



**Hewlett Packard
Enterprise**

HPE Smart SAN for 3PAR 2.0 User Guide

Abstract

This user guide provides information about configuring and using HPE Smart SAN for 3PAR. HPE Smart SAN for 3PAR is a target driven orchestration that provides automated management control of the Storage Area Network (SAN). HPE Smart SAN for 3PAR reduces the number of configuration process steps that a SAN administrator is required to perform.

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Overview of HPE Smart SAN for 3PAR 2.0

HPE Smart SAN for 3PAR provides automated management control of a Storage Area Network (SAN). Smart SAN¹ reduces the number of configuration process steps that a SAN administrator is required to perform.

Smart SAN 1.0 introduced Target Driven Peer Zoning (TDPZ). TDPZ reduces the complexity of manually performing Fibre Channel (FC) zoning tasks by automating these tasks through the HPE 3PAR storage array. The HPE 3PAR StoreServ Storage system communicates with the SAN fabric switches and creates the required Target Driven Peer Zones. TDPZ utilizes peer zoning to reduce the number of steps required to provision new storage by up to 90%.

Smart SAN 2.0 supports the following features:

- **Target Driven Peer Zoning (TDPZ)**
- **Registration of HBA/Target Port Management Information (using Fabric Device Management Interface)**
- **Framework for Capturing Diagnostic Ready Information**
- **Fibre Channel (FC) Port Security**
- **SSMC-based Target Driven Peer Zoning (TDPZ) Provisioning**
- **Automated Federation Zoning**

HPE Smart Fabric Orchestrator

Available as a complementary product to HPE Smart SAN for 3PAR, HPE Smart Fabric Orchestrator delivers automation, orchestration, and environment awareness. It can help you perform provisioning and arrangement of fabric services for increased fabric resiliency, productivity, scale, and efficient use of your storage environment. Smart Fabric Orchestrator delivers protocol-agnostic fabric configuration validation with HPE Single Point of Connectivity Knowledge (SPOCK) data, provides end-to-end fabric topology viewing and monitoring, and assesses and takes action on the health of the environment with self-healing. Predefined templates speed deployment, maintain your IT environment standards, and makes error-prone tasks error-free. For more information, see the *HPE Smart Fabric Orchestrator Installation and User Guide*.

Target Driven Peer Zoning (TDPZ)

Target Driven Peer Zoning is one of the main features of Smart SAN. It provides for the creation of peer zones in a Storage Area Network (SAN) that are created and managed by the HPE 3PAR storage array target ports instead of the user manually creating them. In essence, TDPZ automates the creation of these zones. It is controlled by the HPE 3PAR StoreServ Storage system.

TDPZ creates a zone containing a single target port with multiple initiator peer port members. Within each Target Driven Peer Zone, the target port that is creating the zone is the principal member of the zone. Only a principal member can create, add/remove members, and delete the peer zone. Currently, there can only be one principal member in a peer zone. Any changes to the peer zone members will result in a peer zone Registered State Change Notification (RSCN) which is sent only to the principal member, i.e., the target port. The non-principal members of the peer zone cannot communicate with each other; only the principal member can communicate with all the members of the peer zone, i.e., the initiators.

The HPE 3PAR StoreServ Storage system determines whether TDPZ is supported by the attached switch. Using the HPE 3PAR CLI, the user adds each required initiator to a "Host Group" on the storage array. The user associates the host group to a HPE 3PAR array port. The HPE 3PAR StoreServ Storage system will then automatically set up the appropriate zones to allow each initiator to access the array port.

¹ In this document Smart SAN will be used to represent HPE Smart SAN for 3PAR

From the user's perspective, the zoning happens "behind the scenes". All the actions for managing these zones created by the array are done with minimum user input.

Requirements for Target Driven Peer Zoning (TDPZ)

The requirements for Target Driven Peer Zoning (TDPZ) are as follows:

- Smart SAN license installed on the HPE 3PAR
- Smart SAN capable fabric switches with Smart SAN supported Firmware and Smart SAN feature enabled
- Smart SAN TDPZ capability is available on the HPE 3PAR StoreServ Storage systems with 16Gb FC ports

NOTE:

The HPE 3PAR 16Gb FC ports can be used to create TDPZ zones after the Smart SAN license is installed on the HPE 3PAR and Smart SAN is enabled on the switch which is directly connected to the 16Gb FC ports.

Configuring Target Driven Peer Zoning (TDPZ) using HPE 3PAR CLI

The initial steps for configuring the Target Driven Peer Zoning (TDPZ) are outlined below:

Prerequisites

Smart SAN needs to be configured on the switch prior to configuring TDPZ on the HPE 3PAR.

For configuring Target Driven Peer Zoning using SSMC, see [Creating TDPZ Zones Using SSMC](#).

Procedure

1. Install the Smart SAN license on the HPE 3PAR.
2. Verify Smart SAN ports/fabric using the `showport -par` CLI command. HPE 3PAR ports connected to Smart SAN enabled switches will display `enabled`.
3. Create a host using the `createhost` CLI command. For TDPZ, the `-port` option should be used to identify the target port(s) associated with the host.
4. **(optional)** Create host sets using the `createhostset` CLI command.
5. Create a virtual volume using the `createvv` CLI command.
6. **(optional)** Create virtual volume sets using the `createvvset` CLI command.
7. Export the LUN to host using the `createvlun` CLI command.

As can be seen in the steps above, the only additional step required for Smart SAN is the `-port` option on the `createhost` CLI command. Everything else related to creating the zone is done automatically.

If the host definition has been previously created and now the user wants to create TDPZ zones containing this host, i.e., associate this host with a specific array target port. Issue the following HPE 3PAR CLI command:

```
createhost -add -port <node:slot:port> <hostname> <WWN>...
```

This will add the listed WWNs associated with the host to a TDPZ zone whose principal member is the specified target port.

Example showing associating a host with an array target port

```
createhost -add -port 0:2:1,1:2:1 MyHost 1000CDABCD680586
```

NOTE: Since the TDPZ zones are created by HPE 3PAR and since their membership is controlled by HPE 3PAR, the switch cannot modify the TDPZ zones, i.e., the switch cannot modify the zone name or the zone members. The switch can delete the TDPZ zone. Some switches create zones that have the peer zone characteristics, i.e., multiple initiators are zoned with a single target and the notifications (RSCNs) occur according to the peer zone rules as described earlier. These are different from the TDPZ zones. The switch itself manages these peer zones, which were created through the switch CLI, and can only be modified by the switch. The HPE 3PAR is unaware of the switch-created peer zones; hence, these switch-created zones would not appear in HPE 3PAR TDPZ displays. Currently, the HPE FlexFabric switch CLI does not prevent modification of the zone membership of the TDPZ zone. It is highly recommended this operation is not done via the switch CLI.

Registration of HBA/Target Port Management Information

The intent of this registration is to provide information about the ports that are connected to the Storage Area Network (SAN). This information is displayed to the user to provide an overall view of the SAN topology.

Smart SAN enabled HBAs and target ports perform device registrations based on the Fabric Device Management Interface (FDMI) protocol. These registrations are performed automatically and include data as defined by the `Register HBA (RHBA)` and `Register Port Attributes (RPA)` commands. The RPA includes additional parameters specific to Smart SAN to provide more meaningful information about these end devices.

The HBA and target port will provide their management information to the SAN upon each 'link up' event, which can be displayed from the switch CLI.

Framework for Capturing Diagnostic Ready Information

Storage networking end devices, such as storage systems, host adapters, and switches provide various lower level attributes that can be used to help in troubleshooting link issues. These include the following information:

- SFP diagnostic data – temperature, voltage, Tx and Rx power and Tx bias (collected approximately every hour; polling interval configurable).
- Port speed descriptor – supported speeds and current speed.
- Link Error Status Block (LESB) data – link failure, loss-of-sync, loss-of-signal counts, invalid CRC counts, etc.

This data will be collected centrally by the switch (management component in the switch) using the `Read Diagnostic Parameters (RDP)` command as defined in the FC standards. The data will be used for physical layer diagnostics. The switch can poll for diagnostic information from end devices using a predetermined polling interval. This data can be displayed using switch CLI commands. Future versions of Smart SAN might analyze this data and determine if there is a failure that requires immediate attention.

Fibre Channel Port Security

Ordinarily any device would be able to access the SAN through any port on a switch. There is a security feature which will prevent unauthorized devices from accessing the SAN. This feature restricts access to a switch as ports are bound to a given device port WWN. The switch can be "taught" which device is allowed to access the SAN through a specific switchport. Once the binding is locked down, if a device which is not bound to a particular switchport attempts to access the SAN through that switchport, it is prevented as the switchport becomes disabled due to the illegal access attempt.

On a Smart SAN-enabled HPE FlexFabric switch, Smart SAN-specific port binding is automatically enabled for Smart SAN-enabled devices. Until the Smart SAN learning feature of the FC port security is explicitly

disabled, the switch will automatically learn and populate the Smart SAN entries in the FC port security database. When the Smart SAN learning feature is explicitly disabled, the Smart SAN entries are now locked in the database, i.e., the device ports are now bound to specific switchports. Future logins of new Smart SAN devices will not automatically activate the Smart SAN-specific port binding for those devices. The Smart SAN learning feature of the FC port security will need to be explicitly enabled again prior to the logins of the new Smart SAN devices for the Smart SAN-specific port binding feature to re-activate.

NOTE: This feature is available only with the supported HPE FlexFabric switches.

Smart SAN specific FC port security affects only the WWNs of physical ports. For binding virtual port WWN using the FC port security feature of the HPE FlexFabric switches, see the CLI documentation for the HPE FlexFabric switches. If a device logs into the switch via NPIV, its port WWN does not result in an entry in the FC port security database. Only the WWN of the NP_Port will result in an entry in the FC port security database. In addition, the Smart SAN-specific port binding feature does not apply to this port. With logins from NPIV-devices, where the device is obtaining virtual WWNs, only the WWN of the physical port will result in an entry in the database. If the host is Smart SAN-enabled and Smart SAN learning is enabled on the switch, then a Smart SAN-related entry will also be made in the database.

Summary of Smart SAN Features

The following matrix summarizes and differentiates the Smart SAN 1.0 and 2.0 features:

NOTE: Features listed under Smart SAN 2.0 column represent Smart SAN 2.0 supported features in addition to the previously stated Smart SAN 1.0 supported features.

Components	Smart SAN 1.0 Features	Smart SAN 2.0 Features
	<ul style="list-style-type: none"> • 3PAR CLI based TDPZ • FDMI registrations • Basic diagnostics support 	<ul style="list-style-type: none"> • SSMC based TDPZ provisioning • Alias support • Federation Zoning (3PAR SSMC feature) • Enhanced diagnostics support • Port Binding (switch feature)
HPE 3PAR StoreServ (16Gb host port only)	ALL	ALL
Emulex HBA	ALL	ALL
Qlogic HBA	ALL	ALL
B-Series 16Gb or greater FC switch	ALL	SSMC based TDPZ provisioning Federation Zoning
B-Series 8Gb FC switch	ALL	Same as Smart SAN 1.0
HPE FlexFabric switch	ALL	See the 3PAR Smart SAN Support Matrix in SPOCK
LPe1605 16Gb FC HBA for c-Class BladeSystem	HPE 3PAR CLI based TDPZ FDMI registrations	SSMC TDPZ based provisioning support

Table Continued

Components	Smart SAN 1.0 Features	Smart SAN 2.0 Features
QMH2672 16Gb FC HBA for c-Class BladeSystem	HPE 3PAR CLI based TDPZ FDMI registrations	SSMC TDPZ based provisioning support
B-Series 16Gb/28 SAN Switch for BladeSystem c-Class	ALL	SSMC based TDPZ provisioning Federation Zoning
HPE 6125XLG Ethernet Blade Switch	HPE 3PAR CLI based TDPZ	HPE 3PAR CLI based TDPZ
HPE 6127XLG Blade Switch	HPE 3PAR CLI based TDPZ	HPE 3PAR CLI based TDPZ
HPE Virtual Connect Modules FlexFabric-20/40 F8 Module for c-Class BladeSystem	HPE 3PAR CLI based TDPZ	HPE 3PAR CLI based TDPZ
HPE Virtual Connect Modules for c-Class BladeSystem	HPE 3PAR CLI based TDPZ	HPE 3PAR CLI based TDPZ

Support Configurations

Smart SAN supports several Fibre Channel Switched fabric (FC-SW) and storage configurations. To simplify the understanding and implementation of these configurations, a set of use case topology designs have been defined in this section. These use cases recommend ways to use switches, switch modes, and port types in different server-storage deployment scenarios. Some of the use cases show multiple types of connectivity within the same configuration. This is meant to show the different connection options available. All HPE switch use cases for storage described here in this section implement dual-redundant fabrics for high availability. Your Smart SAN design might use one or more of these options, but not necessarily all as shown.

The Smart SAN TDPZ features are also supported with Blade Servers and Virtual Connect. HPE recommends that all storage configurations implement dual-redundant fabrics for high availability.

Smart SAN Use Case Configurations

The following is a tabular representation of the possible Smart SAN use case configurations. The Smart SAN use case configurations have been broken down into two broad categories depending on the type of fabric being used: HPE FlexFabric and HPE B-Series Fabric. They are further sub-divided based on their Base SAN Fabric Configuration.

NOTE: The * in following table states that Storage Fabric IRF Configurations are also supported.

Table 1: Smart SAN Use Case Configurations

Use Case	Base SAN Fabric Configuration	Variant	Fabric	Server Connect	HPE 3PAR StoreServ Storage	Switch Mode
1	Single-Tier Fabric Rack Servers*	Rack Server, FC Storage	HPE FlexFabric	Rack HBA	Native 16Gb FC	FCF
2	Multi-hop Fabric, Rack Servers*	Rack Server, FC Storage		Rack HBA		
3	Single-Tier Fabric NPV Gateway*	Rack Server, FC NPV Gateway, FC Storage		Rack HBA	Native 16Gb FC via HPE FlexFabric switch/HPE B-Series FC switch	NPV Gateway
4	Simple dual fabric	Any director or switch	B-Series Fabric	Rack HBA	Native 16Gb FC	Switch
5	Core/Edge	All directors, director/rack switches, any combination		Rack HBA	Native 16Gb FC	

Table Continued

Use Case	Base SAN Fabric Configuration	Variant	Fabric	Server Connect	HPE 3PAR StoreServ Storage	Switch Mode
6	Multi-hop	Any combination of switches up to 7 hops		Rack HBA	Native 16Gb FC	
7	Access Gateway	Access gateway and switch combinations		Rack HBA	Native 16Gb FC via HPE B-series switch/fabric	Access Gateway
8	MetaSANs (FC Routing)	NOTE: No Smart SAN/TDPZ support across IFLs	NA	NA	NA	NA
9	Blade Servers and Virtual Connect					

Pictorial Representation of Use Case Configurations

Each of the use cases described in the above table have been pictorially represented in this illustration section. Use Case 1, 2 and 3 use an HPE FlexFabric switch Fabric and Use Case 4, 5, 6 and 7 use an HPE B-Series Fabric. Use Case 9 tabulates Smart SAN configurations using Blade Servers and Virtual Connect.

NOTE: Although the HPE FlexFabric 5900CP is depicted in the use case illustrations that follow, any supported HPE FlexFabric switch can be used in its place. Refer to the 3PAR Smart SAN Support Matrix in [SPOCK](#).

HPE FlexFabric FCF Use Case 1

Figure 1 depicts a single-tier use case scenario, also referred to as East-West fabric topology. This use case consists of rack servers and HPE 3PAR FC storage in a dual-redundant fabric for high availability.

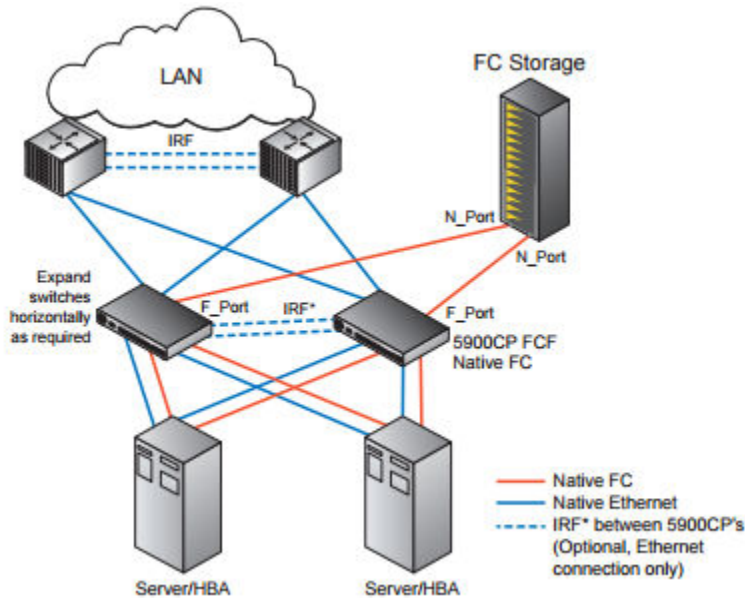


Figure 1: HPE FlexFabric FCF

HPE FlexFabric FCF Maximum FC Hop Count Use Case 2

Figure 2 depicts an HPE FlexFabric multi-hop or cascaded switch use case. For all multi-hop configurations using the HPE FlexFabric in FCF mode, HPE supports up to three hops for Fibre Channel. This use case consists of rack servers and HPE 3PAR FC storage in a dual-redundant fabric for high availability. All FlexFabric switches need to be in enhanced zoning mode.

