BROCADE
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Brocade X6 (FC32-64 Blade)

Brocade X6 FCoE Deployment Guide for Cisco UCS

Deployment Guide

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Chapter 1: Introduction

Users have two options when connecting Fibre Channel storage to Cisco UCS through an enterprise SAN. The options are either the native FC in NIPV mode or the Fibre Channel over Ethernet (FCoE) protocol.

With the Brocade® port blade FC32-64, both options are available along with different FC and FCoE data rates.

This document provides a best practice configuration for deployment of a Cisco UCS using the FCoE option in the Brocade FC32-64. The test configuration uses redundant 40G FCoE links between a Cisco FI 63xx and a Brocade FC32-64. The Brocade FC32-64 supports several other configurations that are out of scope for this deployment guide.

This guide is intended for experienced network and SAN administrators who are familiar with configuring and maintaining a Cisco UCS and Brocade Fabric OS® (FOS) switches.

1.1 Topology

The topology used to develop this best practice guide is shown in Figure 1.

A Cisco UCS B-series chassis is connected to two FI-6332-16UP on ports 1 through 4.

From each FI, ports 35 and 36 are configured as FCoE uplinks connected to port 9/0 and 9/4 on the FC32-64 port blade in Fabric A and Fabric B. The FCoE links are then aggregated into two port channels, one for each FI/SAN fabric. Each of the links in the port channel is 40GE for a total bandwidth of 80 Gb/s.

An FC storage array is connected to port 6/8 in each FC fabric.

Figure 1: Topology Used in the Configuration

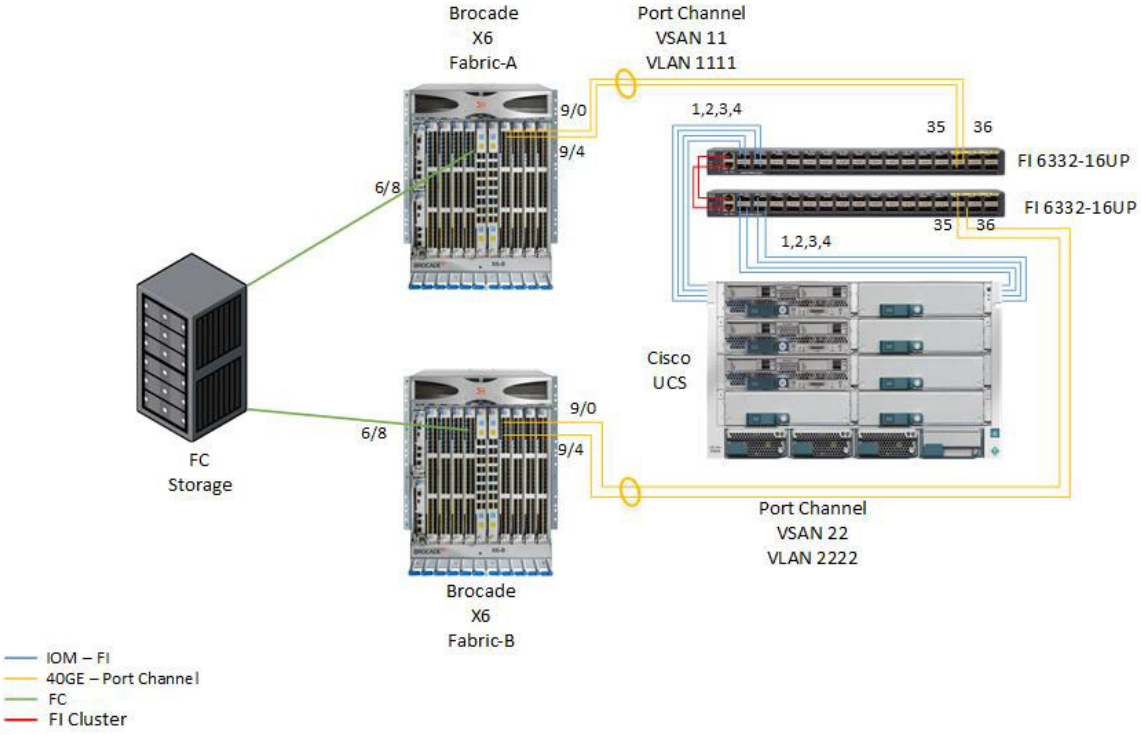


Table 1 lists the details for each component in the topology:

Table 1: Details of the Topology Components

Vendor	Model	Firmware	Description
Cisco	5108	3.1(2e)A	UCS chassis
Cisco	B200 M3	3.1(2e)A	Blade server
Cisco	6332 16UP	5.0(3)N2(3.12e)	Fabric interconnect
Cisco	QSFP 40G SR BD	N/A	40G Ethernet BiDi optic
Brocade	X6	FOS 8.2.0	SAN director chassis
Brocade	FC32-64	FOS 8.2.0	SAN director port blade
Brocade	QSFP 40G SRBD	N/A	40G Ethernet BiDi optic

Chapter 2: Tasks

A number of tasks must be performed on both the Cisco UCS/FIs and the Brocade X6/FC32-64 before configuring the uplink. These tasks are covered below.

2.1 Prerequisite Checklist

2.1.1 Cisco UCS

1. Install the correct SFP/QSFP. Refer to Table 1.
2. Connect the cables from the Cisco FI to the Brocade X6's FC32-64 blade.
3. Configure the ports on the Cisco FI as FCoE uplinks.
4. Create a VSAN with an FCoE VLAN for each connected Brocade FC fabric.
5. Create two vHBAs in a service profile, and assign each vHBA to the VSAN created for FCoE in the previous step.
6. The service profile should be associated to all servers that are running FCoE.
7. An OS has been installed in the blade server with the Multipath I/O (MPIO) application installed.

2.1.2 Brocade X6

1. Insert the Brocade FC32-64 blade in the X6 chassis.
2. Upgrade both X6 chassis to FOS 8.2.0 or later.
3. Install the correct SFP/QSFP. Refer to Table 1.
4. Connect the cables between the Cisco FI and the Brocade FC32-64 blade.
5. Connect the FC storage, and assign a LUN to each fabric.

2.2 Configuration Overview

In the sections that follow, we will cover the tasks needed to provision FCoE, enable the port channel, and allocate storage to the blade server. In addition, we show the tasks to validate port channel redundancy and traffic load balancing across the links. Listed below are the configuration tasks:

- Task 1: Check the Brocade Blade Identity.
- Task 2: Configure Ports on the Brocade Blade.
- Task 3: Configure the Port Channel for the Brocade Blade.
- Task 4: Configure the Port Channel for Cisco FI Uplinks.
- Task 5: Validate Connectivity and FC Login.
- Task 6: Define Fabric Zones on the Brocade X6.
- Task 7: Mount LUNs to a Host on the Cisco UCS.
- Task 8: Run I/O from an FCoE Host to the FC Storage.

2.3 Identify the Blade on the Brocade X6 (FC32-64 Blade) — Task 1

The FC32-64 blade for the X6 chassis has ID 204. To verify the correct installation of the blade and its readiness for use, issue the `slotshow` command and look for ID 204.

```
FAB-A_X6:FID128:admin> slotshow

Slot    Blade Type  ID      Status
---------------------------------
  1     CP BLADE    175     ENABLED
  2     CP BLADE    175     ENABLED
  3     UNKNOWN             VACANT
  4     UNKNOWN             VACANT
  5     SW BLADE    178     ENABLED
  6     SW BLADE    178     ENABLED
  7     CORE BLADE  177     ENABLED
  8     CORE BLADE  177     ENABLED
  9     SW BLADE    204     ENABLED
 10     UNKNOWN             VACANT
 11     UNKNOWN             VACANT
 12     UNKNOWN             VACANT
```

```
FAB-B_X6:FID128:admin> slotshow

Slot    Blade Type  ID      Status
---------------------------------
  1     CP BLADE    175     ENABLED
  2     CP BLADE    175     ENABLED
  3     UNKNOWN             VACANT
  4     UNKNOWN             VACANT
  5     UNKNOWN             VACANT
  6     SW BLADE    178     ENABLED
  7     CORE BLADE  177     ENABLED
  8     CORE BLADE  177     ENABLED
  9     SW BLADE    204     ENABLED
 10     UNKNOWN             VACANT
 11     UNKNOWN             VACANT
 12     UNKNOWN             VACANT
```

2.4 Configure Ports on the Brocade X6 (FC32-64 Blade) — Task 2

Before configuring the ports on the FC32-64 blade, you must provision VF_Ports (for FCoE) on the X6 director. The nomenclature is “enode” (per the standard specification).

2.4.1 VF_Port or Enode

Each logical VF_Port/enode supports an individual FCoE uplink. The maximum number of the VF_Ports supported on the Brocade X6 is 1600. The index (the first column in the `switchshow` command output) always starts at 1800. When the VF port is first created, it does not have an address (PID). Once there is a FLOGI, the enode is assigned a PID from a special pool.

NOTE: If you have more uplinks than the number of VF_Ports/enodes created, an error message is generated in RASLOG showing no more VF_Port available for login.

NOTE: No matter how many links in a port channel, it still counts as one uplink and consumes only one enode.

We create 10 enodes in our example, which means that we can now support a total of 10 FCoE port channels on the chassis. We use the following command to create 10 enodes in FC Fabric-A.

```
FAB-A_X6:FID128:admin> fcoe --config -enodes 10
```

Validate that 10 enodes have been created. The following output shows that 10 enodes have been created (output truncated) and that their index is from 1800 to 1809:

```
FAB-A_X6:FID128:admin> switchshow | grep -i fcoe

1800   -1  1800   ------   --    --       Offline    FCoE
1801   -1  1801   ------   --    --       Offline    FCoE
1802   -1  1802   ------   --    --       Offline    FCoE
...
```

```
...
...
1807   -1  1807   ------   --    --       Offline    FCoE
1808   -1  1808   ------   --    --       Offline    FCoE
1809   -1  1809   ------   --    --       Offline    FCoE
```

Issue the same commands to create and verify 10 enodes on Fabric-B.

2.4.2 Ethernet Port Mode

By default, all ports on the Brocade FC32-64 blade are configured to support the FC protocol. To change the port mode to support the Ethernet protocol, perform the following steps for both Fabric-A and Fabric-B.

```
FAB-A_X6:FID128:admin> portdisable 9/0-3      FAB-B_X6:FID128:admin> portdisable 9/0-3
FAB-A_X6:FID128:admin> portdisable 9/4-7      FAB-B_X6:FID128:admin> portdisable 9/4-7
```

As noted in the topology, we will use port 9/0 and 9/4 in both FC fabrics. Disable the ports before provisioning them for Ethernet. Issue the following command to disable them.

