Dell EMC ECS: Using Veritas Enterprise Vault

Abstract
This document explains how to use Dell EMC™ ECS™ object storage with Veritas™ Enterprise Vault™.

April 2019
Revisions

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<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>October 2018</td>
<td>Release 8</td>
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Author: Paul McKeown

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# Table of contents

Revisions ........................................................................................................................................... 2
Acknowledgements ............................................................................................................................. 2
Table of contents ............................................................................................................................... 3
Executive summary ............................................................................................................................. 5
Audience ................................................................................................................................................ 5
Terminology ......................................................................................................................................... 5

1 Solution overview ............................................................................................................................ 6
   1.1 ECS Streamer overview .................................................................................................................. 6
   1.2 ECS: multi-protocol, API-accessible storage .................................................................................. 7
       1.2.1 Simple multi-tenancy .............................................................................................................. 7
       1.2.2 Multi-site, active-active architecture and access .................................................................. 7

2 ECS configuration details ................................................................................................................. 8
   2.1 Namespace compliance ................................................................................................................. 8

3 ECS Streamer installation ................................................................................................................ 11
   3.1 Download the ECS Streamer driver ............................................................................................. 11

4 ECS Streamer configuration ............................................................................................................. 13
   4.1 Add ECS as a storage option in Enterprise Vault ............................................................... 13
   4.2 Configuring a ECS Streamer-based Enterprise Vault Store partition ..................................... 13
       4.2.1 Host property ....................................................................................................................... 15

5 ECS Streamer driver details ............................................................................................................. 19
   5.1 Network ports .............................................................................................................................. 19
   5.2 Retention ....................................................................................................................................... 19
       5.2.1 Retention policies ................................................................................................................ 19
   5.3 WORM and NON-WORM support ............................................................................................. 19
   5.4 Safe Copy Check .......................................................................................................................... 20
   5.5 Support of large partition listings ............................................................................................... 21
   5.6 Handling failed ECS nodes .......................................................................................................... 21
   5.7 Windows performance monitoring support .................................................................................. 21
       5.7.1 Global counter object ............................................................................................................ 22
       5.7.2 Instance counter object ....................................................................................................... 22
       5.7.3 Process counter object ......................................................................................................... 23
       5.7.4 Reset performance monitor maximum counters: EVResetPerf.exe .................................. 24
       5.7.5 Log-level registry value to troubleshoot performance monitor support ............................. 24

6 Troubleshooting .............................................................................................................................. 26
   6.1 Windows event log ...................................................................................................................... 26
# Table of contents

6.2 Fiddler ....................................................................................................................... 27  
6.3 DebugView ................................................................................................................ 31  
6.4 ECSCHECK.EXE ......................................................................................................... 33  
  6.4.1 Test dtquery ......................................................................................................... 35

7 Supported environments ............................................................................................... 36  
  7.1 Veritas Enterprise Vault .......................................................................................... 36

8 Streamer release information ......................................................................................... 37

9 Performance information ............................................................................................... 39  
  9.1 Testing configuration .............................................................................................. 39  
  9.2 Results .................................................................................................................... 39

A Technical support and resources .................................................................................. 40  
  A.1 Related resources .................................................................................................... 40
Executive summary

To support Dell EMC™ ECS™ object storage with Veritas™ Enterprise Vault™, the Dell EMC Streamer driver is used to translate the Veritas Streamer API to the ECS S3 API. This allows content to be archived from Enterprise Vault servers to ECS, as well as queried, restored, and deleted. The ECS Streamer driver leverages the ECS S3 API extensions for retention support and for replication status checking required by Enterprise Vault.

This document discusses how to configure Enterprise Vault to use ECS as an archive target.

Audience

This document is intended for storage administrators and Dell EMC professional services personnel who wish to learn how to deploy and configure ECS object storage with Veritas Enterprise Vault.

Terminology

**EV**: Veritas Enterprise Vault  
**S3**: Simple Storage Service (API)  
**LB**: IP Network Load Balancer  
**VDC**: ECS Virtual Data Center  
**Bucket**: Logical unit of storage on an ECS system in which objects (including their metadata) are stored
1 Solution overview

This section provides an overview of the integration of ECS with Veritas Enterprise Vault and the key technologies used.

1.1 ECS Streamer overview

Veritas has developed a Storage Streamer API for Enterprise Vault (EV) which archive storage vendors must integrate with to allow Enterprise Vault to archive files, email, and other items to their storage systems. Dell EMC has developed the ECS Storage Streamer driver to allow Veritas Enterprise Vault to archive to ECS. The ECS Streamer driver translates the Streamer API calls to the ECS S3 API.

Customers can now create Vault Store partitions of type ECS Streamer within the Veritas Enterprise Vault VAC. These Vault Store partitions are associated with S3 buckets on the ECS cluster where files archived to the Vault Store will reside.

ECS buckets reside within ECS namespaces that may be compliant or non-compliant namespaces. Both compliant and non-compliant namespaces allow retention to be propagated from Enterprise Vault to the ECS cluster, however compliant namespaces store archive data in tamper-resistant storage which meets strict SEC 17a-4(f) rules for electronic record-keeping.

Figure 1 Example of an ECS-based storage solution for Veritas Enterprise Vault

The Veritas Enterprise Vault system has archive policies that archive files to a Vault Store in which an ECS based partition has been defined. The ECS Streamer driver uses the ECS S3 API to store/access objects in the S3 bucket on the ECS cluster.