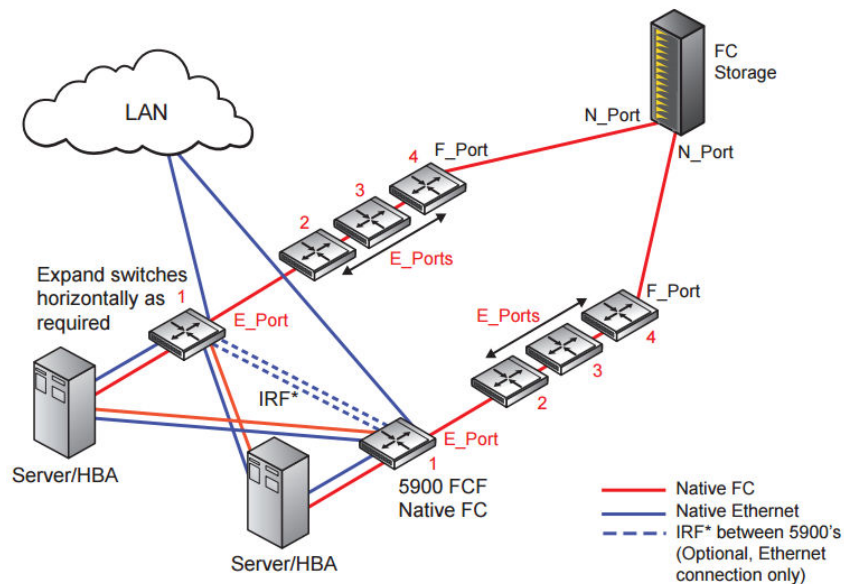


Figure 2: HPE FlexFabric Maximum FC Hop Count

HPE FlexFabric NPV Use Case 3

Figure 3 depicts an HPE FlexFabric switch in a N_Port Virtualization (NPV) mode configuration. The HPE FlexFabric switch in NPV mode is connected to Smart SAN enabled fabrics, consisting either of HPE FlexFabric switches or HPE B-series switches.

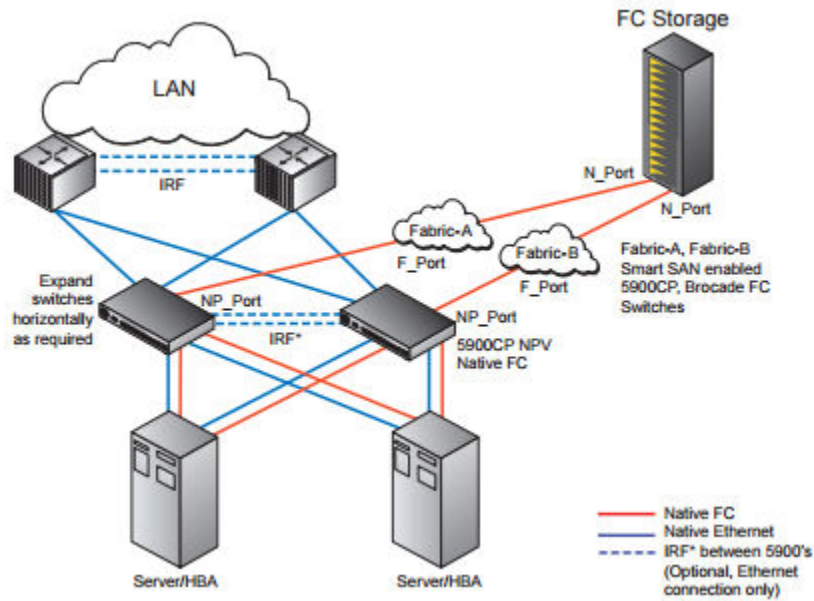


Figure 3: HPE FlexFabric NPV

B-Series Dual Fabric Use Case 4

Figure 4 depicts a HPE B-Series fabric with core/edge Target Zoning. The servers and storage both are connected to the dual fabric with simultaneous zone configuration on both the fabrics.

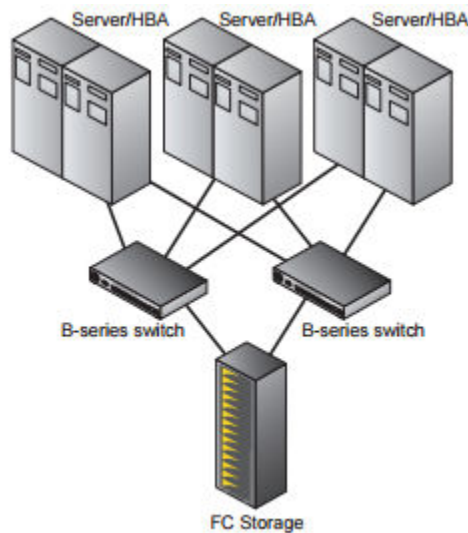


Figure 4: B-Series Simple Dual Fabric

B-Series Core/Edge Fabric Use Case 5

Figure 5 depicts a HPE B-Series fabric with core/edge Target Zoning. There could be multiple storage and servers connected. This configuration offers simultaneous zone configurations from multiple arrays at the same time. It is suggested that the storage be kept on the core and the servers on the edge.

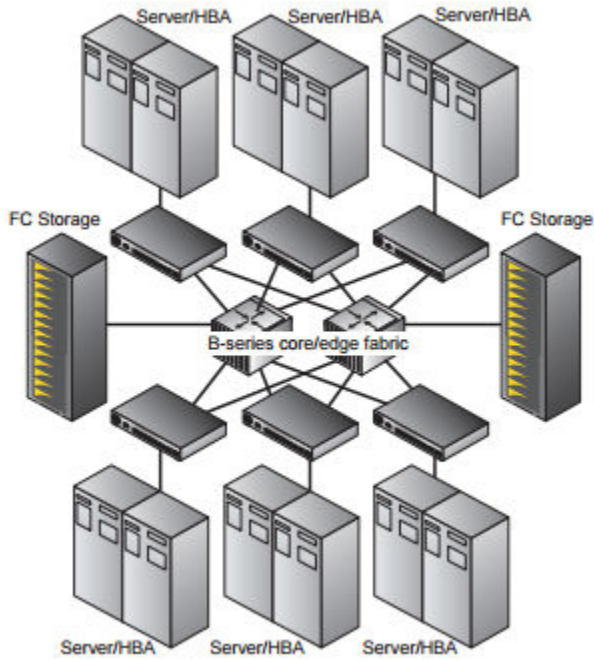


Figure 5: B-Series Core/Edge Fabric

B-Series Maximum FC Hop Count Use Case 6

Figure 6 depicts an HPE B-series multi-hop fabric configuration. HPE supports up to 7 hops from storage to server in this configuration. Simultaneous zone configurations are available from both ends.

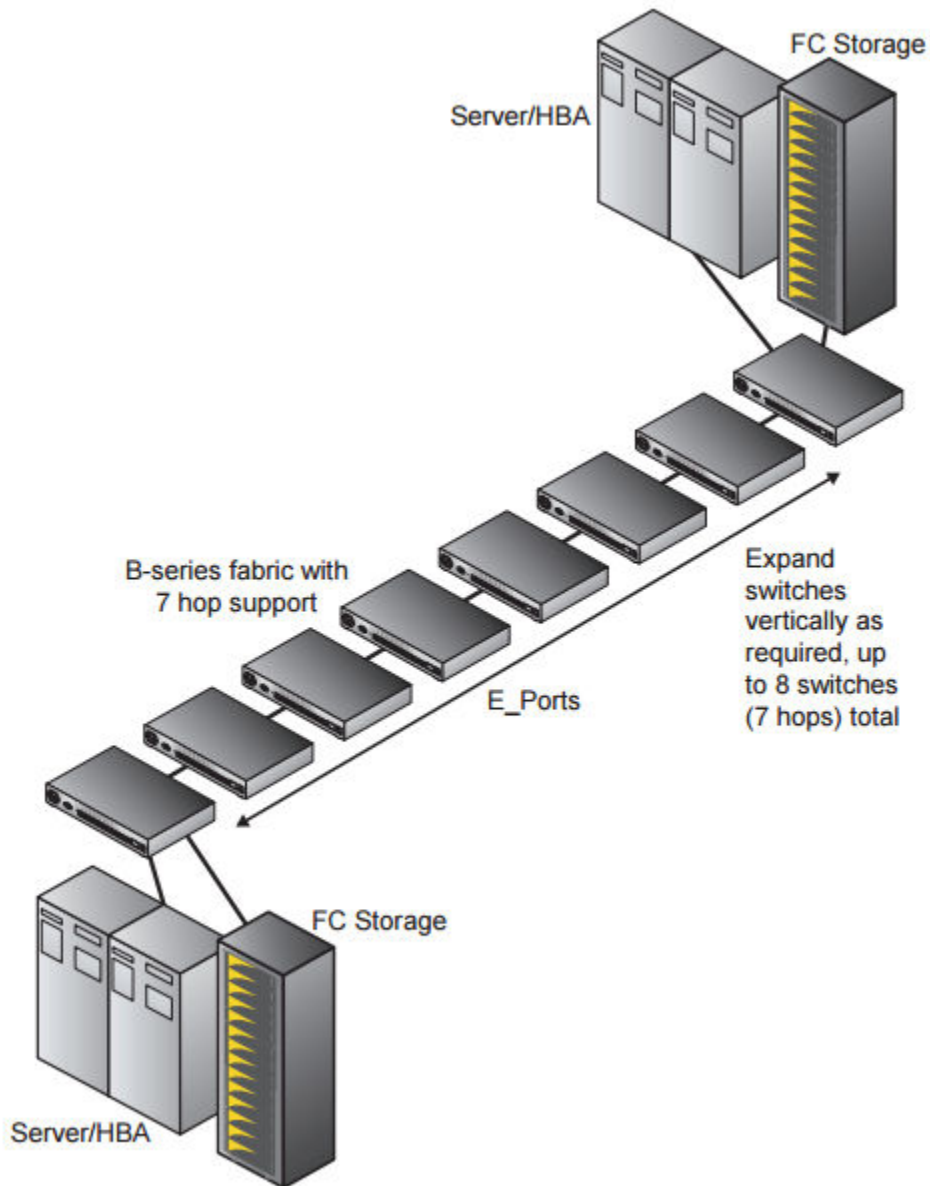


Figure 6: B-Series Maximum FC Hop Count

B-Series Access Gateway Use Case 7

Figure 7 depicts a scenario where servers are connected to a switch and the switch is acting as an Access Gateway. The Access Gateway is connected to an external B-Series fabric. The storage target is connected to the B-Series fabric. Additional servers could be connected to the fabric.

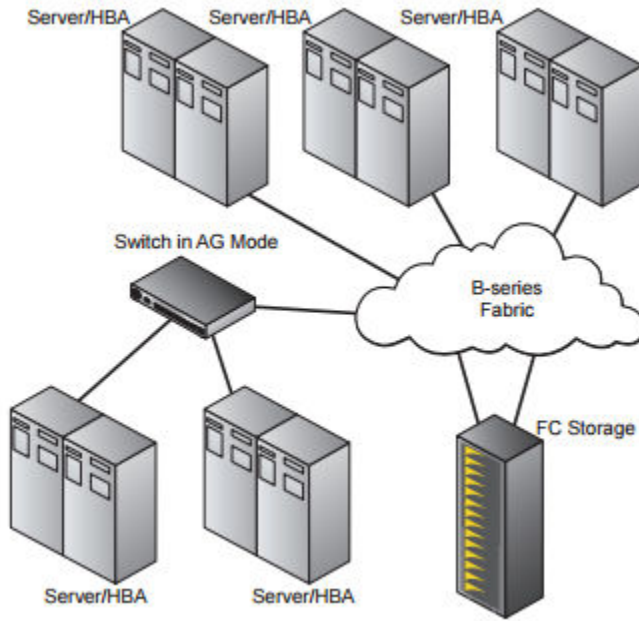


Figure 7: B-Series Access Gateway

MetaSANs (FC Routing) Use Case 8

No Smart SAN/TDPZ support across IFLs.

Blade Servers and Virtual Connect Use Case 9

The following is a tabular representation of possible Smart SAN use case configurations using Blade Servers and Virtual Connect and the supported Smart SAN features in these configurations.

Table 2: Blade Servers and Virtual Connect Use Case

Server Connect	Interconnect ¹	Interconnect Mode	Fabric	Smart SAN features
Blade Server Mezzanine 16Gb FC HBA	B-Series 16Gb/28 SAN Switch for BladeSystem c-Class	FC Access Gateway to fabric (NPV mode)	HPE FlexFabric switch or B-Series fabric	<ul style="list-style-type: none"> TDPZ FDMI data (if Smart SAN driver installed on HBA)
		FCF	B- Series Fabric	<ul style="list-style-type: none"> TDPZ FDMI data (if Smart SAN driver installed on HBA)

Table Continued

Server Connect	Interconnect ¹	Interconnect Mode	Fabric	Smart SAN features
Bladeserver FCoE	<ul style="list-style-type: none"> 6125XLG Ethernet Blade Switch 6127XLG Ethernet Blade Switch 	FCoE NPV to fabric FCF (VE_Port)	HPE FlexFabric switch fabric	TDPZ
Bladeserver FCoE	<ul style="list-style-type: none"> VC FlexFabric 20/40 F8 VC FlexFabric 10Gb/24-port VC Flex-10/10D 	FCoE Virtual Connect	HPE FlexFabric switch fabric	
Bladeserver FC	VC 8Gb 24-port FC Module	FC Virtual Connect	HPE FlexFabric switch fabric	

¹ Please consult SPOCK for the complete list of supported Virtual Connect modules

Configuring HPE FlexFabric Switches for Smart SAN

Prerequisite

- ❗ **IMPORTANT:** For information on Smart SAN support for HPE FlexFabric switch models, see the 3PAR Smart SAN Support Matrix in **SPOCK**.

To configure HPE FlexFabric switches and ports, refer to the *HPE FlexFabric Switch Series Storage Solutions Configuration Guide, edition 7* (or later).

Enabling Smart SAN

When Smart SAN is enabled on the switch, `enhanced zoning` is automatically enabled on all VSANs.

- To enable the Smart SAN feature on an HPE FlexFabric switch, issue the following commands:

```
<Sysname> system-view
[Sysname] smartsan enable
```

The switch will create and activate a zone set automatically, if one does not already exist while creating the first peer zone. There is no need to create an active zone set upfront before creating a peer zone.

NOTE: This could result in an isolated VSAN in a distributed multi-switch VSAN configuration and a user may have to **undo enhanced zoning enable** on VSANs not participating in Smart SAN functionality.

- To display the Smart SAN status on an HPE FlexFabric switch, issue the following commands:

```
<Sysname> system-view
[Sysname] display smartsan status
```

Example: The following is an example displaying Smart SAN status:

```
<Sysname> display smartsan status
SmartSAN Status:
FC/FCoE: Enabled
iSCSI: Enabled
```

- To disable the Smart SAN feature on an HPE FlexFabric switch, issue the following commands:

```
<Sysname> system-view
[Sysname] undo smartsan enable
```

Disabling Smart SAN does not automatically remove `enhanced zoning` from the VSANs. If `enhanced zoning` is not desired, it will have to be manually disabled for each VSAN.

Displaying HBA/Target Port Registered Management Information

- To display FDMI database information on an HPE FlexFabric switch for all VSANs, issue the following command:

```
<Sysname> display fdmi database
```

Example: The following example displays FDMI database information

```
<Sysname> display fdmi database
Registered HBA List for VSAN 200:
  HBA ID                               Port WWNs
  50:01:43:80:02:3c:bf:6e               50:01:43:80:02:3c:bf:6e
  50:01:43:80:23:1c:50:26               50:01:43:80:23:1c:50:26
  50:01:43:80:23:1c:5d:1a               50:01:43:80:23:1c:5d:1a
  50:01:43:80:23:1c:c1:8e               50:01:43:80:23:1c:c1:8e
  50:01:43:80:23:1d:ad:1a               50:01:43:80:23:1d:ad:1a
  50:01:43:80:28:cb:2a:ca               50:01:43:80:28:cb:2a:ca
  50:01:43:80:28:cb:2c:d6               50:01:43:80:28:cb:2c:d6
  50:01:43:80:28:cf:95:d8               50:01:43:80:28:cf:95:d8
  50:01:43:80:28:cf:95:f8               50:01:43:80:28:cf:95:f8
  50:01:43:80:28:cf:97:48               50:01:43:80:28:cf:97:48
  50:01:43:80:28:cf:97:4c               50:01:43:80:28:cf:97:4c
```

- To display detailed information about the HBA, e.g., 50:01:43:80:23:1d:ad:1a in the FDMI database for VSAN 200, issue the following command:

```
<Sysname> display fdmi database vsan <vsan-num> hba-id <hbaID> verbose
```

Example: The following example displays FDMI database detailed information about HBA:

```

<Sysname> display fdmi database vsan 200 hba-id 50:01:43:80:23:1d:ad:1a
verbose
Registered HBA List for VSAN 200:
  HBA ID: 50:01:43:80:23:1d:ad:1a
    Manufacturer: QLogic Corporation
    Serial Number: 6C444241XZ
    Model: SN1000Q
    Model Description: HPE SN1000Q 16Gb 2P FC HBA
    Node Name: 50:01:43:80:23:1d:ad:1b
    Node Symbolic Name: SN1000Q FW:v8.00.40 DVR:v8.07.00.23.12.0-k
    Hardware Version: HD8310405-18 E
    Driver Version: 8.07.00.23.12.0-k
    Option ROM Version: 3.28
    Firmware Version: 8.00.40 (d0d5)
    OS Name and Version: Linux 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34
UTC
                                2014 (9879bd4)
Maximum CT Payload: 2048
Vendor Identifier: QLGC
Vendor Specific Information: 0x1077
Number of Ports: 1
Fabric Name: 20:c8:5c:8a:38:23:23:0e
Boot BIOS Version: BIOS 3.28
  Port WWN: 50:01:43:80:23:1d:ad:1a
    Port Symbolic Name: SN1000Q FW:v8.00.40 DVR:v8.07.00.23.12.0-k
    Port Identifier: 0x01000e
    Port Type: 0x7f(Nx)
    Supported Class of Service: 3
    Supported FC-4 Types: FCP
    Port Active FC-4 Types: FCP
    Supported Speed: 4 Gbps, 8 Gbps, 16 Gbps
    Current Speed: 8 Gbps
    Maximum Frame Size: 2048
    OS Device Name: qla2xxx:host3
    Host Name: r124-s14
    Port Fabric Name: 20:c8:5c:8a:38:23:23:0e
    Port State: 0x00000001
    Number of Discovered Ports: 1
    Smart SAN Service Category: Smart SAN Initiator
    Smart SAN GUID: 50014380-231d-ad1b-5001-4380231dad1a
    Smart SAN Version: Smart SAN Version 2.0
    Smart SAN Product Name(Model): ISP2031
    Smart SAN Port Info: 0x01(Physical)
    Smart SAN QoS Support: 0x00(Not Supported)
    Smart SAN Security Support: 0x00(Not Supported)

```

Displaying Diagnostic Ready Information

- To display RDP (Read Diagnostics Parameters) database on an HPE FlexFabric switch, issue the following command:

```
<Sysname> display rdp database
```

This will display information for all the ports on the switch as well as the attached end devices. To see information for a single attached end device, the user will need to find out the port WWN for that end device. Display the port WWNs for all the logged in devices on the switch and select the appropriate WWN.