NOTE: The Brocade FC32-64 blade has 16 physical QSFP ports. Each QSFP port supports breakout connectivity to 4 individual ports for a total of 64 ports. When a port is used as 40GE, it takes the group of 4 ports; therefore, we need to disable all 4 ports in the group. In this case, we use ports 0-3 and ports 4-7. Only the first port (port 0 and port 4) in the group must be configured. All other ports (ports 1-3 and ports 5-7) in the group are automatically set in a persistently disabled state.

In the following, we go through the configuration and validation of the ports for Fabric-A and Fabric-B.

Configuring 9/0 and 9/4 as Ethernet ports in Fabric-A:

```
FAB-A_X6:FID128:admin> portcfgflexport --proto eth 9/0
Success: Ports 9/0,9/1,9/2,9/3 are configured as port type ETH
FAB-A_X6:FID128:admin> portcfgflexport --proto eth 9/4
Success: Ports 9/4,9/5,9/6,9/7 are configured as port type ETH
```

Configure ports 9/0 and 9/4 as Ethernet ports in Fabric-B as well.

Enable port 9/0 in Fabric-A, and verify that it comes up as an Ethernet port (output truncated).

```
FAB-A_X6:FID128:admin> portenable 9/0
FAB-A_X6:FID128:admin> switchshow
...
  64   9   0   024000   --   40G      No_Module   ETH
  65   9   1   024100   --   40G      No_Module   ETH  Disabled (Persistent)  (QSFP Secondary port)
  66   9   2   024200   --   40G      No_Module   ETH  Disabled (Persistent)  (QSFP Secondary port)
  67   9   3   024300   --   40G      No_Module   ETH  Disabled (Persistent)  (QSFP Secondary port)
...
```

Enable port 9/4 in Fabric-A, and verify that it comes up as an Ethernet port (output truncated).

```
FAB-A_X6:FID128:admin> portenable 9/4
FAB-A_X6:FID128:admin> switchshow
...
   68    9   4   024400   --    40G    No_Module    ETH
   69    9   5   024500   --    40G    No_Module    ETH  Disabled (Persistent  (QSFP Secondary port)
   70    9   6   024600   --    40G    No_Module    ETH  Disabled (Persistent  (QSFP Secondary port)
   71    9   7   024700   --    40G    No_Module    ETH  Disabled (Persistent) (QSFP Secondary port)
...
```

Do the same in Fabric-B.

2.4.3 FCoE VLAN

In the Brocade X6, the default FCoE VLAN ID is 1002. Create an FCoE VLAN to match the one created in the Cisco UCS environment as noted in the topology earlier.

Issue the following commands to create VLAN 1111 in Fabric-A and verify its presence.

```
FAB-A_X6:FID128:admin> fcoe --config -vlan 1111
FAB-A_X6:FID128:root> fcoe --show -fabric
=========================================================
VLAN      VFID      Pri     FCMAP        FKA       Timeout
=========================================================
1111      128[D]    3[D]    0xefc00[D]   8000[D]   Enabled[D]
```

Issue the following commands to create VLAN 2222 in Fabric-B and verify its presence.

```
FAB-B_X6:FID128:admin> fcoe --config -vlan 2222
FAB-B_X6:FID128:root> fcoe --show -fabric
=========================================================
VLAN      VFID      Pri     FCMAP        FKA       Timeout
=========================================================
2222      128[D]    3[D]    0xefc00[D]   8000[D]   Enabled[D]
```

NOTE: Brocade FOS version 8.2.0 supports only one FCoE VLAN. If you create a new VLAN, it will override the existing one.

NOTE: Once you have created a port channel, you cannot change the VLAN configuration. To change the VLAN ID, first unprovision or delete any existing port channels; otherwise, an error message similar to following appears.

```
FAB-A_X6:FID128:admin> fcoe --config -vlan 1111
VLAN change not allowed if switch having any fcoe enabled port(s) or portchannel(s).
```

2.5 Configure the Port Channel on the Brocade X6 (FC32-64 Blade) — Task 3

Brocade FC32-64 blades support only dynamic port channel (LACP) (not static port channel). The port channel can span multiple blades within an X6 chassis, but it cannot span multiple X6 chassis or virtual fabrics.

We issue the following command on the Brocade X6 to create a port channel named Fab_A_PO11 on Fabric-A, and then we include ports 9/0 and 9/4 to be part of the port channel and verify.

```
FAB-A_X6:FID128:admin> portchannel --create Fab_A_PO11 -type dynamic -key 11 -speed 40G

FAB-A_X6:FID128:admin> portchannel --add Fab_A_PO11 -port 9/0
FAB-A_X6:FID128:admin> portchannel --add Fab_A_PO11 -port 9/4

FAB-A_X6:FID128:admin> portchannel --show
Name                          Type        Oper-State   Port-Count   Member Ports
--------------------------------------------------------------------------------
Fab_A_PO11                    Dynamic     Offline      2            9/0 ,9/4
```

Create a port channel on Brocade Fabric-B.

```
FAB-B_X6:FID128:admin> portchannel --create Fab_B_PO22 -type dynamic -key 22 -speed 40G

FAB-B_X6:FID128:admin> portchannel --add Fab_B_PO22 -port 9/0
FAB-B_X6:FID128:admin> portchannel --add Fab_B_PO22 -port 9/4

FAB-B_X6:FID128:admin> portchannel --show
Name                          Type        Oper-State   Port-Count   Member Ports
--------------------------------------------------------------------------------
Fab_B_PO22                    Dynamic     Offline      2            9/0 ,9/4
```

After creating the port channels, you must enable them on the Brocade X6 in Fabric-A and Fabric-B.

Issue the following commands to enable and verify port channel Fab_A_PO11 in Fabric-A with both ports 9/0 and 9/4. Notice that the “Operating State” is “Offline” because the port channel has not yet been configured and enabled on the Cisco FIs.

```
FAB-A_X6:FID128:admin> portchannel --enable Fab_A_PO11

FAB-A_X6:FID128:admin> portchannel --show -detail
 Name :Fab_A_PO11
 Type :Dynamic
 Key  :11
 Speed  :40G
 Autoneg  :Off
 Admin-state: Enable
 Oper-state : Offline
  Admin Key: 0011 - Oper Key 0011
  LACP System ID: 0x8000,c4-f5-7c-2d-a6-22
  PART System ID: 0x0000,00-00-00-00-00-00
  Portchannel Member count = 2
  Port          Oper state      Sync    Timeout
  ------------------------------------------
   9/0          Offline         0       Long
   9/4          Offline         0       Long
```

Run the same commands to enable and verify port channel Fab_B_PO22 in Fabric-B.

Finally you must provision the port channel to be in UCS mode in order to interoperate with the Cisco FCoE port channel.

Issue the following commands to provision the port channel with “ucs” mode in Fabric-A, and verify.

```
FAB-A_X6:FID128:admin> fcoe --enable -portchannel Fab_A_PO11 ucs
Enabling UCS mode will disable VNPort KA on the port
Would you like to continue [y/n]?: y


FAB-A_X6:FID128:admin> fcoe --show -provision
=========================================
Domain        Port(s)/Portchannel(s)     Mode
=========================================
2             Fab_A_PO11                  UCS

Total number of port(s) = 1
```

Do the same for Fabric-B and verify.

2.6 Configure the Port Channel on the Cisco FI — Task 4

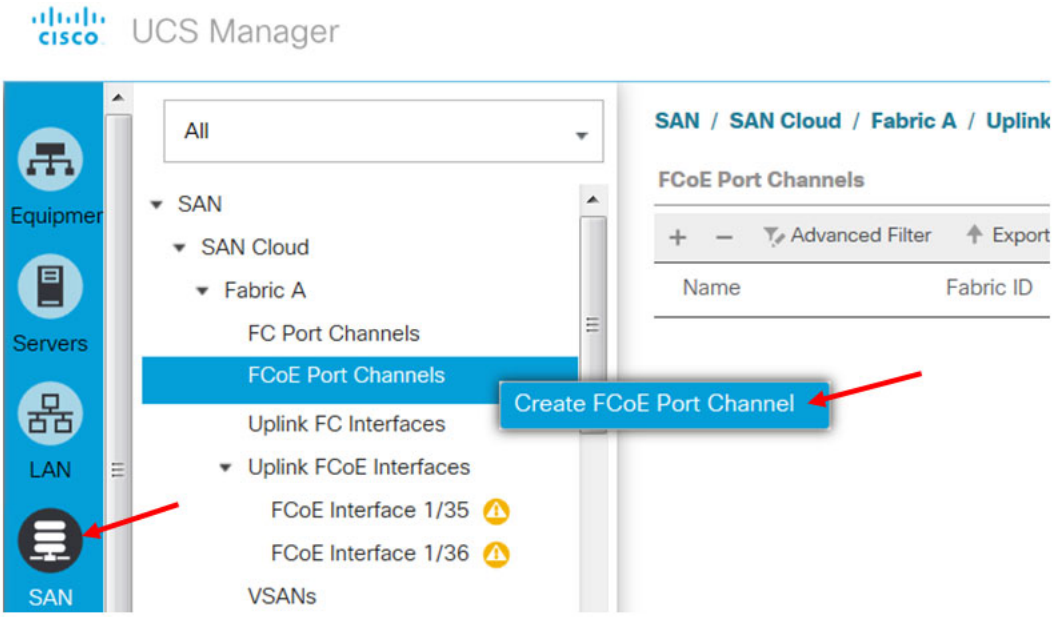
We now go through the steps to configure a port channel for ports 35 and 36 on the FI connected to Fabric-A, as shown in the topology.

NOTE: Enabling the port channel is recommended in order to increase bandwidth, load balancing, and high availability; however, it is not required.

