Oracle® SDN User's Guide

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Oracle SDN User's Guide

Part No: E50732-05

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Using This Documentation

- **Overview** – Provides conceptual information about Oracle SDN and describes how to configure it for use with the Oracle InfiniBand IS2-46, Oracle InfiniBand Switch IS2-254, or Oracle Fabric Interconnect F2-12 Virtualized I/O system and servers running standard, industry-accepted OSes.
- **Audience** – Experienced network and server administrators and Oracle-approved personnel.
- **Required knowledge** – Advanced experience with configuring and maintaining standard networks, software-defined networks, and host servers.

This documentation uses the terms *leaf switch*, *spine switch*, and *virtualization switch* to refer to the Oracle InfiniBand Switch IS2-46, Oracle InfiniBand Switch IS2-254, or Oracle Fabric Interconnect F2-12 Virtualized I/O System, respectively.

Product Documentation Library

Documentation and resources for this product and related products are available at http://docs.oracle.com/cd/E48586_01/.

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Understanding Oracle SDN

These topic provide information about Oracle's software-defined networking (SDN) product and important concepts, as well as a high-level overview of configuring Oracle SDN in your environment.

- "Oracle SDN Overview" on page 11
- "PVI Modes Overview" on page 12
- "Public Cloud Overview" on page 13
- "Oracle SDN Configuration Task Overview" on page 14

Related Information

- "Preparing for Installation" on page 17
- "Creating a Merged Fabric" on page 21
- "Configuring Oracle SDN (Oracle Fabric Manager)" on page 37
- "Configuring Oracle SDN (CLI)" on page 57
- "Verifying Oracle SDN Configuration" on page 69

Oracle SDN Overview

Oracle SDN is a virtual interconnection between servers that speeds up migrating data between servers in the Oracle SDN environment. Servers are connected into one or more Oracle SDN environments through the use of a *private virtual interconnect* (PVI).

The PVI acts as a virtual network that is overlaid on the IB fabric. When you create a PVI , you can assign one or more VNICs to it. The servers connect to the PVI through those VNICs. When the servers are interconnected, the majority of the traffic is processed by the Oracle SDN components of the host drivers installed on the server, instead of that processing occurring on a GbE I/O module.

Oracle SDN supports lateral traffic (also known as "east-west" traffic) for applications such as vMotion traffic for QDR fabrics. However, for EDR fabrics, Oracle SDN also supports vertical traffic (also known as "north-south" traffic), for example, forwarding traffic off of (or on to) the EDR fabric through a gateway.

Additionally, Oracle SDN benefits traffic between servers or VMs, in the following ways:

- **Isolated connectivity for server-to-server traffic.**

  Each PVI in the Oracle SDN provides traffic isolation and security similar to a VLAN. Because VNICs are explicitly assigned to PVI(s), only the servers with those VNICs can communicate on the PVI. Servers that are not on the PVI cannot communicate with servers that are on PVI. In addition, each PVI can support a VLAN configured on top of it, and because the PVI does not consume a VLAN ID, the full range of VLANs is available in your network.
- **Flexibility and agility for servers and VMs.**

  Servers or virtual machines are added to and deleted from the Oracle SDN through software commands, so deployment and topology change is accomplished quickly. No cabling or changes to the physical network are required.
- **Scalability and performance for server-to-server traffic.**

  Each Oracle SDN environment can support server-to-server traffic at either QDR or EDR speeds assuming corresponding equipment for each data rate. Each Oracle SDN environment can scale out to 64,000 PVIs.
- **Redundancy and resilience for servers and VMs.**
  - Server connection failures are avoided because traffic is automatically failed over to a separate data path. Because paths are isolated, no path has the ability to impact the other's functionality.
  - Link failures within the Oracle SDN environment are avoided because traffic is re-routed over the remaining links with no interruption.
  - Forwarding tables are stored at redundant locations in the Oracle SDN environment and kept in sync, ensuring resilience.

Related Information

- "PVI Modes Overview" on page 12
- "Public Cloud Overview" on page 13
- "Oracle SDN Configuration Task Overview" on page 14

PVI Modes Overview

Oracle SDN operates in one of two modes, depending on the fabric type in use:

- For QDR fabrics supplied by the switch's fabric board, PVIs operate in *reliable connection* (RC) mode. This mode enables server-to-server communication within the QDR fabric. Communication occurs only within IB-connected servers on a virtual network that is an overlay (a PVI) on the IB fabric. RC-mode communication enables east-west traffic on the

fabric, and this mode has different IB MTU sizes than UD mode. For more information, see “Supported MTU Sizes” on page 39.

- For EDR fabrics supplied by the switch's fabric board, PVIs operate in *unreliable datagram* (UD) mode. This mode enables server-to-server communication from the fabric through a PVI to other parts of the network. In addition to east-west traffic, UD-mode communication enables north-south traffic to egress and ingress the fabric through a gateway uplink. This mode has different IB MTU sizes than RC mode. For more information, see “Supported MTU Sizes” on page 39.

Related Information

- “Oracle SDN Overview” on page 11
- “Public Cloud Overview” on page 13
- “Create a Public Cloud (EDR)” on page 42
- “Supported MTU Sizes” on page 39
- “Create a PVI Cloud (QDR)” on page 46

Public Cloud Overview

A public cloud is an association of EDR-capable ports that allow devices on the EDR IB fabric to communicate off of the fabric. To connect devices on the IB fabric to the rest of the network, the public cloud requires a gateway port, which is also called an uplink. With an uplink, traffic can move freely between a company's IB fabric and Ethernet network, including possibly an external gateway to the public internet. You cannot create a public cloud without an uplink. If you do so, you prohibit north-south traffic and enable only east-west traffic, which is effectively a standard PVI cloud.

The process of configuring VNICs for EDR includes connecting to a public cloud, not a PVI cloud. The presence or absence of a gateway port determines whether the traffic remains on the EDR fabric or can move through the Ethernet network too.

Note - Oracle sometimes uses the terms "unified VNIC" or "uVNIC" to describe a VNIC connected to a public cloud in an EDR fabric.

Related Information

- “Oracle SDN Overview” on page 11
- “PVI Modes Overview” on page 12
- “Create a Public Cloud (EDR)” on page 42

- “Supported MTU Sizes” on page 39

Oracle SDN Configuration Task Overview

Configuring Oracle SDN consists of the following main steps. This table lists only high-level steps. It does not include all prerequisites or complete information for each step.

Step	Task	Links
1.	Review the overall procedure and familiarize yourself with concepts, terminology, and requirements.	“PVI Modes Overview” on page 12 “Public Cloud Overview” on page 13 “Minimum Hardware and Software Requirements” on page 18 “EDR Cables Overview” on page 22
2.	Install or upgrade: ■ XgOS on the Oracle Fabric Interconnect F1 systems. ■ Oracle InfiniBand Switch IS2-46 (leaf switch), Oracle InfiniBand Switch IS2-254 (spine switch), or Oracle Fabric Interconnect F2-12 Virtualized I/O System (virtualization switch).	*XgOS User's Guide* “Upgrading the Software” in *Oracle Fabric Manager 5.0.2 Installation Guide*.
3.	Connect the appropriate switches: ■ For EDR, initially cable together the leaf switch, spine switch, or virtualization switch. ■ For QDR, install the Oracle Fabric Interconnect F1 systems and create a merged fabric.	“Connecting Cables (EDR)” on page 22 “Preparing to Merge an IB Fabric (QDR)” on page 25
4.	Configure Oracle SDN through your preferred interface.	“Configuring Oracle SDN (Oracle Fabric Manager)” on page 37 “Configuring Oracle SDN (CLI)” on page 57
5.	Install the required software for host-drivers and Oracle Fabric Manager (if applicable).	See the appropriate release notes.
6.	Configure either single or HA PVIs for the fabric type through your preferred interface.	For the GUI: “Create a PVI VNIC (EDR) (GUI)” on page 48 “Create an HA PVI VNIC (EDR) (GUI)” on page 51 “Create a PVI VNIC (QDR) (GUI)” on page 49 “Create an HA PVI VNIC (QDR) (GUI)” on page 53 For the CLI:

Step	Task	Links
		"Configuring PVI VNICs (EDR) (CLI)" on page 62 "Configuring PVI VNICs (QDR)" on page 64
7.	(Optional) Perform post-configuration validation.	"Verifying Oracle SDN Configuration" on page 69

Related Information

- "Oracle SDN Overview" on page 11
- "PVI Modes Overview" on page 12
- "Public Cloud Overview" on page 13

Preparing for Installation

These topics describe how to prepare your environment for the installation.

Step	Description	Links
1.	Verify that the switch or Oracle Fabric Interconnect is installed and powered on.	"Prepare for Installation" on page 17
2.	Confirm that your Oracle SDN deployment meets the minimum requirements.	"Minimum Hardware and Software Requirements" on page 18

Related Information

- "Creating a Merged Fabric" on page 21
- "Configuring Oracle SDN (Oracle Fabric Manager)" on page 37
- "Configuring Oracle SDN (CLI)" on page 57

▼ Prepare for Installation

1. **Verify that the leaf switch, spine switch, virtualization switch, or Oracle Fabric Interconnect F1 system is correctly installed, cabled, and powered on.**

   - **For leaf switches, refer to the *Oracle InfiniBand Switch IS2-46 Installation Guide*.**
   - **For spine switches, refer to the *Oracle InfiniBand IS2-254 Installation Manual*.**
   - **For virtualization switches, refer to the *Oracle Fabric Interconnect F2-12 Installation Manual*.**
   - **For Oracle Fabric Interconnect F1 switches, refer to the installation chapter of the *Oracle Fabric Interconnect Hardware and Host Drivers Installation Guide*.**

2. **Confirm that the hardware and software in the Oracle SDN environment meets the minimum requirements.**

See “Minimum Hardware and Software Requirements” on page 18.

Related Information

- “Creating a Merged Fabric” on page 21

Minimum Hardware and Software Requirements

Hardware or Software	Minimum Version
Oracle IB switches	For EDR IB functionality: ■ Oracle InfiniBand Switch IS2-46 as a core or fan-out switch ■ Oracle InfiniBand Switch IS2-254 as a core IB switch ■ Oracle Fabric Interconnect F2-12 Virtualized I/O system as a core or fan-out switch For QDR IB functionality: ■ Oracle Fabric Interconnect F1-15 as a core IB switch ■ Oracle Fabric Interconnect F1-4 as a core IB switch Oracle's Sun Data Center InfiniBand Switch 36 and Sun Network QDR InfiniBand Gateway Switch can be used as fan-out switches for either EDR or QDR fabrics.
Oracle HCAs	For EDR IB functionality, EDR-capable HCAs running supported firmware, for example, Oracle Dual Port EDR InfiniBand Adapter. For QDR IB functionality, QDR-capable HCAs running supported firmware, for example, Oracle Dual Port QDR InfiniBand Adapter M4. To support an HA PVI, a dual-port HCA is required so that each of the two VNICs in the PVI has a unique termination port.
Leaf switch, spine switch, or virtualization switch	For EDR IB functionality, two Oracle EDR IB switches running a supported version of Oracle Fabric OS.
Oracle Fabric Interconnects	For QDR IB functionality, two Oracle Fabric Interconnect F1-15 or F1-4 switches running a supported version of XgOS.
Switch OS	For EDR IB functionality, Oracle Fabric OS 1.0.0. For QDR IB functionality, 3.7.0-XGOS.
Oracle Fabric Manager GUI	For EDR IB functionality, Oracle Fabric Manager 5.0.1. For QDR IB functionality, Oracle Fabric Manager 4.*x*.
Linux host OS	For EDR IB functionality, Oracle Linux 6.7, Oracle Solaris 11.3 SRU9, or Oracle VM 3.4.1 For QDR IB functionality, Red Hat Enterprise Linux 6 update 1 OS with a minimum Oracle Virtual Networking host driver version of 5.0.0-LX.

Hardware or Software	Minimum Version
ESX host OS	For EDR IB functionality, this OS is not supported.
	For QDR IB functionality, VMware ESXi Server 5 update 0 (GA) OS with a minimum Oracle Virtual Networking host driver version of 5.1.0-ESX.
Windows host OS	For EDR IB functionality, this OS is not supported.
	For QDR IB functionality, Microsoft Windows Server 2012 R2 OS with a minimum Oracle Virtual Networking host driver version of 5.2.2-WIN.
Oracle Solaris host OS	For EDR IB functionality, Oracle Solaris 11.3.
	For QDR IB functionality, Oracle Solaris 11.2.

Related Information

- “Prepare for Installation” on page 17
- “Creating a Merged Fabric” on page 21

Creating a Merged Fabric

Oracle SDN is supported in a merged IB fabric. A merged fabric occurs when Oracle Fabric Interconnects are connected so that they both act as one unified system (and IB fabric) instead of two individual systems.

How you create the merged fabric differs depending on type of switch environment you have:

- *New deployment*, which is a new shipment of switches that have not yet been configured in the fabric.
- *Existing stand-alone*, which occurs when one or more existing QDR Oracle Fabric Interconnects are already installed and operating as two independent systems, each with its own IB fabric. In this environment, you need to complete additional steps before and after cabling the switches together.

Typically, these two types of switch environment are mutually exclusive.