- Issue the following command to display the port WWN for the end device:

```
<Sysname> display fc login
```

Example: The following is an example showing the recommended method for obtaining port WWN for the end device:

```
<Sysname> display fc login
Interface VSAN FCID Node WWN Port WWN
Fc1/0/11 200 0x010007 50:01:43:80:28:cb:2a:cb 50:01:43:80:28:cb:2a:ca
Fc1/0/12 200 0x010006 50:01:43:80:28:cb:2c:d7 50:01:43:80:28:cb:2c:d6
Fc1/0/13 200 0x010000 2f:f7:00:02:ac:00:c5:29 21:22:00:02:ac:00:c5:29
Fc1/0/14 200 0x010001 2f:f7:00:02:ac:00:c5:29 20:22:00:02:ac:00:c5:29
Fc1/0/43 200 0x010005 50:01:43:80:23:1c:5d:1b 50:01:43:80:23:1c:5d:1a
Fc1/0/44 200 0x010002 50:01:43:80:28:cf:97:49 50:01:43:80:28:cf:97:48
Fc1/0/45 200 0x010003 20:00:fc:15:b4:43:5f:e2 10:00:fc:15:b4:43:5f:e2
Fc1/0/46 200 0x010004 20:00:fc:15:b4:43:5f:e3 10:00:fc:15:b4:43:5f:e3
Fc1/0/47 200 0x010008 20:c8:78:48:59:6a:22:f0 28:01:bc:ea:fa:7f:55:f5
Fc1/0/47 200 0x010009 50:01:43:80:28:cf:95:d9 50:01:43:80:28:cf:95:d8
Fc1/0/47 200 0x01000a 50:01:43:80:28:cf:95:f9 50:01:43:80:28:cf:95:f8
Fc1/0/47 200 0x01000b 50:01:43:80:28:cf:97:4d 50:01:43:80:28:cf:97:4c
Fc1/0/47 200 0x01000c 50:01:43:80:02:3c:bf:6f 50:01:43:80:02:3c:bf:6e
Fc1/0/47 200 0x01000d 50:01:43:80:23:1c:50:27 50:01:43:80:23:1c:50:26
Fc1/0/47 200 0x01000e 50:01:43:80:23:1d:ad:1b 50:01:43:80:23:1d:ad:1a
Fc1/0/47 200 0x01000f 50:01:43:80:23:1c:c1:8f 50:01:43:80:23:1c:c1:8e
```

- To display the RDP data specifying the device's port WWN, issue the following command:

```
<Sysname> display rdp database port-name <portWWN>
```

Example: The following is an example displaying the rdp database information for a port WWN:

```
<Sysname> display rdp database port-name 50:01:43:80:28:cb:2a:ca
Port Name: 50:01:43:80:28:cb:2a:ca
Node Name: 50:01:43:80:28:cb:2a:cb
Fabric Port Name: 28:01:5c:8a:38:23:23:42
Fabric Node Name: 20:c8:5c:8a:38:23:23:0e
Port Speed:
Port Speed Capabilities: 1 Gbps, 2 Gbps, 4 Gbps, 8 Gbps
Port Operating Speed: 8 Gbps
Link Error Status(FC):
Link Failure Count: 0
Loss-of-Synchronization Count: 0
Loss-of-Signal Count: 0
Primitive Sequence Protocol Error: 0
Invalid Transmission Word: 0
Invalid CRC Count: 0
SFP Diagnostics:
Temperature: 37C
Voltage: 3.3257V
Bias Current: 7.104mA
Tx Power: 0.5513mW
Rx Power: 0.5349mW
Tx Type: Short Wave Laser
Optical Port: Yes
Connector Type: SFP+
```

A Smart SAN enabled switch periodically polls the end devices for diagnostic information. The default polling interval is 30 minutes.

- **Displaying the polling interval on an HPE FlexFabric switch**

To display the polling interval on an HPE FlexFabric switch, issue the following commands:

```
<Sysname> system-view
[Sysname] display rdp request-polling-interval
RDP request-polling-interval: 5 minutes
```

- **Modifying the RDP polling interval on an HPE FlexFabric switch**

To modify the RDP polling interval on an HPE FlexFabric switch, e.g., to 5 minutes, issue the following commands:

```
<Sysname> system-view
[Sysname] RDP request-polling-interval 5
```

Please note that the polling interval time is in minutes and can be set in a range from 5 to 1440 minutes.

Displaying ZoneSet Information

To display Smart SAN enabled Target Driven Peer Zoning (TDPZ) information, issue the following command:

```
<Sysname> display zoneset active
```

Example: The following example showcases how to display the Target Driven Peer Zoning information:

```
<Sysname> display zoneset active
VSAN 1:
VSAN 100:
  zoneset name TDPZ_DefaultZoneSet
    zone name tdz3par_20210002ac00b349_00
      type: peer-zoning
      *fcid 0x030006 [pwn 20:21:00:02:ac:00:b3:49] [principal]
      pwn 50:01:43:80:28:cc:54:78
      *fcid 0x030004 [pwn 50:01:43:80:28:cc:54:7a]
    zone name tdz3par_21210002ac00b349_00
      type: peer-zoning
      *fcid 0x030007 [pwn 21:21:00:02:ac:00:b3:49] [principal]
      pwn 50:01:43:80:28:cc:54:78
      *fcid 0x030004 [pwn 50:01:43:80:28:cc:54:7a]
    zone name #default_zone#
      *fcid 0x03000c
      *fcid 0x03000d
      *fcid 0x03000e
      *fcid 0x03000a
      *fcid 0x030005
      *fcid 0x030000
      *fcid 0x030001
      *fcid 0x03000b
```

Displaying Mode of a Zone on a VSAN

To display a zone's mode on a VSAN, issue the following commands:

```
<Sysname> system-view
[Sysname] display zone status vsan <vsan-id>
```

Example: The following example showcases how to display a zone's mode in a VSAN:

```
<Sysname> system-view
[Sysname] display zone status VSAN 100
VSAN 100:
Mode: enhanced
...
```

Disabling Enhanced Zoning

To disable the enhanced zoning feature, issue the following commands:

```
<Sysname> system-view
[Sysname] vsan <vsan-id>
[Sysname-vsan-id] undo zone mode enhanced
```

Example: The following example showcases how to disable the enhanced zoning feature:

```
<Sysname>system-view
System View: return to User View with Ctrl+Z.
[Sysname]vsan 100
[Sysname-vsan100]undo zone mode enhanced
The zoning database in this switch would be distributed throughout the
fabric. Continue? [Y/N]:y
```

Fibre Channel (FC) Port Security Commands

The HPE FlexFabric switch supports additional port security features, but this section will describe the port security commands and features which pertain only to Smart SAN.

Enabling/Disabling FC Port Security

When Smart SAN is enabled, port security gets automatically enabled. Both `auto-learning` and `smartsan-learning` are also automatically enabled unless they were previously explicitly disabled. If the Smart SAN security feature attribute has been successfully registered in the switch's FDMI database, the device's port WWN is automatically entered into the port security database as `smartsan-learn` if `smartsan-learning` state is enabled. Although the port WWN is automatically entered into the port security database, the port binding does not occur until `smartsan-learn` is explicitly disabled.

The following commands are executed only in a VSAN view. Since the Smart SAN specific FC port security is automatically enabled, the following commands should not need to be executed normally unless a change is needed in the port security database.

- To enable `fc-port-security` in a VSAN, issue the following command:

```
[Sysname-vsanX] fc-port-security enable [ auto-learn | smartsan-learn |all]
```
- To enable `fc-port-security`, issue the following command:

```
[Sysname-vsanX] fc-port-security enable
```
- To enable `fc-port-security` and both `smartsan-learning` and `auto-learning`, issue the following command:

```
[Sysname-vsanX] fc-port-security enable all
```
- To enable `fc-port-security` and only `smartsan-learning`, issue the following command:

```
[Sysname-vsanX] fc-port-security enable smartsan-learn
```

- To disable port security in a VSAN, issue the following command:

```
[Sysname-vsanX] undo fc-port-security enable
```

- To transition from `smartsan-learn` to `smartsan-static`, i.e., bind the entry to the port, issue the following command:

```
[Sysname-vsanX] undo fc-port-security smartsan-learn
```

When "undo `fc-port-security smartsan-learn`" is executed to bind the entry to the port, only the `smartsan-learning` entries are affected. The auto-learning entries will remain in a learning state. If auto-learning is not disabled, then on the other switchports, i.e., those that are not bound to a `smartsan-static` entry, devices will still be able to access and log into the switch. Once a device is bound to a switchport, the device will not be allowed to access the switch through another switchport, i.e., if the bound device is moved to another switchport, it will be prevented from logging into the switch. After `smartsan-learning` is disabled, entries for Smart SAN devices will not be automatically entered into the security database. The device login will only result in a single entry into the `fc-security` database with the status of "learning".

Example: The following example shows the Fibre Channel port security status and database before Smart SAN is enabled:

```
[Sysname]display fc-port-security status
Status for VSAN 1:
  FC port security: Disabled
  Auto learn: Disabled
  SmartSAN auto learn: Disabled
Status for VSAN 100:
  FC port security: Disabled
  Auto learn: Disabled
  SmartSAN auto learn: Disabled
[Sysname]display fc-port-security database all
```

Currently, there are no entries in the database as can be seen above when the display command is executed.

NOTE: If there are devices already logged into the switch prior to enabling Smart SAN, the devices are forced to log off and log back into the switch when Smart SAN is enabled.

Example: The following example shows the Fibre Channel port security status and database after Smart SAN is enabled:

```

[Sysname]smartsan enable
[Sysname]display fc-port-security status
Status for VSAN 1:
  FC port security: Enabled
  Auto learn: Enabled
  SmartSAN auto learn: Enabled
Status for VSAN 100:
  FC port security: Enabled
  Auto learn: Enabled
  SmartSAN auto learn: Enabled
[Sysname]display fc-port-security database all
Total entries: 26
Database for VSAN 100:

```

Logging-in Entity	Interface	Type
10:00:3c:a8:2a:fe:57:b5 (pWWN)	Fc1/0/33	Learning
10:00:3c:a8:2a:fe:57:b5 (pWWN)	Fc1/0/33	SmartSAN-Learning
10:00:3c:a8:2a:fe:59:f9 (pWWN)	Fc1/0/34	Learning
10:00:3c:a8:2a:fe:59:f9 (pWWN)	Fc1/0/34	SmartSAN-Learning
10:00:3c:a8:2a:fe:5b:09 (pWWN)	Fc1/0/44	Learning
10:00:3c:a8:2a:fe:5b:09 (pWWN)	Fc1/0/44	SmartSAN-Learning
10:00:c4:34:6b:20:22:b9 (pWWN)	Fc1/0/5	Learning
10:00:c4:34:6b:20:22:b9 (pWWN)	Fc1/0/5	SmartSAN-Learning
10:00:c4:34:6b:20:62:7d (pWWN)	Fc1/0/8	Learning
10:00:c4:34:6b:20:62:7d (pWWN)	Fc1/0/8	SmartSAN-Learning
10:00:fc:15:b4:43:5f:53 (pWWN)	Fc1/0/35	Learning
10:00:fc:15:b4:43:5f:53 (pWWN)	Fc1/0/35	SmartSAN-Learning
20:01:00:02:ac:01:98:7f (pWWN)	Fc1/0/43	Learning
20:01:00:02:ac:01:98:7f (pWWN)	Fc1/0/43	SmartSAN-Learning
21:01:00:02:ac:01:98:7f (pWWN)	Fc1/0/47	Learning
21:01:00:02:ac:01:98:7f (pWWN)	Fc1/0/47	SmartSAN-Learning
50:01:43:80:23:1c:50:1c (pWWN)	Fc1/0/6	Learning
50:01:43:80:23:1c:50:1c (pWWN)	Fc1/0/6	SmartSAN-Learning
50:01:43:80:23:1c:50:24 (pWWN)	Fc1/0/4	Learning
50:01:43:80:23:1c:50:24 (pWWN)	Fc1/0/4	SmartSAN-Learning
50:01:43:80:23:1d:30:7c (pWWN)	Fc1/0/7	Learning
50:01:43:80:23:1d:30:7c (pWWN)	Fc1/0/7	SmartSAN-Learning
50:01:43:80:23:1d:ec:14 (pWWN)	Fc1/0/10	Learning
50:01:43:80:23:1d:ec:14 (pWWN)	Fc1/0/10	SmartSAN-Learning
50:01:43:80:28:cf:95:da (pWWN)	Fc1/0/14	Learning
50:01:43:80:28:cf:95:da (pWWN)	Fc1/0/14	SmartSAN-Learning

Example: The following example shows how to explicitly disable smartsan-learning to bind the entry to the port:


```

[Sysname]vsan 100
[Sysname-vsan100]undo fc-port-security smartsan-learn
[Sysname-vsan100]display fc-port-security database all
Total entries: 25
Database for VSAN 100:
  Logging-in Entity                Interface                Type
10:00:3c:a8:2a:fe:57:b5 (pWWN)    Fc1/0/33                Learning
10:00:3c:a8:2a:fe:57:b5 (pWWN)    Fc1/0/33                SmartSAN-Static
10:00:3c:a8:2a:fe:59:f9 (pWWN)    Fc1/0/34                Learning
10:00:3c:a8:2a:fe:59:f9 (pWWN)    Fc1/0/34                SmartSAN-Static
10:00:3c:a8:2a:fe:5b:09 (pWWN)    Fc1/0/44                Learning
10:00:3c:a8:2a:fe:5b:09 (pWWN)    Fc1/0/44                SmartSAN-Static
10:00:c4:34:6b:20:22:b9 (pWWN)    Fc1/0/5                 Learning
10:00:c4:34:6b:20:62:7d (pWWN)    Fc1/0/8                 Learning
10:00:c4:34:6b:20:62:7d (pWWN)    Fc1/0/8                 SmartSAN-Static
10:00:fc:15:b4:43:5f:53 (pWWN)    Fc1/0/35                Learning
10:00:fc:15:b4:43:5f:53 (pWWN)    Fc1/0/35                SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43                Learning
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43                SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47                Learning
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47                SmartSAN-Static
50:01:43:80:23:1c:50:1c (pWWN)    Fc1/0/6                 Learning
50:01:43:80:23:1c:50:1c (pWWN)    Fc1/0/6                 SmartSAN-Static
50:01:43:80:23:1c:50:24 (pWWN)    Fc1/0/4                 Learning
50:01:43:80:23:1c:50:24 (pWWN)    Fc1/0/4                 SmartSAN-Static
50:01:43:80:23:1d:30:7c (pWWN)    Fc1/0/7                 Learning
50:01:43:80:23:1d:30:7c (pWWN)    Fc1/0/7                 SmartSAN-Static
50:01:43:80:23:1d:ec:14 (pWWN)    Fc1/0/10                Learning
50:01:43:80:23:1d:ec:14 (pWWN)    Fc1/0/10                SmartSAN-Static
50:01:43:80:28:cf:95:da (pWWN)    Fc1/0/14                Learning
50:01:43:80:28:cf:95:da (pWWN)    Fc1/0/14                SmartSAN-Static

```

Displaying FC Port Security Binding Database

To display binding entries in the port security database, issue the following command:

```

<Sysname> display fc-port-security database { all | auto-learn | static |
smartsan-learn | smartsan-static } [ interface <interface-type> <interface-
number> ] [ vsan <vsan-id> ]

```

where the parameters are the following:

- all
 - specifies all binding entries, including static entries, learned entries, and learning entries
- auto-learn
 - specifies learned and learning entries
- static
 - specifies static entries
- smartsan-learn
 - specifies smartsan-learn entries
- smartsan-static
 - specifies smartsan static entries
- interface <interface-type> <interface-number>

specifies an interface by its type and number. If not specified, this command displays binding entries for all interfaces.

- vsan <vsan-id>

specifies a VSAN by its ID in the range of 1 to 3839. If not specified, this command displays binding entries in all VSANs.

