
Site Requirements

This chapter describes the site requirements for Oracle Big Data Appliance. Use this chapter while you complete the *Oracle Big Data Appliance Site Checklists*.

This chapter contains these sections:

- [General Environmental Requirements](#)
- [Space Requirements](#)
- [Flooring Requirements](#)
- [Electrical Power Requirements](#)
- [Temperature and Humidity Requirements](#)
- [Ventilation and Cooling Requirements](#)
- [Network Connection Requirements](#)
- [Ensuring That the Site Is Ready](#)

See Also: *Oracle Big Data Appliance Site Checklists*

General Environmental Requirements

[Table 2–1](#) shows the general environmental requirements for Oracle Big Data Appliance. The other sections in this chapter provide detailed information.

Table 2–1 *Environmental Requirements for Oracle Big Data Appliance*

Environmental Component	Oracle Big Data Appliance
Weight	909.5 kg (2005 lb) See Also: "Flooring Requirements" on page 2-3
Acoustic levels	8.3 Bel
Power	Maximum: 12.0 kW (12.25 kVA) Typical: 8.4 kW (8.6 kVA) ¹ See Also: "Electrical Power Requirements" on page 2-3
Cooling	Maximum: 40,971 BTU/hour (41,807 kJ/hour) Typical: 28,680 BTU/hour (29,265 kJ/hour) See Also: "Temperature and Humidity Requirements" on page 2-8 and "Ventilation and Cooling Requirements" on page 2-9

Table 2–1 (Cont.) Environmental Requirements for Oracle Big Data Appliance

Environmental Component	Oracle Big Data Appliance
Air flow front-to-back (subject to actual data center environment)	Maximum: Approximately 1,886 CFM Typical: Approximately 1,340 CFM See Also: "Temperature and Humidity Requirements" on page 2-8, and "Ventilation and Cooling Requirements" on page 2-9
IP Addresses	24 for Ethernet network 18 for InfiniBand network See Also: Chapter 3, "Network Requirements."
Network drops	Minimum of two network connections See Also: Chapter 3, "Network Requirements."
External connectivity	2 x 1 Gbps Ethernet ports 18 x 10 Gbps Ethernet ports See Also: Chapter 3, "Network Requirements."

¹ Varies based on application load.

Space Requirements

The space requirements for Oracle Big Data Appliance are as follows:

- Height: 200 cm (79 inches)
- Width: 60 cm with side panels (24 inches)
- Depth: 120 cm (47.5 inches)

The minimum ceiling height for the cabinet is 230 cm (90 inches), measured from the true floor or raised floor, whichever is higher. An additional 92 cm (36 inches) is for top clearance. The space above the cabinet and its surroundings must not restrict the movement of cool air between the air conditioner and the cabinet, or the movement of hot air coming out of the top of the cabinet.

Receiving and Unpacking Requirements

Before Oracle Big Data Appliance arrives, ensure that the receiving area is large enough for the package. The following are the package specifications:

- Shipping height: 216 cm (85 inches)
- Shipping width: 122 cm (48 inches)
- Shipping depth: 157.5 cm (62 inches)
- Shipping weight: 993 kg (2189 lb)
- Net weight: 909.5 kg (2005 lb)

If your loading dock meets the height and ramp requirements for a standard freight carrier truck, then you can use a pallet jack to unload the rack. If not, you must provide a standard forklift or other means to unload the rack. You can also request that the rack be shipped in a truck with a lift gate.

Leave Oracle Big Data Appliance in its shipping container until it arrives at the installation site. Ensure sufficient clearance and clear pathways for moving it from the unpacking location to the installation location. The entire access route to the installation site should be free of raised-pattern flooring that can cause vibration.

Use a conditioned space when removing the packaging material to reduce particles before entering the data center. Allow enough space for unpacking Oracle Big Data Appliance from its shipping cartons. [Table 2–2](#) lists the access route requirements.

Table 2–2 Access Route Requirements for Oracle Big Data Appliance

Access Route Item	With Shipping Pallet	Without Shipping Pallet
Minimum door height	218.4 cm (86 inches)	204 cm (80.5 inches)
Minimum door width	127 cm (50 inches)	64 cm (25.5 inches)
Minimum elevator depth	162.6 cm (64 inches)	124 cm (49 inches)
Maximum incline	6 degrees	6 degrees
Minimum elevator, pallet jack, and floor loading capacity	1134 kg (2500 lb)	1134 kg (2500 lb)

Maintenance Access Requirements

The maintenance area must be large enough for Oracle Big Data Appliance and have the required access space. For example, the required space to remove the side panels is 67.6 cm (26.6 inches). [Table 2–3](#) lists the maintenance access requirements.