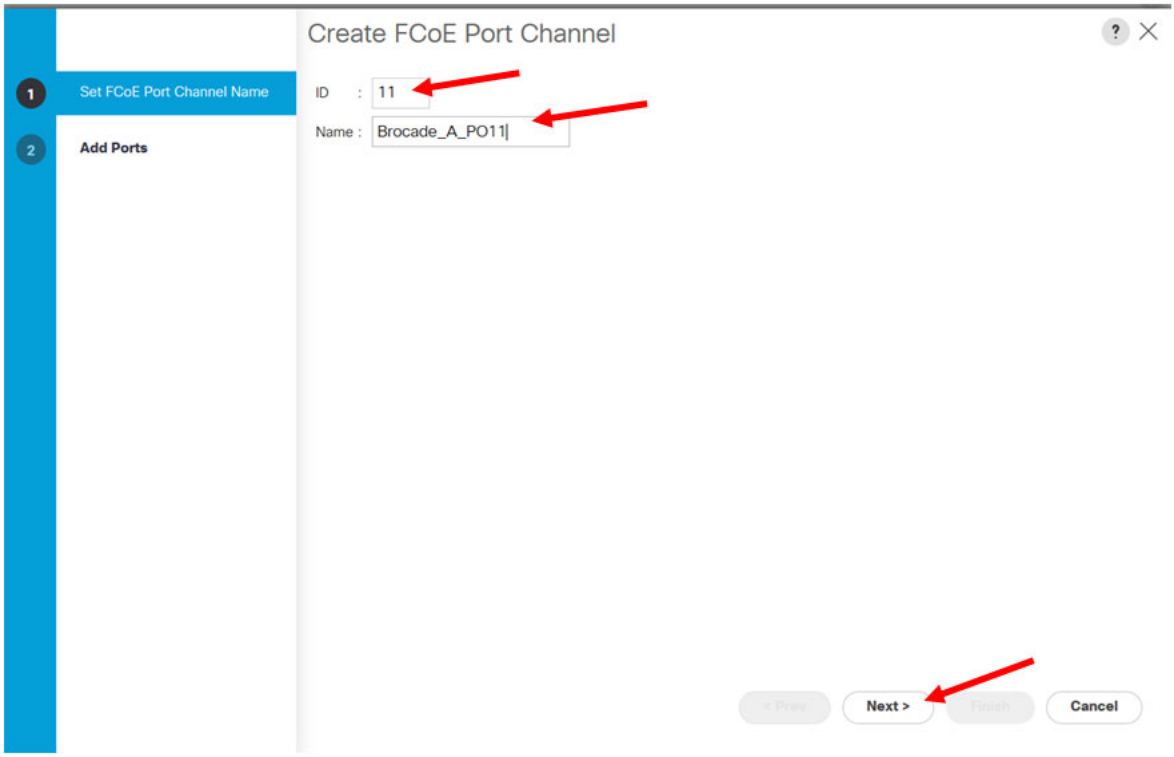
NOTE: Depending on which UCS Manager interface is used, the UI may look different. In this document, we use the UCS Manager HTML interface (not Java based).

The sequence of configuration steps needed to enable the port channel using Cisco UCS Manager is covered next.

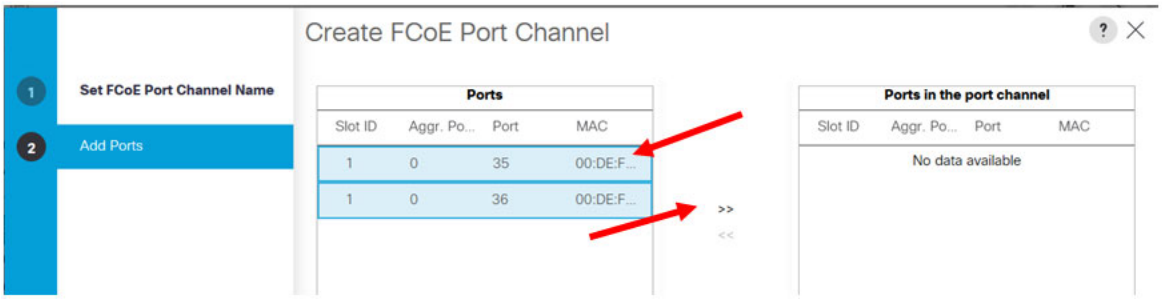
1. From the Cisco UCS Manager (UCSM) main screen, click the **SAN** icon on the left pane under **SAN Cloud > Fabric A**, right-click **FCoE Port Channels**, and select **Create FCoE Port Channel**.

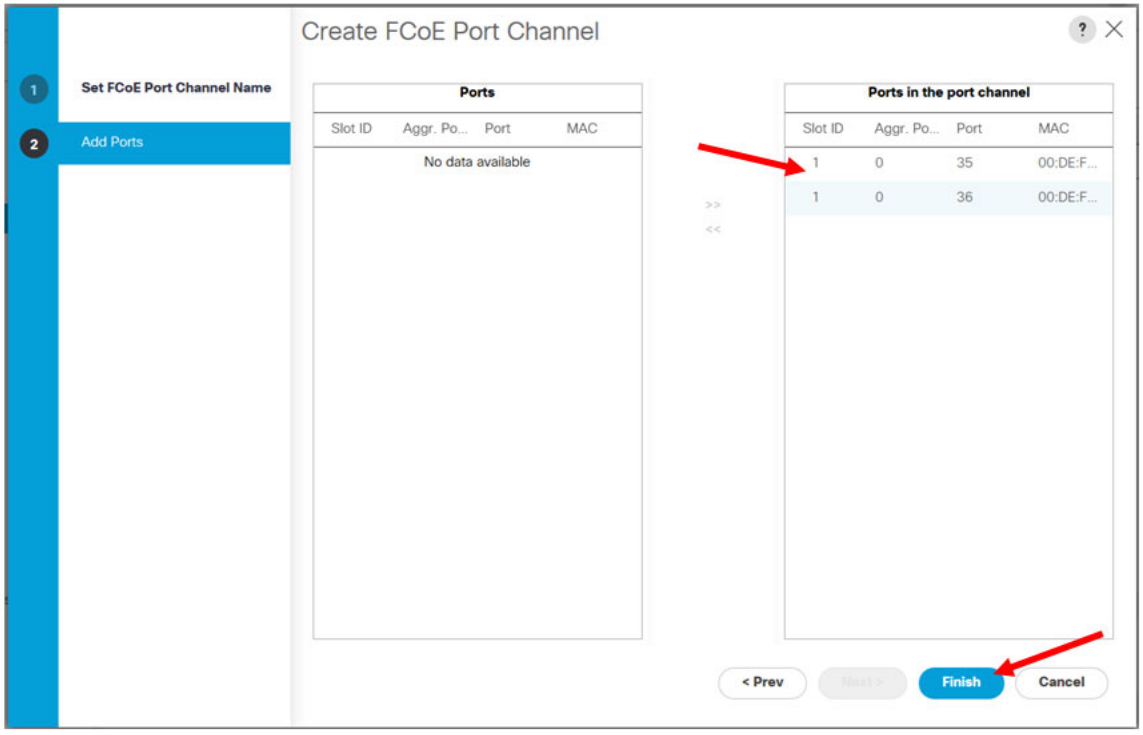


2. On the next screen, enter **ID: 11** and **Name: Brocade_A_PO11** for Fabric-A, and click **Next**.



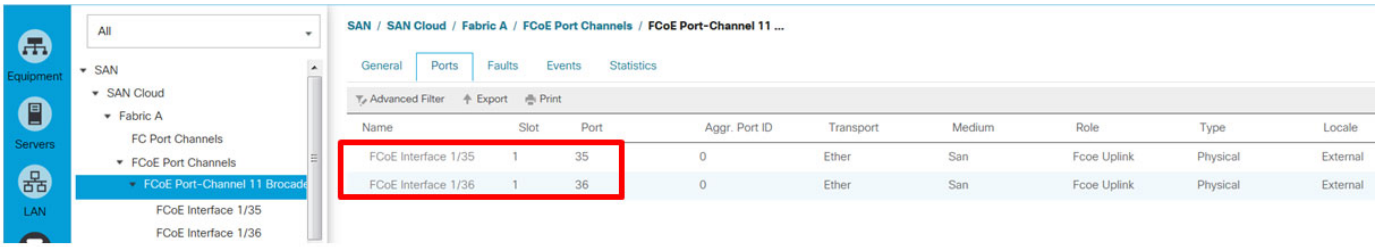
3. In the next window, under the **Ports** middle pane, hold down the **Shift** key to select both port 35 and port 36, click the right arrow (**>>**) to move them under the **Ports in the port channel** pane, and click **Finish**.





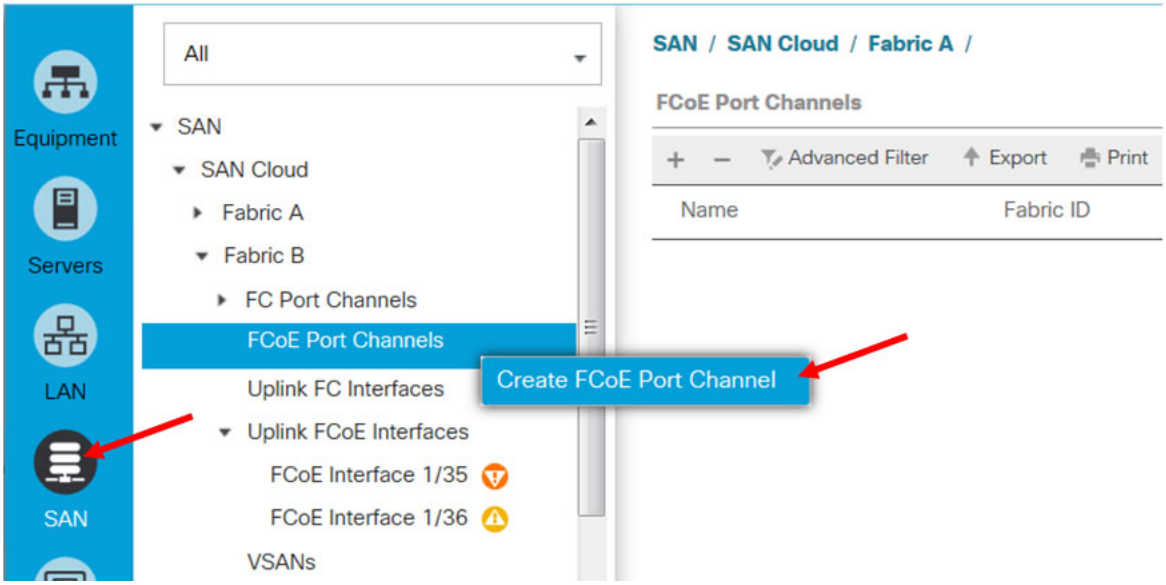
4. Click **OK** in the confirmation window.

After creating the port channel, both port 35 and 36 will show up in the **FCoE Port-Channel 11** window, as shown below.