Example: The following example displays only the smartsan-static entries in the port security database:

```
<Sysname>display fc-port-security database smartsan-static
Total entries: 12
Database for VSAN 100:
  Logging-in Entity      Interface      Type
10:00:3c:a8:2a:fe:57:b5 (pWWN)  Fc1/0/33     SmartSAN-Static
10:00:3c:a8:2a:fe:59:f9 (pWWN)  Fc1/0/34     SmartSAN-Static
10:00:3c:a8:2a:fe:5b:09 (pWWN)  Fc1/0/44     SmartSAN-Static
10:00:c4:34:6b:20:62:7d (pWWN)  Fc1/0/8      SmartSAN-Static
10:00:fc:15:b4:43:5f:53 (pWWN)  Fc1/0/35     SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43     SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47     SmartSAN-Static
50:01:43:80:23:1c:50:1c (pWWN)  Fc1/0/6      SmartSAN-Static
50:01:43:80:23:1c:50:24 (pWWN)  Fc1/0/4      SmartSAN-Static
50:01:43:80:23:1d:30:7c (pWWN)  Fc1/0/7      SmartSAN-Static
50:01:43:80:23:1d:ec:14 (pWWN)  Fc1/0/10     SmartSAN-Static
50:01:43:80:28:cf:95:da (pWWN)  Fc1/0/14     SmartSAN-Static
```

Example: The following example displays all the entries in the port security database:

```
<Sysname>display fc-port-security database all
Total entries: 25
Database for VSAN 100:
  Logging-in Entity      Interface      Type
10:00:3c:a8:2a:fe:57:b5 (pWWN)  Fc1/0/33     Learning
10:00:3c:a8:2a:fe:57:b5 (pWWN)  Fc1/0/33     SmartSAN-Static
10:00:3c:a8:2a:fe:59:f9 (pWWN)  Fc1/0/34     Learning
10:00:3c:a8:2a:fe:59:f9 (pWWN)  Fc1/0/34     SmartSAN-Static
10:00:3c:a8:2a:fe:5b:09 (pWWN)  Fc1/0/44     Learning
10:00:3c:a8:2a:fe:5b:09 (pWWN)  Fc1/0/44     SmartSAN-Static
10:00:c4:34:6b:20:22:b9 (pWWN)  Fc1/0/5      Learning
10:00:c4:34:6b:20:62:7d (pWWN)  Fc1/0/8      Learning
10:00:c4:34:6b:20:62:7d (pWWN)  Fc1/0/8      SmartSAN-Static
10:00:fc:15:b4:43:5f:53 (pWWN)  Fc1/0/35     Learning
10:00:fc:15:b4:43:5f:53 (pWWN)  Fc1/0/35     SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43     Learning
20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43     SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47     Learning
21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47     SmartSAN-Static
50:01:43:80:23:1c:50:1c (pWWN)  Fc1/0/6      Learning
50:01:43:80:23:1c:50:1c (pWWN)  Fc1/0/6      SmartSAN-Static
50:01:43:80:23:1c:50:24 (pWWN)  Fc1/0/4      Learning
50:01:43:80:23:1c:50:24 (pWWN)  Fc1/0/4      SmartSAN-Static
50:01:43:80:23:1d:30:7c (pWWN)  Fc1/0/7      Learning
50:01:43:80:23:1d:30:7c (pWWN)  Fc1/0/7      SmartSAN-Static
50:01:43:80:23:1d:ec:14 (pWWN)  Fc1/0/10     Learning
50:01:43:80:23:1d:ec:14 (pWWN)  Fc1/0/10     SmartSAN-Static
50:01:43:80:28:cf:95:da (pWWN)  Fc1/0/14     Learning
50:01:43:80:28:cf:95:da (pWWN)  Fc1/0/14     SmartSAN-Static
```

Displaying FC Port Security Statistics

To display port security statistics, issue the following command:

```
<Sysname> display fc-port-security statistics [ vsan <vsan-id> ]
```

Example: The following example displays the port security statistics for VSAN 100:

```
<Sysname>display fc-port-security statistics vsan 100
Statistics for VSAN 100:
  Number of permitted pWWN logins: 2
  Number of permitted nWWN logins: 0
  Number of permitted sWWN logins: 0
  Number of denied pWWN logins   : 0
  Number of denied nWWN logins   : 0
  Number of denied sWWN logins   : 0

  Total logins permitted   : 2
  Total logins denied      : 0
```

Displaying FC Port Security Status

To display the status of port security, issue the following command:

```
<Sysname> display fc-port-security status [ vsan <vsan-id> ]
```

Example: The following example displays the status of port security in all VSANs:

```
<Sysname>display fc-port-security status
Status for VSAN 1:
  FC port security: Enabled
  Auto learn: Enabled
  SmartSAN auto learn: Enabled
Status for VSAN 100:
  FC port security: Enabled
  Auto learn: Enabled
  SmartSAN auto learn: Enabled
```

Resetting FC Port Security Database

To clear the binding entries in the port security data, issue the following command:

```
<Sysname> reset fc-port-security database { all | auto-learn | static |
smartsan-static } [ interface <interface-type> <interface-number> ] vsan <vsan-
id
```

where the parameters are the following:

- all
specifies all binding entries, including static entries, learned entries, and learning entries
- auto-learn
specifies learned and learning entries
- static
specifies static entries
- smartsan-learn
specifies smartsan-learn entries

- `smartsan-static`
specifies smartsan static entries
- `interface <interface-type> <interface-number>`
specifies an interface by its type and number. If not specified, this command displays binding entries for all interfaces.
- `vsan <vsan-id>`
specifies a VSAN by its ID in the range of 1 to 3839.

Example: The following example shows how to clear all binding entries in the port security database for VSAN 100:

```
<Sysname>reset fc-port-security database all vsan 100
```

Resetting FC Port Security Statistics

To clear the port security statistics for a VSAN, issue the following command:

```
<Sysname> reset fc-port-security statistics vsan <vsan-id>
```

Example: The following example shows how to clear port security statistics for VSAN 100:

```
<Sysname>reset fc-port-security statistics vsan 100
```

Fibre Channel (FC) Port Security Examples

CNAs in BladeServers Configuration

The example shown below consists of several bladeservers within a C7000 enclosure. The interconnect used is the 6127XLG Ethernet Blade Switch. The CNA adapters on the bladeservers have logged into the HPE FlexFabric switch, which has FC port security, via NPV, so the CNA adapter ports appear as virtual ports to the HPE FlexFabric switch. As seen below, only the port (VFC140) is shown in the port security database. The connections between the 6127XLG and the HPE FlexFabric switch are configured as VFC101 on the 6127XLG and VFC140 on the HPE FlexFabric switch.

Example: The following example showcases CNAs connected to the interconnect via VFC101:

```
[c7000-interconnect]display npv login
Server
Interface VSAN FCID Node WWN Port WWN External
Interface
Vfc1 100 0x86002c 10:00:ec:b1:d7:a1:6b:11 20:00:ec:b1:d7:a1:6b:11 Vfc101
Vfc2 100 0x860028 10:00:ec:b1:d7:a1:7b:51 20:00:ec:b1:d7:a1:7b:51 Vfc101
Vfc4 100 0x860026 10:00:ec:b1:d7:a5:c6:21 20:00:ec:b1:d7:a5:c6:21 Vfc101
Vfc6 100 0x860027 10:00:ec:b1:d7:a5:38:c1 20:00:ec:b1:d7:a5:38:c1 Vfc101
Vfc7 100 0x860029 10:00:ec:b1:d7:a5:47:c1 20:00:ec:b1:d7:a5:47:c1 Vfc101
Vfc10 100 0x86002b 10:00:ec:b1:d7:a0:d5:a1 20:00:ec:b1:d7:a0:d5:a1 Vfc101
Vfc13 100 0x860025 10:00:ec:b1:d7:a5:3e:a1 20:00:ec:b1:d7:a5:3e:a1 Vfc101
Vfc14 100 0x86002a 10:00:ec:b1:d7:a5:4d:f1 20:00:ec:b1:d7:a5:4d:f1 Vfc101
```

Example: The following example showcases devices logged into the HPE FlexFabric switch:

```
[fcf-switch]dis fc login
Interface VSAN FCID Node WWN Port WWN
Fc1/0/33 100 0x860003 20:00:3c:a8:2a:fe:57:b5 10:00:3c:a8:2a:fe:57:b5
Fc1/0/35 100 0x860004 20:00:fc:15:b4:43:5f:53 10:00:fc:15:b4:43:5f:53
Fc1/0/36 100 0x86000a 50:01:43:80:23:1c:50:1d 50:01:43:80:23:1c:50:1c
Fc1/0/36 100 0x86000b 50:ba:43:80:23:1c:50:1c 50:ba:43:80:23:1c:50:1c
Fc1/0/36 100 0x86000c 50:bb:43:80:23:1c:50:1c 50:bb:43:80:23:1c:50:1c
Fc1/0/43 100 0x860006 2f:f7:00:02:ac:01:98:7f 20:01:00:02:ac:01:98:7f
Fc1/0/47 100 0x860007 2f:f7:00:02:ac:01:98:7f 21:01:00:02:ac:01:98:7f
Vfc140 100 0x860024 20:64:2c:23:3a:33:bd:b4 20:65:2c:23:3a:33:bd:bb
Vfc140 100 0x860025 10:00:ec:b1:d7:a5:3e:a1 20:00:ec:b1:d7:a5:3e:a1
Vfc140 100 0x860026 10:00:ec:b1:d7:a5:c6:21 20:00:ec:b1:d7:a5:c6:21
Vfc140 100 0x860027 10:00:ec:b1:d7:a5:38:c1 20:00:ec:b1:d7:a5:38:c1
Vfc140 100 0x860028 10:00:ec:b1:d7:a1:7b:51 20:00:ec:b1:d7:a1:7b:51
Vfc140 100 0x860029 10:00:ec:b1:d7:a5:47:c1 20:00:ec:b1:d7:a5:47:c1
Vfc140 100 0x86002a 10:00:ec:b1:d7:a5:4d:f1 20:00:ec:b1:d7:a5:4d:f1
Vfc140 100 0x86002b 10:00:ec:b1:d7:a0:d5:a1 20:00:ec:b1:d7:a0:d5:a1
Vfc140 100 0x86002c 10:00:ec:b1:d7:a1:6b:11 20:00:ec:b1:d7:a1:6b:11
```

Example: The following example showcases the entries within the FC port security database:

```
[fcf-switch]display fc-port-security database all
Total entries: 11
Database for VSAN 100:
Logging-in Entity Interface Type
10:00:3c:a8:2a:fe:57:b5 (pWWN) Fc1/0/33 Learning
10:00:3c:a8:2a:fe:57:b5 (pWWN) Fc1/0/33 SmartSAN-Static
10:00:fc:15:b4:43:5f:53 (pWWN) Fc1/0/35 Learning
10:00:fc:15:b4:43:5f:53 (pWWN) Fc1/0/35 SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN) Fc1/0/43 Learning
20:01:00:02:ac:01:98:7f (pWWN) Fc1/0/43 SmartSAN-Static
20:65:2c:23:3a:33:bd:bb (pWWN) Vfc140 Learning
21:01:00:02:ac:01:98:7f (pWWN) Fc1/0/47 Learning
21:01:00:02:ac:01:98:7f (pWWN) Fc1/0/47 SmartSAN-Static
50:01:43:80:23:1c:50:1c (pWWN) Fc1/0/36 Learning
50:01:43:80:23:1c:50:1c (pWWN) Fc1/0/36 SmartSAN-Static
```

As mentioned before, only a single entry for VFC140 appears for all the CNAs in the bladeserver. In addition, this port is not affected by the Smart SAN-specific port security. This would also be true for CNAs logging into the HPE FlexFabric switch using Virtual Connect.

HBAs/CNAs in Rack Servers Configuration

The HBAs are connected to a HPE FlexFabric switch in NPV mode. In turn, the NPV switch is connected to a HPE FlexFabric switch in FCF mode. The two switches can be connected via Fibre Channel (FC) or Fibre Channel over Ethernet (FCoE) as both are supported by the HPE FlexFabric switches.

Shown below are examples when NPV connection between switches is via FCoE. The connections between the NPV switch and the FCF switch are configured as VFC1010 on the NPV switch and VFC1010 on the FCF switch.

Example: The following example showcases adapters connected to the NPV switch:

```
<npv-switch>display npv login
Server
Interface VSAN FCID Node WWN Port WWN External
Interface
Fc1/0/43 100 0x86000f 50:01:43:80:28:cc:54:7b 50:01:43:80:28:cc:54:7a Vfc1010
Fc1/0/45 100 0x860010 50:01:43:80:28:cb:2a:cb 50:01:43:80:28:cb:2a:ca Vfc1010
```

Example: The following example showcases devices logged into the FCF switch:

```
<fcf-switch>display fc login
Interface VSAN FCID      Node WWN                Port WWN
Fc1/0/4   100  0x860009 50:01:43:80:23:1c:50:25 50:01:43:80:23:1c:50:24
Fc1/0/6   100  0x860005 20:00:c4:34:6b:20:22:b9 10:00:c4:34:6b:20:22:b9
Fc1/0/43  100  0x860006 2f:f7:00:02:ac:01:98:7f 20:01:00:02:ac:01:98:7f
Fc1/0/47  100  0x860007 2f:f7:00:02:ac:01:98:7f 21:01:00:02:ac:01:98:7f
Vfc1010   100  0x860008 20:64:5c:8a:38:23:23:0e 23:f2:5c:8a:38:23:23:15
Vfc1010   100  0x86000f 50:01:43:80:28:cc:54:7b 50:01:43:80:28:cc:54:7a
Vfc1010   100  0x860010 50:01:43:80:28:cb:2a:cb 50:01:43:80:28:cb:2a:ca
```

Example: The following example showcases port security entries for the above devices:

```
[fcf-switch-vsan100]display fc-port-security database all
Total entries: 9
Database for VSAN 100:
Logging-in Entity                Interface                Type
10:00:c4:34:6b:20:22:b9 (pWWN)  Fc1/0/6                 Learning
10:00:c4:34:6b:20:22:b9 (pWWN)  Fc1/0/6                 SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43                Learning
20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43                SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47                Learning
21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47                SmartSAN-Static
23:f2:5c:8a:38:23:23:15 (pWWN)  Vfc1010                 Learning
50:01:43:80:23:1c:50:24 (pWWN)  Fc1/0/4                 Learning
50:01:43:80:23:1c:50:24 (pWWN)  Fc1/0/4                 SmartSAN-Static
```

As mentioned before, only a single entry for VFC1010 appears for all the adapters connected to the NPV switch. In addition, this port is not affected by the Smart SAN-specific port security.

Shown below are examples when NPV connection between switches is via FC. Only a single connection between the two switches, and on both, port FC1/0/39 is used.

Example: The following example showcases adapters connected to the NPV switch:

```
[npv-switch]display npv login
Server                                External
Interface VSAN FCID      Node WWN                Port WWN
Interface
Fc1/0/43  100  0x86000f 50:01:43:80:28:cc:54:7b 50:01:43:80:28:cc:54:7a Fc1/0/39
Fc1/0/45  100  0x860010 50:01:43:80:28:cb:2a:cb 50:01:43:80:28:cb:2a:ca Fc1/0/39
```

Example: The following example showcases when devices are logged into the FCF switch:

```
[fcf-switch-vsan100]display fc login
Interface VSAN FCID      Node WWN                Port WWN
Fc1/0/4   100  0x860009 50:01:43:80:23:1c:50:25 50:01:43:80:23:1c:50:24
Fc1/0/6   100  0x860005 20:00:c4:34:6b:20:22:b9 10:00:c4:34:6b:20:22:b9
Fc1/0/39  100  0x86000f 50:01:43:80:28:cc:54:7b 50:01:43:80:28:cc:54:7a
Fc1/0/39  100  0x860010 50:01:43:80:28:cb:2a:cb 50:01:43:80:28:cb:2a:ca
Fc1/0/39  100  0x860015 20:64:5c:8a:38:23:23:0e 28:01:5c:8a:38:23:23:5e
Fc1/0/43  100  0x860006 2f:f7:00:02:ac:01:98:7f 20:01:00:02:ac:01:98:7f
Fc1/0/47  100  0x860007 2f:f7:00:02:ac:01:98:7f 21:01:00:02:ac:01:98:7f
```

Example: The following example showcases port security entries for the above devices:

```
[fcf-switch-vsan100]display fc-port-security database all
Total entries: 9
Database for VSAN 100:
  Logging-in Entity                Interface                Type
10:00:c4:34:6b:20:22:b9 (pWWN)    Fc1/0/6                Learning
10:00:c4:34:6b:20:22:b9 (pWWN)    Fc1/0/6                SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43               Learning
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43               SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47               Learning
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47               SmartSAN-Static
28:01:5c:8a:38:23:23:5e (pWWN)    Fc1/0/39               Learning
50:01:43:80:23:1c:50:24 (pWWN)    Fc1/0/4                Learning
50:01:43:80:23:1c:50:24 (pWWN)    Fc1/0/4                SmartSAN-Static
```

As mentioned before, only a single entry for interface FC1/0/39 appears for all the adapters connected to the NPV switch. In addition, this port is not affected by the Smart SAN-specific port security.

NPIV Devices

NPIV device logins can be seen where a device port simultaneously logged into a switch using multiple port WWNs. This can occur with host adapters as well as target devices. This example shows how this type of login affects the port security entries.

Example: The following example showcases an HBA logs in with one physical port (50:01:43:80:23:1c:50:1c) and two virtual ports (50:ba:43:80:23:1c:50:1c and 50:bb:43:80:23:1c:50:1c).

```
[Sysname]display fc login
Interface VSAN FCID      Node WWN                Port WWN
Fc1/0/35  100  0x860004  20:00:fc:15:b4:43:5f:53  10:00:fc:15:b4:43:5f:53
Fc1/0/36  100  0x86000a  50:01:43:80:23:1c:50:1d  50:01:43:80:23:1c:50:1c
Fc1/0/36  100  0x86000b  50:ba:43:80:23:1c:50:1c  50:ba:43:80:23:1c:50:1c
Fc1/0/36  100  0x86000c  50:bb:43:80:23:1c:50:1c  50:bb:43:80:23:1c:50:1c
Fc1/0/43  100  0x860006  2f:f7:00:02:ac:01:98:7f  20:01:00:02:ac:01:98:7f
Fc1/0/47  100  0x860007  2f:f7:00:02:ac:01:98:7f  21:01:00:02:ac:01:98:7f
```

Example: The following example showcases corresponding database entries for the above device logins:

```
[Sysname]display fc-port-security database all
Total entries: 8
Database for VSAN 100:
  Logging-in Entity                Interface                Type
10:00:fc:15:b4:43:5f:53 (pWWN)    Fc1/0/35               Learning
10:00:fc:15:b4:43:5f:53 (pWWN)    Fc1/0/35               SmartSAN-Static
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43               Learning
20:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/43               SmartSAN-Static
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47               Learning
21:01:00:02:ac:01:98:7f (pWWN)    Fc1/0/47               SmartSAN-Static
50:01:43:80:23:1c:50:1c (pWWN)    Fc1/0/36               Learning
50:01:43:80:23:1c:50:1c (pWWN)    Fc1/0/36               SmartSAN-Static
```

As can be seen, the virtual ports do not result in database entries.