ECS systems are clusters of 4 or more individual ECS nodes. Customers can use the ECS Streamer built in load balancer (from revision 2.0) to distribute I/O across all nodes in the ECS cluster or deploy an IP Load Balancer to distribute I/O.
1.2 ECS: multi-protocol, API-accessible storage

ECS is a massively scalable, software-defined object storage platform that enables any organization to store, access and manipulate unstructured data as objects. ECS provides support for industry standard APIs such as Amazon S3. In addition, ECS extends the Amazon S3 API with support for retention, byte range updates and atomic appends.

1.2.1 Simple multi-tenancy

ECS delivers a flat software architecture ideal for multi-tenant environments. Configuring, provisioning, creating a namespace and managing a multitenant platform has never been easier. Key metrics and reporting are provided for capacity, object count, objects created, objects deleted and inbound/outbound bandwidth. These activities are all visible via the ECS GUI and through the REST API.

1.2.2 Multi-site, active-active architecture and access

ECS features a truly geo-efficient architecture that stores, distributes and protects data both locally and geographically. This eliminates any single point of failure and provides seamless failover from site to site with no impact to the business. ECS automatically maximizes throughout, maintains high availability and data durability, and increases capacity and the reliability of applications. In terms of geographic limitations – there are none – providing users with a single global namespace with anywhere access to content.

Today’s modern applications demand a different architecture. Managing both cost and accessibility as storage environments grow and become more complex is one of the biggest challenges organizations face today. Developers are finding it easier to go to public cloud alternatives putting data at risk and increasing management costs. ECS provides a cloud-scale storage architecture that is specifically designed to support modern applications with unparalleled availability, protection, simplicity and scale.
2 ECS configuration details

How the ECS is configured (for example, the number of ECS nodes, number of VDCs, GEO protection, and application location access) is decided by the solution architect designing the ECS configuration, and for the most part, Veritas Enterprise Vault is unaware of the design. However, the solution architect should take into account the compliance requirements of the customer’s Enterprise Vault solution.

2.1 Namespace compliance

If the customer wishes to have an SEC-compliant solution, the namespace that the buckets (that all Enterprise Vault partitions will use) should be configured as compliant.

When creating the namespace in the ECS Management GUI, ensure the Compliance option is selected.

Figure 2 Namespace creation

When using ECS buckets in a compliant ECS namespace, to meet SEC 17-A4 requirements, be aware of the following potential issues when choosing between WORM and NON-WORM partition types.
NON-WORM mode EV partitions

If you are setting an ECS Streamer partition to NON-WORM mode, EV will not write objects with any retention period even if you are setting a retention period in the EV Retention Category. If you are using NON-WORM partitions, it is likely that you should not be using a compliant ECS namespace.

WORM mode

If you are using a compliant namespace, you must give a minimum of a one-second retention to the bucket retention value. This means you must set the following option after the Host IP address when creating the ECS Streamer Partition:

DISABLE_WRITE_TEST

If you do not set this option, the ECS Streamer will fail connectivity checking because it will create an object and then delete it as part of its checks. This create/delete will occur within one second and will fail and cause the connectivity check fail.

Revision 2.0.1 of the ECS Streamer driver will check if there is a retention period set on the bucket, and if so, it will not perform the write test.

ECS Bucket default retention setting

Create the bucket for the EV Vault Store in the compliant Namespace.

Ensure that the Bucket Retention is set to a value that does not conflict with any Enterprise Vault Retention Category. This must be set, or an error will occur when you attempt to create the bucket.

Administrators should take care when setting the ECS bucket-level retention. Enterprise Vault will expect to be able to delete expired content and although EV will cleanly handle deletion errors on content that is still under ECS retention, it will post and error in the Microsoft® Windows® Event log.

If a customer is using a NON-WORM EV partition it is recommended that ECS bucket level retention is not applied as EV will expect all the savesets written to the partition to have no retention.
Consideration should be given to the interaction between Enterprise Vault and bucket-level retention if more than one second is used for Enterprise Vault Partitions.
3 ECS Streamer installation

3.1 Download the ECS Streamer driver

Use the following procedure to Download the ECS Streamer driver.

1. Go to www.dell.com/support to locate the ECS Streamer installer.
2. Once you have downloaded the ECS Streamer driver onto the Veritas Enterprise Vault server, double-click the installation file and it will install itself.
3. The first time you install the ECS Streamer on a EV server, it will prompt you to install the Microsoft Visual C++ 2017 redistributable.

4. Click Next to install the ECS Streamer driver and click through the remaining screens to finish the installation.
The ECS Streamer driver should be installed on all Enterprise Vault servers.

If you are re-installing the ECS Streamer driver, you may be required to reboot your Enterprise Vault servers.
4 ECS Streamer configuration

4.1 Add ECS as a storage option in Enterprise Vault

Refer to the following procedure on the Veritas support web site:

This procedure is only required to be performed on one Enterprise Vault server instance.

**Note:** With Enterprise Vault revision 12.3, the ECS Streamer driver configuration files (not the ECS Streamer Driver itself) are already included in the EV 12.3 distribution and this task does not need to be performed.

Always check with the Veritas document linked above in case Veritas have made any changes to this procedure.

4.2 Configuring a ECS Streamer-based Enterprise Vault Store partition

1. In the VAC, expand the Enterprise Vault Site and Vault Store Groups and right-click the Vault Store you wish to create a new Vault Store Partition for. Click New > Partition and click Next.
2. Choose an appropriate Name and Description and click Next.
3. Choose Dell EMC Elastic Cloud Storage from the Storage Type drop-down menu. Click Next.