Open tiles are required for electrical access.

Table 2–3 Maintenance Access Requirements for Oracle Big Data Appliance

Location	Maintenance Access Requirement
Rear maintenance	91.4 cm (36 inches)
Front maintenance	91.4 cm (36 inches)
Top maintenance	91.4 cm (36 inches)

Flooring Requirements

Oracle recommends that Oracle Big Data Appliance be installed on raised flooring. The site floor and the raised flooring must be able to support the total weight.

[Table 2–4](#) lists the floor load requirements.

Table 2–4 Floor Load Requirements for Oracle Big Data Appliance

Description	Requirement
Maximum allowable weight of installed rack equipment	998 kg (2200 lb)
Maximum allowable weight of installed power distribution units	52 kg (115 lb)
Maximum dynamic load (maximum allowable weight of installed equipment including PDUs)	1050 kg (2315 lb)

Electrical Power Requirements

Oracle Big Data Appliance can operate effectively over a wide range of voltages and frequencies. However, it must have a reliable power source. Damage may occur if the ranges are exceeded. Electrical disturbances such as the following may damage Oracle Big Data Appliance:

- Fluctuations caused by brownouts
- Wide and rapid variations in input voltage levels or in input power frequency

- Electrical storms
- Faults in the distribution system, such as defective wiring

To protect Oracle Big Data Appliance from such disturbances, you should have a dedicated power distribution system, power-conditioning equipment, and lightning arresters or power cables to protect from electrical storms.

Each rack has two preinstalled power distribution units (PDUs). The PDUs accept different power sources. You must specify the type of PDU that is correct for your Oracle Big Data Appliance and data center.

PDUs for Oracle Big Data Appliance

The type of PDU depends on the location where Oracle Big Data Appliance is installed:

- North America, South America, Japan, and Taiwan use low-voltage PDUs.
- Europe, the Middle East, and Africa (EMEA) use high-voltage PDUs.
- Asia Pacific (APAC) locations, except for Japan and Taiwan, use high-voltage PDUs.

Refer to the appropriate sections for your location:

- [Low-Voltage 15 kVA Single-Phase PDUs](#)
- [Low-Voltage 15 kVA Three-Phase PDUs](#)
- [High-Voltage 15 kVA Single-Phase PDUs](#)
- [High-Voltage 15 kVA Three-Phase PDUs](#)

Low-Voltage 15 kVA Single-Phase PDUs

[Table 2–5](#) lists the requirements for low-voltage single-phase PDUs for North America, South America, Japan, and Taiwan. There are two PDUs per rack.

Table 2–5 Low-Voltage 15 kVA Single-Phase PDUs

Option	Requirement per PDU
Number of inputs	3 x 30A single phase
Voltage	200 to 240 VAC
Frequency	50/60 Hz
Current	24A maximum per input
Power rating	15 kVA
Output current	72A (3 x 24A)
Outlets	42 x C13; 6 x C19
Outlet groups	6
Group protection ¹	20A
Data center receptacle	15 kVA, with three 30A/250V 2-pole/3-wire NEMA L6-30P plugs

¹ UL489 2-pole circuit breaker

The following are needed to connect Oracle Big Data Appliance to a low-voltage single-phase power source:

- 6 power cords for two PDUs, 30A at 200 to 240 VAC
- 6 receptacles to connect the PDUs to 6 NEMA L6-30 data center receptacles

Figure 2–1 shows the low-voltage, single-phase PDU power connector for North America, South America, Japan, and Taiwan.

Figure 2–1 Low-Voltage, Single-Phase Power Connector



Low-Voltage 15 kVA Three-Phase PDUs

Table 2–6 lists the requirements for low-voltage three-phase PDUs for North America, South America, Japan, and Taiwan. There are two PDUs per rack.