Persistent ports with HPE 3PAR

Example: The following example showcases a persistent port pair (0:0:1 and 1:0:1) that would appear in the security database as shown below:

```

<Sysname>display fc-port-security data all
Total entries: 4
Database for VSAN 100:
  Logging-in Entity          Interface          Type
  20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43         Learning
  20:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/43         SmartSAN-Static
  21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47         Learning
  21:01:00:02:ac:01:98:7f (pWWN)  Fc1/0/47         SmartSAN-Static

```

If one of the nodes goes away, the HPE 3PAR would use a NPV login for the target port that went away, i.e, I/O destined for LUNs behind target port 1:0:1 will still reach the LUNs via the switchport bound to the other target port (0:0:1).

Example: The following example showcases NPV login as target port:

```

[Sysname]display fc login
Interface VSAN FCID      Node WWN          Port WWN
Fc1/0/43  100  0x860006 2f:f7:00:02:ac:01:98:7f 20:01:00:02:ac:01:98:7f
Fc1/0/43  100  0x860007 2f:f7:00:02:ac:01:98:7f 21:01:00:02:ac:01:98:7f

```

The HPE 3PAR NPV login will not cause the switchport bound to target port 0:0:1 to become disabled as virtual ports do not affect the Smart SAN security feature. Therefore, HPE 3PAR persistent ports are not adversely affected by the Smart SAN FC port security feature.

Configuring B-Series FC Switches for Smart SAN

Enabling the Target Driven Peer Zoning Feature

With B-Series switches, the Target Driven Peer Zoning feature can be enabled/disabled on a per-port basis. By default the Target Driven peer Zoning feature is disabled.

- To enable the Target Driven Peer Zoning feature on a single B-Series switch port, issue the following command:

```
portcfgtdz --enable <portnum>
```

where

portnum is the switch port [*<slot>/*]*<port>*

- To enable Target Driven Peer Zoning on **all** switch ports, issue the following command:

```
portcfgtdz --enable *
```

To disable the Target Driven Peer Zoning feature on a B-Series switch port, issue the following command:

```
portcfgtdz --disable <portnum>
```

where

portnum is the switch port [*<slot>/*]*<port>*

To disable the Target Driven Peer Zoning feature on **all** switch ports, issue the following command:

```
portcfgtdz --disable *
```

NOTE: Prior to FOS version 8.0.1, a B-Series switch required that an active zoning configuration exist before a target would be allowed to create a Target Driven Peer Zone. If one did not exist, the user was required to create and activate a zoning configuration. With FOS version 8.0.1 or later, the switch will automatically create an active zoning configuration when the target attempts to create a TDPZ zone if one does not already exist.. For this auto-creation to occur, there should not be any zoning configuration (active or defined) in the current or saved configuration for the switch.

Displaying HBA/Target Port Registered Management Information

To display the FDMI database on a B-Series switch, issue the following command:

```
fdmishow
```

This will display the entire FDMI database.

Displaying Diagnostic Ready Information

- To display the SFP information about a B-Series switch port and the attached device port, issue the following command:

```
sfps show <portnum> -link
```

where

portnum is the switch port [*<slot>/<port>*]

- To display additional diagnostic information about a B-Series switch port and the attached device port, issue the following command:

```
portshow <portnum> -link
```

where

portnum is the switch port [*<slot>/<port>*]

- To refresh the SFP information on a port and view the SFP information from the end device, issue the following command:

```
sfps show <portnum> -link -force
```

where

portnum is the switch port [*<slot>/<port>*] that the end device is connected to.

- To refresh and display additional diagnostic information about a B-Series switch port and the attached device port, issue the following command:

```
portshow <portnum> -link -force
```

where

portnum is the switch port [*<slot>/<port>*] that the end port is attached to.

Configuring an HPE 3PAR StoreServ Storage System for Smart SAN

To configure a 16Gb FC target port on a HPE 3PAR StoreServ Storage system for Smart SAN, complete the following steps:

1. Install the Smart SAN license.

To enable Smart SAN related features, the Smart SAN license is required to be installed on the HPE 3PAR StoreServ Storage system. The Smart SAN license can be applied and validated either through the HPE 3PAR Management Console or through the HPE 3PAR CLI Interface.

NOTE: If you do not have the HPE 3PAR StoreServ Storage system Smart SAN license, contact your HPE representative.

To set the HPE StoreServ Smart SAN license use the `setlicense` command. The command can be used to enable the Smart SAN feature.

Example: The following example showcases installing Smart SAN license with the `setlicense` command:

```
cli% setlicense -f license.txt
If this software is being provided to you for a limited evaluation
period, then your license shall be governed by the current HPE Software
License Terms (or as otherwise agreed between us) with the
exception that the term of the license shall expire upon the earlier
of the evaluation period notified to you or 120 days. Upon expiration
of the license, you must cease using the software and HPE reserves
the right to disable the software without notice. By using or
activating the software you are agreeing to these terms.
Do you agree to these terms and conditions? y=yes n=no: y
The system will be licensed for 40 disks instead of unlimited disks.
The following features will be enabled:
Smart SAN (No expiration date)
Are these the expected changes? (yes/no)
yes
License key successfully set
```

NOTE: Replace `license.txt` file name with your appropriate license file name.

2. Display the Smart SAN license.

Once the Smart SAN license is successfully installed, you can display the Smart SAN license and its related features using the `showlicense` command.

Example: The following example showcases displaying the Smart SAN license with the `showlicense` command:

```
cli% showlicense
License key was generated on Thu Feb 19 16:50:15 2015
System is licensed for 40 disks.
License features currently enabled:
3PAR OS Suite
Adaptive Flash Cache
Adaptive Optimization
Cluster Extension
Cluster Extension (102400G)
Data Encryption
Dynamic Optimization
File Persona (102400G)
File Persona Basic
Management Plug-In for VMware vCenter
Peer Motion
Peer Persistence
Peer Persistence (102400G)
Priority Optimization
Recovery Manager Central
Recovery Manager for Exchange
Recovery Manager for Microsoft Hyper-V
Recovery Manager for Oracle
Recovery Manager for SQL
Recovery Manager for VMware vSphere
Remote Copy
Remote Copy (102400G)
Smart SAN
```

3. Display Smart SAN enabled ports.

The HPE 3PAR `showport -par` command can be used to validate whether the Smart SAN feature is supported within the fabric or switch. All the possible statuses are shown below:

- **enabled**
The Smart SAN feature is enabled and supported for connected fabric and switch.
- **disabled²**
The Smart SAN feature is supported but disabled for connected fabric and switch.
- **unknown**
There is no information whether the Smart SAN feature is supported or not.
- **unsupported**
The Smart SAN feature is not supported by the connected fabric or switch.
- **n/a**
Not Applicable
- **unlicensed**
The Smart SAN license has not been applied on the HPE 3PAR StoreServ Storage system.

Example: The following example showcases how to validate whether Smart SAN is supported within the fabric or switch:

² If the target port is attached to a non-Smart SAN switch which supports enhanced zoning, the state will appear as disabled although the Smart SAN feature is not supported.

```

cli% showport -par
      Conn  Conn
N:S:P mode  Type   CfgRate MaxRate Class2  Uniq
Smart_SAN NodeWnn  VCN      IntCoal  TMWO
0:0:1 disk  point  12Gbps  12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
0:0:2 disk  point  n/a     12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
0:0:3 disk  point  12Gbps  12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
0:0:4 disk  point  n/a     12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
0:6:1 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled enabled
0:6:2 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled enabled
0:6:3 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled unknown
0:6:4 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled unknown
1:0:1 disk  point  12Gbps  12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
1:0:2 disk  point  n/a     12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
1:0:3 disk  point  12Gbps  12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
1:0:4 disk  point  n/a     12Gbps  n/a     n/a     n/a     enabled  n/a     n/a
1:6:1 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled enabled
1:6:2 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled enabled
1:6:3 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled unknown
1:6:4 host  point  auto    16Gbps  disabled disabled disabled disabled disabled disabled unknown
-----

```

Provisioning Target Driven Peer Zoning (TDPZ)

Creating a Target Driven Peer Zone (Smart Zone)

A key aspect of the TDPZ feature is to automatically create zones on the switch. To do so, the relationship between the host's World Wide Name (WWN) and array ports needs to be known. This is accomplished with the `-port` option on the `createhost` CLI command.

When creating a host, the user can define which array ports (`node:slot:port`) the user wants the host to 'see' through the Target Driven peer Zoning by using the option `-port`. Issue the following command:

```
createhost -persona <hostpersonaval> -port <node:slot:port>... <hostname> <WWN>...
```

where the port(s) can be specified as a single NSP, a comma-separated list of NSP(s) or an NSP pattern.

At least one WWN needs to be specified when the `-port` option is used and cannot be used in conjunction with the `-iscsi` sub-command. The individual TDPZ peer zones are determined by the specified target port. If host definitions already exist, the associated target port(s) can be added by using the `-add` and `-port` options. At least one WWN needs to be specified and the target port(s) associated with the WWNs should be specified in the command line.

Example: The following example showcases creation of a Target Driven Peer Zone (Smart Zone):

- Create a new host with a single WWN that will be zoned to port 0:8:1.

```
createhost -persona 15 -port 0:8:1 lincoln 1000A0B3CC1C68BE
```

This will result in a TDPZ peer zone with the WWN of target port 0:8:1 as its principal member and WWN 1000A0B3CC1C68BE as one of its non-principal members.

- Create a new host with multiple WWNs that will be zoned to multiple ports.

```
createhost -port *:8:* lincoln 1000A0B3CC1C68BE 1000A0B3CC1C68BF
```

This will result in several TDPZ peer zones, depending on the number of NSP values that match the specified pattern. Each TDPZ peer zone will have the WWN of the target port as its principal member and the WWNs 1000A0B3CC1C68BE and 1000A0B3CC1C68BF as non-principal members.

- Add a new WWN to an existing host and create a relationship to multiple ports

```
createhost -add -port 0:8:3,1:8:3 lincoln 1000A0B3CC1C68BD
```

This will result in a TDPZ peer zone with WWN of port 0:8:3 as its principal member and WWN 1000A0B3CC1C68BD in its members list as well as a TDPZ peer zone with the WWN of port 1:8:3 as its principal member and WWN 1000A0B3CC1C68BD in its member list.

NOTE: The `createhost -port` command will trigger the action to create the TDPZ zones. The status of the zone creation operation is viewed through the `showportdev tzone` command.

Removing a Target Driven Peer Zone (Smart Zone)

To remove WWNs from a TDPZ peer zone use the `removehost` CLI command. Similar to the `createhost` CLI command, option `-port` is used to remove the mapping of the host WWN to the target port. If the

removal action results in a TDPZ peer zone that has only one member, i.e., the principal target port, then the entire TDPZ peer zone would be removed. The associated port(s) can be a single NSP, a comma-separated NSP list, or an NSP pattern. Issue the following command:

```
removehost -port <node:slot:port>... <hostname> <WWN>...
```

Example: The following example showcases removal of a Target Driven Peer Zone (Smart Zone):

- Remove an NSP relationship from a host

```
removehost -port 0:8:3 lincoln 1000A0B3CC1C68BD
```

This will remove WWN 1000A0B3CC1C68BD from the TDPZ peer zone that has a target port 0:8:3 as its principal member.

- Remove a WWN from the host and any associated NSP relationships

```
removehost lincoln 1000A0B3CC1C68BD
```

This will remove WWN 1000A0B3CC1C68BD from all TDPZ peer zones that currently contain this WWN.

Displaying a Target Driven Peer Zone (TDPZ)

This section describes various commands that can be used to display the attributes of a Target Driven Peer Zone(TDPZ).

- **showportdev tzzone**

To display information about a TDPZ peer zone, use the following CLI command:

```
showportdev tzzone
```

Example: The following example shows how to display a TDPZ peer zone:

```
cli% showportdev tzzone
N:S:P -----Zone_Name----- Count State
0:2:3 tdz3par_20230002ac01987f_00 3      up_to_date
1:2:3 tdz3par_21230002ac01987f_00 3      up_to_date
-----
      2 total
```

NOTE: Count indicates the number of non-principal members in the zone.

- **showportdev tzzone [<node:slot:port>]**

To display the specific WWNs contained in a TDPZ peer zone, specify the NSP for the target port. The syntax for the CLI command is as follows:

```
showportdev tzzone [<node:slot:port>]
```

Example: The following example shows how to display members within a TDPZ peer zone:

```
cli% showportdev tzone 0:0:2

Zone Name:          tdz3par_20020002ac01987f_00
Zone Entry Count:  12
Zone State:         up_to_date
Principal Member:  20020002AC01987F
Number  ----Port_WWN---- -Alias_Name-
1       10003CA82AFE57B4
2       10003CA82AFE59F8
3       1000C4346B2022B8
4       1000C4346B20627C
5       1000FC15B4435F52
6       50014380231C501E
7       50014380231C5026
8       50014380231C5D16
9       50014380231D307E
10      50014380231DEC16
11      50014380231DEC7A
12      60014380231DADF8

Zone Name:          tdz3par_20020002ac01987f_01
Zone Entry Count:  16
Zone State:         up_to_date
Principal Member:  20020002AC01987F
Number  ----Port_WWN---- -Alias_Name-
1       600A4180231C6024
2       600B4180231C6024
3       600C4180231C6024
4       600E4180231C6024
5       600F4180231C6024
6       60104180231C6024
7       60114180231C6024
8       60124180231C6024
9       60154380231DADF8
10      60164380231DADF8
11      60174380231DADF8
12      60184380231DADF8
13      60194380231DADF8
14      601A4380231DADF8
15      601B4380231DADF8
16      60384380231DADF8
```

! **IMPORTANT:** There can be a maximum of 4 peer zones per principal port; hence 256 non-principal members per target port.

All the TDPZ peer zones with the primary member being the specified target port are displayed. There can be a maximum of 64 non-principal members in a given TDPZ peer zone created by the HPE 3PAR port. When user specifies more than 64 initiators, HPE 3PAR splits them into multiple zones, with each zone a maximum of 64 members.

- **showportdev tzone -d [<node:slot:port>]**

The option, `-d`, allows detailed information to be displayed for each initiator. The detailed information includes HBA Manufacturer, HBA Model, HBA Firmware Version, HBA OS Name/Version, the HBA port's supported and current speeds, HBA port's OS device name, hostname, alias name(s), and whether the Smart SAN QoS and Security features are supported. The syntax for the CLI command is as follows:

```
showportdev tzone -d [<node:slot:port>]
```

Example: The following example shows how to display detailed information about the initiators within a peer zone:


```
cli% showportdev tzone -d 1:0:2

Zone Name:          tdz3par_21020002ac01987f_00
Zone Entry Count:  2
Zone State:         up_to_date
Principal Member:   21020002AC01987F

Port WWN:  50014380231C501E
  Alias Name:
  Port Hostname:          R207-S12
  HBA Manufacturer:      QLogic Corporation
  HBA Model:             QLogic SN1000Q Fibre Channel Adapter
  HBA Driver Version:    101.1.18.20 RDP test 1 DBG
  HBA Firmware Version:  8.02.00
  HBA OS Name/Version:   Windows Server 2008 R2 Enterprise Service Pack 1 for
AMD64
  Port Supported Speed:  4Gbps 8Gbps 16Gbps
  Port Current Speed:    16Gbps
  Port OS Device Name:   QLogic Adapter
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1

Port WWN:  50014380231C5026
  Alias Name:
  Port Hostname:          Linux-default
  HBA Manufacturer:      QLogic Corporation
  HBA Model:             HP SN1000Q 16Gb 2P FC HBA
  HBA Driver Version:    8.07.00.35.06.0-k~rdp~67
  HBA Firmware Version:  8.02.00 (d0d5)
  HBA OS Name/Version:   Linux 2.6.32-504.el6.x86_64 x86_64
  Port Supported Speed:  4Gbps 8Gbps 16Gbps
  Port Current Speed:    16Gbps
  Port OS Device Name:   qla2xxx:host5
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1
```

- **Displaying Alias names for the Initiators if HPE 3PAR is part of an HPE FlexFabric switch Fabric**

If the HPE 3PAR is part of an HPE FlexFabric switch fabric, then the output of the above CLI commands will also include any assigned alias names for the initiators. Up to a total of five alias names will be displayed for an initiator. The alias names are ones that have been created via the switch CLI.

