supply any DNS servers or domain names, then no DNS addresses are used. Role required: admin, limited-admin.

net route

The net route command manages to route between protection systems and backup hosts. An additional routing rule in the Kernel IP routing table and in the protection system Net Route Config list shows a list of static routes reapplied at each system boot. Each interface is assigned a route based on its assigned address.

In addition, depending on the default gateway subnet and the gateway owner, a route is added to an interface automatically if the interface is in the subnet of a default gateway address. If the address is an IPv4 type, a routing table is created for the interface and default routes for that address are set up in that table.

net route guidelines and restrictions
Changes to Ethernet interfaces made with net route command options flush the routing table. All routing information is lost and data movement using routing is cut off immediately. You should make interface changes only during a scheduled downtime. You must also reconfigure routing rules and gateways after making interface changes.

net route add [ipversion {ipv4 | ipv6}] route spec
The IPv4 route spec syntax is: [host/net] dest IP4 address [netmask mask] gw gateway addr dev interface [src addr]

The IPv6 route spec syntax is: [host/net] dest IP6 address [prefix length] [netmask mask] gw gateway addr dev interface [src addr]

Add an IPv4 or IPv6 static route for a network or network host. Role required: admin, limited-admin.

**Arguments and definitions**

**ipv4address**
Specifies the IPv4 address for the destination network or host. If no gateway is specified, the command fails if the destination host is not found on the local network or through the default gateway.

**interface name**
The name of the interface for adding the default gateway. This makes this default gateway a "targeted" default gateway, which means this default will be used to route traffic for the IP address on this interface as long as the address is in the same subnet as this default gateway.

```
net route add [ipversion {ipv4 | ipv6}] [type {fixed | floating}] route spec
```

Add a fixed or floating static route in a high-availability (HA) system. Role required: admin, limited-admin.

**Arguments and definitions**

**fixed**
Specifies that the static route is fixed.

**floating**
Specifies that the static route is floating.

**gw gateway**
Specifies the IP address of the gateway to use to reach the destination network or host. If no gateway is specified, the route uses the default gateway.

**ipv4address**
Specifies the IPv4 address for the destination network or host. If no gateway is specified, the command fails if the destination host is not found on the local network or through the default gateway.

**ipv6address**
Specifies that the route is for IPv6 routing. This argument is not required when an IPv6 address is specified.

**-netmask**
Specifies the network mask that applies to the destination network or network host.

**type**
Specifies the type of static route is either a fixed or floating IP.

**Note:** Except for the cases where specific gateways are used to get to specific addresses or set of addresses, it is recommended to use the gateway as a default gateway instead of specified in a static route.

**Example 130**
Example 130  (continued)
The following example shows an IPv4 route added to network 192.168.1.0 with netmask 255.255.255.0 using the srvr12 gateway.

# net route add 192.168.1.0 netmask 255.255.255.0 gw srvr12

Example 131
The following example shows an IPv4 route added to network 192.168.1.0 with netmask 255.255.255.0.

# net route add 192.168.1.0 netmask 255.255.255.0 gw srvr12 table teth5a

Example 132
The following example shows an IPv4 route added to a host named user24 through the srvr12 gateway.

# route add user24 gw srvr12

net route add gateway ipv4address [interface name]
Add a gateway address to the list of gateway addresses on the protection system. Optionally specify a specific interface to associate with the gateway address. If the gateway is unreachable, the system displays a warning, but still adds the gateway. Role required: admin, limited-admin.

If the same route is needed from multiple NICs, then consider adding static gateways:

net route add gateway gateway IP interface NIC name

Example 133
The following example shows the addition of default gateways on specific NICs.

# net route add gateway 192.168.1.2 interface eth0b
# net route add gateway 192.168.1.2 interface eth1b

Arguments and definitions

ipv4address
The default gateway's IP address. It can only be an IPv4 address type.

interface name
The name of the interface for adding the default gateway. This makes this default gateway a "targeted" default gateway, which means this default will be used to route traffic for the IP address on this interface only as long as the address is in the same subnet as this default gateway.

net route del [ipversion {ipv4 | ipv6}] route spec
Delete an IPv4 or IPv6 static route for a network or network host. Role required: admin, limited-admin.

The IPv4 route spec syntax is: [host/net] dest IP4 address [netmask mask] gw gateway addr dev interface [srcaddr]
The IPv6 route spec syntax is: [host/net] dest IP6 address[\prefix length] [netmask mask] gw gateway addr dev interface [src addr]

net route del gateway ipv4address [interface name]
Deletes the specified gateway or routing table along with associated route entries and route rules. If the gateway is "targeted" (associated with a specific interface), the interface must be also given. Role required: admin, limited-admin.

net route del gateway {ipv4address | routing-table-name name}
Deletes the specified gateway, along with its associated route entries and route rules. Role required: admin, limited-admin.

Argument Definitions

**gw gateway**
Specifies the IP address of the gateway used to reach the destination network or host.

**ipv4address**
Specifies the IPv4 address of the destination network or host.

**ipv6address**
Specifies the IPv6 address of the destination network or host.

**ipversion ipv4**
Specifies that the route is an IPv4 route. If this is omitted, the route is deleted from the IPv4 routing table.

**ipversion ipv6**
Specifies that the route is an IPv6 route. If this is omitted, the route is deleted from the IPv4 routing table.

**-netmask**
Specifies the network mask that applies to the destination network.

net route reset [ipversion {ipv4 | ipv6}]
Delete the static default gateway for the protocol specified. If no protocol is specified, the IPv4 gateway is removed. Any other default gateways are applied and the appropriate default gateway is added to main. Role required: admin, limited-admin.

net route set gateway {ipaddr | ipv6addr}
Configure the IP address to be the static IPv4 or IPv6 default gateway. When the default gateway is added or changed, the DD OS automatically adds a route to default gateway for each interface with the same subnet. Role required: admin, limited-admin.

**Note:** When configuring an IPv6 address, a command failure might not produce an error message in the CLI. If the new gateway is not visible using the route show gateway and route show table commands, check the messages log file for information on why the command failed.

**Example 134**

The following example shows the device configured at 192.168.10.1 the default IPv4 gateway.

```
# net route set gateway 192.168.10.1
```

net route show config [routing-table-name name]
Display the configured static routes. Role required: admin, limited-admin, security, user, backup-operator, or none.

net route show gateways [detailed] [ipversion {ipv4 | ipv6}] [<ipv4addr>]
Displays the configured or DHCP-supplied IPv4 and IPv6 gateways as specified. The detailed option displays the network interface or type, associated routing tables, interface addresses, and owners if applicable. If no IP version is specified, gateways from both IP versions are displayed. Role required: admin, limited-admin, security, user, backup-operator, or none.

net route show tables [table-name-list] [ipversion {ipv4 | ipv6}]
Displays the IPv4 and IPv6 routing tables as specified. If no IP version is specified, both tables are displayed. Role required: admin, limited-admin, security, user, backup-operator, or none.

```bash
# net route show tables ipversion ipv4
```

IP Routing Tables and IDs in the Kernel
254    main
1    teth0b
2    teth0a
3    tethla.555

Table: main
Kernel IP routing table:
Destination       Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0           10.25.128.1     0.0.0.0         UG    0      0        0 eth0a
10.25.128.0       0.0.0.0         255.255.240.0   U     0      0        0 eth0a
10.25.160.0       0.0.0.0         255.255.240.0   U     0      0        0 eth0b
127.0.0.0         0.0.0.0         255.0.0.0       U     0      0        0 lo
172.16.32.0       0.0.0.0         255.255.240.0   U     0      0        0 eth1b.100
172.16.208.0      0.0.0.0         255.255.240.0   U     0      0        0 ethla.200
172.16.240.0      0.0.0.0         255.255.240.0   U     0      0        0 ethla.100
172.17.48.0       0.0.0.0         255.255.240.0   U     0      0        0 ethla.555
192.168.112.0     0.0.0.0         255.255.255.0   U     0      0        0 eth1d
Routing rules:
32766:      from all lookup main

Table: teth0a
Kernel IP routing table:
default via 10.25.128.1 dev eth0a
10.25.128.0/20 dev eth0a  scope link src 10.25.142.166
Routing rules:
32764:      from all oif eth0a lookup teth0a
32765:      from 10.25.142.166 lookup teth0a

Table: teth0b
Kernel IP routing table:
default via 10.25.160.1 dev eth0b
10.25.160.0/20 dev eth0b  scope link src 10.25.167.241
Routing rules:
32762:      from all oif eth0b lookup teth0b
32763:      from 10.25.167.241 lookup teth0b

Table: tethla.555
Kernel IP routing table:
default via 172.17.55.1 dev ethla.555
172.17.48.0/20 dev ethla.555  scope link src 172.17.55.55
Routing rules:
32760:      from all oif ethla.555 lookup tethla.555
32761:      from 172.17.55.55 lookup tethla.555

# net route show tables ipversion ipv4
```

IP Routing Tables and IDs in the Kernel
254    main
1    teth0b
Table: main
Kernel IP routing table
<table>
<thead>
<tr>
<th>Destination</th>
<th>Gateway</th>
<th>Genmask</th>
<th>Flags</th>
<th>Metric</th>
<th>Ref</th>
<th>Use</th>
<th>Iface</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0.0.0</td>
<td>10.25.128.1</td>
<td>0.0.0.0</td>
<td>UG</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth0a</td>
</tr>
<tr>
<td>10.25.128.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth0a</td>
</tr>
<tr>
<td>10.25.160.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth0b</td>
</tr>
<tr>
<td>127.0.0.0</td>
<td>0.0.0.0</td>
<td>255.0.0.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>lo</td>
</tr>
<tr>
<td>172.16.32.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1b.100</td>
</tr>
<tr>
<td>172.16.144.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1b</td>
</tr>
<tr>
<td>172.16.208.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1a.100</td>
</tr>
<tr>
<td>172.16.240.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1a.100</td>
</tr>
<tr>
<td>172.17.48.0</td>
<td>0.0.0.0</td>
<td>255.255.240.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1a.555</td>
</tr>
<tr>
<td>192.168.112.0</td>
<td>0.0.0.0</td>
<td>255.255.255.0</td>
<td>U</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>eth1d</td>
</tr>
</tbody>
</table>

Routing rules:
32766: from all lookup main

Table: teth0a
Kernel IP routing table:
default via 10.25.128.1 dev eth0a
10.25.128.0/20 dev eth0a scope link src 10.25.142.166

Routing rules:
32764: from all oif eth0a lookup teth0a
32765: from 10.25.142.166 lookup teth0a

Table: teth0b
Kernel IP routing table:
default via 10.25.160.1 dev eth0b
10.25.160.0/20 dev eth0b scope link src 10.25.167.241

Routing rules:
32762: from all oif eth0b lookup teth0b
32763: from 10.25.167.241 lookup teth0b

Table: teth1a.555
Kernel IP routing table:
default via 172.17.55.1 dev eth1a.555
172.17.48.0/20 dev eth1a.555 scope link src 172.17.55.55

Routing rules:
32760: from all oif eth1a.555 lookup teth1a.555
32761: from 172.17.55.55 lookup teth1a.555

net route show [ipversion {ipv4 | ipv6}] [type {fixed | floating}]
Displays the type of IP address as specified.

net route trace {ipv4addr | ipv6addr | hostname [ipversion {ipv4 | ipv6}]} [no-resolve] [mtu] [gateway {ipv4addr | ipv6addr}] [interface ifname] [protocol {udp | tcp}] [src-addr {ipv4addr | ipv6addr}] [src-port port] [dest-port port]
Display a route used by a protection system to connect with the specified destination. The protocol option is supported for IPv4 only. Role required: admin, limited-admin, security, user, backup-operator, or none.

To trace the route to srvr24:

# net route trace srvr24
Traceroute to srvr24.yourcompany.com (192.168.1.6), 30 hops max, 38 byte packets
1 srvr24 (192.168.1.6) 0.163 ms 0.178 ms 0.147 ms
net set

net set {domainname local-domain-name | searchdomains search-domain-list}
Set the domain name or search domains used by the protection system. The default for domainname is the return from DHCP, or domain portion of the hostname configured with net set hostname. The default for searchdomains is the domain name configured with net set domainname. The configured domain name is always included in the list of search domains. Role required: admin, limited-admin.

Example 135

```bash
# net set domainname yourcompany-ny.com
# net set searchdomains yourcompany2.com, yourcompany3.com
```

The searchdomains list is yourcompany-ny.com, yourcompany2.com and yourcompany3.com.

If the domain names provided cannot be resolved, a warning appears.

net set dns ipv4-ipv6-addr-list
Set the DNS server list using addresses for IP version 4, IP version 6, or both. Separate the IP addresses with a comma or a space. This command overwrites the current list of DNS servers. Only servers included in the most recently issued command are available to a protection system. Role required: admin, limited-admin.

Example 136

```bash
# net set dns 10.0.0.1, 10.0.0.2, 10.0.0.3
The Name (DNS) server list is:
  10.0.0.1, 10.0.0.2, 10.0.0.3
```

Example 137

```bash
# net set dns 2100:bad:cafe:f00d::1:101 10.24.255.146 10.24.255.150
The Name (DNS) server list is:
  2100:bad:cafe:f00d::1:101, 10.24.255.146, 10.24.255.150
```

net set hostname host
Set the hostname of the protection system. If you do not statically set the hostname, the system uses a DHCP hostname from one of the system interfaces. If multiple interfaces have DHCP hostnames, then during some DD OS upgrades, the system hostname might change to a hostname from a different interface. The best practice is to use this command to statically set the system hostname.

Note that some browsers may prevent logins to the host if the hostname contains an underscore. Dell EMC recommends using host names without underscores to ensure the GUI can recognize and manage the host. Role required: admin, limited-admin.

**Note:** If the protection system is using CIFS with Active Directory authentication, changing the hostname causes the protection system to drop out of the domain. Use the cifs set authentication command option to rejoin the Active Directory domain.
**Note:** This command accepts domain names and validates that the domain name is made up of valid characters separated by periods. Although an IPv4 address passes the validation for a domain name, this command does not recognize the IP address as such and does not validate the IP address. This is not an issue for IPv6 addresses because they contain colon characters, which are invalid in host names.

```
net set hostname ha-system
```

Promote the hostname of the system to be the HA system name for the HA pair.

### net show

```
net show {domainname | searchdomains}
```

Display the domain name or search domains used for email sent by a protection system. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Example 138**

```bash
# net show domainname
The Domainname is: emc.com

# net show searchdomains
#  Searchdomains
#     --------------------------
1  emc.com (local domain)
```

```
net show all
```

Display all networking information produced by the other `net show` commands and a Network Stats table. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Output Definitions**

Most of the command output is described for other `net show` commands. The following definitions are for the columns in the Network Stats table.

**Foreign Address**

The connection IP address and port used on a destination device or application.

**Local Address**

The connection IP address and port used on the local system or application.

**Proto**

The protocol in use for the listed connection. This is always TCP because UDP is a connectionless protocol.

**Recv-Q**

A count of the protocol packets in the receive queue.

**Send-Q**

A count of the protocol packets in the send queue.

**State**

The state of the connection as signaled by the TCP protocol. The state for active sessions is ESTABLISHED. The TIME_WAIT state appears when the local connection is closing and reserving the port number for a wait period in case any additional packets arrive. The SYN_RCVD, SYN_SENT, and CLOSE_WAIT states are usually so brief that they do not
appear, but if one of these states do appear in several consecutive command displays, it might indicate a connection problem.

```
net show config [ifname]
```

Display the configuration for a specific Ethernet interface. Exclude the keyword *ifname* to view the configuration for all Ethernet interfaces. This command also shows auto-generated IPv6 addresses, which are automatically generated and assigned to the base interface. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Example 139**

```
# net show config
eth0a     Link encap:Ethernet   HWaddr 00:8C:FA:08:92:19
          inet  addr:10.110.141.187  Bcast:10.110.143.255  Mask:255.255.248.0
          inet6 addr: 2620:0:170:1a04:28c:faff:fe08:9219/64 Scope:Global
          inet6 addr: fe80::28c:faff:fe08:9219/64 Scope:Link
          UP BROADCAST NOTRAILERS RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:6891161 errors:0 dropped:0 overruns:0 frame:0
          TX packets:339319 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:726690965 (693.0 MiB)  TX bytes:102448918 (97.7 MiB)
```

**Output Definitions**

**Bcast**
IPv4 network broadcast address.

**Collisions**
Network collisions.

**HWaddr**
MAC address.

**inet addr**
IPv4 network address.

**inet6 addr**
IPv6 network address. An interface can have multiple IPv6 IP addresses.

**Link encap**
Link encapsulation used, typically Ethernet.

**Mask**
IPv4 network mask.

**MTU**
Maximum transfer unit.

**RX bytes**
Bytes of data received.

**RX packets**
Network packets received.

**TX bytes**
Bytes of data transmitted.
TX packets
Network packets transmitted.

txqueuelen
Transmit queue length.

net show dns
Display a list of DNS servers used by the protection system. The final line in the output shows if the servers were configured manually or by DHCP. Role required: admin, limited-admin, security, user, backup-operator, or none.

Example 140

```
# net show dns
#   Server
-   -------------
1   10.24.255.146
2   10.24.255.150
3   10.110.188.5
-   -------------
Showing DNS servers configured manually.
```

net show hardware
Display Ethernet port hardware information from the kernel.
On DD3300 systems, this command displays the interface speed that is recorded in the registry if the interface is down. This provides the ability to see what the interface speed was set at before the interface went down.
Role required: admin, limited-admin, security, user, backup-operator, or none.

Figure 1 Output: net show hardware

```
# net show hardware
<table>
<thead>
<tr>
<th>Port</th>
<th>Speed</th>
<th>Duplex</th>
<th>Supp Speeds</th>
<th>Hardware Address</th>
<th>Physical</th>
<th>Link Status</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>eth0a</td>
<td>1000Mb/s</td>
<td>full</td>
<td>10/100/1000</td>
<td>00:8c:fa:05:6c:91</td>
<td>Copper</td>
<td>yes</td>
<td>running</td>
</tr>
<tr>
<td>eth0b</td>
<td>unknown</td>
<td>unknown</td>
<td>10/100/1000</td>
<td>00:8c:fa:05:6c:90</td>
<td>Copper</td>
<td>unknown</td>
<td>down</td>
</tr>
</tbody>
</table>
```

Output Definitions

Duplex
Full, half, or unknown duplex protocol. Unknown means the interface is not available.

Hardware Address
The MAC address.

Link Status
The status is yes if the link is receiving carrier from the remote system and no if no carrier is present. Carrier must be present for the link to support data transfer. The status is unknown when the link is administratively down and the link state cannot be determined.

Physical
Copper, DA Copper, Optical, or Fibre.

Port
The Ethernet interfaces on the system.
Speed

The actual speed at which the port processes data.

State

The port state indicates whether the port is administratively up or down and whether the link is ready for traffic. A port in the running state is enabled and receiving carrier from the remote system, so it is ready to send and receive data.

Supp Speeds

Lists speeds the port is capable of using.

net show hostname

Display the hostname of the protection system. Role required: admin, limited-admin, security, user, backup-operator, or none.

net show settings

Display the registry settings for the network interfaces available on the system. Settings include the name for the physical, virtual, VLAN, and alias interfaces. The settings also indicate if an interface is enabled and if the interface information is from DHCP using IPv4 or IPv6. A type field for interconnect or floating, and additional settings such as bonding information are also included.

On DD3300 systems, this command displays the interface speed that is recorded in the registry if the interface is down. This provides the ability to see what the interface speed was set at before the interface went down.

Role required: admin, limited-admin, security, user, backup-operator, or none.

Figure 2 Output: net show settings
## Figure 3: Output: net show settings for HA (active)

<table>
<thead>
<tr>
<th>port</th>
<th>enabled</th>
<th>state</th>
<th>DHCP IP address</th>
<th>netmask</th>
<th>length</th>
<th>type</th>
<th>additional setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethMa</td>
<td>yes</td>
<td>running</td>
<td>ipv4 10.25.132.160*</td>
<td>255.255.240.0*</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2620::170:1106:260:16ff:fe5c:8f70**</td>
<td>/64</td>
<td></td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe5c:8f70**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etMb</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>etMc</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>etMd</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>ethla</td>
<td>yes</td>
<td>running</td>
<td>no 2.2.2.1</td>
<td>255.255.250.0*</td>
<td>n/a</td>
<td>floating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2620::170:1106:260:16ff:fe52:14a4**</td>
<td>/64</td>
<td></td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe52:14a4**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethla.1</td>
<td>yes</td>
<td>running</td>
<td>no 1.3.3.1</td>
<td>255.255.250.0*</td>
<td>n/a</td>
<td>floating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2620::170:1106:260:16ff:fe52:14a4**</td>
<td>/64</td>
<td></td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe52:14a4**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethla.1:1</td>
<td>yes</td>
<td>running</td>
<td>no n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>floating</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>eth1b</td>
<td>no</td>
<td>down</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1c</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1d</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1e</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1f</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1g</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1h</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1i</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>eth1lc</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>eth1ld</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>veth99</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
</tbody>
</table>

## Figure 4: Output: net show settings for HA (standby)

<table>
<thead>
<tr>
<th>port</th>
<th>enabled</th>
<th>state</th>
<th>DHCP IP address</th>
<th>netmask</th>
<th>length</th>
<th>type</th>
<th>additional setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethMa</td>
<td>yes</td>
<td>running</td>
<td>ipv4 10.23.30.160*</td>
<td>255.255.240.0*</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2620::170:1106:260:16ff:fe5c:8f7c**</td>
<td>/64</td>
<td></td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe5c:8f7c**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etMb</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>etMc</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>etMd</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>ethla</td>
<td>yes</td>
<td>running</td>
<td>no 2.2.2.1</td>
<td>255.255.250.0*</td>
<td>n/a</td>
<td>floating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2620::170:1106:260:16ff:fe52:1780**</td>
<td>/64</td>
<td></td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe52:1780**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethla.1</td>
<td>yes</td>
<td>running</td>
<td>no n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>floating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fe80::1260:16ff:fe52:1780**</td>
<td>/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethla.1:1</td>
<td>yes</td>
<td>running</td>
<td>no n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>floating</td>
<td></td>
</tr>
<tr>
<td>eth1b</td>
<td>no</td>
<td>down</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1c</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1d</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1e</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1f</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1g</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1h</td>
<td>no</td>
<td>down</td>
<td>ipv4 n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>eth1i</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>eth1lc</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>eth1ld</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
<tr>
<td>veth99</td>
<td>yes</td>
<td>running</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>interconnect bonded to veth99</td>
</tr>
</tbody>
</table>

## Output Definitions

### DHCP

The DHCP configuration for the interface, which is ipv4 (enabled for IPv4), ipv6 (enabled for IPv6), disabled (no), or not applicable (n/a).

### Enabled

The target state of the interface, which is yes (enabled) or no (disabled).

### Floating

The floating keyword means that the IP address is a floating type. If the column does not indicate a floating type, then it is a fixed IP address.
IP address
The IPv4 and IPv6 addresses that are assigned to the interface. The auto-generated IPv6 addresses are followed by one asterisk (*).

Interconnect
Used for internal communication between HA nodes.

Netmask/prefix length
The IPv4 network mask or IPv6 addresses prefix assigned to the interface.

Port
The Ethernet interfaces on the system. Interface eth1d represents the physical interface. Interface eth1d:10 is an alias interface that adds an IPv4 address to the base interface, and eth1d:100 is an alias interface that adds an IPv6 address to the same base interface.

State
The port state indicates whether the port is administratively up or down and whether the link is ready for traffic. A port in the running state is enabled and receiving carrier from the remote system, so it is ready to send and receive data.

Type
The label assigned to the interface with the net config ifname type command.

net show stats [[ipversion {ipv4 | ipv6}] [all | listening] [detailed] | [ipversion {ipv4 | ipv6}] route | interfaces | [ipversion {ipv4 | ipv6}] statistics]
Display network statistics. Role required: admin, limited-admin, security, user, backup-operator, or none.

Argument Definitions
all
Lists local client connections for the TCP and UDP protocols. Also lists client and server connections for the UNIX protocol.

detailed
Adds the associated processes for each connection.

interfaces
Displays a table of the driver statistics for each interface that is UP.

ipversion {ipv4 | ipv6}
Limits the display output to IPv4 or IPv6 statistics only. When this option is omitted, the system shows all statistics.

ipversion {ipv4 | ipv6}] route
Displays the route table (default is the IPv4 main table only).

listening
Lists local server TCP connections.

statistics
Displays the statistics for IP, IP extended, ICMP, TCP, TCP extended, UDP, and UDP Lite.
**net tcpdump**

net tcpdump capture filename [interface iface] [{host host [ipversion [ipv4 | ipv6]] | net {ipaddr [mask mask] | ipv6addr[/prefixlength]}]} [port port] [snaplen bytes]
Capture data, and then copy the output file to another system for analysis. This command converts the options from the command line to equivalent tcpdump options. Output files are placed in /ddvar/traces where you can upload them to autosupport. Values for bytes may be followed by the K, M, or G to scale the value accordingly. A maximum of 10 output files may be retained on the system. If this limit is reached, you are prompted to delete some of the files. Role required: admin.

**Argument Definitions**

*filename*
Specifies the output filename. Equivalent Linux argument: -w /ddvar/traces/tcpdump_ filename -C 100 -W 5.

*host host [ipversion {ipv4 | ipv6}]*
Equivalent Linux argument: host host.

*interface iface*
Equivalent Linux argument: -i iface.

*ipv6addr/prefixlength*
IPv6 address.

*net (ipaddr [mask mask]*)*
Equivalent Linux arguments:

- net net
- mask mask

*port port*
Equivalent Linux argument: port port

*snaplen bytes*
Equivalent Linux argument: -s bytes

net tcpdump del {filename | all}
Delete output files created by the net tcpdump capture command. Specify a filename to delete files matching the pattern /ddvar/traces/tcpdump_ filename *. Specify all to remove all net tcpdump output files. Role required: admin.

**net troubleshooting**

net troubleshooting duplicate-ip
Detect duplicate IP addresses in the local network. Role required: admin, security, user, backup-operator, or none.
The `nfs` command enables you to add NFS clients and manage access to a protection system. It also enables you to display status information, such as verifying that the NFS system is active, and the time required for specific NFS operations.

This chapter contains the following topics:

- `nfs change history` ........................................................................................................... 270
- `nfs add` ............................................................................................................................ 270
- `nfs del` ............................................................................................................................ 270
- `nfs disable` ....................................................................................................................... 270
- `nfs enable` ......................................................................................................................... 270
- `nfs export add` ................................................................................................................ 270
- `nfs export create` ............................................................................................................ 273
- `nfs export del` .................................................................................................................. 273
- `nfs export destroy` ........................................................................................................... 274
- `nfs export modify` ............................................................................................................ 275
- `nfs export rename` ........................................................................................................... 275
- `nfs export show` ................................................................................................................ 275
- `nfs option` .......................................................................................................................... 276
- `nfs reset` ........................................................................................................................... 278
- `nfs show` ........................................................................................................................... 278
- `nfs status` ........................................................................................................................... 280
nfs change history

There have been no changes to this command in this release.

nfs add

nfs add path client-list [(option-list)]

Note: This command is deprecated and will be removed from a future release. Use nfs export add.

nfs del

nfs del path client-list

Note: This command is deprecated and will be removed from a future release. Use nfs export del.

nfs disable

nfs disable
Disable the NFS server, effectively disabling access from the clients. Role required: admin, limited-admin.

nfs enable

nfs enable
Allow all NFS-defined clients to access the protection system. Role required: admin, limited-admin.

nfs export add

nfs export add {<export-spec> | all} clients <client-list> [options <option-list>]

Add a client or list of clients to one or more exports. A client can be a fully qualified domain hostname, a class-C IP address, an IP address with netmask or length, an IPV6 address, an NIS netgroup name with the prefix @, or an asterisk wildcard for the domain name such as *yourcompany.com. Role required: admin, limited-admin.

An asterisk by itself means no restrictions.

The options-list is comma separated and enclosed by quotes if more than one option is provided. If no option is specified, the default options are sec=sys, rw, root_squash, no_all_squash, secure, and version=3.

Note: NFSv4 has the same export options as those that exist for NFSv3.

NFS options

version
Select the appropriate version or versions of NFS, which can be 3, 4, 3:4, or all.

ro
Enable read-only permission.
rw
Enable read and write permissions (default value).

root_squash
Map requests from uid or gid 0 to the anonymous uid/gid.

no_root_squash
Turn off root squashing.

Note: no_root_squash is the default value.

all_squash
Map all user requests to the anonymous uid/gid.

no_all_squash
Turn off the mapping of all user requests to the anonymous uid/gid (default value).

default_root_squash

force_minimum_root_squash

secure
Require that requests originate on an Internet port that is less than IPPORT_RESERVED (1024) (default value).

insecure
Turn off the secure option.

anongid=id
Set an explicit user ID for the anonymous account. The ID is an integer bounded from 0 to 65635.

sec
Set sec equal to one or more of the following options to activate different types of authentication security options. The default for sec is sys.

sys: Allow unauthenticated connections. Select to not use authentication. This is the default.
krb5: Allow Kerberos-5 NFS authenticated connections.
krb5i: (krb5 integrity) Allow connections that checksum NFS arguments and results.
krb5p: (krb5 privacy) Allow connections that encrypt NFS arguments and results.

Note: You can use any combination of the sec options. Security options are colon separated.

CAUTION If authentication options (sec options) on the DDR are selected and a client tries to connect to the DDR without setting the respective setting(s) on the client, the client will be denied with an authentication failure. If multiple authentication options are present for an export, the clients will be able to mount the export using any one of the specified authentication options.

nfs export add {<export-spec> | all} referral <referral-name> remote-servers <address-list> [ remote-path <path>]
Add a referral location to the export defined in <export-spec>. Role required: admin.

<referral-name> defines the name of the referral. If the name you choose is the same as an existing referral, you will see an error message. Each export can have multiple referrals, each with a unique name.
When adding `<referral-name>` or `<referral-list>`, consider the following guidelines:

- Both `<referral-name>` and `<referral-list>` can accept embedded spaces; if you use embedded spaces for an item, that item must be contained within double quotation marks.
  - Specify a single referral name as `ref1` without quotation marks if the name contains no spaces.
  - Specify a single referral name as “`ref1 space`” with quotation marks if the name contains spaces.
  - Use quotation marks with lists of items whether or not they have embedded spaces; for example, “`ref1,ref2`” and “`ref1,ref3 space`”

`remote servers <address-list>` defines the remote network address or addresses to be used in the referral. The following must be true for each export:

- Each referral location must refer to only one NFS server, although the server can contain multiple network addresses.
- Each NFS server should be associated with only one referral location.

`remote-path <path>` allows you to specify a remote path name. If you do not specify a path, the current export path is used.

In the following example, you would add a referral to a single remote server for an existing export and use a different path on the referred system:

```plaintext
# nfs export add db_backups referral db_backups
    remote-servers db_backups.domain.name
    remote-path /data/col1/db_backups2
```

In the following example, you would create referrals for several exports using referral export locations with two remote addresses for the same server. You would also use the same path on the server that you use on the protection system:

```plaintext
# nfs export add dd_backups,dd_locks
    referral backups2
    remote-servers db_backups2a.domain.name,
           db_backups2b.domain.name
```

In the following example, you would create referrals for several exports using two referral locations to indicate two different servers, and using the same path on each server. Compare this with the previous example:

```plaintext
# nfs export add "dd_backups,dd_locks" referral backups2
    remote-servers db_backups2.domain.name
NFS referral added.
# nfs export add "export1,export2" referral referral1 remote-servers
    test.domain.com remote-path /test1
2 NFS referrals added.
```

If you try to create a referral with a duplicate location, you will see an error message:

```plaintext
# nfs export add "dd_backups,dd_locks"
    referral backups2
    remote-servers db_backups2a.domain.name,
           db_backups2b.domain.name
NFS referral entry(s) added.
```
nfs export create

nfs export create [export-name] path path [clients client-list [options option-list]] [referral referral-name remote-servers address-list [remote-path path]]
Create a named export and add a path. If you do not provide an export name, the name simply defaults to the path. Use the clients parameter to optionally add a client or list of clients to the export. A client can be a fully qualified domain hostname, a class-C IP address, an IP address with netmask or length, an IPv6 address, an NIS netgroup name with the prefix @, or an asterisk wildcard for the domain name such as *.yourcompany.com. Role required: admin.

In the following example, a named export is created with one added client:

```
# nfs export create path /data/coll/new_data clients emc.datadomain.com options version=all
NFS export '/data/coll/new_data' created.
```

nfs export del

nfs export del {<export-spec> | all} clients {<client-list> | all}
Removes a client or a list of clients from existing exports. You can remove a single client or a list of clients, with the name of each client separated by a comma. Role required: admin.

Note: If either referral lists or client lists have comma separators in them, the entire list must be enclosed in double quotes.

```
nfs export del {<export-spec> | all} referrals {<referral-list> | all}
Removes specified NFSv4 referrals. You can remove a single referral or a list of referrals, with the name of each referral separated by a comma. If a referral in a referral list does not exist on one or more of the specified exports, you will see an error message and the exports will remain unchanged.

If more than one referral is given (with each separated by a comma), the entire list must be enclosed within double quotation marks. If you specify all, all referrals are removed from the indicated exports.

Role required: admin.

Delete all referrals for every export:

```
# nfs export del all referrals all
<count> NFS referral(s) deleted.
```

Delete all referrals for the export db_backups:
Delete the specific referral `backups1`:

```bash
# nfs export del db_backups referrals backups1
<count> NFS referral(s) deleted.
```

Delete a referral that does not exist, and the system indicates the nonexistent referral cannot be found:

```bash
# nfs export del db_backups referrals backups1UUU
**** Referral ‘backups1UUU’ was not found.
```

### nfs export destroy

```
nfs export destroy {<export-spec> | all}
```

Destroys one or multiple NFS exports. Role required: admin.

### nfs export modify

```
nfs export modify {<export-spec> | all} clients {<client-list> | all}
options <option-list>
```

Updates an existing client or clients to an export or set of exports identified in `{export-spec | all}`. Role required: admin.

```
nfs export modify {<export-spec> | all} referral <referral-name>
[remote-servers <address-list>] [remote-path {<path> | default}]
```

Updates an existing referral to an export or set of exports identified in `{export-spec | all}`.

- If the referral specified in `<referral-name>` does not exist in one or more of the specified exports, you see an error message and no change occurs. Similarly, if the requested specific client does not exist, you see an error message and no change occurs.
- `remote-servers` defines the remote network address or addresses to be used in the referral. It replaces the existing remote network address list, if used.
- If `remote-path` is specified, enter the remote path name in `<path>`; otherwise, the current path is unchanged. If you use the default instead of a specific path, the export path is used.

Role required: admin.

In the following example, a referral is modified to a single remote server for an existing export:

```bash
# nfs export modify db_backups referral db_backups
 remote-servers db_backups3.<domain-name>
<count> NFS referral(s) modified.
```

In the following example, you can see a referral modified to a single remote server for an existing export, but with an invalid referral:
# nfs export modify db_backups referral db_backups
remote-servers db_backups3.mycorp.com
****Referral 'db_backups’ was not found.

**nfs export rename**

```
nfs export rename <export-name> <new-export-name>
```  
Rename a specific export. Role required: admin.

**nfs export show**

```
nfs export show list [<export-spec>] [path <path-spec>] [clients <client-list>] [tenant-unit <tenant-unit>]
```  
Enables you to view a list of exports. Role required: admin, limited-admin.

**Note:** The NFS data path security feature filters the Linux 'showmount' output on the client to match the client permissions in the export list. The system displays only the client's activity. Because NFSv4 does not use the mountd daemon, NFSv4 exports are not listed.

The following example output shows a list of all exports:

```
# nfs export show list
<table>
<thead>
<tr>
<th>Export</th>
<th>Path</th>
<th># Client Entries</th>
<th>Tenant-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data</td>
<td>/data</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>/ddvar</td>
<td>/ddvar</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>finance</td>
<td>/data/col1/m1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
(3 exports found)
```

The following example output shows a specific list of exports that share the prefix hr:

```
# nfs export show list hr*
<table>
<thead>
<tr>
<th>Export</th>
<th>Path</th>
<th># Client Entries</th>
<th>Tenant-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>hr1</td>
<td>/data/col1/m2</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>hr2</td>
<td>/data/col1/m4</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
(2 exports found)
```

The following example output shows information related to two specific clients, c1 and c4:

```
# nfs export show list clients "c1,c4"
<table>
<thead>
<tr>
<th>Export</th>
<th>Path</th>
<th># Client Entries</th>
<th>Tenant-Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>finance</td>
<td>/data/col1/m1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>hr1</td>
<td>/data/col1/m2</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
(2 exports found)
```
The following example displays existing referrals for the export `db_backups`:

```
# nfs export show detailed db_backups
```

```
NFS Export: db_backups
Path: /data/col1/backups_15
Tenant-Unit: -
NFSv3 Mounts: 200
Active NFSv3 clients: 300
NFSv4 Clients instances: 100
Active NFSv4 clients: 22

Client            Options
----------------  ---------------------------------
oradb.mycorp.com  (rw,secure,root_squash,sec=krb5i)
*                    (ro,insecure,root_squash)
----------------  ---------------------------------
Total Client Entries: 2
Referrals:
Name   Remote Path    Remote Servers
----   -----------    -----------------------------
  db2   /mnt/data1/db2 ddr1a.myco.com,ddr1b.myco.com
  db4   /mnt/data1/db4 ddr17.myco.com
---   -----------    -----------------------------
Total Referral locations: 2
```

```
nfs export show detailed [<export-spec>] [path <path-spec>] [clients <client-list>] [tenant-unit <tenant-unit>]
```

Allows you to apply filters to selectively view certain exports, clients, paths, and tenant-units. Some filters accept limited wildcards. Role required: admin.