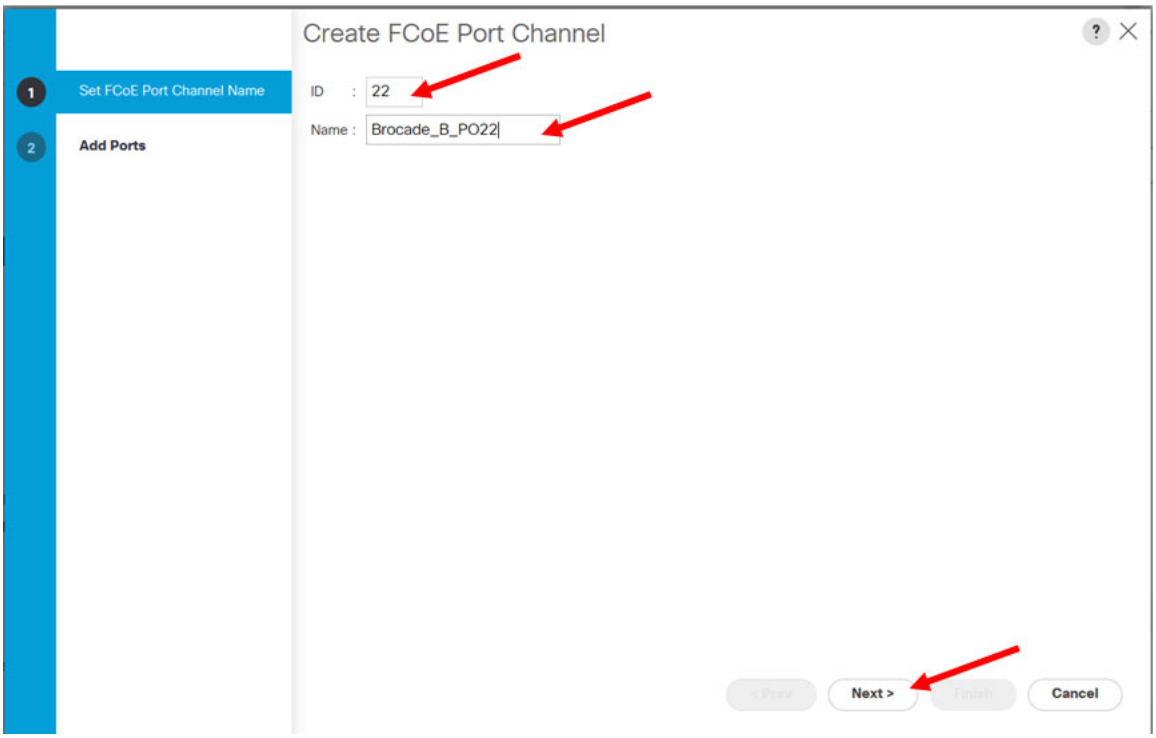


Repeat the same steps to create a port channel for Fabric-B.

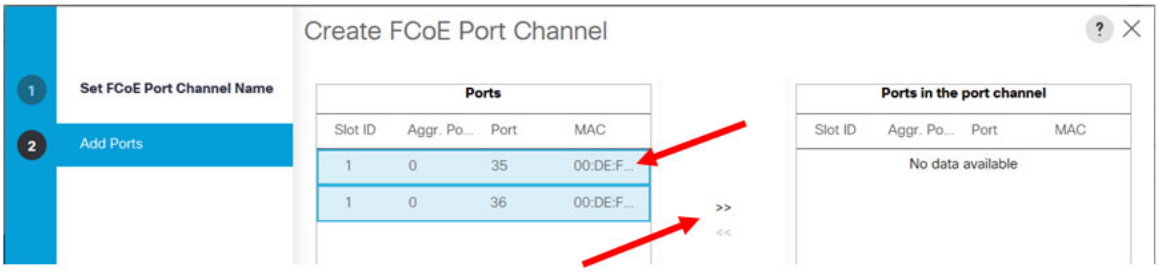
1. From the Cisco UCSM main screen, click the **SAN** icon on the left pane under **SAN Cloud > Fabric B**, right-click **FCoE Port Channels**, and select **Create FCoE Port Channel**.

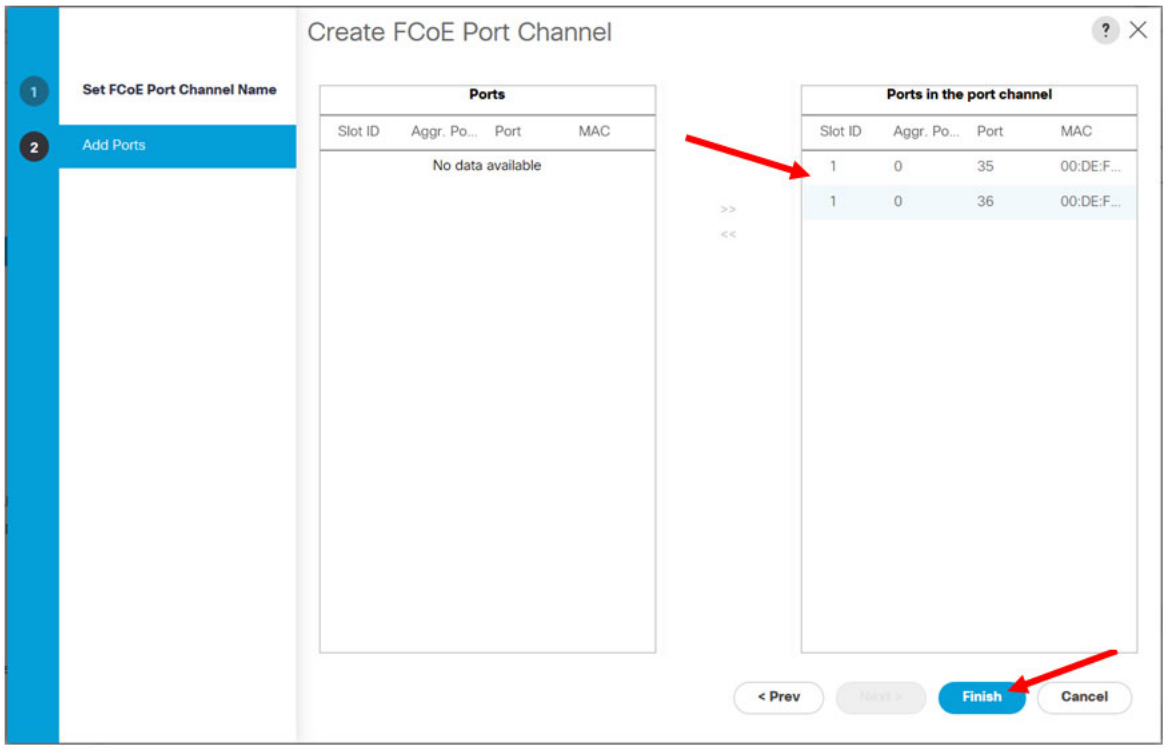


2. In the next screen, enter **ID: 22** and **Name: Brocade_B_PO22** for Fabric-B, and click **Next**.



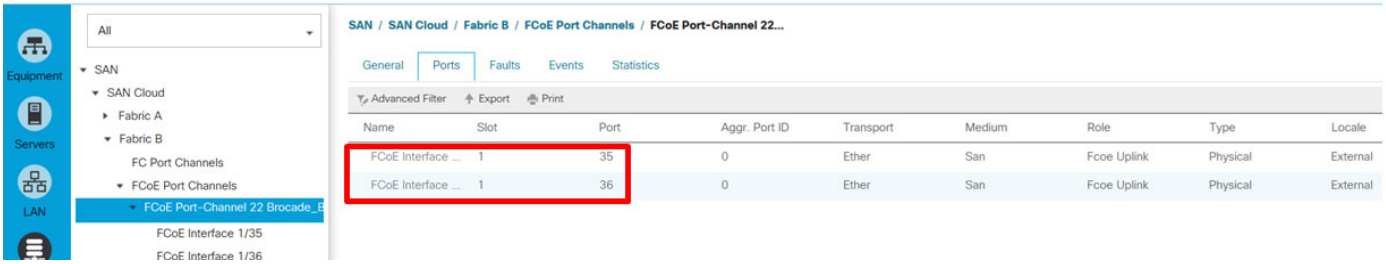
3. In the next window, under the **Ports** middle pane, hold down the **Shift** key to select both port 35 and port 36, click the right arrow (**>>**) to move them under the **Ports in the port channel** pane, and click **Finish**.





4. Click **OK** in the confirmation window.

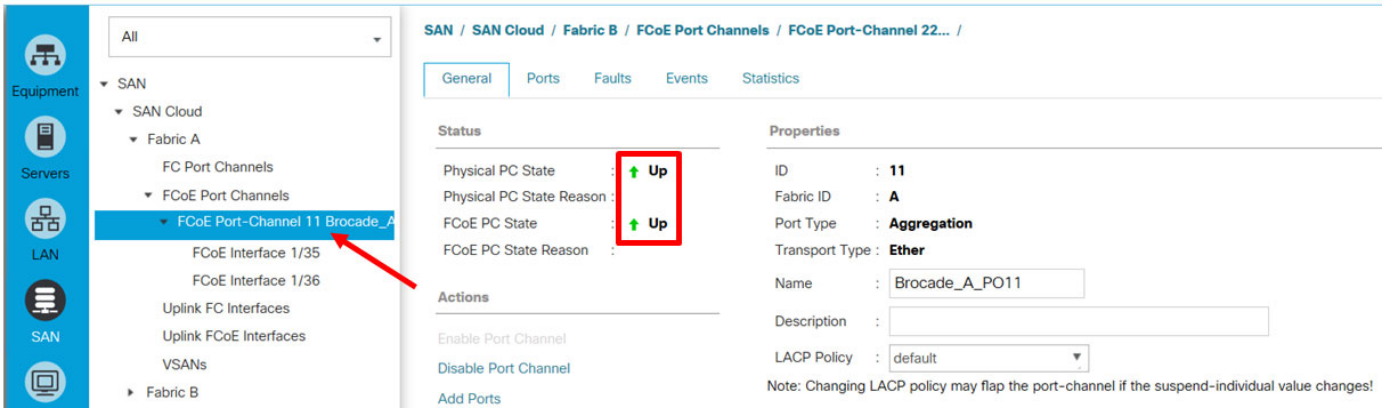
After creating the port channel, both port 35 and port 36 will show up in the **FCoE Port-Channel 22** window, as shown below:



2.7 Validate Connectivity and FC Login — Task 5

The port channel configuration is now completed on both sides (Cisco FI and Brocade X6). Now validate that the port channels have formed and that connectivity is established.

1. From the Cisco UCSM main window, select the **SAN** icon on the left pane under **SAN Cloud > Fabric A**, and select **FCoE Port-Channel 11 Brocade_A_PO11**. In the right pane, click the **General** tab, and verify **Physical PC State: Up** and **FCoE PC State: Up**.



   Perform the same steps to verify that the FCoE port channel is connected to Fabric-B.