![New Partition menu](image)

Figure 5 New Partition menu

4. Enter the connectivity details for the ECS cluster to be connected to and select **Test** to check the configuration details.
Figure 6  Partition definition

Table 1  Partition properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOST</td>
<td>Enter the IP address or FDQN of the LB service. See section 4.2.1.</td>
</tr>
<tr>
<td>Port</td>
<td>Default 9020. Enter the port number being used for data connection to the ECS (or Load Balancer).</td>
</tr>
<tr>
<td>Bucket Name</td>
<td>Enter the name of the ECS bucket to be used.</td>
</tr>
<tr>
<td></td>
<td>ECS buckets used by Enterprise Vault should not be file system enabled.</td>
</tr>
<tr>
<td>Access Key</td>
<td>Enter the ECS access key (object user) to be used.</td>
</tr>
<tr>
<td>Secret Key</td>
<td>Enter the Access key secret key.</td>
</tr>
<tr>
<td>Safe Copy Check</td>
<td>0 or 2. See section 5.4. Do not use option 1.</td>
</tr>
<tr>
<td>Use proxy</td>
<td>Set to 0 if no proxy is being used or to the port the proxy is using.</td>
</tr>
</tbody>
</table>

5. Click the Test button to perform a check of the configuration settings. If you get an error, recheck the settings as entered. Also check what errors are being logged in the Windows Event Log.

The namespace property is only used in the dtquery request (used when safe copy check is 2, see the section below). The namespace property is irrelevant to the actual archiving process and it is not used in S3 object requests. The object user is globally unique and belongs to a namespace, therefore the namespace is implicitly identified.

6. If the Test is successful, click Next.
7. In the next GUI form, select the appropriate WORM setting for the partition. The ECS Streamer driver has been validated for NON-WORM and well as WORM Enterprise Vault partitions, check or uncheck this radio button appropriately.
8. Complete the forms that follow as required.

4.2.1 Host property

With revision 2.0.1.1, it is possible to specify a comma-separated list of ECS Node IP or FQDN addresses as the Host value in the Partition Configuration GUI. See the following examples:

U300-01.lab.emc.com,U300-02.lab.emc.com,U300-03.lab.emc.com,U300-04.lab.emc.com

10.0.0.1,10.0.0.2,10.0.0.3,10.0.0.4

You may also specify an IP address range, for example:

10.0.0.1-10.0.0.8

When specifying the host addresses or range, use of the ECS Streamer driver internal IP Load Balancer is enabled.

The ECS Streamer driver will not attempt to auto-discover any other ECS Node IPs when a list or range is specified.

If you do use the ;LB=true option, the ECS streamer driver will auto-discover all Node IPs and ignore your list or range.

With version 1.0.10 of the Dell ECS Streamer driver, some additions were made to the syntax of the Host property to allow the administrator to set some internal settings of the Dell ECS Streamer driver. The options are as follows:

- MAX_TRIES
- DISABLE_WRITE_TEST
- MAX_CONNS
- DTHOST
- RDT
- SHOWCHUNKS
- LB=true
- DONT_TEST_STOPPING
- IGNORE_BAD_COMMON_NAME
ECS Streamer configuration

To use the options, the Host IP (or name) must come first and the other options can be specified using a semicolon separator in <name>=<value> format, for example:

10.1.83.51;MAX_TRIES=2;MAX_CONNS=25;DISABLE_WRITE_TEST=1

With revision 2.0.2.1 of the ECS streamer driver, you may just specify the value to have it set to 1 (or true). The following example is the same as the prior example:

10.1.83.51;MAX_TRIES=2;MAX_CONNS=25;DISABLE_WRITE_TEST

4.2.1.1 MAX_TRIES
When any server failure response is received, the Streamer will attempt a total of 5 tries by default before returned bad status to Evault. There is a standard exponential back-off algorithm between retries. This value can be overridden by the MAX_TRIES option which must be greater than 0 and less than 5.

4.2.1.2 MAX_CONNS
This controls the maximum number of simultaneous safe copy checks that can occur at one time. The default is 65 as of revision 1.0.14 of the Streamer driver. Customers should not need to change this number, but it may be set between 2 and 100.

Note: As of revision 2.0 of the Streamer driver, this setting is ignored if used.

4.2.1.3 DISABLE_WRITE_TEST
When creating a Vault Store Partition for the first time when there is a Temporary Site Outage (TSO), the tests performed when the user clicks on the Test button will fail because of the TSO. We recommend that you do not create Vault Store Partitions while a TSO is in effect, but if needed, set DISABLE_WRITE_TEST=1 to disable the test. With revision 2.0.2.1 of the Streamer driver, you need only specify DISABLE_WRITE_TEST to set the flag to 1.

Additionally, if you are using a compliance namespace, you should disable the write test. When the ECS Streamer checks connectivity, it writes a test object and deletes it to check connectivity. This will occur in less than one second which would cause even a one-second bucket-retention setting on a bucket to fail the deletion. The ECS Streamer would then report an error to Enterprise Vault.

With revision 2.0.1, the ECS Streamer driver will check if there is a retention period set on the bucket, and if so, it will not perform the write test.

4.2.1.4 DTHOST=<hostname> or <IP>
This allows the user to specify the endpoint for the DTQUERY geo replication checking to a different host than the one specified for the Vault Store partition. This should only be changed under the instruction of Dell EMC support personnel.

RDT=1

This will set &random=<someUniqueGuid> to the end of the DTQUERY URL to make sure the URL response is never cached. The <someUniqueGuid> is never reused to ensure the request URL is unique. Although additional flags are now used in the request constructor to prevent caching, but this variation is still available for use. This is added to revision 1.0.14 of the Streamer driver.
**4.2.1.5 SHOWCHUNKS=1**

This will include the chunkIDs and chunk ranges for files written in the DTRACE log, only if the files were archived to the bucket-owning site. Do not enable this unless told to by Dell EMC support personnel. If enabled, there will be an effect on performance. This is added to revision 1.0.14 of the Streamer driver.