The following shows detailed information for an export called `finance`:

```
# nfs export show detailed finance
```

```
NFS Export: finance
Path: /data/col1/m1
Tenant-Unit: -
NFSv3 Mounts: 0
Active NFSv3 clients: 0
Active NFSv4 clients: 0

Client    Options
-------   ---------------------------------------------------------
1.1.1.1   (sec=sys,rw,root_squash,no_all_squash,secure,version=3)
2.2.2.2   (sec=sys,rw,root_squash,no_all_squash,secure,version=4)
3.3.3.3   (sec=sys,ro,root_squash,no_all_squash,secure,version=3:4)
-------   ---------------------------------------------------------
Total Client Entries: 3
```

```
nfs export show stats [<export-spec>] [interval <secs>] [count <count>]
```

Shows NFS export statistics. The interval is an optional number of seconds with a minimum of 1. The count is an optional ordinal value with a minimum of 1. Role required: admin, limited-admin.

```
nfs export show summary [tenant-unit <tenant-unit>]
```

Show summary information for NFS exports. Role required: admin, limited-admin.

```
nfs option
```

```
nfs option reset default-server-version
Reset the NFS server to NFSv3. Role required: admin, limited-admin.
```

```
nfs
```

Dell EMC DD OS Command Reference Guide
nfs option set default-server-version
Set the NFS server to use NFSv4 as the default. Role required: admin, limited-admin.

# nfs option set default-server-version 4
NFS option 'default-server-version' set to '4'.

nfs option show
Show the NFS version that is currently used as the default. Role required: admin, limited-admin.

# nfs option show
<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>default-export-version</td>
<td>3</td>
</tr>
<tr>
<td>default-server-version</td>
<td>3</td>
</tr>
<tr>
<td>nfs4-grace-period</td>
<td>30</td>
</tr>
<tr>
<td>nfs4-lease-interval</td>
<td>300</td>
</tr>
<tr>
<td>mountd-port</td>
<td>2052</td>
</tr>
<tr>
<td>nfs4-port</td>
<td>2049</td>
</tr>
<tr>
<td>nfs3-port</td>
<td>2049</td>
</tr>
<tr>
<td>nfs4-domain</td>
<td>brs.lab.emc.com</td>
</tr>
<tr>
<td>nfs4-idmap-out-numeric</td>
<td>map-first</td>
</tr>
<tr>
<td>nfs4-idmap-active-directory</td>
<td>disabled</td>
</tr>
<tr>
<td>nfs4-acls</td>
<td>disabled</td>
</tr>
<tr>
<td>default-root-squash</td>
<td>enabled</td>
</tr>
<tr>
<td>force-minimum-root-squash-default</td>
<td>disabled</td>
</tr>
</tbody>
</table>

Output Definitions

default-export-version
The default version or versions for client exports. This takes effect for future client exports only.

Any legal version string is allowed ("3", "3:4", "all").

default-server-version
The NFS server version or versions enabled by default.

Any legal version string is allowed ("3", "3:4", "all").
nfs4-grace-period
The grace period for NFSv4 recovery measured in seconds.

The minimum is 5 seconds; the maximum is 120 seconds.

The default is 30 seconds.
nfs4-lease-interval
The client lease interval measured in seconds.

The minimum is 120 seconds, the maximum is 3600 seconds.

The default is 300 seconds.

mountd-port
The IP port for mountd. Changing this port requires an NFS server restart.

The default port is 2052.
nfs4-port
The IP port for the NFSv4 server. Changing this port requires an NFS server restart.

The default port is 2049.
nfs3-port
The IP port for the NFSv3 server and related protocols. Changing this port requires an NFS server restart.

The default port is 2049.

nfs4-domain
The NFSv4 server domain. Any valid domain name is permitted.

The protection system DNS domain name is the default; "" is the default if the domain name is not set.

nfs4-idmap-out-numeric
Set output mapping of NFSv4 owner/group ids (e.g. fred@emc.com) as numeric values or names in output attributes and ACL ACE entries.

The default is map-first; use numeric ID mapping if normal mapping fails.

Use numeric ID mapping if allowed. Numeric IDs are never sent; if mapping fails, the server sends the ID “nobody”.

nfs4-idmap-active-directory
Determine whether NFSv4 should use CIFS active directory (AD) for name resolution and ID mapping.

Disabled is the default setting.

Active-Directory mapping may be used to increase interoperability in a mixed CIFS/NFS environment.

nfs4-acls
Determine whether NFSv4 ACLs (access control lists) are enabled.

Disabled is the default setting.

nfs reset
nfs reset clients
Removes the existing client/share configuration, resetting the client list to the factory default (empty). In non-interactive mode, for example when the command is run as part of a script, the system will not pause. However, in interactive mode, the command warns the user and asks for confirmation before proceeding. NFS clients can access the protection system when the client list is empty. Role required: admin, limited-admin.

Note: In interactive mode, the system will prompt the user with the following warning message:
This command will delete all exports and client configurations.
Do you want to proceed? (yes|no) [no]

nfs reset stats
Clear the NFS statistics. Role required: admin, limited-admin.

nfs show
nfs show active [tenant-unit tenant-unit]
List clients active in the past 15 minutes and the mount path for each. Optionally, list NFS clients assigned to a tenant-unit. Role required: admin, limited-admin, user, backup-operator, security, tenant-user, tenant-admin.
Note: The NFS data path security feature filters the Linux ‘showmount’ output on the client to match the client permissions in the export list. The system displays only the client’s activity. Because NFSv4 does not use the mountd daemon, NFSv4 exports are not listed.

**Argument definitions**

**tenant-unit (Optional)**

The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

```
nfs show clients [tenant-unit tenant-unit]
```

Lists NFS clients allowed to access the protection system and the mount path as well as NFS options for each. Optionally, list NFS clients assigned to a tenant-unit. A client added using a hostname is displayed using the client’s hostname. Security options and the log option are displayed for each mount point. If client is added using a hostname, and both sides support IPv6 and IPv4, then the client can connect using both addresses. Role required: admin, limited-admin, user, backup-operator, security, tenant-user, tenant-admin.

Note: The NFS data path security feature filters the Linux `showmount` output on the client to match the client permissions in the export list; the system does not display output that is not relevant to the client.

When you run the `showmount` command with the tenant-unit hostname, you see only the exports that tenant-unit owns.

```
nfs show detailed-stats
```

Display NFS cache entries and status to facilitate troubleshooting. Role required: admin, limited-admin, user, backup-operator, security.

```
nfs show histogram
```

Display NFS operations in a histogram. Users with user role permissions may run this command. Role required: admin, limited-admin, user, backup-operator, security.

**Output Definitions**

**mean (ms)**

The mathematical mean time for completion of the operations.

**std-dev**

The standard deviation for time to complete operations, derived from the mean time.

**max**

The maximum time taken for a single operation.

**min**

The minimum time taken for a single operation.

**2ms**

The number of operations that took 2 ms or less.

**4ms**

The number of operations that took between 2ms and 4ms.

**6ms**

The number of operations that took between 4ms and 6ms.

**8ms**

The number of operations that took between 6ms and 8ms.
10ms
The number of operations that took between 8ms and 10ms.

100ms
The number of operations that took between 10ms and 100ms.

1s
The number of operations that took between 100ms and 1 second.

10s
The number of operations that took between 1 second and 10 seconds.

>10s
The number of operations that took over 10 seconds.

**nfs show port**
Display NFS port information. Role required: admin, limited-admin, user, backup-operator, security.

**nfs show stats**
Display NFS statistics, including NFS Kerberos (only) related GSSAPI (Generic Security Services API) statistics. Role required: admin, limited-admin, user, backup-operator, security.

**nfs status**
**nfs status**
Enter this option to determine if the NFS system is operational. When the filesystem is active and running, the output shows the total number of NFS requests since the filesystem started, or since the last time that the NFS statistics were reset.
The `ntp` command synchronizes a protection system with an NTP time server, manages the NTP service, or turns off the local NTP server.

A protection system can use a time server supplied through the default multicast operation, received from Dynamic Host Configuration Protocol (DHCP), or set manually with the protection system `ntp add` command.

This chapter contains the following topics:

- ntp change history .................................................................282
- ntp guidelines and restrictions ...........................................282
- ntp add ................................................................................. 282
- ntp del ................................................................................. 282
- ntp disable ...........................................................................282
- ntp enable ............................................................................ 283
- ntp reset ................................................................................. 283
- ntp show .............................................................................. 283
- ntp status .............................................................................. 283
ntp change history

There have been no changes to this command in this release.

ntp guidelines and restrictions

- Default system settings for NTP service are enabled and multicast.
- Time servers set with the `ntp add` command override time servers from DHCP and from multicast operations.
- Time servers from DHCP override time servers from multicast operations.
- The protection system `ntp del` and `ntp reset` commands act only on manually added time servers, not on DHCP-supplied time servers. You cannot delete DHCP time servers or reset to multicast when DHCP time servers are supplied.

ntp add

```
ntp add timeserver server-name
```

Add a remote time server hostname to the NTP timeserver list. Role required: admin, limited-admin. This command option requires security officer authorization for Retention Lock Compliance systems.

Example 141

To add an NTP time server named srvr26.yourcompany.com to the list, enter:

```
# ntp add timeserver srvr26.yourcompany.com
```

ntp del

```
ntp del timeserver server-name
```

Delete a manually added time server hostname from the NTP server list. Role required: admin, limited-admin. This command option requires security officer authorization for Retention Lock Compliance systems.

Example 142

To delete an NTP time server named srvr26.yourcompany.com from the list, enter:

```
# ntp del timeserver srvr26.yourcompany.com
```

ntp disable

```
ntp disable
```

Disable NTP service on a protection system. Role required: admin, limited-admin. This command option requires security officer authorization for Retention Lock Compliance systems.
**ntp enable**

**ntp enable**
Enable NTP service on a protection system. Role required: admin, limited-admin. This command option requires security officer authorization for Retention Lock Compliance systems.

**ntp reset**

**ntp reset**
Reset the NTP configuration to the default settings. Role required: admin. This command option requires security officer authorization for Retention Lock Compliance systems.

**ntp reset timeservers**
Reset the time server list from manually entered time servers to DHCP time servers (if supplied) or to the multicast mode (if no DHCP time servers supplied). Role required: admin, limited-admin. This command option requires security officer authorization for Retention Lock Compliance systems.

**ntp show**

**ntp show config**
Display whether NTP is enabled or disabled and show the time server list. Role required: admin, limited-admin, security, user, backup-operator, or none.

**ntp status**

**ntp status**
Display the local NTP service status, time, and synchronization information. Role required: admin, limited-admin, security, user, backup-operator, or none.
ntp
CHAPTER 32

qos

The qos command displays, modifies, or resets the value of the Random I/O throttle.

This chapter contains the following topics:

- qos change history ............................................................................................................. 286
- qos randomio .....................................................................................................................286
qos change history

There have been no changes to this command in this release.

qos randomio

qos randomio throttle reset
Reset the Random I/O throttle to its default value of 40 percent. Role required: admin, limited-admin, security, user, backup-operator, or none.

qos randomio throttle set percent
Set the Random I/O throttle to a percent value from 1 to 100, where 1 allocates the fewest resources for Random I/O workloads and 100 allocates the most resources. Role required: admin, limited-admin, security, user, backup-operator, or none.

qos randomio throttle show
Display the current value of the Random I/O throttle. Role required: admin, limited-admin, security, user, backup-operator, or none.
The `quota` command lets you modify the amount of storage space for MTrees and for VTL and DD Boost storage units. There are two quota limits: hard and soft. The hard limit prevents writes from exceeding the quota. An error message and an alert are generated if the hard limit is exceeded. The soft limit allows writes to exceed the quota. However, an alert is generated if this happens. The soft limit value must be less than the hard limit value. Quota limit values must be specified as integers.

You can set a hard limit, a soft limit, or both, depending on your requirements. For example, an administrator may choose to enforce only a soft limit to prevent overnight backup jobs from failing when the quota limit is reached. Or the administrator may choose to enforce only a hard limit to block a user from writing when the quota limit is reached.

Snapshots capture quota information at a precise point in time. Usage tracking in the active file system does not account for the space of a snapshot, so quota limits are not enforced on snapshots.

This chapter contains the following topics:

- `quota change history` ................................................................. 288
- `quota capacity` ........................................................................ 288
- `quota disable` ........................................................................ 289
- `quota enable` .......................................................................... 289
- `quota reset` ........................................................................... 289
- `quota set` ................................................................................ 289
- `quota show` ........................................................................... 290
- `quota status` .......................................................................... 290
- `quota streams` ....................................................................... 290
quota change history

There have been no changes to this command in this release.

quota capacity

quota capacity disable
Disable capacity quota. Also disables MTree quota limits and restores the limits to the default state (unlimited). Role required: admin, limited-admin.

quota capacity enable
Enable capacity quota. Role required: admin, limited-admin.

quota capacity reset { all | mtrees mtree-list | storage-units storage-unit-list } [soft-limit] [hard-limit]
Reset capacity quota limits. Both the mtree-list and the storage-unit-list are space-, colon-, or comma-separated lists. If hard or soft limits are not entered, both are reset to the default state (unlimited). Role required: admin, limited-admin.

To reset hard and soft limits for an MTree:

# quota capacity reset mtrees /data/coll1/backup1

To reset only a soft limit for an MTree:

# quota capacity reset mtrees /data/coll1/backup1 soft-limit

To reset only a hard limit for an MTree:

# quota capacity reset mtrees /data/coll1/backup3 hard-limit

To reset hard and soft limits for a storage unit:

# quota capacity reset storage-units DDBOOST_STRESS_SU

quota capacity set { all | mtrees mtree-list | storage-units storage-unit-list } {soft-limit n {MiB|GiB|TiB|PiB} | hard-limit n {MiB|GiB|TiB|PiB} | soft-limit n {MiB|GiB|TiB|PiB} hard-limit n {MiB|GiB|TiB|PiB}}
Set capacity quota limits during runtime for multiple MTrees (mtree-list is a space-, colon-, or comma-separated list). When used for storage units (storage-unit-list is a space-, colon-, or comma-separated list), this sets limits only after the storage unit is created. Note that the quota feature must be enabled, because limits are otherwise not enforced. Setting quotas does not require disabling the file system and therefore does not affect system performance. Role required: admin, limited-admin.

To set a soft limit quota of 10 GiB on MTree /data/coll1/backup1 when the quota feature is disabled:

# quota capacity set mtrees /data/coll1/backup1 soft-limit 10 GiB
To set a hard limit quota of 10 TiB on MTree /data/coll1/backup1:

```bash
# quota capacity set mtrees /data/coll1/backup1 hard-limit 10 GiB
```

To set a soft limit quota of 100 GiB and a hard limit quota of 1 TiB on MTree /data/coll1/backup1:

```bash
# quota capacity set mtrees /data/coll1/backup1 soft-limit 10 GiB hard-limit 10 TiB
```

To set a soft limit quota of 100 GiB and a hard limit quota of 1 TiB on storage-unit DDBOOST_STRESS_SU:

```bash
# quota capacity set storage-units DDBOOST_STRESS_SU soft-limit 100 GiB hard-limit 1 TiB
```

`quota capacity show {all | mtrees mtree-list | storage-units storage-unit-list | tenant-unit tenant-unit}`

List capacity quotas and usage of a particular MTree (`mtree-list` is a space-, colon-, or comma-separated list) or storage unit (`storage-unit-list` is a space-, colon-, or comma-separated list), all mtrees or storage units, or all of both. The unit of display for usage and limits is MiB. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

`quota capacity status`

Display status of capacity quota enforcement: enabled or disabled. If output includes a note stating that status is disabled, capacity quota limits are not being enforced and are therefore unlimited. Role required: admin, limited-admin, security, user, backup-operator, none.

**quota disable**

*quota disable* - deprecated

This command is deprecated. Use `quota capacity disable` instead. Role required: admin, limited-admin.

**quota enable**

*quota enable* - deprecated

This command is deprecated. Use `quota capacity enable` instead. Role required: admin, limited-admin.

**quota reset**

*quota reset* - deprecated

This command is deprecated. Use `quota capacity reset` instead. Role required: admin, limited-admin.

**quota set**

*quota set* - deprecated

This command is deprecated. Use `quota capacity set` instead. Role required: admin, limited-admin.
quota show

This command is deprecated. Use `quota capacity show` instead. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-admin, tenant-user.

quota status

This command is deprecated. Use `quota capacity status` instead. Role required: admin, limited-admin, security, user, backup-operator, none.

quota streams

Reset streams quota soft limits. The `storage-unit-list` is a space-, colon-, or comma-separated list. Note that this command controls the same stream limits as `ddboost storage-unit modify`. Role required: admin, limited-admin.

Example 143

```
# quota streams reset storage-units sul write-stream-soft-limit read-stream-soft-limit repl-stream-soft-limit combined-stream-soft-limit
sul: Stream soft limits: write=none, read=none, repl=none, combined=none
```

Set streams quota soft limits. The `storage-unit-list` is a space-, colon-, or comma-separated list. Note that this command controls the same stream limits as `ddboost storage-unit modify`. Role required: admin, limited-admin.

Example 144

```
# quota streams set storage-units sul write-stream-soft-limit 10 read-stream-soft-limit 3 repl-stream-soft-limit 10 combined-stream-soft-limit 10
sul: Stream soft limits: write=10, read=3, repl=10, combined=10
```

List streams quotas for all storage units or tenant units. Or list streams quotas for a specific storage or tenant unit. Role required: admin, limited-admin, security, user, backup-operator, tenant-user, tenant-admin, none.

Example 145
Example 145 (continued)

When SMT is enabled and tenant-units exist, this example displays filtering by tenant-unit tu1.

```
# quota streams show tenant-unit tu1

<table>
<thead>
<tr>
<th>Tenant-unit: tu1</th>
<th>Storage Unit</th>
<th>Write Streams</th>
<th>Read Streams</th>
<th>Repl Streams</th>
<th>Combined Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>su1</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>su2</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

DD System Stream Limits: write=16 read=4 repl-in=20 repl-out=20 combined=16
```

Example 146

When SMT is enabled and tenant-units exist, but not all storage-units are contained in tenant-units, this example displays streams quotas for all storage-units, where some storage-units are in tenant-units, and some storage-units are not in any tenant-unit.

```
# quota streams show all

<table>
<thead>
<tr>
<th>Storage Unit</th>
<th>Write Streams</th>
<th>Read Streams</th>
<th>Repl Streams</th>
<th>Combined Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>su4</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>su5</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>su6</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

Tenant-unit: tu1

<table>
<thead>
<tr>
<th>Storage Unit</th>
<th>Write Streams</th>
<th>Read Streams</th>
<th>Repl Streams</th>
<th>Combined Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>su1</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>su2</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

Tenant-unit: tu2

<table>
<thead>
<tr>
<th>Storage Unit</th>
<th>Write Streams</th>
<th>Read Streams</th>
<th>Repl Streams</th>
<th>Combined Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>su3</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

DD System Stream Limits: write=16 read=4 repl-in=20 repl-out=20 combined=16
quota
DD Replicator lets you replicate data (copy and synchronize) between two protection systems: a source and a destination. Source and destination configurations, or pairs, are also known as “contexts.” Depending on your objective, you can replicate entire sites, specific directories, MTrees, or files. Replication is a licensed software option. See the *DD OS Administration Guide* for details on replication practices and procedures.

This chapter contains the following topics:

- replication change history .............................................................. 294
- replication abort ........................................................................... 294
- replication add .............................................................................. 294
- replication break .......................................................................... 296
- replication dir-to-mtree ................................................................. 297
- replication disable ......................................................................... 297
- replication enable ........................................................................... 297
- replication initialize .......................................................... 297
- replication modify ......................................................................... 298
- replication option .......................................................................... 299
- replication reauth ........................................................................... 300
- replication recover ......................................................................... 300
- replication resync ........................................................................... 300
- replication show .............................................................................. 300
- replication status ............................................................................ 305
- replication sync ................................................................................ 305
- replication throttle .......................................................................... 305
- replication watch ............................................................................. 307
replication change history

There have been no changes to this command in this release.

replication abort

replication abort recover destination
Stop a recover process. Run this on the destination protection system only. Then, reconfigure replication on the source protection system and restart the recover process. Role required: admin, limited-admin.

replication abort resync destination
Stop a resync operation. Run this on the source or destination protection system. In case of a directory replication context, run it both on the source and the destination. Role required: admin, limited-admin.

replication add

replication add source source destination destination [low-bw-optim enabled | disabled] [encryption [enabled [authentication-mode {one-way | two-way | anonymous}] | disabled]] [propagate-retention-lock enabled | disabled] [ipversion {ipv4 | ipv6}] [max-repl-streams n] [destination-tenant-unit tenant-unit]
Create a replication pair, which can be for Collection, MTree, or Directory Replication. If the destination exists, you will get an error, and you must either delete it or rename it before proceeding. If a source or destination name does not correspond to a protection system network name, run replication modify connection-host on the source system. When entering names that include spaces or special characters, enclose the entire pathname with double quotation marks, or enter a backslash before the space, but do not use both. A file or a directory may not be renamed or moved into or out of a source. This includes a “cut” operation followed by a “paste” operation in Windows. After replication is initialized, ownership and permissions of the destination are always identical to those of the source. If the context is configured, the destination is kept in a read-only state and can receive data only from the source. Role required: admin, limited-admin.

Example 147 Collection Replication

- The storage capacity of the destination system must be equal to, or greater than, that of the source system. If the destination capacity is less than that of the source, the available capacity on the source is reduced to that of the destination.
- The destination must have been destroyed and subsequently created, but not enabled.
- Each destination and each source can be in only one context at a time.

In this example, notice the prefix col to the URL signifying Collection Replication. The source hostname is system-dd1, and the destination hostname is system-dd2.

# replication add source col://system-dd1.chaos.local destination col://system-dd2.chaos.local

Example 148 MTree Replication
Example 148  MTree Replication (continued)

- You can “reverse” the context for an MTree Replication, that is, you can switch the destination and the source.
- Subdirectories within an MTree cannot be replicated, because the MTree, in its entirety, is replicated.
- MTree Replication is supported from Extended Retention systems to non-Extended Retention systems if both are running DD OS 5.5 or later.
- The destination protection system must have available storage capacity of at least the post-compressed size of the expected maximum post-compressed size of the source directory or MTree.
- When replication is initialized, a destination MTree is created automatically.
- A protection system can simultaneously be the source for one context and the destination for another context.

In this example, notice the prefix mtree to the URL signifying MTree Replication. The source MTree path is /data/coll/mtree1, the destination MTree path is /data/coll/dstmtree1, the maximum number of replication streams is 6, and the destination Tenant Unit is tu1.

```
# replication add source mtree://system-dd1.chaos.local/data/coll/mtree1 destination mtree://system-dd2.chaos.local/data/coll/dstmtree1 max-repl-streams 6 destination-tenant-unit tu1
```

Example 149  Directory Replication

- The destination protection system must have available storage capacity of at least the post-compressed size of the expected maximum post-compressed size of the source directory or MTree.
- When replication is initialized, a destination directory is created automatically.
- A protection system can simultaneously be the source for one context and the destination for another context.

In this example, notice the prefix dir to the URL signifying Directory Replication. The source directory name is dir1, and it resides in the /backup MTree (the default MTree).

```
# replication add source dir://system-dd1.chaos.local/backup/dir1 destination dir://system-dd2.chaos.local/backup/dir1
```

Replication with HA

If the source system, destination system, or both are HA pairs, additional commands are required before starting replication.

If the source system is an HA pair and the destination is a single node system:

1. On the source system, run `net hosts add destination-IP-address destination-hostname`.
2. On the destination system, run `net hosts add source-HA-floating-IP-address source-HA-system-name`
If the source is a single node system and the destination is an HA pair:

1. On the source system, run `net hosts add destination-HA-floating-IP-address destination-HA-system-name`.

2. On the destination system, run `net hosts add source-IP-address source-hostname`.

If both the source and destination are HA pairs:

1. On the source system, run `net hosts add destination-HA-floating-IP-address destination-HA-system-name`.

2. On the destination system, run `net hosts add source-HA-floating-IP-address source-HA-system-name`.

**Argument Definitions**

- `authentication-mode {anonymous | one-way | two-way | disabled}`
  - Lets you choose an authentication-mode. If the mode is not specified, anonymous is the default. One-way indicates that only the destination certificate is certified. Two-way indicates that both the source and destination certificates are verified.
  - **Note:** Mutual trust must be established before you can use authentication-mode. The `adminaccess trust` section provides more details about establishing mutual trust.

- `destination-tenant-unit tenant-unit`
  - Lets you specify a Tenant Unit only on the destination.

- `encryption {enabled | disabled}`
  - Enables or disables encryption over wire. Both the source and the destination must enable this feature. Encrypted replication uses the ADH-AES256-SHA cipher suite.

- `low-bw-optim {enabled | disabled}`
  - Enables or disables low bandwidth optimization, which improves data transfer over low bandwidth links by adding increased data compression to optimize network bandwidth. Both the source and the destination must enable this feature.
  - Low bandwidth optimization is not supported for Collection Replication.

- `max-repl-streams n`
  - The maximum number of replication streams allowed, which must be between 1 and the maximum streams per context for a given protection system model, and is supported only for MTree Replication.

- `propagate-retention-lock {enabled | disabled}`
  - Enables or disables the propagation of Retention Lock. This cannot be enabled for Directory Replication.

- `ipversion {ipv4 | ipv6}`
  - Lets you choose your network preference for the replication pair. An IPv6-enabled replication service can still accept connections from an IPv4 replication client if the service is reachable via IPv4. An IPv6-enabled replication client can still communicate with an IPv4 replication service if the service is reachable via IPv4.

**replication break**

`replication break {destination | all}`

Remove the source or destination protection system from a replication pair, or remove all Replicator configurations from a protection system. The `all` option breaks all the replication
contexts on the system without individual confirmation prompts. Role required: admin and limited-admin for all systems except Retention Lock Compliance Systems; security for Retention Lock Compliance systems.

Note: This command must be run in interactive mode on Retention Lock Compliance systems.

**replication dir-to-mtree**

*replication dir-to-mtree abort source*
Abort the directory-to-MTree migration process for the specified context. The command stops the ongoing migration and performs the necessary cleanup. When the process is complete, the MTree replication context and the associated MTrees on both source and destination system are deleted. Role required: admin, limited-admin.

*replication dir-to-mtree start from source to destination*
Perform the directory-to-MTree migration from the directory replication context to the MTree replication context. Role required: admin, limited-admin.

*replication dir-to-mtree status [source | all]*
Shows you the status of the directory-to-MTree replication for the specified context or contexts. This command allows you to instantly see the status of fastcopy or replication initialization operations. Role required: admin, limited-admin.

*replication dir-to-mtree watch destination*
Displays the progress of the directory-to-MTree migration. You can see the percentage of the initialization that is complete and track the virtual and physical bytes that are transferred. Role required: admin, limited-admin.

**replication disable**

*replication disable {destination | all}*
Disable replication. Run this on the source or destination system to halt data replication temporarily. If run on the source, the operation stops sending data to the destination. If run on the destination, the operation stops serving the active connection from the source. Role required: security for Retention Lock Compliance systems; admin, limited-admin for all other systems.

**replication enable**

*replication enable {destination | all}*
Restart replication. If run on the source, the operation resumes sending data to the destination. If run on the destination, the operation resumes serving the active connection from the source. Role required: admin, limited-admin.

**replication initialize**

*replication initialize destination*
Initialize replication. Run this on the source to start replication between a source and destination and to verify that configuration and connections, including checking for a matching tenant on both sides if a destination-tenant-unit was set for this context. Error messages are returned if problems appear. Initialization can take several hours, or days, depending on the amount of data in the source. To reduce initialization time, consider placing both protection systems of the replicator pair in the same location with a direct link. The destination variable is required. Key-manager settings on a destination are ignored when users set up and initialize a collection replication pair. The keys are copied to the replica, but key-manager settings are not. If the destination is
configured with key-manager settings prior to becoming the replication destination, the settings
remain on the system but are not used. If a collection replication breaks, you must reconfigure the
destination to use the correct key-manager settings and key class. If possible, reset the key-
manager on the destination prior to collection replication, and then configure the destination with
the correct key manager-server and key class after a collection replication is broken. Role
required: admin, limited-admin.

**replication modify**

`replication modify destination {source-host | destination-host} new-host-name`

Modify the source or destination host name. In this case, you must modify the replication
configuration on both the source and the destination; that is, if the host name that changed was
the destination, you must run replication modify on both the destination and the source so both
sides will be updated. The *new-host-name* must be the name returned by `net show hostname`
on the system receiving the new host. When using `replication modify`, always run `filesys
disable` or `replication disable` first, and conclude with `filesys enable` or `replication enable`. Then, run `replication show config` to make sure all changes were
done. Role required: admin, limited-admin.

`replication modify destination connection-host new-host-name [port port]`

Modify the destination host name, when it does not resolve for the connection, to a new host
name or IP address. You may also specify an optional port number. This action may be required
when a connection passes through a firewall. It is definitely required when connecting to an
alternate listen-port on the destination. It may also be required after adding a new source and
destination pair, or after renaming a source or a destination. Role required: admin, limited-admin.

**Example 150**

If local destination ca.company.com is moved from California to New York, run the
following on both the source and the destination:

```
# replication disable
# replication modify dir://ca.company.com/backup/dir2 destination-host ny.company.com
# replication enable
# replication show config
```

`replication modify destination crepl-gc-bw-optim {enabled | disabled}`

Modify the collection replication bandwidth optimization option. The default value is enabled.
Disable this option in a high bandwidth environment to enhance throughput. Role required: admin,
limited-admin.

`replication modify destination destination-tenant-unit tenant-unit`

Modify the destination Tenant Unit. Note that after the replication context has been initialized, the
Tenant Unit for the replica MTree can be modified only by using `mtree modify`. Role required:
admin, limited-admin.

**Example 151**

```
replication modify mtree://ip2/data/coll1/mtr1 destination-tenant-unit tu2
```

`replication modify destination encryption {enabled | disabled}`

Modify the state of encryption over wire for the destination. This feature is active only when
enabled on both the source and the destination. Role required: admin, limited-admin.
replication modify destination ipversion \{ipv4 | ipv6\}
Modify the network preference for the destination. An IPv6-enabled replication service can still accept connections from an IPv4 replication client if the service is reachable via IPv4. An IPv6-enabled replication client can still communicate with an IPv4 replication service if the service is reachable via IPv4. Role required: admin, limited-admin.

replication modify destination low-bw-optim \{enabled | disabled\}
Modify the state of low bandwidth optimization for the destination. This feature is active only when enabled on both the source and the destination. This feature is not supported for collection replication or if DD Extended Retention is enabled on the destination. Role required: admin, limited-admin.

replication modify destination max-repl-streams n
Modify the number of maximum replication streams allowed, which must be between 1 and the maximum streams per context for a given protection system model, and is supported only for MTree Replication. Role required: admin, limited-admin.

Example 152

```
replication modify mtree://ip2/data/coll1/mtr1 max-repl-streams 6
```

"max-repl-streams" changed to 6 for replication context mtree://ip2/data/coll1/mtr1.

replication option

replication option reset \{bandwidth | delay | listen-port | default-sync-alert-threshold\}
Reset system bandwidth, delay, listen port, and sync-alert-threshold to default values. Defaults are bandwidth, unlimited; delay, none; listen-port, 2051. Default for sync-alert-threshold is 24 (hours). When using replication option reset, always run filesys disable first, and conclude with filesys enable. Role required: admin, limited-admin.

replication option set bandwidth rate
Set the network bandwidth rate for the protection system. You must set the bandwidth and network delay on each side of the connection. Role required: admin, limited-admin.

replication option set default-sync-alert-threshold value
Set the sync time to configure when an alert is generated. The sync time is set in hours. The default value is 24. Role required: admin, limited-admin.

replication option set delay value
Set the network delay in milliseconds for the protection system. You must set the bandwidth and network-delay on each side of the connection. Role required: admin, limited-admin.

replication option set listen-port value
Set the listen port for the protection system. On a destination protection system, set the port from which the destination receives data from replication sources (the default is 2051). A destination can have only one listen port used by all sources. The connection-host port used by a source must match the listen port used by the destination. For DD Boost managed file replication, the listen port is used on the source protection system and on the destination protection system to specify the connection-host port. For directory replication, replication modify connection-host is used on the source protection system. Role required: admin, limited-admin.

replication option show
Display the current bandwidth, network-delay settings, listen port, and sync-alert-threshold. If these settings are configured using default values, replication option show returns a command prompt with no setting information. Role required: admin, limited-admin, security, user, backup-operator, none.
replication reauth

replication reauth destination
Reset authentication on the source and destination systems. The destination variable is required. Messages similar to Authentication keys out of sync or Key out of sync indicate a reset is required. Reauthorization is primarily used when replacing a source protection system. Role required: admin, limited-admin.

replication recover

replication recover destination
Recover replication. Run this on a new source to move data from a destination system. If configuring collection replication, this must be run on the new source only. The destination argument is required. This is not available for MTree replication. When using replication recover, always run filesys disable first, and conclude with filesys enable. If replication break was previously run, the destination cannot be used to recover a source. If configuring directory replication, the destination directory on the source must be empty. Role required: admin, limited-admin.

replication resync

replication resync destination
Bring back into sync (or recover) the data between a source and destination replication pair after a manual break. The replication pair are resynchronized so both endpoints contain the same data. Resynchronization is available for Directory, MTree or Pool Replication, but not for Collection Replication.
Before running replication resync, you must run replication add to add the source and destination back on the system.
A replication resynchronization can also be used:

- To recreate a context that has been deleted.
- When a destination runs out of space, but the source still has data to replicate.
- To convert a Directory Replication pair to an MTree Replication pair.

Note the following about using replication resync with DD Retention Lock:

- If the destination MTree or directory contains retention-locked files that do not exist on the source, then resync will fail.
- If the destination directory has retention lock enabled, but the source directory does not have retention lock enabled, then a resync of a directory replication will fail.
- With MTree replication, resync will succeed if the source MTree does not have retention lock enabled while the destination MTree has retention lock enabled or vice versa, as long as the destination MTree does not contain retention-locked files not present on the source.

Role required: admin, limited-admin.

replication show

replication show config [destination | tenant-unit tenant-unit | all]
Show replication configuration. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.
Output Definitions

Connection Host and Port
A source system connects to the destination system using the name returned by the hostname command on the destination. It may also connect using a destination name or IP address and port designated by replication modify connection-host. The destination hostname may not resolve to the correct IP address when connecting to an alternate interface on the destination, or when passing through a firewall.

Ipversion
The IP version - either IPv4 or IPv6.

Low-bw-optim
The status of low-bandwidth optimization: enabled, disabled, or configuration mismatch.

Crepl-gc-bw-optim
The status of Collection Replication bandwidth optimization: enabled, disabled. The default value is enabled. Disable this optimization to enhance throughput in a high bandwidth environment.

Encryption
The replication process is enabled and available for encryption (yes) or disabled and not available for encryption (no).

Enabled
The replication process is enabled and available to replicate data (yes) or disabled and not available to replicate data (no).

Propagate-retention-lock
The retention lock process is available (enabled) or not available (disabled).

Max-repl-streams
The maximum number of replication streams allowed.

Tenant-unit (if SMT enabled)
The local Tenant Unit to which the local MTree belongs or (-) if the local MTree does not belong to any Tenant Unit.

replication show detailed-history {obj-spec-list | tenant-unit tenant-unit | all} [duration hr] [interval hr]
Show details of replication performance history. The obj-spec-list is a space- or comma-separated list. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.

Output Definitions

Pre-Comp (KB) Written
The number of logical bytes ingested to the source corresponding to the CTX.

Pre-Comp (KB) Remaining
For directory replication only, this is the sum of file sizes remaining to be replicated for the context. Output includes the entire logical size of the current file being replicated. If a large file is being replicated, this number may take a lot of time to change. The number changes only after the current file finishes.

Replicated (KB) Pre-compressed
The amount of pre-compressed data replicated.
Replicated (KB) Post-synthetic-optim  
The amount of data replicated after synthetic optimization was applied.

Replicated (KB) Post-filtered  
The amount of data replicated after identity filtering (dedup).

Replicated (KB) Post-low-bw-optim  
The amount of data replicated after delta compression (low-bandwidth optimization).

Replicated (KB) Post-local-comp  
The amount of data replicated after local compression.

Replicated (KB) Network  
The amount of data replicated over the wire.

Sync-as-of Time  
The time when the most recently replicated data on the destination was generated on the source. A value of unknown appears during replication initialization.

replication show detailed-stats [destination | tenant-unit tenant-unit | all]  
Display cumulative statistics beginning from when the context was created. Byte-count statistics are provided related to identity filtering, delta compression, and local compression. The ratio of the values Bytes after filtering by destination to Bytes after low bandwidth optimization gives additional compression ratio supplied by delta compression. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.

Output Definitions

Network bytes sent to destination  
The number of physical bytes sent to the destination over the wire.

Pre-compressed bytes written to source  
The number of bytes received by the source, including logical bytes associated with the file being replicated.

Pre-compressed bytes sent to destination  
The number of bytes sent to the destination, including logical bytes associated with the file being replicated.

Bytes after synthetic optimization  
The number of bytes still needed to send/receive after synthetic replication optimization.

Bytes after filtering by destination  
The number of bytes sent after identity filtering (dedup).

Bytes after low bandwidth optimization  
The number of bytes sent after delta compression (low-bandwidth optimization).

Bytes after local compression  
The number of bytes sent after local compression.

Pre-compressed bytes remaining  
For directory replication only, this is the sum of file sizes remaining to be replicated for the context. Output includes the entire logical size of the current file being replicated. If a large file is being replicated, this number may take a lot of time to change. The number changes only after the current file finishes.
Compression ratio
The ratio of the value of logical bytes ingested to the source to physical bytes actually sent to the destination over the wire.

Sync'ed-as-of Time
The time when the most recently replicated data on the destination was generated on the source. A value of unknown appears during replication initialization.

replication show history {obj-spec-list | tenant-unit tenant-unit | all} [duration hr] [interval hr]
Show replication performance history. The obj-spec-list is a space- or comma-separated list. Statistics are generated hourly. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.

Output Definitions

Pre-Comp (KB) Written
The number of logical bytes ingested to the source corresponding to the CTX.

Pre-Comp (KB) Remaining
The amount of pre-compression data not replicated.

Replicated (KB) Pre-Comp
The amount of pre-compressed data replicated.

Replicated (KB) Network
The amount of compressed data sent over the network.

Low-bw-optim
The additional compression ratio supplied by delta compression (low-bandwidth optimization).

Sync-as-of Time
The time when the most recently replicated data on the destination was generated on the source. A value of unknown appears during replication initialization.

replication show performance {obj-spec-list | tenant-unit tenant-unit | all} [interval sec] [count count]
Display current replication activity. The obj-spec-list is a space- or comma-separated list. Default interval is two seconds. If a single source context is specified, four additional columns are presented. These columns show the relative amounts of time spent working on, or waiting for, replication sender threads for the specified context. Values are calculated by the amount of time spent for the activity, multiplying the time by 100, and dividing the time by the duration of the reporting interval.

Due to the presence of multiple threads working on behalf of the specified replication context, the average values are displayed. This average is calculated by adding all the values from all the threads that worked on behalf of the replication context, and dividing this sum with the number of threads that worked on behalf of the context. When a replication throttle is configured, you may see a large amount of output followed by a period of none while viewing performance or statistics. This behavior is the result of how statistics are calculated by replication, combined with the default protection system replication configuration of using large TCP buffers. When a throttle is in effect, data is buffered before being sent on the network. Users may configure the replication bandwidth and delay arguments in replication option reset on the source and destination to use smaller TCP socket buffers. This reduces the total amount of data on the network, increases how often replication writes data to its sockets, and, as a result, increases the frequency of updates for statistics counters. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.
**Output Definitions**

**Pre-comp (KB/s)**
The size value before compression is applied. Sometimes referred to as *logical size*.

**Network (KB/s)**
The amount of compressed data transferred over the network per second.

**Streams**
An internal system resource associated with reads and writes. One replication context can use multiple streams for better performance.

**Busy Reading**
The time spent reading file system data from the local file system. This number is typically the second highest number after Network. On a deployment with high network bandwidth, Busy Reading may be the largest column.

**Busy Meta**
The time spent on miscellaneous bookkeeping activities and replicating file system namespace operations. This value is typically under 50. If this value exceeds 50 on a sustained basis, it may indicate an unusual workload (a large number of file attribute updates, for example).

**Waiting Dest**
The time spent waiting because the receiver is not providing the sender enough information on what data to send. Typically this value is low. Exceptions include systems on high-speed networks where the sender is a more powerful protection system than the replica, or where the replica has a higher workload than the sender because the replica is the destination for multiple replication contexts.

**Waiting Network**
The time spent sending file data and metadata and waiting for replies from the server on what data needs to be sent. This is typically the highest of the four values. This value exceeds 100 regularly if the sender is able to replicate multiple files in parallel.

**Note:** If the Network column has the highest time values among Reading, Meta, Waiting, and Network, and if the Network KB/sec value is lower than expected, a network problem may be present. For example, packet loss may be causing reduced throughput.

The command `replication show stats [destination | tenant-unit tenant-unit | all]` displays statistics for all replication pairs, a tenant unit, or a specific destination pair. Output format is based on replication type. In collection replication, the difference in values between Post-comp Bytes Sent and Post-comp Bytes Received is expected behavior. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.

**Output Definitions**

- **Network bytes sent to destination**
  The number of physical bytes sent to the destination over the wire.

- **Pre-compressed bytes written to source**
  The number of bytes received by the source, including logical bytes associated with the file being replicated.

- **Pre-compressed bytes sent to destination**
  The number of bytes sent to the destination, including logical bytes associated with the file being replicated.
Pre-compressed bytes remaining

For directory replication only, this is the sum of file sizes remaining to be replicated for the context. Output includes the entire logical size of the current file being replicated. If a large file is being replicated, this number may take a lot of time to change. The number changes only after the current file finishes.

Compression ratio

The ratio of the value of logical bytes ingested to the source to physical bytes actually sent to the destination over the wire.

Sync'ed-as-of time

The time when the most recently replicated data on the destination was generated on the source. A value of Unknown appears during replication initialization.

replication status

replication status [destination | tenant-unit tenant-unit | all] [detailed]

Show the current status of replication. Role required: admin, limited-admin, security, user, backup-operator, none, tenant-user, tenant-admin.

Example 153

# repl status mtree://dd860-79.chaos.local/data/col1/m1
CTX:                                  1
Mode:                                 source
Destination:                          mtree://dd860-79.chaos.local/data/col1/m1
Tenant-unit:                          tu1
Enabled:                              no
Low bandwidth optimization:           disabled
Replication encryption:               disabled
Replication propagate-retention-lock: enabled
Local filesystem status:              enabled
Connection:                           idle since Mon Jun 16 14:39:32
State:                                normal
Error:                                no error
Sync'ed-as-of time:                   Mon Jun 16 14:39
Current throttle:                     983040 bps
Max-repl-streams:                     32 (default)

replication sync

replication sync [and-verify] [destination]

Synchronize replication between the source and destination and wait for replication to complete. You must first configure the source and destination and initialize the context. Role required: admin, limited-admin, security, backup-operator.

replication throttle

replication throttle add [destination host | default] sched-specrate

Change the rate of network bandwidth used by replication. By default, network bandwidth use is unlimited, meaning it continuously runs as fast as possible. If you set a throttle, replication runs at the given rate until the next scheduled change, or until new throttle command options force a
change. Throttle is usually set at the source protection system, but can optionally be set at the destination. Role required: admin, limited-admin.

To limit replication to 5 megabits per second for a destination protection system named ddr1-ny, starting on Tuesdays and Fridays, at 10:00 a.m., enter:

```
# replication throttle add destination ddr1-ny tue fri 2200 5Mbps
```

replication throttle del [destination host | default] sched-spec

Remove one or more throttle schedule entries. Role required: admin, limited-admin.

To remove an entry for Mondays at 1:00 p.m., enter:

```
# replication throttle del mon 1300
```

replication throttle reset [destination host | default] {current | override | schedule | all}

Reset a throttling schedule. Role required: admin, limited-admin.

replication throttle set current [destination host | default] rate

Set the throttle rate until the next scheduled change or a system reboot. Setting the throttle to current cannot be done if replication throttle set override is in effect. Role required: admin, limited-admin.

replication throttle set override [destination host | default] rate

Set the throttle rate until another override is issued. Throttle override cannot be set if replication throttle set current is in effect. Role required: admin, limited-admin.

replication throttle show [destination host | default | all]

Show throttle configuration. If no option is specified, all is the default option. Role required: admin, limited-admin, security, user, backup-operator, none.

replication throttle show performance [destination host | default | all] [interval sec] [count count]

Show current throttle throughput for an optionally specified number of times and interval. If no option is specified, all is the default option. Role required: admin, limited-admin, security, user, backup-operator, none.

To specify that results be shown exactly 7 times, at 2 second intervals (for a total of 14 seconds), enter:

```
# replication throttle show performance all interval 2 count
```

710/16 10:15:18
usr1-dl.datadomain

[8000K bps]

---------
(0 bps)
(0 bps)
(0 bps)
(0 bps)
(0 bps)
(0 bps)
(0 bps)
(0 bps)
(0 bps)

SE@usr1-dd1## date
Wed Oct 16 10:15:34 PDT 2013
Argument Definitions

**all**
Removes and resets current or override settings and removes all scheduled changes. This option returns the system to the default settings.

**count**
The number of times the results will be shown. The default is unlimited (the command will run until it is ended by the user).

**current**
Removes and resets the rate set by a previous `replication throttle set current`.

**host**
The destination hostname when you are setting up a destination throttle.

**override**
Removes and resets the rate set by a previous `replication throttle set override`.

**rate**
The rate, which can be the word `unlimited`; or a number; or disable, disabled, or zero (any of the last three will stop replication until the next rate change). If set to zero, new contexts are also throttled to zero. The system enforces a minimum rate of 98,304 bits per second (about 100 Kbps) and a maximum of 34,358,689,792 bits per second (about 34 Gbps). The number can include a tag for bits or bytes per second. Do not use a space between the number and the bits or bytes specification. The default rate is bits per second. In the rate variable:
- bps equals raw bits per second
- Kbps or kbps equals 1000 bits per second
- Mbps or mbps equals 1x10^6 bits per second
- Gbps or gbps equals 1x10^9 bits per second

KiB = Kibibits, the base-2 equivalent of Kb or Kilobits. KiB = Kibibytes, the base-2 equivalent of KB or Kilobytes.

**sched-spec**
One or more three-letter days of the week (such as `mon`, `tue`, or `wed`), or the word `daily` (to set the schedule every day). This argument can also specify a time of day in 24-hour format.

**schedule**
Removes and resets scheduled changes.

**sec**
The number of seconds for the interval between displaying the results. The default is five seconds.

---

**replication watch**

**replication watch destination**
Display the progress of a replication initialization, resynchronization process, or recovery operation. Role required: admin, limited-admin, security, user, backup-operator, none.
Example 154

During initialization:

```
# repl init rctx://14
(00:00) Initialize started.
Use 'replication watch rctx://14' to monitor progress.

# repl watch rctx://14
Use Control-C to stop monitoring.
(00:00) Replication initialize started...
(00:08) 100%: pre-initialize
(00:08) initializing 3/3:
(00:33) : 60% completed, pre-comp: 0 KB/s, network: 6 KB/s
```

When initialization completes:

```
# repl init rctx://14
(00:00) Initialize started.
Use 'replication watch rctx://14' to monitor progress.

# repl watch rctx://14
Use Control-C to stop monitoring.
(00:00) Replication initialize started...
(00:08) 100%: pre-initialize
(00:08) initializing 3/3:
(00:49) : 100% completed, pre-comp: 0 KB/s, network: 6 KB/s
(00:49) Replication initialize completed.
```
The route command is an alias for the net route command.

The route command manages routing between a protection system and backup hosts. An additional routing rule in the Kernel IP routing table and in the protection system Route Config list shows a list of static routes reapplied at each system boot. Each interface is assigned a route based on the address assigned to it. Also, depending on the default gateway subnet, a route is added to an interface automatically if the interface is in the subnet of the default gateway address.

Federal certification requirements state the DD OS must be IPv6-capable and that interoperability with IPv4 be maintained in a heterogeneous environment. As a result, several net command options now include arguments for both versions of Internet Protocol. Customers select which version to use, based on the type of configuration. If the IP version is not specified, the default uses IPv4 for configuration and both IPv4 and IPv6 for display.

This chapter contains the following topics:

- route change history ................................................................. 310
- route guidelines and restrictions ........................................ 310
- route add .............................................................................. 310
- route del .............................................................................. 310
- route reset ............................................................................ 311
- route set ............................................................................ 311
- route show ........................................................................... 311
- route trace ........................................................................... 311
route change history

This group of commands is an alias of the net route command.

route guidelines and restrictions

- Changes to Ethernet interfaces made with net command options flush the routing table. All routing information is lost and data movement using routing is cut off immediately. If possible, make interface changes only during scheduled downtime. After making interface changes, consider reconfiguring routing rules and gateways.

- IPv4 uses Linux Policy Routing. The policy is based on the source IP address of the outbound packet and the interface used. A separate routing table is created for each for each interface that has a default gateway associated with the interface IP address.

  This Policy Routing provides only one default gateway route in the main table with many interfaces that have a route to the default gateway. Each interface has its own routing table created by the following rule: "If the source address matches the address of the interface, use that table to route the packet." Therefore the packets are fully source routed within the DDOS system. The packets are not source routed on the network.

  Multiple default gateways can exist, each with its own routing table. The only restriction is that the subnet of the gateway must match the subnet of the IP address on the interface.

New terms associated with this policy routing:

- Static Gateway—The main gateway in the main routing table, which is configured using the route set gateway and the route reset gateway commands.

- DHCP Gateway—The gateways from the DHCP server, which can be used if they are different from the static gateway.

- Added Gateways—Gateways that are configured from the route add gateway and route del gateway commands and are used if none of the subnets of the other gateways match an IP address.

- Targeted Gateways—Default gateways for specific interfaces if the subnet of the associated IP matches the subnet of this targeted gateway, regardless of the other gateways. Use the following command to configure: route add/del gateway <address> interface <interface name>.

  The gateways do not have to be different. After the Targeted Gateway for a specific interface, the static gateway has priority over all others. After the static gateway is applied, and is put into main, the DHCP gateways are applied, and then the added gateways are applied.

  The route show gateways command displays what is in the system registry.

  The route show tables command displays what is in the system kernel.

route add

This command is an alias of the net route command.

route del

This command is an alias of the net route command.
route reset

This command is an alias of the net route command.

route set

This command is an alias of the net route command.

route show

This command is an alias of the net route command.

route trace

This command is an alias of the net route command.
route
CHAPTER 36

scsitarget

The scsitarget command manages the SCSI (Small Computer System Interface) target subsystem configuration.

The SCSI target subsystem configuration comprises several SCSI target entities:

- services (VTL, DD Boost, and vdisk)
- transports (Fibre Channel)
- transport endpoints (Fibre Channel port)
- endpoints (such as VTL tape drives)
- logical devices
- host initiators
- access groups

In some cases, mostly group management, individual services provide interfaces more tailored to the service, for example, vtl group. These services may be more convenient for daily use than the generic scsitarget interface.

This chapter contains the following topics:

- scsitarget_change_history ........................................................................................................ 314
- scsitarget_device ..................................................................................................................... 314
- scsitarget_disable .................................................................................................................... 314
- scsitarget_enable .................................................................................................................... 314
- scsitarget_endpoint ................................................................................................................ 314
- scsitarget_group ..................................................................................................................... 318
- scsitarget_initiator .................................................................................................................. 320
- scsitarget_option ...................................................................................................................... 321
- scsitarget_persistent-reservation ......................................................................................... 322
- scsitarget_port ......................................................................................................................... 323
- scsitarget_reset ....................................................................................................................... 326
- scsitarget_service ................................................................................................................... 326
- scsitarget_show ....................................................................................................................... 326
- scsitarget_status ...................................................................................................................... 326
- scsitarget_trace ....................................................................................................................... 327
- scsitarget_transport ................................................................................................................ 328
**scsitarget change history**

There have been no changes to this command in this release.

**scsitarget device**

`scsitarget device show detailed [device-spec] [service service-name] [group group-spec]`

Show detailed information for SCSI target or vdisk devices. Role required: admin, limited-admin, security, user, backup-operator, none.

`scsitarget device show list [device-spec] [service service-name] [group group-spec]`

List summary information for SCSI target or vdisk devices. If no arguments are selected, the output includes basic information for all device criteria, including vdisk devices. Role required: admin, limited-admin, security, user, backup-operator, none.

**Argument Definitions**

`device-spec`

A list of devices that may use wildcards. This can be a vdisk `device-spec`.

`group-name`

The name of the SCSI target access group. These names are case-insensitive and case-preserving. They cannot include colons, question marks, commas, asterisks, forward or backward slashes, open or closed parentheses, or the words `summary`, `all`, or `VTL`.

`service-name`

A SCSI target service: vtl, ddboost, or vdisk.

**scsitarget disable**

`scsitarget disable`

Disable the SCSI target subsystem. Role required: admin, limited-admin.

**scsitarget enable**

`scsitarget enable`

Enable the SCSI target subsystem. Role required: admin, limited-admin.

**scsitarget endpoint**

`scsitarget endpoint add endpoint-name system-address address [primary-system-address address] [secondary-system-address {address-list | none}] [{wwpn {auto | wwpn}} [{wwnn {auto | wwnn}} [fcp2-retry {disable | enable | default}]]

Add a SCSI target endpoint. For the Fibre Channel transport, NPIV must be enabled to have more than one endpoint per system address. Endpoints are added as disabled; they must be explicitly enabled using `scsitarget endpoint enable`. This allows other properties of the endpoint to be changed before enabling the endpoint. Role required: admin, limited-admin.

**Note:** In NPIV mode, endpoints:
- have a primary system address.
- may have zero or more secondary system addresses.
- are all candidates for failover to an alternate system address on failure of a port; however, failover to a marginal port is not supported.
- may be failed back to use their primary port when the port comes back up online.

**Note:** When using NPIV, it is recommended that you use only one protocol (that is, VTL Fibre Channel, DD Boost-over-Fibre Channel, or vDisk Fibre Channel) per endpoint. For failover configurations, secondary endpoints should also be configured to have the same protocol as the primary.

**Example 155**

```bash
Endpoint "endpoint-2" created OK.
```

**Example 156**

The following example sets the primary system address endpoint-fc-1 to 5a and the secondary system address to 6a,6b and verifies both addresses. Note that the system-address is changed in this case because the current system address is set to the new primary system address as part of the change.
Example 156 (continued)

```plaintext
# scsitarget endpoint modify endpoint-fc-1 system-address "5a"
# scsitarget endpoint secondary-system-address "6a,6b"
Endpoint 'endpoint-fc-1' successfully modified.
```

```plaintext
# scsitarget endpoint show detailed endpoint-fc-1
Endpoint:                  endpoint-fc-1
Current System Address:    5a
Primary System Address:    5a
Secondary System Address:  6a,6b
Enabled:                   Yes
...                           
```

Example 157

The following example changes the primary system address of a failed-over endpoint so that on failback it moves to a different port.

```plaintext
# scsitarget endpoint modify endpoint-fc-1 primary-system-address "8a"
Endpoint 'endpoint-fc-1' successfully modified.
```

```plaintext
# scsitarget endpoint show detailed endpoint-fc-1
Endpoint:                  endpoint-fc-1
Current System Address:    6a
Primary System Address:    8a
Secondary System Address:  6a,6b
Enabled:                   Yes
...                           
```

csitarget endpoint rename src-endpoint-name dst-endpoint-name

Rename an endpoint. Role required: admin, limited-admin.

csitarget endpoint show detailed [endpoint-spec] [system-address system-address-spec]

Show detailed information about one or more endpoints. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 158

```plaintext
# scsitarget endpoint show detailed endpoint-fc-1
Endpoint:                  endpoint-fc-1
Current System Address:    5a
Primary System Address:    5a
Secondary System Address:  6a,6b
Enabled:                   Yes
Status:                    Online
Transport:                 FibreChannel
FC WWNN:                   25:80:00:21:88:00:61:d3
FC WWPN:                   25:00:00:21:88:00:61:d3
```

csitarget endpoint show list [endpoint-spec] [system-address system-address-spec]

Show summarized list of configured endpoints. If no argument is selected, the output will be basic information for all endpoint criteria. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 159

```plaintext
# scsitarget endpoint show list
system-address 5a,5b
Endpoint  System Address  Transport  Enabled  Status
```
Example 159  (continued)

<table>
<thead>
<tr>
<th>endpoint-fc-0</th>
<th>5a</th>
<th>FibreChannel</th>
<th>Yes</th>
<th>Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>endpoint-fc-3</td>
<td>5a</td>
<td>FibreChannel</td>
<td>No</td>
<td>Offline</td>
</tr>
<tr>
<td>xl</td>
<td>5b</td>
<td>FibreChannel</td>
<td>Yes</td>
<td>Online</td>
</tr>
<tr>
<td>hpdpl</td>
<td>5b</td>
<td>FibreChannel</td>
<td>Yes</td>
<td>Online</td>
</tr>
</tbody>
</table>

scsitarget endpoint show stats [endpoint-spec] [interval interval] [count count]
Periodically list I/O statistics on one or more endpoints. If no endpoints are specified, the output will be a single-line total for each interval. Role required: admin, limited-admin, security, user, backup-operator, none.

scsitarget endpoint use endpoint-spec { primary | secondary }
Change the in-use system address for one or more endpoints. Role required: admin, limited-admin.

Example 160

```bash
# scsitarget endpoint use endpoint-fc-1 primary
```

Argument Definitions

count
The number of objects on which to perform the action, as specified by the command option.

dependent-name
The name of the endpoint (which, in a SCSI target architecture, corresponds to a virtual port on a DD system). The name must not conflict with any other endpoint name currently in the system.

dependent-spec
A list of endpoints (which, in a SCSI target architecture, corresponds to a virtual port on a DD system) that may use wildcards.

fcp2-retry
A port option.

interval interval
The time interval in seconds. The default is 2 seconds.

primary-system-address
The primary system address for the endpoint. The primary and any secondary system address must be different. The current system address must always be in the set of primary and secondary addresses.

secondary-system-address
The secondary system address for the endpoint. The primary and any secondary system address must be different. if the endpoint is failed-over, the current system address must remain in the secondary address list. if this is set to none, the endpoint cannot failover. The current system address must always be in the set of primary and secondary addresses. If multiple secondary addresses are given, when failover occurs the system will automatically pick one of the addresses from that list to make the current system address.
system-address
A system-specific name that identifies a specific SCSI target transport interface. For the Fibre Channel transport, the system address is the name of the HBA (host bus adapter) port used, for example, 5a. This name must match a currently valid system address in the system. It must always be in the set of primary and secondary addresses.

topology
The Fibre Channel topology for the endpoint. Values include: loop-preferred, loop-only, point-to-point, default.

wwpn
The worldwide port name (WWPN) for the endpoint, which must follow existing rules for WWPN conflict. If you do not provide a wwpn, and the transport uses wwpn, it is assigned by default.

wwnn
The worldwide node name (WWNN) for the endpoint, which must follow existing rules for WWNN conflict. If you do not provide a wwnn, and the transport uses wwnn, it is assigned by default.

**scsitarget group**

scsitarget group add group-name device device-spec [lun lun] [primary-endpoint {all | none | endpoint-list}] [secondary-endpoint {all | none | endpoint-list}]
Add SCSI target or vdisk devices to a group. Role required: admin, limited-admin.

scsitarget group add group-name initiator initiator-spec
Add one or more initiators to a group. Role required: admin, limited-admin.

scsitarget group attach group-name device device-name lun lun primary-endpoint {all | none | endpoint-list} secondary-endpoint {all | none | endpoint-list}
Attach an additional LUN to a SCSI target or vdisk device in a group. This may be used to expose a device with different LUNs through different endpoints. Role required: admin, limited-admin.

scsitarget group create group-name service service-name
Create a new group associated with a specific service, which can be a vdisk service. Role required: admin, limited-admin.

scsitarget group del group-name device device-spec
Delete one or more SCSI target or vdisk devices from a group. Role required: admin, limited-admin.

scsitarget group del group-name initiator initiator-spec
Delete one or more initiators from a group. Role required: admin, limited-admin.

scsitarget group destroy group-name
Destroy a group. Role required: admin, limited-admin.

scsitarget group detach group-name device device-name lun lun
Detach a SCSI target or vdisk device from a LUN in a group. There must be at least one LUN for a device in a group. Role required: admin, limited-admin.

scsitarget group modify group-name device device-spec [lun lun] [primary-endpoint {all | none | endpoint-list}] [secondary-endpoint {all | none | endpoint-list}]
Modify SCSI target or vdisk device attributes in a group. If a device is attached to multiple LUNs, the lun argument, if specified, indicates which LUN to update. Role required: admin, limited-admin.
scsitarget group rename src-group-namedst-group-name
Rename a group. Role required: admin, limited-admin.

scsitarget group show detailed [group-spec] [device device-spec] [initiator initiator-spec] [service service-name]
Show detailed information on specific groups, based on selected arguments. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 161

#scsitarget group show detailed vdisk_g1
Group: vdisk_g1
Service: VDISK
Active state: active
Initiators: None
Devices: None

scsitarget group show list [group-spec] [device device-spec] [initiator initiator-spec] [service service-name]
Display a list of groups based on selected arguments. If no arguments are selected, output displays basic information on all group criteria, including vdisk devices. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 162

# scsitarget group show list
<table>
<thead>
<tr>
<th>Group Name</th>
<th>Service</th>
<th># Initiators</th>
<th># Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>TapeServer</td>
<td>VTL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>disk1</td>
<td>VDISK</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>test1</td>
<td>VTL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk_g1</td>
<td>VDISK</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk_g2</td>
<td>VDISK</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

scsitarget group use group-name device device-spec {primary | secondary}
Switch the in-use endpoint lists for one or more SCSI target or vdisk devices in a group between primary and secondary endpoint lists. For best results, do not run this command option during heavy VTL usage. Role required: admin, limited-admin.

Argument Definitions

dl all
 Shows all information about the object specified by the command option.

device-name
 The name of the SCSI target or vdisk device. These names are case-insensitive and case-preserving. They cannot include colons, question marks, commas, asterisks, forward or backward slashes, open or closed parentheses, or the word all.

device-spec
 A list of devices that may use wildcards. This can be a vdisk device-spec.

group-name
 The name of the SCSI target access group. These names are case-insensitive and case-preserving. They cannot include colons, question marks, commas, asterisks, forward or backward slashes, open or closed parentheses, or the words summary, all, or VTL.
**group-spec**
A list of access groups that may use wildcards. This can be a vdisk group-spec.

**initiator-spec**
A list of initiators that may use wildcards.

**lun**
A device address to pass to the initiator. The maximum logical unit number (LUN) is 16383. A LUN must be unique within a group, but need not be unique across the system. LUNs for VTL devices within a group must start with zero and be contiguous numbers.

**primary-endpoint**
The primary endpoint on which the SCSI target devices are visible. By default, or if you specify all, SCSI target devices are visible on all ports. Specify none if the devices should not be visible on any ports.

**secondary-endpoint**
The secondary endpoint on which the SCSI target devices are visible. By default, the devices are visible on all ports. The secondary port list supports path redundancy.

**service-name**
A SCSI target service: vtl, ddboost, or vdisk.

**scsitarget initiator**

**scsitarget initiator add initiator-name system-address system-address**
Add an initiator with the specified system address. An initiator may be added before it is visible on a port, which allows for early provisioning. Role required: admin, limited-admin.

**scsitarget initiator del initiator-spec**
Delete an initiator. Note that if the initiator remains visible, it may be automatically rediscovered. Role required: admin, limited-admin.

**scsitarget initiator modify initiator-spec [address-method {auto | vsa | default}]**
Modify one or more initiators. Role required: admin, limited-admin.

**scsitarget initiator rename src-initiator-name dst-initiator-name**
Rename an initiator. Role required: admin, limited-admin.

**scsitarget initiator show detailed [initiator-spec] [endpoint endpoint-spec] [group group-spec]**
Show detailed information for one or more initiators, based on selected arguments. Role required: admin, limited-admin, security, user, backup-operator.

**scsitarget initiator show list [initiator-spec] [endpoint endpoint-spec] [group group-spec]**
Display a list of initiators based on selected arguments. If no arguments are selected, the output consists of basic information for all initiator criteria. Role required: admin, limited-admin, security, user, backup-operator.

**Argument Definitions**

**auto**
The device address method chosen based on the numeric LUN range being reported: 0 - 255, peripheral device addressing is used, 256 - 16383, flat device addressing is used (default).
endpoint-spec
A list of endpoints (which, in a SCSI target architecture, corresponds to a virtual port on a DD system) that may use wildcards.

group-spec
A list of access groups that may use wildcards. This can be a vdisk group-spec.

initiator-name
The name of SCSI target host initiator.

initiator-spec
A list of initiators that may use wildcards.

system-address
A system-specific name that identifies a specific SCSI target transport interface. For the Fibre Channel transport, the system address is the name of the HBA (host bus adapter) port used, for example, 5a. This name must match a currently valid system address in the system. It must always be in the set of primary and secondary addresses.

vsa
Volume set addressing (VSA). This method is used primarily for addressing virtual buses, targets, and LUNs. The HP-UX operating system selects the volume set addressing method based on inquiry data and LUN information returned by the SCSI-3 REPORT LUNS command.

scsitarget option

scsitarget option reset {option-name | all}
Reset SCSI target global options. Role required: admin, limited-admin.

scsitarget option set [failover-delay delay-secs] [failback-delay delay-secs] [automatic-failback {enabled | disabled}]
Set SCSI target global options. Role required: admin, limited-admin.

Note: Automatic failback is not guaranteed if all ports are disabled and then subsequently enabled (which could be triggered by the administrator), as the order in which ports get enabled is unspecified.

Note: Here is expected behavior for Fibre Channel port failover, by application:

- DD Boost-over-Fibre Channel operation is expected to continue without user intervention when the Fibre Channel endpoints failover.
- VTL Fibre Channel operation is expected to be interrupted when the VTL Fibre Channel endpoints failover. You may need to perform discovery (that is, operating system discovery and configuration of VTL devices) on the initiators using the affected Fibre Channel endpoint. You should expect to re-start active backup and restore operations.
- vDisk Fibre Channel operation is expected to continue without user intervention when the Fibre Channel endpoints failover.

Example 163
To set a delay of 60 seconds before starting failover and to perform automatic failback when a port has been normal for 300 seconds:

# scsitarget option set failover-delay 60 automatic-failback enabled failback-delay 300
scsitarget option show {option-name | all}
Show SCSI target global options. Role required: admin, limited-admin, security, user, backup-operator, none.

Argument Definitions

automatic-failback
A SCSI target global option, which provides the option to automatically failback or not. Values are enabled or disabled (default).

failback-delay
A SCSI target global option, which is the time to wait before attempting automatic failback when the interface is normal. The default is 120 seconds, the minimum is 30 seconds, and the maximum is 600 seconds.

failover-delay
A SCSI target global option, which is the time to delay before performing a failover. The default is 90 seconds, the minimum is 10 seconds, and the maximum is 300 seconds.

option-name
List of SCSI target global options. One or more may be specified.
automatic-failback
failback-delay
failover-delay

scsitarget persistent-reservation

scsitarget persistent-reservation clear [device device-spec] [initiator initiator-name]
Clear SCSI persistent reservations. Role required: admin, limited-admin.

Example 164

To clear all persistent reservations set by an initiator no longer visible to the system, enter:

# scsitarget persistent-reservation clear initiator ibm-initiator-17

scsitarget persistent-reservation disable [service service-name]
Disable SCSI persistent reservations. Role required: admin, limited-admin.

scsitarget persistent-reservation enable [service service-name]
Enable SCSI persistent reservations. Role required: admin, limited-admin.

scsitarget persistent-reservation show detailed [device device-spec] [initiator initiator-name]
Show detailed information for SCSI persistent reservations. Be aware that if a device does not include a reservation key, or is using a shared key, a series of zeros (0X0000000000000000) will be displayed in the Reservation Key category, instead of n/a, which is the expected behavior. Role required: admin, limited-admin, security, user, backup-operator, none.

scsitarget persistent-reservation show list [device device-spec] [initiator initiator-name]
Show summary information for SCSI persistent reservations. Role required: admin, limited-admin, security, user, backup-operator, none.
Argument Definitions

device-spec
A list of devices that may use wildcards. This can be a vdisk device-spec.

initiator-name
The name of SCSI target host initiator.

service-name
A SCSI target service: vtl, ddboost, or vdisk.

scsitarget port

scsitarget port connection-reset system-address-spec
Reset all connections for the given SCSI target port. Role required: admin, limited-admin.

scsitarget port disable system-address-spec [failover-endpoints]
Disable one or more SCSI target ports, along with any endpoints currently using that port. If failover-endpoints is used, any endpoints that use the port for their primary system address will be disabled or failed-over. Endpoints that are already disabled by administrative operation prior to a port being disabled are remembered as manually disabled. This state will be restored when that port is later enabled. Role required: admin, limited-admin.

Example 165

# scsitarget port disable 5a failover-endpoints

scsitarget port enable system-address-spec [failback-endpoints]
Enable one or more SCSI target ports, along with any endpoints currently using that port. If failback-endpoints is used, any endpoints that use the port for their primary system address, and are failed-over, will be failed-back. Role required: admin, limited-admin.

Example 166

# scsitarget port enable 5a failback-endpoints
System address '5a' successfully enabled.

scsitarget port modify system-address-spec [topology {loop-preferred | loop-only | point-to-point | default}] [speed {auto | speed}] [base-wwpn {auto | wwpn}] [base-wwnn {auto | wwnn}] [npiv {auto | disabled}] [fcp2-retry {disable | enable | default}]
Modify options for SCSI target ports. Role required: admin, limited-admin.

The properties of the base port depend on whether NPIV is enabled:

- In non-NPIV mode, ports use the same properties as the endpoint, that is, the WWPN for the base port and the endpoint are the same.
- In NPIV mode, the base port properties are derived from default values, that is, a new WWPN is generated for the base port and is preserved to allow consistent switching between NPIV modes. Also, NPIV mode provides the ability to support multiple endpoints per port.

Example 167

# scsitarget port modify 6b topology point-to-point speed 16

scsitarget port reset detailed-stats
Reset cumulative information about SCSI target ports. Note that these statistics are gathered by autosupport. As with other similar always-incrementing statistics, autosupport itself may periodically reset the statistics. Role required: admin, limited-admin.

```
scsitarget port show detailed [system-address-spec] [transport transport-name]
```

Show configured SCSI target ports in detailed form. Role required: admin, limited-admin.

**Example 168**

```
# scsitarget port show detailed 5a
```

```
System Address:  5a
Enabled:        Yes
Status:         Online
Transport:      FibreChannel
FC Port:        5a
FC Operational Status: Normal
FC NPIV:        Enabled (auto)
Port ID:        0x0b0000
Model:          QLE2562
Firmware:       5.08.00
FC WWNN:        25:80:00:21:88:00:61:d3
FC WWPN:        25:00:00:21:88:00:61:d3
Connection Type: N-Port
Link Speed:     8 Gbps (auto)
FC Topology:    Default

Endpoints for port 5a:
```
<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Enabled</th>
<th>Status</th>
<th>Current Instance</th>
</tr>
</thead>
<tbody>
<tr>
<td>endpoint-fc-1</td>
<td>Yes</td>
<td>Online</td>
<td>5a:1</td>
</tr>
<tr>
<td>endpoint-fc-2</td>
<td>Yes</td>
<td>Online</td>
<td>5a:3</td>
</tr>
<tr>
<td>endpoint-fc-7</td>
<td>Yes</td>
<td>Online</td>
<td>5a:2</td>
</tr>
<tr>
<td>endpoint-fc-10</td>
<td>No</td>
<td>Offline</td>
<td>n/a</td>
</tr>
</tbody>
</table>
```

**scsitarget port show detailed-stats**

Show detailed cumulative information about SCSI target ports. Note that these statistics are gathered by autosupport. As with other similar always-incrementing statistics, autosupport may periodically reset the statistics. Role required: admin, limited-admin.

**Example 169**

```
# scsitarget port show detailed-stats
```

```
Statistics for Transport: FibreChannel
```

```
<table>
<thead>
<tr>
<th>System Address</th>
<th>Control Commands</th>
<th>Write Commands</th>
<th>Read Commands</th>
<th>In (MiB)</th>
<th>Out (MiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td>7</td>
<td>32</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5b</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

```
<table>
<thead>
<tr>
<th>System Address</th>
<th>Link Failures</th>
<th>LIP Count</th>
<th>Sync Losses</th>
<th>Signal Losses</th>
<th>Prim Seq Proto Errors</th>
<th>Invalid Tx Words</th>
<th>Invalid CRCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5b</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

**scsitarget port show list [system-address-spec] [transport transport-name]**

List configured SCSI target ports in summary form. Role required: admin, limited-admin.
Example 170

To list addresses starting with "5":

```bash
# scsitarget port show list 5*
```

<table>
<thead>
<tr>
<th>System Address</th>
<th>Transport</th>
<th>Enabled</th>
<th>Online</th>
<th>Operation</th>
<th>Status</th>
<th>#Endpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td>FibreChannel</td>
<td>Yes</td>
<td>Online</td>
<td>Normal</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5b</td>
<td>FibreChannel</td>
<td>Yes</td>
<td>Online</td>
<td>Marginal</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

```bash
scsitarget port show stats [system-address-spec] [interval interval] [count count]
```

Show I/O-oriented statistics related to one or more SCSI target port. This command is functionally and syntactically equivalent to scsitarget endpoint show stats, except that it shows values by port instead of by endpoint. Role required: admin, limited-admin.

Example 171

To show I/O statistics every 30 seconds, two times, for system address 5a:

```bash
# scsitarget port show stats 5a interval 30 count 2
```

<table>
<thead>
<tr>
<th>08/13 15:52:12</th>
<th>System Address</th>
<th>Ctrl/s</th>
<th>Read/s</th>
<th>Read MiB/s</th>
<th>Write/s</th>
<th>Write MiB/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td></td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>08/13 15:52:42</td>
<td>System Address</td>
<td>Ctrl/s</td>
<td>Read/s</td>
<td>Read MiB/s</td>
<td>Write/s</td>
<td>Write MiB/s</td>
</tr>
<tr>
<td>5a</td>
<td></td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Argument Definitions

base-wwnn

The base worldwide node name (WWNN) for the port. This is used only when NPIV is enabled for the port. Values are auto (default) or a valid WWNN.

base-wwpn

The base worldwide port name (WWPN) for the port. This is used only when NPIV is enabled for the port. Values are auto (default) or a valid WWPN.

fcp2-retry

A port option.

npiv

Enables NPIV (N_Port ID Virtualization) support for the port. Values are auto (default) or disabled. If set to disabled, NPIV is always disabled for the port. NPIV is a Fibre Channel feature in which multiple Fibre Channel node port (N_Port) IDs can share a single physical N_Port.

speed

The preferred link speed for the port. Values can be auto (default) or a number in Gb/s (1, 2, 4, 8, or 16).

system-address-spec

A list of port system addresses that may use wildcards.
**topology**

The Fibre Channel topology for the endpoint. Values include: loop-preferred, loop-only, point-to-point, default.