Environment	Description	Links
New deployment	1. Install and power on the switches.	Refer to the appropriate installation manual for your switch or Oracle Fabric Interconnect
	2. Connect the cables to create a merged EDR or QDR fabric.	“Connecting Cables (EDR)” on page 22 “Connecting Cables (QDR)” on page 27
Existing stand-alone environment	1. For QDR fabrics, shut down the IB subnet manager and remove the IB LID table.	“Preparing to Merge an IB Fabric (QDR)” on page 25
	2. For QDR fabrics, connect the cables to create a merged QDR fabric.	“Connecting Cables (QDR)” on page 27
	3. For QDR fabrics, restart the IB subnet manager.	“Complete the Merged Fabric (QDR)” on page 35

Related Information

- “Preparing for Installation” on page 17
- “Configuring Oracle SDN (Oracle Fabric Manager)” on page 37

- “Configuring Oracle SDN (CLI)” on page 57
- “Verifying Oracle SDN Configuration” on page 69

Connecting Cables (EDR)

This topics document information about connecting cables for your switch.

- “EDR Cables Overview” on page 22
- “Cable Direct-Attached Servers (EDR)” on page 22
- “Cable Indirect-Attached Servers (EDR)” on page 24

Related Information

- “Preparing to Merge an IB Fabric (QDR)” on page 25
- “Complete the Merged Fabric (QDR)” on page 35
- “Verify the Installed Software” on page 35

EDR Cables Overview

The leaf switch and spine switch support a variety of cable types. As a general rule, each cable has a color-coded plug at each end, and the color coding matches the port labels on the switches' faceplates. When connecting the EDR cables, make sure to match the correct plug color with the correct port color. For more information and special considerations about EDR cables, refer to the installation manual for your switch.

Caution - Using the wrong cable can damage the port or the cable's ferrule and render the cable unusable.

Related Information

- “Connecting Cables (EDR)” on page 22
- “Verify the Installed Software” on page 35

▼ Cable Direct-Attached Servers (EDR)

Use this procedure if your host servers will be directly attached to leaf switches. It is a best practice to always connect to redundant leaf switches to ensure HA.

This procedure assumes you will use the 12x IB ports as the Inter-Switch Links (ISLs). You can use 4x IB ports for ISLs, but as your fabric grows, be aware that you might saturate the 4x ISLs and might need to recable the ISLs to the 12x ports to enable higher throughput.

1. **Verify the cable types, plugs, and color codes with the ports and color codes on the switch.**

   If there is mismatch, determine the correct type of cable and port before proceeding. See "EDR Cables Overview" on page 22.

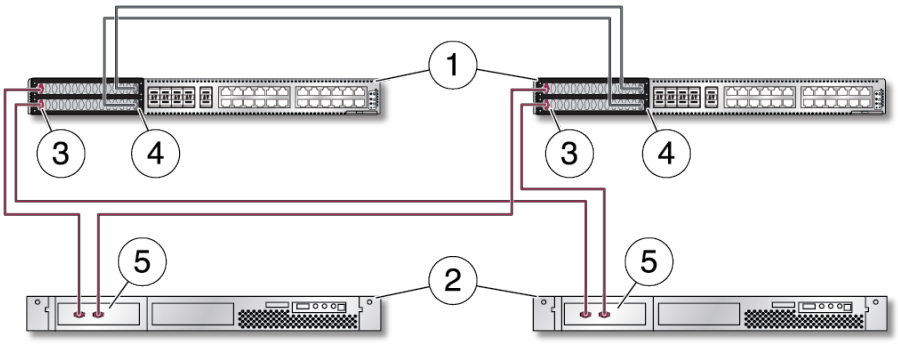
2. **Connect one IB cable from one 12x port on one switch to a 12x port on the other switch.**

3. **Connect a second IB cable from one 12x port on one switch to a 12x port on the other switch.**

   The switches should now have redundant cross-connections to each other. Each of these connections should be on the 12x ports.

4. **When the switches are correctly connected, attach the hosts to the remaining 4x ports on each switch as needed.**

   At the completion of this task, the switches are connected as shown.



No.	Description
1	Leaf switches. Can also be spine switches.
2	Host servers with EDR-capable HCAs. Hosts must be running a supported OS.
3	4x EDR ports on the switches, which provide connections to the host servers.
4	12x EDR ports on the switches, which provide connections between the switches as ISLs.
5	4x EDR ports on the host's EDR HCA, which provide connections to the switches.

Related Information

- “Cable Indirect-Attached Servers (EDR)” on page 24

▼ Cable Indirect-Attached Servers (EDR)

Use this procedure if your host servers will be indirectly attached through an intervening layer of leaf switches. This configuration is also called an IB "fan out" in which hosts are connected to a pair of leaf switches, which are in turn connected to spine switches. It is a best practice to always connect to redundant switches to ensure HA.

This procedure assumes you will use the 12x IB ports as the Inter-Switch Links (ISLs). You can use 4x IB ports for ISLs, but as your fabric grows, be aware that you might saturate the 4x ISLs and might need to recable the ISLs to the 12x ports to enable higher throughput.

1. **Verify the cable types, plugs, and color codes with the ports and color codes on the switch.**

   If there is a mismatch, determine the correct type of cable and port before proceeding. See “EDR Cables Overview” on page 22.

2. **Connect one IB cable from one 12x port on one leaf switch to a 12x port on the first spine switch.**

3. **Connect one IB cable from one 12x port on leaf switch to a 12x port on the second spine switch.**

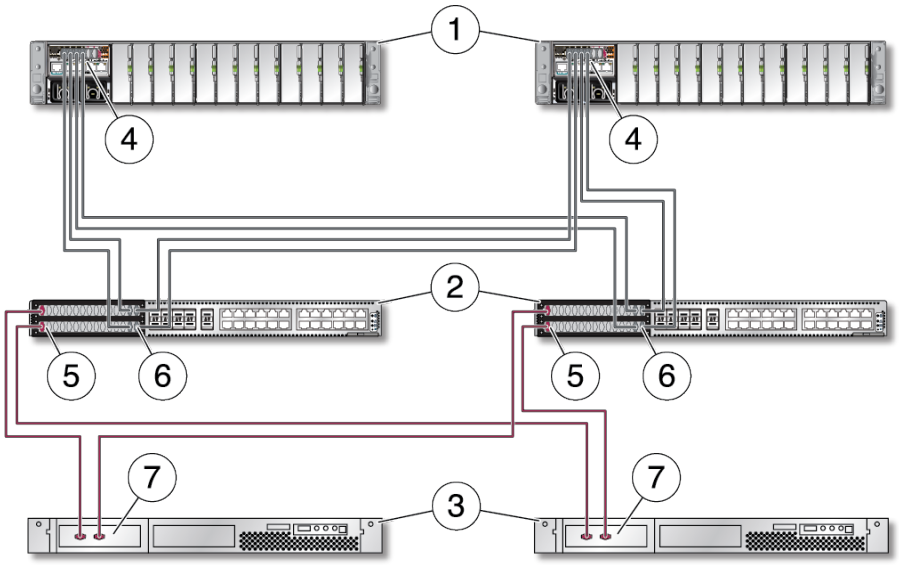
4. **Connect one IB cable from one 12x port on the other leaf switch to a 12x port on the first spine switch.**

5. **Connect one IB cable from one 12x port on the other leaf switch to an 12x IB port on the spine switch.**

   At this point of the procedure, the leaf switches should have redundant cross-connections to each of the spine switches. Each of these connections should be on the 12x ports.

6. **Attach the hosts to the remaining 4x ports on each leaf switch as needed.**

At the completion of this task, the switches are connected as shown.



No.	Description
1	Spine switches.
2	Leaf switches.
3	Host servers with EDR-capable HCAs. Hosts must be running a supported OS.
4	12x EDR ports on the spine switches, which provide connections to the leaf switches.
5	4x EDR ports on the leaf switches, which provide connections to the hosts.
6	12x EDR ports on the leaf switches, which provide connections to the spine switches.
7	4x EDR ports on the host's EDR HCA, which provide connections to the switches.

Related Information

- “Cable Direct-Attached Servers (EDR)” on page 22

Preparing to Merge an IB Fabric (QDR)

These tasks are applicable to QDR Oracle Fabric Interconnects.

- “Shut Down the IB Subnet Manager (QDR)” on page 26

- “Remove the LID Table (QDR)” on page 26

Related Information

- “Connecting Cables (QDR)” on page 27
- “Complete the Merged Fabric (QDR)” on page 35
- “Verify the Installed Software” on page 35

Shut Down the IB Subnet Manager (QDR)

Use this procedure to deactivate the IB subnet manager running on both Oracle Fabric Interconnects.

1. **On each Oracle Fabric Interconnect, log in as admin.**
2. **Shut down the IB subnet manager:**

```
# set system is-subnet-manager false
```

In a few seconds, the subnet manager is completely deactivated.

Related Information

- “Remove the LID Table (QDR)” on page 26
- “Cable Direct-Attached Rack Servers (QDR)” on page 27
- “Cable Indirect-Attached Rack Servers (QDR)” on page 29
- “Cable Direct-Attached Blade Servers (QDR)” on page 31
- “Cable Indirect-Attached Blade Servers (QDR)” on page 33

Remove the LID Table (QDR)

Use this procedure to delete the IB LID table from both Oracle Fabric Interconnects.

1. **On each Oracle Fabric Interconnect, log in as root user and remove the LID table.**

```
# cd /etc/osm
# echo "0" > guid2lid
```

2. **On each Oracle Fabric Interconnect, using `vi`, `emacs`, or any other commonly available file editor, display the LID-to-GUID table to verify that the contents of `/etc/osm` have been removed.**

```
# vi guid2lid
```

Related Information

- “Shut Down the IB Subnet Manager (QDR)” on page 26
- “Cable Direct-Attached Rack Servers (QDR)” on page 27
- “Cable Indirect-Attached Rack Servers (QDR)” on page 29
- “Cable Direct-Attached Blade Servers (QDR)” on page 31
- “Cable Indirect-Attached Blade Servers (QDR)” on page 33

Connecting Cables (QDR)

Caution - Creating a merged fabric requires cabling changes and causes downtime. Perform the fabric merge during a scheduled maintenance window to minimize network downtime. Use redundant connections for high availability. Use multiple connections to support a merged fabric.

When cabling Oracle SDN, you can create either direct connections (which occur when IB cables connect from the server or blade server to the Oracle Fabric Interconnect), indirect connections (which occur when IB cables connect from the server to an IB switch, and the IB switch connects to the Oracle Fabric Interconnect), or a mixture of both.

Choose the appropriate connection type for your needs:

- “Cable Direct-Attached Rack Servers (QDR)” on page 27
- “Cable Indirect-Attached Rack Servers (QDR)” on page 29
- “Cable Direct-Attached Blade Servers (QDR)” on page 31
- “Cable Indirect-Attached Blade Servers (QDR)” on page 33

Related Information

- “Preparing to Merge an IB Fabric (QDR)” on page 25
- “Complete the Merged Fabric (QDR)” on page 35
- “Verify the Installed Software” on page 35

▼ Cable Direct-Attached Rack Servers (QDR)

In a single-server, direct-attach environment, the Oracle Fabric Interconnects share an IB fabric by being connected directly. At least two connections are required for redundancy, but more than two connections can be used for additional redundancy.

However, using more cables reduces the number of available ports, which reduces the total number of servers that can be connected. There is no restriction on which ports on the Oracle Fabric Interconnect connect to which ports on an IB switch.

1. **Make sure that the subnet manager is shut down and the LID table is removed.**

   See "Preparing to Merge an IB Fabric (QDR)" on page 25.

2. **Connect a QDR IB cable from one port on the first Oracle Fabric Interconnect (1) to an IB port on the second Oracle Fabric Interconnect (2).**

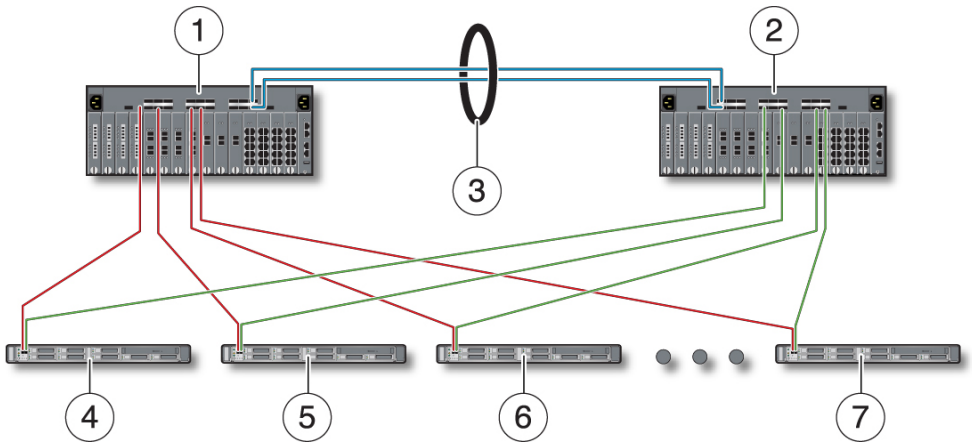
3. **Repeat step 2 to create an HA connection between the Oracle Fabric Interconnects.**

   These connections provide the merged IB fabric that the two Oracle Fabric Interconnects share. All other IB ports on each Oracle Fabric Interconnect can be used to provide connections to host servers in the fabric.

4. **On each host server, connect a QDR IB cable from one server HCA port to an IB port on the first Oracle Fabric Interconnect (1).**

5. **On each host server, connect a QDR IB cable from one server HCA port to an IB port on the second Oracle Fabric Interconnect (2).**

   At the completion of this step, the Oracle Fabric Interconnects and servers are connected as shown.



