

# Dell EMC PowerMax: iSCSI Implementation for Dell EMC Storage Arrays Running PowerMaxOS

## Abstract

This document provides an in-depth overview of the Dell EMC PowerMaxOS iSCSI implementation on Dell EMC PowerMax and VMAX All Flash storage arrays.

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In two way authentication, each target visible to the host must present an appropriate secret back to the host. In Windows, the initiator secret which the targets must present back to the host is set up in the Windows iSCSI Initiator tool Configuration tab as shown below:

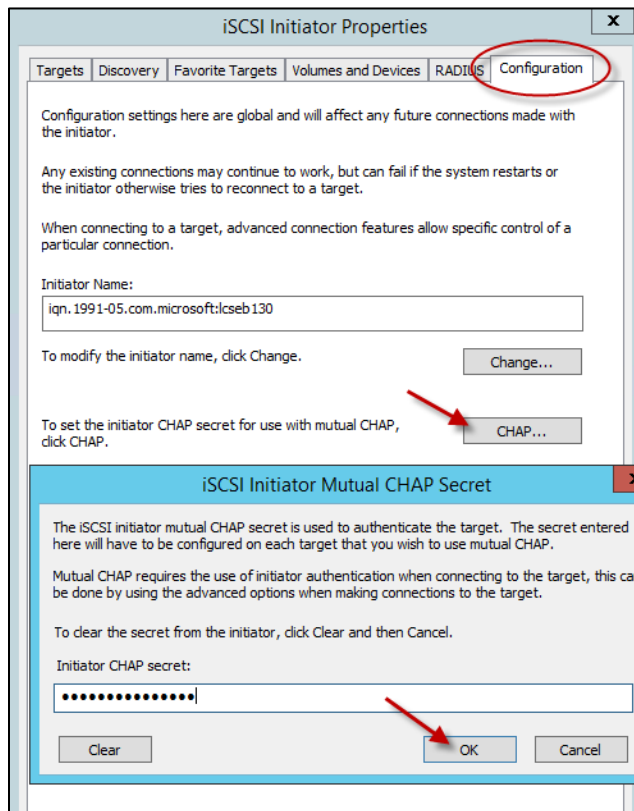


Figure 9 Setting the initiator secret using the Windows iSCSI Tool

This can also be accomplished by using the “set-IscsiChapSecret” PowerShell cmdlet on the host:

```
[LCSEB129] PS C:\ >Set-IscsiChapSecret -ChapSecret <InitiatorCHAPSecret>
```

On the PowerMax array, two-way CHAP authentication is set up on the target using the following command:

```
symaccess -sid 0248 -iqn iqn.emc.0248.1E.prod set chap -cred  
iqn.emc.0248.1E.prod -secret <InitiatorCHAPSecret>
```

In the above command, the IQN of the PowerMax iSCSI target which will be authenticated by the host initiator is the value used in the `-iqn` parameter. The IQN of the PowerMax iSCSI target is the value used in the `-cred` parameter (how the target presents itself to the host initiator in discovery). The secret that the target needs to present to the host initiator (as specified in the Windows iSCSI Tool Configuration tab) is the value used in the `-secret` parameter. If storage is to be presented to a host initiator through multiple PowerMax iSCSI targets, then the above command will need to be run for each target that will present itself to the host in order for successful two-way CHAP authentication.

Two-way CHAP authentication can also be set using the PowerMax iSCSI target's associated director and virtual port combination as follows:

```
symaccess -sid 0248 -iscsi_dirport 1e:0 set chap -cred iqn.emc.0248.1E.prod -secret <InitiatorCHAPSecret>
```

In the above command, the `-iqn` parameter has been replaced with the `-iscsi_dirport` parameter. A storage array iSCSI target's associated director and virtual port can be found using the following "symcfg" command:

```
symcfg -sid 0248 list -se all -iscsi_tgt
```

```
Symmetrix ID: 000196800248 (Local)
Dir:P   NetId Status IQN
-----
01E:000   80 Online  iqn.emc.0248.1E.prod
02E:000   81 Online  iqn.emc.0248.2E.prod
```

To examine two-way CHAP authentication set up on the PowerMax array, run the following `symaccess` command:

```
symaccess -sid 0248 list chap
```

```
Symmetrix ID           : 000196800248
```

```
Director Identification : SE-1E
```

```
Director Port          : 000
```

```
iSCSI Target Name     :
```

```
Protocol               : CHAP
```

Identifier	Type	State	Credential
SE-1E:000	N/A	ENABLED	iqn.emc.0248.1E.prod

To delete CHAP from a specific PowerMaxOS iSCSI target, use the following command:

```
symaccess -sid 0248 -iqn iqn.emc.0248.1E.prod delete chap
```

### 2.3.5 Routing instance

In many implementations, storage administrators are limited to one or two VLANs for their entire storage environment by their network teams. This is because VLANs can be expensive from a resource and management perspective which makes them somewhat of a precious commodity in many environments. In order to compensate for environments with limited VLAN availability, the iSCSI network will often use a lower subnet mask to accommodate a larger number of subnets and host initiator and storage target IP interface IP addresses. In these cases, the PowerMaxOS iSCSI model must be able to properly route the iSCSI traffic across the different subnets being used in the environment. This is the function of the routing instance object.