**scsitarget reset**

scsitarget reset detailed-stats
Reset detailed statistics for a SCSI target subsystem. Role required: admin, limited-admin, security, user, backup-operator, none.

**scsitarget service**

scsitarget service refresh [service]
Refresh SCSI target service configuration. All services, including vdisk, within the SCSI target system configuration will be re-created. Role required: admin, limited-admin.

scsitarget service show list
Display a list of configured services, including vdisk, and current state. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 172

```
# scsitarget service show list
SCSI Target Services
Service       Status
-----------   -----------------
VTL           Running
DD-Boost FC   Shutdown/Inactive
VDISK         Running
-------------- ---------------
```

**scsitarget show**

scsitarget show config
Show SCSI target configuration. Role required: admin, limited-admin, security, user, backup-operator, none.

scsitarget show detailed-stats
Show detailed statistics for the SCSI target subsystem. Role required: admin, limited-admin, security, user, backup-operator, none.

**scsitarget status**

scsitarget status
Show SCSI target status.

- The administrative state shows the overall state of the SCSI target subsystem.
- The process state shows if the SCSI target management process is currently running.
- The module state shows if required system modules have been loaded prior to starting the management process.
If the status shows an administrative state of enabled but a process state of stopped, you can use `scsitarget enable` to request a start of the SCSI target subsystem. Role required: admin, limited-admin, security, user, backup-operator, none.

**scsitarget trace**

`scsitarget trace disable [component {all | user | kernel | default | component-list}]`

Disable SCSI target tracing. Role required: admin, limited-admin.

`scsitarget trace enable [component {all | user | kernel | default | component-list}] [level {all | high | medium | low}] [timeout {never | timeout-mins}] [service service-name]`

Enable SCSI target tracing. If no components are specified, the default components are used. If no timeout is given, a 10-minute timeout is used. Use `scsitarget trace show` to see which components are available for each type (all, default, user, kernel). Role required: admin, limited-admin.

`scsitarget trace show [component {all | user | kernel | default | component-list}]`

Show SCSI target trace status, which includes vdisk service. Role required: admin, limited-admin, security, user, backup-operator, none.

Example 173

```
# scsitarget trace show
Component Name  Level   Timeout (min)  Service
--------------  ------  -------------  -------
service         medium         9 mins    VDISK
```

**Argument Definitions**

**all**

Shows all information about the object specified by the command option.

**component**

Components available for tracing: all, default, user, kernel.

**component-list**

List of tracing components. One or more may be specified.

`service`

`device`

`group`

`transport`

`initiator`

`endpoint`

`failover`

`op`

`system`

`event`
comm
monitor
persistent-reservation
session
port

level
The degree of debugging verbosity to enable (all | high | medium | low | none).

service-name
A SCSI target service: vtl, ddboost, or vdisk.

timeout
The length of time that debugging is enabled for the specified components.

scsitarget transport

scsitarget transport option reset {option-name | all}
Reset a SCSI target transport option (loop-id, npiv, or wwnn-scope). Role required: admin, limited-admin.

scsitarget transport option set option-name value
Set a SCSI target transport option (loop-id, npiv, or wwnn-scope). Role required: admin, limited-admin.

NPIV provides simplified multiple-system consolidation:

- NPIV is an ANSI T11 standard that allows a single HBA physical port to register with a Fibre Channel fabric using multiple WWPNs.
- The virtual and physical ports have the same port properties and behave exactly the same.
- There may be m:1 relationships between the endpoints and the port, that is, multiple endpoints can share the same physical port.

Specifically, enabling NPIV enables the following features:

- Multiple endpoints are allowed per physical port (up to a maximum of 8 endpoints per port), each using a virtual (NPIV) port. The base port is a placeholder for the physical port and is not associated with an endpoint.
- Endpoint failover/failback is automatically enabled when using NPIV.
- Multiple DD systems can be consolidated into a single DD system, however, the number of HBAs remains the same on the single DD system.
- Multiple endpoints can be configured on the single DD system, providing equivalent access to the DD systems that were previously consolidated.

iNote: Before enabling NPIV, the following conditions must be met:

- The DD system must be running DD OS 5.7.
- All ports must be connected to 4Gb, 8Gb, and 16 Gb Fibre Channel HBA and SLIC.
- The DD system ID must be valid, that is, it must not be 0xffffffff. Check the Online Support website for details on updating the system ID.

In addition, port topologies and port names will be reviewed and may prevent NPIV from being enabled:
- NPIV is allowed if the topology for all ports is loop-preferred.
- NPIV is allowed if the topology for some of the ports is loop-preferred; however, NPIV must be disabled for ports that are loop-only, or you must reconfigure the topology to loop-preferred for proper functionality.
- NPIV is not allowed if none of the ports has a topology of loop-preferred.
- If port names are present in access groups, the port names are replaced with their associated endpoint names.

**Example 174** Some ports have loop-preferred topology

```
# scsitarget port show detailed
System Address: 6a
Enabled: No
... FC Topology: Loop-Only
System Address: 6b
... FC Topology: Loop-Preferred
```

```
# scsitarget transport option set npiv enabled
Transport option npiv set for transport fc.
```

```
scsitgtd.info log
07/15 11:17:57.234 (tid 0x7f46183b59d0): NPIV is allowed but NPIV for port 6a must be disabled or reconfigured to a different topology to function properly.
```

**Example 175** No ports have loop-preferred topology

```
scsitarget port show detailed
System Address: 6a
Enabled: No
... FC Topology: Loop-Only
System Address: 6b
... FC Topology: Loop-Only
```

```
# scsitarget transport option set npiv enabled
Failed to set option npiv for transport fc.
```

```
**** NPIV is not allowed. Topology for some or all ports must be reconfigured to loop preferred.
If port topology is not configured to loop preferred then npiv must be disabled on the port to function properly.
```

```
scsitarget transport option show {option-name | all}
Show SCSI target transport options and currently assigned values. Role required: admin, limited-admin, security, user, backup-operator, none.
```

**Example 176**

```
# scsitarget transport option show all
SCSI Target Transport Options
Option       Value
----------   -------
loop-id      1
wwnn-scope   global
```
Example 176 (continued)

npiv enabled
---------- -------

scsitarget transport show stats
This command is deprecated. Use scsitarget port show stats, scsitarget port show detailed-stats, and/or scsitarget port reset detailed-stats instead.

Argument Definitions

option-name
- The specific SCSI target transport option, which can be loop-id, npiv, or wwnn-scope.

value
- The value for the specific option.
The `smt` command manages the Secure Multi-Tenancy software option, available on DD OS versions 5.7 and later. See the *DD OS Administration Guide* for instructions on how to create and administer multiple Tenant Units on a single system.

This chapter contains the following topics:

- `smt change history` .............................................................................................................. 332
- `smt disable` .......................................................................................................................... 332
- `smt enable` ........................................................................................................................... 332
- `smt status` ........................................................................................................................... 332
- `smt tenant` ........................................................................................................................... 332
- `smt tenant-unit` ................................................................................................................... 334
smt change history

There are no changes to this command for this release.

smt disable

smt disable
Disable the SMT (Secure Multitenancy) feature. Prior to running this command, you must unassign Tenant Unit resources and destroy Tenant Units. When an MTree is unassigned from a Tenant Unit, the MTree remains on the DD system, and functionality is unaffected. Role required: admin, limited-admin.

smt enable

smt enable
Enable the SMT (Secure Multitenancy) software option. Required role: admin, limited-admin.

smt status

smt status
View the status of the SMT (Secure Multitenancy) software option – either enabled or disabled. Required role: admin, limited-admin.

smt tenant

smt tenant add tenant-name tenant-units tenant-unit-list
Add Tenant Units to a Tenant. Role required: admin, limited-admin.

Example 177

# smt tenant add tenant1 tenant-units tu1,tu2
Tenant-unit "tu1" added to tenant "tenant1".
Tenant-unit "tu2" added to tenant "tenant1".

smt tenant create tenant-name [tenant-uuid uuid]
Create a Tenant. When setting up SMT-aware MTree replication, on the destination machine, a Tenant has to be created with the same UUID as the UUID of the Tenant at the source DD system that is associated with the MTree being replicated. MTree replication protocol does an SMT security check during replication initialization, to check that the Tenant UUID at the source and destination are not different. Role required: admin, limited-admin.

Example 178

# smt tenant create tenant1 tenant-uuid 659b71dada2f0025:1cf71c412c48fe77
Tenant "tenant1" created with tenant-uuid "659b71dada2f0025:1cf71c412c48fe77".

smt tenant del tenant-name tenant-units tenant-unit-list
Delete Tenant Units from a Tenant. Role required: admin, limited-admin.
Example 179

```
# smt tenant del tenant1 tenant-units tu1,tu2
Tenant-unit "tu1" deleted from tenant "tenant1".
Tenant-unit "tu2" deleted from tenant "tenant1".
```

smt tenant destroy tenant-name
Destroy a Tenant. Role required: admin, limited-admin.

Example 180

```
# smt tenant destroy tenant1
Tenant "tenant1" destroyed.
```

smt tenant rename tenant-name new-tenant-name
Rename a Tenant. Role required: admin, limited-admin.

Example 181

```
# smt tenant rename tenant1 tenant2
Tenant "tenant1" renamed to "tenant2".
```

smt tenant show detailed [all | tenant tenant-name]
Show detailed information about all Tenants or a specific Tenant. Role required: admin, limited-admin, security, user, backup-operator.

Example 182

```
# smt tenant show detailed all
Tenant:                  t1
Tenant UUID:             f15c920502a3a7f8:e3ca68e199aac091
Tenant Pre-Comp (GiB):   360
Tenant-units:
<table>
<thead>
<tr>
<th>Name</th>
<th>Tenant Self-service</th>
<th>Number of Mtrees</th>
<th>Types</th>
<th>Pre-Comp (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>tu1</td>
<td>Disabled</td>
<td>1</td>
<td>DD Boost</td>
<td>120.0</td>
</tr>
<tr>
<td>tu2</td>
<td>Enabled</td>
<td>2</td>
<td>CIFS, DD Boost</td>
<td>240.0</td>
</tr>
<tr>
<td>tu3</td>
<td>Enabled</td>
<td>2</td>
<td></td>
<td>240.0</td>
</tr>
<tr>
<td>tu4</td>
<td>Enabled</td>
<td>2</td>
<td></td>
<td>240.0</td>
</tr>
</tbody>
</table>
Management-IP:
<table>
<thead>
<tr>
<th>IP Address</th>
<th>Type</th>
<th>Tenant-unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.25.246.70</td>
<td>local</td>
<td>tu1</td>
</tr>
<tr>
<td>10.25.246.80</td>
<td>remote</td>
<td>tu2</td>
</tr>
<tr>
<td>2001:0db8:85a3:0000:0000:8a2e:0370:7334</td>
<td>remote</td>
<td>tu3</td>
</tr>
</tbody>
</table>
Management-User:
<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Tenant-unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>u1</td>
<td>tenant-admin</td>
<td>tu1</td>
</tr>
<tr>
<td></td>
<td>tenant-admin</td>
<td>tu2</td>
</tr>
<tr>
<td></td>
<td>tenant-user</td>
<td>tu4</td>
</tr>
<tr>
<td>u2</td>
<td>tenant-user</td>
<td>tu3</td>
</tr>
</tbody>
</table>
Management-Group:
<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Tenant-unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>g1</td>
<td>tenant-admin</td>
<td>tu1</td>
</tr>
</tbody>
</table>
Example 182 (continued)

<table>
<thead>
<tr>
<th>Tenant</th>
<th>tu2</th>
</tr>
</thead>
<tbody>
<tr>
<td>tu4</td>
<td>tu3</td>
</tr>
<tr>
<td>tu2</td>
<td>tu3</td>
</tr>
<tr>
<td>tu4</td>
<td>tu3</td>
</tr>
</tbody>
</table>

Tenant: t2
Tenant UUID: f15c920502a3a7f8:e3ca68e199aac092
Tenant Pre-Comp (GiB): 0
Tenant-units:
  No tenant-units.
Management-IP:
  No management-ips.
Management-User:
  No management-users.
Management-Group:
  No management-groups.

smt tenant show list [all | tenant tenant-name]
Show a summary for all known Tenants or a specific Tenant. Role required: admin, limited-admin, security, user, backup-operator.

Example 183

# smt tenant show list all

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of Tenant-units</th>
<th>Pre-comp (GiB)</th>
<th>UUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>tenant1</td>
<td>2</td>
<td>120.0</td>
<td>f15c920502a3a7f8:e3ca68e199aac091</td>
</tr>
<tr>
<td>tenant2</td>
<td>2</td>
<td>120.0</td>
<td>f15c920502a3a7f8:e3ca68e199aac091</td>
</tr>
<tr>
<td>tenant3</td>
<td>2</td>
<td>120.0</td>
<td>f15c920502a3a7f8:e3ca68e199aac091</td>
</tr>
</tbody>
</table>

Total Pre-Comp (GiB): 360.0 <- when filesystem is up and running
Total Pre-Comp (GiB): The filesystem is not running. <- when filesystem is not running

Argument Definitions

tenant-name
This must be a unique name.

tenant-unit-list
A comma-separated list of Tenant Units.

Pre-comp (GiB)
Amount of pre-compression capacity used by the tenant.

tenant-uuid
This must be a unique identifier.

smt tenant-unit

smt tenant-unit create tenant-unit
Create a Tenant Unit. Tenant Units are initially created using the SMT (Secure Multitenancy) configuration wizard. Role required: admin, limited-admin.

smt tenant-unit data-ip add local ipv4-ipv6-list [remote ipaddr-list]
tenant-unit tenant-unit
Add a local or remote data IP address to a Tenant Unit. To add a local IP address, that IP address must already be configured on an existing interface on the protection system. A local IP address must be associated with the Tenant Unit before a remote association is permitted. Role required: admin, limited-admin.

smt tenant-unit data-ip del local ipv4-ipv6-list [remote ipaddr-list] tenant-unit tenant-unit
Delete a local or remote data IP address from a Tenant Unit. Role required: admin, limited-admin.

smt tenant-unit data-ip show [tenant-unit | all]
Show the local and remote data IP addresses for a Tenant Unit. Role required: admin, limited-admin, user, security, backup-operator.

smt tenant-unit destroy tenant-unit
Destroy a Tenant Unit. Tenant Units must be destroyed before the SMT software option can be disabled. Role required: admin, limited-admin.

smt tenant-unit gateway add ipv4-address tenant-unit tenant-unit
Add a gateway to a Tenant Unit. A Tenant Unit must have a local IP address on the same subnet as the gateway before the gateway can be added. The command fails if the system does not detect a local IP address on the same subnet as the gateway. Role required: admin, limited-admin.

smt tenant-unit gateway del ipv4-address tenant-unit tenant-unit
Delete a gateway from a Tenant Unit. Role required: admin, limited-admin.

smt tenant-unit gateway show [tenant-unit | all]
Show the gateway for a Tenant Unit. Role required: admin, limited-admin, user, security, backup-operator.

smt tenant-unit hostname reset tenant-unit tenant-unit
Delete a hostname from a Tenant Unit. Role required: admin, limited-admin.

smt tenant-unit hostname set hostname tenant-unit tenant-unit
Add a hostname to a Tenant Unit. Role required: admin, limited-admin.

smt tenant-unit hostname show [tenant-unit | all]
Show the hostname for a Tenant Unit. Role required: admin, limited-admin, user, security, backup-operator.

smt tenant-unit management-group assign group group-type {active-directory | nis | ldap} tenant-unit tenant-unit [role {tenant-admin | tenant-user}]
Assign an active directory, NIS (Network Information System), or LDAP management group to a Tenant Unit in the role of tenant-admin or tenant-user. Role required: admin, limited-admin.

Example 184

```bash
# smt tenant-unit management-group assign group1 group-type nis tenant-unit tul role tenant-admin
Management group "group1" with type "nis" is assigned to tenant-unit "tul" as "tenant-admin".
```

smt tenant-unit management-group show [tenant-unit | all]
Show the management group that is assigned to one or all Tenant Units. Role required: admin, limited-admin, tenant-admin, tenant-user.

smt tenant-unit management-group unassign group group-type {active-directory | nis | ldap} tenant-unit tenant-unit
Unassign an active directory, NIS, or LDAP management group from a Tenant Unit. Role required: admin, limited-admin.

Example 185
Example 185 (continued)

```
# smt tenant-unit management-group unassign group1 group-type nis
tenant-unit tul
Management group "group1" with type "nis" is unassigned from tenant-
unit "tul".
```

```
smt tenant-unit management-ip add {ipaddr | ip6addr} tenant-unit tenant-
unit type {local | remote}
Add a management IP address to a Tenant Unit. Use management IP addresses when you want to
restrict self-service access to specific IP address(es). Local IP is the IP at the DD system, which is
associated with a Tenant Unit for providing self-service. Remote IP is a remote IP address (of the
client), from which a self-service user can log in to the DD system. Role required: admin, limited-
admin.
```

Example 186

```
# smt tenant-unit management-ip add 10.A.B.C tenant-unit tul type
remote
Remote/Local management access ip "10.A.B.C" added to tenant-unit
"tul".
```

```
smt tenant-unit management-ip del {ipaddr | ip6addr} tenant-unit tenant-
unit
Delete a management IP address from a Tenant Unit. Role required: admin, limited-admin.
```

Example 187

```
# smt tenant-unit management-ip del 10.X.Y.Z tenant-unit tu1
Remote management access ip "10.X.Y.Z" deleted from tenant-unit
"tu1".
```

```
smt tenant-unit management-ip show [tenant-unit | all]
Show management IP address information for all Tenant Units. Role required: admin, limited-
admin, tenant-admin, tenant-user.
```

Example 188

```
# smt tenant-unit management-ip show
tenant-unit: tul
  IP Address                          Type
  -----------------------------------  -----
  10.25.246.190                      remote
  10.110.250.31                      local
  2001:0db8:85a3:0000:0000:8a2e:0370:7334 remote

  tenant-unit: tu2
  No management-ips.
```

```
smt tenant-unit management-user assign user tenant-unit tenant-unit
[role {tenant-admin | tenant-user}]
Assign a user from a management group to a Tenant Unit in the role of tenant-admin or tenant-
user. Role required: admin, limited-admin.
```

```
smt tenant-unit management-user show [tenant-unit | all]
Show user access information for a specific Tenant Unit or for all Tenant Units. Role required:
admin, limited-admin, security, user, backup-operator, tenant-admin, tenant-user.
```
smt tenant-unit management-user unassign user tenant-unit tenant-unit
Unassign a management group user from a Tenant Unit. Role required: admin, limited-admin.
smt tenant-unit option reset tenant-unit {all | self-service | security-mode}
Reset options for the specified Tenant Unit. Role required: admin, limited-admin.

Example 189

#smt tenant-unit option reset tu1 security-mode
Security-mode reset to default for tenant-unit "tu1".

smt tenant-unit option set tenant-unit {self-service {enabled | disabled} | security-mode {default | strict}}
Set options for the specified Tenant Unit. Security mode sets a check for SMT-aware replication.
The default mode ensures that the source and destination do not belong to different Tenants. The strict mode ensures they belong to the same Tenant. In the latter case, the UUID for both the source and destination Tenant must have been set and must be identical. Role required: admin, limited-admin.

Example 190

#smt tenant-unit option set tu1 security-mode strict
Security-mode set to "strict" for tenant-unit "tu1".

smt tenant-unit option show {tenant-unit | all}
Show options for a specified Tenant Unit or for all Tenant Units. Role required: admin, limited-admin.

Example 191

#smt tenant-unit option show all
<table>
<thead>
<tr>
<th>Tenant-unit</th>
<th>Self-service</th>
<th>Security-mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>tu1</td>
<td>Disabled</td>
<td>strict</td>
</tr>
<tr>
<td>tu2</td>
<td>Enabled</td>
<td>default</td>
</tr>
</tbody>
</table>

smt tenant-unit rename tenant-unit new-name
Rename a Tenant Unit. Role required: admin, limited-admin.
smt tenant-unit setup tenant-unit
Lets you type Tenant Unit values as prompted by the SMT configuration wizard. Role required: admin, limited-admin.
smt tenant-unit show detailed [tenant-unit | all]
Show detailed information for specific Tenant Units or for all Tenant Units. Role required: admin, limited-admin, tenant-admin, tenant-user.

Example 192

# smt tenant-unit show detailed tu1
Tenant-unit: "tu_test_1"
Summary:
<table>
<thead>
<tr>
<th>Tenant-unit</th>
<th>Tenant service</th>
<th>Tenant Security-mode</th>
<th>Hostname</th>
<th>Pre-Comp</th>
<th>Number of Mtrees</th>
<th>Type(s)</th>
<th>Self-Comp</th>
</tr>
</thead>
<tbody>
<tr>
<td>tu1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(GiB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tu2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dell EMC DD OS Command Reference Guide 337
### Example 192 (continued)

<table>
<thead>
<tr>
<th>Local Address</th>
<th>Remote Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.20.30.22</td>
<td>172.16.204.122</td>
</tr>
</tbody>
</table>

### Management-IP:
No management-ips.

### Gateway:
- **Tenant-unit** | **Gateway IP**
  - tu_test_1 | 10.20.30.1

### Management-User:
No management-users.

### Management-Group:
No management-groups.

### DDBoost:
- Storage-units not found
- Getting users with default-tenant-unit (null)
- DD Boost users not found

### Mtrees:
 **** There are no MTrees configured.

### Quota:
 **** There are no MTrees configured that match the pattern .

### Replication:
 **** License for "REPLICATION" does not exist.

### Alerts:
No such active alerts.

---

smt tenant-unit show list [tenant-unit | all]

Show a list of all Tenant Units or for a specific Tenant Unit. Role required: admin, limited-admin, tenant-admin, tenant-user.

---

### Example 193

#### # smt tenant-unit show list

<table>
<thead>
<tr>
<th>Tenant-unit</th>
<th>Tenant</th>
<th>Pre-Comp</th>
<th>Number of Mtrees</th>
<th>Type(s)</th>
<th>Self-service</th>
<th>Security-mode</th>
<th>Hostname</th>
</tr>
</thead>
<tbody>
<tr>
<td>tu_test_1</td>
<td></td>
<td>0.0</td>
<td>0</td>
<td>Disabled</td>
<td></td>
<td></td>
<td>host1.datadomain.com</td>
</tr>
</tbody>
</table>

---

338 Dell EMC DD OS Command Reference Guide
The snapshot command manages MTrees snapshots. MTrees add granularity to filesystem-type operations, allowing operations to be performed on a specific MTree instead of the entire filesystem. Snapshots are useful for avoiding version skew when backing up volatile data sets, such as tables in a busy database, and for restoring previous versions of a deleted directory or file.

A snapshot is a read-only copy of the protection system MTree from the top of each MTree: /data/coll/mtree-name. The MTree /data/coll/backup is the default directory created in the system during installation. It is also the MTree that is refreshed during an upgrade procedure. The directory /backup points to the default MTree. Snapshots can be accessed from the directories /backup/.snapshot or /data/coll/mtree-name/.snapshot.

This chapter contains the following topics:

- snapshot change history .................................................................340
- snapshot create ........................................................................340
- snapshot expire ......................................................................340
- snapshot list ............................................................................341
- snapshot rename .....................................................................341
- snapshot schedule .................................................................341
snapshot create

`snapshot create snapshot mtree mtree-path [retention {date | period}]`

Create a snapshot. Naming conventions for creating MTrees include uppercase and lowercase letters A-Z, a-z), numbers 0-9, single, non-leading embedded space, exclamation point (!), hash (#), dollar sign ($), ampersand (&), caret (^), tilde (~), left and right parentheses ( ( or ) ), left and right brackets ( [ or ] ), left and right curly braces ( { or } ). Role required: admin, limited-admin, backup.

**Argument Definitions**

- **snapshot**
  - A name for the snapshot.

- **mtree mtree-path**
  - The pathname of the MTree for which the snapshot is being created. The base of the path must be `/data/coll/mtree_name or /backup`.

- **retention date**
  - A four-digit year, two-digit month, and two-day day separated by dots, slashes, or hyphens. For example, 2013.03.23. The snapshot is retained until midnight (00:00, the first minute of the day) of the designated date.

- **retention period**
  - Number of days, weeks (wks), or months (mos) to retain a snapshot. Note there is no space between the number and time period; for example, 4wks. Also, one month equals 30 days. The snapshot is retained until the same time of day it was created.

**Example 194**

If a snapshot was created at 8:48 a.m. on March 1, 2013 with a retention period of one month, it would be retained for 30 days.

```
# snapshot create test22 mtree /backup retention 1mos
```
**snapshot list**

View a list of snapshots of a specific MTree. The display shows the snapshot name, the amount of pre-compression data, the creation date, the retention date, and the status. The status may be blank or expired. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.

Example 195  Argument Definitions

```
# snapshot list mtree /data/coll/ddmtree1
```

**tenant-unit**

A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.

**snapshot rename**

Rename a snapshot for a specific MTree. Role required: admin, limited-admin.

Example 196

To change the name from snap1 to new-snap1 for an MTree named /newMTree, enter:

```
# snapshot rename snap1 new-snap1 mtree /backup
```

**snapshot schedule**

Add multiple MTrees to a single snapshot schedule. Separate multiple MTrees with colons. Role required: admin, limited-admin.
snapshot schedule create name [mtrees mtree-list] [days days] time time [,time ...] [retention period] [snap-name-pattern pattern]
snapshot schedule create name [mtrees mtree-list] [days days] time time every mins [retention period] [snap-name-pattern pattern]
snapshot schedule create name [mtrees mtree-list] [days days] time time-time time-time time-time every <hrs | mins> [retention period] [snap-name-pattern pattern]

Use these commands to create a snapshot schedule for multiple MTrees. Command arguments determine the duration of the schedule. (Note the different arguments for specifying time interval.) Role required: admin, limited-admin.

⚠️ CAUTION The retention period must be set in days only.

Example 197

In the following example, snapshots are spaced one minute apart.

```
# snapshot schedule create sml mtrees /data/coll/ml time
00:00-23:00 every 1mins retention 1days
```

snapshot schedule del name mtrees mtree-list
Remove a list of MTrees from a schedule. Separate multiple MTrees with colons. Role required: admin, limited-admin.

snapshot schedule destroy [name | all]
Remove the name of a schedule. Role required: admin, limited-admin.

snapshot schedule modify name [mtrees mtree-list] [days days] time time [,time ...] [retention period] [snap-name-pattern pattern]
snapshot schedule modify name [mtrees mtree-list] [days days] time time every mins [retention period] [snap-name-pattern pattern]
snapshot schedule modify name [mtrees mtree-list] [days days] time time-time time-time every hrs | mins [retention period] [snap-name-pattern pattern]

Use these commands to modify a snapshot schedule. Command arguments determine the duration of the schedule. (Note the different arguments for specifying time interval.) Role required: admin, limited-admin.

snapshot schedule reset
Reset a snapshot schedule and delete all snapshot schedules. Role required: admin, limited-admin.

⚠️ CAUTION This command deletes the previous schedule without prompting the user.

snapshot schedule show [name | mtrees mtree-list | [tenant-unit tenant-unit]]
Show a specific schedule and show schedules associated with a specific MTree. Separate multiple MTrees with colons. To show a list of schedules, enter the command with no options. Role required: admin, limited-admin, user, backup-operator, tenant-admin, tenant-user, security, none.

Argument Definitions

tenant-unit (Optional)
The basic unit of a multi-tenancy configuration. A tenant unit is a secure, isolated partition for tenant-specific data and control flow within a protection system.
The `snmp` command enables or disables SNMP access to a protection system, adds community strings, gives contact and location information, and displays configuration settings.

SNMP management requires two primary elements: an SNMP manager and an SNMP agent. An SNMP manager is software running on a workstation from which an administrator monitors and controls the different hardware and software systems on a network. These devices include, but are not limited to, storage systems, routers, and switches.

An SNMP agent is software running on equipment that implements the SNMP protocol. SNMP defines how an SNMP manager communicates with an SNMP agent. For example, SNMP defines the format of requests that an SNMP manager sends to an agent and the format of replies the agent returns.

From an SNMP perspective a protection system is a read-only device, with one exception: A remote machine can set the SNMP location, contact, and system name on a protection system. The `snmp` command enables administrative users to configure community strings, hosts, and other SNMP MIB variables on the protection system.

With one or more trap hosts defined, a protection system takes the additional action of sending alert messages as SNMP traps, even when the SNMP agent is disabled.

This chapter contains the following topics:

- `snmp change history` ................................................................. 344
- `snmp guidelines and restrictions` ................................................. 344
- `snmp add` ............................................................................. 344
- `snmp_debug` ........................................................................ 345
- `snmp del` .............................................................................. 345
- `snmp disable` ...................................................................... 346
- `snmp enable` ...................................................................... 346
- `snmp reset` .......................................................................... 347
- `snmp set` ............................................................................ 347
- `snmp show` .......................................................................... 347
- `snmp status` ....................................................................... 348
- `snmp user` ......................................................................... 348
**snmp change history**

There have been no changes to this command in this release.

**snmp guidelines and restrictions**

- Protection systems support MIB access from management stations using SNMPv1, v2C, and v3.
- Protection system can send traps using SNMP v2c or SNMP v3.
- Default port 161 is used for inbound/outbound, read/write SNMP access. Default port 162 is used for outbound traffic for SNMP traps.
- Spaces, tabs, colons, semicolons, U.S. dollar signs, and quotation marks cannot be used in community strings.
- To change multiple settings quickly and avoid restarting SNMP, run the `snmp disable` command, change the settings, and then run `snmp enable`.

**snmp add**

```
snmp add ro-community community-string-list [hosts host-list]
```

Add one or more community strings for read-only access to the protection system. A common string for read-only access is `public`. To grant access to specific hosts, replace `host-list` with one or more hostnames. Role required: admin, limited-admin.

**Example 198**

A valid host list can include both hostnames and IP addresses.

```
hostnameA,hostNameB 10.10.1.2,10.10.1.310.**
```

**Example 199**

The following command adds the `public` community string for read-only access from host `host.emc.com`.

```
# snmp add ro-community public hosts host.emc.com
```

```
snmp add rw-community community-string-list [hosts host-list]
```

Add one or more community strings for read/write access to the protection system. A common string for read/write access is `private`. To grant access to specific hosts, replace `host-list` with one or more hostnames. Role required: admin, limited-admin.

**Example 200**

The following command adds the `private` community string for read-write access from host `host.emc.com`.

```
# snmp add rw-community private hosts host.emc.com
```
Add one or more trap hosts to receive the SNMP traps generated by the protection system. Note that alerts are also sent as traps, even when the local SNMP agent is disabled.

Replace *host-name-list* with one or more hostnames or IP addresses. By default, port 162 is used to send traps, but another port may be assigned. For SNMPv1 and v2c specify the version and the pre-existing community (username). For SNMPv3, specify the SNMPv3 username. Role required: admin, limited-admin.

**Example 201**

The following command adds trap host *admin12*.

```
# snmp add trap-host admin12 version v2c community public
```

### snmp_debug

**snmp debug-level set {none | packet | error | all}**

Provides debug options for the SNMP component. This command allows debug levels of none, packet, error, and all. The "none" turns off additional debug information. "Packet" provides the input and output packets in a readable format. "Error" is an intermediate level and only shows output errors. All is a verbose level that displays all possible information.

You can display debug information by using the `log watch` as shown in the following example:

```
log watch debug/sm/snmpd.log
2015-12-21 10:23:12 NET-SNMP version 5.4.2.1
2015-12-21 10:23:28 Received SNMP packet(s) from UDP: [127.0.0.1]->
> [127.0.0.1]:47393
```

Once the required information is retrieved, you should reset the debug level back to the default ("none"). In addition, you should monitor the size of the file `/ddr/var/log/debug/sm/snmpd.log` to ensure it is not too large. If the file is too large, you can disable the snmp service, delete the file, and then reenable the service. Role required: admin, limited-admin.

**snmp debug-level show**

Shows the current debug status. Role required: admin, limited-admin.

### snmp del

**snmp del ro-community community-string-list [hosts host-list]**

Delete one or more community strings or hosts from the read-only access list. To display the read-only access list, enter `snmp show ro-communities`. Role required: admin, limited-admin.

**snmp del rw-community community-string-list [hosts host-list]**

Delete one or more community strings or hosts from the read-write access list. To display the read-write access list, enter `snmp show rw-communities`. Role required: admin, limited-admin.

**Example 202**

The following command deletes host `myhost.emc.com` from the community string `private`.

```
# snmp del rw-community private hosts myhost.emc.com
```
Example 203

The following command deletes the community *private* and all associated hosts.

```
# snmp del rw-community private
```

```
snmp del trap-host host-name-list [version {v2c | v3}]
```

Delete one or more hosts from the list of SNMP trap hosts. To display the list of trap hosts, enter `snmp show trap-hosts`. Include the SNMP version in the command to list the trap hosts for that version. Role required: admin, limited-admin.

Example 204

The following command deletes trap host *admin12*.

```
# snmp del trap-host admin12
```

---

**snmp disable**

```
snmp disable
```

Disable SNMP and close port 161. Role required: admin, limited-admin.

**snmp enable**

```
snmp enable
```

Enable SNMP and open port 161. Role required: admin, limited-admin.

**snmp reset**

```
snmp reset
```

Reset the SNMP agent configuration to the default values. Role required: admin, limited-admin.

```
snmp reset ro-communities
```

Reset the list of read-only community strings to the default values. Role required: admin, limited-admin.

```
snmp reset rw-communities
```

Reset the list of read-write community strings to the default values. Role required: admin, limited-admin.

```
snmp reset sysContact
```

Reset the SNMP administrative contact MIB variable to the default value or to an empty string if the system value is empty. Role required: admin, limited-admin.

```
snmp reset sysLocation
```

Reset the system location MIB variable to the default value or to an empty string if the system value is empty. Role required: admin, limited-admin.

```
snmp reset trap-hosts
```

Reset the list of SNMP trap receiver hosts to default values. Role required: admin, limited-admin.
### snmp set

**snmp set engineID**
Configure a unique SNMP engine ID for the protection system. The engine ID must be between 5 and 34 hexadecimal characters. Role required: admin.

```
# snmp set engineID 00112233445566778899AABBCCDDEEFF
SNMP engineID: [Hex] 00112233445566778899AABBCCDDEEFF
```

**snmp set sysContact**
Set the SNMP administrative contact MIB variable using a text string such as an email address. The SNMP sysContact MIB variable differs from the value set with the `config set admin-email` command option. However, if the SNMP MIB variables are not set with the SNMP commands, the variables default to the system values given with the `config set commands`. Role required: admin, limited-admin.

**snmp set sysLocation**
Set the SNMP physical location MIB variable using a text string. The SNMP sysLocation MIB variables differ from the value set with the `config set location` command option. However, if the SNMP MIB variables are not set with the SNMP commands, the variables default to the system values given with the `config set commands`. Role required: admin, limited-admin.

**snmp set sysNotes**
Set the SNMP system notes MIB variable to a text string to record system-specific data not stored in other SNMP variables. Role required: admin, limited-admin.

### snmp show

**snmp show config [version {v2c | v3}]**
Use this command to display all SNMP configuration parameters or only those for SNMP V2C or V3. Role required: admin, limited-admin, security, user, backup-operator, or none.

```
# snmp show config
```

**snmp show engineID**
Show the configured SNMP engine ID for the protection system. Role required: admin.

```
# snmp show engineID
SNMP engineID: [Hex] 00112233445566778899AABBCCDDEEFF
```

**snmp show ro-communities**
Show the configured SNMP read-only communities and hosts. Role required: admin, limited-admin.

**snmp show rw-communities**
Show the configured SNMP read/write communities and hosts. Role required: admin, limited-admin.

**snmp show stats**
Show the SNMP operating statistics. Role required: admin, limited-admin, security, user, backup-operator, or none.

**snmp show sysContact**
Show the configured SNMP administrative contact. Role required: admin, limited-admin, security, user, backup-operator, or none.

**snmp show sysLocation**
Show the configured SNMP physical location MIB variable. Role required: admin, limited-admin, security, user, backup-operator, or none.

**snmp show sysNotes**
Show the configured SNMP system notes MIB variable. Role required: admin, limited-admin, security, user, backup-operator, or none.

```
snmp show trap-hosts [version {v2c | v3}]
```

Use this command to display all configured trap hosts or only those for SNMP V2C or V3. Role required: admin, limited-admin, security, user, backup-operator, or none.

---

**snmp status**

```
snmp status
```

Display whether SNMP is enabled or disabled. Role required: admin, limited-admin, security, user, backup-operator, or none.

---

**snmp user**

```
snmp user add user-name access {read-only | read-write} [authentication-protocol {MD5 | SHA1} authentication-key auth-key [privacy-protocol {AES | DES} privacy-key priv-key]]
```

Add an SNMPv3 user to the local system specifying the access rights, authentication protocol, and privacy protocol. The authentication key is used when calculating the digest for the authentication protocol. The privacy key is used as input for the privacy protocol. Role required: admin, limited-admin.

```
snmp user del user-name
```

Delete an SNMPv3 user. To view the configured SNMPv3 users, enter `snmp show config version v3`. Role required: admin, limited-admin.

```
snmp user modify user-name access {read-only | read-write} [authentication-protocol {MD5 | SHA1} authentication-key auth-key [privacy-protocol {AES | DES} privacy-key priv-key]]
```

Modify SNMPv3 user settings such as access rights, authentication protocol, and privacy key. To view the configured SNMPv3 users, enter `snmp show config version v3`. Role required: admin, limited-admin.

```
snmp user reset
```

Reset the list of SNMPv3 users to the default values. Role required: admin, limited-admin.