No.	Description
1, 2	Oracle Fabric Interconnect F1-15s (or F1-4s) directly connected.

No.	Description
3	QDR speed connections (interswitch links, ISLs) connect the switches together.
4, 5, 6, 7	Host servers with QDR-capable HCAs directly connected to each switch over QDR links.

6. **Complete merging the fabric.**

   See “Complete the Merged Fabric (QDR)” on page 35.

Related Information

- “Shut Down the IB Subnet Manager (QDR)” on page 26
- “Remove the LID Table (QDR)” on page 26
- “Cable Direct-Attached Blade Servers (QDR)” on page 31

▼ Cable Indirect-Attached Rack Servers (QDR)

To create a merged IB fabric for rack servers through indirect connections, connect one or more ports on each Oracle Fabric Interconnect to one or more ports on intervening IB switches.

When connected correctly, the Oracle Fabric Interconnects are meshed through the connections to the IB switches. The IB switches then enable the network to “fan out” to support the hosts.

To create a merged fabric of rack servers through indirect connections, follow this procedure:

1. **Make sure that the subnet manager is shut down and the LID table is removed.**

   See “Preparing to Merge an IB Fabric (QDR)” on page 25.

2. **Connect a QDR IB cable from one port on the first Oracle Fabric Interconnect (1) to an IB port on the first IB switch.**

3. **Connect a QDR IB cable from one port on the first Oracle Fabric Interconnect (1) to an IB port on the second IB switch.**

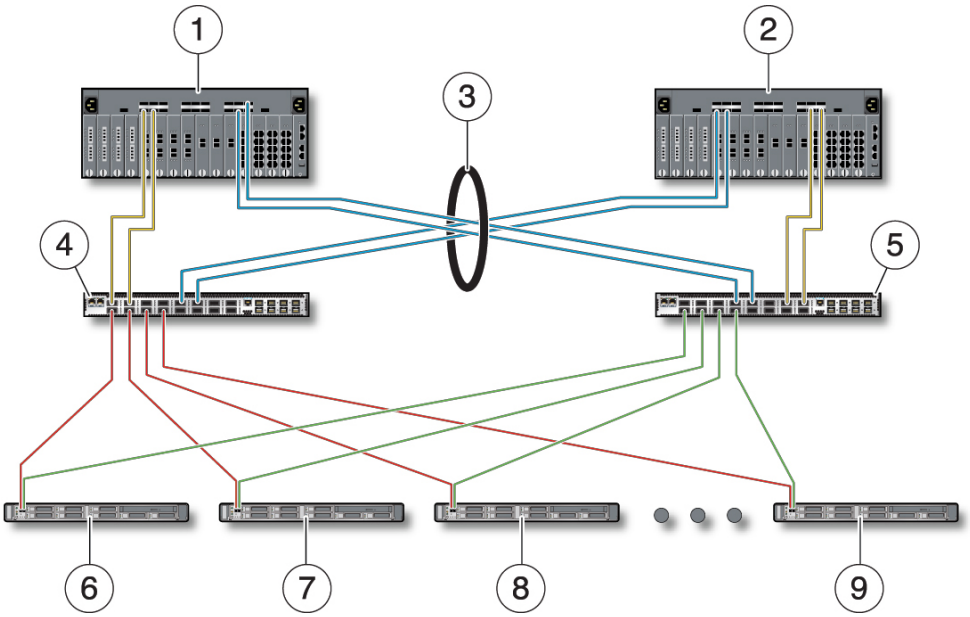
4. **Connect a QDR IB cable from one port on the second Oracle Fabric Interconnect (2) to an IB port on the first IB switch.**

5. **Connect a QDR IB cable from one port on the second Oracle Fabric Interconnect (2) to an IB port on the second IB switch.**

6. **On each host server, connect a QDR IB cable from one server HCA port to an IB port on the first IB switch.**

7. **On each host server, connect a QDR IB cable from one server HCA port to an IB port on the second IB switch.**

At the completion of this step, the Oracle Fabric Interconnects and servers are connected as shown.



No.	Description
1, 2	Oracle Fabric Interconnect F1-15s (or F1-4s) indirectly connected through intermediary QDR IB switches.
3	QDR speed connections (interswitch links, ISLs) connect the Oracle Fabric Interconnects together through the IB switches.
4, 5	Intermediary QDR speed IB switches provide IB fan out, and connect host servers to the IB fabric.
6, 7 8, 9	Host servers with QDR-capable HCAs directly connected to the intermediary IB switches over QDR links.

8. **Complete merging the fabric.**

   See “Complete the Merged Fabric (QDR)” on page 35.

Related Information

- “Shut Down the IB Subnet Manager (QDR)” on page 26
- “Remove the LID Table (QDR)” on page 26
- “Cable Indirect-Attached Blade Servers (QDR)” on page 33

Cable Direct-Attached Blade Servers (QDR)

In a blade server configuration, you can direct-connect each Oracle Fabric Interconnect through one or more links to each controller in each of the blade servers.

You can connect two cables to each blade-server controller. However, using two cables reduces the number of available ports, which reduces the total number of blade servers that can be connected. There is no restriction on which ports on the Oracle Fabric Interconnect connect to which ports on the controller.

Each Oracle Fabric Interconnect has a connection to each blade server controller, and the Oracle Fabric Interconnects are connected in a merged fabric through those blade servers.

1. **Make sure the subnet manager is shut down and the LID table is removed.**

   See "Preparing to Merge an IB Fabric (QDR)" on page 25.

2. **Connect one or more QDR ports on the first Oracle Fabric Interconnect (1) to a blade server controller.**

   You will need one IB connection to each Oracle Fabric Interconnect for each controller.

3. **Connect one or more QDR ports on the second Oracle Fabric Interconnect (2) to the same blade server controller.**

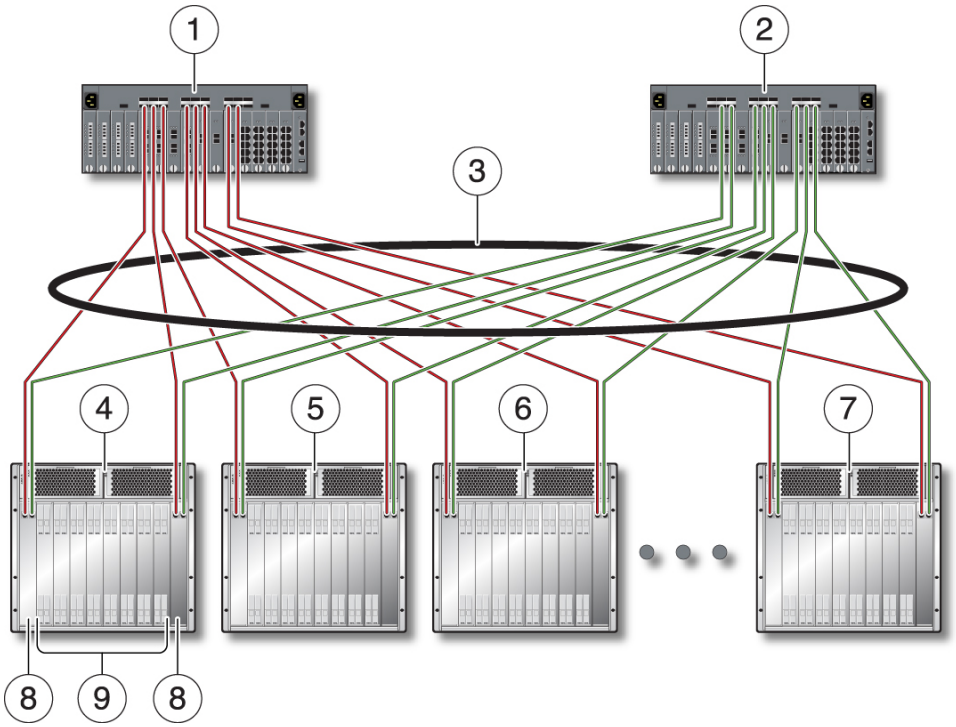
   At the completion of this step, each Oracle Fabric Interconnect is connected to the same blade server through one of the controllers. The cross-connection between the IB switches creates the merged fabric.

4. **Connect one or more of the QDR ports on the first Oracle Fabric Interconnect (1) to the second blade server controller.**

5. **Connect one or more of the QDR ports on the first Oracle Fabric Interconnect (2) to the second blade server controller.**

6. **Repeat this procedure as needed to connect Oracle Fabric Interconnects to each blade-server controller.**

At the completion of this step, each Oracle Fabric Interconnect has one or more connections to each controller in each blade server as shown in the following figure.



No.	Description
1, 2	Oracle Fabric Interconnect F1-15s (or F1-4s).
3	QDR speed connections indirectly connect the Oracle Fabric Interconnects together through each blade-server controllers.
4, 5, 6, 7	QDR speed blade servers.
8	Blade-server controllers connect to Oracle Fabric Interconnects to provide QDR links to individual blades (host servers).
9	Individual blades (host servers) that are internally connected to the blade-server controllers.

When the Oracle Fabric Interconnects are correctly connected, at least two connections exist between the Oracle Fabric Interconnects. These connections provide the merged IB fabric that the two Oracle Fabric Interconnects share. All other IB ports on each Oracle Fabric Interconnect can be used to provide connections to host servers in the fabric.

7. **Complete merging the fabric.**

See “Complete the Merged Fabric (QDR)” on page 35.

Related Information

- “Shut Down the IB Subnet Manager (QDR)” on page 26
- “Remove the LID Table (QDR)” on page 26
- “Cable Direct-Attached Rack Servers (QDR)” on page 27

▼ Cable Indirect-Attached Blade Servers (QDR)

In this configuration, each of the Oracle Fabric Interconnects are connected through redundant links to each IB switch. Additionally, each blade-server controller has two connections to each IB switch, and indirectly, to each Oracle Fabric Interconnect.

You can connect two cables to each blade-server controller. However, using two cables reduces the number of available ports, which reduces the total number of servers that can be connected. There is no restriction as to which ports on the Oracle Fabric Interconnect connect to which ports on the controller.

1. **Make sure that the subnet manager is shut down and the LID table is removed.**

   See “Preparing to Merge an IB Fabric (QDR)” on page 25.

2. **Connect ports on the first Oracle Fabric Interconnect (Laverne) to the second IB switch.**

   You will need one IB connection to the IB switch for each blade server.

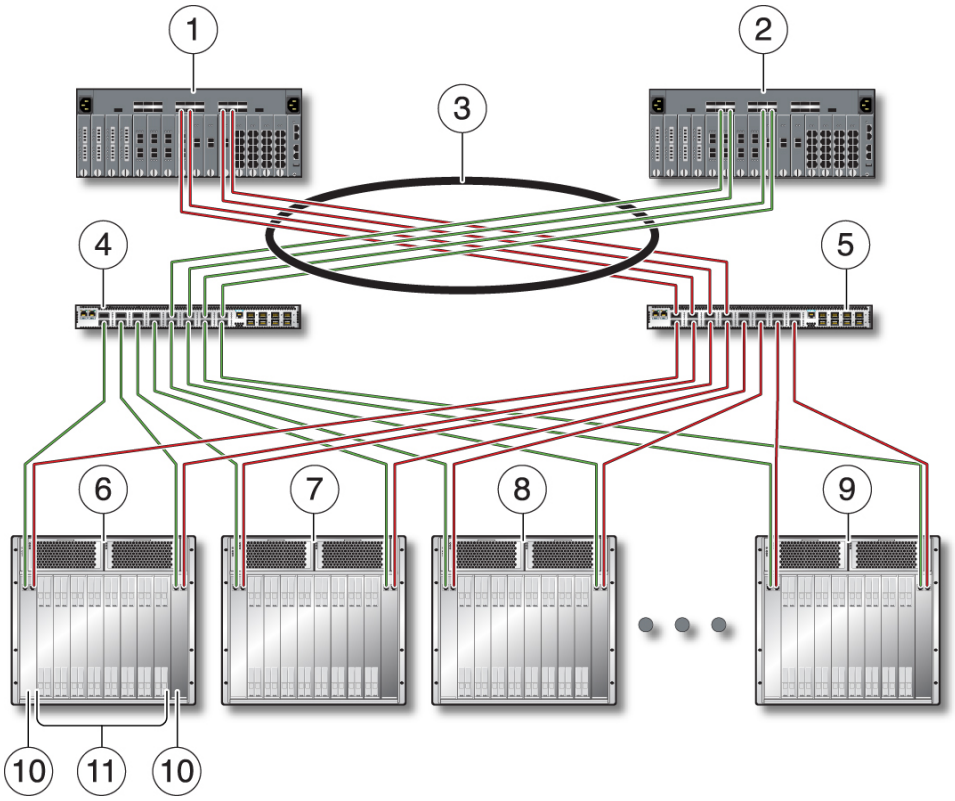
3. **Connect ports on the second Oracle Fabric Interconnect (Shirley) to the first IB switch.**

   At the completion of this step, each Oracle Fabric Interconnect is connected to the IB fabric through one of the two IB switches. The cross-connection between the IB switches creates the merged fabric.

4. **Connect one or more of the ports on the second IB switch to one or more of the ports on blade-server controller “A” in each blade server enclosure.**

5. **Connect one or more of the ports on the first IB switch to one or more of the ports on blade-server controller “B.”**

At the completion of this step, the Oracle Fabric Interconnects and hosts has one or two connections to each controller in each blade server.