**4.2.1.6 LB=true**

With revision 2.0.0, the ECS Streamer driver has a built-in load balancer which obviates the need to use an IP load balancer with the ECS Streamer driver to ensure that all nodes in an ECS VDC are used. To use the built-in LB, specify ;LB=true after the IP Address prompt (and any other parameter being used).

```
10.1.83.51;LB=true
```

The IP address must be of an ECS node in the VDC, and the ECS Streamer will auto-discover the IP addresses of all the ECS nodes in the VDC. The IP address must not be an IP load balancer. Any firewall between the EV server and the ECS must open ports 9020/9021 and 9101 for HTTP, HTTPS and HTTP traffic, respectively.

If you are using IP addresses and SSL certificates with your ECS or IP load balancer, ensure that the ECS node IP addresses are include in the certificates SANs.

An example of a SAN in a certificate is as follows

```
IP Address=10.1.83.51
IP Address=10.1.83.52
IP Address=10.1.83.53
IP Address=10.1.83.54
DNS Name=*.company.com
DNS Name=**.*.company.com
```

On Windows 10 or Windows Server® 2016, using IP addresses for an SSL connection is acceptable.

If the system is Windows Server 2012 R2 or earlier, it will fail because it does not recognize that the IP address is in the certificate.

This means that for Windows Server 2016, it is possible to use the LB option:

```
Host property: 10.1.83.51;LB=1
```

For earlier versions of Windows, you will need to use the fully qualified DNS name, such as:

```
Host property:
ecsn1.company.com,ecsn2.company.com,ecsn3.company.com,ecsn4.company.com
```

With revision 2.0.2.1 of the ECS Streamer driver, you need only specify ;LB to enable IP load balancing.

**4.2.1.7 DONT_TEST_STOPPING**

This will disable the streamer INIT check which tests if the EV Storage Service is up. Only set this is instructed by Dell EMC support.

**4.2.1.8 IGNORE_BAD_COMMON_NAME**

Normally when establishing an HTTPS connection, the connection will fail if the host name provided does not match the name in the certificate, for example, when using an IP address.
With Streamer revision 2.0.2.1, if you are using an older version of Windows Server, you can use the “IGNORE_BAD_COMMON_NAME” option in the host parameter to allow the connection to succeed.

10.1.83.51;LB;IGNORE_BAD_COMMON_NAME
5 ECS Streamer driver details

5.1 Network ports
The following network ports are used to communicate between the Enterprise Vault Server and ECS.

<table>
<thead>
<tr>
<th>Port number</th>
<th>Port detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>9101</td>
<td>Required to perform the Enterprise Vault “safe copy” check. TCP to the ECS</td>
</tr>
<tr>
<td>9020 or 9021</td>
<td>Non-SSL or SSL data connection port</td>
</tr>
</tbody>
</table>

If the customer uses an IP Load Balancer they may choose to use different HTTP or HTTPS ports from the Enterprise Vault server to the IP Load Balancer. Ports used should be configured in any IP Load Balancer for TCP to the ECS nodes.

At the present, port 9101 cannot be mapped to another port by any Load Balancer being used.

5.2 Retention
Enterprise Vault allows users to associate EV retention policies to archived objects, files, email, or other data. The ECS Streamer driver provides Enterprise Vault with the capability of associating these EV retention policies with the objects stored on the ECS. The ECS object store will enforce the objects retention and will not allow objects to be deleted until its retention has expired.

Objects archived to ECS cannot have their retention shortened or extended by Enterprise Vault.

Enterprise Vault will not apply retention periods to objects stored in a Dell ECS Streamer Partition that is configured as NON-WORM.

5.2.1 Retention policies
The ECS Streamer driver does not support ECS retention policies.

5.3 WORM and NON-WORM support
Veritas defines WORM and NON-WORM as follows:

**WORM**: Enterprise Vault will set the retention period defined in an Enterprise Vault Retention Category to the objects written to a ECS Streamer Partition.

**NON-WORM**: Enterprise Vault will not set the retention period defined in an Enterprise Vault Retention Category to the objects written to an ECS Streamer Partition.

When a NON-WORM partition is created, this allows the following:

- Even if a Vault Store is using a Retention Category that has a retention period, users using the Enterprise Vault Search Browser can select a document(s) for deletion and as there is no-retention on the object(s) on the ECS, the ECS will allow the deletion to succeed. Administrators, for example,
use this to set documents to be Retained Forever in Enterprise Vault so that the Enterprise Vault Expiration Task will not be run on the Partition but still allow users to delete individual documents.

- Enterprise Vault Administrators can change the retention period of a Retention Category and can shorten it. Subsequent runs of the Enterprise Vault Expiration Task will act on the newly shortened retention period and will attempt to delete the content which will succeed as there is no retention on the object on the ECS.

ECS 3.x is supported as a WORM or NON-WORM enabled Enterprise Vault archive device for EV11 and EV12. When any Veritas Vault Store Partition is created and uses the ECS Streamer driver, check the box shown in Figure 8 to enable WORM storage, or uncheck the box to use NON-WORM.

![New Partition](image)

This setting cannot be changed once the Partition has been created.

### 5.4 Safe Copy Check

Enterprise Vault has a **Safe Copy Check** feature which can be enabled by customers at the Vault Store level. This check is to ensure that content archived by Enterprise Vault is not replaced in its original location by an HTM link until it has been backed up to a second archive device via the devices replication functionality.

This approach is commonly used by customers who use archive devices with replication functionality that have an eventual consistency model. With Dell EMC Centera™, for example, it can be several minutes before replication has created the second copy of the archive content and the Safe Copy Check is commonly used.