```
snmp user show user-name
```

Display SNMPv3 user information. To view the configured SNMPv3 users, enter `snmp show config version v3`. Role required: admin, limited-admin, security, user, backup-operator, or none.
CHAPTER 40

storage

The `storage` command adds, removes, and displays disks and LUNs belonging to the active and cache storage tiers.

System storage for a file system or associated RAID disk group consists of the active tier. The cache tier does not use RAID protection. The active tier uses one active unit of storage, and the cache tier uses one unit of storage.

This chapter contains the following topics:

- `storage change history` ................................................................. 350
- `storage guidelines and restrictions` .............................................. 350
- `storage add` .............................................................................. 350
- `storage migration` .................................................................... 351
- `storage remove` ....................................................................... 355
- `storage sanitize` ....................................................................... 356
- `storage show` ............................................................................ 356
storage change history

There have been no changes to this command in this release.

storage guidelines and restrictions

- After adding disks or LUNs to storage tiers, the storage must be provisioned by creating or expanding the filesystem.
- Available LUNs may be removed from a tier to use as a RAID hot spare.

storage add

```
storage add [tier {active | cache | cloud}] {enclosures <enclosure-list> | disks <disk-list> | <LUN-list> [spindle-group <1-16>]}   
```

Add storage devices to a tier. Device types include all disks in an enclosure, multiple enclosures, one or more disks, one or more LUNs, or spindle group. Disks or LUNs must be in the Unknown state to be added to the designated tier, after which the state changes to Available. This command cannot be used on dataless head (DLH) units. The default spindle group is 1.

When adding storage, consider the following guidelines.

- Cache tier storage is preconfigured on DD6900, DD9400, and DD9900 systems.
- Specify <enclosure-list> as: A comma or space-separated list formatted {<enclosure-id>[::<pack-id>]} or <enclosure-id>-<enclosure-id>.
- Specify <disk-list> as: A comma or space-separated list formatted <enclosure-id>.<disk-id>.
- Specify <LUN-list> as: A comma or space-separated list formatted {dev<disk-id> or dev<disk-id>-<disk-id> }.
- Each system model tier supports a maximum storage quantity based on the system capacity and the installed memory. It is a good practice to add no more than the storage quantity supported by your system. Although you can use the storage add command to add storage beyond the supported capacity, an error is reported if you attempt to use the unsupported storage with the filesys create or filesys expand command.
- If adding a disk to an enclosure on the active tier and if there is already a disk group in the enclosure, the disk becomes a spare, not available. This is because if you add a disk and it becomes available, there is no way for the available disk to become spare. Spares are only created when a disk group is created within the enclosure. This rule also applies to the head unit.
- If there is not a disk group in the enclosure (other disks are available or spare), the disk becomes available.
- If the tier option is excluded, the storage will be added to the active tier by default.
- For DD3300 DD3300 systems, specify the value in the Disk column of the disk show hardware command output as the disk ID when adding storage.

| Note: The storage add dev disk-id command option is allowed only after running the command option storage add enclosure enclosure-id to add the shelf. |

Role required: admin, limited-admin.
Argument Definitions

`dev disk-id [spindle-group 1-16]`
Specifies the device and spindle group to be added. To see the available disk IDs, enter `disk show hardware`.

`disk enclosure-id.disk-id`
Specifies the disk to be added with the associated enclosure. To see the available disk IDs with enclosure information, enter `disk show hardware`.

`enclosure enclosure-id[pack-id]`
Adds all disks in the specified enclosure or pack to the specified tier. If you do not specify a pack within a DS60 enclosure, the system adds all valid packs that have not been previously added.

`tier {active | cache}`
Specifies whether the storage is to be added to the active or cache tier. If no tier is specified, the storage is added to the active tier.

Example 205

To add disks in two different enclosures to the active tier:

```
# storage add enclosure 2
# storage add enclosure 5
```

Figure 5 Output: storage add enclosure 2 tier cache

```
#storage add enclosure 2 tier cache
Checking storage requirements...done
Adding enclosure 2 to the cache tier...Enclosure 2 successfully added to the cache tier.
Updating system information...done
Successfully added: 2 done
Notifying filesystem...done
```

storage migration

`storage migration finalize`
Finalize the storage migration. Remove the configuration associated with the source enclosures (such as disk groups), remove the migration destination flag on the destination enclosures, and restart the file system using only the storage on the destination enclosures. Role required: admin, limited-admin.

⚠️ CAUTION Storage migration is blocked if the destination storage uses 8 TB drives.
**Figure 6 Output: storage migration finalize**

```
# storage migration finalize
Storage migration finalize restarts the filesystem.
This can take several minutes and the filesystem is unavailable until the operation completes.
Do you want to continue? (yes/no) [no]: yes

Performing migration finalization pre-check:
(P1) Verifying storage migration is ready for finalization....PASS
(P2) Verifying there are no foreign disks.........................PASS
(P3) Verifying data layout on the source shelves..............PASS

Migration finalization pre-check PASSED
Finalizing the storage migration with id 5:
Notifying filesystem to finalize migration...
Done.
Disabling the filesystem
Please wait..........
The filesystem is now disabled.
Removing source enclosures from filesystem...
Done.
Removing source enclosures from storage tier...
Done.
Enabling the filesystem
Please wait..................
The filesystem is now enabled.
Storage migration with id 5 from enclosure(s) 7.2 to enclosure(s) 7.4 has been finalized.
```

**storage migration option reset throttle**

Reset the throttle used during storage migration to the default value. Role required: admin, limited-admin.

**storage migration option set throttle {low | medium | high}**

Set the throttle that is used during storage migration. A low throttle setting gives storage migration a lower resource priority, which results in a slower migration and requires fewer system resources. Conversely, a high throttle setting gives storage migration a higher resource priority, which results in a faster migration and requires more system resources. The medium setting selects an intermediate priority. Role required: admin, limited-admin.

**Example 206**

```
# storage migration option set throttle high
Throttle for storage migration set to high
```

**storage migration option show throttle**

Display the throttle that is used during storage migration. Role required: admin, limited-admin.

**storage migration precheck source-enclosures enclosure-list destination-enclosures enclosure-list**

Perform checks to determine if data migration can proceed from one or more source enclosures to one or more destination enclosures. For example, the storage on the destination enclosure set must be equal to or larger than the storage on the source enclosure set.

The enclosure list can include one or more enclosure numbers, separated by commas or space characters. To specify a pack within a DS60 enclosure, use the format `enclosure_number:pack`. Role required: admin, limited-admin.
Migration pre-check PASSED

Expected time to migrate data: 8 hrs 33 min

storage migration resume
Resume a suspended storage migration. Role required: admin, limited-admin.

storage migration show history
Display the history of completed migrations. Role required: admin, limited-admin.

Figure 7 Output: storage migration show history

storage migration start source-enclosures enclosure-list destination-enclosures enclosure-list
Initiate data migration from one or more source enclosures to one or more destination enclosures. The storage on the destination enclosure set must be equal to or larger than the storage on the source enclosures.
source enclosure set. If necessary the command reserves space inside the file system to account for different types of drives.

**Note:** Storage migration does not start when disks are rebuilding in the source enclosures. If a disk in any enclosure requires rebuilding after storage migration starts, the migration is suspended to speed up the rebuilding process. When the rebuild is complete, the migration process automatically resumes.

The enclosure list can include one or more enclosure numbers, separated by commas or space characters. To specify a pack within a DS60 enclosure, use the format `enclosure_number:pack`.

Role required: admin, limited-admin.

```
storage migration start source-enclosures 2 destination-enclosures 11
```

**Source enclosures:**

<table>
<thead>
<tr>
<th>Disks</th>
<th>Count</th>
<th>Disk</th>
<th>Disk</th>
<th>Enclosure</th>
<th>Enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>------</td>
<td>-----</td>
<td>----</td>
<td>--------</td>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>2.1-2.15</td>
<td>15</td>
<td>dg1</td>
<td>1.81 TiB</td>
<td>ES30</td>
<td>APM00111103820</td>
</tr>
</tbody>
</table>

Total source disk size: 27.29 TiB

**Destination enclosures:**

<table>
<thead>
<tr>
<th>Disks</th>
<th>Count</th>
<th>Disk</th>
<th>Disk</th>
<th>Enclosure</th>
<th>Enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>------</td>
<td>-----</td>
<td>----</td>
<td>--------</td>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>11.1-11.15</td>
<td>15</td>
<td>unknown</td>
<td>931.51 GiB</td>
<td>ES30</td>
<td>APM00111103840</td>
</tr>
</tbody>
</table>

Total destination disk size: 13.64 TiB

Expected time to migrate data: 84 hrs 40 min

** Storage migration once started cannot be aborted.  
Existing data on the destination shelves will be overwritten.**

Do you want to continue with the migration? (yes|no) [no]: yes

Performing migration pre-check:

1 Verifying platform support................................................PASS
2 Verifying valid storage migration license exists..........................PASS
3 Verifying no other migration is running....................................PASS
4 Verifying request matches interrupted migration...........................PASS
5 Verifying data layout on the source shelves.................................PASS
6 Verifying final system capacity...........................................PASS
7 Verifying destination capacity...........................................PASS
8 Verifying source shelves belong to same tier................................PASS
9 Verifying enclosure 1 is not used as source...............................PASS
10 Verifying destination shelves are addable to storage......................PASS
11 Verifying no RAID reconstruction is going on in source shelves...........PASS

Migration pre-check PASSED

Storage migration will reserve space in the filesystem to migrate data.  
Space reservation may add up to an hour or more based on system resources.

Storage migration process initiated.  
Check storage migration status to monitor progress.

```
storage migration status
```

Display the status of storage migration. Role required: admin, limited-admin.

**Note:** The migration status shows the percentage of blocks transferred. In a system with many free blocks, the free blocks are not migrated, but they are included in the progress indication. In this situation, the progress indication will climb quickly and then slow when the data migration starts.
#storage migration status

Migration status needs to report 'reserving space' and 'preparing' as one of the 'States' now.

<table>
<thead>
<tr>
<th>Id</th>
<th>Source</th>
<th>Destination</th>
<th>State</th>
<th>Percent</th>
<th>Estimated Time</th>
<th>Current Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>11</td>
<td>Reserving Space</td>
<td>40%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>11</td>
<td>Preparing</td>
<td>10%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>11</td>
<td>Migrating</td>
<td>1%</td>
<td>80 hrs 25 mins</td>
<td>medium</td>
</tr>
</tbody>
</table>

storage migration suspend

Pause the storage migration. You can continue a suspended storage migration using storage migration resume. Role required: admin, limited-admin.

storage remove

storage remove {enclosures <enclosure-list> | disks <disk-list> | <LUN-list> [spindle-group <1-16>]}]

Remove storage devices from the tier, including all disks in an enclosure, multiple enclosures, one or more disks, or one or more LUNs. You can also remove a disk from a DLH unit. When a device is removed the state changes to Unknown.

- Specify <enclosure-list> as: A comma or space-separated list formatted {<enclosure-id>[:<pack-id>]} or <enclosure-id>-<enclosure-id>.
- Specify <disk-list> as: A comma or space-separated list formatted <enclosure-id>.<disk-id>.
- Specify <LUN-list> as: A comma or space-separated list formatted {dev<disk-id> or dev<disk-id>-<disk-id>}.

This command cannot remove an In Use disk if doing so exceeds the minimum number allowed by the RAID scheme. This command also cannot remove a disk if the disk is a spare or an In Use LUN. Role required: admin, limited-admin.

Argument Definitions

- **dev disk-id**: Removes the specified device.
**storage sanitize**

**storage sanitize abort enclosure enclosure-id[:pack-id]**  
Abort the storage sanitize task for the specified storage location. Role required: admin, limited-admin.

**storage sanitize resume enclosure enclosure-id[:pack-id]**  
Resume a suspended storage sanitize task at the specified storage location. Role required: admin, limited-admin.

**storage sanitize start enclosure enclosure-id[:pack-id]**  
Initiate the storage sanitize task to remove (zero out) all data from all disks in the specified storage location. All disks in the specified location must be in the unknown state. You cannot use this command to sanitize disks that are being used by the system. Role required: admin, limited-admin.

**Example 207**

```
# storage sanitize start enclosure 2
**  This operation will take approximately 50+ hours to complete.  
Do you want to continue? (yes|no) [no]:
```

**storage sanitize status [enclosure enclosure-id[:pack-id]]**  
Display the status of all sanitize tasks or only the task for specified storage location. The status can be any of the following: COMPLETED, STARTED, STOPPED, SUSPENDED or ABORTED. This command also displays the percent complete for unfinished sanitize tasks. Role required: admin, limited-admin.

**storage sanitize suspend enclosure enclosure-id[:pack-id]**  
Pause the storage sanitize task for the specified storage location. You can continue a suspended sanitize task using `storage sanitize resume`. Role required: admin, limited-admin.

**storage show**

**storage show {all | summary | tier {active | cache | cloud}}**  
Display information about the disk groups, disks, and storage capacity of the file system. The information that appears depends on the system configuration. All systems display the Active tier details table and summary information about the storage tiers. Additional tables may appear for Storage addable disks, Storage expandable disks, and Shelf Capacity License information. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Argument Definitions**

**all**  
Displays storage information for the active, cache, and cloud tiers.

**summary**  
Displays the states of the disk drives and a count of the disks in each state.
tier {active | cache | cloud}

Specifies the tier for which you want to display storage information.
### Figure 8 Output: storage show all

**Active tier details:**

<table>
<thead>
<tr>
<th>Disk Group</th>
<th>Disks</th>
<th>Count</th>
<th>Disk Size</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>dg0</td>
<td>1.1-1.7, 1.9-1.12</td>
<td>11</td>
<td>931.5 GiB</td>
<td></td>
</tr>
<tr>
<td>(spare)</td>
<td>1.0</td>
<td>1</td>
<td>931.5 GiB</td>
<td></td>
</tr>
</tbody>
</table>

Current active tier size: 8.1 TiB  
Active tier maximum capacity: 3.6 TiB

**Cache tier details:**

<table>
<thead>
<tr>
<th>Disk Group</th>
<th>Disks</th>
<th>Count</th>
<th>Disk Size</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>dg0</td>
<td>2.1-2.12</td>
<td>12</td>
<td>931.5 GiB</td>
<td></td>
</tr>
</tbody>
</table>

Current cache tier size: 8.1 TiB  
Cache tier maximum capacity: 3.6 TiB

**Storage addable disks:**

<table>
<thead>
<tr>
<th>Disk Type</th>
<th>Disks</th>
<th>Count</th>
<th>Disk Size</th>
<th>Enclosure</th>
<th>Shelf Capacity</th>
<th>License Needed</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>(unknown)</td>
<td>2.13-2.15</td>
<td>3</td>
<td>931.5 GiB</td>
<td>ES300</td>
<td>N/A</td>
<td>cache only</td>
<td></td>
</tr>
</tbody>
</table>

**Shelf Capacity License:**

- **License**: CAPACITY-ACTIVE  
  - **Model**: DS60  
  - **Total**: 43.6 TiB  
  - **Used**: 0.0 TiB  
  - **Remaining**: 43.6 TiB
Figure 9 Output: disk show hardware

<table>
<thead>
<tr>
<th>Disk (enc/disk)</th>
<th>Slot</th>
<th>Manufacturer/Model</th>
<th>Firmware</th>
<th>Serial No.</th>
<th>Capacity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>1</td>
<td>WDC_WD1002FYS-02A6B0</td>
<td>03.00C06</td>
<td>WD-WXTV1675254</td>
<td>931.51 Gb</td>
<td>SATA</td>
</tr>
<tr>
<td>1.2</td>
<td>2</td>
<td>WDC_WD1002FYS-02A6B0</td>
<td>03.00C06</td>
<td>WD-WXTV1677124</td>
<td>931.51 Gb</td>
<td>SATA</td>
</tr>
<tr>
<td>2.1</td>
<td>1</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTF002PBHZ6L9F</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.2</td>
<td>2</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.3</td>
<td>3</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZ7A3E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.4</td>
<td>4</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTF002PBHZ6L9F</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.5</td>
<td>5</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.6</td>
<td>6</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.7</td>
<td>7</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.8</td>
<td>8</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
<tr>
<td>2.9</td>
<td>9</td>
<td>Hitachi_HUA721010KLA330</td>
<td>GKGA70M</td>
<td>GTE002PBHZH6U1E</td>
<td>931.51 Gb</td>
<td>SAS_SSD</td>
</tr>
</tbody>
</table>

Output Definitions

**Additional Information**

**Displays additional information regarding the disk group.**

**Expandable**

The Expandable entry indicates a system or enclosure that can provide additional storage if the proper license is added. For expandable systems, the Storage expandable disks table appears and the Additional Information column in that table displays the capacity in use.

**Migration destination**

The disk is in use as the destination for storage migration.

**Migration source**

The disk is in use as the source for storage migration.

**Pack n**

This entry identifies the DS60 pack that contains the disks.

**Capacity License Needed**

If a license is needed to use the full capacity of the enclosure, the license is indicated in this column in the Storage expandable disks table. The abbreviation N/A in this column indicates that the enclosure does not require a capacity license, or that part of the enclosure is within a tier and the capacity license for the entire enclosure is accounted for.

**Count**

Shows a count of the disks in the disk group or in the disk state identified in the Disk Group column.

**Disk Group**

Identifies the configured disk groups and the state of disk slots that are not actively participating in a disk group. The following are the disk states that can appear in the Disk Group column.

**absent**

No disk is in the disk slot.
available
  Any of the following:
  
  - A previously unknown disk or LUN added to a tier by the `storage add enclosure` command option.
  
  - A previously failed disk in an expansion shelf populated with other disks belonging to a tier that is not primarily composed of disk group disks, and whose partition was destroyed by the `disk unfail` command.

Failed
  Tiered storage (Available, Spare, or In Use) removed from the tier automatically by the disk subsystem, or explicitly by an administrative user. Failed may also indicate unknown or foreign storage explicitly changed to the Failed state.

Foreign
  A disk belonging to a third-party vendor.

In Use
  Storage that is part of an active filesystem or associated RAID disk group.

Reconstructing
  An active disk is reconstructing in response to a `disk fail` command or by direction from RAID/SSM.

Spare
  A disk that can be used as a RAID hot spare through RAID reconstruction. Spare disks can be used to create or expand the filesystem.

Spare (reconstruction)
  A spare disk that is pending or undergoing RAID reconstruction, which puts file system data into what the formerly spare disk and then makes the disk an integral part of a disk group. After RAID reconstruction of a spare disk completes, the disk is part of a RAID disk group.

unknown
  A blank disk inserted into the disk slot, or a disk failed by a RAID system.

Disk States
  When the summary argument is specified, this column displays the operational states of system disks.

Destination
  The disks in this row are in use as a destination for storage migration.

In Use
  The disks in this row are part of the system storage in use.

Migrating
  The disks in this row are in use as a source for storage migration.

Spare
  The disks in this row are reserved for use as a spares.
Disk Size
The size of the disks in the disk group or disk state.

Disks
Identifies the disks within a disk group using the format enclosure_number.disk_number.

Enclosure Model
This column appears in the Storage expandable disks table and indicates the enclosure model that contains the expandable disk group.

Shelf Capacity License
This table lists the storage related licenses in use by the system enclosures.

License
Displays Capacity-Active for an active tier license.

Model
Displays the enclosure model number to which the license applies.

Remaining
Displays the enclosure capacity available for use.

Total
Shows the total enclosure capacity supported by the license.

Used
Displays the enclosure capacity in use.
storage
The `support` command manages bundles (protection system log files), traces (performance log files, also known as `perf.logs`), and file lists (file names under `/ddvar`) from a customer protection system. This command also configures the ConnectEMC transport feature for securely transmitting information to the protection system.

This chapter contains the following topics:

- `support change history` ................................................................. 364
- `support bundle` ........................................................................... 364
- `support connectemc` ................................................................. 364
- `support coredump` ................................................................. 365
- `support notification` ............................................................... 367
support change history

There are no changes to this command for this release.

support bundle

support bundle create {files-only file-list | traces-only}
Compress listed files into bundle and upload if specified. File names in a list must be separated by a space or a comma. The system automatically deletes the oldest support bundle if five support bundles exist on the system. Role required: admin, limited-admin.

support bundle create default [with-files file-list]
Compress default and listed files into bundle and upload if specified. File names in a list must be separated by a space or a comma. The maximum number of support bundles (standard and mini) allowed is five. Role required: admin, limited-admin.

support bundle create mini [with-files file-list]
Compress default and listed files into a mini support bundle and upload if specified. File names in a list must be separated by a space or a comma. The maximum number allowed is two created within the last 24 hours, and four total. New mini bundles will not be generated if there are already two that were created in the last 24 hours. If the maximum of four is reached, the system will automatically delete the oldest one. Role required: admin, limited-admin.

support bundle delete {bundle-name-list | all}
Delete some or all of the support bundles on the system. File names in a bundle list must be separated by a space or a comma. To list the system bundles available, enter support bundle list. Role required: admin, limited-admin.

support bundle list
List all support bundles on system. Role required: admin, limited-admin.

support connectemc

support connectemc device register ipaddr esrs-gateway [host-list] [ha-peer ipaddr]
Register the system to the Secure Remote Services gateway. Use the host-list parameter to specify multiple Secure Remote Services gateways to provide redundancy.
Role required: admin, limited-admin.

support connectemc device unregister [host-list]
Unregister from the Secure Remote Services gateway. If the notification method for communicating ASUPs and alerts to EMC is ConnectEMC, this command switches the notification method to email after the system unregisters from the last Secure Remote Services gateway. Use the host-list parameter to unregister multiple from Secure Remote Services gateway IP addresses. Role required: admin, limited-admin.

**: Note:** Running this command without specifying a gateway unregisters from all the Secure Remote Services gateways configured on the system.

support connectemc device update [new-ipaddr] [ha-peer new-ipaddr] [esrs-gateway host-list]
Update the system's IP address for the Secure Remote Services gateway. Use the host-list parameter to update the system IP address on multiple Secure Remote Services gateways. Running this command without specifying a gateway updates the system IP address on all the Secure Remote Services gateways configured on the system. Role required: admin, limited-admin.
support connectemc config show
Display the ConnectEMC configuration. Role required: admin, limited-admin.

Example 208

```
# support connectemc config show
ConnectEMC Configuration:
  ESRS gateway IP/hostname: esrs-gateway-1
  Registered device IP(s): 10.1.1.2
  ESRS gateway IP/hostname: esrs-gateway-2
  Registered device IP(s): 10.1.1.2
```

support connectemc show history [last n {hours | days | weeks}]
List the ConnectEMC event messages sent during the specified period. If you do not specify a period, the command displays all messages from the last 24 hours. Role required: admin, limited-admin.

```
# support connectemc show history
Message Type          Time Completed          Result
-------------------   ---------------------   --------
  Autosupport           "2018-04-03 07:01:02"   Success
  Alert-summary-email   "2018-04-03 08:00:09"   Success
-------------------   ---------------------   --------
```

support connectemc test
Send a test message to Support through the Secure Remote Services gateway to test ConnectEMC operation. Test messages are not included in the message history list. Role required: admin, limited-admin.

Example 209

```
# support connectemc test
Sending test message through ConnectEMC...
Test message successfully sent through ConnectEMC.
```

support coredump

support coredump delete {core-file-list | all}
Delete the specified coredump files or delete all coredump files. File names in a list must be separated by a space or a comma. To display the coredump files on the system, enter support coredump list. Role required: admin, limited-admin.

support coredump list
List the coredump files on the system. Role required: admin, limited-admin.

support coredump save file-list
Saves the specified coredump files to a USB storage device. Role required: admin, limited-admin.

support coredump split filename by n {MiB|GiB}
Split the specified coredump file into chunks of the specified size. A single file cannot be split into more than 20 chunks. The smallest allowed size for a chunk is 1 MB. An MD5 checksum is created for the split coredump file. Role required: admin.

```
# support coredump split cpmdb.core.19297.1517443767 10 MiB
cpmdb.core.19297.1517443767 will be split into 5 chunks.
Splitting...
The md5 and split chunks of cpmdb.core.19297.1517443767:
```

<table>
<thead>
<tr>
<th>File</th>
<th>Size</th>
<th>Time Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpmdb.core.19297.1517443767</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Download the files as soon as possible. Otherwise they will be automatically delete in 48 hours.
support notification disable {autosupport | alerts | all}
Disable email notification to Dell EMC for the specified option. Disabling autosupport disables the daily autosupport email. Disabling alerts disables all alert email, including both current alerts and summary reports. The all option specifies that reporting of both autosupport and alerts is to be disabled. Role required: admin, limited-admin.

support notification enable {autosupport | alerts | all}
Enable email notification to Dell EMC for the specified option. Enabling autosupport enables the daily autosupport email. Enabling alerts enables all alert email, including both current alerts and summary reports. The all option specifies that reporting of both autosupport and alerts is to be enabled. Role required: admin, limited-admin.

support notification method reset
Use this command to reset the notification method selection from ConnectEMC to legacy email. Role required: admin, limited-admin.

support notification method set {email | connectemc}
Select email to use the legacy unsecure method of sending autosupport and alert messages to Dell EMC. Select connectemc to send ConnectEMC secure messages. The ConnectEMC method requires a configured system administrator email address (config set admin-email). The default method is legacy email. Role required: admin, limited-admin.

support notification method show {email | connectemc}
Display which notification method is selected. Role required: admin, limited-admin, security, user, backup-operator, or none.

support notification show {autosupport | alerts | all}
Show the notification configuration for the autosupport option, the alerts option, or both. Role required: admin, limited-admin, security, user, backup-operator, or none.
support
The `system` command enables administrative users to perform standard tasks on protection systems, configure a system for Retention Lock Compliance, and view system-level information.

This chapter contains the following topics:

- `system change history`.........................................................................................................370
- `system availability`..................................................................................................................370
- `system bash`..........................................................................................................................370
- `system fips-mode`...................................................................................................................370
- `system headswap`...................................................................................................................370
- `system option`.......................................................................................................................370
- `system package`.......................................................................................................................371
- `system passphrase`..................................................................................................................372
- `system poweroff`.....................................................................................................................374
- `system reboot`.........................................................................................................................375
- `system retention-lock`.............................................................................................................375
- `system sanitize`.......................................................................................................................375
- `system set`................................................................................................................................375
- `system show`............................................................................................................................376
- `system status`..........................................................................................................................385
- `system upgrade`.......................................................................................................................385


**system change history**

*New commands in DD OS 7.1*

- **system fips-mode enable**
  
  Enable FIPS 140-2 compliant mode on protection system. Role required: admin.

- **system fips-mode disable**
  
  Disable FIPS 140-2 compliant mode on protection system. Role required: admin.

- **system fips-mode show**
  
  Shows if the FIPS 140-2 compliance is enabled or disabled. Role required: admin.

**system availability**

- **system availability reset**
  
  Reset the system availability information. Role required: admin, limited-admin.

- **system availability show**
  
  Show the system availability information. Role required: admin, limited-admin, user, backup-operator, or none.

**system bash**

- **system bash enter [timeout n {hr | min}]**
  
  Access BASH on the protection system. If a timeout value is not specified, the default timeout value is 10 minutes. A BASH token issued by Dell EMC support is required to gain access to BASH. If security officer oversight is enabled on the protection system, the system also prompts for the security officer credentials.

  The minimum value allowed for the timeout is 5 minutes, and the maximum is 119,000 hours.

  Type `exit` to exit BASH.

  Role required: admin, limited-admin.

**system fips-mode**

- **system fips-mode enable**
  
  Enable FIPS 140-2 compliant mode on protection system. Role required: sysadmin

- **system fips-mode disable**
  
  Disable FIPS 140-2 compliant mode on protection system. Role required: sysadmin

- **system fips-mode show**
  
  Shows if the FIPS 140-2 compliance is enabled or disabled. Role required: sysadmin

**system headswap**

- **system headswap**
  
  Restore the configuration to a system after replacing the head unit. For additional instructions, see the Chassis Replacement FRU document for the system mode and the *DD OS System Controller Upgrade Guide*. Role required: admin, limited-admin.
system option

system option reset {login-banner}
Delete the configuration for the login banner, so that no login banner is displayed. Role required: admin, limited-admin.

system option set console {serial | lan | monitor}
Set the active console option to one of the following:

- For a Serial Over LAN (SOL) connection, enter `system option set console lan`.
- For a console connection through the serial port, enter `system option set console serial`.
- For a console connection through the monitor port (which is not available on all systems), enter `system option set console monitor`.

Role required: admin, limited-admin.

system option set login-banner file
Set the login banner file. Role required: admin, limited-admin.

Example 210

To create a banner message for your system, mount the protection system directory, `/ddvar`, from another system, create a text file with your login message in `/ddvar`, and then enter the command to use the system banner. The following command selects a file named `banner` in `/ddvar`:

```
# system option set login-banner /ddvar/banner
```

system option show
View the configuration for the login banner file and the active console. Role required: admin, limited-admin.

system package

system package del file
Deletes the specified package file. Role required: admin, limited-admin.

system package list [file]
If the file attribute is omitted, this command lists all files in the `/ddvar/releases` directory, which is where package files are stored. If the file attribute is specified, this command lists information about the specified package file. In either case, this command indicates whether the package is signed and if so, whether the signature is valid, and whether the package is production software or support software. Role required: admin, limited-admin, security, user, backup-operator, or none.

system package show installed
Lists the packages that are installed on the system. The listing includes three pieces of information: the package name, the package version, whether or not the package is an upgrade relative to the base DD OS version, and whether the package is production software or support software. Role required: admin, limited-admin, security, user, backup-operator, or none.
Example 211

The following example shows the output if there are add-on packages:

```
sysadmin@koala39: system package show installed
Package      Version
------------ -------------------
 ddr          0.6000.12.2-497289
 upgrade*     6.0.0.0-000000
(1) Upgraded package
```

Example 212

The following example shows the output if there are no add-on packages:

```
sysadmin@koala39: system package show installed
Package      Version
------------ -------------------
 ddr          0.6000.12.2-497289
 upgrade      6.0.0.0-000000
```

**system passphrase**

`system passphrase change`

Change the passphrase used to access the system. You must disable the file system before using this command, and the new passphrase must contain the minimum number of characters configured with the `system passphrase option set min-length` command. Role required: admin, limited-admin. This command requires security officer authorization.

Example 213

The following is an example of a successful passphrase change.

```
# system passphrase change
This command requires authorization by a user having a 'security' role.
Please present credentials for such a user below.
Username:
Password:
Enter current passphrase:
Enter new passphrase:
Re-enter new passphrase:
Passphrases matched.
The system passphrase has changed
```

Example 214

The passphrase change fails in the following example because the new passphrase does not conform to the configured minimum length.

```
# system passphrase change
This command requires authorization by a user having a 'security' role.
Please present credentials for such a user below.
Username:
Password:
Enter current passphrase:
```
**Example 214**  (continued)

<table>
<thead>
<tr>
<th>Enter new passphrase:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-enter new passphrase:</td>
</tr>
<tr>
<td>Passphrases matched.</td>
</tr>
<tr>
<td>**** New passphrase does not meet the minimum length policy.</td>
</tr>
</tbody>
</table>

**system passphrase option reset min-length**

Reset the system passphrase min-length option to the default value of 9. Role required: admin, limited-admin. This command requires security officer authorization.

**Example 215**

```bash
# system passphrase option reset min-length
This command requires authorization by a user having a 'security' role.
Please present credentials for such a user below.
  Username: 
  Password: 
Passphrase option "min-length" is reset to default(9).
** The current passphrase (length 6) must be changed to meet the new min-length requirement.
```

**system passphrase option set min-length length**

Set the minimum length for the system passphrase. No minimum length is defined for new systems. The range for the minimum length is 1 to 255 characters. Role required: admin, limited-admin. This command requires security officer authorization.

**Example 216**

```bash
# system passphrase option set min-length 16
This command requires authorization by a user having a 'security' role.
Please present credentials for such a user below.
  Username: 
Passphrase option "min-length" set to 16.
```

**Example 217**

If you set a passphrase minimum length that is longer then the current passphrase length, DD OS displays a message to remind you to change the current passphrase.

```bash
# system passphrase option set min-length 20
This command requires authorization by a user having a 'security' role.
Please present credentials for such a user below.
  Username: 
Passphrase option "min-length" set to 20.
** The current passphrase (length X) must be changed to meet the new min-length requirement.
```

**system passphrase option show [min-length]**

Show the system passphrase minimum length configuration. Role required: admin, limited-admin.

**Example 218**

```bash
# system passphrase option show
Option     Value
----------- ------
```
Example 218 (continued)

```
min-length 16
---------- -----
```

**system passphrase set**

For fresh installations, set the passphrase used to access the system. The passphrase length must be longer than the configured minimum and cannot exceed 255 characters. Role required: admin, limited-admin.

**Example 219**

```
# system passphrase set
Enter new passphrase:
Re-enter new passphrase:
Passphrases matched.
The passphrase is set.
```

**system poweroff**

**system poweroff**

Shut down the protection system. The command performs an orderly shutdown of file system processes. This command does not power off external storage. Role required: admin, limited-admin.
### system reboot

**system reboot**

Shut down and restart a protection system. The command automatically performs an orderly shutdown and restart of file system processes. Role required: admin, limited-admin.

### system retention-lock

**system retention-lock compliance configure**

Configure Retention Lock Compliance on the protection system. Role required: admin, limited-admin. This command option requires security officer authorization.

*Note:* If a system is currently configured for retention-lock compliance, the interface displays this fact and the message that reconfiguration of retention-lock compliance is disabled.

**system retention-lock compliance enable**

Enable Retention Lock Compliance on the protection system. Role required: admin, limited-admin. This command option requires security officer authorization. See the *DD OS Administration Guide* for instructions on configuring and enabling Retention Lock.

For DD6900, DD9400, or DD9900 systems, iDRAC must be set to RLC mode, and an iDRAC user must be created before running this command to configure DD Retention Lock Compliance.

**system retention-lock compliance status**

Display the status of the Retention Lock Compliance policy on the system, including system clock skew. Role required: admin, limited-admin.

### system sanitize

**system sanitize abort**

Stop the system sanitization process. Role required: admin, limited-admin.

**system sanitize start**

Start the system sanitization process. Note that prior to running sanitization, snapshots created during a previous replication process by another user may continue to hold deleted data. To ensure data is removed from replication snapshots during system sanitization, synchronize all replication contexts prior to beginning the procedure. Role required: admin, limited-admin.

*Note:* When the *system sanitize start* command is run on a Cloud Tier enabled system, an incorrect status message is displayed saying that sanitization has started. The message should indicate that the command failed.

**system sanitize status**

Check system sanitization process status. Role required: admin, limited-admin.

**system sanitize watch**

Monitor the progress of system sanitization. Role required: admin, limited-admin.

For more information on sanitization and task-based instructions, see the *DD OS Administration Guide*.

### system set

**system set date** *MMDDhhmm[[CC]YY]*
Set the system date and time. Do not use this command if Network Time Protocol (NTP) is enabled. This command option requires security officer authorization if the system is enabled for Retention Lock Compliance.

The data and time format uses the following elements.

- Two digits for the month, **MM** (01 through 12).
- Two digits for the day of the month, **DD** (01 through 31).
- Two digits for the hour, **hh** (00 through 23).
- Two digits for minutes, **mm** (00 through 59).
- Optional: Two digits for the century **CC** and two digits for the year **YY**.

The hour **hh** and minute **mm** variables are entered in 24-hour format with no colon between the hours and minutes. 2400 is an invalid entry. The entry 0000 equals midnight. Role required: admin, limited-admin.

**Example 220**

You can use either of the following commands (two- or four-digit year) to set the date and time to April 23, 2013, at 3:24 p.m.