Example: The following example shows the alias names of the initiators within a peer zone:

```
cli% showportdev tzone 1:0:2

Zone Name:          tdz3par_21020002ac01987f_00
Zone Entry Count:  2
Zone State:         up_to_date
Principal Member:   21020002AC01987F
Number  ----Port WWN---- -Alias Name-
1      50014380231C501E  LinuxHost
                               QLG_16G
2      50014380231C5026  QLG_16G
                               LinuxHost
```

Example: The following example shows detailed information, including alias names, for initiators within a peer zone:

```

cli% showportdev tzone -d 1:0:2

Zone Name:          tdz3par_21020002ac01987f_00
Zone Entry Count:  2
Zone State:         up_to_date
Principal Member:   21020002AC01987F

Port WWN:  50014380231C501E
  Alias Name:          WindowsHost
                   QLogicHost
  Port Hostname:      R207-S12
  HBA Manufacturer:   QLogic Corporation
  HBA Model:          QLogic SN1000Q Fibre Channel Adapter
  HBA Driver Version: 101.1.18.20 RDP test 1 DBG
  HBA Firmware Version: 8.02.00
  HBA OS Name/Version: Windows Server 2008 R2 Enterprise Service Pack 1 for
AMD64
  Port Supported Speed: 4Gbps 8Gbps 16Gbps
  Port Current Speed:  16Gbps
  Port OS Device Name: QLogic Adapter
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1

Port WWN:  50014380231C5026
  Alias Name:          LinuxHost
  Port Hostname:      Linux-default
  HBA Manufacturer:   QLogic Corporation
  HBA Model:          HP SN1000Q 16Gb 2P FC HBA
  HBA Driver Version: 8.07.00.35.06.0-k~rdp~67
  HBA Firmware Version: 8.02.00 (d0d5)
  HBA OS Name/Version: Linux 2.6.32-504.el6.x86_64 x86_64
  Port Supported Speed: 4Gbps 8Gbps 16Gbps
  Port Current Speed:  16Gbps
  Port OS Device Name: qla2xxx:host5
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1

```

Displaying Initiators in a Fabric

A query is made to the unzoned nameserver in order to retrieve the initiator list. The `showportdev uns` CLI command displays the initiators which are logged into the fabric/switch that the specified target port `<node:slot:port>` is attached to. The syntax of the CLI command is as follows:

```
showportdev uns <node:slot:port>
```

Example: The following example shows the initiators in the same fabric as the target port:

```

cli% showportdev uns 1:0:2
Number ----Port_WWN---- -Alias_Name-
1      50014380231C5026 LinuxHost
                   QLG_16G
2      50014380231C5D16 QLG_16G
                   LinuxHost
3      10003CA82AFE57B4 LinuxHost

```

The option, `-d`, allows detailed information to be displayed about each initiator. The detailed information includes HBA Manufacturer, HBA Model, HBA Firmware Version, HBA OS Name/Version, the HBA port's supported and current speeds, HBA port's OS device name, hostname, alias name(s), and whether the Smart SAN QoS and Security features are supported.

Example: The following example shows how to display details about the initiators in the same fabric as the target port:

```
cli% showportdev uns -d 1:0:2

Port WWN: 50014380231C5026
  Alias Name: LinuxHost
              QLG_16G
  Port Hostname: Linux-default
  HBA Manufacturer: QLogic Corporation
  HBA Model: HP SN1000Q 16Gb 2P FC HBA
  HBA Driver Version: 8.07.00.35.06.0-k~rdp~67
  HBA Firmware Version: 8.02.00 (d0d5)
  HBA OS Name/Version: Linux 2.6.32-504.el6.x86_64 x86_64
  Port Supported Speed: 4Gbps 8Gbps 16Gbps
  Port Current Speed: 16Gbps
  Port OS Device Name: qla2xxx:host5
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1

Port WWN: 50014380231C5D16
  Alias Name: QLG_16G
              LinuxHost
  Port Hostname: R207-S08
  HBA Manufacturer: QLogic Corporation
  HBA Model: HP SN1000Q 16Gb 2P FC HBA
  HBA Driver Version: 8.07.00.34.12.0-k1
  HBA Firmware Version: 8.02.00 (d0d5)
  HBA OS Name/Version: Linux 3.12.28-4-default x86_64
  Port Supported Speed: 4Gbps 8Gbps 16Gbps
  Port Current Speed: 16Gbps
  Port OS Device Name: qla2xxx:host3
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Tier 1

Port WWN: 10003CA82AFE57B4
  Alias Name: LinuxHost
              EMX_16G
  Port Hostname: R207-S08
  HBA Manufacturer: Emulex Corporation
  HBA Model: HP SN1100E2P 16Gb 2P FC HBA
  HBA Driver Version: 10.7.173.0
  HBA Firmware Version: 10.7.230.0
  HBA OS Name/Version: Linux 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
(9879bd4)
  Port Supported Speed: 4Gbps 8Gbps 16Gbps
  Port Current Speed: 16Gbps
  Port OS Device Name: /sys/class/scsi_host/host0
  Port SSAN QoS Support: Not Supported
  Port SSAN Security Support: Not Supported
```

Configuring QLogic FC Adapters for Smart SAN

This section lists the QLogic configuration commands for manually setting up Smart SAN in Windows, Linux, and VMware environments. For Windows and Linux, the adapters can also be configured for Smart SAN using HPE Smart Update Manager (SUM). For detailed information, see the *HPE Smart Update Manager User Guide* at http://www.hpe.com/support/HP_SUM_UG_en. Check SPOCK for supported QLogic FC Adapters.

Steps for Enabling Smart SAN using HPSUM

Follow the steps below to enable Smart SAN using HPSUM:

1. Launch HPSUM from the HPE Service Pack for ProLiant (SPP)
2. Select the Baseline Library option
3. Select the Components tab
4. Search for appropriate Smart SAN component
 - a. HPE QLogic Smart SAN Enablement Kit for Windows 64 bit operating systems
 - b. HPE Emulex Smart SAN Enablement Kit for Windows 64 bit operating systems
 - c. HPE Emulex Smart SAN Enablement Kit for Linux
 - d. HPE QLogic Smart SAN Enablement Kit for Linux
5. Select the option to configure the component and enable the Smart SAN feature
 - a. Under Configuration State, click on either Configurable or Configured (had been previously configured)
 - b. Enable the Smart SAN feature
 - c. Save in HPSUM
6. From the main menu (pull-down), select Localhost Guided Update
7. Select Interactive in order to check that the Smart SAN component will be run
8. Search for the Smart SAN component in the deployment list
9. If the component has not been not selected, select Forced so that the Smart SAN component will be run
10. Select Deploy

Configuring Smart SAN in Windows: via a driver parameter

To configure Smart SAN in a Windows environment, follow the procedure below:

Procedure

1. Add "smartsanhp=1;" to the DriverParameter registry key under the directory structure:
`\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\ql2300\Parameters\Device\`
2. If the registry key does not exist, add the key.
3. Reboot to activate the Smart SAN feature.

NOTE: Installing a new driver will remove the driver parameter, so it will need to be added.

Configuring Smart SAN in Linux (RHEL/SLES): via a module parameter `ql2xsmartsan`

To configure Smart SAN in Linux environment, follow the steps below:

Procedure

1. Edit the module parameter configuration file and add "`ql2xsmartsan=1`".

The module parameter file is usually located in `/etc/modprobe.d/`

If `qla2xxx.conf` exists, add the "smartsan" parameter to that file:

```
options qla2xxx ql2xsmartsan=1
```

If `qla2xxx.conf` does not exist, create a file with that name in `/etc/modprobe.d/` and include the line `options qla2xxx ql2xsmartsan=1`.

2. Rebuild the ramdisk image, so that the added module parameter will be used when the driver is loaded at boot time:

- a. Backup the existing ramdisk image (`initrd` or `initramfs`) by issuing the following command:

```
mv /boot/<ramdisk image> /boot/<ramdisk image>.bak
```

- b. Generate a new ramdisk image by executing the following command:

```
mkinitrd /boot/<ramdisk image> `uname -r`
```

Examples: The following examples show how to rebuild the ramdisk image on RHEL7 and SLES12:

RHEL7

```
mv /boot/initramfs-3.10.0-229.el7.x86_64.img /boot/initramfs-3.10.0-229.el7.x86_64.img.bak
```

```
mkinitrd /boot/initramfs-`uname -r`.img `uname -r`
```

SLES12

```
mv /boot/initrd-3.12.28-4-default /boot/initrd-3.12.28-4-default.bak
```

```
mkinitrd /boot/initrd-`uname -r` `uname -r`
```

Configuring Smart SAN in VMware: via module `qla2xenablesmartsan`

To configure Smart SAN in a VMware environment, follow the steps below:

Procedure

1. Issue the command: `esxcfg-module -s "qla2xenablesmartSAN=1" qlnativefc`
2. Reboot the system.

Configuring Emulex FC Adapters for Smart SAN

This section lists the Emulex configuration commands for manually setting up Smart SAN in Windows, Linux, and VMware environments. For Windows and Linux, the adapters can also be configured for Smart SAN using HPE Smart Update Manager (HPSUM). Refer to section **Steps for Enabling Smart SAN using HPSUM** on page 44 to enable Smart SAN using HPSUM. For detailed information, see the HPE Smart Update Manager User Guide. Check SPOCK for supported Emulex FC Adapters.

Configuring Smart SAN in Windows: via a driver parameter

To configure Smart SAN in a Windows environment, follow the steps below:

Procedure

1. By using either the hbacmd or the One Command Manager (OCM), set the driver parameter `EnableSmartSAN` to 1.
2. Reset the FC port in order to activate the Smart SAN feature. Alternatively, reboot to activate the Smart SAN feature.

Configuring Smart SAN in Linux (RHEL/SLES): via a module parameter `lpfc_enable_SmartSAN`

To configure Smart SAN in Linux environment, follow these steps:

Procedure

1. Edit the module parameter configuration file and add "`lpfc_enable_SmartSAN=1`".

The module parameter file is usually located in `/etc/modprobe.d/`

If `elx-lpfc.conf` exists, add the "smartsan" parameter to that file:

```
options lpfc lpfc_enable_SmartSAN=1
```

If `elx-lpfc.conf` does not exist, create a file with that name in `/etc/modprobe.d/` and include the line `options lpfc lpfc_enable_SmartSAN=1`.

2. Rebuild the ramdisk image, so that the added module parameter will be used when the driver is loaded at boot time:

- a. Backup the existing ramdisk image (initrd or initramfs) by issuing the following command:

```
mv /boot/<ramdisk image> /boot/<ramdisk image>.bak
```

- b. Generate a new ramdisk image by executing the following command:

```
mkinitrd /boot/<ramdisk image> `uname -r`
```

Configuring Smart SAN in VMware: via module parameter `lpfc_enable_SmartSAN`

To configure Smart SAN in a VMware environment, follow these steps:

Procedure

1. Issue the command: `esxcfg-module -s "lpfc_enable_SmartSAN=1" lpfc`
2. Reboot the system.

NOTE: If a new driver has been installed, reboot after installing the driver and before configuring the module parameter for Smart SAN.

Smart SAN and HPE 3PAR StoreServ Management Console (SSMC)

Smart SAN is now integrated with StoreServ Management Console (SSMC), allowing the user to create TDPZ zones using SSMC and automating the zoning needed for Storage Federation. For detailed information, see the HPE 3PAR StoreServ Management Console User Guide.

Creating TDPZ Zones Using SSMC

Hosts and their associated zones can be created from the **Hosts** screen within **Block Persona (Block Persona > Hosts)**.

Follow the steps below:

1. Select **Create Host**.
2. On the **Create Host** screen, the drop-down menu lists the hostnames as well as the host's operating system.

Create Host General ?

General

Name

System **R207-S12**
OS: Windows 2008/2008 R2

Host set **R207-S13**
OS: Windows 2012 / WS2012 R2

Host OS **R2**

Persona **R207-S14.snesanbox.lab**

Select an available Host Explorer or Smart SAN host or enter a host name. Name must be unique on the selected storage system. Name may be 1 to 31 alphanumeric characters including hyphen, period, and underscore but cannot begin with a hyphen.

Paths

0 Paths

Name	System Ports (N:SP)	Type	Reported Host Name	Operating System
No data available in table				

Add FC **Add iSCSI**

Descriptors

Operating system

Location optional

IP address optional

Model optional

Create **Create +** **Cancel**

- Select the hostname, and once the hostname is selected, SSMC will automatically fill in the Host OS and Persona for the selected host as shown below. Select or remove the paths to associate with the host and then select **Create**.

Create Host General

General

Name: R207-S12

System: TAY-8200-10

Host set: <None >

Host OS: Windows 2008/2008 R2

Persona: 15 - WindowsServer

Select an available Host Explorer or Smart SAN host or enter a host name. Name must be unique on the selected storage system. Name may be 1 to 31 alphanumeric characters including hyphen, period, and underscore but cannot begin with a hyphen.

Paths

4 Paths

Name	System Ports (N:SP)	Type	Reported Host Name	Operating System
1000C4346B2022B8	0:0:2, 1:0:2	FC	R207-S12	Windows 2008/2008 R2
1000C4346B2022B9	0:0:1, 1:0:1	FC	R207-S12	Windows 2008/2008 R2
50014380231C501C	0:0:1, 1:0:1	FC	R207-S12	Windows 2008/2008 R2
50014380231C501E	0:0:2, 1:0:2	FC	R207-S12	Windows 2008/2008 R2

Add FC Add iSCSI 4 added

Descriptors

Operating system: Windows 2008/2008 R2

Location: optional

IP address: optional

Changed: Name to 'R207-S12'

Create Create + Cancel

- After the host is successfully created, select **Host Details** from the drop-down menu (**Block Persona > Hosts > Host Details**) to see additional HBA information, such as firmware and driver versions.

R207-S12 Host Details

Create host (R207-S12) Completed 3paradm Jul 25, 2016 4:13:05 PM EDT

General

Name: R207-S12

Reported name: R207-S12

Domain: —

Operating system: Windows 2008/2008 R2

Operating system patch: —

Architecture: —

IP address: —

Multipath software: —

Cluster software: —

Cluster ID: —

HBA

WWN/SCSI Name	Vendor	Model	Firmware Version	Driver Version	Speed	Multiple Attach
1000C4346B2022B8	Emulex Corporation	HP SN1100E2P 16Gb 2P FC HBA	11.1.145.0	11.1.145.16	16Gbps	Yes
1000C4346B2022B9	Emulex Corporation	HP SN1100E2P 16Gb 2P FC HBA	11.1.145.0	11.1.145.16	8Gbps	Yes
50014380231C501C	QLogic Corporation	QLogic SN1000Q Fibre Channel Adapter	8.02.51	9.2.2.20 Alpha 1	8Gbps	Yes
50014380231C501E	QLogic Corporation	QLogic SN1000Q Fibre Channel Adapter	8.02.51	9.2.2.20 Alpha 1	16Gbps	Yes

- Select **Overview** from the drop-down menu to see the 3PAR ports associated with the host (**Block Persona > Hosts > Overview**):

✓ R207-S12 Overview ↕

● Create host (R207-S12) Completed

General

Name	R207-S12
Host set	—
System	TAY-8200-10
Location	—
IP address	—
Model	—
Operating system	Windows 2008/2008 R2
Persona	15 - WindowsServer
Contact	—
Comments	—

Paths

- WWN/iSCSI Name ▲ System Ports (N:SP)
- 1000C4346B2022B8 [0:0:2, 1:0:2](#)
- 1000C4346B2022B9 [0:0:1, 1:0:1](#)
- 50014380231C501C [0:0:1, 1:0:1](#)
- 50014380231C501E [0:0:2, 1:0:2](#)

- To view the created TDPZ zones, go to **Storage Systems > Ports**. Select the port, e.g., 0:0:2 for TAY-8200-10, and select the **Hosts** option in the drop-down menu. Under the **Host Details** display for the ports, the created TDPZ zone and its members are shown.

3PAR StoreServ Search

Ports (11) All systems ▾ All statuses ▾ All port types ▾ All port states ▾ All protocols ▾

● 0:0:2 Hosts ↕ Actions

Part ID	Label	System	Port Type	Port State	UID / Locate
0:0:1	—	TAY-8200-10	Host	Ready	
0:0:2	—	TAY-8200-10	Host	Ready	
0:2:1	—	TAY-8200-10	Host	Ready	
0:2:2	—	TAY-8200-10	Host	Ready	

Host Details

Host Name	WWN	Host OS	HBA Manufacturer	HBA Model	Zone Name	Zone State
R207-S12	1000C4346B2022B8	Windows 2008 R2	Emulex Corporation	HP SN1100E2P 16Gb 2P FC HBA	tdz3par_20020002ac01987f_00	Up to date
R207-S12	50014380231C501E	Windows Server 2008 R2 Enterprise Service Pack 1 for AMD64	QLogic Corporation	QLogic SN1000Q Fibre Channel Adapter	tdz3par_20020002ac01987f_00	Up to date

● 0:0:2 Hosts ↕ Actions

Host Details

Host Name	WWN	Host OS	HBA Manufacturer	HBA Model	Zone Name	Zone State
R207-S12	1000C4346B2022B8	Windows 2008 R2	Emulex Corporation	HP SN1100E2P 16Gb 2P FC HBA	tdz3par_20020002ac01987f_00	Up to date
R207-S12	50014380231C501E	Windows Server 2008 R2 Enterprise Service Pack 1 for AMD64	QLogic Corporation	QLogic SN1000Q Fibre Channel Adapter	tdz3par_20020002ac01987f_00	Up to date

Automated Zone Creation for Storage Federation

NOTE: If using the Smart SAN TDPZ feature on SSMC, ensure that the default zone is disabled on the switches.

On B-series switches:

To check if the default zone is disabled, issue the command `defzone -show`. The output should show that the default zone is set to "No Access". If the default zone needs to be disabled, issue the command `defzone -noaccess`.

Using SSMC to configure Storage Federation, the needed zoning configuration will be automatically created using the Smart SAN TDPZ feature. There is no longer a need to access the switch to create the zones used by Storage Federation as long as the 3PARs and associated switches are Smart SAN enabled.

On HPE FlexFabric switches:

To check if the default zone is disabled, issue the command `display zone status`. The output should show that the default zone status is "deny". If the default zone needs to be disabled, issue the command `undo zone default-zone permit` in the appropriate vsan context:

```
[Sysname] vsan X
```

```
[Sysname-vsanX] undo zone default-zone permit
```

To create a zone for Storage Federation, follow the steps below:

1. Go to **Storage Systems > Federations** and select **Create Federation**.
2. On the **Create Federation** screen, select and add only Smart SAN enabled 3PAR systems, the zoning will automatically create. The requirements for the systems to be selected for federation are listed in the **Create Federation** screen. For the automated zoning feature, HPE 3PAR OS 3.2.2.EMU2 or later is required.