Table 2–6 Low-Voltage 15 kVA Three-Phase PDUs

Option	Requirement per PDU
Number of inputs	1 x 60A three-phase 4-wire
Voltage	190 to 220 VAC
Frequency	50/60 Hz
Current	40A maximum per phase
Power rating	14.4 kVA
Output current	69A (3 x 23A)
Outlets	42 x C13; 6 x C19
Outlet groups	6
Group protection ¹	20A
Data center receptacle	15 kVA IEC 60309 60A 4-pin 250 VAC three-phase IP67

¹ UL489 2-pole circuit breaker

The following are needed to connect Oracle Big Data Appliance to a low-voltage three-phase power source:

- 2 power cords for two PDUs, 60A at 190 to 220 VAC three-phase
- 2 receptacles to connect the PDUs to 2 IEC 60309 60A 4-pin 250 VAC three-phase IP67 data center receptacles

Figure 2–2 shows the low-voltage three-phase PDU power connector for North America, South America, Japan, and Taiwan.

Figure 2–2 Low-Voltage Three-Phase Power Connector

High-Voltage 15 kVA Single-Phase PDUs

Table 2–7 lists the requirements for 15 kVA high-voltage single-phase PDUs for Europe, the Middle East, Africa, and Asia Pacific, except Japan and Taiwan. There are two PDUs per rack.

Table 2–7 High-Voltage 15 kVA Single-Phase PDUs

Option	Requirement per PDU
Number of inputs	3 x 25A single phase
Voltage	220 to 240 VAC
Frequency	50/60 Hz
Current	25A maximum per input
Power rating	15 kVA
Output current	72A (3 x 24A)
Outlets	42 x C13; 6 x C19
Outlet groups	6
Group protection ¹	20A
Data center receptacle	15 kVA, with three blue 32A/240V splash-proof 2-pole/3-wire IEC 60309 plugs

¹ UL489 1-pole circuit breaker

The following are needed to connect Oracle Big Data Appliance to a high-voltage single-phase power source:

- 6 power cords for two PDUs, 25A at 220/380 to 240/415 VAC single-phase voltage
- 6 receptacles to connect the PDUs to 2 IEC 60309 32A 3-pin 250 VAC IP44 data center receptacles, and requires 22 kVA, single-phase

Figure 2–3 shows the high-voltage single-phase PDU power connector for EMEA and APAC, except for Japan and Taiwan.

Figure 2–3 High-Voltage Single-Phase Power Connector

High-Voltage 15 kVA Three-Phase PDUs

Table 2–8 lists the requirements for high-voltage three-phase PDUs for Europe, the Middle East, Africa, and Asia Pacific, except Japan and Taiwan. There are two PDUs per rack. The following specifications are per PDU.

Table 2–8 High-Voltage 15 kVA Three-Phase PDUs

Option	Requirement per PDU
Number of inputs	1 x 25A three-phase 5 wire
Voltage	220/380 to 240/415 VAC three-phase
Frequency	50/60 Hz
Current	25A maximum per phase
Power rating	14.4 kVA
Output current	62.7A (3 x 20.9A)
Outlets	42 x C13; 6 x C19
Outlet groups	6
Group protection ¹	20A
Data center receptacle	15 kVA, three-phase, 5-pin, IEC 60309 32A, 5-pin 230/400V, three-phase IP44

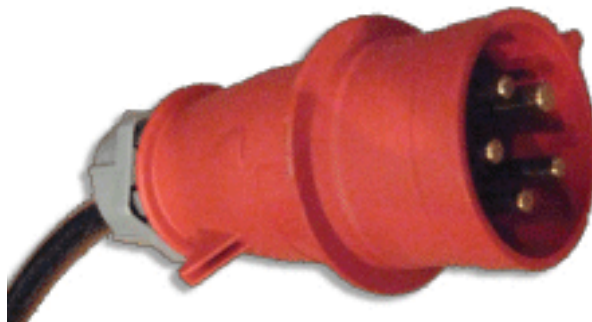
¹ UL489 1-pole circuit breaker

The following are needed to connect Oracle Big Data Appliance to a high-voltage three-phase power source:

- 2 power cords for two PDUs, 25A at 220/380 to 240/415 VAC three-phase
- 2 receptacles to connect the PDUs to 2 IEC 60309 32A 5-pin 230/400 VAC three-phase IP44 data center receptacles

Figure 2–4 shows the high-voltage three-phase PDU power connector for EMEA and APAC, except for Japan and Taiwan.

Figure 2–4 High-Voltage Three-Phase Power Connector



Facility Power Requirements

Electrical work and installations must obey applicable local, state, or national electrical codes. Contact your facilities manager or a qualified electrician to determine what type of power is supplied to the building.