```
# system set date 0423152413
# system set date 042315242013
```

### system show

**system show all**

Show all system information. Note that newer systems, such as DD4500 and DD7200, display the product serial number in the Serial number row and the chassis serial number in the Chassis serial number row. On legacy systems, such as DD990 and earlier, the Serial number row displays the chassis serial number and the Service tag row displays the product serial number. The product serial number remains the same during many maintenance events, including chassis upgrades. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show date**

Display the system clock. Role required: admin, limited-admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

**system show detailed-version**

Show the version number and release information. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show eula**

View the End User License Agreement (EULA). Note if the user is not present during system installation, the Dell EMC Technical Consultant can temporarily bypass license acceptance and continue with the installation by pressing Ctrl-C. Otherwise, the user must press Enter to accept the license, which is displayed the first time he or she logs in to the system. See the *DD OS Initial Configuration Guide* for details. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show hardware**

Display information about slots and vendors and other hardware in a protection system. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show managing-system**

Identify on which DD Management Console the protection system was added. Also display details about the DD Management Console, such as the outbound proxy host and port, the date for which
the system became managed, and the date of last contact. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show meminfo**
Display summary of system memory usage. Output differs between newer systems, such as DD4500 and DD7200, and legacy systems, such as DD990 and earlier. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show modelno**
Display the hardware model number of a protection system. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show nvram**
Display information about NVRAM cards. If output indicates one or more component errors, an alert notification is sent to the designated group and the Daily Alert Summary email includes an entry citing details of problem.

The normal charge level for batteries is 100 percent, and the normal charging status is enabled. Exceptions occur when the system is new or the card is replaced. In both cases the charge may be less than 100 percent initially; however, if it does not reach 100 percent within three days, or if a battery is not enabled, the card must be replaced. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show oemid [name | value]**
Show the system OEM IDs for the system controller and any shelves. The OEM ID consists of a name and a value. Omit the options to display both the name and value, or specify one option to display only that data. On systems with head units and shelves, the OEM identifier of the head unit is displayed first. The output includes IDs for connected enclosures only. Role required: admin, limited-admin, security, user, backup-operator, or none.

**system show performance [raw | fsop | view {legacy | default} custom-view {state | throughput | protocol | compression | streams | utilization | mtree-active},...] [duration duration {hr | min} [interval interval {hr | min}]]**
Display system performance statistics for a designated interval. If you enter this command without the custom-view argument, the standard performance report appears. Role required: admin, limited-admin, security, user, backup-operator, or none.

**Argument Definitions**

**custom-view**
Specifies a custom report that includes only those performance statistics that you specify. To display multiple performance statistics, enter multiple labels in the order in which you want the statistics to appear. For example, system show performance custom-view state streams.

**duration duration {hr | min}**
The hours or minutes prior to the current time for which to show data.

**fsop**
Display the number of each filesystem operation performed per minute.

**interval interval {hr | min}**
The time between each line in the display. To specify the interval, you must also specify the duration.

**raw**
Show unformatted statistics.
view {legacy | default}
   Selects one of two predefined views.

Example 221

To show performance figures of the prior 30-minute duration only, enter:

```
# system show performance duration 30 min
```

Example 222

To show performance figures of the prior 30-minute duration with an interval of 5
minutes between each set of figures, enter:

```
# system show performance duration 30 min interval 5 min
```

Output Definitions: Cache Miss

data
   Percent of data segment lookups that miss in the cache. A high percent indicates poor data
   prefetching.

meta
   Percent of metadata segment lookups that miss in the cache. For each data access, first
   perform a metadata lookup followed by a data lookup. A high percent indicates poor metadata
   prefetching.

ovhd
   Percent of a compression unit cache block that is unused. Compression regions are stored in
   fixed size (128 KB) blocks. A high ovhd relative to unus indicates space is being wasted due to
   cache block fragmentation. In the ideal case, ovhd exactly equals unus.

thra
   Percent of compression units that were read and discarded without being used. A high
   percent indicates cache thrashing.

unus
   Percent of compression unit data that is unused. Because a compression unit contains
   multiple segments, not all segments in a compression region may be used. A high percent
   indicates poor data locality.

Output Definitions: Compression

gcomp
   Global compression rate.

lcomp
   Local compression rate.

Output Definitions: IOPS

total
   Operations per second.
**read seq/rand**
Sequential and random read operations per second.

**write seq/rand**
Sequential and random write operations per second.

**Output Definitions: Protocol Latency**

**avg/sdev ms**
The average and standard deviation of the response time for ddfs to service all protocol requests, excluding the time to receive or send the request or reply.

**read seq/rand**
The response time for sequential and random reads.

**write seq/rand**
The response time for sequential and random writes.

**Output Definitions: SS Load Balance (user/repl)**
Indicates the relative load balance across segment storage (segstore) instances. Information under (user/repl) denotes all user-plus-Replicator traffic.

**prefetch avg/sdev**
Prefetch requests.

**stream avg/sdev**
The average number of open streams and the standard deviation.

**rd**
The number of read requests.

**rd**
Read processes.

**tot**
The total number of requests.

**SS Load Balance (gc)**
Denotes type and number of expunge (gc) processes.

**wr**
The number of write requests.

**wr**
Write processes.

**tot**
The total number of gc processes.

**Output Definitions: MTree Active**

**rd**
The number of active read streams.

**wr**
The number of active write streams.
Output Definitions: Protocol

data (MB/s in/out)
  Protocol throughput. Amount of data the filesystem can read from and write to the kernel socket buffer.

load
  Load percentage (pending ops/total RPC ops *100).

ops/s
  Operations per second.

wait (ms/MB in/out)
  Time taken to send and receive 1MB of data from the filesystem to kernel socket buffer.

Note: Protocol data includes NFS, CIFS, DD Boost over IP, and DD Boost-managed replication and optimized duplication. Data does not include Replication, VTL over Fibre Channel, or DD Boost over Fibre Channel.

Output Definitions: State

C
  Cleaning

D
  Disk reconstruction

I
  Container verification (scrubbing)

M
  Fingerprint merge

P
  Physical space measurement

S
  Summary vector checkpoint

t
  Storage migration in progress.

V
  File verification running

Output Definitions: Streams

read seq/rand
  The number of sequential and random read streams.

write seq/rand
  The number of sequential and random write streams.

r+
  The number of reopened read file streams in the past 30 seconds.
rd
The number of active read streams.

Repl in
The number of incoming replication streams.

Repl out
The number of outgoing replication streams.

w+
The number of reopened write file streams in the past 30 seconds.

wr
The number of active write streams.

Output Definitions: Throughput (MB/s)

Read
The read throughput data from the protection system.

Repl Network (in/out)
Network replication throughput into and out of the protection system.

Repl Pre-comp (in/out)
Replication pre-compressed (logical) throughput into and out of the protection system. The value is always zero for collection replication.

Write
The write throughput data to the protection system.

Note: Throughput Read and Write data includes NFS, CIFS, DD Boost over IP and Fibre Channel, VTL, Replication, DD Boost-managed replication and optimized duplication.

Output Definitions: Time Stamp

Date
The date system performance is being viewed.

Time
The time system performance is being viewed.

Output Definitions: Utilization

CPU avg/max %
The average and maximum percentage of CPU utilization.

Disk max %
The maximum percentage of disk utilization.

system show ports
Display information about ports. VTL-related ports do not display unless VTL is enabled. Role required: admin, limited-admin, security, user, backup-operator, or none.

Output Definitions

Connection Type
The type of connection, such as Ethernet, SAS, VTL, etc.
Firmware
The protection system HBA firmware version.

Hardware Address
A MAC address or WWN. An address followed by an Ethernet port number is a MAC address. WWN is the world-wide name of the protection system SAS HBA on a system with expansion shelves.

Link Speed
The speed in Gbps (Gigabits per second).

Port
The port number. See the model-specific installation and setup guide to match a slot to a port number.

system show serialno [detailed]
Display the system serial number and also shows whether encryption is enabled. On newer systems, such as DD4500 and DD7200, the system serial number is the product serial number, which remains the same during many maintenance events, including chassis upgrades. On legacy systems, such as DD990 and earlier, the system serial number is the chassis serial number. When the detailed argument is specified, the output displays both the system serial number and the chassis serial number, which is different on newer systems and identical on legacy systems. Role required: admin, limited-admin, security, user, backup-operator, or none.

Example 223
The following example is from a newer system that displays the product serial number as the system serial number as well as support for data encryption:

```
# system show serialno detailed
Serial number: APM00141269680
Chassis Serial number: FCNME140100235
Data Encryption Supported: Yes
Data Deduplication Supported: No
```

system show stats [view {cifs | repl | net | iostat | sysstat | ddboost},...] [custom-view view-spec,...] [interval nsecs] [count count]
Display the system statistics collected since the last reboot. If you enter this command without the view or custom-view arguments, the standard statistics report appears.

If the system is too busy to determine a value, the column shows a dash instead of a number. Role required: admin, limited-admin, security, user, backup-operator, or none.

Argument Definitions

column
Displays output of for each node in column format. Column headings indicate type of stat value.

count count
Specifies how many times to display the results. The default count is one. If interval is specified and count is omitted, the count is set to infinite, or until the user presses Ctrl-C.

custom-view view-spec,...
Specifies a custom report that includes only those statistics that you specify. Valid entries include any column section label in the standard reports: cpu, state, nfs, cifs, net (for
network), disk, nvram, and repl (for replication). To display multiple column sections, enter the column labels in the order in which you want the sections to appear.

**Interval nsecs**

When specifying intervals for collecting statistics, the first report is for current activity. Subsequent reports show activity performed during `[interval nsecs]`. The default interval is five seconds.

**row**

Output for each node is in row format, displayed as a single line for each interval.

**view {cifs | repl | net | iostat | sysstat | ddboost},...**

Specifies a variation of the standard statistics report that provides additional statistics for the feature specified. Valid entries are cifs for CIFS, repl for replication, net for network, iostat for I/O statistics, sysstat for system statistics, and ddboost for DD Boost statistics.

**Example 224**

```
# system show stats view cifs interval 2
```

**Output Definitions: CPU**

- **aggr busy %**
  
  Average of busy percentage of all CPUs.

- **aggr max %**
  
  Amount of data sent through all interfaces.

**State**

Indicates system state. See the description of the show system performance command for details on what each letter represents.

**Protocol Aggr**

- **total**
  
  Operations per second.

- **load %**
  
  Load percentage (pending ops/total RPC ops *100).

- **data in % MB/s**
  
  Protocol throughput. Amount of data the filesystem can read from and write to the kernel socket buffer.

- **data out % MB/s**
  
  Protocol throughput. Amount of data the filesystem can write to the kernel socket buffer.

**CIFS**

- **ops/s**
  
  I/O and metadata operations per second.
ops/s
   I/O and metadata operations per second.

in MB/s
   Write throughput.

out MB/s
   Read throughput.

NFS
   ops/s
   I/O operations.

load %
   Load percentage (pending ops/total RPC ops *100).x.

data in % MB/s
   Protocol throughput. Amount of data the filesystem can read from and write to the kernel
   socket buffer.

data out % MB/s
   Protocol throughput. Amount of data the filesystem can write to the kernel socket buffer.

wait in ms/MB
   Average amount of time spent in ms to receive the amount of data.

wait out ms/MB
   Average amount of time spent in ms to send the amount of data.

Net
   aggr in MB/s
   Amount of data received through all interfaces.

   aggr out MB/s
   Amount of data sent through all interfaces.

   aggr drop (in)
   Number of incoming connections dropped by all interfaces.

   aggr drop (out)
   Number of outgoing connections dropped on all interfaces.

   <Interface> drop (in)
   Number of incoming connections dropped by a specific interface.

   <Interface> drop (out)
   Number of outgoing connections dropped on a specific interface.

system show uptime
   Display the filesystem uptime, the time since the last reboot, the number of users, and the average
   load. Role required: admin, limited-admin, security, user, backup-operator, or none.

system show version
   Display the DD OS version and build identification number. Role required: admin, limited-admin,
   tenant-admin, security, user, tenant-user, backup-operator, or none.
system

sysadmin@apollo65# system show version
Data Domain OS 0.6000.0.0-528922
sysadmin@apollo65#

sysadmin@apollo65# system show meminfo
Memory Usage Summary
Total memory:      773941 MiB
Free memory:       476625 MiB
Inactive memory:   3353 MiB
Total swap:        5119 MiB
Free swap:         5119 MiB

system status

Display status of fans, internal temperatures, and power supplies. Information is grouped separately for the protection system and each expansion shelf connected to the system. See the DD OS Administration Guide for details. Role required: admin, limited-admin, security, user, backup-operator, or none.

system upgrade

system upgrade \[precheck\] file

Note: This command is deprecated and will be removed from a future release. Use system upgrade start or system upgrade precheck.

system upgrade history

Display the history of system upgrades. Role required: admin, limited-admin.

Example 225

<table>
<thead>
<tr>
<th>#</th>
<th>system upgrade history</th>
<th>Partition Number</th>
<th>State</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5.0.7-448183</td>
<td>1</td>
<td>INSTALL</td>
<td>09/24/14 17:16:17</td>
<td></td>
</tr>
<tr>
<td>5.5.1.1-450844</td>
<td>2</td>
<td>UPGRADE</td>
<td>09/25/14 12:50:23</td>
<td></td>
</tr>
<tr>
<td>5.5.2.0-461195</td>
<td>1</td>
<td>UPGRADE</td>
<td>12/01/14 08:16:37</td>
<td></td>
</tr>
<tr>
<td>5.5.2.0-461359</td>
<td>2</td>
<td>UPGRADE</td>
<td>12/03/14 08:21:00</td>
<td></td>
</tr>
<tr>
<td>5.6.0.0-466502</td>
<td>1</td>
<td>UPGRADE</td>
<td>01/13/15 14:12:11</td>
<td></td>
</tr>
<tr>
<td>5.7.0.0-466745</td>
<td>2</td>
<td>UPGRADE</td>
<td>01/15/15 07:51:05</td>
<td></td>
</tr>
<tr>
<td>5.7.0.0-473398</td>
<td>1</td>
<td>UPGRADE</td>
<td>02/11/15 09:42:44</td>
<td></td>
</tr>
<tr>
<td>5.7.0.0-475811</td>
<td>2</td>
<td>UPGRADE</td>
<td>03/04/15 14:32:10</td>
<td></td>
</tr>
<tr>
<td>5.7.0.0-475968</td>
<td>1</td>
<td>UPGRADE</td>
<td>03/09/15 11:33:05</td>
<td></td>
</tr>
</tbody>
</table>

system upgrade option show \[support-software\]

Display whether the protection system allows or prevents the installation of support software. Support software may cause the system to function in unexpected ways. Contact Support for additional information about support software. Role required: admin, limited-admin.

system upgrade precheck file

Evaluate whether the operating system can be upgraded to the version in the specified file. The system searches for the file in the /ddvar/releases directory and on a USB key. The precheck does not upgrade or modify the system, and it does not impact system performance. The precheck evaluates a set of parameters and indicates whether or not there are any issues that will prevent an upgrade.
A precheck cannot start until any active upgrade or precheck completes. Role required: admin, limited-admin.

**Note:** You must specify an upgrade file for a newer version of DD OS. DD OS does not support downgrades to previous versions.

**system upgrade start file**
Upgrade the protection system software to the version in the specified file. The system searches for the file in the `/ddvar/releases` directory and on a USB key. An upgrade cannot start until any active upgrade or precheck completes. The upgrade starts with a precheck of the system parameter values required to support an upgrade. If the precheck fails, the command terminates without modifying the system.

**Note:** System upgrades are not supported while a storage migration finalize process is active. If an upgrade fails while a storage migration finalize process is active, restart the upgrade after the process completes.

If the precheck is successful, the upgrade begins and the console displays the upgrade status. Other users can monitor the upgrade by entering `system upgrade watch`. To stop the upgrade status display, press `Ctrl-C`. Terminating the upgrade status display does not stop the upgrade. Once started, the upgrade continues to completion.

When the upgrade is nearly complete, the system shuts down the filesystem and reboots. The upgrade may require over an hour, depending on the amount of data on the system. During a system upgrade, a banner appears to warn all logged-in users and any new logged-in users that an upgrade is in progress and that not all DD OS operations are available. See the **DD OS Release Notes** for instructions on upgrading protection systems. Role required: admin, limited-admin.

**Note:** You must specify an upgrade file for a newer version of DD OS. DD OS does not support downgrades to previous versions.

**system upgrade start rpm [force] [local]**
Upgrade the protection software RPM with the local parameter specified to also allow the standby node in a high-availability (HA) system to reboot. Role required: admin, limited-admin.

The standby node rejects the command unless the local parameter is specified.

**Note:** The RPM can be a system RPM, a bundle RPM, a component RPM, or an add-on RPM.

If the upgrade request succeeds, the command polls the status of the upgrade until the current node reboots; the operation finishes with a success status or until an error is reported. The CLI is rejected on the passive node in an HA system unless the local parameter is specified. Yes/no confirmation is required in interactive mode.

**system upgrade status**
When an upgrade is in progress, this command displays the current upgrade status and upgrade procedure phase, and then the command terminates. This command does not continually display the upgrade progress.

If no upgrade is in progress, the system displays the completion time and status of the last upgrade. The status shown is not affected or updated in response to any corrective measures or configuration changes made after the completion time. Role required: admin, limited-admin.

**Example 226**

```
# system upgrade status
Current Upgrade Status: DD OS upgrade succeeded
End time: 2015.04.27:09:08
```

**system upgrade uninstall package [local]**
Request that the named package be uninstalled. The package must have been installed as an add-on.

`system upgrade watch`

This command displays the current status throughout the precheck or upgrade process, and this command is not limited to the user who initiated the upgrade. You can enter this command after reboot to continue monitoring an upgrade. To terminate the display before the process completes, press Ctrl-C. Role required: admin.

**Example 227**

```
# system upgrade watch
There is no upgrade or precheck in progress.
```
system
The `user` command adds and deletes users, manages password aging and strength policies, and displays user roles. A role determines the type of operations a user can perform on the protection system. See the *DD OS Administration Guide* for details.

The default administrative account is `sysadmin`. You can change the `sysadmin` password but cannot delete the account.

This chapter contains the following topics:

- `user change history`............................................................................................................. 390
- `user add`.............................................................................................................................. 390
- `user change`......................................................................................................................... 391
- `user del`................................................................................................................................ 391
- `user disable`......................................................................................................................... 392
- `user enable`.......................................................................................................................... 392
- `user idrac`............................................................................................................................ 392
- `user password`..................................................................................................................... 394
- `user reset`............................................................................................................................ 398
- `user show`............................................................................................................................ 398
user change history

There have been no changes to this command in this release.

user add

user add user [role {admin | limited-admin | security | user | backup-operator | none}] [min-days-between-change days] [max-days-between-change days] [warn-days-before-expire days] [disable-days-after-expire days] [disable-date date] [force-password-change {yes | no}]

Add a new locally defined user. A user name must start with a number or a letter. Special characters cannot be used. The user names `root` and `admin` are default names on each protection system and are not available for general use.

The following list describes the roles that can add new users, and the level of users that they can add:

- sysadmin: Can add admin, limited-admin, backup-operator, user, none.
- admin: Can add limited-admin, backup-operator, user, none.
- limited-admin: Can add backup-operator, user, none.

Admin users can create the first security officer role. After the first security-role user is created, only security-role users can add or delete other security-role users. After creating a security role, you must enable security authorization using the `authorization policy` command. See the `DD OS Administration Guide` for details on user roles.

Argument Definitions

**disable-date**

Account is disabled on this date. If not specified, account never expires.

**disable-days-after-expire**

Account is disabled if inactive for the specified number of days past expiration.

**force-password-change**

Require that the user change the password during the first login when connecting using SSH or Telnet or through DD System Manager. The default value is `no`, do not force a password change.

**max-days-between-change**

Maximum number of days before password expires.

**min-days-between-change**

Minimum number of days allowed before the password can be changed again.

**role**

The type of user permissions allowed. The default role is `none`. For SMT configurations, the only user role that can be assigned to SU under tenant-units is `none`. See the `DD OS Administration Guide` for details.

**warn-days-before-expire**

Number of days of warning before a password expires.
**user change**

**user change password [user]**

Change the password of a locally defined user. Admin-role users can change the password for any user, and security-role users can change the passwords for other security role users. Users in all other management roles can change only their own passwords. Passwords must comply with the password strength policy, which you can check with the command option `user password strength show`. To display a list of all locally defined users, enter `user show list`.

The following list describes the roles that can change passwords and the level of users that they can change passwords for:

- **sysadmin**: Can change password for itself, admin, limited-admin, backup-operator, user, none.
- **admin**: Can change password for itself, limited-admin, backup-operator, user, none.
- **limited-admin**: Can change password for itself, backup-operator, user, none.
- **security officer**: Can change its own password only.

Role required: admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

**user change role user {admin | limited-admin | user | backup-operator | none}**

Change the role of a user.

The following list describes the roles that can change the roles of other users, and the level of users that they can act upon:

- **sysadmin**: Can change admin, limited-admin, backup-operator, user, none.
- **admin**: Can change limited-admin, backup-operator, user, none.
- **limited-admin**: Can change backup-operator, user, none.

Users cannot promote other users to greater or equal roles. For example, an admin user cannot promote a limited-admin user to admin or sysadmin.

No management role is permitted to change the role of a security-role user. If SMT is enabled and a role change is requested from none to any other role, the change is accepted only if the user is not assigned to a tenant-unit as a management-user, is not a DD Boost user with its default-tenant-unit set, and is not the owner of a storage-unit that is assigned to a tenant-unit.

**Note**: To change the role for a DD Boost user that does not own any storage units, unassign it as a DD Boost user, change the user role, and re-assign it as a DD Boost user again.

To display a list of all locally defined users, enter `user show list`. See the *DD OS Administration Guide* for more information on user roles.

**user del**

**user del user**

Remove any locally defined user except sysadmin and DD Boost users. The sysadmin user cannot be deleted. To delete a user name in use by DD Boost, delete the DD Boost user first, then use this command to delete the user name. To display a list of all locally defined users, enter `user show list`.

The following list describes the roles that can delete users, and the level of users that they can delete:

- **sysadmin**: Can delete admin, limited-admin, backup-operator, user, none.
- **admin**: Can delete limited-admin, backup-operator, user, none.
user disable

user disable user

Disable the specified locally defined user account so that the user cannot log on to the protection system. To display a list of all locally defined users, enter `user show list`.

The following list describes the roles that can disable users, and the level of users that they can disable:

- **sysadmin**: Can disable admin, limited-admin, backup-operator, user, none.
- **admin**: Can disable limited-admin, backup-operator, user, none.
- **limited-admin**: Can disable backup-operator, user, none.

Security-role users can only disable security-role users.

user enable

user enable user [disable-date date]

Enable the specified locally defined user account so that the user can log on to the protection system. To display a list of all locally defined users, enter `user show list`. Admin-role users can enable users in all management roles except the security role.

The following list describes the roles that can enable users, and the level of users that they can enable:

- **sysadmin**: Can enable admin, limited-admin, backup-operator, user, none.
- **admin**: Can enable limited-admin, backup-operator, user, none.
- **limited-admin**: Can enable backup-operator, user, none.

Security-role users can only enable security-role users.

user idrac

user idrac guidelines and restrictions

These commands are only available on DD6900, DD9400, and DD9900 and systems.

user idrac create

Add new administrator and operator users for iDRAC. The following guidelines apply:

- **user idrac create** only works when DD Retention Lock Compliance is configured but not enabled on the protection system.
- A maximum of 12 iDRAC accounts are supported.
- At least one account must be an iDRAC administrator.
- By default, iDRAC administrator accounts are disabled and iDRAC operator accounts are enabled when they are created.
The following special characters are allowed in the username and password:
- Period: .
- Dash: -
- Underscore: _

These command options require security officer authorization.

After users are created successfully, iDRAC is reset and DD OS reboots. During the reset, you cannot perform any other iDRAC operations. Doing so produces the following error: Object Name idracUsers not found in the json, which is not harmful. The root password is randomized, and the existing iDRAC users are deleted.

This command takes approximately six minutes to complete and return the command prompt. Do not interrupt the command before the command prompt returns. Once the command completes, the system automatically reboots.

Role required: admin, operator.

user idrac disable
Disable an iDRAC administrator account. The following guidelines apply:
- user idrac disable only works when DD Retention Lock Compliance is enabled on the protection system.
- This command does not disable iDRAC operator accounts.
- This command only disables iDRAC administrator accounts.
- These command options require security officer authorization.

This command takes approximately six minutes to complete and return the command prompt. Do not interrupt the command before the command prompt returns. Once the command completes, the system automatically reboots.

Role required: admin, limited-admin.

user idrac enable username [duration {30min | 45 min | 60min}]
Enable an iDRAC administrator account for the specified amount of time. The user will be automatically disabled after the set duration. If duration is not set, the default is 30 minutes. The following guidelines apply:
- user idrac enable only works when DD Retention Lock Compliance is enabled on the protection system.
- This command only enables iDRAC administrator accounts created with the user idrac create command.
- These command options require security officer authorization.

This command takes approximately six minutes to complete and return the command prompt. Do not interrupt the command before the command prompt returns. Once the command completes, the system automatically reboots.

Role required: admin, limited-admin.

user idrac list
Display iDRAC administrator and operator accounts on the protection system. The list includes iDRAC accounts created with the user idrac create command. After idrac users are created, the "user idrac list" will not list PTAdmin Role required: admin, tenant-admin, security, user, tenant-user, backup-operator, or none.

Note: If this command returns the error Object Name idracUsers not found in the json, it means the reserved iDRAC user PTAdmin was deleted from the system. Reboot the
system to regenerate the PTAdmin user, which will take 3-5 minutes, and this error should go away after iDRAC has completed its reset.

<table>
<thead>
<tr>
<th># user iDRAC list</th>
<th>Name</th>
<th>Role</th>
<th>Status</th>
<th>Disable_time</th>
</tr>
</thead>
<tbody>
<tr>
<td>operator1</td>
<td>Operator</td>
<td>enabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>admin</td>
<td>Administrator</td>
<td>disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>operator</td>
<td>Operator</td>
<td>enabled</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

user password

user password aging option reset {all | [min-days-between-change] [max-days-between-change] [warn-days-before-expire] [disable-days-after-expire]}

Reset one or more rules in the default password aging policy to the current default values. New accounts inherit the policy in effect at the time they are created, unless you set different aging options with the user add command. The argument definitions are the same as for user password aging option set. Role required: admin.

Example 229

# user password aging option reset all
Password aging options have been reset.

user password aging option set {[min-days-between-change days] [max-days-between-change days] [warn-days-before-expire days] [disable-days-after-expire days]}

Set the default values for the password aging policy. Role required: admin.

Argument Definitions

min-days-between-change days

The minimum number of days between password changes that you allow a user. This value must be less than the max-days-between-change value minus the warn-days-before-expire value. The default setting is 0.

max-days-between-change days

The maximum number of days between password changes that you allow a user. The minimum value is 1. The default setting is 90.

warn-days-before-expire days

The number of days to warn the users before their password expires. This value must be less than the max-days-between-change value minus the min-days-between-change value. The default setting is 7.

disable-days-after-expire days

The system disables a user account after password expiration according to the number of days specified with this argument. Enter never or a number equal to or greater than zero. The default setting is never.

Example 230
Example 230  (continued)

# user password aging option set warn-days-before-expire 14
Password aging options have been set.

user password aging option show
Display the default password aging policy. Role required: admin.

Example 231

# user password aging option show
Minimum Days Between Password Change: 0
Maximum Days Between Password Change: 90
Warning Days Between Password Change: 14
Disable Days After Expire: never

user password aging reset user {all | [min-days-between-change] [max-days-between-change] [warn-days-before-expire] [disable-days-after-expire]}
Reset one or more rules in the password aging policy for the specified locally defined user to the current default values set by the user password aging option set command. The argument definitions are the same as for user password aging set. Role required: admin for all except security-role users, security for security-role users.

user password aging set user [min-days-between-change days] [max-days-between-change days] [warn-days-before-expire days] [disable-days-after-expire days]
Set the password aging policy for the specified locally defined user. To display the locally defined users, enter user show list. Role required: admin for all except security-role users, security for security-role users.

Argument Definitions

min-days-between-change days
The minimum number of days between password changes that you allow a user. This value must be less than the max-days-between-change value minus the warn-days-before-expire value. The default setting is 0 and may be changed using the user password aging option set command.

max-days-between-change days
The maximum number of days between password changes that you allow a user. The minimum value is 1. The default setting is 90 and may be changed using the user password aging option set command.

warn-days-before-expire days
The number of days to warn the users before their password expires. This value must be less than the max-days-between-change value minus the min-days-between-change value. The default setting is 7 and may be changed using the user password aging option set command.

disable-days-after-expire days
The system disables a user account after password expiration according to the number of days specified with this argument. Enter never or a number equal to or greater than zero. The default setting is never and may be changed using the user password aging option set command.
Example 232

```
# user password aging set user disable-days-after-expire 99
User "user's" password aging information has been updated.
```

```
user password aging show [user]
Show the password aging policy for all locally defined users, or for a specified user. Only admin-role and security-role users can display the policy for other users. User-role, backup-operator-role, and none-role users can check the policy for their own account.
```

Example 233

```
# user password aging option show
Minimum Days Between Password Change: 0
Maximum Days Between Password Change: 99999
Warning Days Between Password Change: 0
Disable Days After Expire: never
```

```
user password strength reset {all | min-length | min-char-classes | min-one-lowercase | min-one-uppercase | min-one-digit | min-one-special | max-three-repeat | passwords-remembered}
Reset one or all of the password strength arguments to the default values. Role required: admin.
```

**Argument Definitions**

- **all**
  Reset the minimum length to 6 and minimum number of character classes to 1.

- **min-length**
  Reset the minimum number of characters in the password to 6.

- **min-char-classes**
  Reset the minimum number of character classes to 1.

- **min-one-lowercase**
  Reset the requirement for at least one lowercase character to disabled.

- **min-one-uppercase**
  Reset the requirement for at least one uppercase character to disabled.

- **min-one-digit**
  Reset the requirement for at least one numerical character to disabled.

- **min-one-special**
  Reset the requirement for at least one special character to disabled.

- **max-three-repeat**
  Reset the requirement for a maximum of three repeated characters to disabled.

- **passwords-remembered**
  Reset the number of remembered passwords to 1.

Example 234

```
# user password strength reset min-length
Password strength "min-length" reset to default (6).
```
Example 234 (continued)

user password strength set {[min-length length] [min-char-classes num_classes] [min-one-lowercase {enabled | disabled}] [min-one-uppercase {enabled | disabled}] [min-one-digit {enabled | disabled}] [min-one-special {enabled | disabled}] [max-three-repeat {enabled | disabled}] [passwords-remembered <0 - 24>]}  
Set the password strength policy. Specify either min-length or min-char-classes, or both. Role required: admin.

Argument Definitions

min-length  
The minimum number of characters in the password. The range is 1 to 100; the default setting is 6.

min-char-classes  
The minimum number of character classes. Specify 1, 2, 3, or 4. Valid passwords must contain at least one character from the specified number of classes. The four character classes are lowercase letters, uppercase letters, digits, and special characters.

When DD OS counts the number of character classes, an uppercase letter at the beginning of the password does not count as an uppercase letter. Similarly, a digit at the end of the password does not count as a digit.

min-one-lowercase  
Enable the requirement for at least one lowercase character. The default setting is disabled.

min-one-uppercase  
Enable the requirement for at least one uppercase character. The default setting is disabled.

min-one-digit  
Enable the requirement for at least one numerical character. The default setting is disabled.

min-one-special  
Enable the requirement for at least one special character. The default setting is disabled.

max-three-repeat  
Enable the requirement for a maximum of three repeated characters. The default setting is disabled.

passwords-remembered  
Specify the number of remembered passwords. The range is 0 to 24. The default settings is 1.

Note: If the passwords-remembered value is reduced, the remembered password list remains unchanged until the next time the password is changed. For example, if the passwords-remembered value is changed from 4 to 3, the last four passwords are remembered until the next time the password is changed.
Example 235

```
# user password strength set min-length 10
Specified password strength requirements have been enforced.
```

```
user password strength show
Show the current password strength policy. Role required: admin, security, user, backup-operator, or none.
```

Example 236

```
# user password strength show
Option                                          Value
---------------------------------------------   --------
Minimum password length                         1
Minimum character classes                       1
At least one lowercase character                disabled
At least one uppercase character                disabled
At least one digit                              disabled
At least one special character                  disabled
At most three consecutive repeated characters   disabled
Passwords remembered                            0
---------------------------------------------   --------
```

user reset

```
user reset
This command deletes all locally defined user accounts except sysadmin and user accounts for security, DD Boost (role = none), and VDISK. This command also resets the password strength and password aging options to the factory default values. Role required: admin.
```

**Note:** This command option is not allowed on Retention Lock Compliance systems.

user show

```
user show active
Display a list of users currently logged in. The tty column displays the access method for the user.

- Console access appears as tty#, where # represents a session number for that user.
- SSH, Telnet, and FTP access appears as pts#, where # represents a session number for that user.
- DD SM access appears as GUI.
- REST service access appears as WEB_SVC.
- Vdisk access appears as API.
```

Role required: admin, tenant-admin, security, user, tenant-user, backup-operator, or none.
Example 237

```
# user show active
User list from node "localhost".
Name       Idle   Login Time         Login From                    tty
--------   ----   ----------------   ---------------------------   -------
sysadmin   20h    Thu Oct  9 17:40
           ddang.datadomain.com tty1
sysadmin   19h    Thu Oct  9 17:41   ddang.datadomain.com pts/0
sysadmin   0s     Thu Oct  9 17:52   ddang.datadomain.com pts/1
sysadmin   3m     Fri Oct 10 13:42   usendangdl1.datadomain.com pts/2
sysadmin   3m     Fri Oct 10 13:37   :ffff:137.69.74.231 GUI
sysadmin   3m     Fri Oct 10 13:38   :ffff:137.69.74.230 WEB_SVC
sysadmin   3m     Fri Oct 10 13:37   ddang.datadomain.com API
--------   ----   ----------------   ---------------------------   -------
5 users found.
```

**user show detailed [user]**

Show detailed information for a specified user or for all users. Role required: admin or security.

Example 238

```
# user show detailed Tu1
User:                                   Tu1
Uid:                                    501
Role:                                   user
Last Login From:                        <unknown>
Last Login Time:                        Mon Jan 14 11:55:49 2013
Status:                                 enabled
Password Last Changed:                  Mar 16, 2006
Disable Date:                           never
Minimum Days Between Password Change:   0
Maximum Days Between Password Change:   99999
Warning Days Between Password Change:   7
Disable Days After Expire:              never
Force Password Change at Next Login:    no
Tenant-unit Roles:
   Tenant-unit          Role
   ----------------     -----
   Tenant-unit1         tenant-admin
   Tenant-unit2         tenant-user
```

**user show list**

Display list of system users. Role required: admin or security.

Figure 10 Output: user show list