No.	Description
1, 2	Oracle Fabric Interconnect F1-15s (or F1-4s).
3	QDR speed connections indirectly connect the Oracle Fabric Interconnects together through the intermediary IB switches.
4, 5	Intermediary QDR speed IB switches provide IB fan out, and connect blade servers to the IB fabric.
6, 7, 8, 9	QDR speed blade servers.
10	Blade-server controllers connect to Oracle Fabric Interconnects to provide QDR links to individual blades (host servers).
11	Individual blades (host servers) that are internally connected to the blade-server controllers.

Each Oracle Fabric Interconnect has a connection to each blade server through each of the IB switches, and the Oracle Fabric Interconnects are connected in a merged fabric at the IB-switch

level. You can use the remaining ports on the IB switches to connect to hosts, and the remaining ports on the Oracle Fabric Interconnects to connect to either IB switches or direct-connected hosts.

6. **Complete merging the fabric.**

   See “Complete the Merged Fabric (QDR)” on page 35.

Related Information

- “Shut Down the IB Subnet Manager (QDR)” on page 26
- “Remove the LID Table (QDR)” on page 26
- “Cable Indirect-Attached Rack Servers (QDR)” on page 29

▼ Complete the Merged Fabric (QDR)

1. **Log out of the Oracle Fabric Interconnect as root.**
2. **Log back in to the Oracle Fabric Interconnect as admin.**
3. **Restart the IB subnet manager.**

```
# set system is-subnet-manager true
```

Related Information

- “Preparing to Merge an IB Fabric (QDR)” on page 25
- “Connecting Cables (QDR)” on page 27
- “Verify the Installed Software” on page 35

▼ Verify the Installed Software

- **Make sure that the software you installed or upgraded meets the requirements.**

Interface or OS Type	Action
XgOS	Type **`show system version`**.
Oracle Fabric OS	Type **`show system version`**. As an option, you also can type **`show software`** and then scroll to the `Installed OFOS Versions` section of the command output.
Oracle Fabric Manager	Display the About Oracle Fabric Manager dialog.

Interface or OS Type	Action
Linux host OS	Type **`rpm -q orcl-ovn`**. As an option, you can verify that the software is running, by typing: **`chkconfig --list | grep orcl-ovn`**.
ESX host OS	Type **`esxcli software vib list | grep xs`**.
Oracle Solaris OS	Type **`pkg info system/io/infiniband/ovn-virtual-io`**.
Windows host OS	Display the System Properties control panel.

Related Information

- “Connecting Cables (EDR)” on page 22
- “Preparing to Merge an IB Fabric (QDR)” on page 25
- “Connecting Cables (QDR)” on page 27
- “Complete the Merged Fabric (QDR)” on page 35

Configuring Oracle SDN (Oracle Fabric Manager)

These topics explain how to configure Oracle SDN through the Oracle Fabric Manager GUI, which is the preferred interface.

Step	Description	Links
1.	Review information about the configuration procedure.	“Configuration Considerations” on page 38
2.	Complete prerequisites for configuration.	“Preparing for Configuration” on page 40
3.	For EDR devices, determine if public clouds need an uplink, and if so, create them.	“Public Cloud Overview” on page 13 “Controlling Uplinks for Public Clouds (EDR)” on page 43
4.	Add termination for the PVI VNICs.	“Create a Public Cloud (EDR)” on page 42 “Create a PVI Cloud (QDR)” on page 46
5.	Create either a single PVI or an HA PVI Template for servers.	“Create a PVI VNIC (EDR) (GUI)” on page 48 “Create a PVI VNIC (QDR) (GUI)” on page 49 “Create an HA PVI VNIC (EDR) (GUI)” on page 51 “Create an HA PVI VNIC (QDR) (GUI)” on page 53 “Deploy the I/O Template to a Server” on page 51
6.	For HA PVI VNICs, configure host-side HA.	“Set Up PVI VNIC Redundancy on Hosts” on page 55
7.	Finish the Oracle SDN configuration.	“Complete the Oracle SDN Configuration” on page 55

Related Information

- “Configuring Oracle SDN (CLI)” on page 57
- “Verifying Oracle SDN Configuration” on page 69

Configuration Considerations

Be aware of the following considerations for configuring servers in Oracle SDN:

- When configuring single VNICs, be aware that only one VNIC per HCA port per cloud is supported.
- For HA VNICs:
  - The two VNICs will be “bonded” through the host OS or hypervisor, which determines the fault tolerance and failover properties.
  - On Linux hosts, many bonding modes exist for bonded interfaces. However, Oracle SDN supports only `mode=1` (active-backup).
  - When configuring HA VNICs, be aware that only one VNIC per HCA port per cloud is supported. Do not attempt to configure both VNICs in the HA VNICs to the same HCA port or cloud.
  - HA PVI VNICs require a dual-port HCA, and one VNIC must be connected to each port of the dual-port HCA.
- To prevent an MTU mismatch, the MTU size for the VNIC, cloud, and host server's interface(s) must be the same.

Related Information

- “Oracle SDN Fabric ID Overview (QDR)” on page 38
- “Supported MTU Sizes” on page 39

Oracle SDN Fabric ID Overview (QDR)

An Oracle SDN environment is one or more of the switches connected at the IB level. You can display one or more Oracle SDN environments, depending on how your hardware is connected:

- If you have pairs of hardware platforms that are not interconnected, you have multiple, separate environments in your data center. As a result, you will see multiple environments listed in the Oracle SDN Summary.
- If you have two pairs of hardware platforms that are interconnected into one shared environment, you will see one environment listed.

For fabrics managed by Oracle Fabric Manager 4.*x* software, Oracle Fabric Manager assigns a specific ID for the environment. The ID is a randomly generated string of integers that always creates a unique ID, even if the current deployment will not be supporting Oracle SDN. As an option, you can rename the Oracle SDN fabric ID string to something more understandable.

Note - For fabrics managed by Oracle Fabric Manager 5.0.1 software, the Oracle SDN fabric ID does not exist.

Related Information

- “Configuration Considerations” on page 38
- “Create a PVI Cloud (QDR)” on page 46

Supported MTU Sizes

To ensure proper network traffic flow, MTUs must be the same across the clouds and VNICs. However the MTU sizes available can differ depending on the fabric type in which the clouds and VNICs are being created:

- For QDR VNICs, the MTU is set by the PVI cloud, and the PVI VNIC inherits the MTU value when it connects to the PVI cloud. If needed, you can set a different MTU size on the PVI VNIC, but the default interface MTU from the cloud supports correct functionality in QDR fabrics.
- For EDR VNICs, the MTU is controlled by the IB MTU. See the following table for correct sizes.

Type of cloud	Fabric Type	MTU
RC-mode PVI clouds	QDR and EDR	1500 9000 65504 (Default)
UD-mode PVI clouds	EDR	1500 4070 9000 (Jumbo) (default) 9222 **Note -** MTUs above 4070 are supported only on Oracle Dual Port QDR InfiniBand Adapter and Oracle EDR hardware.
UD-mode public clouds	EDR	1500 (default) 4070 9000 (Jumbo) 9194

Related Information

- “Configuration Considerations” on page 38
- “Create a Public Cloud (EDR)” on page 42
- “Controlling Uplinks for Public Clouds (EDR)” on page 43
- “Create a PVI Cloud (QDR)” on page 46
- “Create a PVI VNIC (EDR) (GUI)” on page 48
- “Create a PVI VNIC (QDR) (GUI)” on page 49
- “Create an HA PVI VNIC (EDR) (GUI)” on page 51
- “Create an HA PVI VNIC (QDR) (GUI)” on page 53
- “Set Up PVI VNIC Redundancy on Hosts” on page 55
- “Complete the Oracle SDN Configuration” on page 55

Preparing for Configuration

Before configuring Oracle SDN, complete these prerequisite tasks.

- “Gather Information” on page 40
- “(Optional) Rename the Oracle SDN Fabric (QDR)” on page 41

Related Information

- “Configuration Considerations” on page 38
- “Create a Public Cloud (EDR)” on page 42
- “Complete the Oracle SDN Configuration” on page 55

▼ Gather Information

Use this task to discover device information that will be useful when configuring Oracle SDN.

1. **If you haven't done so already, discover all the Oracle leaf, spine, virtualization switches, and Oracle Fabric Interconnect F1 devices in the fabric.**
   Refer to“Discover Devices” in *Oracle Fabric Manager 5.0.2 Administration Guide*.
2. **For QDR Oracle devices being managed through Oracle Fabric Manager 4.x only:**
   a. **Display the Oracle SDN Summary page.**
   b. **Make a note of the Oracle fabric ID.**

For information about the Oracle fabric ID, see “Oracle SDN Fabric ID Overview (QDR)” on page 38.

3. **For any Oracle device, make a note of which servers you will add to the Oracle SDN environment.**

   In a mixed environment, some servers participate in Oracle SDN and some are using standard I/O. Make a note of the servers that will be running Oracle SDN.

4. **(Optional) Rename the Oracle SDN fabric.**

   See “(Optional) Rename the Oracle SDN Fabric (QDR)” on page 41.

Related Information

- “(Optional) Rename the Oracle SDN Fabric (QDR)” on page 41
- “Create a PVI Cloud (QDR)” on page 46
- “Create a PVI VNIC (QDR) (GUI)” on page 49
- “Create an HA PVI VNIC (QDR) (GUI)” on page 53
- “Complete the Oracle SDN Configuration” on page 55

▼ (Optional) Rename the Oracle SDN Fabric (QDR)

For QDR fabrics, changing the Oracle SDN fabric ID from an integer string to an intuitive name is not required, but it can be helpful. This task is not applicable to EDR fabrics.

1. **On the Oracle SDN Summary page, click the ID of the Oracle SDN fabric you want to rename.**

2. **On the details frame, click the General tab.**

3. **When the Name field is editable, enter the Oracle SDN fabric's new name.**

4. **Click Submit.**

Related Information

- “Oracle SDN Fabric ID Overview (QDR)” on page 38
- “Gather Information” on page 40
- “Create a PVI Cloud (QDR)” on page 46
- “Create a PVI VNIC (QDR) (GUI)” on page 49
- “Create an HA PVI VNIC (QDR) (GUI)” on page 53
- “Complete the Oracle SDN Configuration” on page 55

Create a Public Cloud (EDR)

Use this procedure to create a public cloud as the termination for EDR PVI VNICs.

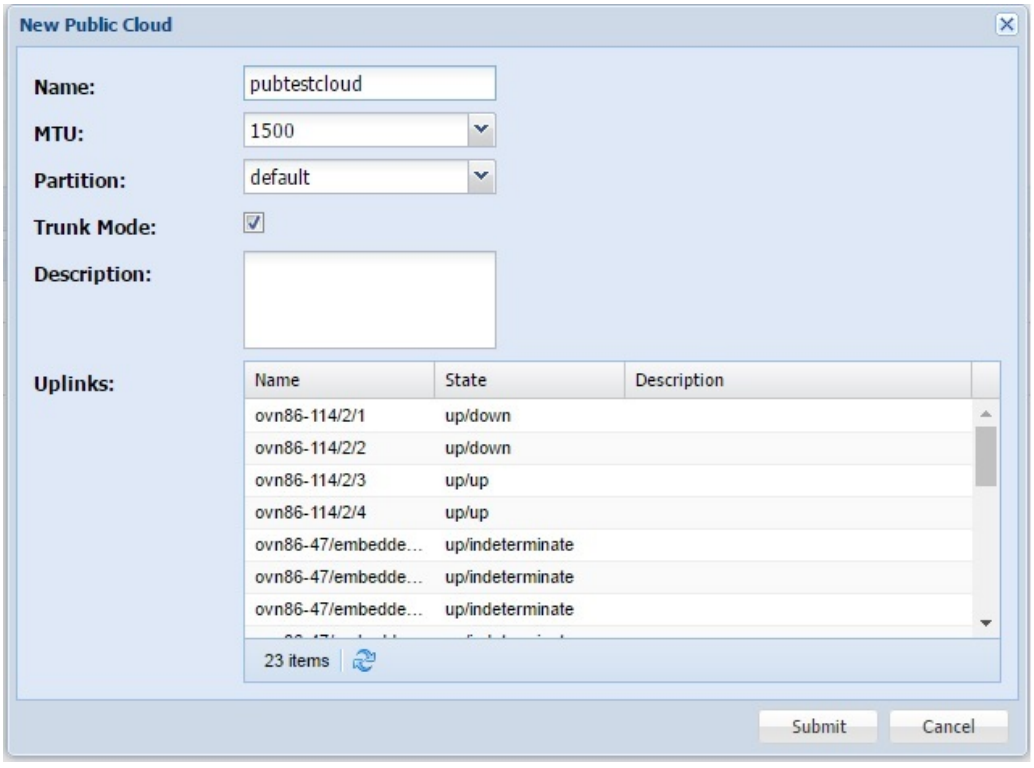
1. **Determine whether the EDR devices need to connect to devices off of the IB fabric.**

   If devices need to connect off of the IB fabric, you will need to create an uplink. See "(Optional) Add an Uplink to a Public Cloud (EDR)" on page 44.

2. **Display the Public Cloud Summary.**

3. **Click the plus sign to add a new public cloud.**

   The New Public Cloud dialog is displayed.