A PowerMaxOS routing instance is associated with a specific network ID on a single director. A user can create a maximum of 1024 routing instance per engine. When creating a PowerMaxOS routing a user will need to specify:

- The director number
- IP address of default gateway
- Subnet Mask (prefix)
- Network ID number
- PowerMaxOS IP interface IP address

The following table lists some commonly used subnet masks in iSCSI environments:

Table 3 Commonly used iSCSI subnets

Subnet Mask	Total number of IP addresses	Netmask	Number of subnets
/26	64	255.255.255.192	4
/25	128	255.255.255.128	2
/24	256	255.255.255.0	1
/23	512	255.255.254.0	2
/22	1024	255.255.252.0	4
/21	2048	255.255.248.0	8
/20	4096	255.255.240.0	16
/0	NA	0.0.0.0	NA

**Note:** Subnet mask 0.0.0.0/0 signifies all address visible on the network. In traditional networking best practice, the use of this subnet is discouraged because of the confusion in having a network and subnet with indistinguishable addresses; however in networks with a few IP addresses, it can function as a useful “catch all” subnet to allow for broadcast to all visible IP address and subnets.

### 2.3.5.1 Creating a PowerMaxOS iSCSI IP Route using Solutions Enabler

A user can specify an IP route for a specific IP address on a director by the following Solutions Enabler SYMCLI command:

```
symconfigure -sid 0248 -cmd "add ip_route dir 1E, ip_address=0.0.0.0, ip_prefix=0, gateway=192.168.80.1, network_id=80;" commit -nop
```

The above Solutions Enabler command will create a “catch all” routing instance which uses a default gateway of 192.168.80.1 for all IP interface IP address (0.0.0.0) and all subnets (0) using Network ID 80 on director 1E.

### 2.3.5.2 Creating a PowerMaxOS iSCSI IP Route using Unisphere

A user can specify an IP route for a specific IP address on a director by the following Solutions Enabler SYMCLI command:

To create an iSCSI IP Interface using Unisphere, the user selects a array; then navigates to the iSCSI dashboard in “System”; and selects “Add IP Route”. The Add iSCSI IP Route wizard is shown in the screen shot below:

The screenshot shows a 'Add IP Route' dialog box. It contains the following fields and values:

- Director: SE-1E
- IP Address \*: 0.0.0.0
- Gateway IP \*: 192.168.80.1
- Prefix \*: 0
- Network ID \*: 80

At the bottom of the dialog, there is a help icon (question mark), a 'CANCEL' button, and an 'OK' button.

Figure 10 Creating a PowerMaxOS Routing Instance using Unisphere

After entering the required information, the user selects OK to create the IP route.

## 2.4 PowerMaxOS iSCSI host connectivity limits

The following table summarizes the host connectivity limits for PowerMaxOS iSCSI

Table 4 PowerMaxOS iSCSI host connectivity limits

Component	Maximum Values			
	Per 10 GbE Port	Per SE Instance	Per Director	Per Engine
VLANs	64	512	512	1024
SE Instance	NA	NA	1	2
Physical 10 GbE Ports	NA	16	16	32 <sup>(1)</sup>
Network IDs	NA	512	512	1024
Routing Instances	NA	1024	1024	2048
IP Interfaces	64	512	512	1024
iSCSI Targets	64	512	512	1024
Host Connections	2048	8192	8192	8192



Component	Maximum Values			
	Per 10 GbE Port	Per SE Instance	Per Director	Per Engine
Host Sessions	64	512	512	1024
Host IQNs	512	512	512	1024

1. Maximums of 32 ports on the VMAX 250F and PowerMax 2000 and 24 ports on the VMAX 950F and PowerMax 8000

### 3 Summary

The Dell EMC iSCSI implementation on PowerMaxOS based storage arrays provides a viable, lower cost connectivity method for customers who are looking at alternatives to Fibre Channel. The Dell EMC PowerMaxOS iSCSI model is architected to support true multi-tenancy and other needs being driven by the market. The model is a good fit the cloud/service provider space, converging infrastructures, and heavily virtualized environments where slices of infrastructure (e.g., Compute, Network and Storage) are assigned to different users (tenants).

## A Technical support and resources

[Dell.com/support](https://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

Document Title	Collateral Type	Part Number
Dell EMC PowerMax Family Overview	White Paper	H17118
Dell EMC VMAX All Flash Family Overview	White Paper	H14920.3
Dell EMC Service Levels for PowerMaxOS	White Paper	H17108
Dell EMC Embedded Management on PowerMax, VMAX All Flash, and VMAX3	White Paper	H16856
Data Reduction with Dell EMC PowerMax	White Paper	H17072
Dell EMC PowerMax Reliability, Availability, and Serviceability Technical Note	White Paper	H17064
VMAX All Flash iSCSI Deployment Guide for Oracle Databases	White Paper	H15132.1
VMAX All Flash iSCSI Deployment Guide for Windows	White Paper	H15143