```
# user show list
User list from node "localhost".
Name       Uid  Role            Last Login From            Last Login Time          Status   Disable Date
--------   ----  ---------------  --------------------------  ------------------------  -------   ----------
sysadmin   100   admin          carvej-d1.datadomain.com  Mon Aug 17 13:02:32 2015  enabled  never
security  500    security       <unknown>                  never                     never     never
boost3     501    none           <unknown>                  never                     never     never
boost4     502    none(*)        <unknown>                  never                     never     never
Tuesday     504    user           <unknown>                  never                     never     never
anonymous  505    admin          <unknown>                  never                     never     never
backup     506    backup-operator <unknown>                  never                     never     never
new_user   507    none           <unknown>                  never                     never     never
new1       508    none           <unknown>                  never                     never     never
(*) This user has additional roles for tenant-unit(s).
11 users found.
```
CHAPTER 44

vdisk

The vdisk command creates and manages virtual disk devices that can be exported as a block-level disk device to an initiator over a Fibre Channel link. These block-level devices can be accessed by an application host, backup host, or a disk sub-system for block-level backup and recovery.

This chapter contains the following topics:

- vdisk change history ................................................................. 402
- vdisk guidelines and restrictions .............................................. 402
- vdisk config .............................................................................. 402
- vdisk device ............................................................................. 403
- vdisk device-group ................................................................. 405
- vdisk disable ........................................................................... 406
- vdisk enable ............................................................................ 406
- vdisk group ............................................................................. 406
- vdisk pool ............................................................................... 407
- vdisk property ......................................................................... 408
- vdisk reset ............................................................................... 409
- vdisk show ............................................................................... 409
- vdisk static-image ................................................................. 411
- vdisk status ............................................................................ 413
- vdisk trace .............................................................................. 413
- vdisk user ............................................................................... 413
vdisk change history

There have been no changes to this command in this release.

vdisk guidelines and restrictions

- In the current release, virtual disks are only supported for certain solutions that incorporate protection systems and Symmetrix VMAX systems. See the Backup Compatibility Guide, DD OS for information about supported configurations.
- If you use virtual disks, using either the VTL feature or DD Boost over Fibre Channel on the same protection system is not supported.
- The output of `filesys show compression` may be misleading for virtual disks. Large virtual disks that contain very little data may show a total compression factor of 100%. This happens because, when you create a virtual disk, the system creates a file of the specified size (such as 2 PB) but does not actually write data to the disk, so no physical space is used. The compression ratio for that file will be extremely high until a substantial amount of real data gets written to the virtual disk.
- The output of `filesys show space` may also be misleading for virtual disks. When you create a virtual disk, the entire amount of space allocated for that virtual disk gets added to the `pre-comp` statistic for the file system. Likewise, when you delete a virtual disk, only the amount of space actually used for data gets added to the `Cleanable` statistic. This behavior is expected.
- Deleting the vdisk device that is assigned to LUN 0 from a vdisk device group is not supported, and will cause the other devices in the group to not be visible on the initiator.
- LUN 0 must be visible to all endpoints.
- Vdisk Fibre Channel operation is expected to continue without user intervention when the Fibre Channel endpoints failover.
- If a ProtectPoint backup description is longer than 1024 characters, the vdisk static-image show detailed command truncates the description to 1024 characters.
- If a vdisk static-image property is longer than the UI column width, the `vdisk static-image show detailed` command adds two blank spaces between each property name.
- The maximum values displayed by the `vdisk show config` are system-wide limits inherited from the MTree limit. The maximum number of pools supported ranges from 100 to 256, depending on the specific model of the protection system.
- The `vdisk device create` command creates a device of at least, but not necessarily the exact size specified. The only time a device of the exact size specified is created is specified is when the capacity is specified in sectors with the `capacity n sectors` option.
- Vdisk devices use device-locking to prevent data corruption when multiple hosts are running control path operations on a single vdisk device.
- DD Retention Lock is supported on vdisk devices.

vdisk config

Virtual disk clone configuration.

Virtual disk cloning creates copies of virtual disk objects.

Clone operations are supported on the following virtual disk objects:
Devices

Device-groups

Pools

vdisk config clone device source-device device-name source-pool pool-name source-device-group device-group-name destination-pool pool-name destination-device-group device-group-name

Clone a virtual disk device configuration to a specified destination pool and device group. This command creates a new device in the destination pool and device-group with the same configuration parameters as the source device. Role required: admin, limited-admin.

vdisk config clone device-group source-device-group device-group-name source-pool pool-name destination-pool pool-name [destination-device-group device-group-name]

Clone a virtual disk device-group to a specified destination. This command creates a new device-group and devices in the destination pool with the same configuration parameters as the source device-group and devices. The command fails if the destination pool or device-group already exists. Role required: admin, limited-admin.

vdisk config clone pool source-pool pool-name destination-pool pool-name [vdisk-user vdisk-user]

Clone a virtual disk pool to a specified destination pool. This command creates a new pool, device-group, and devices with the same configuration parameters as the source pool, device-group, and devices. The command fails if the destination pool. Role required: admin, limited-admin.

vdisk config export [{pool <pool-name>| pool <pool-name> device-group <device-group-name>}] output-file <file-name>

Export a vdisk configuration to a file pathname Optionally specify a specific pool or device-group configuration for export. Role required: admin, limited-admin.

vdisk config import [{pool <pool-name>| pool <pool-name> device-group <device-group-name>}] [check-only] [skip-initiators] [retain-serial-numbers] [on-error {continue | stop}] input-file <filename>

Import a vdisk configuration that was exported to a file for migration to another location. Role required: admin, limited-admin.

Argument definitions

device-group-name
A virtual disk device group name of up to 32 characters.

device-name
The name of the virtual disk device.

pool-name
A virtual disk pool name of up to 32 characters.

vdisk-user
An authorized virtual disk user who is associated (registered) with a virtual disk pool. This user may manage all virtual disk objects that are associated with the pool.

vdisk device

Manage individual virtual disk devices. A virtual disk device is a virtualized hard disk drive that has the characteristics of a physical hard disk drive: heads, cylinders, and sectors-per-track.

vdisk device create [count count] capacity n {MiB|GiB|TiB|PiB|sectors} pool pool-name device-group device-group-name
Creates a device of at least, but not necessarily the exact size specified. The only time a device of the exact size specified is created is specified when the capacity is specified in sectors with the capacity n sectors option.

vdisk device create [count count] heads head-count cylinders cylinder-count sectors-per-track sector-count pool pool-name device-group device-group-name

Add one or more new virtual disk devices. You can specify the disk size either by entering a value n and a unit of size, or by specifying the physical characteristics of the virtual disk. Not every possible geometry is compatible with VMAX, and not every device size can be represented as a valid geometry. Role required: admin, limited-admin.

vdisk device destroy device-name [destroy-static-images {yes|no}]

Delete a device and optionally delete its static images.

If you do not delete the static images, they become detached from (no longer associated with) the device. Use the vdisk static-image commands to attach and detach static images. Role required: admin.

Example 239

vdisk device create count 2 capacity 10 GiB pool p1 device-group dg1

Created VDISK device "vdisk-dev1", WWN: 60:02:18:80:00:00:00:63:05:1C:1B:02:D0:00:00
Created VDISK device "vdisk-dev2", WWN: 60:02:18:80:00:00:00:63:05:1C:1B:02:D0:00:01
2 VDISK devices created.

vdisk device modify device-name state {read-write|read-only|not-ready}

Modify the state of the specified vdisk device. Role required: admin, limited-admin.

vdisk device overwrite device-name [source-device device-name | source-pool pool-name source-device-group device-group-name] source-static-image static-image-name

Overwrite a virtual disk device from a static-image. This command option destroys the existing data on the device-name. Role required: admin, limited-admin.

vdisk device show detailed [wwn <wwn-name>] | [<device-spec] [pool <pool-name> | pool <pool-name> device-group <device-group-name>]]

Show detailed information about all or selected virtual disk devices. All users may run this command option.

vdisk device show list [wwn <wwn-name>] | [<device-spec] [pool <pool-name> | pool <pool-name> device-group <device-group-name>]]

List all or selected virtual disk devices. All users may run this command option.

Argument definitions

capacity n [{MiB|GiB|TiB|PiB}]

The capacity limit of the vdisk device. The default units are GiB. Enter a value and optionally specify the units. The capacity must be between 1 GiB and 4 TiB.

count count

The number of vdisk devices to create. The maximum is 2048. The default is 1.

cylinders cylinder-count

The number of cylinders that define the disk geometry, which is used to calculate the disk capacity.
**destruct-static-images** {yes|no}

Whether to delete the static images of the specified device.

**device-group-name**

A virtual disk device group name of up to 32 characters.

**device-name**

The name of the virtual disk device.

**heads head-count**

The number of heads that define the disk geometry, which is used to calculate the disk capacity.

**pool-name**

A virtual disk pool name of up to 32 characters.

**sectors-per-track sector-count**

The number of sectors per track that defines the virtual disk device geometry, which is used to calculate the disk capacity.

**static-image-name**

The name of a static image.

**wwn-name**

A case-insensitive 30-byte string containing the hexadecimal values of the WWN. Delimiting the string with ":" characters is optional.

---

**vdisk device-group**

Manage virtual disk device groups.

A virtual disk device-group is a second-level container in a pool. It contains one or more virtual disk devices. It is represented as a subdirectory in the MTree of a virtual disk pool. The name space for a device-group name is limited to the MTree of a single vdisk pool.

**Note:** A device-group is not an access group.

A device group may contain:

- Devices
- Static images

vdisk device-group create device-group-name pool pool-name

Create a device-group in a local pool. Role required: admin, limited-admin.

vdisk device-group destroy device-group-name pool pool-name

Destroy a device-group, including all of its devices and data. Role required: admin.

vdisk device-group rename src-device-group-name destination-group-name pool pool-name

Rename the device-group src-device-group-name to destination-group-name. Role required: admin, limited-admin.

vdisk device-group show detailed [device-group-spec] [pool pool-spec]

Show detailed information about all or selected device-groups. All users may run this command option.

vdisk device-group show list [device-group-spec]
List all or selected device groups. The output shows the name of the pool that contains these device-groups and the number of devices in each device-group. All users may run this command option.

**Argument definitions**

- **device-group-name**
  - A virtual disk device group name of up to 32 characters.

- **device-group-spec**
  - A list of virtual disk device groups that uses wildcards, such as “dg*”.

- **pool-name**
  - A virtual disk pool name of up to 32 characters.

- **pool-spec**
  - A list of virtual disk pools that uses a wildcard, such as “vpool*”.

**vdisk disable**

vdisk disable
Disable the vdisk service. Role required: admin, limited-admin.

**vdisk enable**

vdisk enable
Enable the vdisk service. Role required: admin, limited-admin.

**vdisk group**

Manage access between virtual devices and initiators.

[1] **Note:** Use the scsitarget group commands to create, rename, or destroy virtual disk groups.

- **vdisk group add**
  - Add an initiator to a virtual disk access group. Role required: admin, limited-admin.

- **vdisk group add**
  - Add virtual disk devices to a virtual disk access group. Role required: admin, limited-admin.

- **vdisk group del**
  - Remove virtual disk devices from a virtual disk access group. Role required: admin, limited-admin.

- **vdisk group modify**
  - Modify the virtual disk device attributes in a virtual disk access group. Role required: admin, limited-admin.
vdisk group use group-name {device device-spec | pool pool-name device-group device-group [device device-spec]} {primary | secondary}

Switch the in-use endpoints list for one or more devices in a virtual disk access group between the primary port and the secondary endpoints. If you do not want to operate on all of the devices in the device-group, filter the devices by providing a device-spec. Role required: admin, limited-admin.

**Argument definitions**

- **device-group-name**
  A virtual disk device group name of up to 32 characters.

- **device device-spec**
  A list of devices that uses wildcards, such as “vdisk-dev*”.

- **group-spec**
  A list of virtual disk access groups that uses a wildcard, such as “group*”.

- **endpoint-list**
  A list of endpoints (logical names for target ports on the protection system).

- **group-name**
  Name of an access group.

- **group-spec**
  A list of virtual disk access groups that uses a wildcard, such as “group*”.

- **initiator initiator-spec**
  A list of initiators attached to the protection system for the virtual disk service that uses a wildcard, such as “init1*”.

- **lun lun**
  A logical unit identified by a number. These are virtual disk devices exported from the protection system.

- **pool-name**
  A virtual disk pool name of up to 32 characters.

vdisk pool

Manage the virtual disk pool.

A virtual disk pool is the highest-level container for virtual disk objects. It corresponds to a managed tree (MTree) on a protection system.

Pools contain these lower-level objects:

- Device groups
- Devices
- Static images

vdisk pool create pool-name user user-name

Create a pool and its MTree, and assign an existing virtual disk user to the new pool. Role required: admin, limited-admin.

vdisk pool destroy pool-name

Destroy a pool, including all of its devices and data. This command cannot destroy pools that are replication destinations. Role required: admin.
vdisk pool modify pool-name user user-name
Assign an existing virtual disk user to an existing pool. Role required: admin, limited-admin.

vdisk pool register pool-name user vdisk-user
Register an existing pool or replica virtual disk MTree on a protection system configured as a replication destination to vdisk, and assign an existing virtual disk user to the pool. Role required: admin, limited-admin.

vdisk pool rename src-pool-name dst-pool-name
Rename a pool from src-pool-name to dst-pool-name. Role required: admin, limited-admin.

vdisk pool show list [pool-spec]
List all pools or selected pools. All users may run this command option.

vdisk pool show detailed [pool-spec] [user vdisk-user]
Show detailed information about some or all pools. All users may run this command option.

vdisk pool unregister pool-name user vdisk-user
Unregister an existing pool or MTree from vdisk, making all the data associated with the pool inaccessible. This command requires the user to enter a password. Role required: admin, limited-admin.

**Argument definitions**

**pool-name**
A virtual disk pool name of up to 32 characters.

**pool-spec**
A list of virtual disk pools that uses a wildcard, such as “vpool*”.

**user-name**
A protection system user name with a specified role, such as backup operator.

**vdisk-user**
An authorized virtual disk user who is associated (registered) with a virtual disk pool. This user may manage all virtual disk objects that are associated with the pool.

**vdisk property**
Set or remove properties for pools, device groups, devices, and static images.

vdisk property reset object-name name object-type pool {all | property-name name}
vdisk property reset object-name name object-type device-group pool pool-name {all | property-name name}
vdisk property reset object-name name object-type device {all | property-name name}
vdisk property reset object-name name object-type static-image {device device-name | device-group device-group-name pool pool-name}{all | property-name name}

Reset properties for a virtual disk object. Role required: admin, limited-admin.

vdisk property set object-name name object-type pool property-name name property-value value
vdisk property set object-name name object-type device-group pool pool-name property-name name property-value value
vdisk property set object-name name object-type device property-name name property-value value
vdisk property set object-name name object-type static-image {device device-name | device-group device-group-name pool pool-name} property-name name property-value value
Set key-value pair properties for a virtual disk object. Role required: admin, limited-admin.

Example 240

```
# vdisk property set object-name pool_3 object-type pool property-name Department property-value HR
VDISK property set for pool “pool_3”
```

**Argument definitions**

- **device-group-name**
  - A virtual disk device group name of up to 32 characters.

- **device-name**
  - The name of the virtual disk device.

- **object-name name**
  - A virtual disk object name. Virtual disk objects include pools, device groups, devices, and static images.

- **pool-name**
  - A virtual disk pool name of up to 32 characters.

- **property-name name**
  - A property for a virtual disk object, which can be used to identity the object. For example, a virtual disk pool named pool-1 might have a property department with the value HR.

- **property-value value**
  - A value for a virtual disk object property.

**vdisk reset**

Reset detailed virtual disk statistics. Role required: admin, limited-admin.

vdisk reset detailed-stats

**vdisk show**

Display information about virtual disk configuration limits and I/O statistics.

vdisk show config

Show the vdisk configuration limits. The limits displayed scale based on the protection system model. Role required: admin, limited-admin.

The maximum values are system-wide limits inherited from the MTree limit. The command adjusts the output based on MTrees used by other protocols. The maximum number of pools supported ranges from 100 to 256, depending on the specific model of protection system.

Example 241  DD4500 vdisk limits

```
vdisk show config
Name        Current  Maximum
```

Dell EMC DD OS Command Reference Guide  409
### Example 241 DD4500 vdisk limits (continued)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pools</td>
<td>0</td>
<td>127</td>
</tr>
<tr>
<td>Device-groups per pool</td>
<td>1024</td>
<td></td>
</tr>
<tr>
<td>Device-groups</td>
<td>0</td>
<td>130048</td>
</tr>
<tr>
<td>Devices</td>
<td>0</td>
<td>2048</td>
</tr>
<tr>
<td>Static images</td>
<td></td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

### Example 242 DD9500 vdisk limits

**vdisk show config**

<table>
<thead>
<tr>
<th>Name</th>
<th>Current</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pools</td>
<td>0</td>
<td>255</td>
</tr>
<tr>
<td>Device-groups per pool</td>
<td></td>
<td>1024</td>
</tr>
<tr>
<td>Device-groups</td>
<td>0</td>
<td>262143</td>
</tr>
<tr>
<td>Devices</td>
<td>0</td>
<td>2048</td>
</tr>
<tr>
<td>Static images</td>
<td></td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

**vdisk show detailed-stats**

Display detailed statistics. Role required: admin, limited-admin.

vdisk show stats [{pool pool-name | pool pool-name device-group devgrp-spec}] [device device-spec] [interval interval] [count count]

Periodically list I/O statistics for one or more virtual disk devices. If no pools or device-groups are specified, statistics for all virtual disk devices on the system are displayed. Specifying count sets the number of iterations to display. Specifying interval sets the amount of time between iterations. The possible combinations of count and interval create the following results:

- Neither count nor interval is specified: The system displays a single iteration of statistics.
- Both count and interval are specified: The system displays count number of iterations at the specified interval.
- If count is specified, but interval is not: The system displays count number of iterations at a default interval of two seconds.
- If interval is specified, but count is not: The system displays vdisk stats at the specified interval until the command is terminated manually.

Role required: admin, limited-admin.

### Example 243

**vdisk show stats interval 2 count 3**

<table>
<thead>
<tr>
<th>Device</th>
<th>Ops/s</th>
<th>Read</th>
<th>Read</th>
<th>Write</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ops/s</td>
<td>KiB/s</td>
<td>Ops/s</td>
<td>KiB/s</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>vdisk-dev1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Start Time: 09/03 14:09:53</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval: 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Ops/s</th>
<th>Read</th>
<th>Read</th>
<th>Write</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ops/s</td>
<td>KiB/s</td>
<td>Ops/s</td>
<td>KiB/s</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>vdisk-dev1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Start Time: 09/03 14:09:55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval: 2</td>
</tr>
</tbody>
</table>

**Dell EMC DD OS Command Reference Guide**
Example 243  (continued)

<table>
<thead>
<tr>
<th>Device</th>
<th>Ops/s</th>
<th>Read</th>
<th>Read</th>
<th>Write</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>vdisk-dev1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Start Time: 09/03 14:09:57
Interval: 2

<table>
<thead>
<tr>
<th>Device</th>
<th>Ops/s</th>
<th>Read</th>
<th>Read</th>
<th>Write</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>vdisk-dev1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>vdisk-dev6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Argument definitions

**count count**

The number of iterations of statistics to display.

**device device-spec**

A list of devices that uses wildcards, such as “vdisk-dev*”.

**device-group devgrp-spec**

A collection of virtual disk devices.

**endpoint-spec**

A list of endpoints that uses a wildcard, such as “endpoint*”.

**interval interval**

A time window (waiting time) within which to show virtual disk I/O statistics for virtual disk devices

**pool-name**

A virtual disk pool name of up to 32 characters.

**vdisk static-image**

Manage static images for devices.

A static image is a point-in-time copy of data for a vdisk device. Static images are created within a device group. You can copy (but not move) static images to other device groups. When you create a static image, it has the same pre-compression size as the original vdisk device. As you create more static images, the pre-compression sizes of the static image files adds to the pre-compression size of the containing Mtree. Likewise, the compression ratio is affected by creating the static image files. This behavior means that you can set Mtree quotas based on the sizes of the devices and their associated static images.

A static image contains:

- A point-in-time copy of application data for a vdisk device.
- Additional metadata inserted by the vdisk feature.
Attach an existing static image to a specified destination device. This command fails if a static image is already attached to the specified destination device. Role required: admin, limited-admin.

The attach and detach command options let you organize static images by associating them with a specific device, device group, or pool. When a static image becomes detached, it is still available for use, but it is not visible if you run vdisk static-image show commands and you filter the output by device.

Attaching a static image to a device does not imply that the device is using the image, and does not alter the current set of active data. The attach operation only associates the static image with the device, for purposes of organizing the static images.

Copy an existing static image to a specified destination. Role required: admin, limited-admin.

Create a new static image of a device and attach the static image to the same device, to a different device, or to a specified device group in a specified pool. Role required: admin, limited-admin.

Delete a static image. Specify the device, pool, or device-group where the static image resides to delete a single copy if there are multiple copies of the static image. Role required: admin.

Detach a static image from a device. Role required: admin, limited-admin.

Show detailed information about all or specified static images. All users may run this command option.

List all or specified static images. All users may run this command option.

**Argument definitions**

**device-group**
A collection of virtual disk devices that you can use to manage the devices as a group. Device groups exist in virtual disk pools. Device group namespaces are limited to the virtual disk pool that contains the device group. Device group names may be up to 32 characters in length. The maximum number of device groups per pool is 1024. The maximum number of device groups per system is 5120.

**device-group-name**
A virtual disk device group name of up to 32 characters.

**device-name**
The name of the virtual disk device.

**pool-name**
A virtual disk pool name of up to 32 characters.
The name of a static image that is the source for a copy operation. The system generates these names automatically; use `vdisk static-image show list` to see the names.

The name of a static image.

A list of static image names that uses a wildcard (*).

**vdisk status**

Show the status of the vdisk service. The output shows whether the vdisk service is enabled or disabled; whether the vdisk process is running; and whether the system has a license for the vdisk feature. Role required: admin, limited-admin.

**vdisk trace**

Manage tracing for virtual disk groups, initiators, and other components.

Disable tracing for all or specified components. Role required: admin, limited-admin.

Enable tracing for all or specified components. By default, tracing applies to all components. If you specify a component, tracing is limited to that component, where applicable. Role required: admin, limited-admin.

Show tracing for all or specified components. All users may run this command option.

**Argument definitions**

Specify all, default, or specific vdisk components from this list: abnormal, device-io, fs-op, hba, obj_mgmt, procmon, scsi-other, scsi-reg, scsitgt, sms-op, sys-mgmt, threads, and work-item. The default list is used by default.

Tracing level. The default is medium.

Timeout for tracing. The default timeout is 10 minutes.

**vdisk user**

Manages user privilege to access and perform tasks on virtual disks.

Let the specified users work with virtual disks. Separate each user name in `user-list` with a comma. Role required: admin, limited-admin.
Revoke the permission for the specified users to work with virtual disks. Role required: admin, limited-admin.

vdisk user show
List the virtual disk users and the pools to which each user is assigned. All users may run this command option.

**Argument definitions**

**vdisk-user**

An authorized virtual disk user who is associated (registered) with a virtual disk pool. This user may manage all virtual disk objects that are associated with the pool.
CHAPTER 45

vtl

DD Virtual Tape Library (VTL) is a licensed software option that enables backup applications to connect to and manage a DD system as a virtual tape library.

VTL pools are MTree-based (as of DD OS 5.2). Multiple MTrees let you more closely configure DD OS for data management. MTree-based pools allow MTree replication to be used instead of directory replication. Existing pools are backward compatible. You may create additional backward-compatible pools as needed. VTL pool-based replication is performed using MTree replication for MTree pools, and directory replication for backward-compatible pools. MTree-specific attributes can be applied to each VTL pool individually and include snapshots and snapshot schedules, compression information, and migration policies.

The recommended number of concurrent virtual tape drive instances is platform-dependent, as is the recommended number of streams between a DD system and a backup server. This number is system-wide and includes streams from all sources, such as VTL, NFS, and CIFS. For details on the recommended number of tape drives and data streams, see the DD OS Administration Guide.

**Note:** VTL does not protect virtual tapes from a filesys destroy, which will delete all virtual tapes.

This chapter contains the following topics:

- **vtl change history** .................................................................................................................. 416
- **vtl add** .................................................................................................................................. 416
- **vtl cap** .................................................................................................................................. 416
- **vtl config** .............................................................................................................................. 417
- **vtl debug** .............................................................................................................................. 419
- **vtl del** .................................................................................................................................. 420
- **vtl disable** ............................................................................................................................. 421
- **vtl drive** ................................................................................................................................ 421
- **vtl enable** ............................................................................................................................. 422
- **vtl export** .............................................................................................................................. 422
- **vtl group** ................................................................................................................................ 423
- **vtl import** ............................................................................................................................. 425
- **vtl option** ............................................................................................................................. 426
- **vtl pool** ................................................................................................................................ 427
- **vtl readahead** ....................................................................................................................... 429
- **vtl rename** ............................................................................................................................ 429
- **vtl reset** ................................................................................................................................ 429
- **vtl show** ................................................................................................................................ 430
- **vtl slot** .................................................................................................................................. 431
- **vtl status** .............................................................................................................................. 431
- **vtl tape** .................................................................................................................................. 431
vtl change history

There have been no changes to this command in this release.

vtl add

vtl add vtl [model model] [slots num-slots] [caps num-caps]
Add a tape library. VTL supports a maximum of 64 libraries per DD system (that is, 64 VTL instances on each DD system). Role required: admin, limited-admin.

Argument Definitions

caps num-caps
The number of cartridge-access ports. The default is zero (0), and the maximum is 100 per library or 1000 per system.

model model
The name of the tape library model. See the technical note for the model name that corresponds with your backup software.

slots num-slots
The number of slots in the library. You cannot add more drives than the number of configured slots. The maximum number of slots for all VTLs on a DD system is 32,000. The default is 20 slots.

vtl
The name of the particular virtual tape library.

vtl cap

vtl cap add vtl [count num-caps]
Add cartridge access ports (CAPs) to a virtual tape library (VTL). The total number of CAPs cannot exceed 100 per library or 1000 per system. Role required: admin, limited-admin.

vtl cap del vtl [count num-to-del]
Delete num-to-del CAPs from a VTL. The CAPs are deleted from the end. Role required: admin, limited-admin.

Example 244

To delete CAPs 8-10 on a VTL with 10 CAPs:

# vtl cap del vtl1 count 3

Argument Definitions

count num-caps
The number of cartridge-access ports to add. The default is 1.

count num-to-del
The number of objects to delete. The default is 1.
The name of the particular virtual tape library.

vtl config

vtl config export [vtl vtl] output-file filename
Export a VTL configuration to a file pathname. Role required: admin, limited-admin.

vtl config import [vtl vtl] [check-only] [skip-initiators] [retain-serial-numbers] [on-error {continue | stop}] input-file filename
Import a VTL configuration from a file pathname. Role required: admin, limited-admin.

Argument Definitions

check-only
This option:

- Uses the schema to validate the XML Configuration File.
- Validates the names of the following:
  - groups
  - initiators
  - endpoints
  - devices (changers, drives)
- Checks the format of the initiator system name.
- Checks whether the initiator_address_method element value belongs to one of the following:
  - SCSITGTD_INITIATOR_ADDRESS_METHOD_UNKNOWN
  - SCSITGTD_INITIATOR_ADDRESS_METHOD_AUTO
  - SCSITGTD_INITIATOR_ADDRESS_METHOD_VSA
- Checks whether the initiator_transport and endpoint_transport elements values belong to one of the following:
  - SCSITGTD_TRANSPORT_UNKNOWN
  - SCSITGTD_TRANSPORT_FC
  - SCSITGTD_TRANSPORT_FCOE
  - SCSITGTD_TRANSPORT_ISCSI
  - SCSITGTD_TRANSPORT_DUMMY
  - SCSITGTD_TRANSPORT_ALL
- Checks that the values of the following elements are BOOLEAN values (0,1 which mean FALSE and TRUE, respectively.)
  - endpoint_enabled_status
  - endpoint_online_status
  - auto_offline_option (global)
  - auto_eject_option (global)
  - vtl_auto_eject_option
- vtl_auto_offline_option
  - Validates the drive numbers.
    - Checks for repeated occurrences of the drive number.
    - Checks to make sure that the drive number does not exceed the maximum drive number allowed on the protection system.
  - Makes sure that the value of the VTL barcode length is appropriate, based on the model of the library.
  - Does not commit the transactions or does not import any of the VTL configuration.
  - When the retain-serial-numbers option is used, checks for the following:
    - whether the protection system on which the `vtl config import retain-serial-numbers` is being used already has some VTL devices. If yes, it gives you an error.
    - validates the devices serial numbers.

**input-file filename**

The input file. Note that:
- The filename will be automatically appended with an .xml extension and stored in the `/ddvar/etc/vtl_configuration_files` directory.
- An .xml extension can also be provided explicitly. Any other extension will cause an error.

**on-error {continue | stop}**

Indicates what to do when an error occurs. For `stop`, the command stops, and all of the VTL configurations imported prior to the error remains, but no additional configurations are imported.

For `continue`, the action depends on the item being modified:
- Groups
  - If an error occurs while creating a group, and the group already exists, the command continues to create the next group.
  - For any other errors, the process stops.
- Endpoints
  - If an error occurs while renaming an endpoint, the command continues to configure the next endpoint.
- Initiators
  - If an error occurs while renaming an initiator, or setting an initiator alias, the command continues to configure the next initiator.
  - If an error occurs while adding an initiator to a group, the command continues to configure the next initiator.
- VTL-specific library options
  - If an error occurs while configuring any of the options, the command continues to configure the next option.
- Devices
  - Changers
    - If an error occurs while creating a changer, the command continues to configure the next VTL.
If an error occurs while adding a changer to a group, the command continues to add the changer to other groups.

- Drives
  - If an error occurs while adding a drive, the command continues to add the next drive.
  - If an error occurs while adding a drive to a group, the command continues to add the drive to other groups.

- Options
  - If an error occurs while enabling/disabling a VTL option, the command continues to configure the next option.

**output-file filename**

The output file. Note that:

- The filename will be automatically appended with an .xml extension and stored in the /ddvar/etc/vtl_configuration_files directory.
- An .xml extension can also be provided explicitly. Any other extension will cause an error.

**retain-serial-numbers**

Preserves serial numbers while creating devices on a DD system, but only when there are no pre-existing devices on that DD system. If the serial number of a device is changed in the XML configuration file, then the vdev_id of that device should also be changed to an appropriate value, because the serial number of a device is dependent on the vdev_id.

**skip-initiators**

Indicates:

- Skip renaming initiators, if initiators with the same system names already exist.
- Skip setting initiator aliases.
- Skip adding initiators to groups.

**vtl**

The name of the particular virtual tape library.

### vtl debug

**vtl debug disable [component {all | user | default | component-list}]**

Disable debug functionality of the specified components. Role required: admin, limited-admin.

**vtl debug enable [component {all | user | default | component-list}] [level {high | medium | low}] [timeout {never | timeout-value-in-minutes}]**

Enable debug functionality for the specified components in persistent mode or for a specified timeout period (in minutes) at a specified debug level. Role required: admin, limited-admin.

**vtl debug show [component {all | user | default | component-list}]**

Show specified components, or all components, running debug functionality. Role required: admin, limited-admin, security, user, backup-operator, none.

**Argument Definitions**

**component {all | user | default | component-list}**

The VTL debugging components. If you want to list them, you can include one or more of the following:
vhba
scst
fc
ddcl
vtc
vmc
vtlprocess
group
vscsi
vtlsm
vtc_readahead
info_cache
persistent_reservations
master_client
master_server
worker_client
worker_server
vdev_thread
registry
misc

**Note:** Components **master_client**, **master_server**, **worker_client**, and **worker_server** are used only for GDA, which is no longer supported as of 5.4.

*level* {high | medium | low}
   The degree of VTL debugging verbosity.

*timeout* {never | timeout-value-in-minutes}
   Determines the length of time (in minutes, if specified) that debugging should remain enabled for the specified components.

**vtl del**

*vtl del vtl*
Remove an existing VTL. Any tapes loaded into the library when the library is deleted are not destroyed. Instead, tapes are placed back into the virtual tape vault. Role required: admin.

**Argument Definitions**

*vtl*
   The name of the particular virtual tape library.
vtl disable

vtl disable
Close all libraries and shut down the VTL process. Role required: admin, limited-admin.

vtl drive

vtl drive add vtl [count num-drives] [model model]
Add drives to a VTL. Drives are added by starting with drive number 1 and scanning for logical unit address gaps left by vtl drive del. When the gaps are filled, the drives are appended to the end of the library. The number of slots within a library cannot be fewer than the number of drives in the library. If an attempt is made to add more drives than the current number of slots, the system automatically adds the additional slots required. Be aware that you cannot mix drive models within the same library. Role required: admin, limited-admin.

vtl drive del vtl drive drive-number [count num-to-del]
Delete virtual drives from a VTL. Any drive can be deleted, which means there can be gaps in the drive list. This may cause issues with some applications. Role required: admin, limited-admin.

vtl drive show {serial-number serial-number | vtl vtl [drive {drive-list}]}
View details of VTL drives. Role required: admin, limited-admin, security, user, backup-operator, none.

Output Definitions

Location
Standard format location of library or drive.

Serial #
Drive serial number.

Vendor
Drive vendor identification.

Product
Drive product identification.

Product revision
Drive product revision.

Status
Drive status.

Barcode
Barcode of loaded tape.

Pool
Pool of loaded tape.

Previous Slot
Previous slot of loaded tape.

Device
SCSI device ID.
**Persistent Reservation**
Persistent reservation information.

**Access Groups**
Fibre Channel access groups for device.

**Argument Definitions**

- `count num-drives`
  The number of drives to add. The default is 1.

- `count num-to-del`
  The number of objects to delete. The default is 1.

- `drive drive-list`
  The list of drives.

- `drive drive-number`
  The number of the VTL drive.

- `model model`
  The name of the tape library model. See the technical note for the model name that corresponds with your backup software.

- `serial-number serial-number`
  The serial number.

- `vtl`
  The name of the particular virtual tape library.

---

**vtl enable**

Enable the VTL subsystem. Before VTL can be enabled:

- You must have at least one Fibre Channel (FC) interface card installed on your DD system. VTL communicates between a backup server and a DD system through an FC interface.
- You must have previously enabled the file system and scsitarget features.
- You must have set the record (block) size for the backup software on the application host; the minimum is 64 KiB or larger. Changing the block size after the initial configuration may render unreadable any data written in the original size.

**Note:** VTL Fibre Channel operation is expected to be interrupted when VTL Fibre Channel endpoints failover. You may need to perform discovery (that is, operating system discovery and configuration of VTL devices) on the initiators using the affected Fibre Channel endpoint. You should expect to re-start active backup and restore operations.

Role required: admin, limited-admin.

---

**vtl export**

Remove tapes from a slot, drive, or cartridge-access port (CAP) and send them to the vault. Role required: admin, limited-admin, backup-operator.
**Argument Definitions**

**address**
The address.

**count count**
The number of tapes.

**vtl**
The name of the particular virtual tape library.

---

**vtl group**

vtl group add group-name initiator initiator-alias-or-WWPN
Add an initiator alias or world-wide port name to the specified VTL access group. Role required: admin, limited-admin.

vtl group add group-name vtl vtl-name {all | changer | drive drive-list} [lun lun] [primary-port {all | none | port-list}] [secondary-port {all | none | port-list}]
Add a changer or drives to the specified VTL access group. You can add a changer or drive, optionally starting at a given logical unit number (LUN). You can optionally specify primary and secondary DD system VTL port lists. By default, the port lists contain all DD system VTL ports. Role required: admin, limited-admin.

vtl group create group-name
Create a VTL access group with the specified name. After the group is created, VTL devices (changer or drive) and initiators may then be added to the group. Role required: admin, limited-admin.

vtl group del group-name initiator initiator-alias-or-WWPN
Remove an initiator alias or world-wide port name from the specified VTL access group. Role required: admin, limited-admin.

vtl group del group-name vtl vtl-name {all | changer | drive drive-list}
Remove one or more devices from an access group. This immediately removes access from the specified initiator to the VTL devices within the group. Role required: admin, limited-admin.

vtl group destroy group-name
Remove the specified empty VTL access group. Before you can destroy a group, run vtl group del to remove the initiators and devices from the group. Role required: admin, limited-admin.

vtl group modify group-name vtl vtl-name {all | changer [lun lun] | drive drive [lun lun]} [primary-port {all | none | port-list}] [secondary-port {all | none | port-list}]
Modify an access group without removing and replacing devices or initiators in the group. You can use this command to change LUN assignments and primary and secondary port assignments. (Clients can access only selected LUNs from a DD system.) The main purpose of this command is to change group port assignments. VTL group changes may require the media server to rescan the SCSI bus, or you can reset the link with scsitarget endpoint connection-reset. Role required: admin, limited-admin.

vtl group rename src-group-name dst-group-name
Rename a VTL access group. The dst-group-name must not already exist. Be aware that this does not interrupt active sessions. Role required: admin, limited-admin.

vtl group show [ all | vtl vtl | group-name ]
Show information about VTL access groups. Role required: admin, limited-admin, security, user, backup-operator, none.
vtl group use group-name [vtl vtl-name {all | changer | drive drive-list}] {primary | secondary}

Switch ports in use for the specified changer in a group or library to the primary or secondary port list for the specified changer or drives. This immediately changes the access path to the primary or secondary port for the selected VTL components in an access group. When the path is restored, this will return the group to its primary port list. After you apply a group to new VTL ports, you may need to rescan the media server’s SCSI bus. Also, a backup application may need to rescan available SCSI devices. This interrupts any current access to the specified group and is intended to be used during path failures. To return a group to the primary port list after the path is repaired, run vtl group use primary. Role required: admin, limited-admin.

Argument Definitions

**drive drive-list**
The list of drives.

**dst-group-name**
The name of the destination group.

**group-name**
The VTL group name, which must follow these rules:
- It must be unique
- It can contain only the characters 0-9, a-z, A-Z, underscore, and hyphen.
- It cannot exceed 256 characters.
- It cannot be a reserved name: TapeServer, default, all, and summary.
- A maximum of 2,048 groups is allowed.

**initiator initiator-alias-or-WWPN**
The initiator alias or world-wide port name.

**lun lun**
The device address to pass to the initiator. The maximum logical unit number (LUN) is 16383. A LUN must be unique within a group, but does not have to be unique across the system. LUNs for VTL devices within a group must start with zero (0) and be contiguous numbers.

**port port-list**
Includes a comma-separated list of DD system VTL ports. You can specify port names as a range separated by a hyphen (-). The ports must already exist. For multiple ports, separate each name with a comma, and enclose the list with double quotes.

**primary-port**
The primary VTL ports on which the devices are visible. By default, or if you specify all, the VTL devices are visible on all ports. Specify none if the devices should not be visible on any ports.

**secondary-port**
The secondary VTL ports on which devices are visible to vtl group use secondary. By default, the devices are visible on all ports. The secondary port list supports path redundancy.

**src-group-name**
The name of the source group.
vtl

The name of the particular virtual tape library.

vtl import

vtl import vtl barcode barcode [count count] [pool pool] [element {drive | cap | slot}] [address addr]

Move tapes from the vault into a slot, drive, or CAP (cartridge access port). Use vtl tape show to display the total number of slots for a VTL and to view which slots are currently used. Use commands from the backup server to move VTL tapes to and from drives. Although vtl import can move tapes into tape drives, backup software commands from the backup server are more frequently used to move VTL tapes to and from drives. The default address is 1, the default element is slot, and the default pool is Default. If no address is specified, the first free slot available is used. For example if slots 1 through 4 are occupied or reserved, the address used will be 5. If the address you specify is already in use, the first free slot that is larger than the address specified is used.

The number of tapes that can be imported at one time is limited by:

- The number of empty slots. You cannot import more tapes than the number of currently empty slots.
- The number of slots that are empty and not reserved for a tape currently in a drive.
- If a tape is in a drive and the tape origin is known to be a slot, the slot is reserved.
- If a tape is in a drive and the tape origin is unknown (slot or CAP), a slot is reserved.
- A tape that is known to have come from a CAP and that is in a drive does not get a reserved slot. (The tape returns to the CAP when removed from the drive.)

The number of tapes that can be imported equals:

- The number of empty slots.
- The number of tapes that came from slots.
- The number of tapes of unknown origin.

Role required: admin, limited-admin, backup-operator.

The following two commands are equivalent:

```bash
# vtl import VTL1 barcode TST010L1 count 5
# vtl import VTL1 barcode TST010L1 count 5 element slot address 1
```

**Argument Definitions**

**address**

The address.

**barcode barcode**

An eight-character virtual tape identifier. The first six characters are numbers or uppercase letters (0-9, A-Z). The last two characters are the tape code for the supported tape type: L1 (LTO-1, 100 GiB, the default capacity), LA (LTO-1, 50 GiB), LB (LTO-1, 30 GiB), LC (LTO-1, 10 GiB), L2 (LTO-2, default capacity of 200 GiB), L3 (LTO-3, default capacity of 400 GiB), L4 (LTO-4, default capacity of 800 GiB), L5 (LTO-5, default capacity of 1.5 TiB).
The default capacities are used if you do not specify the capacity argument when creating the tape cartridge. If you do specify a capacity, it will override the two-character tag.

When using count and barcode together, use a wild card character in the barcode to make the count valid. An asterisk matches any character in that position and all other positions. A question mark matches any character in that position.

Note: L1, LA, LB and LC tapes cannot be written on LTO-3 tape drives. L2 and L3 tapes cannot be read on LTO-1 tape drives. Also, LTO-4 will not read L2 tapes (in addition to the LA-L1 tapes).

count count
   The number of tapes.

element
   The destination element.

pool pool
   The name of the pool. This argument is required if tapes are in a pool.

vtl
   The name of the particular virtual tape library.

vtl option

vtl option disable option name [vtl vtl ]
Disable a VTL option. Optionally, you can do this only for the specified VTL. Role required: admin, limited-admin.

vtl option enable option name [vtl vtl ]
Enable a VTL option. Optionally, you can do this only for the specified VTL. Role required: admin, limited-admin.

vtl option reset option name [vtl vtl ]
Reset a VTL option to its default value. Optionally, you can do this only for the specified VTL. Role required: admin, limited-admin.

vtl option set option name value [vtl vtl ]
Set an option and value. Optionally, you can do this only for the specified VTL. Role required: admin, limited-admin.

vtl option show {option name | all} [vtl vtl]
Show settings for a specific option, all VTL options, or only for the specified VTL. Also, lists any serial-number-prefixes that are different from the default values. Role required: admin, limited-admin, security, user, backup-operator, none.

# vtl option show all
Global Options:
Name                      Value
--------------------      --------
auto-eject                disabled
auto-offline              disabled
barcode-length            8
serial-number-prefix      798612
---------------------     --------
Options for library: lib1
Name                      Value
--------------------      ------
Argument Definitions

Values for option name are:

- **auto-eject**
  If enabled, tapes placed into CAPs are automatically ejected to the vault.

- **auto-offline**
  If enabled, tapes being moved from a drive causes the drive to be automatically taken offline and unloaded unless the prevent bit is set for the drive.

- **barcode-length**
  Allows you to explicitly set the length – to either 6 or 8 – of the tape barcode that the library will report to the initiator/client.
  
  By default (when barcode-length is not set), the library reports the length of the barcode depending on the type of library. For example, if tape AAA001L3 is put in an L180, DDVTL, or RESTORER-L180 library, the library will report this tape to the initiator/client as AAA001. If the same tape is placed in a TS3500, I2000, or I6000 library, the library will report this tape to the initiator/client as AAA001L3.
  
  However, if you do specify the barcode-length, for example, vtl option set barcode-length 6 vtl my_ts3500_library on a TS3500 library, then the barcode will be reported to the initiator/client as AAA001, which is the same length as for an L180 library.

- **loop-id - deprecated**
  The Fibre Channel loop ID: 1-26. This value has been deprecated and will be removed in future releases. To set the loop ID on a protection system, enter a number between 1 and 26 in the value field of scsitarget transport option set.

- **serial-number-prefix**
  The prefix of the serial number, which can be modified globally or per library.

vtl pool

vtl pool add pool [backwards-compatibility-mode]
Create a VTL pool. If backwards-compatibility-mode is used, a pool with backwards compatibility is created in the default directory (/backup). It is recommended that you create backwards-compatibility pools only if you have specific requirements, for example, replication with a pre-5.2 DD OS system. Replication of backwards-compatibility-mode pools is done using directory-based replication, as in previous releases. Role required: admin, limited-admin.

vtl pool del pool
Delete a VTL pool. You must run vtl tape del to remove all tapes from a pool, or use vtl tape move to move all tapes to another pool. Role required: admin.

vtl pool modify <pool-name> data-movement-policy {user-managed | age-threshold <days> | none} to-tier {cloud} cloud-unit <unit-name>
Configure the data movement policy and cloud unit information for the specified VTL pool. Role required: admin, limited-admin.

vtl pool rename src-pool dst-pool
Rename a VTL pool. A pool can be renamed only if none of its tapes is in a library. Role required: admin, limited-admin.
vtl pool show {all | pool}
List all tape pools or the contents of a specific pool. If all is used, a summary of all tape pools is provided, including the storage tier unit-name, the cloud data movement policy, the state of each pool, the number of tapes, the total usage and compression for each pool, whether a pool is a replication destination, the Retention Lock status of the pool, read/write properties, and the number of tapes in the pool. Role required: admin, limited-admin, security, user, backup-operator, none.

Output Definitions

**RW**
Pool has normal read/write properties.

**RD**
Pool is a replication destination.

**RO**
Pool is read-only.

**RLCE**
Pool is Retention Lock Compliance Enabled.

**RLGE**
Pool is Retention Lock Governance Enabled.

**RLGD**
Pool is Retention Lock Governance Disabled.

**BCM**
Pool is in backwards-compatibility mode.

vtl pool upgrade-to-mtree {pool-list | all} [check-only]
Upgrade a VTL pool(s) to an MTree pool(s). If pool-list (a colon-separated list) is specified, all pools in the list are candidates for upgrade. If all is specified, all backwards-compatibility mode pools are upgraded. If check-only is specified, the precheck is run, but no upgrade is performed, so that you can plan for these changes prior to the upgrade. If no arguments are provided, a check is made to see if an upgrade is necessary or possible. If so, the upgrade is performed, which converts the specified backwards-compatibility mode pools to MTree pools. An upgrade may be run only when VTL is disabled.

A directory pool will be converted to an MTree pool only if the following prerequisites are met:

- The directory pool must not be a replication source or destination.
- The file system must not be full.
- The file system must not have reached the maximum number of MTrees allowed (100).
- There must not already be an MTree with the same name.
- If the directory pool is being replicated to an older DD OS (for example, from DD OS 5.5 to DD OS 5.4), it cannot be converted. As a workaround:
  - Replicate the directory pool to a second protection system.
  - Replicate the directory pool from the second protection system to a third protection system.
  - Remove the second and third protection systems from the managing protection system's protection network.
  - On any of the systems running DD OS 5.5, run the vtl pool upgrade-to-mtree command.
See the *DD OS Administration Guide* for more information about upgrading directory pools to MTree pools. Role required: admin, limited-admin.

Example 245

```
# vtl pool upgrade-to-mtree all
```

Example 246

```
# vtl pool upgrade-to-mtree old-pool check-only
```

**Argument Definitions**

- **dst-pool**
  - The name of the new VTL pool.

- **source src-pool**
  - The name of the current VTL pool.

**vtl readahead**

```
vtl readahead reset {stats | summary}
```

Reset VTL readahead information. When VTL reads a tape file, it improves performance by reading ahead information from tape files and caching the information until needed. Role required: admin, limited-admin.