Create Federation General ▾

The following requirements must be met by all systems selected for a federation:

- The system must be running HPE 3PAR OS Version 3.2.2 or later and have a valid license.
- The system must have an available pair of ports in corresponding partner nodes that can be configured in peer mode. If configuring a federation using Smart SAN enabled systems only, the ports must also be Smart SAN enabled and not manually zoned.
- If configuring a federation that has more than one system, each system must have an available pair of ports in corresponding partner nodes that can be configured in host mode. If configuring a federation using Smart SAN enabled systems only, the ports must also be Smart SAN enabled and not manually zoned.
- Zoning might take severnal minutes to complete.

General

Name: Fed_SmartSAN

Comments: Creating 2 array federation for Smart SAN enabled 3PAR systems. optional

Systems

Only Smart SAN enabled systems

- On the Create Federation screen, check **Only Smart SAN enabled systems** and select **Add systems**.

Create Federation General

- The system must have an available pair of ports in corresponding partner nodes that can be configured in peer mode. If configuring a federation using Smart SAN enabled systems only, the ports must also be Smart SAN enabled and not manually zoned.
- If configuring a federation that has more than one system, each system must have an available pair of ports in corresponding partner nodes that can be configured in host mode. If configuring a federation using Smart SAN enabled systems only, the ports must also be Smart SAN enabled and not manually zoned.
- Zoning might take several minutes to complete.

General

Name: Fed_SmartSAN

Comments: Creating 2 array federation for Smart SAN enabled 3PAR systems

The comments can contain up to 235 characters.

Systems

Only Smart SAN enabled systems

0 systems

System	Model	HPE 3PAR OS Version	Peer Ports (Fabric A, Fabric B)	Host Ports (Fabric A, Fabric B)
No systems in federation				

Add systems

Changed: Name to "Fed_SmartSAN"

Create **Create +** **Cancel**

- The **Add Systems** screen for selecting the storage systems for the federation will then appear. Select the systems for the federation and select **Add**.

Create Federation **Add Systems**

You can select up to 4 systems for a federation.

2 selected all 2

System	Model	HPE 3PAR OS Version	Status
TAY-7400-02-R21	HP_3PAR 7400	3.3.1 (DEVEL)	Available
TAY-8200-04	HPE_3PAR 8200	3.3.1 (DEVEL)	Available

Add **Add +** **Cancel**

Fibre Channel Zoning

There are no zoning recommendations for this configuration.

Checked: Only Smart SAN enabled systems

Create **Create +** **Cancel**

Create Federation General

General

Name: Fed_SmartSAN

Comments: Creating 2 array federation for Smart SAN enabled 3PAR systems. optional

Systems

Only Smart SAN enabled systems

2 systems

System	Model	HPE 3PAR OS Version	Peer Ports (Fabric A, Fabric B)	Host Ports (Fabric A, Fabric B)	
TAY-7400-02-R21	HP_3PAR 7400	3.3.1 (DEVEL)	0:2:2, 1:2:2	0:2:1, 1:2:1	
TAY-8200-04	HPE_3PAR 8200	3.3.1 (DEVEL)	0:0:2, 1:0:2	0:0:1, 1:0:1	

[Add systems](#)

5. Back on the **Create Federation** screen, the selected storage systems will be displayed. If the selection of peer and host ports need to be edited, select the appropriate edit option (pencil icon) and a dialog box similar to the following will appear:

Edit TAY-7400-02-R21 ?

Name: TAY-7400-02-R21

Model: HP_3PAR 7400

HPE 3PAR OS version: 3.3.1 (DEVEL)

Peer ports (Fabric A, Fabric B): 0:2:2 1:2:2

Host ports (Fabric A, Fabric B): 0:2:1 1:2:1

[OK](#) [Cancel](#)

6. Select **Create** on the original **Create Federation** screen, and the necessary zoning will be automatically established.

While the zoning is being set-up, the following screen may appear. The federation creation has not failed. This is the display that will appear while the zoning is being set-up.

The screenshot shows the 3PAR StoreServ Management Console interface. At the top, there is a search bar and navigation tabs for 'Federations' and 'All federations'. The main content area is titled 'Fed_SmartSAN Overview'. On the left, a sidebar shows a progress indicator for 'Fed_SmartSAN' with the text 'Creating 2 array federation for Smart SAN enabled 3PAR systems. 2 federated systems'. The main panel is divided into three sections: 'Topology', 'Health', and 'Peer Links'. The 'Topology' section shows two nodes: 'TAY-8200-04' (HPE_3PAR 8200) at 26% and 'TAY-7400-02-R21' (HP_3PAR 7400) at 10%. The 'Health' section shows the overall state as 'Failed' with a description: 'Peer link 10:(TAY-8200-04) - 12:(TAY-7400-02-R21) down'. The 'Peer Links' section is currently empty.

- After the zoning is successfully set up, the following screen will appear, indicating that the federation and its zoning have been set up.

This screenshot shows the same 3PAR StoreServ Management Console interface as the previous one, but the health status of the 'Fed_SmartSAN' federation is now 'Normal'. The 'Health' section shows 'State: Normal' and 'State description: Normal'. The 'Topology' section remains the same, showing the two nodes. On the right side, an 'Activity' panel is visible, listing several actions such as 'Create federation (Fed_SmartSAN)', 'Delete federation (SSM)', 'Create federation (SSM)', and 'Create system report (Fed_SmartSAN)'. The sidebar on the left is identical to the previous screenshot.

Smart SAN and other HPE 3PAR Utilities/ Applications/Services

Persistent ports

Persistent ports are an HPE 3PAR feature that enables one port to assume the identity of another in case one of the ports fails. With HPE 3PAR Persistent Ports, each host-facing port has both a "Native" and a "Guest" identity associated with it. In the rare event of failure, the surviving port automatically assumes the native identity of the failed port.

For more information on Persistent ports, see the *HPE 3PAR Command Line Interface Administrator Guide*.

Best Practices for persistent port configuration

The Native and Guest ports should be in the same zone. This allows a port to be notified when its partner becomes unavailable.

Create a unique host for each persistent port pair (port and partner port) as follows:

```
createhost -port <NSP>,<partner port NSP> <name for port pair> <port WWN> <partner port WWN>
```

This command results in two Smart SAN TDPZ zones. In one zone, one of the ports is considered to be the principal port and the partner port a peer member of the TDPZ zone; in the other zone, those port roles are reversed. This allows the principal port (whether Native or Guest) to be notified when the partner port becomes unavailable. See [Target Driven Peer Zoning \(TDPZ\)](#) for more information on principal ports, peer ports, and TDPZ notifications.

Since a World Wide Name (WWN) can be associated with only one host, create a separate host for each persistent port pair, rather than embedding the partner port's WWN within one of the existing hosts (as the deletion of that host will result in removing the TDPZ zoning created in support of persistent ports).

Example configuration if the persistent port pair consists of ports 0:0:2 and 1:0:2

```
createhost -port 0:0:2,1:0:2 p1 20020002AC01987F 21020002AC01987F
```

NOTE: If a port (NSP) is in the failover state and you enter `showportdev tzone <NSP>`, the `tzone` status appears as `Unknown`.

In this scenario, `Unknown` means that the TDPZ code could not check the TDPZ zone status. It does not mean that the persistent port functionality is not working.

Online Import Utility

Smart SAN and the Online Import Utility can coexist.

Caveats

If a user attempts to take the port offline or tries to reset the port, there will be a warning message, provided the Smart SAN license is properly installed and the hosts are properly associated with the node port. The warning message will indicate that there might be some TDPZ peer zones that would get disrupted if the port configuration is changed. The user must remove the TDPZ peer zones prior to taking the port offline or resetting the port if the user plans to change the port configuration.

If the Smart SAN state indicates disabled for that target port, Smart SAN will need to be re-enabled before the TDPZ peer zones can be removed.

OneView

Smart SAN and OneView 3.1 can co-exist when using Brocade fabrics with BNA 14.0.2 and onwards.

Frequently Asked Questions (FAQ)

This chapter describes questions you may have regarding Smart SAN configuration and the related answers:

1. Can regular zones and TDPZ zones exist in the same fabric?

Yes, both regular and TDPZ zones can coexist in the same fabric. If devices are listed in multiple zones, whether regular zones and/or TDPZ zones, the devices will abide by the access rules as defined for the individual zones. If a regular zone exists along with a TDPZ in an active zone set, nonprincipal members in the TDPZ could still communicate with each other if permitted by the regular zone.

2. Must I update the switch firmware and HBA driver to the latest ones supported by Smart SAN?

Yes, if you want to take advantage of the latest Smart SAN features.

The tables that follow present an overview of Smart SAN support. See the Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix website for up-to-date information on Smart SAN supported components and driver/firmware versions:

www.hpe.com/storage/spock

HBA Drivers	3PAR CLI-based TDPZ	SSMC-based TDPZ provisioning	FDMI registrations	Basic diagnostics support
Non-Smart SAN HBA driver	Requires: <ul style="list-style-type: none"> • 3PAR: 3.2.2 or later • Switch: Smart SAN 1.0 or later 			
Smart SAN 1.0 HBA driver	Requires: <ul style="list-style-type: none"> • 3PAR: 3.2.2 or later • Switch: Smart SAN 1.0 or later 		Requires: <ul style="list-style-type: none"> Switch: Smart SAN 1.0 or later 	Requires: <ul style="list-style-type: none"> Switch: Smart SAN 1.0 or later
Smart SAN 2.0 HBA driver	Requires: <ul style="list-style-type: none"> • 3PAR: 3.2.2 or later • Switch: Smart SAN 1.0 or later 	Requires: <ul style="list-style-type: none"> • 3PAR: 3.3.1 or later • Switch: Smart SAN 2.0 or later 	Requires: <ul style="list-style-type: none"> Switch: Smart SAN 1.0 or later 	Requires: <ul style="list-style-type: none"> Switch: Smart SAN 1.0 or later

HBA Drivers	Alias Name Retrieval by 3PAR (HPE FlexFabric switch feature)	Automated Federation Zoning	Enhanced diagnostics support (HPE FlexFabric switch feature)	Port Binding (HPE FlexFabric switch feature)
Non-Smart SAN HBA driver	N/A as using alias names created by switch CLI			
Smart SAN 1.0 driver	N/A as using alias names created by switch CLI			
Smart SAN 2.0 driver	N/A as using alias names created by switch CLI Requires: Switch: HPE FlexFabric switch Smart SAN 2.0 or later	Requires: • 3PAR: 3.3.1 or later • Switch: Smart SAN 2.0 or later	Requires: Switch: HPE FlexFabric switch Smart SAN 2.0 or later	Requires: Switch: HPE FlexFabric switch Smart SAN 2.0 or later
Switch Firmware	3PAR CLI-based TDPZ	SSMC-based TDPZ provisioning	FDMI registrations	Basic diagnostics support
B-Series: version earlier than FOS 7.4.0a HPE FlexFabric switch: version earlier than R2422P01				
B-Series: FOS 7.4.0a or later HPE FlexFabric switch: R2422p01 or later	Requires: 3PAR: 3.2.2 or later		Requires: Devices with Smart SAN 1.0 or later	Requires: Devices with Smart SAN 1.0 or later
B-Series: FOS 8.0.1 or later HPE FlexFabric switch: Version that supports Smart SAN 2.0	Requires: 3PAR: 3.2.2 or later	Requires: • 3PAR: 3.3.1 or later • HBA: Smart SAN 1.0 or later	Requires: Devices with Smart SAN 1.0 or later	Requires: Devices with Smart SAN 1.0 or later

Switch Firmware	Alias Name Retrieval by 3PAR (HPE FlexFabric switch feature)	Automated Federation Zoning	Enhanced diagnostics support (HPE FlexFabric switch feature)	Automatic Port Binding (HPE FlexFabric switch feature)
B-Series: version earlier than FOS 7.4.0a				
HPE FlexFabric switch: version earlier than R2422P01				
B-Series: FOS 7.4.0a or later				
HPE FlexFabric switch: R2422P01 or later				
B-Series: FOS 8.0.1 or later	Requires:	Requires:	Requires:	Requires:
HPE FlexFabric switch: Version that supports Smart SAN 2.0	<ul style="list-style-type: none"> • 3PAR: 3.3.1 or later • Supported for HPE FlexFabric switches only 	<ul style="list-style-type: none"> • 3PAR: 3.3.1 or later • HBA: Smart SAN 1.0 or later 	<ul style="list-style-type: none"> • Devices with Smart SAN 2.0 or later • Supported for HPE FlexFabric switches only 	<ul style="list-style-type: none"> • Devices with Smart SAN 2.0 or later • Supported for HPE FlexFabric switches only

HPE 3PAR:

- FW version 3.2.2 or later supports all Smart SAN 1.0 features (HPE 3PAR CLI-based TDPZ, FDMI (Fabric Device Management Interface) registrations, basic diagnostic support).
- FW version 3.3.1 or later supports all Smart SAN 1.0 and 2.0 features.

CNAs and **Virtual Connect** will support HPE 3PAR CLI-based TDPZ zoning as 3PAR CLI-based TDPZ zoning is dependent only on switch and HPE 3PAR firmware, for example, there is no requirement for the CNA or Virtual Connect. SSMC-based TDPZ provisioning is not supported as the required FDMI support is not available on the CNAs and Virtual Connect.

3. I have regular zones in my fabric, but I want to convert them to TDPZ zones. What must I do?

a. Create the TDPZ zones, using the HPE 3PAR CLI or SSMC.

- Each TDPZ zone contains a single target port but can contain multiple initiator ports.
 - The appropriate TDPZ zones are created automatically when the hosts are created using either the HPE 3PAR CLI or SSMC Create Host.
- Create new TDPZ zones, using `createhost` (CLI) or SSMC **Create Host**.

- Use the `-port` option on the HPE 3PAR CLI `createhost` to autocreate the TDPZ zone.
- Select the appropriate HPE 3PAR target ports for each initiator and the corresponding TDPZ zones will be created.

b. Delete the regular zones, using the switch CLI.

NOTE: To avoid disrupting the currently active zoning configuration, create new TDPZ zones before removing the old regular zones and activating the new zoning configuration using TDPZ zones.

4. Can HPE OneView coexist with Smart SAN?

Yes, HPE OneView 3.1 can coexist with Smart SAN in a B-Series Fabric with BNA 14.0.2 and above.

5. Can LSAN zones be created using TDPZ?

There is no Smart SAN/TDPZ support across IFLs.

6. What is the procedure for replacing an HBA that is part of a TDPZ zone?

If you are replacing an existing HBA with a new one which has a different WWN, follow these steps:

- First, remove the old HBA from the TDPZ zone using either the CLI `removehost` command or "Edit Host" in SSMC:

```
removehost -port <node:slot:port> <hostname> <old-WWN>
```

- Replace the HBA.
 - Add new HBA to the TDPZ zone using either the CLI `createhost` command or "Edit Host" in SSMC:
- ```
createhost -add -port <node:slot:port> <hostname> <new-WWN>
```
- Verify that the old WWN was removed from the TDPZ zone and that the new WWN has been added to the TDPZ zone.

**7. Although the switch attached to the target port does not support Smart SAN, why does the Smart SAN state indicate disabled in the `showport -par` output?**

If the switch supports `enhanced zoning`, the switch will appear with the state "disabled" due to one of the flags used to detect Smart SAN is a flag indicating that `enhanced zoning` is supported.

**8. Is Smart SAN supported on Cisco switches?**

No, Cisco switches support a different type of enhanced zoning than Smart SAN.

As a result, the switch may report that enhanced zoning is supported and possibly enabled, although the supported enhanced zoning is not Smart SAN. The Smart SAN state for a target port attached to a Cisco switch might report as disabled or enabled, instead of unsupported, due to the information reported when Smart SAN queries the switch about enhanced zoning support.

**9. Must the Host Explorer be installed for Smart SAN?**

No, Host Explorer is not a requirement for Smart SAN. The host information is registered by the host adapters using FDMI (Fabric Device Management Interface) commands and automatically extracted from the fabric.

**10. Does Smart SAN support boot from SAN?**

Yes, boot from SAN is supported.

# Troubleshooting Smart SAN

This section describes problems and errors you may encounter when configuring and using the Smart SAN feature on an HPE 3PAR StoreServ Storage system. Refer to this section for possible solutions.

In an HPE FlexFabric switch, all HPE FlexFabric switches need to have enhanced zoning enabled. This is automatically enabled when Smart SAN is enabled on the switch. All the switches must have firmware version R2422P01 or later.

In a B-Series Fabric, all the B-Series switches need to have firmware version (FOS) v7.3.0 or later.

The B-Series switches directly connected to the end devices, i.e., Smart SAN enabled initiators and 3PAR, need to have FOS v7.4.0a or later to take advantage of all Smart SAN capabilities.

# Smart SAN Event Log Error Messages

**Table 3: Smart SAN Event Log Error Messages**

---

**Error:**

"No Active Zone Set"

**Problem:**

Indicates that No Active Zone Set exists on the switch when the HPE 3PAR attempted to create a TDPZ peer zone.

**Solution:**

Go to the switch CLI, create and activate a zone set. Retry the `createhost` command on the HPE 3PAR.

---

**NOTE:** This event log message appears only with B-Series switches with firmware versions earlier than FOS 8.0.1. In the event this occurs with a B-Series switch with later firmware, verify whether there is no zone configuration (active or defined) and that the empty zone configuration has been saved. The B-Series switch with firmware FOS 8.0.1 or later will automatically create and activate a zone configuration only if there is no defined zone configuration and if the empty zone configuration has been saved.

---

**Error:**

"Active Zone is not a Peer Zone"

**Problem:**

Indicates the Active Zone set contains a zone having the specified name but is not a Peer Zone. Usually this error is not expected, unless someone creates a regular zone manually using the same name as the one the target is attempting to create.