To prevent catastrophic failures, design the input power sources to ensure adequate power is provided to the PDUs. Use dedicated AC breaker panels for all power circuits that supply power to the PDU. When planning for power distribution requirements, balance the power load between available AC supply branch circuits. In the United States and Canada, ensure that the overall system AC input current load does not exceed 80 percent of the branch circuit AC current rating.

PDU power cords are 4 meters (13.12 feet) long, and 1 to 1.5 meters (3.3 to 4.9 feet) of the cord is routed within the rack cabinet. The installation site AC power receptacle must be within 2 meters (6.6 feet) of the rack.

Circuit Breaker Requirements

To prevent catastrophic failures, the design of your power system must ensure that adequate power is provided to the servers. Use dedicated AC breaker panels for all power circuits that supply power to the server. Electrical work and installations must obey applicable local, state, and national electrical codes. Servers require that electrical circuits be grounded to the earth.

In addition to circuit breakers, provide a stable power source, such as an uninterruptible power supply (UPS), to reduce the possibility of component failures. If computer equipment is subjected to repeated power interruptions and fluctuations, then it is susceptible to a higher rate of component failure.

Note: The owner supplies the circuit breakers. Each power cord requires one circuit breaker.

Grounding Guidelines

The cabinets for Oracle Big Data Appliance are shipped with grounding-type power cords. Always connect the cords to grounded power outlets. Because different grounding methods are used depending on location, check the grounding type and refer to documentation, such as International Electrotechnical Commission (IEC) documents, for the correct grounding method. Ensure that the facility administrator or qualified electrical engineer verifies the grounding method for the building and performs the grounding work.

Temperature and Humidity Requirements

Airflow through Oracle Big Data Appliance is from front to back. See [Table 2–1](#) for information about cooling and airflow.

Note: Studies show that temperature increases of 10 degrees Celsius (15 degrees Fahrenheit) above 20 degrees Celsius (70 degrees Fahrenheit) reduce long-term electronics reliability by 50 percent.

Excessive internal temperatures may result in full or partial shutdown of Oracle Big Data Appliance.

[Table 2–9](#) lists the temperature, humidity, and altitude requirements for operating and nonoperating systems.

Table 2–9 Temperature, Humidity, and Altitude Requirements

Condition	Operating Requirement	Nonoperating Requirement	Optimum
Temperature	5 to 32 degrees Celsius (40 to 90 degrees Fahrenheit)	-40 to 70 degrees Celsius (-40 to 158 degrees Fahrenheit)	For optimal rack cooling, data center temperatures from 21 to 23 degrees Celsius (70 to 74 degrees Fahrenheit)
Relative humidity	10 to 90 percent relative humidity, noncondensing	Up to 93 percent relative humidity	For optimal data center rack cooling, 45 to 50 percent, noncondensing
Altitude	3048 meters (10000 feet) maximum	12000 meters (40000 feet) maximum	Ambient temperature is reduced by 1 degree Celsius per 300 m above 900 m altitude above sea level

Set conditions to the optimal temperature and humidity ranges to minimize the chance of downtime due to component failure. Operating Oracle Big Data Appliance for extended periods at or near the operating range limits, or installing it in an environment where it remains at or near nonoperating range limits, could significantly increase hardware component failure.

The ambient temperature range of 21 to 23 degrees Celsius (70 to 74 degrees Fahrenheit) is optimal for server reliability and operator comfort. Most computer equipment can operate in a wide temperature range, but near 22 degrees Celsius (72 degrees Fahrenheit) is desirable because it is easier to maintain safe humidity levels. Operating in this temperature range provides a safety buffer if the air conditioning system fails.

The ambient relative humidity range of 45 to 50 percent is suitable for safe data processing operations. Most computer equipment can operate in a wide range (20 to 80 percent), but the range of 45 to 50 percent is recommended for the following reasons:

- Helps protect computer systems from corrosion problems associated with high humidity levels.
- Provides the greatest operating time buffer if the air conditioner control fails
- Helps avoid failures or temporary malfunctions caused by intermittent interference from static discharges that may occur when relative humidity is too low.

Note: Electrostatic discharge (ESD) is easily generated and hard to dissipate in areas of low relative humidity, such as below 35 percent. ESD becomes critical when humidity drops below 30 percent. It is not difficult to maintain humidity in a data center because of the high-efficiency vapor barrier and low rate of air changes normally present.

Ventilation and Cooling Requirements

Always provide adequate space in front and behind the rack to allow for proper ventilation. Do not obstruct the front or rear of the rack with equipment or objects that might prevent air from flowing through the rack. Rack-mountable servers and equipment typically draw cool air in through the front of the rack and let out warm air through the rear of the rack. There is no air flow requirement for the left and right sides due to front-to-back cooling.