4. **Type a name for the public cloud.**

5. **Select the specific MTU for use on all PVI VNICs that terminate in the cloud.**

See “Supported MTU Sizes” on page 39, then select a value that is congruent with the MTU size in use in your IB network.

6. **If the EDR fabric has specific IB partitions, select the partition for the public cloud. Otherwise, leave the Partition drop-down menu at the default value.**
   For information about IB partitions, refer to “Managing Partitions” in *Oracle Fabric Manager 5.0.2 Administration Guide*.

7. **Select whether the public cloud supports trunk mode of VLANs that are configured on the PVI VNICs associated with the public cloud.**
   For information about trunk mode, refer to “Add or Remove a VLAN Range” in *Oracle Fabric Manager 5.0.2 Administration Guide*.

8. **(Optional) Add a description to the public cloud.**

9. **Select one uplink on each chassis, or a pair of uplinks on each chassis for HA.**

10. **Click Submit.**
    At this point, the public cloud is created, but you will need to create PVI VNICs or HA PVI VNICs for it. See the appropriate task:

    - “Create a PVI VNIC (EDR) (GUI)” on page 48
    - “Create an HA PVI VNIC (EDR) (GUI)” on page 51

Related Information

- “Configuration Considerations” on page 38
- “Controlling Uplinks for Public Clouds (EDR)” on page 43
- “Complete the Oracle SDN Configuration” on page 55

Controlling Uplinks for Public Clouds (EDR)

An uplink enables devices on an EDR fabric to connect to the devices elsewhere, for example, to devices in different parts of a company's network, to the company's Ethernet network, or even to the public internet.

- “(Optional) Add an Uplink to a Public Cloud (EDR)” on page 44
- “Set the Preference of HA Uplinks (EDR)” on page 45

Related Information

- “Configuration Considerations” on page 38
- “Create a Public Cloud (EDR)” on page 42

- "Create a PVI VNIC (EDR) (GUI)" on page 48
- "Deploy the I/O Template to a Server" on page 51
- "Set Up PVI VNIC Redundancy on Hosts" on page 55
- "Complete the Oracle SDN Configuration" on page 55

▼ (Optional) Add an Uplink to a Public Cloud (EDR)

When you create a public cloud, you assign one or more gateway ports. Uplinks are assigned to gateway ports, which are automatically learned and added to the GUI when the switch is managed by Oracle Fabric Manager.

1. **Create a public cloud.**
   See "Create a Public Cloud (EDR)" on page 42.
2. **In the Public Clouds summary, select the cloud that requires the uplink.**
   Information for the cloud is displayed in the details frame.
3. **Select the Uplinks tab.**
4. **Click the plus sign to add an uplink.**
5. **Select one or more uplinks to add.**
6. **For an HA uplink, select another uplink to associate it with the public cloud.**
   When selecting the HA uplinks, make sure that the uplink ports have the same attributes. For example, make sure that both ports operate at the same speed, have the same MTU, and so on.

Note - If PVI VNICs are configured in a range of VLANs, be aware that all PVI VNICs in the VLAN will keep the VLAN mode (`trunk`, which is the default, or `access`) that is set when the VLAN range is configured. After this point, all traffic from the switch port to the PVI VNIC will remain in this mode. As a result, you cannot mix or overlap the other mode VLANs in the VLAN range on the switch. For example, if you create VLAN range 1–100 with trunk mode, PVI VNICs in VLANs in that range remain trunk mode. You could not then create an access-mode PVI VNIC in for VLAN 100. If needed, you can use a host tool, for example `vconfig`, to do some customization of the VLAN behavior for a host.

Related Information

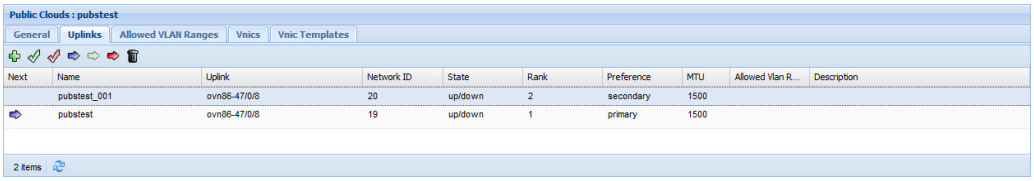
- "Configuration Considerations" on page 38
- "Create a Public Cloud (EDR)" on page 42
- "Controlling Uplinks for Public Clouds (EDR)" on page 43
- "Set the Preference of HA Uplinks (EDR)" on page 45

Set the Preference of HA Uplinks (EDR)

When an HA uplink is configured, it requires a preference that determines which is the active leg of the PVI VNIC, the primary VNIC or the secondary VNIC. During normal operation, the active leg carries traffic, and the secondary leg acts as a hot standby. By default, the first uplink associated with a public cloud becomes the primary, and the second uplink becomes the secondary. This procedure describes how to change the preference of the HA uplink legs.

Note - When you set the new primary uplink, the original primary uplink is not automatically set as the secondary. You must explicitly set the original primary uplink as the secondary.

1. **Display the Public Clouds summary.**
2. **Select the cloud with the uplinks whose priority you want to set.**
3. **Click the Uplinks tab.**
4. **Select the uplink that you want to set as the primary.**



5. **On the toolbar, click the green check mark button to set the selected uplink as the new primary.**

   At this point, you will have two primary uplinks.

6. **Select the original primary uplink.**
7. **Click the red check mark button to change the original primary uplink to the secondary.**

Related Information

- “Configuration Considerations” on page 38
- “Create a Public Cloud (EDR)” on page 42
- “(Optional) Add an Uplink to a Public Cloud (EDR)” on page 44
- “Controlling Uplinks for Public Clouds (EDR)” on page 43

Create a PVI Cloud (QDR)

A PVI cloud is special type of network cloud that provides server-to-server communication between hosts, and between multiple Oracle Fabric Interconnects, in an Oracle SDN environment. PVI clouds are the termination points for PVI VNICs.

1. **On the Oracle SDN Summary page, locate the Oracle Fabric Interconnect(s) that will be used in the Oracle SDN environment.**

2. **Note the Oracle SDN fabric name for those Oracle Fabric Interconnects.**

   You will need to select the Oracle SDN fabric later in this procedure.

3. **Display the PVI Cloud Summary.**

4. **Click the plus sign to add a new PVI cloud.**

5. **On the Add New PVI Cloud dialog, type a name for the PVI cloud.**

6. **Set the PVI MTU to the appropriate value for your network:**

   - 1500
   - 9000 (default)
   - 65504

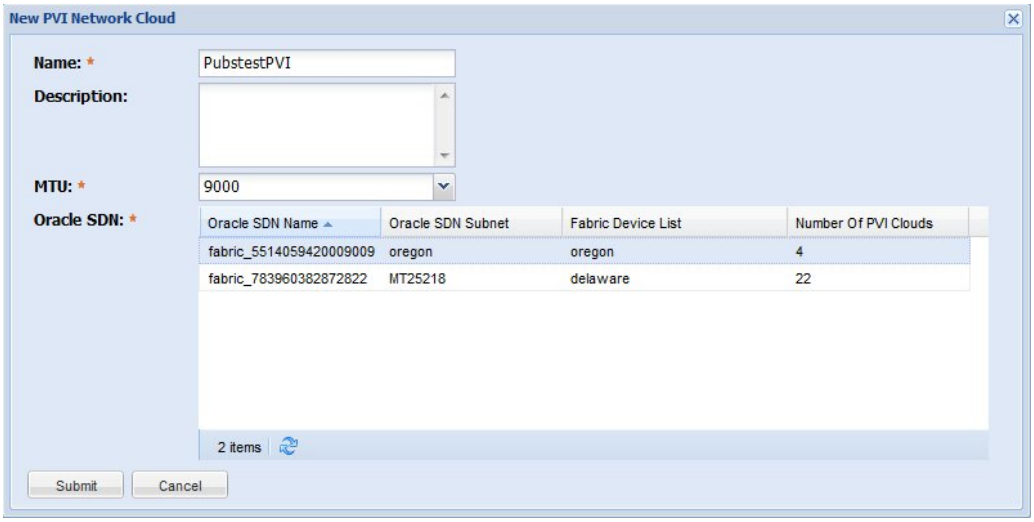
   PVI VNICs that attach to this PVI cloud will inherit this MTU size.

   Note - PVI VNICs will operate at speeds at equal to or less than the PVI cloud's MTU size. For example, a PVI cloud with a 9000 MTU can support a PVI VNICs with an MTU of 9000 or 1500. Be aware of this behavior when you configure the PVI MTU on a host server.

7. **In the Oracle SDN table, select the Oracle SDN Fabric you noted previously in this procedure.**

   Note - Depending on your version of Oracle Fabric Manager, you will select an Oracle SDN fabric (as shown), or you will select one or more Oracle fabric devices to create the PVI VNICs on those devices.

Note - If you are using Oracle Fabric Manager 5.0.1, you can select the mode and the partition for the PVI cloud from the drop-down menus. If the EDR fabric has specific IB partitions, select the partition for the PVI cloud. Otherwise, you can leave the Partition drop-down menu at the default value.



8. **Click Submit.**

   At this point, the PVI cloud is created, but you will need to create PVI VNICs or HA PVI VNICs for it.

9. **Connect either a single PVI VNIC or HA PVI VNICs to the PVI cloud.**

   See either:

   - “Create a PVI VNIC (QDR) (GUI)” on page 49
   - “Create an HA PVI VNIC (QDR) (GUI)” on page 53

Related Information

- “Oracle SDN Fabric ID Overview (QDR)” on page 38
- “Create a PVI VNIC (QDR) (GUI)” on page 49
- “Create an HA PVI VNIC (QDR) (GUI)” on page 53
- “Complete the Oracle SDN Configuration” on page 55

Create a PVI VNIC (EDR) (GUI)

A PVI VNIC is a special type of VNIC that is terminated on a PVI cloud. When the PVI VNIC is terminated on the PVI cloud, it joins the Oracle SDN fabric. Other than needing a PVI cloud for termination, configuring a PVI VNIC is similar to creating a standard VNIC. Use this procedure to create a single PVI VNIC in the EDR environment.

This procedure requires the following:

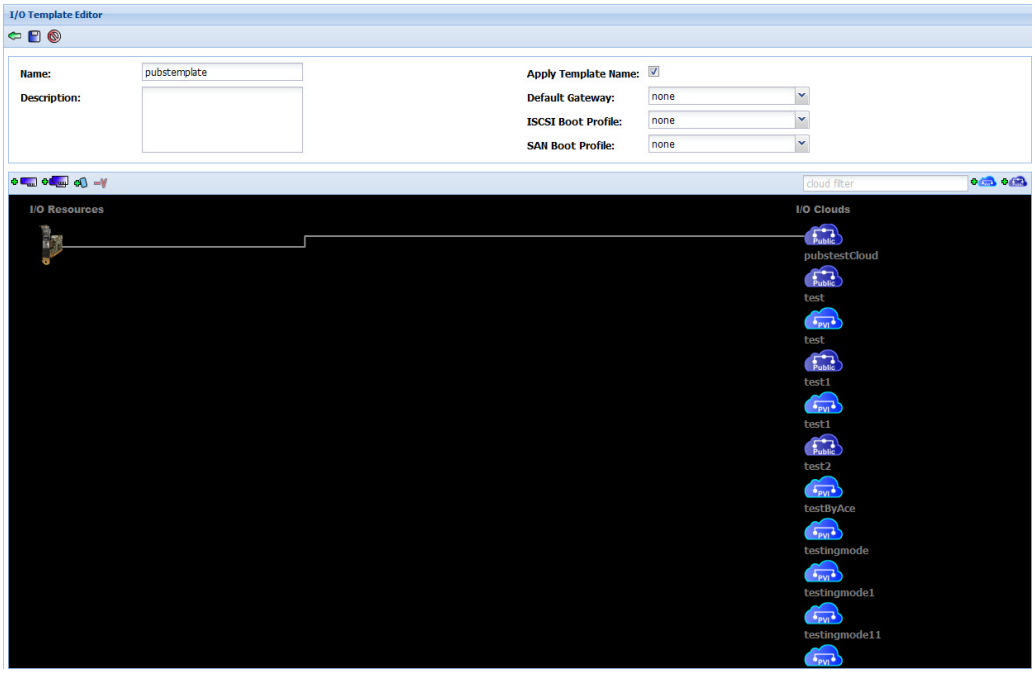
- At least one leaf, spine, or virtualization switch
- A server with a supported, EDR-compatible HCA
- Supported EDR-compatible MBOM/MPO cables

1. **Display the I/O Template Editor and complete the fields above the workspace.**

2. **On the workspace toolbar, click the Add a VNIC icon.**

   The VNIC starts as a standard VNIC, but becomes a PVI VNIC when attached to a public cloud.

3. **Click the VNIC and drag to connect it to the public cloud.**



4. **On the I/O Template Summary, verify that the I/O template is created.**

   The Status field should show a green check mark.

5. **Repeat this procedure as needed to add single PVI VNICs to the public clouds.**

   Each single PVI VNIC can be connected to individual, unique public clouds. You cannot connect two single PVI VNICs to the same public cloud.

   Although the PVI VNIC is created in the template, the PVI VNIC is not yet pushed to the server.

6. **On the top toolbar, click the disk icon to save the I/O template.**

7. **Assign the template to the servers in the Oracle SDN environment.**

   Proceed to "Deploy the I/O Template to a Server" on page 51.