**Solution:**

From the switch CLI, rename the regular zone with a different name. Then retry the TDPZ peer zone creation. If the TDPZ peer zone appears in the `showportdev tzone` output with a state of Unknown, retry the TDPZ peer zone creation by re-issuing the `showportdev tzone` command. If the TDPZ peer zone does not appear in the `showportdev tzone` output, then retry the TDPZ peer zone creation by re-issuing the appropriate `createhost` command.

---

**Error:**

"Peer Zone does not exist"

**Problem:**

The specified peer zone does not exist.

**Solution:**

This is usually a debug message and is not a real problem provided the specified zone does not exist.

---

# Smart SAN or tzone State is Unknown

**Table 4: Smart SAN or tzone State is Unknown**

**Error:**

"Smart SAN state unknown"

**Problem:**

Smart SAN state showing unknown.

```
cli% showport -par *:2:*
 Conn Conn Cfg
N:S:P mode Type Rate MaxRate Class2 Uniq
 NodeWwn VCN IntCoal TMWO
Smart_SAN
0:2:1 host point auto 16Gbps disabled disabled disabled disabled disabled enabled
0:2:2 host point auto 16Gbps disabled disabled disabled disabled disabled unknown
1:2:1 host point auto 16Gbps disabled disabled disabled disabled disabled enabled
1:2:2 host point auto 16Gbps disabled disabled disabled disabled disabled unknown

--
4
```

**Solution:**

The HPE 3PAR needs to check for the Smart SAN status of the switch; do one of the following:

- Verify that Smart SAN is enabled on the attached switch (HPE FlexFabric) or switchport (B-Series).
- Toggle the HPE 3PAR port to force re-discovery if Smart SAN has been enabled on the switch.
- Issue the `showport -par` command to verify that the Smart SAN status of the switch now indicates enabled.

**Error:**

"tzone state unknown"

**Problem:**

tzone state showing unknown.

```
cli% showportdev tzone
N:S:P -----Zone_Name----- Count State
0:2:3 tdz3par_20230002ac01987f_00 3 unknown
1:2:3 tdz3par_21230002ac01987f_00 3 unknown

 2 total
```

**Solution:**

- Check that a zone with the exact name has not been created through the switch CLI. If one has been created through the switch CLI, this user-created zone needs to be renamed. Then re-issue the `showportdev tzone` command in order to check the tzone state.
- Verify that the switch firmware is at least the minimum required for Smart SAN. HPE FlexFabric switch requires R2422P01 or later. B-Series switch requires FOS 7.4.0a or later. If the B-Series switch has



firmware version prior to FOS 8.0.1, check if an active zoning configuration exists. If not, create and activate a zone set.

- Verify that Smart SAN has not been disabled on the attached switch (HPE FlexFabric) or switchport (B-Series).

---

## Smart SAN Configuration Error Messages

**Table 5: Smart SAN Configuration Error Messages**

---

**Error:**

Smart SAN license is installed on the HPE 3PAR but `showport -par` output still does not indicate that Smart SAN is enabled.

**Solution:**

First, verify that the Smart SAN license is properly installed on the HPE 3PAR.

- From the HPE 3PAR CLI, issue the command  

```
showlicense | grep "Smart SAN"
```

  - Verify whether `Smart SAN` is displayed or not. If not displayed, re-install the Smart SAN license.
- For HPE FlexFabric switches, verify that `Smart SAN` is enabled on the switch.
  - From the switch CLI, issue the command `display smartsan status` and verify whether `Smart SAN` is enabled or not.
    - If `Smart SAN` is not enabled, issue the switch CLI command `smartsan enable`. Verify again for `Smart SAN status`.
- For HPE B-Series switches, verify that the switch port connected to the HPE 3PAR port has its TDPZ feature enabled.
  - From the HPE B-Series switch CLI, issue the command `portcfgshow <portnum> | grep TDZ` and verify whether the TDPZ feature is enabled or not.
    - If TDPZ is not enabled, issue the HPE B-Series switch CLI command `portcfgtdz --enable <portnum>`. Verify again for the TDPZ feature.
- Force the HPE 3PAR to re-query the `Smart SAN` status of the switch.
  - Reset the HPE 3PAR controller port to force the HPE 3PAR to re-query the switch for its Smart SAN status. Issue the HPE 3PAR `showport -par` CLI command. The Smart SAN status should indicate `enabled`.

# TDPZ Related Error Messages

**Table 6: TDPZ Related Error Messages**

---

**Error:**

Unable to delete the target-driven peer zone.

**Problem:**

The target-driven peer zone still appears when zones are displayed from the switch CLI although the peer zone was deleted from the HPE 3PAR.

**Solution:**

If using a B-Series switch and the target-driven peer zone is the last zone contained in the zoning configuration, the switch will not delete the zone.

---

**Error:**

Switch zoning database and the HPE 3PAR TDPZ zone display are not in sync.

**Solution:**

If the HPE 3PAR ports are connected to a switch that supports only Smart SAN 1.0, `controlport rst <node:slot:port>` may need to be done from the HPE 3PAR CLI so that the two records of target-driven zones synchronize.

---

**Error:**

The auto-creation of the zoning configuration on a B-Series switch is not occurring when the target creates the first TDPZ peer zone.

**Solution:**

- Verify that the FOS version is 8.0.1 or later.
  - Check that a zoning configuration, whether active or defined, does not exist. Also verify that the empty zoning configuration has been saved. Then retry the creation of the TDPZ peer zone from the target.
- 

**Error:**

The TDPZ peer zones are not being created on a B-Series switch.

**Problem:**

Although the TDPZ peer zones should have been created through host creation, the TDPZ zones temporarily appear in the `showportdev tzone` output but then disappear. This is a symptom of the auto-creation of the zoning configuration not happening.

**Solution:**

- Verify that the FOS version is 8.0.1 or later.
  - Check that a zoning configuration, whether active or defined, does not exist. Also, verify that the empty zoning configuration has been saved. Then retry the creation of the TDPZ peer zone from the target.
-

# FC-Port-Security Error Messages

**Table 7: FC-Port-Security Error Messages**

---

**Error:**

Smart SAN device unable to log into switchport on HPE FlexFabric switch

**Solution:**

Verify in the fc-port-security database that the device's port WWN is bound to that switchport. If the device port is bound to the switchport, then toggle the switchport, i.e, disable and re-enable the switchport, as the switchport may have been disabled by the switch due to an illegal access attempt.

---

**Error**

Two entries appear in the fc-port-security database for a single WWN on the HPE FlexFabric switch

```
[Sysname-vsan100]display fc-port-security database all
Total entries: 8
Database for VSAN 100:
 Logging-in Entity Interface Type
10:00:3c:a8:2a:fe:57:b5 (pWWN) Fc1/0/33 Learning
10:00:3c:a8:2a:fe:57:b5 (pWWN) Fc1/0/33 SmartSAN-Static
10:00:3c:a8:2a:fe:59:f9 (pWWN) Fc1/0/34 Learning
10:00:3c:a8:2a:fe:59:f9 (pWWN) Fc1/0/34 SmartSAN-Static
10:00:3c:a8:2a:fe:5b:09 (pWWN) Fc1/0/44 Learning
10:00:3c:a8:2a:fe:5b:09 (pWWN) Fc1/0/44 SmartSAN-Static
10:00:c4:34:6b:20:22:b9 (pWWN) Fc1/0/5 Learning
10:00:c4:34:6b:20:62:7d (pWWN) Fc1/0/8 Learning
```

**Solution:**

This is normal. There will be a Smart SAN-specific entry, i.e., SmartSAN-Learning or SmartSAN-Static, for Smart SAN devices and also a general entry for fc-port-security, i.e., Learning.

---

# HPE 3PAR CLI Error Messages

**Table 8: CLI Error Messages**

---

**Error:**

Smart SAN-specific warning message displayed when “controlport [ rst | offline ] <node:slot:port>” is issued from the HPE 3PAR CLI although Smart SAN is not enabled for the target port

**Problem:**

```
cli% controlport rst 1:2:4
```

```
WARNING: Port 1:2:4 may have active Smart SAN target driven zones that may be
disrupted. If changing the port configuration, remove the Smart SAN zoning by
using the removehost
command. This must be done before changing the port configuration; otherwise,
you will not be able to manage the zone on the switch associated with this
port.
```

```
Are you sure you want to run controlport rst on port 1:2:4?
select q=quit y=yes n=no: n
```

**Solution:**

TDZ zones were configured for the specified target port prior to Smart SAN being disabled on the attached switch. If the user is planning to change the port configuration, the TDZ zones need to be deleted prior to the port configuration change. Smart SAN must be re-enabled on the attached switch in order to delete the TDZ zones. Once Smart SAN is enabled, use the HPE 3PAR CLI command “removehost” to delete the TDZ zone associated with the target port.

---

**Error:**

```
showportdev tzone -d <nsp> takes a long time to complete
```

**Problem:**

The command takes a long time to complete and when it completes, there is a message that additional information could not be retrieved for the initiators.

**Solution:**

Verify that the attached HPE FlexFabric switch supports Smart SAN 2.0. If not, upgrade to a firmware version that supports Smart SAN 2.0.

---

*Table Continued*

---

**Error**

```
showportdev uns
```

"Not available: Unable to retrieve initiator list"

**Problem**

This indicates that there are no initiators logged into the switch.

**Solution**

Verify that there are initiators logged into the switch

---

**Error:**

```
showportdev uns
```

"Command not supported by switch: Unable to retrieve initiator list"

**Problem:**

This indicates that the query command is not supported by the switch.

**Solution:**

- Verify that the B-Series switch has FOS 8.0.1 or later.
  - Verify that the HPE FlexFabric switch is running Smart SAN v2.0 firmware.
-

# FDMI and/or RDP Data Error Messages

**Table 9: FDMI and/or RDP Data Error Messages**

---

**Error::**

FDMI and/or RDP data for a device is not available

**Solution::** Perform the following to resolve the issue:

- Verify that the Smart SAN feature is enabled on the device and the switch.
- Verify that the initiator parameters are set up correctly as specified in the section **Configuring QLogic FC Adapters for Smart SAN** on page 44 or **Configuring Emulex FC Adapters for Smart SAN** on page 47 if the HBA data is not properly displayed.
- Verify that the HPE Smart SAN for 3PAR license is properly installed if the HPE 3PAR data is not properly displayed. The HPE 3PAR may not have the data available at the time the query for the data is made, so a re-query should display the data.
- Issue the FDMI/RDP command via the switch CLI to verify whether the data is available.
- Verify that the specified device is not a blade server. RDP data is not available for HBAs in blade servers.
- If the hostname is listed as "none", ESXHost or Linux-default, toggle the switchport to force a re-query to occur. There are instances where the hostname is not available at the point when the query is first made.
- RDP data is not available for CNAs.

---

**Error:**

In the displayed FDMI data for an HBA, the port/current speed specified is different from the expected speed for a device logged into a specific switch

Example:

16Gb HBA ---- NPV 16Gb switch ---- 8Gb switch

The displayed FDMI data will show a port speed of 16Gb, not 8Gb

**Problem:**

This will occur when the HBA is attached to a NPV switch or an embedded blade switch.

**Solution::**

The port speed shown is the speed negotiated between the HBA and the NPV/embedded switch, not what the port speed would be if the HBA is directly connected to the external switch.

---

*Table Continued*

---

**Error:**

Smart SAN specific FDMI information is not available on the switch.

**Solution::** Do one of the following:

- Verify that Smart SAN is enabled on the switch.
- Verify that Smart SAN is enabled on the device.

---

**Error:**

Hostname for Qlogic HBA in VMware server shown as a number in the FDMI data or detailed initiator information

**Problem:**

Hostname is displayed as a number

```
<Sysname>display fdmi database vsan 100 hba-id 50:01:43:80:23:1d:30:7c verbose
Registered HBA List for VSAN 100:
 HBA ID: 50:01:43:80:23:1d:30:7c
 Manufacturer: QLogic Corporation
 Serial Number: 6C443240SF
 Model: SN1000Q
 Model Description: HP SN1000Q 16Gb 2P FC HBA
 Node Name: 50:01:43:80:23:1d:30:7d
 Node Symbolic Name: SN1000Q FW:v130.02.00 DVR:v1.1.69.ss09-debug
 Hardware Version: HD8310405-18 E
 Driver Version: 1.1.69.ss09-debug
 Option ROM Version: 3.31
 Firmware Version: 130.02.00 (f0d5)
 OS Name and Version: VMware ESXi-5.5.0 (Releasebuild-2068190)
 Maximum CT Payload: 2048
 Vendor Identifier: QLogic
 Vendor Specific Information: 0x00001077
 Number of Ports: 1
 Fabric Name: 50:01:43:80:23:1d:30:7d
 Boot BIOS Version: 3.31
 Boot BIOS State: Enabled
 Port Name: 50:01:43:80:23:1d:30:7c
 ...
 OS Device Name: vmhba5
 Host Name: 52fb3fff-13c1-6431-6389-40a8f031
 ...
```

**Solution:**

The Qlogic VMware driver is unable to retrieve the hostname for the server. The system id is being displayed instead.

---

## HPE 3PAR Port to be Changed from Host to Peer

If the HPE 3PAR port personality is being changed from `host` to `peer`, before the port is taken “offline”, use the `removehost` command to remove the Target Driven Peer Zones associated with the NSP (`node:slot:port`) before taking the port offline.

## AAPZ Request Submission/Switch Commit Time

For HPE FlexFabric switches, the commit time for a single AAPZ per switch is 6 seconds; otherwise the switch will consolidate requests, and the commit time is 1 minute.

B-Series switches consolidate requests for 10 seconds and then submit the command. Switch commit time can be up to 1 minute.

## HBA (initiator) is Replaced

- If an initiator is replaced, e.g., the HBA is replaced, and it is part of a HPE 3PAR-created TDPZ peer zone, the old HBA's WWN is required to be removed from the TDPZ peer zone and a new WWN should be added.
  - `removehost -port <node:slot:port> <hostname> <old-wwn>`
  - `createhost -add -port <node:slot:port> <hostname> <new-wwn>`

## Files That Could Help In Troubleshooting Smart SAN

The following files are important in troubleshooting and tracing errors:

| Component             | Files to Use                     |
|-----------------------|----------------------------------|
| HPE FlexFabric Switch | Display diag output and FC trace |
| B-Series Switch       | Supportsave and FC trace         |
| HPE 3PAR              | Event Log files                  |



# Websites

## **General websites**

**Hewlett Packard Enterprise Information Library**

**[www.hpe.com/info/EIL](http://www.hpe.com/info/EIL)**

**Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix**

**[www.hpe.com/storage/spock](http://www.hpe.com/storage/spock)**

**Storage white papers and analyst reports**

**[www.hpe.com/storage/whitepapers](http://www.hpe.com/storage/whitepapers)**

For additional websites, see **[Support and other resources](#)**.

# Support and other resources

## Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:  
<http://www.hpe.com/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:  
<http://www.hpe.com/support/hpesc>


### Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

## Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:  
**Hewlett Packard Enterprise Support Center**  
[www.hpe.com/support/hpesc](http://www.hpe.com/support/hpesc)  
**Hewlett Packard Enterprise Support Center: Software downloads**  
[www.hpe.com/support/downloads](http://www.hpe.com/support/downloads)  
**Software Depot**  
[www.hpe.com/support/softwaredepot](http://www.hpe.com/support/softwaredepot)
- To subscribe to eNewsletters and alerts:  
[www.hpe.com/support/e-updates](http://www.hpe.com/support/e-updates)
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:  
[www.hpe.com/support/AccessToSupportMaterials](http://www.hpe.com/support/AccessToSupportMaterials)

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 **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

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## Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

<http://www.hpe.com/support/selfrepair>

## Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

### Remote support and Proactive Care information

#### HPE Get Connected

[www.hpe.com/services/getconnected](http://www.hpe.com/services/getconnected)

#### HPE Proactive Care services

[www.hpe.com/services/proactivecare](http://www.hpe.com/services/proactivecare)

#### HPE Proactive Care service: Supported products list

[www.hpe.com/services/proactivecaresupportedproducts](http://www.hpe.com/services/proactivecaresupportedproducts)

#### HPE Proactive Care advanced service: Supported products list

[www.hpe.com/services/proactivecareadvancedsupportedproducts](http://www.hpe.com/services/proactivecareadvancedsupportedproducts)

### Proactive Care customer information

#### Proactive Care central

[www.hpe.com/services/proactivecarecentral](http://www.hpe.com/services/proactivecarecentral)

#### Proactive Care service activation

[www.hpe.com/services/proactivecarecentralgetstarted](http://www.hpe.com/services/proactivecarecentralgetstarted)

## Warranty information

To view the warranty for your product, see the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* document, available at the Hewlett Packard Enterprise Support Center:

[www.hpe.com/support/Safety-Compliance-EnterpriseProducts](http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts)

### Additional warranty information

#### HPE ProLiant and x86 Servers and Options

[www.hpe.com/support/ProLiantServers-Warranties](http://www.hpe.com/support/ProLiantServers-Warranties)

#### HPE Enterprise Servers

[www.hpe.com/support/EnterpriseServers-Warranties](http://www.hpe.com/support/EnterpriseServers-Warranties)

#### HPE Storage Products

[www.hpe.com/support/Storage-Warranties](http://www.hpe.com/support/Storage-Warranties)

#### HPE Networking Products

[www.hpe.com/support/Networking-Warranties](http://www.hpe.com/support/Networking-Warranties)

# Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

[www.hpe.com/support/Safety-Compliance-EnterpriseProducts](http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts)

## Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

[www.hpe.com/info/reach](http://www.hpe.com/info/reach)

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

[www.hpe.com/info/ecodata](http://www.hpe.com/info/ecodata)

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

[www.hpe.com/info/environment](http://www.hpe.com/info/environment)

# Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback ([docsfeedback@hpe.com](mailto:docsfeedback@hpe.com)). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.