ECS implements a strong consistency model and the latencies that exist in the Centera replication queues do not exist in ECS. Customer can be assured that an object that is written to one Virtual Data Centre in a Replication Group will also be available to all other Virtual Data Centers in that Replication Group. The more advanced multi-site architecture implemented by ECS therefore eliminates the need for the Enterprise Vault “Safe Copy” verification.

The concept of a safe copy means that an archived object is geo replicated on a secondary VDC. However, within a VDC, archived files are always stored in a resilient manner (such as Erasure coding and a copy). Please read the ECS storage documentation for more information.

At the present, the ECS S3 API does not support safe copy check, however the ECS Streamer driver has been written to accommodate this in future revisions of the ECS S3 API. Customers who wish to perform this check will need to specify option 2 described in Table 3. This will cause the ECS Streamer driver to use...
dtQuery to perform the check. It is anticipated that in the future when the ECS S3 API supports the safe copy check, it will be more efficient and will use the same port as the EMC S3 API.

If safe copy check is set to 2, the dtQuery request to validate a safe archive copy (such as Geo replication) will be sent. The test will only check that a valid response is received.

The ECS streamer does not control the message in the failure alert window. ECS streamer will attempt to log a specific reason.

Should a customer wish to use the Enterprise Vault safe copy check, they can enable this as before on the Vault Store and then choose option 2. This check uses port 9101 and this must be considered when planning Load Balancers and Firewalls. The port 9101 is fixed and cannot be mapped to another. This is set on the Partition setup management GUI.

The following table shows the three possible values for the Safe Copy Check parameter.

<table>
<thead>
<tr>
<th>Value</th>
<th>Has object been replicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Always return TRUE</td>
</tr>
<tr>
<td>1</td>
<td>DO NOT USE. Reserved for future use.</td>
</tr>
<tr>
<td>2</td>
<td>Uses the ECS dtQuery check to determine replication status and returns TRUE or FALSE appropriately.</td>
</tr>
</tbody>
</table>

5.5 Support of large partition listings
When Enterprise Vault has asked for an enumeration of the objects in a partition, the previous 2.x versions of the streamer would collect the entire listing before returning to Enterprise Vault with the first object. This fails if there are a lot of objects to list. This version will gather objects in groups of 1,000. This means that the first object is returned much faster, but it insures that the request will not time out waiting for all the objects to be fetched.

5.6 Handling failed ECS nodes
If the Streamer driver detects that an ECS node has failed or become unavailable, the Streamer will mark the node as bad and will retry the I/O on another node.

The Streamer will retry the unavailable ECS node after 12 minutes with Streamer rev 2.0.3.1, and 2 hours with previous revisions.

5.7 Windows performance monitoring support
With ECS Streamer revision 2.0.5.1, support for Windows performance counters has been added.

There are three new Performance Monitor counter objects:

- Dell EMC EV Streamer: Global counters
- Dell EMC EV Streamer Instance: Only available if the streamer is currently active
- Dell EMC EV Streamer Process: Only available if the streamer is currently active

These counter objects allow the user to see the current activity going on with the streamer.
5.7.1 Global counter object

The global counters show the aggregation of all the streamer instances and connections.

Table 4 Global object counter

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes Received (bytes/sec)</td>
<td>The data rate (bytes/sec) received from ECS.</td>
</tr>
<tr>
<td>Bytes Sent (bytes/sec)</td>
<td>The data rate (bytes/sec) sent to ECS.</td>
</tr>
<tr>
<td>EV Request Rate</td>
<td>Request Rate (operations/second) from EVault. This is the aggregation of all requests coming from EVault.</td>
</tr>
<tr>
<td>Init Request Rate</td>
<td>Init Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Write Request Rate</td>
<td>Write Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Read Request Rate</td>
<td>Read Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Retention Request Rate</td>
<td>Update Retention Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Metadata Request Rate</td>
<td>Update Metadata Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Info Request Rate</td>
<td>Info Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Delete Request Rate</td>
<td>Delete Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Capacity Request Rate</td>
<td>Capacity Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Start Request Rate</td>
<td>Enum Start Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Next Request Rate</td>
<td>Enum Next Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum End Request Rate</td>
<td>Enum End Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Test Request Rate</td>
<td>Test Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Streamer Instances</td>
<td>Number of simultaneous Streamer Instances</td>
</tr>
<tr>
<td>Max Streamer Instances</td>
<td>Maximum number of simultaneous Streamer Instances</td>
</tr>
<tr>
<td>Current Requests</td>
<td>Number of simultaneous requests from EVault</td>
</tr>
<tr>
<td>Max Current Requests</td>
<td>Maximum number of simultaneous requests from EVault</td>
</tr>
<tr>
<td>Connection Cache Size</td>
<td>Number of connections in Connection Cache</td>
</tr>
<tr>
<td>Max Connection Cache Size</td>
<td>Maximum number of connections in Connection Cache</td>
</tr>
<tr>
<td>Max Configured Connections</td>
<td>This value reflects the configured number of MAX_CONNS.</td>
</tr>
</tbody>
</table>

5.7.2 Instance counter object

The Instance counters break that down into a list of streamer instances. The instances are named as follows:

<host>,<bucket>,<partition>

It may be possible for there to be more than one instance with the same ID. This can happen, for instance, if one of the other parameters have changed, such as one of the host options. If there is more than one instance with the same name, the subsequent instances will be named as follows:
<host>,<bucket>,<partition> (n)

In this example, n is a number. These counters are available in each connection instance:

Table 5  Instance counter object

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes Received (bytes/sec)</td>
<td>The data rate (bytes/sec) received from ECS</td>
</tr>
<tr>
<td>Bytes Sent (bytes/sec)</td>
<td>The data rate (bytes/sec) sent to ECS</td>
</tr>
<tr>
<td>EV Request Rate</td>
<td>Request Rate (operations/second) from EVault. This is the aggregation of all requests coming from EVault.</td>
</tr>
<tr>
<td>Write Request Rate</td>
<td>Write Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Read Request Rate</td>
<td>Read Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Retention Request Rate</td>
<td>Update Retention Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Metadata Request Rate</td>
<td>Update Metadata Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Info Request Rate</td>
<td>Info Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Delete Request Rate</td>
<td>Delete Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Capacity Request Rate</td>
<td>Capacity Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Start Request Rate</td>
<td>Enum Start Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Next Request Rate</td>
<td>Enum Next Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum End Request Rate</td>
<td>Enum End Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Test Request Rate</td>
<td>Test Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>State List Size</td>
<td>State List Size. Each Connection can have many states which roughly relate to the number of different threads that are making requests through the streamer. This list is trimmed during garbage collection which occurs periodically.</td>
</tr>
<tr>
<td>Max State List Size</td>
<td>Maximum State List Size. Each Connection can have many states which roughly relate to the number of different threads that are making requests through the streamer. This is reset using EVResetPerf.exe.</td>
</tr>
<tr>
<td>Configured Enum Threads</td>
<td>This value reflects the configured number of threads that are spawned during an ENUM operation to speed up the gathering of the Metadata on each item.</td>
</tr>
</tbody>
</table>

5.7.3  Process counter object

The Process instance categorizes the instances by process. The Process instance is named as follows:

<processname> (<process id>)
The following counters are available in each process instance:

### Table 6  Process counter object

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bytes Received (bytes/sec)</td>
<td>The data rate (bytes/sec) received from ECS.</td>
</tr>
<tr>
<td>Bytes Sent (bytes/sec)</td>
<td>The data rate (bytes/sec) sent to ECS.</td>
</tr>
<tr>
<td>EV Request Rate</td>
<td>Request Rate (operations/second) from EVault. This is the aggregation of all requests coming from EVault.</td>
</tr>
<tr>
<td>Write Request Rate</td>
<td>Write Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Read Request Rate</td>
<td>Read Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Retention Request Rate</td>
<td>Update Retention Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Update Metadata Request Rate</td>
<td>Update Metadata Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Info Request Rate</td>
<td>Info Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Delete Request Rate</td>
<td>Delete Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Capacity Request Rate</td>
<td>Capacity Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Start Request Rate</td>
<td>Enum Start Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum Next Request Rate</td>
<td>Enum Next Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Enum End Request Rate</td>
<td>Enum End Request Rate (operations/second) from EVault</td>
</tr>
<tr>
<td>Test Request Rate</td>
<td>Test Request Rate (operations/second) from EVault</td>
</tr>
</tbody>
</table>

#### 5.7.4 Reset performance monitor maximum counters: EVResetPerf.exe

Some of the counters show the highest values that have occurred since the last time they were reset. These include the following:

- Max Streamer Instances (global)
- Max Current Requests (global)
- Max Connection Cache Size (global)
- Max State List Size (instance)

These counters can be reset using the CLI command: EVResetPerf.exe. This command takes no parameters and will reset the above counters to their current values.

#### 5.7.5 Log-level registry value to troubleshoot performance monitor support

If Performance Monitor support is not working, the first thing to do is look in Event Viewer. Look for the following in the application log:

**Source** = DellEMCEVStreamer

The logging level can be changed by setting this registry value as follows:

**Key:** HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\DellEMCEVStreamer\Parameters
Value: DWORD EventLogLevel

The registry can take the following values:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No event log messages ever.</td>
</tr>
<tr>
<td>1</td>
<td>Normal event logging. Errors only.</td>
</tr>
<tr>
<td>2</td>
<td>Minimum Debug logging.</td>
</tr>
<tr>
<td>3</td>
<td>Maximum Debug Logging.</td>
</tr>
</tbody>
</table>
6 Troubleshooting

6.1 Windows event log

Whenever you get an error or suspect an error is occurring, you should use the Windows Event Viewer to check the Windows Event Log for errors in the Applications and Services Log section > Veritas Enterprise Vault.

![Windows Event Log](image)

Figure 9  Windows event log

In this example, we see an error caused by using the IP address instead of the FQDN of the ECS portal. The ECS Portal SSL certificate is only valid when using the FQDN.

This error was displayed by the EV Admin GUI when configuring the Vault Partition.
As shown, there is more detailed logging by the ECS Streamer driver to the Windows event log.

### 6.2 Fiddler

Fiddler is a web debugging tool which will show the HTTP(S) traffic between the EV Server and the ECS system.

Download Fiddler from the following address: [https://www.telerik.com/download/fiddler](https://www.telerik.com/download/fiddler)

After installation, change the EV Vault Store partition definition to use a Proxy on port 8888.
After updating the credentials, restart the EV Storage Service.

The following example shows the output in Fiddler from attempting to perform a Test of the Partition configuration when the partition has been configured to use the Dell EMC online ECS portal and when configuring the partition to use SafeCopy=2. Port 9101 is not open on the ECS portal load balancer and it will fail this check.

Incidentally, this is one of the more common issues encountered in new installation. The firewall and/or Load Balancers are not configured correctly for this port.

![Fiddler output](image1)

You can see the attempts to connection to portal.ecstestdrive.com on port 9101 failing (the portal load balancer is not set up to pass 9101) on transactions 4 – 8.

![Fiddler output 2](image2)
The following screenshot shows the request and response headers.