2. Verify that the port channels are up and operational on the Brocade X6 Fabric-A by issuing the `portchannel --show` command, and check for `Admin-state: Enable` and `Oper-state: Online`.

```
FAB-A_X6:FID128:admin> portchannel --show Fab_A_PO11
 Name :Fab_A_PO11
 Type :Dynamic
 Key  :11
 Speed  :40G
 Autoneg  :Off
 Admin-state: Enable
 Oper-state : Online
  Admin Key: 0011 - Oper Key 0011
  LACP System ID: 0x8000,c4-f5-7c-2d-a6-22
  PART System ID: 0x8000,00-de-fb-b2-d9-65
  Portchannel Member count = 2
  Port          Oper state      Sync    Timeout
  ---------------------------------------------
  *9/0          Online          1       Long
   9/4          Online          1       Long
```

Verify the same on Fabric-B.

```
FAB-B_X6: :FID128admin> portchannel --show Fab_B_PO22
 Name :Fab_B_PO22
 Type :Dynamic
 Key  :22
 Speed  :40G
 Autoneg  :Off
 Admin-state: Enable
 Oper-state : Online
  Admin Key: 0022 - Oper Key 0022
  LACP System ID: 0x8000,c4-f5-7c-64-5b-62
  PART System ID: 0x8000,00-de-fb-b2-cc-65
  Portchannel Member count = 2
  Port          Oper state      Sync    Timeout
  ------------------------------------------
  *9/0          Online          1       Long
   9/4          Online          1       Long
```

3. With the port channel up and operational, verify the FIs using LLDP. Issue the following command on Brocade X6 Fabric-A to display its LLDP neighbor information.

```
FAB-A_X6:FID128:admin> lldp --show -nbr
Local Intf   Dead Interval   Remaining Life   Remote Intf   Chassis ID      Tx   Rx   System Name
9/0          120            93               Eth1/35       00de.fbb2.d85c  142  144  SA-UCS-FI-A
9/4          120            94               Eth1/36       00de.fbb2.d85d  142  144  SA-UCS-FI-A
```

Showing LLDP neighbor information from the Brocade X6 Fabric-B telnet session.

```
FAB-B_X6:FID128:admin> lldp --show -nbr
Local Intf   Dead Interval   Remaining Life   Remote Intf   Chassis ID      Tx   Rx   System Name
9/0          120            116              Eth1/36       00de.fbb2.cb5d  103  105  SA-UCS-FI-B
9/4          120            94               Eth1/35       00de.fbb2.cb5c  93   95   SA-UCS-FI-B
```

4. Now verify FC device login. Issue the following command to show FCoE devices in Brocade X6 Fabric-A. In the test environment, there is a Cisco UCS B-Series with two blade servers. Each blade server is configured with two vHBAs, and each connects to a different fabric. Here, Fabric-A shows one N_Port with two NPIV devices representing two blade servers.

```
FAB-A_X6:FID128:admin> switchshow | grep -i fcoe | more
1800   -1  1800   027040   --    --       Online     FCoE VF-Port  1 N Port + 2 NPIV public
1801   -1  1801   ------   --    --       Offline    FCoE
1802   -1  1802   ------   --    --       Offline    FCoE
1803   -1  1803   ------   --    --       Offline    FCoE
1804   -1  1804   ------   --    --       Offline    FCoE
1805   -1  1805   ------   --    --       Offline    FCoE
```

Verify the same output in Fabric-B.

```
FAB-B_X6:FID128:admin> switchshow | grep -i fcoe | more
1800   -1  1800   017040   --    --       Online     FCoE VF-Port  1 N Port + 2 NPIV public
1801   -1  1801   ------   --    --       Offline    FCoE
1802   -1  1802   ------   --    --       Offline    FCoE
1803   -1  1803   ------   --    --       Offline    FCoE
1804   -1  1804   ------   --    --       Offline    FCoE
1805   -1  1805   ------   --    --       Offline    FCoE
```

5. Also verify that the devices are showing up in the port channel by issuing the following command in Brocade X6 Fabric-A. The first item in the device list is the N_Port, and the next two items are the NPIV devices.

```
FAB-A_X6:FID128:admin> fcoe --show -login portchannel Fab_A_PO11
================================================================================================
FCOE VF-Port     Eth-port/LAG       Device WWN               Device MAC         Session MAC
================================================================================================
1800               Fab_A_PO11  22:c6:00:de:fb:b2:d8:ff  00:de:fb:b2:d8:63  0e:fc:00:02:70:40
1800               Fab_A_PO11  20:00:00:25:b5:00:00:01  00:de:fb:b2:d8:63  0e:fc:00:02:70:41
1800               Fab_A_PO11  20:00:00:25:b5:00:00:03  00:de:fb:b2:d8:63  0e:fc:00:02:70:42

Total number of Login(s) = 3
```

Verify the devices in the port channel in Fabric-B.

```
FAB-B_X6:FID128:admin> fcoe --show -login portchannel Fab_B_PO22
================================================================================================
FCOE VF-Port     Eth-port/LAG       Device WWN               Device MAC         Session MAC
================================================================================================
1800               Fab_B_PO22  22:c7:00:de:fb:b2:cb:ff  00:de:fb:b2:cb:63  0e:fc:00:01:70:40
1800               Fab_B_PO22  20:00:00:25:b5:01:00:00  00:de:fb:b2:cb:63  0e:fc:00:01:70:41
1800               Fab_B_PO22  20:00:00:25:b5:01:00:01  00:de:fb:b2:cb:63  0e:fc:00:01:70:42

Total number of Login(s) = 3
```

2.8 Create Zoning on the Brocade X6 (FC32-64 Blade) — Task 6

Once the FC device WWNs show up in Brocade X6 fabrics, you can create the fabric zoning between the FCoE host devices and the FC storage. In any large enterprise environment, Brocade's best practice is to use peer zoning to limit the zoning entries/size, which dramatically reduces RSCN handling for any device changes.

NOTE: Peer zoning is not required for FCoE-connected devices. You can also use traditional single initiator-target (or multi-) zoning. For larger deployments, peer zoning is strongly recommended.

Perform the following steps to implement peer zoning.

1. As a best practice, create aliases for devices in Fabric-A, two for the vHBA in the blade servers and one for the storage port.

```
FAB-A_X6:FID128:admin> alicreate "FI247a_SVR1_HBA1", "20:00:00:25:b5:00:00:01"
FAB-A_X6:FID128:admin> alicreate "FI247a_SVR3_HBA1", "20:00:00:25:b5:00:00:03"
FAB-A_X6:FID128:admin> alicreate "X6a_Storage1a", "52:4a:93:7f:35:f7:11:10"
```

Also create aliases for the devices in Fabric-B, two for the vHBA in the blade servers and one for the storage port.

```
FAB-B_X6:FID128:admin> alicreate "FI247b_SVR1_HBA2", "20:00:00:25:b5:01:00:00"
FAB-B_X6:FID128:admin> alicreate "FI247b_SVR3_HBA2", "20:00:00:25:b5:01:00:01"
FAB-B_X6:FID128:admin> alicreate "X6b_Storage1b", "52:4a:93:7f:35:f7:11:00"
```

2. Then create peer zoning in Fabric-A with the storage port as a principal and two vHBAs as members.

```
FAB-A_X6:FID128:admin> zonecreate --peerzone FI247a_Peerzone1 -principal
"X6a_Storage1a" -members "FI247a_SVR1_HBA1; FI247a_SVR3_HBA1"
```

Create peer zoning in Fabric-B with the storage port as a principal and two vHBAs as members.

```
FAB-B_X6:FID128:admin> zonecreate --peerzone FI247b_Peerzone1 -principal
"X6b_Storage1b" -members "FI247b_SVR1_HBA2; FI247b_SVR3_HBA2"
```

3. Add peer zoning to the zone configuration, and enable it.

Adding peer zoning to the Fabric-A zone configuration:

```
FAB-A_X6:FID128:admin> cfgadd "Brocade-Fabric-A", "FI247a_Peerzone1"

FAB-A_X6:FID128:admin> cfgenable "Brocade-Fabric-A"
You are about to enable a new zoning configuration.
This action will replace the old zoning configuration with the
current configuration selected. If the update includes changes
to one or more traffic isolation zones, the update may result in
localized disruption to traffic on ports associated with
the traffic isolation zone changes.
Do you want to enable 'Brocade-Fabric-A' configuration  (yes, y, no, n):
[no] y
zone config "Brocade-Fabric-A" is in effect
Updating flash ...
```

Adding peer zoning to the Fabric-B zone configuration:

```
FAB-B_X6:FID128:admin> cfgadd "Brocade-Fabric-B", "FI247b_Peerzone1"

FAB-B_X6:FID128:admin> cfgenable Brocade-Fabric-B
You are about to enable a new zoning configuration.
This action will replace the old zoning configuration with the
current configuration selected. If the update includes changes
to one or more traffic isolation zones, the update may result in
localized disruption to traffic on ports associated with
the traffic isolation zone changes.
Do you want to enable 'Brocade-Fabric-B' configuration  (yes, y, no, n):
[no] y
zone config "Brocade-Fabric-B" is in effect
Updating flash ...
```

4. Verify the current zoning configuration.

NOTE: Output is truncated to highlight the new peer zoning added. Your zoning output may include other entries when added to an existing configuration.

Verify the current zoning configuration in Fabric-A.

```
FAB-A_X6:FID128:admin> cfgshow
...
Effective configuration:
 cfg:   Brocade-Fabric-A

 zone:  FI247a_Peerzone1
                52:4a:93:7f:35:f7:11:10
                20:00:00:25:b5:00:00:01
                20:00:00:25:b5:00:00:03
...
```

Verify the current zoning configuration in Fabric-B.

```
FAB-B_X6:FID128:admin> cfgshow
...
Effective configuration:
 cfg:   Brocade-Fabric-B

 zone:  FI247b_Peerzone1
                52:4a:93:7f:35:f7:11:00
                20:00:00:25:b5:01:00:00
                20:00:00:25:b5:01:00:01
...
```

5. Lastly, check the peer zoning members.

   You will see that the storage port is being dedicated as a principal and that the other two vHBA WWNs are being labeled as members of the peer zoning.