If the rack is not completely filled with components, then cover the empty sections with filler panels. Gaps between components can adversely affect air flow and cooling within the rack.

Relative humidity is the percentage of the total water vapor that can exist in the air without condensing, and it is inversely proportional to air temperature. Humidity goes down when the temperature rises, and goes up when the temperature drops. For example, air with a relative humidity of 45 percent at a temperature of 24 degrees Celsius (75 degrees Fahrenheit) has a relative humidity of 65 percent at a temperature of 18 degrees Celsius (64 degrees Fahrenheit). As the temperature drops, the relative humidity rises to more than 65 percent, and water droplets are formed.

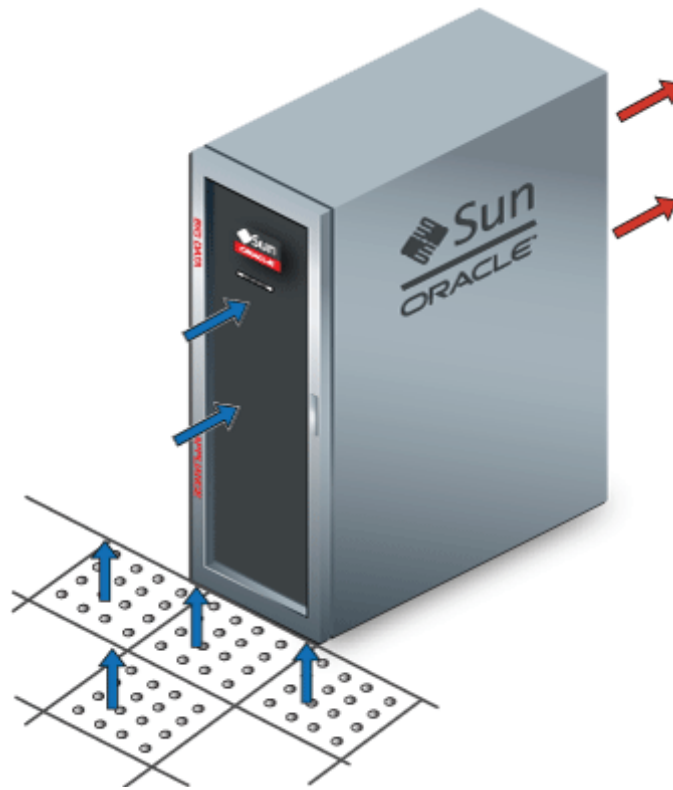
Air conditioning facilities usually do not precisely monitor or control temperature and humidity throughout an entire computer room. Generally, you should monitor individual points corresponding to multiple exhaust vents in the main unit and other units in the room, because the distribution of temperature and humidity is uneven across the room. Pay special consideration to humidity when using underfloor ventilation.

Oracle Big Data Appliance is designed to function while mounted in a natural convection air flow. Follow these requirements to meet the environmental specification:

- Ensure that the server has adequate air flow.
- Ensure that the server has front-to-back cooling. The air inlet is at the front of the server, and the air outlet is at the rear.
- Allow a minimum clearance of 91.4 cm (36 inches) at the front of the server and 91.4 cm (36 inches) at the rear of the server for ventilation.

Use perforated tiles, rated for 400 cubic feet per minute (CFM) per tile air flow, in front of the rack for cold air intake. The tiles can be arranged in any order in front of the rack, provided that cold air from the tiles can flow into the rack. Inadequate cold air flow could result in a higher inlet temperature in the servers due to exhaust air recirculation. Oracle recommends four floor tiles for Oracle Big Data Appliance.

[Figure 2–5](#) shows a typical installation of the floor tiles for Oracle Big Data Appliance in a typical data center.