Related Information

- "Configuration Considerations" on page 38
- "Create a Public Cloud (EDR)" on page 42
- "Controlling Uplinks for Public Clouds (EDR)" on page 43
- "Create an HA PVI VNIC (EDR) (GUI)" on page 51
- "Set Up PVI VNIC Redundancy on Hosts" on page 55
- "Complete the Oracle SDN Configuration" on page 55

▼ Create a PVI VNIC (QDR) (GUI)

A PVI VNIC is a special type of VNIC that is terminated on a PVI cloud. When the PVI VNIC is terminated on the PVI cloud, it joins the Oracle SDN fabric. Other than needing a PVI cloud for termination, configuring a PVI VNIC is similar to creating a standard VNIC. Use this procedure to create a single PVI VNIC in a QDR environment.

This procedure requires the following:

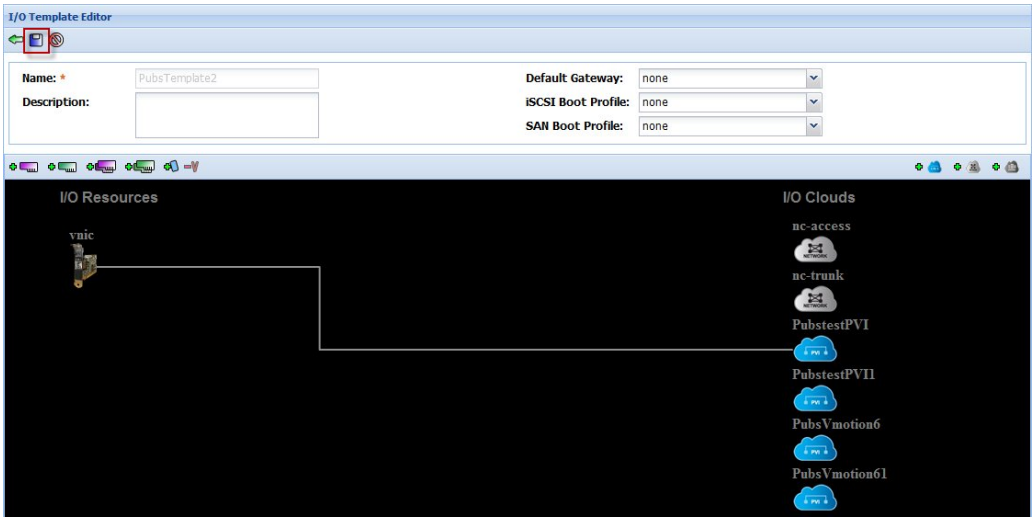
- At least one Oracle Fabric Interconnect F1-15 or Oracle Fabric Interconnect F-14
- A server with a supported, EDR-compatible HCA
- Supported EDR-compatible MBOM/MPO cables

1. **Display the I/O Template Editor and complete the fields above the workspace.**

2. **On the workspace toolbar, click the Add a VNIC icon.**

   The VNIC starts as a standard VNIC, but will become a PVI VNIC when attached to a PVI cloud.

3. **Click the VNIC and drag to draw a line to the PVI VNIC cloud you need.**



When the VNIC is connected to the PVI cloud, the PVI VNIC is created and terminated on a port in that PVI cloud.

4. **On the I/O Template Summary, verify that the I/O template is created.**

   The Status field should show a green check mark.

5. **Repeat this procedure as needed to add single PVI VNICs.**

   Each single PVI VNIC can be connected to individual, unique PVI clouds. You cannot connect two single PVI VNICs to the same PVI cloud.

   Although the PVI VNIC is created in the template, the PVI VNIC is not yet pushed to the server.

6. **On the top toolbar, click the disk icon to save the I/O template.**

7. **Assign the template to the servers in the Oracle SDN environment.**

   Proceed to "Deploy the I/O Template to a Server" on page 51.

Related Information

- "Configuration Considerations" on page 38
- "Create a PVI Cloud (QDR)" on page 46
- "Create an HA PVI VNIC (QDR) (GUI)" on page 53
- "Set Up PVI VNIC Redundancy on Hosts" on page 55

- “Complete the Oracle SDN Configuration” on page 55

Deploy the I/O Template to a Server

After creating the I/O template, you must deploy it to the server(s) that will be in the Oracle SDN environment.

1. **On the I/O Template Summary, select the template that you just created, and click the Assign an I/O Template to a Set of Servers button.**
   This step displays a list of available host servers.

2. **Select the server that you want to receive the I/O template.**
   If the server is bound, it will not appear in the list of available servers. If the server you want is not displayed, make sure that the server is not already bound to a template.

3. **Click Submit.**
   A confirmation dialog is displayed. When you click Yes on the confirmation dialog, the I/O template gets applied to the server, and the PVI VNICs within that template are pushed to the server.

4. **Finalize the configuration.**
   See “Complete the Oracle SDN Configuration” on page 55.

Related Information

- “Create a Public Cloud (EDR)” on page 42
- “Create a PVI Cloud (QDR)” on page 46
- “Create a PVI VNIC (EDR) (GUI)” on page 48
- “Create a PVI VNIC (QDR) (GUI)” on page 49
- “Create an HA PVI VNIC (EDR) (GUI)” on page 51
- “Create an HA PVI VNIC (QDR) (GUI)” on page 53
- “Set Up PVI VNIC Redundancy on Hosts” on page 55

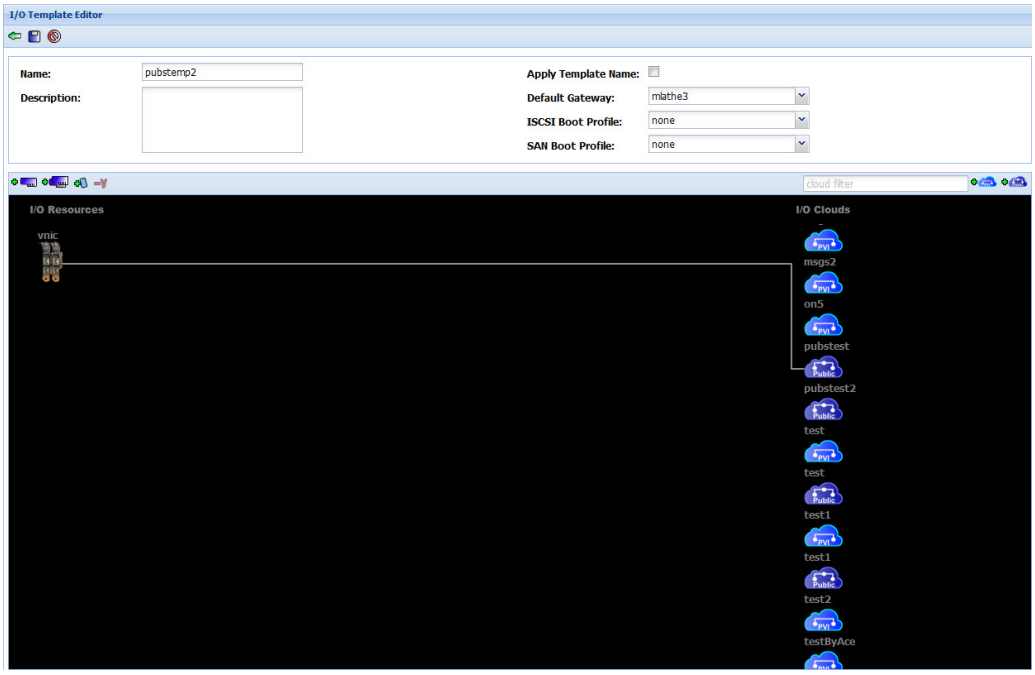
Create an HA PVI VNIC (EDR) (GUI)

HA PVI VNICs are a pair of VNICs in the same PVI that are hosted on the same server. They operate conceptually the same way HA VNICs do. For more information, refer to “HA vNIC Overview” in *Oracle Fabric Manager 5.0.2 Administration Guide* However, with HA PVI VNICs, two separate HCA ports are required to configure HA PVI VNICs.

1. **Display the I/O Template Editor and complete the fields above the workspace.**

2. **On the workspace toolbar, click the Add an HA VNIC icon.**
   The HA VNIC starts as a standard HA VNIC, but will become an HA PVI VNIC when attached to a public cloud.

3. **Click the VNIC and drag to draw a line to the public cloud you need.**



   When the HA VNIC is connected to the PVI cloud, the HA PVI VNIC is created and terminated on a port in that public cloud.

4. **On the I/O Template Summary, verify that the I/O template is created.**
   The Status field should show a green check mark.

5. **Repeat this procedure as needed to create additional HA PVI VNICs.**
   Each HA PVI VNIC can be connected to individual, unique public clouds. You cannot connect two HA PVI VNICs to the same public cloud.
   Although the HA PVI VNIC is created in the template, it is not yet pushed to the server.

6. **On the top toolbar, click the disk icon to save the I/O template.**

7. **Assign the template to the servers in the Oracle SDN environment.**
   See to “Deploy the I/O Template to a Server” on page 51.

8. **Set up host-side HA.**

   See “Set Up PVI VNIC Redundancy on Hosts” on page 55.

9. **Check the Oracle SDN environment through the command-line.**

   See “Verifying Oracle SDN Configuration” on page 69.

Related Information

- “Create a Public Cloud (EDR)” on page 42
- “Create a PVI VNIC (EDR) (GUI)” on page 48
- “Controlling Uplinks for Public Clouds (EDR)” on page 43
- “Complete the Oracle SDN Configuration” on page 55

▼ Create an HA PVI VNIC (QDR) (GUI)

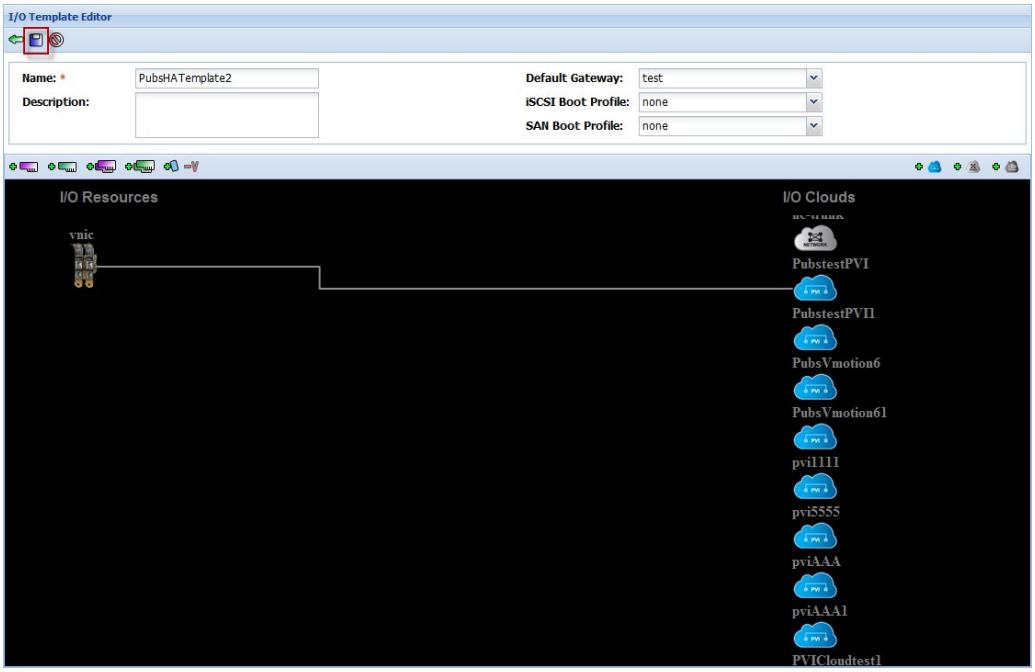
HA PVI VNICs are a pair of VNICs in the same PVI that are hosted on the same server. They operate conceptually the same way HA VNICs do. For more information, refer to the However, with HA PVI VNICs, two separate HCA ports are required to configure HA PVI VNICs.

1. **Display the I/O Template Editor and complete the fields above the workspace.**

2. **On the workspace toolbar, click the Add an HA VNIC icon.**

   The VNIC starts as a standard HA VNIC, but becomes an HA PVI VNIC when attached to a PVI cloud.

3. **Click the HA VNIC and drag to draw a line to the PVI cloud you need.**



When the HA VNIC is connected to the PVI cloud, the HA PVI VNIC is created and terminated on a port in that PVI cloud.

4. **On the top toolbar, click the disk icon to save the I/O template.**

5. **On the I/O Template Summary, verify that the I/O template is created.**
The Status field should show a green check mark.

6. **Repeat this procedure as needed to create multiple HA PVI VNICs.**

7. **Push the I/O template to the server(s) in the Oracle SDN environment.**
See "Deploy the I/O Template to a Server" on page 51.

8. **Set up host-side HA.**
See "Set Up PVI VNIC Redundancy on Hosts" on page 55.

Related Information

- "Oracle SDN Fabric ID Overview (QDR)" on page 38
- "Create a PVI Cloud (QDR)" on page 46

- "Create a PVI VNIC (QDR) (GUI)" on page 49
- "Deploy the I/O Template to a Server" on page 51
- "Set Up PVI VNIC Redundancy on Hosts" on page 55
- "Complete the Oracle SDN Configuration" on page 55

Set Up PVI VNIC Redundancy on Hosts

As pat of creating and HA PVI VNIC, some host-side redundancy is required to configure HA properties for the interface. The host OS HA properties control functions such as failover and failback.