   Verify the peer zoning in Fabric-A.

```
FAB-A_X6:FID128:admin> zoneshow --peerzone all
Defined configuration:
 zone:  FI247a_Peerzone1
   Property Member: 00:02:00:00:00:03:01:01
   Created by: User
   Principal Member(s):
                X6a_Storage1a
   Peer Member(s):
                FI247a_SVR1_HBA1; FI247a_SVR3_HBA1

Effective configuration:
 zone:  FI247a_Peerzone1
   Property Member: 00:02:00:00:00:03:01:01
   Created by: User
   Principal Member(s):
                52:4a:93:7f:35:f7:11:10
   Peer Member(s):
                20:00:00:25:b5:00:00:01
                20:00:00:25:b5:00:00:03
1 Peer Zones in Eff Cfg
```

   Verify the peer zoning in Fabric-B.

```
FAB-B_X6:FID128:admin> zoneshow --peerzone all
Defined configuration:
 zone:  FI247b_Peerzone1
   Property Member: 00:02:00:00:00:03:01:01
   Created by: User
   Principal Member(s):
                X6b_Storage1b
   Peer Member(s):
                FI247b_SVR1_HBA2; FI247b_SVR3_HBA2

Effective configuration:
 zone:  FI247b_Peerzone1
   Property Member: 00:02:00:00:00:03:01:01
   Created by: User
   Principal Member(s):
                52:4a:93:7f:35:f7:11:00
   Peer Member(s):
                20:00:00:25:b5:01:00:00
                20:00:00:25:b5:01:00:01
1 Peer Zones in Eff Cfg
```

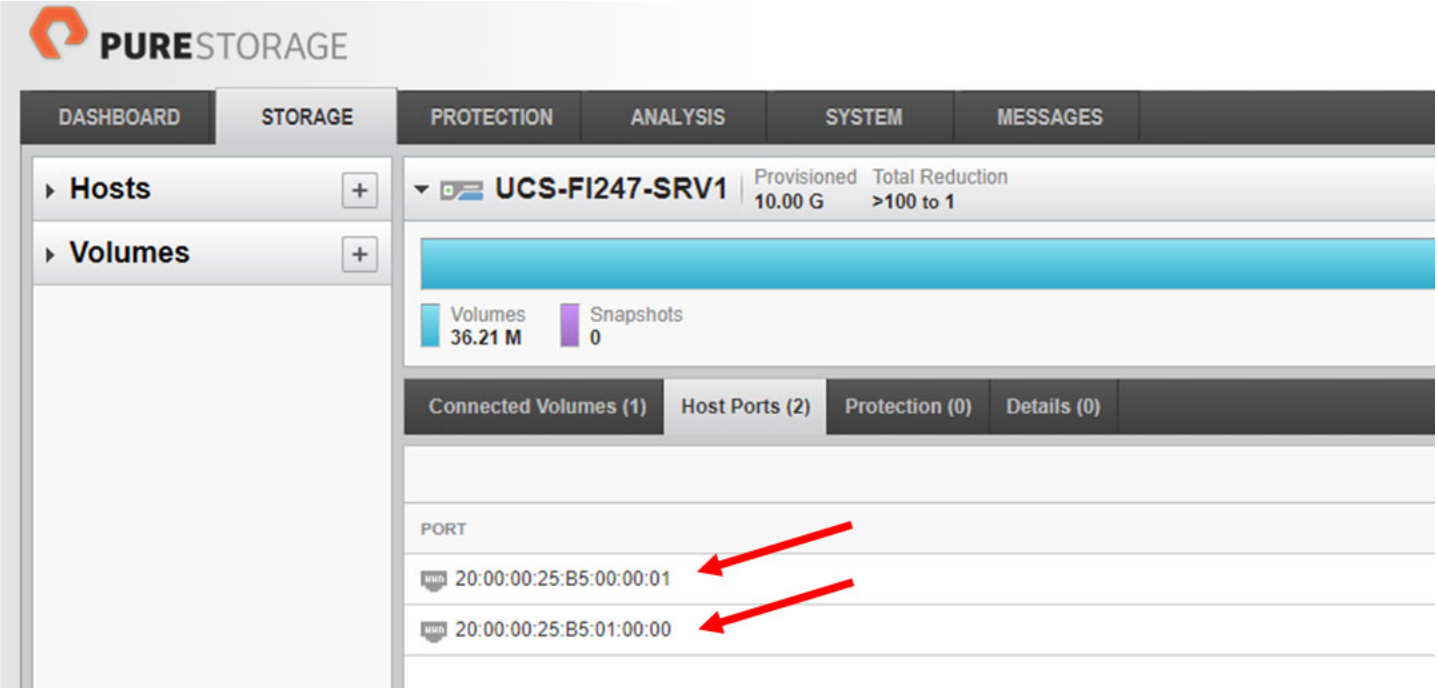
2.9 Mount LUNs to a Host on the Cisco UCS Blade Server — Task 7

After device zoning is completed in both Fabric-A and Fabric-B, assigned LUN(s) from storage should be visible to the host OS in the UCS blade server.

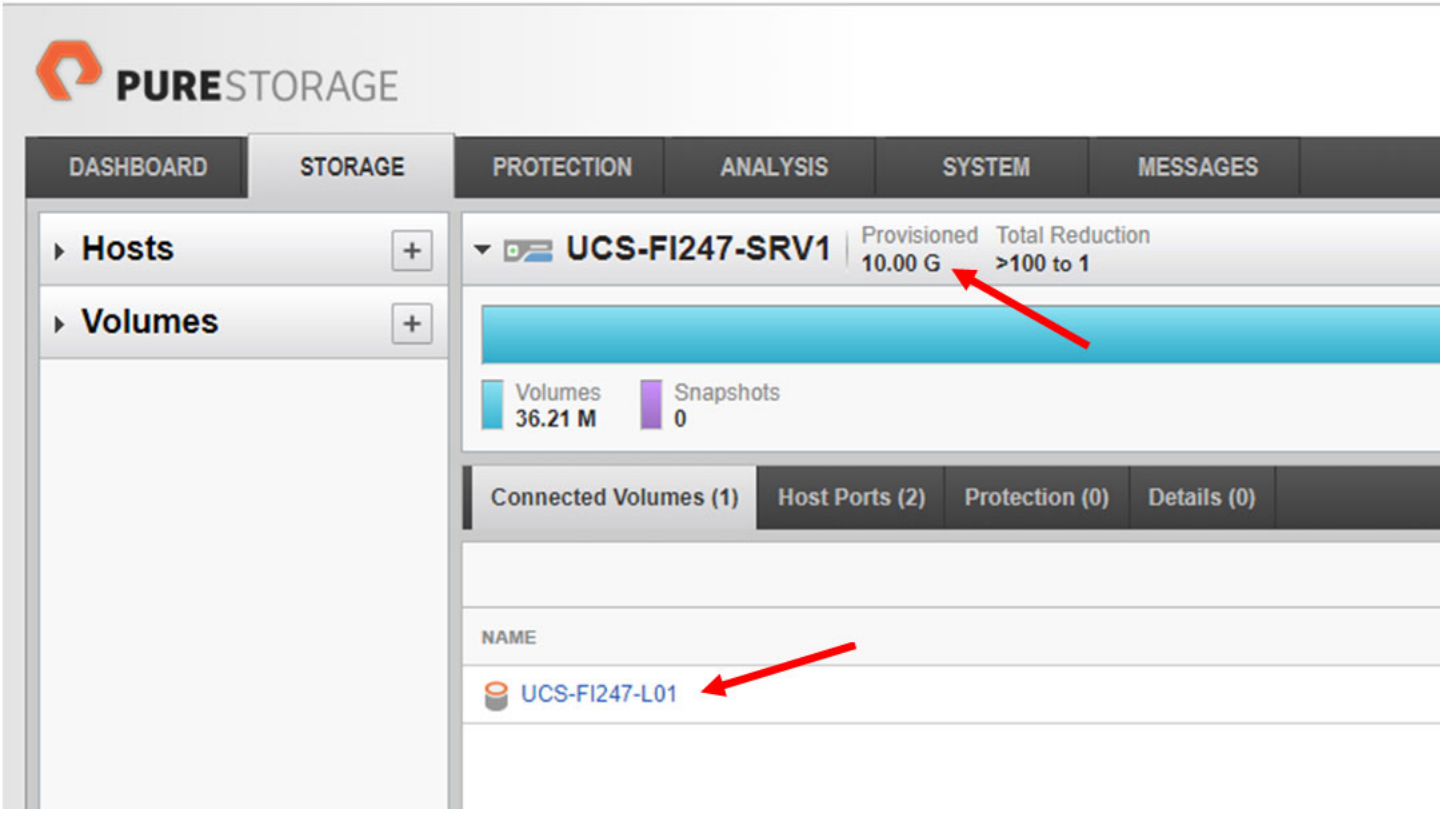
NOTE: LUN provisioning steps on the storage array are not shown.

The following is an illustration of how LUN provisioning has been done in this environment.

The WWN of blade server 1 has been added to a host group.



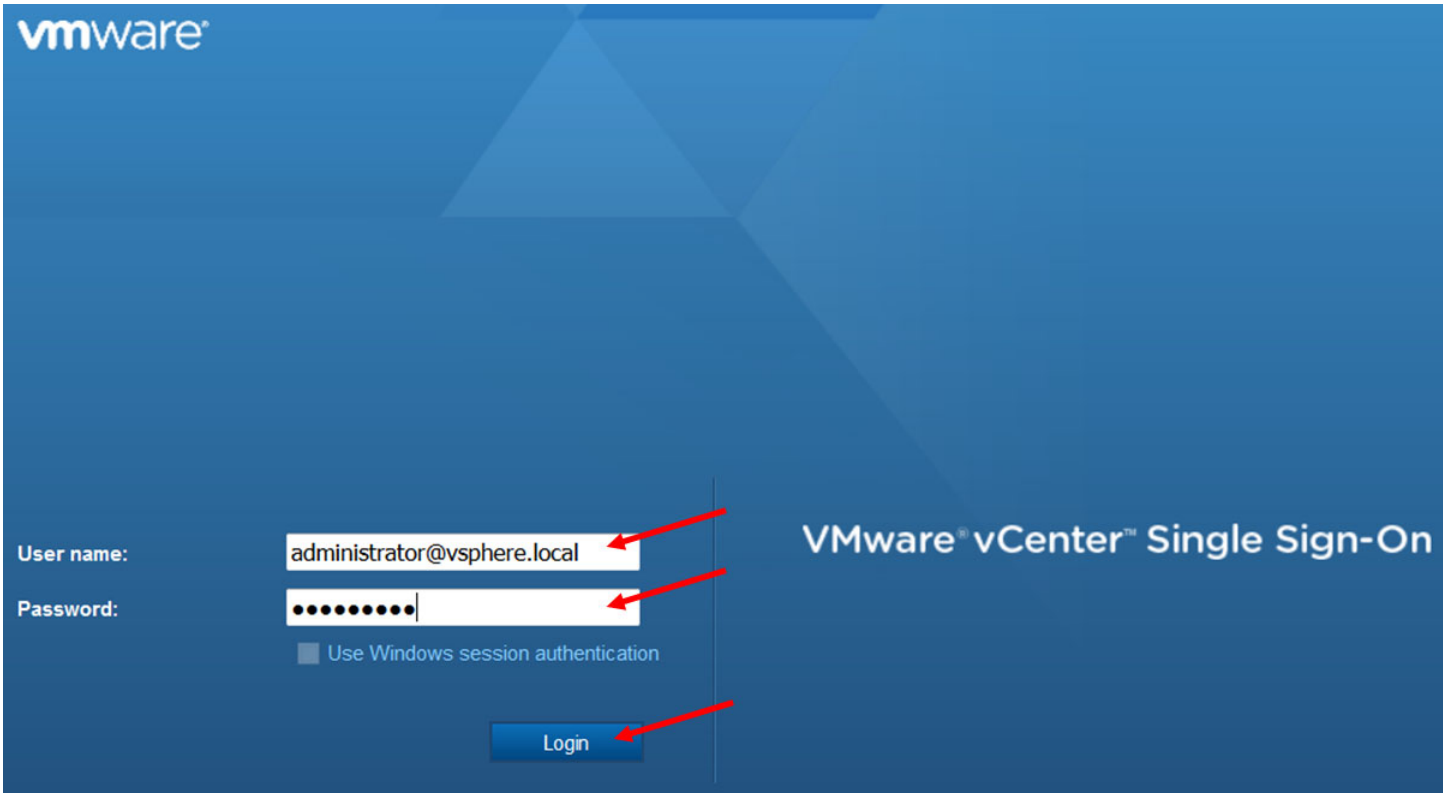
A 10G LUN has been provisioned and assigned to this host group.