```
vtl readahead show {stats | detailed-stats | summary}
```

Display readahead information about each open tape file that has been read. Role required: admin, limited-admin, security, user, backup-operator, none.

**Argument Definitions**

- **detailed-stats**
  - Provides detailed statistics.

- **stats**
  - Displays statistics.

- **summary**
  - Shows a summary of all tapes and tape usage.

**vtl rename**

```
vtl rename src-vtl dst-vtl
```

Rename a virtual tape library. The source name and the destination name must differ. Role required: admin, limited-admin.

**vtl reset**

```
vtl reset hba - deprecated
```

This command is deprecated. Use `scsitarget endpoint connection-reset all` instead. Role required: admin.
vtl reset detailed-stats
Reset the VTL detailed statistics. Role required: admin, limited-admin.

vtl show

vtl show config [vtl]
Show the library name and model and tape drive model for a single VTL or all VTLs. Role required: admin, limited-admin, security, user, backup-operator, none.

vtl show detailed-stats
Show a large quantity of detailed VTL statistics and information. Role required: admin, limited-admin, security, user, backup-operator, none.

vtl show element-address [vtl]
Show the following information for all VTLs, or a single VTL:
- Starting element address
- Slot count and starting address
- CAP count and starting address
- Drive count and starting address
- Changer count and starting address
Role required: admin, security, user, backup-operator, none.

vtl show stats [port {port-list | all}] [interval secs] [count count]
Show VTL I/O stats. Role required: admin, limited-admin, security, user, backup-operator, none.

vtl show stats vtl [drive {drive-list | changer | all}] [port {port-list | all}] [interval secs] [count count]
Periodically list I/O statistics for one or more VTLs. If a VTL is not specified, statistics for all VTLs on the system are displayed. Specifying count sets the number of iterations to display. Specifying interval sets the amount of time between iterations. The possible combinations of count and interval create the following results:
- Neither count nor interval is specified: The system displays a single iteration of statistics.
- Both count and interval are specified: The system displays count number of iterations at the specified interval.
- If count is specified, but interval is not: The system displays count number of iterations at a default interval of two seconds.
- If interval is specified, but count is not: The system displays VTL stats at the specified interval until the command is terminated manually.
Role required: admin, limited-admin, security, user, backup-operator, none.

Argument Definitions

**count count**
The number of tapes.

**drive {drive-list | changer | all}**
Lets you include all drives, changer, or a list of drives.

**detailed-stats**
Provides detailed statistics.

**interval secs**
The time interval in seconds.
**vtl**

The name of the particular virtual tape library.

---

**vtl slot**

**vtl slot add vtl [count num-slots]**

Add slots to a VTL. Additional slots are added to the end of the list of slots in the specified VTL. The maximum is 32,000 slots per library and 64,000 slots per system. Role required: admin, limited-admin.

**vtl slot del vtl [count num-to-del]**

Delete one or more slots from a VTL. Role required: admin, limited-admin.

**Argument Definitions**

**count num-slots**

The number of slots to add to the library. You cannot add more drives than the number of configured slots. The default is 20 slots.

**count num-to-del**

The number of slots to delete from the library.

**vtl**

The name of the particular virtual tape library.

---

**vtl status**

**vtl status**

Show the state of the VTL process. Role required: admin, limited-admin, security, user, backup-operator, none.

---

**vtl tape**

**vtl tape add barcode [capacity capacity] [count count] [pool <pool>]**

Add one or more virtual tapes and insert them into the vault. Optionally, add the tapes to the specified pool. Role required: admin, limited-admin.

**vtl tape copy barcode barcode [count count] source src-pool [snapshot src-snapshot] destination dst-pool**

Copy tapes between VTL pools. An opened writable tape in a tape drive may not be copied. Additionally, source and destination pools cannot be the same unless copying from a snapshot. If the snapshot argument is specified, tapes are copied from the snapshot of the source pool. In this case, the destination pool can be the same as the source pool. A tape in the vault or library slot/cap, or opened read-only in a tape drive, can be copied. A tape that is opened writable in a tape drive may not be copied. Role required: admin, limited-admin, backup-operator.

```
# vtl tape copy barcode AA0000LC count 100 source replica-dest destination daily-restores
```
vtl tape del barcode [count count] [pool pool]
Delete the specified tape or one or more tapes. You cannot delete tapes that are in a VTL. Role required: admin.

**NOTICE** This command deletes all data on the tapes.

vtl tape deselect-for-move barcode <barcode> [count <count>] pool <pool>
to-tier {cloud}
Deselect a specified tape for migration to the cloud. Role required: admin, limited-admin.

vtl tape history delete
Delete all VTL tape history. Role required: admin, limited-admin.

vtl tape history disable
Disable all VTL tape history. Role required: admin, limited-admin.

vtl tape history enable
Enable all VTL tape history. Role required: admin, limited-admin.

vtl tape history show barcode [pool pool] [start-time MMDDhhmm[[CC]YY]]
[end-time MMDDhhmm[[CC]YY]]
Show history of move-related events for a given tape. Role required: admin, limited-admin, security, user, backup-operator, none.

vtl tape history status
Show current state of the VTL tape history feature. Role required: admin, limited-admin, security, user, backup-operator, none.

vtl tape modify barcode [count count] [pool pool] retention-lock {date | period}
Modify the state of retention lock of a specified tape or tapes. Change the amount of time to maintain the retention lock on the specified tape or tapes. If the volume is not mounted, the change is made immediately. Otherwise, data is synchronized first. This will fail if the file system is read-only. Role required: admin, limited-admin.

vtl tape modify barcode [count count] [pool pool] writeprotect {on | off}
Set the write protect state of a specified tape. If the volume is not mounted, the tape file permission is changed immediately. Otherwise, outstanding writes are synchronized first. Role required: admin, limited-admin.

vtl tape move vtl source {slot | drive | cap} {src-address-list | all}
destination {slot | drive | cap} {dst-address-list | auto}
Move one or more tapes between elements in a VTL. Values for src-address-list include: all, 1, 2-14, 3-5, 7-10. Values for dst-address-list include: 1, 2-14, 3-5, 7-10, and auto. You may specify the auto keyword only if moving from tapes from drives to slots. If auto is selected, VTL finds the previous slot the tape was in and moves it to that slot. If the slot is not empty, it moves the next available slot. Role required: admin, limited-admin, backup-operator.

vtl tape move barcode <barcode> [count count] source <src-pool>
destination <dst-pool>
Move a tape between VTL pools if it is in the vault, or in a library slot or CAP. It cannot be moved between VTL pools if the tape is open in a drive, or if it is one of the following kinds of tapes:

- Tapes open in a drive
- Tapes on a replica
- Tapes configured with Retention Lock

Role required: admin, limited-admin.

vtl tape recall start barcode <barcode> [count <count>] pool <pool>
Recall a tape from the cloud. Role required: admin, limited-admin.
vtl tape select-for-move barcode <barcode> [count <count>] pool <pool> to-tier {cloud}

Select a specified tape for migration to the cloud. Role required: admin, limited-admin.

vtl tape show {all | pool <pool> | vault | vtl} [cloud-unit all | <unit-name>] [summary] [count <count>] [barcode <barcode>] [time-display {modification | creation | retention | recalled}] [sort-by {barcode | pool | location | state | capacity | usage | percentfull | compression | time | modtime}] [{ascending | descending}]

Display information about tapes, including modification, creation, retention, or recalled times. If time-display is omitted, the default is modification time for backward-compatibility-mode VTL pools. Modification times used by the system for age-based policies may differ from the last modified time displayed in the tape information sections of the GUI and CLI. This is expected behavior. Role required: admin, limited-admin, security, user, backup-operator, none.

**Argument Definitions**

**address**
The address.

**barcode barcode**
An eight-character virtual tape identifier. The first six characters are numbers or uppercase letters (0-9, A-Z). The last two characters are the tape code for the supported tape type: L1 (LTO-1, 100 GiB, the default capacity), LA (LTO-1, 50 GiB), LB (LTO-1, 30 GiB), LC (LTO-1, 10 GiB), L2 (LTO-2, default capacity of 200 GiB), L3 (LTO-3, default capacity of 400 GiB), L4 (LTO-4, default capacity of 800 GiB), L5 (LTO-5, default capacity of 1.5 TiB).

The default capacities are used if you do not specify the capacity argument when creating the tape cartridge. If you do specify a capacity, it will override the two-character tag.

When using count and barcode together, use a wild card character in the barcode to make the count valid. An asterisk matches any character in that position and all other positions. A question mark matches any character in that position.

**Note:** L1, LA, LB and LC tapes cannot be written on LTO-3 tape drives. L2 and L3 tapes cannot be read on LTO-1 tape drives. Also, LTO-4 will not read L2 tapes (in addition to the LA-L1 tapes).

**capacity capacity**
The number of gibibytes (GiB) for each tape created. This value overrides default barcode capacities. The upper limit is 4,000 GiB. For best results, when data becomes obsolete (and the DD system cleaning process marks data for removal), set capacity to 100 or less for efficient reuse of DD system disk space.

GiBs equal the base-2 value of Gigabytes (GB).

**count count**
The number of tapes.

**pool pool**
The name of the pool. This argument is required if tapes are in a pool.

**snapshot src-snapshot**
A specific snapshot within a source pool.

**source src-pool**
The name of the current VTL pool.
write-protect \{on | off\}
   Enables or disables write-protection for a tape.

cloud-unit \texttt{unit-name}
   The name of the cloud unit where the VTL vault resides.
Time Zones

This appendix covers the following topics:

- Time zones overview ................................................................. 436
- Africa ....................................................................................... 436
- America ................................................................................... 437
- Antarctica ............................................................................... 438
- Asia ......................................................................................... 438
- Atlantic ................................................................................... 439
- Australia ............................................................................... 439
- Brazil ....................................................................................... 439
- Canada .................................................................................... 440
- Chile ....................................................................................... 440
- Etc ......................................................................................... 440
- Europe .................................................................................... 440
- GMT ......................................................................................... 441
- Indian (Indian Ocean) ............................................................. 441
- Mexico ..................................................................................... 441
- Miscellaneous ......................................................................... 441
- Pacific ...................................................................................... 442
- US (United States) ................................................................. 442
- Aliases ..................................................................................... 442
## Time zones overview

Time zones are used to establish your location when you initially configure your system. Locate your time zone using the following tables.

A time zone can consist of two entries separated by a slash (/). The first entry can be a continent, nation, or region, such as Africa, the Pacific, or the United States. The second entry is the city closest to you within that area.

A time zone, and some miscellaneous entries such as GMT, Cuba, and Japan, can also be a single entry.

Examples of time zones include:

- Indiana/Indianapolis
- GMT+5
- Stockholm
- Pacific
- EasterIsland
- Japan

### Africa

**Table 4 African time zones**

<table>
<thead>
<tr>
<th>Abidjan</th>
<th>Accra</th>
<th>Addis_Ababa</th>
<th>Algiers</th>
<th>Asmara</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asmera</td>
<td>Bamako</td>
<td>Bangui</td>
<td>Banjul</td>
<td>Bissau</td>
</tr>
<tr>
<td>Blantyre</td>
<td>Brazzaville</td>
<td>Bujumbura</td>
<td>Cairo</td>
<td>Casablanca</td>
</tr>
<tr>
<td>Ceuta</td>
<td>Conakry</td>
<td>Dakar</td>
<td>Dar_es_Salaam</td>
<td>Djibouti</td>
</tr>
<tr>
<td>Douala</td>
<td>El_Aaiun</td>
<td>Freetown</td>
<td>Gaborone</td>
<td>Harare</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>Juba</td>
<td>Kampala</td>
<td>Khartoum</td>
<td>Kigali</td>
</tr>
<tr>
<td>Kinshasa</td>
<td>Lagos</td>
<td>Libreville</td>
<td>Lome</td>
<td>Luanda</td>
</tr>
<tr>
<td>Lubumbashi</td>
<td>Lusaka</td>
<td>Malabo</td>
<td>Maputo</td>
<td>Maseru</td>
</tr>
</tbody>
</table>
| Mbabane   | Mogadishu | Monrovia    | Nairobi | Ndjamen |}
| Niamey    | Nouakchott | Ouagadougou | Porto-Nov | Sao_Tome |
| Timbuktu  | Tripoli  | Tunis       | Windhoek |
### Table 5 American time zones

<table>
<thead>
<tr>
<th>Location</th>
<th>Time Zone</th>
<th>Location</th>
<th>Time Zone</th>
<th>Location</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adak</td>
<td>Anchorage</td>
<td>Anguilla</td>
<td>Antigua</td>
<td>Araguaina</td>
<td></td>
</tr>
<tr>
<td>Argentina/Buenos_Aires</td>
<td>Argentina/Catamarca</td>
<td>Argentina/ComoRivadavia</td>
<td>Argentina/Cordoba</td>
<td>Argentina/Juluy</td>
<td></td>
</tr>
<tr>
<td>Argentina/La_Rioja</td>
<td>Argentina/Mendoza</td>
<td>Argentina/Rio_Gallegos</td>
<td>Argentina/Salta</td>
<td>Argentina/San_Juan</td>
<td></td>
</tr>
<tr>
<td>Argentina/San_Luis</td>
<td>Argentina/Tucuman</td>
<td>Argentina/Ushuaia</td>
<td>Aruba</td>
<td>Asuncion</td>
<td></td>
</tr>
<tr>
<td>Atikokan</td>
<td>Atka</td>
<td>Bahia</td>
<td>Bahia_Banderas</td>
<td>Barbados</td>
<td></td>
</tr>
<tr>
<td>Belem</td>
<td>Belize</td>
<td>Blanc-Sablon</td>
<td>Boa_Vista</td>
<td>Bogota</td>
<td></td>
</tr>
<tr>
<td>Boise</td>
<td>Buenos_Aires</td>
<td>Cambridge_Bay</td>
<td>Campo_Grande</td>
<td>Cancun</td>
<td></td>
</tr>
<tr>
<td>Caracas</td>
<td>Catamarca</td>
<td>Cayenne</td>
<td>Cayman</td>
<td>Chicago</td>
<td></td>
</tr>
<tr>
<td>Chihuahua</td>
<td>Coral_Harbour</td>
<td>Cordoba</td>
<td>Costa_Rica</td>
<td>Creston</td>
<td></td>
</tr>
<tr>
<td>Cuiaba</td>
<td>Curacao</td>
<td>Danmarkshavn</td>
<td>Dawson</td>
<td>Dawson_Creek</td>
<td></td>
</tr>
<tr>
<td>Denver</td>
<td>Detroit</td>
<td>Dominica</td>
<td>Edmonton</td>
<td>Eirunepe</td>
<td></td>
</tr>
<tr>
<td>El_Salvador</td>
<td>Ensenada</td>
<td>Fort_Wayne</td>
<td>Fortaleza</td>
<td>Glace_Bay</td>
<td></td>
</tr>
<tr>
<td>Godthab</td>
<td>Goose_Bay</td>
<td>Grand_Turk</td>
<td>Grenada</td>
<td>Guadeloupe</td>
<td></td>
</tr>
<tr>
<td>Guatemala</td>
<td>Guayaquil</td>
<td>Guyana</td>
<td>Halifax</td>
<td>Havana</td>
<td></td>
</tr>
<tr>
<td>Hermosillo</td>
<td>Indiana/Indianapolis</td>
<td>Indiana/Knox</td>
<td>Indiana/Marengo</td>
<td>Indiana/Petersburg</td>
<td></td>
</tr>
<tr>
<td>Indiana/Tell_City</td>
<td>Indiana/Vevay</td>
<td>Indiana/Vincennes</td>
<td>Indiana/Winamac</td>
<td>Indianapolis</td>
<td></td>
</tr>
<tr>
<td>Inuvik</td>
<td>Iqaluit</td>
<td>Jamaica</td>
<td>Jujuy</td>
<td>Juneau</td>
<td></td>
</tr>
<tr>
<td>Kentucky/Louisville</td>
<td>Kentucky/Monticello</td>
<td>Knox_IN</td>
<td>Kralendijk</td>
<td>La_Paz</td>
<td></td>
</tr>
<tr>
<td>Lima</td>
<td>Los_Angeles</td>
<td>Louisville</td>
<td>Lower_Princes</td>
<td>Maceio</td>
<td></td>
</tr>
<tr>
<td>Managua</td>
<td>Manaus</td>
<td>Marigot</td>
<td>Martinique</td>
<td>Matamoros</td>
<td></td>
</tr>
<tr>
<td>Mazatlan</td>
<td>Mendoza</td>
<td>Menominee</td>
<td>Merida</td>
<td>Metlakatla</td>
<td></td>
</tr>
<tr>
<td>Mexico_City</td>
<td>Miquelon</td>
<td>Moncton</td>
<td>Monterrey</td>
<td>Montevideo</td>
<td></td>
</tr>
<tr>
<td>Montreal</td>
<td>Montserrat</td>
<td>Nassau</td>
<td>New_York</td>
<td>Nipigon</td>
<td></td>
</tr>
<tr>
<td>Nome</td>
<td>Noronha</td>
<td>North_Dakota/Beulah</td>
<td>North_Dakota/Center</td>
<td>North_Dakota/New_Salem</td>
<td></td>
</tr>
<tr>
<td>Ojinaga</td>
<td>Panama</td>
<td>Pangnirtung</td>
<td>Paramaribo</td>
<td>Phoenix</td>
<td></td>
</tr>
<tr>
<td>Port-au-Prince</td>
<td>Port_of_Spain</td>
<td>Porto_Acre</td>
<td>Porto_Velho</td>
<td>Puerto_Rico</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5 American time zones (continued)

<table>
<thead>
<tr>
<th>Rainy_River</th>
<th>Rankin_Inlet</th>
<th>Recife</th>
<th>Regina</th>
<th>Resolute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rio_Branco</td>
<td>Rosario</td>
<td>Santa_Isabel</td>
<td>Santarem</td>
<td>Santiago</td>
</tr>
<tr>
<td>Santo_Domingo</td>
<td>Sao_Paulo</td>
<td>Scoresbysund</td>
<td>Shiprock</td>
<td>Sitka</td>
</tr>
<tr>
<td>St_Barthelemy</td>
<td>St_Johns</td>
<td>St_Kitts</td>
<td>St_Lucia</td>
<td>St_Thomas</td>
</tr>
<tr>
<td>St_Vincent</td>
<td>Swift_Current</td>
<td>Tegucigalpa</td>
<td>Thule</td>
<td>Thunder_Bay</td>
</tr>
<tr>
<td>Tijuana</td>
<td>Toronto</td>
<td>Tortola</td>
<td>Vancouver</td>
<td>Virgin</td>
</tr>
<tr>
<td>Whitehorse</td>
<td>Winnipeg</td>
<td>Yakutat</td>
<td>Yellowknife</td>
<td></td>
</tr>
</tbody>
</table>

### Antarctica

#### Table 6 Antarctic time zones

<table>
<thead>
<tr>
<th>Casey</th>
<th>Davis</th>
<th>DumontDUrville</th>
<th>Macquarie</th>
<th>Mawson</th>
</tr>
</thead>
<tbody>
<tr>
<td>McMurdo</td>
<td>Palmer</td>
<td>Rothera</td>
<td>South_Pole</td>
<td>Syowa</td>
</tr>
<tr>
<td>Troll</td>
<td>Vostok</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Asia

#### Table 7 Asian time zones

<table>
<thead>
<tr>
<th>Aden</th>
<th>Almaty</th>
<th>Amman</th>
<th>Anadyr</th>
<th>Aqtau</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqtoe</td>
<td>Ashgabat</td>
<td>Ashkhabad</td>
<td>Baghdad</td>
<td>Bahrain</td>
</tr>
<tr>
<td>Baku</td>
<td>Bangkok</td>
<td>Beijing</td>
<td>Beirut</td>
<td>Bishkek</td>
</tr>
<tr>
<td>Brunei</td>
<td>Calcutta</td>
<td>Chita</td>
<td>Choibalsan</td>
<td>Chongqing</td>
</tr>
<tr>
<td>Chungking</td>
<td>Colombo</td>
<td>Dacca</td>
<td>Damascus</td>
<td>Dhaka</td>
</tr>
<tr>
<td>Dili</td>
<td>Dubai</td>
<td>Dushanbe</td>
<td>Gaza</td>
<td>Harbin</td>
</tr>
<tr>
<td>Hebron</td>
<td>Ho_Chi_Minh</td>
<td>Hong_Kong</td>
<td>Hovd</td>
<td>Irkutsk</td>
</tr>
<tr>
<td>Istanbul</td>
<td>Jakarta</td>
<td>Jayapura</td>
<td>Jerusalem</td>
<td>Kabul</td>
</tr>
<tr>
<td>Kamchatka</td>
<td>Karachi</td>
<td>Kashgar</td>
<td>Kathmandu</td>
<td>Katmandu</td>
</tr>
<tr>
<td>Khandyga</td>
<td>Kolkata</td>
<td>Krasnoyarsk</td>
<td>Kuala_Lumpur</td>
<td>Kuching</td>
</tr>
<tr>
<td>Kuwait</td>
<td>Macao</td>
<td>Macau</td>
<td>Magadan</td>
<td>Makassar</td>
</tr>
<tr>
<td>Manila</td>
<td>Muscat</td>
<td>Nicosia</td>
<td>Novokuznetsk</td>
<td>Novosibirsk</td>
</tr>
<tr>
<td>Omsk</td>
<td>Oral</td>
<td>Phnom_Penh</td>
<td>Pontianak</td>
<td>Pyongyang</td>
</tr>
<tr>
<td>Qatar</td>
<td>Qyzylorda</td>
<td>Rangoon</td>
<td>Riyadh</td>
<td>Saigon</td>
</tr>
<tr>
<td>Sakhalin</td>
<td>Samarkand</td>
<td>Seoul</td>
<td>Shanghai</td>
<td>Singapore</td>
</tr>
</tbody>
</table>
### Time Zones

#### Table 7 Asian time zones (continued)

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Taipei</th>
<th>Tashkent</th>
<th>Tbilisi</th>
<th>Tehran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Srednekolymsk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tel_Aviv</td>
<td>Thimbu</td>
<td>Thimphu</td>
<td>Tokyo</td>
<td>Ujung_Pandang</td>
</tr>
<tr>
<td>Ulaanbaatar</td>
<td>Ulan_Bator</td>
<td>Urumqi</td>
<td>Ust-Nera</td>
<td>Vientiane</td>
</tr>
<tr>
<td>Vladivostok</td>
<td>Yakutsk</td>
<td>Yekaterinburg</td>
<td>Yerevan</td>
<td></td>
</tr>
</tbody>
</table>

#### Atlantic

#### Table 8 Atlantic time zones

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Azores</th>
<th>Bermuda</th>
<th>Canary</th>
<th>Cape_Verde</th>
<th>Faeroe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faroe</td>
<td>Azores</td>
<td>Bermuda</td>
<td>Canary</td>
<td>Cape_Verde</td>
<td>Faeroe</td>
</tr>
<tr>
<td>St_Helena</td>
<td>Faroe</td>
<td>Jan_Mayen</td>
<td>Canary</td>
<td>Reykjavik</td>
<td>South_Georgia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Madeira</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Australia

#### Table 9 Australian time zones

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>ACT</th>
<th>Adelaide</th>
<th>Brisbane</th>
<th>Broken_Hill</th>
<th>Canberra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currie</td>
<td>Currie</td>
<td>Darwin</td>
<td>Eucla</td>
<td>Hobart</td>
<td>LHI</td>
</tr>
<tr>
<td>Lindeman</td>
<td>Lindeman</td>
<td>Lord Howe</td>
<td>Melbourne</td>
<td>NSW</td>
<td>North</td>
</tr>
<tr>
<td>Perth</td>
<td>Perth</td>
<td>Queensland</td>
<td>South</td>
<td>Sydney</td>
<td>Tasmania</td>
</tr>
<tr>
<td>Victoria</td>
<td>Victoria</td>
<td>West</td>
<td>Yancowinna</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Brazil

#### Table 10 Brazilian time zones

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Acre</th>
<th>DeNoronha</th>
<th>East</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acre</td>
<td>DeNoronha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Canada

**Table 11** Canadian time zones

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic</td>
<td>Central</td>
<td>East-Saskatchewan</td>
<td>Eastern</td>
</tr>
<tr>
<td>Mountain</td>
<td>Newfoundland</td>
<td>Pacific</td>
<td>Saskatchewan</td>
</tr>
<tr>
<td>Yukon</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Chile

**Table 12** Chilean time zone

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continental</td>
<td>Easter Island</td>
</tr>
</tbody>
</table>

## Etc

**Table 13** Etc time zones

<table>
<thead>
<tr>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
<th>Time Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMT</td>
<td>GMT+0</td>
<td>GMT+1</td>
<td>GMT+2</td>
<td>GMT+3</td>
<td></td>
</tr>
<tr>
<td>GMT+4</td>
<td>GMT+5</td>
<td>GMT+6</td>
<td>GMT+7</td>
<td>GMT+8</td>
<td></td>
</tr>
<tr>
<td>GMT+9</td>
<td>GMT+10</td>
<td>GMT+11</td>
<td>GMT+12</td>
<td>GMT0</td>
<td></td>
</tr>
<tr>
<td>GMT-0</td>
<td>GMT-1</td>
<td>GMT-2</td>
<td>GMT-3</td>
<td>GMT-4</td>
<td></td>
</tr>
<tr>
<td>GMT-5</td>
<td>GMT-6</td>
<td>GMT-7</td>
<td>GMT-8</td>
<td>GMT-9</td>
<td></td>
</tr>
<tr>
<td>GMT-10</td>
<td>GMT-11</td>
<td>GMT-12</td>
<td>GMT-13</td>
<td>GMT-14</td>
<td></td>
</tr>
<tr>
<td>Greenwich</td>
<td>UCT</td>
<td>Universal</td>
<td>UTC</td>
<td>Zulu</td>
<td></td>
</tr>
</tbody>
</table>

## Europe

**Table 14** European time zones

<table>
<thead>
<tr>
<th>Location</th>
<th>Location</th>
<th>Location</th>
<th>Location</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amsterdam</td>
<td>Andorra</td>
<td>Athens</td>
<td>Belfast</td>
<td>Belgrade</td>
</tr>
<tr>
<td>Berlin</td>
<td>Bratislava</td>
<td>Brussels</td>
<td>Bucharest</td>
<td>Budapest</td>
</tr>
<tr>
<td>Busingen</td>
<td>Chisinau</td>
<td>Copenhagen</td>
<td>Dublin</td>
<td>Gibraltar</td>
</tr>
<tr>
<td>Guernsey</td>
<td>Helsinki</td>
<td>Isle_of_Man</td>
<td>Istanbul</td>
<td>Jersey</td>
</tr>
<tr>
<td>Kaliningrad</td>
<td>Kiev</td>
<td>Lisbon</td>
<td>Ljubljana</td>
<td>London</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Madrid</td>
<td>Malta</td>
<td>Mariehamn</td>
<td>Minsk</td>
</tr>
<tr>
<td>Monaco</td>
<td>Moscow</td>
<td>Nicosia</td>
<td>Oslo</td>
<td>Paris</td>
</tr>
<tr>
<td>Podgorica</td>
<td>Prague</td>
<td>Riga</td>
<td>Rome</td>
<td>Samara</td>
</tr>
</tbody>
</table>
Table 14 European time zones (continued)

<table>
<thead>
<tr>
<th>San_Marino</th>
<th>Sarajevo</th>
<th>Simferopol</th>
<th>Skopje</th>
<th>Sofia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockholm</td>
<td>Tallinn</td>
<td>Tirane</td>
<td>Tiraspol</td>
<td>Uzhgorod</td>
</tr>
<tr>
<td>Vaduz</td>
<td>Vatican</td>
<td>Vienna</td>
<td>Vilnius</td>
<td>Volgograd</td>
</tr>
<tr>
<td>Warsaw</td>
<td>Zagreb</td>
<td>Zaporozhye</td>
<td>Zurich</td>
<td></td>
</tr>
</tbody>
</table>

GMT

Table 15 GMT time zones

<table>
<thead>
<tr>
<th>GMT</th>
<th>GMT+1</th>
<th>GMT+2</th>
<th>GMT+3</th>
<th>GMT+4</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMT</td>
<td>GMT+5</td>
<td>GMT+6</td>
<td>GMT+7</td>
<td>GMT+8</td>
</tr>
<tr>
<td>GMT+10</td>
<td>GMT+11</td>
<td>GMT+12</td>
<td>GMT+13</td>
<td>GMT-1</td>
</tr>
<tr>
<td>GMT-2</td>
<td>GMT-3</td>
<td>GMT-4</td>
<td>GMT-5</td>
<td>GMT-6</td>
</tr>
<tr>
<td>GMT-7</td>
<td>GMT-8</td>
<td>GMT-9</td>
<td>GMT-10</td>
<td>GMT-11</td>
</tr>
<tr>
<td>GMT-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Indian (Indian Ocean)

Table 16 Indian (Indian Ocean) time zones

<table>
<thead>
<tr>
<th>Antananarivo</th>
<th>Chagos</th>
<th>Christmas</th>
<th>Cocos</th>
<th>Comoro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerguelen</td>
<td>Mahe</td>
<td>Maldives</td>
<td>Mauritius</td>
<td>Mayotte</td>
</tr>
<tr>
<td>Reunion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mexico

Table 17 Mexican time zones

<table>
<thead>
<tr>
<th>BajaNorte</th>
<th>BajaSur</th>
<th>General</th>
</tr>
</thead>
</table>

Miscellaneous

Table 18 Miscellaneous time zones

<table>
<thead>
<tr>
<th>Arctic/Longyearbyen</th>
<th>CET</th>
<th>CST6CDT</th>
<th>Cuba</th>
<th>EET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>Eire</td>
<td>EST</td>
<td>EST5EDT</td>
<td>Factory</td>
</tr>
<tr>
<td>GB</td>
<td>GB-Eire</td>
<td>Greenwich</td>
<td>Hongkong</td>
<td>HST</td>
</tr>
</tbody>
</table>
Table 18 Miscellaneous time zones (continued)

<table>
<thead>
<tr>
<th>Iceland</th>
<th>Iran</th>
<th>Israel</th>
<th>Jamaica</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwajalein</td>
<td>Libya</td>
<td>MET</td>
<td>MST</td>
<td>MST7MDT</td>
</tr>
<tr>
<td>Navajo</td>
<td>NZ</td>
<td>NZ-CHAT</td>
<td>Poland</td>
<td>Portugal</td>
</tr>
<tr>
<td>PRC</td>
<td>PST8PDT</td>
<td>ROC</td>
<td>ROK</td>
<td>Singapore</td>
</tr>
<tr>
<td>Turkey</td>
<td>UCT</td>
<td>Universal</td>
<td>UTC</td>
<td>WET</td>
</tr>
<tr>
<td>W-SU</td>
<td>Zulu</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pacific

Table 19 Pacific time zones

<table>
<thead>
<tr>
<th>Apia</th>
<th>Auckland</th>
<th>Chatham</th>
<th>Chuuk</th>
<th>Easter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efate</td>
<td>Enderbury</td>
<td>Fakaofo</td>
<td>Fiji</td>
<td>Funafuti</td>
</tr>
<tr>
<td>Galapagos</td>
<td>Gambier</td>
<td>Guadalcanal</td>
<td>Guam</td>
<td>Honolulu</td>
</tr>
<tr>
<td>Johnston</td>
<td>Kirimiti</td>
<td>Kosrae</td>
<td>Kwajalein</td>
<td>Majuro</td>
</tr>
<tr>
<td>Marquesas</td>
<td>Midway</td>
<td>Nauru</td>
<td>Niue</td>
<td>Norfolk</td>
</tr>
<tr>
<td>Noumea</td>
<td>Pago_Pago</td>
<td>Palau</td>
<td>Pitcairn</td>
<td>Pohnpei</td>
</tr>
<tr>
<td>Ponape</td>
<td>Port_Moresby</td>
<td>Rarotonga</td>
<td>Saipan</td>
<td>Samoa</td>
</tr>
<tr>
<td>Tahiti</td>
<td>Tarawa</td>
<td>Tongatapu</td>
<td>Truk</td>
<td>Wake</td>
</tr>
<tr>
<td>Wallis</td>
<td>Yap</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

US (United States)

Table 20 US (United States) time zones

<table>
<thead>
<tr>
<th>Alaska</th>
<th>Aleutian</th>
<th>Arizona</th>
<th>Central</th>
<th>East-Indiana</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>Hawaii</td>
<td>Indiana-Starke</td>
<td>Michigan</td>
<td>Mountain</td>
</tr>
<tr>
<td>Pacific</td>
<td>Pacific-New</td>
<td>Samoa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Aliases

GMT=Greenwich, UCT, UTC, Universal, Zulu CET=MET (Middle European Time) Eastern=Jamaica Mountain=Navajo