![Fiddler header and response](image)

Figure 14  Fiddler header and response
The following shows the response as raw.

Fiddler is very useful for looking at the web traffic from the EV Server to ECS, and it may be simpler to use than a full network monitor.
6.3 DebugView

The ECS Streamer driver publishes debug information which normally is not viewable. The DebugView utility from Microsoft allows admins to view and log debug information that all applications write.

Download DebugView from the following address: https://docs.microsoft.com/en-us/sysinternals/downloads/debugview

Make sure to run DebugView as administrator.

![DebugView](image)

**Figure 16** Running DebugView

When running DebugView, ensure that Capture Win32 and Capture Global Win32 are set.

![DebugView settings](image)

**Figure 17** DebugView settings

If repeating a Partition Properties Test where specifying `;LB=true`, the debugview window will show the following:

```
00140407 10:34:52 AM [9392] IP list coming in Init...prior to any possible client side load balancing
00140408 10:34:52 AM [9392] 10.246.22.187
```
Troubleshooting

Enable more debugging output by running the EV dtrace.exe utility from the EV product installation directory and entering the following command:

```bash
set StorageManagement v y
```

![Image of EV DTrace interface](image)

**Figure 18** Running EV DTrace

If you repeat the same Test on the ECS Partition you will get a more-detailed debug output.

```
00140427 10:35:31 AM [9392] IP list coming in Init...prior to any possible client side load balancing
00140428 10:35:31 AM [9392] 10.246.22.187
00140429 10:35:31 AM [9392] [TID:9412] EVStreamer: DataNodeEndpointS3 for evtestbckt1 success
00140430 10:35:31 AM [9392] [TID:9412] EVStreamer: setting endpoints for client side load balancing
00140433 10:35:31 AM [9392] [TID:9412] EVStreamer: client side load balancing: set address = 10.246.22.194
00140436 10:35:31 AM [9392] [TID:9412] EVStreamer: client side load balancing: set address = 10.246.22.188
00140439 10:35:31 AM [9392] [TID:9412] EVStreamer: CStreamerObject::Init checking if the bucket has search metadata fields enabled
00140440 10:35:31 AM [9392] [TID:9412] EVStreamer: CStreamerObject::Init does not seem to be search meta but no error
00140441 10:35:31 AM [9392] [TID:9412] EVStreamer: CStreamerObject::Init Exiting with HRESULT 0x0
00140442 10:35:31 AM [9392] [TID:9412] EVStreamer: CStreamerObject::Test Entry
```
The output is displaying the ECS node IP addresses that it will use, and it will read the properties for the ECS bucket being used. It created and deleted a test object and checked the replication status of the test object. Also, 9392 is the PID of the StorageManagement.exe process.

6.4 ECSCHECK.EXE

With ECS Streamer driver revision 2.0.1.5, the driver ships with a diagnostic utility to help you check the connection to the ECS from your EV server.

Ecscheck.exe is installed into the same directory as the ECS Streamer, normally as in the following case.

C:\Program Files (x86)\Dell EMC\EVStreamer

Start a CMD.EXE window and change to that directory. The following shows ecscheck commands:

```
C:\Program Files (x86)\Dell EMC\EVStreamer>ecscheck.exe /T
Usage:
  /https /endpoint <IP or hostname> /user <user ID> /secret <secret>
  /create <localFile> <ECSpath> /create <localFile> <ECSpath>
  /write <localFile> <ECSpath> /read <ECSpath>
  /delete <ECSpath> /readmeta <ECSpath> /list <path, starting with bucket>

Create ECS object and Initialize with file
Read ECS object into file
Write ECS object from file
Delete ECS object
Read all metadata from object
Object listing

Press ENTER to continue...
```

Figure 19  Getting help from ecscheck.exe
The following lists the details of the endpoint:

Figure 20  Listing buckets and details

The /list command on its own will show the buckets available to the user and the IP addresses of all ECS Nodes in the cluster. The following shows obtaining the ECS installed certificate:

Figure 21  Obtain the installed certificate

This use of the /cert command shows you the installed certificate on the ECS. In this example, there is no certificate installed, and the utility does prompt to allow you to install one.

The following shows a self-signed certificate example:

Figure 22  Obtain the installed certificate: self-signed certificate example
The following shows obtaining the installed certificate from portal.ecstestdrive.com. This screenshot shows the same command used against the ECS portal system which does have a certificate installed.

![Certificate obtained from portal.ecstestdrive.com](image)

**Figure 23** Obtain the installed certificate from portal.ecstestdrive.com

### 6.4.1 Test dtquery

To check that dtquery will work, create a new bucket, write a file, and do the dtrace check with the following commands:

```plaintext
ecscheck.exe /http /endpoint 10.x.x.x /port 9020 /user ev1 /secret OT+<snip> /createbucket test1

ecscheck.exe /http /endpoint 10.x.x.x /port 9020 /user ev1 /secret OT+<snip> /write localfile /test1/object1

ecscheck.exe /http /endpoint 10.x.x.x /port 9020 /user ev1 /secret OT+<snip> /dtquery veritas_c test1 object1
```

![dtquery check](image)

**Figure 24** dtquery check

The dtquery check figure shows the check on the object showing that 0% of it has been replicated to ECS VDC2, but the second check shows that 100% of the object has been replicated.
7 Supported environments

7.1 Veritas Enterprise Vault
Veritas has a detailed support matrix for all Enterprise Vault including third-party software and hardware components at the following address: https://www.veritas.com/support/en_US/article.TECH38537
## Streamer release information