In this environment, a VMware ESXi is installed in the blade server. The following are the steps to validate access to the LUN, create a data store, and provision a vDisk to a VM on the data store.

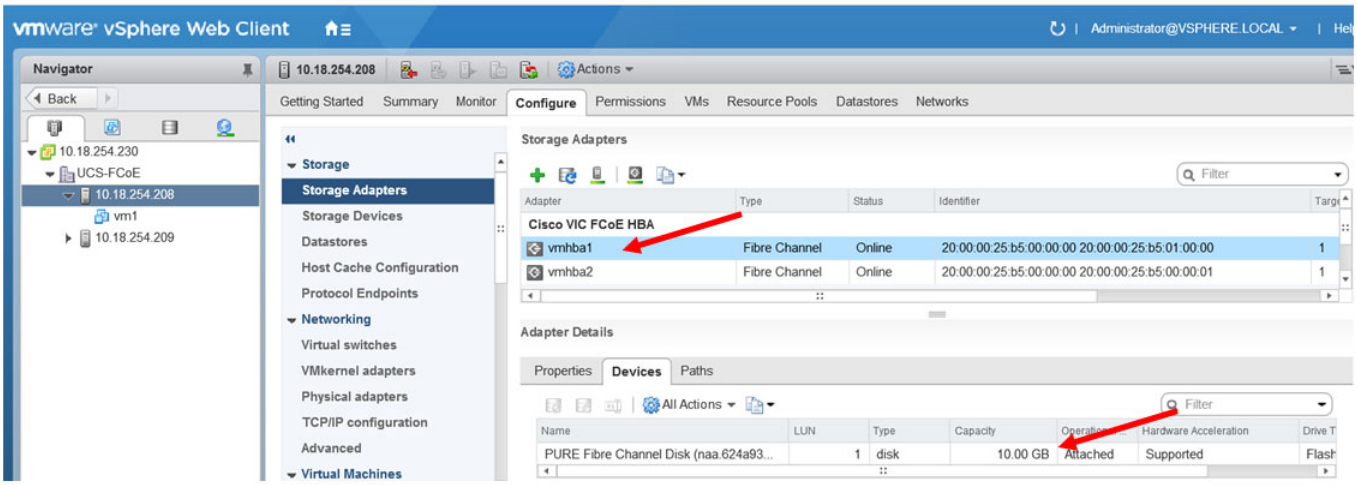
NOTE: In this section, we highlight only the validation of LUN access and do not go through a step-by-step configuration. If you have a different OS, your configuration will be different.

Using the vSphere Web Client to log in to the vCenter, which manages the ESXi servers.

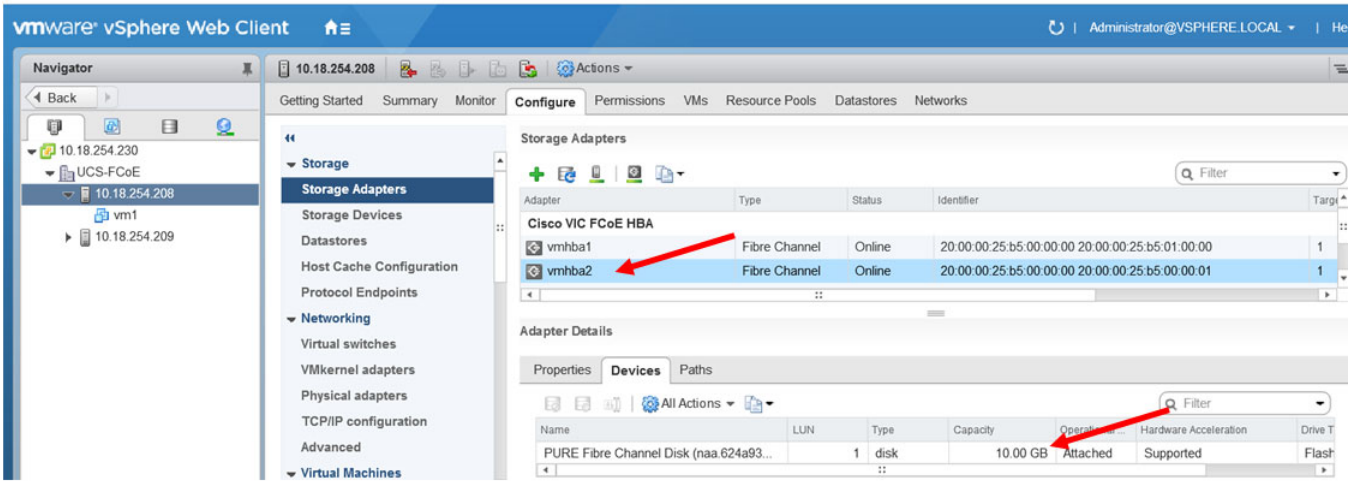


Once you log in to the vCenter, check that the newly added LUNs show up on each vHBA path.

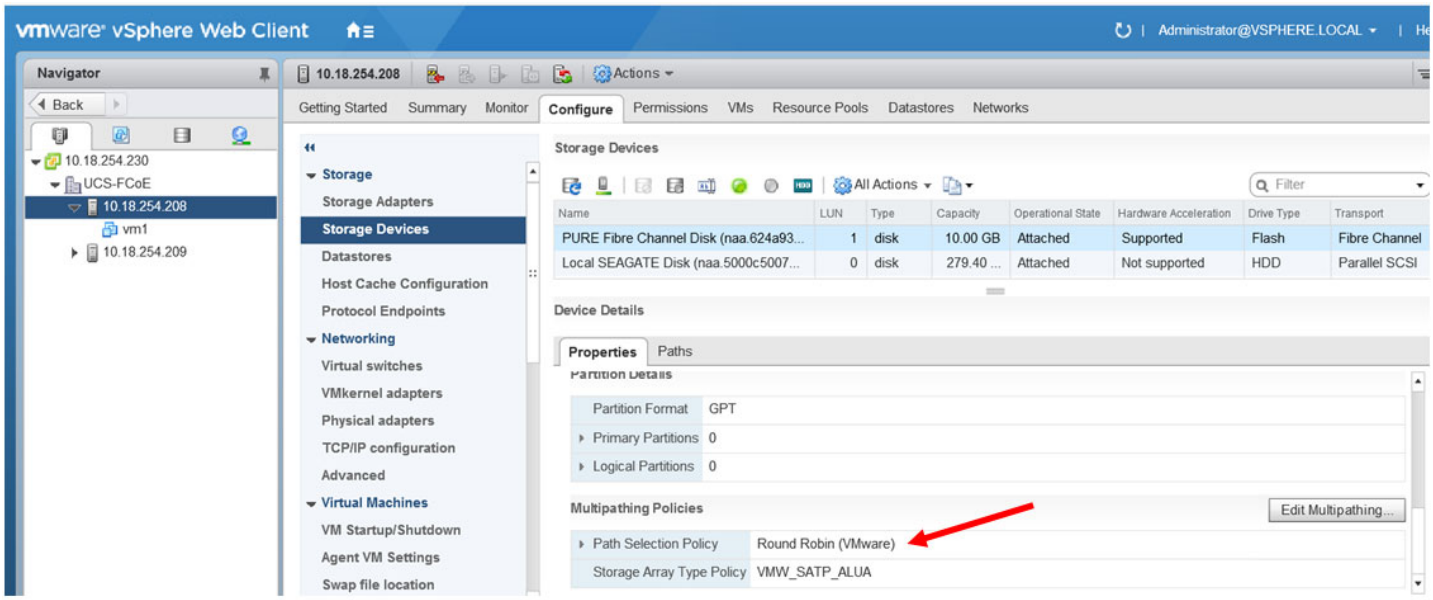
Below, a 10-GB LUN shows under vmhba1.



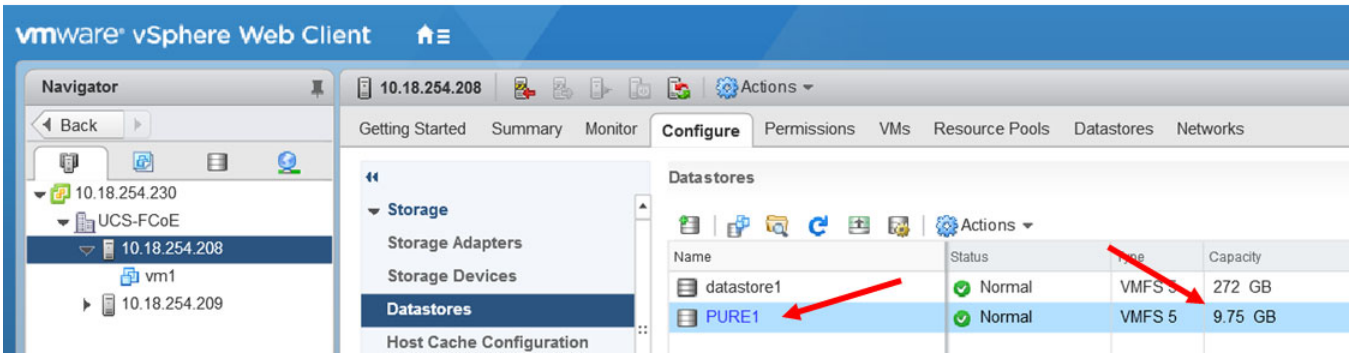
And the same 10-GB LUN also shows on the other path, vmhba2.