Figure 2–5 Typical Data Center Configuration for Perforated Floor Tiles

Network Connection Requirements

Before installation, network cables must run from your existing network infrastructure to the installation site. The requirements to connect Oracle Big Data Appliance to your existing network infrastructure are as follows:

- Management network connection requirements
 - 1 Ethernet connection for the Ethernet switch in the rack
 - 1 Ethernet connection for the KVM switch in the rack
- Client access network connection requirements
 - 1 Ethernet connection for each server in the rack, for a total of 18 connections.
 - 2 10 GbE connections, one to each Sun Network QDR InfiniBand Gateway Switch

See Also: [Chapter 3, "Network Requirements"](#)

Ensuring That the Site Is Ready

Before Oracle Big Data Appliance is delivered to the site, perform these tasks to ensure that the site is ready:

- [Task 1, "Review Site Requirements"](#)
- [Task 2, "Complete the Oracle Big Data Appliance Configuration Worksheets"](#)
- [Task 3, "Complete the Oracle Big Data Appliance Configuration Utility"](#)
- [Task 4, "Configure the Network"](#)

- [Task 5, "Prepare the Site Based on Requirements"](#)

Task 1 Review Site Requirements

Review the site requirements in this chapter and in the *Oracle Big Data Appliance Site Checklists* to understand the requirements of Oracle Big Data Appliance.

Task 2 Complete the Oracle Big Data Appliance Configuration Worksheets

Provide the network configuration details and select the optional software components to be installed. Complete the *Oracle Big Data Appliance Configuration Worksheets* for every set of appliances that will be configured as a single CDH cluster. Give the completed worksheets to your Oracle representative.

Task 3 Complete the Oracle Big Data Appliance Configuration Utility

Complete the spreadsheet from the information in the *Oracle Big Data Appliance Configuration Worksheets* and generate the Installation Template and configuration files. This step is performed by an Oracle representative, except when the owner performs the installation and configuration without assistance.

See Also: [Chapter 4, "Using the Oracle Big Data Appliance Configuration Utility"](#)

Task 4 Configure the Network

Configure the existing network using the Installation Template provided by your Oracle representative. This includes registering the networks in the Domain Name System (DNS), assigning IP addresses, and configuring data center switches and firewalls.

See Also:

- [Chapter 3, "Network Requirements"](#)
- [Chapter 4, "Using the Oracle Big Data Appliance Configuration Utility"](#)
- [Chapter 8, "Configuring Oracle Big Data Appliance"](#)

Task 5 Prepare the Site Based on Requirements

Prepare the site based on the requirements described earlier in this chapter, such as installing the network cables and power supplies, before the arrival of Oracle Big Data Appliance:

1. Review the safety guidelines.

See Also: ["Reviewing Safety Guidelines"](#) on page 5-1

2. Note problems or peculiarities at the site. For example, ensure that the doors are tall enough and wide enough for Oracle Big Data Appliance.

See Also: ["Space Requirements"](#) on page 2-2

3. Verify that the installation site flooring has a strength rating to withstand the combined weight of Oracle Big Data Appliance and any other installed equipment.

See Also: ["Flooring Requirements"](#) on page 2-3

4. Install all necessary electrical equipment, and ensure that sufficient power is provided for Oracle Big Data Appliance.

See Also:

- "Electrical Power Requirements" on page 2-3
- *Sun Rack II Power Distribution Units User's Guide* for the power distribution unit (PDU) power requirements at
<http://docs.oracle.com/cd/E19844-01/>

5. Install network cables for Oracle Big Data Appliance.

See Also: "Network Connection Requirements" on page 2-11

6. Ensure that the installation site provides adequate air conditioning.

See Also: "Ventilation and Cooling Requirements" on page 2-9

7. Operate the air conditioning system for 48 hours to bring the room temperature to the appropriate level.

See Also: "Temperature and Humidity Requirements" on page 2-8

8. Clean and vacuum the area thoroughly in preparation for installation.

Network Requirements

This chapter describes the network requirements for Oracle Big Data Appliance. This chapter contains these sections:

- [Overview of Network Requirements](#)
- [Cabling the Client Network](#)
- [Factory Network Settings](#)
- [Port Assignments](#)

Overview of Network Requirements

Oracle Big Data Appliance includes 18 servers and the equipment to connect the servers to your network. The network connections allow the servers to be administered remotely and allow clients to connect to them. Use the information in this chapter to configure the environment for Oracle Big Data Appliance.

Each server has the following network components and interfaces:

- 1 Dual-port 4X QDR (40 Gbps) InfiniBand Host Channel Adapter network interface card
- 1 Ethernet port for Oracle Integrated Lights Out Manager v3.0 for remote management
- 1 Gigabit Ethernet port

Default Network Connections

The installation process automatically discovers whether each Sun Network QDR InfiniBand Gateway Switch has at least one 10 GbE connection. If they all do, then two virtual network interface cards (VNICs) are configured for each server: one for each switch bonded as bondeth0 in active/passive failover mode. The VNICs are assigned automatically to the available 10 GbE connections in round-robin fashion. For example, if each switch has three available 10 GbE connections, then the VNIC on server 1 is assigned to 10 GbE port 1, server 2 to port 2, server 3 to port 3, server 4 to port 1, and so on.