### Table 7  Streamer release information

<table>
<thead>
<tr>
<th>Release #</th>
<th>Description</th>
</tr>
</thead>
</table>
| 2.0.5.4   | Windows Performance Monitor counter objects added.  
The ECS Streamer install directory is added to the Windows PATH environment variable. This allows users to run ECSCheck.exe or EVResetPerf.exe from any directory. |
| 2.0.4.1   | Throttle Streamer Instances – the number of outstanding EVStreamer requests by default limited to 65.  
Faster enumeration of objects in a vault store.  
Improved management of the connection object. |
| 2.0.3.2   | Corrections made to the error codes returned when some errors are encountered. |
| 2.0.3.1   | Corrections to error returns from the ECS Streamer to Enterprise Vault.  
Added DONT_TEST_STOPPING switch on HOST – Dell EMC Support use only  
Changed the time that the streamer will wait before retrying an ECS node marked as offline to 12 minutes from 2 hours. |
| 2.0.2.3   | Improved handling of Partition listings  
**Installation**  
Install file is a .MSI instead of a .EXE  
**Cached Connections**  
S3 connections are cached to greatly reduce the overhead involved with establishing connections. Currently the streamer will frequently execute the "Init()" entry which will do the following ECS requests:  
- Get endpoint list  
- Test if search metadata can be used.  
With the new version, that initialization only occurs the first time the connection is requested. It will only redo it if any of the parameters change, or if the S3 request fails.  
**Allow HTTPS connections to Ignore Bad CN Error**  
When establishing an HTTPS connection, normally the connection will fail if the host name provided does not match the name in the certificate. For example, using an IP address. The user can use the IGNORE_BAD_COMMON_NAME option in host parameter to allow the connection to succeed.  
**Relax Syntax for Host Name Options** |
<table>
<thead>
<tr>
<th>Release #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The current syntax for each host name option is &quot;&lt;option&gt;=&lt;value&gt;&quot;. The &quot;&lt;value&gt;&quot; is now optional if &lt;value&gt; would be 1. This means that the following is now accepted: 10.1.2.3;LB;DISABLE_WRITE_TEST</td>
</tr>
<tr>
<td>2.0.1.5</td>
<td>Improved error log messaging</td>
</tr>
<tr>
<td></td>
<td>Additional IP range specification</td>
</tr>
<tr>
<td></td>
<td>Writes of old files have their retention handled properly, previously an error would be generated. ecscheck utility.</td>
</tr>
<tr>
<td>2.0.0.7</td>
<td>Better error log messages and diagnostics</td>
</tr>
<tr>
<td></td>
<td>Multi-Part uploads are multithreaded and will perform better</td>
</tr>
<tr>
<td></td>
<td>Better overall performance</td>
</tr>
<tr>
<td></td>
<td>Improved Stability</td>
</tr>
<tr>
<td></td>
<td>Built in IP Load Balancer across ECS Nodes in the VDC being used.</td>
</tr>
<tr>
<td>1.0.16</td>
<td>Fix to partial file read requests which where erroneously on occasion performing full file reads unnecessarily.</td>
</tr>
<tr>
<td>1.0.14</td>
<td>Default MAX_CONNS changed to 65</td>
</tr>
<tr>
<td></td>
<td>Added optional SHOWCHUNKS configuration parameter to assist debugging</td>
</tr>
<tr>
<td></td>
<td>Added optional RDT parameter to ensure requests are not cached</td>
</tr>
<tr>
<td></td>
<td>Added option DTHOSTS parameter to assist with debugging</td>
</tr>
<tr>
<td></td>
<td>Issue caused by caching in the Windows HTTP library resolved.</td>
</tr>
<tr>
<td>1.0.12</td>
<td>Modified the Test() function. Since Evault itself also calls the Test functionality, it is not reasonable to fail the test if the dtquery call fails. This information is logged but does not fail the connectivity test. This portion of the test is only done when safecopy=2. Unfortunately, dtquery has problems during TSO. Any call to the Test functionality by Evault when safecopy=2 during TSO, would cause archiving to stop. During archiving any failure in dtquery simply sets the safe copy boolean to false and archiving continues.</td>
</tr>
<tr>
<td>1.0.11</td>
<td>Added a fix for a potential Read() problem where Windows may require a larger buffer</td>
</tr>
</tbody>
</table>
9 Performance information

At the present, no performance testing has been performed. However, as part of the Veritas Enterprise Vault Self Certification testing performed by Dell EMC, some basic throughput measurements were taken.

9.1 Testing configuration

The following system configurations were used for testing with Enterprise Vault revisions tested.

<table>
<thead>
<tr>
<th>Server</th>
<th>Configuration</th>
</tr>
</thead>
</table>
| SQL Server DB | 8 x vCPU, 32Gb RAM  
3 x 100GB SAN Disk  
10GbE NIC  
Windows 2012R2 STD  
SQL Server 2014 |
| EVServer 1 | 8 x vCPU, 32Gb RAM  
3 x 100GB SAN Disk  
10GbE NIC  
Windows 2012R2 STD |
| EVServer 2 | 8 x vCPU, 32Gb RAM  
3 x 100GB SAN Disk  
10GbE NIC  
Windows 2012R2 STD |

9.2 Results

<table>
<thead>
<tr>
<th>Item</th>
<th>EV12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingest – File/ Hour</td>
<td>136,000</td>
</tr>
<tr>
<td>Ingest – Mbytes/hour</td>
<td>6485</td>
</tr>
<tr>
<td>Read Test – Files/ Hour</td>
<td>1,285,550</td>
</tr>
<tr>
<td>Expiration Test – Files/hr</td>
<td>34600</td>
</tr>
</tbody>
</table>
Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage technical documents and videos provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

Provide a list of documents and other assets that are referenced in the paper; include other resources that may be helpful.