- You can configure redundancy for Oracle Linux, Oracle Solaris, and Oracle VM hosts as either link aggregation groups (LAGs) or bonded interfaces. For Oracle VM, you will use the guest OS's tools for configuring HA interfaces.
- For Windows or VMware hosts. you create an HA PVI through Oracle Fabric Manager and use the respective HA-interface features (for example, VMware NIC Teaming), and consult the vendor's documentation.

1. **For Oracle Linux, Oracle Solaris, or Oracle VM, determine if you need a LAG or a bonded interface.**
2. **Configure the appropriate redundancy.**
   - **For LAGs, refer to `https://docs.oracle.com/cd/E23824_01/html/821-1458/fpjvl.html`.**
   - **For bonded interfaces, refer to `https://docs.oracle.com/cd/E37670_01/E41138/html/ch11s05.html`.**
3. **Configure the interfaces with standard networking parameters.**
   See "Complete the Oracle SDN Configuration" on page 55.

Related Information

- "Deploy the I/O Template to a Server" on page 51
- "Complete the Oracle SDN Configuration" on page 55

Complete the Oracle SDN Configuration

Finish the procedure by configuring the HA PVI VNICs as you would a physical network interface, including, but not limited to:

1. **Set the IP address type and interface address.**

2. **Set the VLAN IDs (if needed).**

   If PVI VNICs will be configured in VLAN ranges, all PVI VNICs within the range must use the same mode. All PVI VNICs in the range must be trunk mode, or all must be access mode.

3. **Verify that the MTUs in use on the PVI Cloud, the VNICs, and the host are the same.**

4. **(Optional) Check the Oracle SDN environment through the command-line.**

   See "Verifying Oracle SDN Configuration" on page 69.

Related Information

- "Verifying Oracle SDN Configuration" on page 69

Configuring Oracle SDN (CLI)

Although this topic explains how to configure Oracle SDN through the Oracle Fabric OS or XgOS CLI, Oracle SDN also can be configured through the Oracle Fabric Manager GUI, which is the preferred interface. For information, see “Configuring Oracle SDN (Oracle Fabric Manager)” on page 37.

Step	Description	Links
1.	Review information about the configuration procedure.	“Configuration Considerations” on page 38
2.	Add clouds to your fabric.	“Add a Public Cloud to the Oracle Fabric Interconnect (EDR)” on page 58 “Add a PVI Cloud to the Oracle Fabric Interconnect (QDR)” on page 59
3.	For EDR fabrics, configure a public network.	“Create a Public Network (EDR)” on page 60
4.	Configure a Server Profile for PVI VNICs.	“Get Server IB-Port Information” on page 60 “Create a Server Profile” on page 61
5.	Add a single VNIC or an HA VNIC pair	“Configuring PVI VNICs (EDR) (CLI)” on page 62 “Configuring PVI VNICs (QDR)” on page 64
6.	Set up host-side HA.	“Set Up PVI VNIC Redundancy on Hosts” on page 55
7.	Enable Jumbo MTUs on Preconfigured PVIs and Public Network	“Enable Jumbo MTUs on Preconfigured PVIs and Public Network” on page 66
8.	Complete the Oracle SDN configuration.	“Complete the Oracle SDN Configuration” on page 55 “Verifying Oracle SDN Configuration” on page 69

Related Information

- “Understanding Oracle SDN” on page 11
- “Preparing for Installation” on page 17
- “Creating a Merged Fabric” on page 21
- “Configuring Oracle SDN (Oracle Fabric Manager)” on page 37
- “Verifying Oracle SDN Configuration” on page 69

Add a Public Cloud to the Oracle Fabric Interconnect (EDR)

A public cloud is an empty container to which you will add the VNICs that carry traffic. In EDR fabrics, VNICs are added in reliable connection (RC) mode by default. However, this mode does not support EDR communication off the fabric. See "PVI Modes Overview" on page 12.

UD mode requires specific IB MTU sizes. See "Supported MTU Sizes" on page 39. Start the configuration process by adding a public cloud to the EDR fabric. Later, you will add VNICs to the public cloud.

1. **When you are logged in to the switch, create an EDR cloud.**

   `add pvi` *name ID* `-type=`*global*`|`*subnet*

   Note - The *global* option is not supported, so by default, PVI cloud is assigned as a subnet.

   For more information about PVI cloud type, see the section about adding PVIs in the "Working With PVI Clouds" in *Oracle Fabric Manager 5.0.2 Administration Guide*.

2. **Set UD mode for the EDR cloud.**

   `set pvi` *name* `-mode=UD`

   Note - Only UD mode is supported for EDR clouds. This argument is case sensitive.

3. **If needed, set the MTU for the PVI cloud.**

   `set pvi` *name* `-mtu=`*MTU-size*

   Note - Make sure to use the correct MTU size, and set it across the PVI cloud, PVI VNICs, and host.

4. **If needed, specify the Partition Key for the PVI cloud.**

   `set pvi` *name* `-pkey=`*PKey-value*

   The partition key for the default IB partition is `7fff`, but you can specify a non-default key. For more information, refer to "Managing Partitions" in *Oracle Fabric Manager 5.0.2 Administration Guide*.

5. **(Optional) Add a description to the PVI cloud.**

   `set pvi` *name* `-descr=`*string*

6. **Create a public network.**

Go to “Create a Public Network (EDR)” on page 60.

Related Information

- “Get Server IB-Port Information” on page 60
- “Create a Server Profile” on page 61
- “Create a Public Network (EDR)” on page 60
- “Configuring PVI VNICs (EDR) (CLI)” on page 62
- “Complete the Oracle SDN Configuration” on page 55

▼ Add a PVI Cloud to the Oracle Fabric Interconnect (QDR)

A PVI cloud is an empty container to which you will add the VNICs that carry traffic. In QDR fabrics, PVI VNICs are added in reliable connection (RC) mode. See “PVI Modes Overview” on page 12.

Start by adding a PVI as an empty container. Later, you will add PVI VNICs to the PVI cloud.

1. **After logging in to the switch, create a PVI cloud.**

   `add pvi` *name ID*

2. **If needed, set the MTU for the PVI cloud.**

   `set pvi` *name* `-mtu=`*MTU-size*

Note - The MTU can be set a creation time, but not reset after the VNIC already exists. When setting the MTU, make sure to use the correct MTU size, and set it across the PVI cloud, PVI VNICs, and host. If the PVI VNIC exists and you need to set a different MTU, delete the VNIC and recreate it.

Some OSes or applications require different size MTUs. For example, for ESX servers, this value can be no larger than 9000. The default value is 9000.

3. **(Optional) Add a description to the PVI cloud.**

   `set pvi` *name* `-descr=`*string*

4. **Gather the IB connection information for the server(s) in the Oracle SDN environment.**

   See “Get Server IB-Port Information” on page 60.

Related Information

- “Get Server IB-Port Information” on page 60

- "Create a Server Profile" on page 61
- "Configuring PVI VNICs (QDR)" on page 64
- "Complete the Oracle SDN Configuration" on page 55

Create a Public Network (EDR)

A public network (also called a public cloud) serves as a termination point for a single PVI VNIC or HA PVI VNICs in an EDR fabric. A public network can provide access to other parts of the Ethernet network, including the gateway to the public Internet.

1. **Issue the `add public-network` command and specify the gateway name, network ID, and gateway port for the uplink.**

   For example:

   `add public-network` *name public-network-ID slot.port*

2. **Gather IB connection information for the server(s) in the Oracle SDN environment.**

   See "Get Server IB-Port Information" on page 60.

Related Information

- "Add a Public Cloud to the Oracle Fabric Interconnect (EDR)" on page 58
- "Get Server IB-Port Information" on page 60
- "Create a Server Profile" on page 61
- "Configuring PVI VNICs (EDR) (CLI)" on page 62
- "Complete the Oracle SDN Configuration" on page 55

Get Server IB-Port Information

For each server that will be in the Oracle SDN environment, get information about which IB port and Oracle Fabric Interconnect is connected to the host. This task is the same for QDR or EDR fabrics.

1. **For each server that will be in the Oracle SDN environment, type `show physical-server` *server-name*.**

```
name     guid         descr  port              cap  server-profile
-------------------------------------------------------------------
alexander 2c90200204935       iowa:ServerPort8      ef-x  spLinux
```

2. **Note the information in the Port field.**

   This field shows the name of the Oracle Fabric Interconnect and the IB port on which the server is connected. You will use this information to create a server profile.

   If two entries exist, the server is physically cabled for HA—meaning it has two physical IB connections to two different Oracle Fabric Interconnects.

3. **Continue the configuration by adding a server profile for the PVI VNIC.**

   The task to create a server profile is the same for QDR and EDR fabrics. See "Create a Server Profile" on page 61.

Related Information

- "Add a Public Cloud to the Oracle Fabric Interconnect (EDR)" on page 58
- "Add a PVI Cloud to the Oracle Fabric Interconnect (QDR)" on page 59
- "Create a Public Network (EDR)" on page 60
- "Configuring PVI VNICs (EDR) (CLI)" on page 62
- "Configuring PVI VNICs (QDR)" on page 64
- "Complete the Oracle SDN Configuration" on page 55

▼ Create a Server Profile

A server profile is required as a container for the PVI cloud and its VNICs. When you create a server profile, you specify an IB port on the Oracle Fabric Interconnect.

1. **Add a server profile to the Oracle Fabric Interconnect.**

   `add server-profile`*name*

   If you will be configuring HA PVI VNICs, repeat this procedure on the second Oracle Fabric Interconnect, and use the same server profile name.

2. **Connect the server profile to a server port and server.**

   `add server-profile` *name server-name*`@`*EDR-switch-name*`:`*IB-port-name*

   For example, **`add server-profile techpubs musashi@iowa:ServerPort11`** would add server profile named `techpubs` to the server named `musashi`, which is connected to an Oracle leaf switch, spine switch, or virtualization switch named `iowa` through server port `ServerPort11`.

   If you will be configuring HA PVI VNICs, repeat this procedure on the second Oracle Fabric Interconnect, and use the same server profile.

3. **Repeat this procedure as many times as needed to connect appropriate servers to Oracle SDN, making sure to connect each server to a different server port.**

4. **Continue configuring Oracle SDN in your fabric:**

   - For EDR fabrics, see “Configuring PVI VNICs (EDR) (CLI)” on page 62.
   - For QDR fabrics, see “Configuring PVI VNICs (QDR)” on page 64.

Related Information

- “Add a Public Cloud to the Oracle Fabric Interconnect (EDR)” on page 58
- “Add a PVI Cloud to the Oracle Fabric Interconnect (QDR)” on page 59
- “Create a Public Network (EDR)” on page 60
- “Get Server IB-Port Information” on page 60
- “Configuring PVI VNICs (EDR) (CLI)” on page 62
- “Configuring PVI VNICs (QDR)” on page 64
- “Complete the Oracle SDN Configuration” on page 55

Configuring PVI VNICs (EDR) (CLI)

Add VNICs to the public cloud to enable communication through the Oracle SDN environment. You can add a single VNIC or HA VNICs.

- “Create a Single PVI VNIC (EDR) (CLI)” on page 62
- “Create HA PVI VNICs (EDR) (CLI)” on page 63

Related Information

- “Add a Public Cloud to the Oracle Fabric Interconnect (EDR)” on page 58
- “Create a Public Network (EDR)” on page 60
- “Get Server IB-Port Information” on page 60
- “Create a Server Profile” on page 61
- “Complete the Oracle SDN Configuration” on page 55

▼ Create a Single PVI VNIC (EDR) (CLI)

A single PVI VNIC is one VNIC configured in a PVI. The single PVI VNIC offers one server connection into the Oracle SDN environment. Even though this is a valid configuration, a typical deployment has two PVI VNICs (HA) for redundancy.

1. **Add a VNIC to the server profile and associate it with the public network.**

`add vnic` *VNIC-name*`.`*server-profile-name* *public-network-name*

2. **Repeat this procedure to add other servers that you want to communicate with each other in the public cloud `pubstest`.**

   Each new server is added to the public cloud through the VNICs that connect the server to the public cloud.

3. **Finalize the single PVI VNIC configuration.**

   See "Complete the Oracle SDN Configuration" on page 55.

Related Information

- "Create HA PVI VNICs (EDR) (CLI)" on page 63

▼ Create HA PVI VNICs (EDR) (CLI)

HA PVI VNICs are two standard VNICs that are added to the PVI cloud you just created. The HA PVI VNIC is typically created on two different server profiles from two different Oracle Fabric Interconnects.

You are required to configure the two server profiles on two different ports, and optimally, each of the ports would be on different Oracle Fabric Interconnects. In this configuration, each of the PVI VNICs is terminated on the same server running Oracle SDN to provide the two independent ports to the server and avoid any single point of failure.

1. **Log in to the first Oracle Fabric Interconnect.**

2. **Add a VNIC to the server profile and associate it with the public cloud.**

   `add vnic` *VNIC-name*`.`*server-profile-name* *public-network-name*

3. **Log in to the second Oracle Fabric Interconnect.**

4. **Add the second VNIC with a different name to the same server profile and associate it with the same public cloud as the primary VNIC.**

   `add vnic` *VNIC-name*`.`*server-profile-name* *public-network-name*

Caution - The second VNIC must be configured with a different name than the first VNIC. For example, you could create *vnic1.serverprofile1* as the first PVI VNIC, and *vnic2.serverprofile1* as the second PVI VNIC to make each unique.