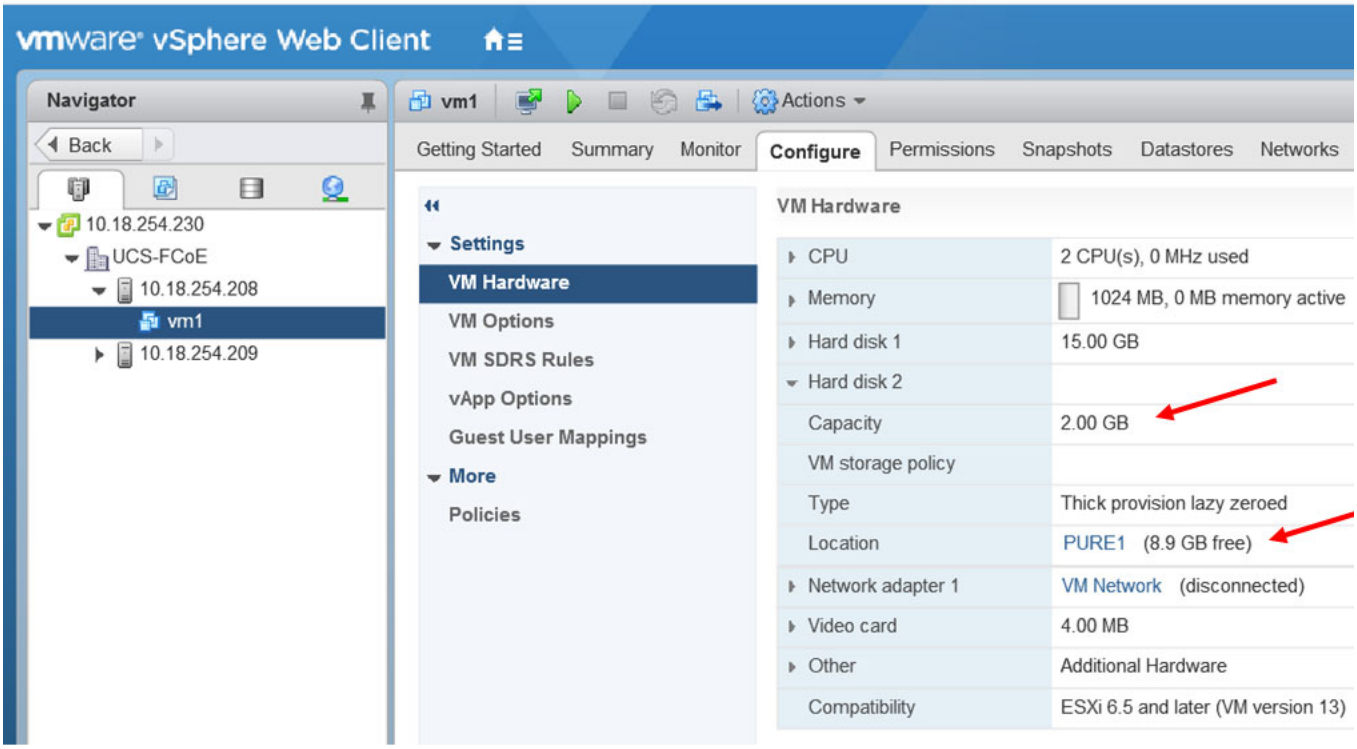
Set **Patch Selection Policy = Round Robin (VMware)** on the new LUN.



Now create a data store on the new LUN.



Configure a 2-GB LUN from this data store to a VM.



In this environment, we have deployed an Ubuntu VM. Log in to the VM, and issue the following command to check that the new 2-GB disk shows up.

```
root@ubuntu238:~# lsblk
NAME   MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
sda      8:0    0  15G  0 disk
â””â”€sda1   8:1    0  15G  0 part /
sdb      8:16   0   2G  0 disk
```

2.10 Validate the Port Channel — Task 8

In order to validate the load balancing and redundancy of the port channels, we run continuous storage traffic from the VM that we provisioned.

2.10.1 Start Storage Traffic

In this environment, we have deployed an Ubuntu VM on the ESXi of a Cisco UCS blade server. From this VM, we use Medusa® Labs Test Tool (MLTT) to drive I/O toward the new disk, in this case `/dev/sdb`.

NOTE: Any other storage I/O generating tool can be used instead.

The base test command looks like this.

```
root@ubuntu238:~# maim --perf-mode -t8 -b4k -%r50 -Q16 -f/dev/sdb
...
Creating I/O threads
Target 1: '/dev/sdb' Size: 2GB / 0x80000000 LB Size: 512B Last LBA: 0x3FFFFF
Inquiry: VMware Virtual disk 2.0

Starting I/O threads
START: Fri Mar  2 13:14:34 2018

MAIM v3.6.1 (linux26-x64) 03/02/18 13:14:34: FILE:/dev/sdb
File Size:10MB b:4KB t:8 l:17 Q:16 m:11 Test: Profile

00:00:00:05: FOPS: 66 IO/S: 36740.60   MB/s: 143.52  PEND: 117 CPU: 19
00:00:00:10: FOPS: 143 IO/S: 37898.00   MB/s: 148.04  PEND: 121 CPU: 18
00:00:00:15: FOPS: 216 IO/S: 38146.20   MB/s: 149.01  PEND: 118 CPU: 18
```

2.10.2 Load Balance, Failover/Failback

With I/O running on the VM on the Cisco UCS blade server, validate that traffic is distributed equally between the port channel in both fabrics (Fabric-A and Fabric-B). Also, verify the load balancing between the member links of a port channel.

1. From the Brocade X6 in Fabric-A, we see traffic on both port 9/0 and port 9/4. The running I/O profile is configured with 50% Read/Write, and we see evenly balanced traffic across both ports in both directions (Tx and Rx).

```
FAB-A_X6:FID128:admin> portperfshow 9/0-9/4 -tx -rx
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=============================================================================
slot 9:  20.1m  20.9m   0      0      0      0      0      0     20.3m  19.6m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=============================================================================
slot 9:  20.3m  20.0m   0      0      0      0      0      0     20.7m  20.5m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=============================================================================
slot 9:  20.8m  21.0m   0      0      0      0      0      0     21.1m  20.5m
```

On the Brocade X6 in Fabric-B, we also see the same amount of I/O throughput running on ports 9/0 and 9/4.

```
FAB-B_X6:FID128:admin> portperfshow 9/0-9/4 -tx -rx
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:  20.1m  20.4m  0      0      0      0      0      0     21.3m  20.2m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:  21.1m  20.6m  0      0      0      0      0      0     20.6m  21.2m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:  19.3m  20.2m  0      0      0      0      0      0     21.0m  20.5m
```

2. Verify redundancy of the port channels by failing a link member of the port channel in Fabric-A.

   In this case, port 9/0 in X6 Fabric-A is disabled; consequently, the traffic fails over to port 9/4, now carrying a double load (output truncated). The time it takes to fail over is dependent on the SCSI timeout setting in the host OS or FC driver.

```
FAB-A_X6:FID128:admin> portdisable 9/0; portperfshow 9/0-9/4 -tx -rx
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0     20.5m  21.0m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0     20.6m  21.0m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0    170.5k 196.2k
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0    200    100

...
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0    800    600
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0     26.5m  25.3m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
==========================================================================================
slot 9:   0      0      0      0      0      0      0      0     41.9m  43.0m
```

3. By re-enabling port 9/0 in Fabric-A, observe that the traffic falls back, load-balanced on both member links of the port channel (output truncated).

```
FAB-A_X6:FID128:admin> portenable 9/0; portperfshow 9/0-9/4 -tx -rx
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:   0      0     0      0     0      0     0      0     38.8m  38.6m
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:   0      0     0      0     0      0     0      0     40.5m  41.1m
...
==========================================================================
slot 9:   1.0k 500     0      0     0      0     0      0    200      1.4k
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:  13.7k   5.4k  0      0     0      0     0      0     21.5k   1.1k
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:  22.1m  21.6m  0      0     0      0     0      0     21.7m  21.3m
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:  19.7m  19.8m  0      0     0      0     0      0     19.8m  19.8m
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:  20.8m  20.9m  0      0     0      0     0      0     21.0m  20.7m
```

4. To validate redundancy across fabrics, fail both member links in the port channel in Fabric-A, and observe that the traffic fails over to Fabric-B (output truncated).

```
FAB-A_X6:FID128:admin> portdisable 9/0; portdisable 9/4

FAB-B_X6:FID128:admin> portperfshow 9/0-9/4 -tx –rx
...
==========================================================================
slot 9: 100    100     0      0     0      0     0      0    100    100
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:   4.6m   4.6m  0      0     0      0     0      0     4.2m   4.4m
          0            1            2            3            4
          TX     RX    TX     RX    TX     RX    TX     RX    TX     RX
==========================================================================
slot 9:  38.8m  37.2m  0      0     0      0     0      0     38.3m  38.8m
```

5. Re-enabling the links in Fabric-A redistributes traffic equally across both fabrics once the ports are back online. Shown below is Fabric-A after the links in the port channel are back online and traffic resumes on the port channel.

```
FAB-A_X6:FID128:admin> portenable 9/0; portenable 9/4
FAB-A_X6:FID128:admin> portperfshow 9/0-9/4 -tx -rx
...
=========================================================================================
slot 9: 100    100      0      0      0      0      0      0    100    100
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9: 100    100      0      0      0      0      0      0    100    100
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:   8.2m   8.1m   0      0      0      0      0      0      8.3m   7.9m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  20.1m  20.1m   0      0      0      0      0      0     20.7m  20.2m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  22.0m  21.8m   0      0      0      0      0      0     20.8m  21.0m
```

And the traffic in Fabric-B will return to normal as before. As you can see below, the traffic in Fabric-B was reduced by half after the port channel in Fabric-A resumed operation.

```
FAB-B_X6:FID128:admin> portperfshow 9/0-9/4 -tx -rx
...
=========================================================================================
slot 9:  40.1m  40.2m   0      0      0      0      0      0     40.7m  39.8m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  41.0m  40.9m   0      0      0      0      0      0     39.5m  39.2m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  26.6m  26.3m   0      0      0      0      0      0     26.6m  25.7m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  20.5m  20.3m   0      0      0      0      0      0     20.8m  20.1m
          0             1             2             3             4
          TX     RX     TX     RX     TX     RX     TX     RX     TX     RX
=========================================================================================
slot 9:  20.9m  20.5m   0      0      0      0      0      0     20.8m  20.6m
```

Chapter 3: Conclusion

With the Brocade FC32-64 blade in the X6 director, users have the option to connect UCS FI uplinks with native Fibre Channel in NIPV mode or the Fibre Channel over Ethernet (FCoE) protocol.

With this best practice guide for deploying FCoE uplinks from the Cisco UCS to the Brocade SAN with the Brocade X6 (FC32-64 blade), the user is guided through configuration of FCoE uplinks with link aggregation (port channels), providing redundancy and load sharing of storage traffic. The steps outlined in the validation section demonstrate redundant FCoE port channels to dual FC fabrics and how to validate the configuration before entering production.

Revision History

X6-FCoE-UG100; April 10, 2018

Initial release.