5. **Continue the HA PVI configuration.**

See “Set Up PVI VNIC Redundancy on Hosts” on page 55.

Related Information

- “Create a Single PVI VNIC (EDR) (CLI)” on page 62

Configuring PVI VNICs (QDR)

Add VNICs to the PVI cloud to enable communication through the Oracle SDN environment. You can add a single VNIC to a PVI (a PVI VNIC) or HA VNICs to the PVI (an HA PVI VNIC).

- “Create a Single PVI VNIC (QDR) (CLI)” on page 64
- “Create HA PVI VNICs (QDR) (CLI)” on page 65

Related Information

- “Add a PVI Cloud to the Oracle Fabric Interconnect (QDR)” on page 59
- “Get Server IB-Port Information” on page 60
- “Create a Server Profile” on page 61
- “Complete the Oracle SDN Configuration” on page 55

▼ Create a Single PVI VNIC (QDR) (CLI)

A single PVI VNIC is one VNIC configured in a PVI. The single PVI VNIC offers one server connection into the Oracle SDN environment. Even though this is a valid configuration, a typical deployment has two PVI VNICs (HA) for redundancy.

1. **Add a VNIC to the server profile and associate it with the PVI.**

   `add vnic` *VNIC-name*`.`*server-profile-name* *PVI-name*

2. **Repeat this procedure to add other servers that you want to communicate in the PVI `pubstest`.**

   Each new server is added to the PVI cloud through the VNICs that connect the server to the PVI.

3. **Finalize the single PVI VNIC configuration.**

See “Complete the Oracle SDN Configuration” on page 55.

Related Information

- “Create HA PVI VNICs (QDR) (CLI)” on page 65

▼ Create HA PVI VNICs (QDR) (CLI)

HA PVI VNICs are two standard VNICs that are added to the PVI cloud you just created. The HA PVI VNIC is typically created on two different server profiles from two different Oracle Fabric Interconnects.

You are required to configure the two server profiles on two different ports, and optimally each of the two different ports would be on different Oracle Fabric Interconnects. In this configuration, each of the PVI VNICs is terminated on the same server running Oracle SDN to provide the two independent ports to the server and avoid any single point of failure.

Note - To support HA PVI VNICs on Linux and ESX hosts, you will need to set up bonding or NIC teaming, respectively, though the host's OS to enable the hosts to participate in the PVI.

---

1. **Log in to the first Oracle Fabric Interconnect.**

2. **Add a VNIC to the server profile and associate it with the PVI cloud.**

   `add vnic` *VNIC-name.server-profile-name PVI-name*

3. **Log in to the second Oracle Fabric Interconnect.**

4. **Add the second VNIC with a different name to the same server profile and associate it with the same PVI as the primary VNIC.**

   `add vnic` *VNIC-name.server-profile-name PVI-name*

Caution - The second VNIC must be configured with a different name than the first VNIC. For example, you could create *vnic1.serverprofile1* as the first PVI VNIC, and *vnic2.serverprofile1* as the second PVI VNIC to make each unique.

---

5. **Continue the HA PVI configuration.**

   See “Set Up PVI VNIC Redundancy on Hosts” on page 55.

Related Information

- “Create a Single PVI VNIC (QDR) (CLI)” on page 64

Enable Jumbo MTUs on Preconfigured PVIs and Public Network

When you enable jumbo MTUs on the PVIs and public networks that are already configured, you must first delete all the existing PVIs and public networks and then enable the jumbo MTUs. You must then recreate all the PVIs and public networks that were configured earlier.

Note - This MTU is supported in fabrics exclusively running Oracle EDR hardware. You might experience issues if you use a combination of Oracle hardware and other vendor's hardware in Oracle EDR fabrics.

1. **Display all the configured PVIs and public network.**

```
show system info
hostname                        ovn87-195
descr
domain                          us.oracle.com
address                         10.129.87.195
netmask                         255.255.255.0
model-num                       Oracle Fabric Interconnect IS2-46
serial-num                      Not Specified
ipconfig                        static
default-gateway                 10.129.87.1
mtu                             1500
support-jumbo-packet            true
timezone                        GMT
console-speed                   115200
```

   - **For PVIs, use the command `show pvi *`**
   - **For public network, use the command `show public-network`**

2. **Gather information about all the existing PVIs and public networks.**

   `show pvi` *VNICs*
   `show public-network` *VNICs*

   Make sure that you note the PVI and VNIC names, the hosts on which the PVIs or VNICs are terminated on, and the other information that you might need to recreate PVI and public networks.

3. **Delete the existing configuration.**

4. **Verify whether you are running PSIF 1.0.0 or later and Oracle Fabric OS 1.0.1 or later.**

   `show physical-server` *server-name*

```
show version
```

Note - Jumbo MTUs are supported only on PSIF 1.0.0 or later.

5. **Verify whether the HCA is capable of jumbo MTU.**

```
# cat /proc/driver/xve/devices/vnic_test/vnic_test |grep -i eoib
Eoib: yes

# cat /proc/driver/xve/devices/vnic_test |grep -i titan
Titan: yes
```

If the value of the `eoib` and `titan` is `yes`, the HCA is capable of jumbo MTU.

6. **Enable jumbo MTU on PVI and public network.**

```
set system jumbo-packet true
```

7. **Display the MTU that has taken effect.**

```
# cat /proc/driver/xve/devices/vnic_test/vnic_test |grep -i mtu
mtu:                              9000
Admin mtu:                        9000
```

8. **Recreate the PVIs and public networks by providing the correct MTU size.**

Note - See "Supported MTU Sizes" on page 39, then select a value that is appropriate to the MTU size in use in your IB network.

9. **Verify the MTU size on public cloud.**

```
# show public-network pub_net_name
```

10. **Display the system version of the virtualization switch.**

```
# show system version
```

11. **Check the MTU size on the host.**

```
# ifconfig
```

Verifying Oracle SDN Configuration

These topics explain how to verify the Oracle SDN configuration through Oracle Fabric OS or XgOS if needed.

Step	Description	Links
1.	Review information about configured public clouds and PVI clouds.	“Display Public Cloud Information (EDR)” on page 70
2.	Review Information about the IB paths to hosts.	“Displaying IB Path Information” on page 72

Related Information

- “Configuring Oracle SDN (Oracle Fabric Manager)” on page 37
- “Configuring Oracle SDN (CLI)” on page 57

Displaying Public Cloud and PVI Cloud Information

These topics explain how to show pertinent information about PVIs and the VNICs within them.

- “Display Public Cloud Information (EDR)” on page 70
- “Show PVI Clouds (QDR)” on page 70
- “Show PVI VNIC” on page 71

Related Information

- “Display the IB Topology” on page 72
- “Displaying IB Path Information” on page 72

Display Public Cloud Information (EDR)

For EDR fabrics, you can view the public clouds configured on the switch. All public clouds are displayed regardless of the presence, or absence, of an uplink.

1. **Log in to the switch.**
2. **Display all configured public clouds:**

   `show public-network`

   For example:

```
#show public-network pubstest
name     group-name id pkey state trunkMode mtu  oper-mtu mode description uplink
 allowed-vlans
-------------------------------------------------------------------------------------------------------------
pubstest default    22 7fff up/up true      1500 1500     UD               0/6(up/up)
 none
1 record displayed
```

   Clouds that display `UD` in the `mode` field support EDR.

Related Information

- "Show PVI VNIC" on page 71
- "Display IB Path Information for a PVI Between Hosts" on page 73

Show PVI Clouds (QDR)

You can display all PVIs on an Oracle Fabric Interconnect or a single PVI as needed.

1. **Display all PVIs configured on an Oracle Fabric Interconnect:**

   `show pvi *`

2. **After finding the name of a single PVI, display information for it:**

   `show pvi` *PVI-name*

   For example:

```
#show pvi techpubs
name      id  pkey  state  type    mtu   oper-mtu  mode  description
-------------------------------------------------------------------------------------------------------------
techpubs  11  7fff  up/up  subnet  4070  4070      RC    For Tech Pubs use. Please do
 not delete.
1 record displayed
```

Related Information

- “Show PVI VNIC” on page 71
- “Display IB Path Information for a PVI Between Hosts” on page 73
- “Display IB Path Information for a PVI on Hosts (QDR)” on page 73

▼ Show PVI VNIC

PVI VNICs contain information similar to standard VNICs. The commands to display PVI VNIC information are the same as for standard VNICs. The same commands can be used to display PVI VNICs in an EDR or QDR fabric.

1. **Display the PVI VNIC information:**

   `show vnic` *VNIC-name*`.`*server-profile-name*

   For example:

```
# show vnic vn1.pubstest
-------------------------------------------------------------------------------------------------------------------
name          vn1.techpubs
state         up/resourceUnavailable
mac-addr      00:13:97:5D:A0:02
ipaddr
if            techpubs(11)
if-state      up
type
vlans         none
boot-capable  false
-------------------------------------------------------------------------------------------------------------------
1 record displayed
```

   In this example, the `if` field shows the network ID for the PVI cloud (QDR) or public network (EDR) in which `vn1.techpubs` is configured.

2. **Display the transmit and receive throughput statistics for a VNIC in a PVI:**

   `show vnic` *server-profile-name* `throughput`

3. **(Optional) Continue by verifying paths through the IB fabric.**

   See “Display IB Path Information for a PVI Between Hosts” on page 73.

Related Information

- “Display Public Cloud Information (EDR)” on page 70
- “Show PVI Clouds (QDR)” on page 70

- “Display IB Path Information for a PVI Between Hosts” on page 73
- “Display IB Path Information for a PVI on Hosts (QDR)” on page 73

▼ Display the IB Topology

You can display the entire IB topology as learned by the switch, including all devices in the fabric, both EDR and QDR.

- **Type:**

  # **show diagnostics ib-topo**

  For example:

```
#show diagnostics ib-topo
TCA     0x0    Oracle Leaf_00 vTC     10e08b53a90101   1     10e08b53a90102   11
 10e08b53a903ff   38    ACTIVE (Qdr)      TCA:leaf_01-0/38  IB Subnet Topology: 7 HCAs,
 8 TCAs, 9 switches
Type hwMode  Name                  Node Guid        Port  Port Guid        Lid
 Neighbor(guid,  port)  OperState         portName
-------------------------------------------------------------------------------------------------------------
HCA     0x0    nsn178-32             2c9030057b4dc    2     2c9030057b4de    36
 10e08b53a903ff   21    ACTIVE (Qdr)      leaf_01:ServerPort20
HCA     0x0    nsn178-42             10e08508ac0004   1     10e08508ac0005   5
 10e08508ac0001   2     ACTIVE (EDR)      OSDN on nsn178-42
TCA     0x0    Oracle Spine_Main_     10e08508ad0107   1     10e08508ad0108   6
 10e08508ad03ff   40    ACTIVE (Qdr)      TCA:nsn178-42-0/40
TCA     0x0    Oracle Spine_Main_     10e08508ad010a   1     10e08508ad010b   7
 10e08508ad03ff   41    ACTIVE (Qdr)      TCA:nsn178-42-0/41
HCA     0x0    nsn178-76             10e085095a0004   1     10e085095a0005   30
 10e085095a0001   2     ACTIVE (EDR)      OSDN on nsn178-76
```

Related Information

- “Displaying Public Cloud and PVI Cloud Information” on page 69
- “Displaying IB Path Information” on page 72

Displaying IB Path Information

You can display operational and performance data for the PVI connection(s) between Oracle SDN hosts in the Oracle SDN environment by using the `show diagnostics -table -pvi-path` command.

You can also display information for the hosts themselves.

- "Display IB Path Information for a PVI Between Hosts" on page 73
- "Display IB Path Information for a PVI on Hosts (QDR)" on page 73

Related Information

- "Displaying Public Cloud and PVI Cloud Information" on page 69
- "Display the IB Topology" on page 72

▼ Display IB Path Information for a PVI Between Hosts

When displaying IB path information between hosts, you will list two hosts. To determine the direction of traffic, the first host listed is the `from` host, and the second host listed is the `to` host. For example, to display traffic from a host named `bones` to a server named `riker`, you would list `bones` first in the command syntax.

IB path information is displayed for QDR and EDR fabrics. Look for `Qdr` or `Edr` as needed for your fabric type.

1. **Display IB path information from one server to another by typing:**

   `show diagnostics pvi-path` *from-server to-server*

   You might see multiple entries (including any intervening IB switches) listed in the output.

2. **Display the information for the other part of the IB path by issuing the command again and switching the `from` and `to` servers.**

Related Information

- "Display Public Cloud Information (EDR)" on page 70
- "Show PVI Clouds (QDR)" on page 70
- "Show PVI VNIC" on page 71
- "Display IB Path Information for a PVI on Hosts (QDR)" on page 73

▼ Display IB Path Information for a PVI on Hosts (QDR)

Host-side information is available for PVI and PVI VNICs information on Linux and ESX hosts.

1. **Log in to the host server.**
2. **Change directory to `/proc/driver/xve/devices`.**
3. **View (`cat`) the following files:**
   - `l2`.
   - `flush_l2`, which can be triggered to clear the L2 table on the host.

Caution - Do not flush the host's L2 table unless directed to do so by Oracle personnel.

   - Device file for whichever VNIC(s) are in PVIs (for example the `vnic1_pvi1` file, for a VNIC in PVI1).

Related Information

- “Show PVI Clouds (QDR)” on page 70
- “Show PVI VNIC” on page 71
- “Display IB Path Information for a PVI Between Hosts” on page 73

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