All VNICs are assigned to the same default VLAN. To assign different VLANs to different VNICs, you must delete the initial VNICs and manually create your own.

See Also:

- [Chapter 10, "Configuring Ethernet over InfiniBand"](#)
- [Chapter 11, "Creating Virtual LANs"](#)

Minimum Requirements for the Networks

Additional configuration, such as defining multiple virtual local area networks (VLANs) or enabling routing, may be required for the switch to operate properly in your environment. If additional configuration is needed, then your network administrator must perform the necessary configuration steps during installation of Oracle Big Data Appliance.

To deploy Oracle Big Data Appliance, ensure that your network meets the minimum requirements. Oracle Big Data Appliance uses three networks. Each network must be on a distinct and separate subnet from the others. These are the network descriptions:

- **Administrative network:** This 1 Gigabit Ethernet (GbE) network connects to your existing administrative network and is used to administer all components of Oracle Big Data Appliance. It connects the servers, Oracle ILOM, and switches connected to the Ethernet switch in the rack.

There are three uplinks to the administrative network:

- From the Ethernet switch in the rack
- From the KVM switch in the rack
- From each power distribution unit (PDU).

Network connectivity to the PDUs is required only if the electric current is monitored remotely.

Each server has two network interfaces for administration. One provides administrative access to the operating system through the ETH0 Ethernet interface, and the other provides access to the Integrated Lights Out Manager through the Oracle ILOM Ethernet interface. Oracle Big Data Appliance is delivered with the ETH0 and ILOM interfaces connected to the Ethernet switch on the rack. Do not use the ETH0 interface on the servers for client network traffic. Cabling or configuration changes to these interfaces are not permitted.

- **Client access network:** This 10 GbE network connects the servers through the gateway switches to your existing client network and is used for client access to the servers. Client applications access the software through this network by using Single Client Access Name (SCAN).

There are two Sun Network QDR InfiniBand Gateway Switches in the rack. Each switch supports 1 to 8 connections for client access for a total of up to 16 client network connections. For failover, you must have at least one connection from each switch and scale up according to your requirements for loading data and providing client access.

- **InfiniBand private network:** This network connects the servers by using the InfiniBand switches on the rack and the bondib0 interface. This nonroutable network is fully contained in Oracle Big Data Appliance and does not connect to your existing network. This network is automatically configured during installation.

Note: All networks must be on distinct and separate subnets from each other.

Network Diagram

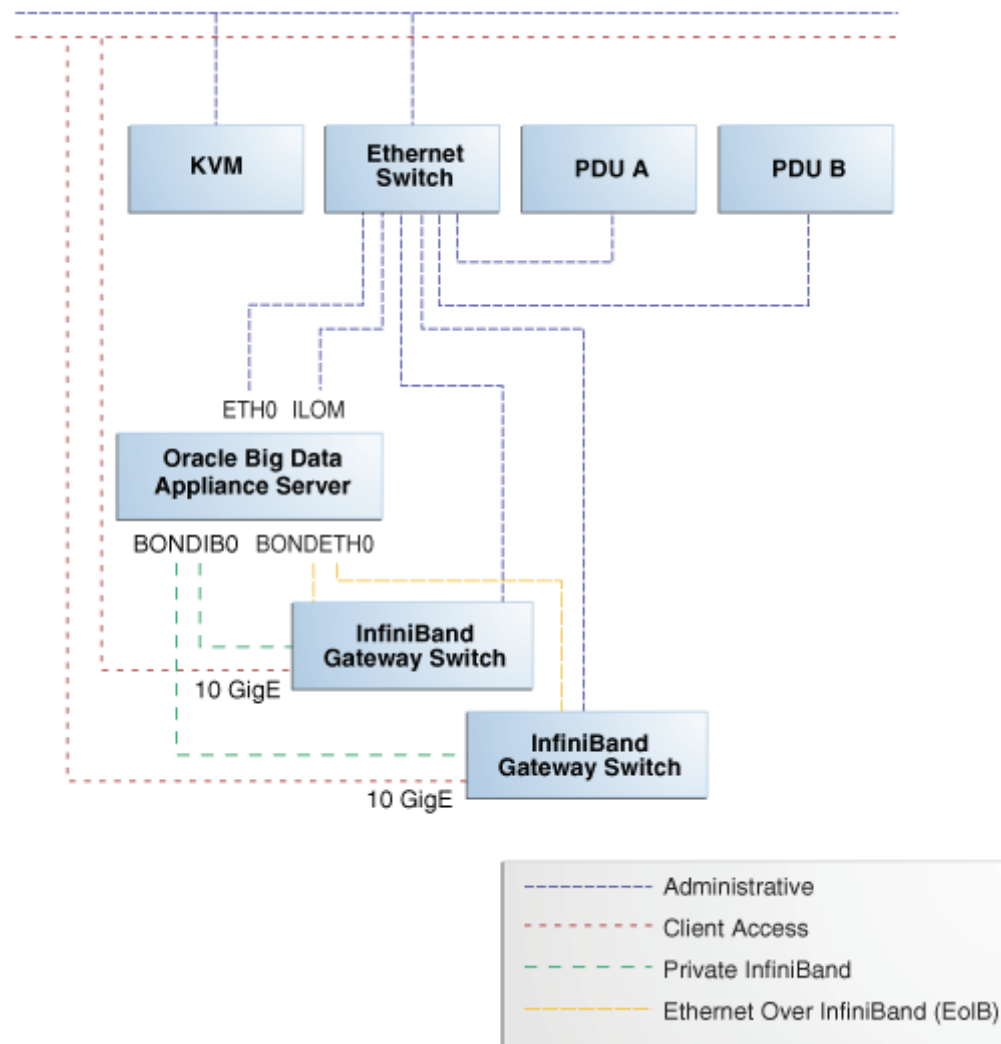
The servers are configured on the network as follows:

- ETH0: Provides access to the operating system using the administrative network.

- **BONDETH0:** Provides access to the server using the client access network. The SCAN addresses are defined on this interface.
- **ILOM:** Provides access to Oracle Integrated Lights Out Manager (ILOM) using the administrative network.

Figure 3–1 shows the network diagram. Use the `preinstall-checkip.sh` script to verify the cable connections when cabling Oracle Big Data Appliance to the existing network. See "Checking for Network Errors" on page 4-4.

Figure 3–1 Network Diagram for Oracle Big Data Appliance



Cabling the Client Network

Each of the two Sun Network QDR InfiniBand Gateway Switches in Oracle Big Data Appliance has eight 10 GbE ports. The two switches enable you to create up to 16 10 GbE connections for each rack. You can determine how many connections to create based on the bandwidth needed for the client network. For proper functioning, at least one of the eight ports of each gateway switch must have an active connection to the site's 10 GbE network.

How the Servers Connect to the Gateway Switches

Physical Ethernet connections are created only between the site network and the gateway switches. The Oracle Big Data Appliance servers are connected only by InfiniBand to those switches. Each server has two InfiniBand connections, one to each gateway switch, in an active backup mode; only the active InfiniBand connection is used for all InfiniBand traffic to that server. If that connection fails, it immediately fails over to the other connection.

Half of the Oracle Big Data Appliance servers have active connections to one gateway switch, and the other half have active connections to the other gateway switch. Inside Oracle Big Data Appliance, the client network traffic is transported over those InfiniBand connections using the Ethernet over InfiniBand (EoIB) protocol. As a result, each Oracle Big Data Appliance server has two virtual NICs (VNICs) that are bonded in the same active backup mode. Each VNIC is assigned a specific port on the gateway switch. If a switch has only one 10 GbE connection, then all VNICs for that switch point to the same port. If a switch has multiple connections, then the VNICs are spread across those ports in round-robin fashion.

For example, if you create three 10 GbE uplinks from each gateway switch, then the client network traffic from the servers is handled by the switches as shown in the following table:

Server Number	Active Link	Backup Link
1 to 3	GW Switch 1 Link 1	GW Switch 2 Link 1
4 to 6	GW Switch 1 Link 2	GW Switch 2 Link 2
...
16 to 18	GW Switch 2 Link 3	GW Switch 1 Link 3

If you do not want all servers balanced across the available connections, then you can manually delete the VNICs that are automatically created during the network setup process. You can then create your own VNIC to 10 GbE port mapping. See [Chapter 10](#) and [Chapter 11](#).

Depending on the number of 10 GbE connections, the client network traffic for multiple servers may be sent across the same physical 10 GbE connection. The maximum number of connections provides 160 gigabits per second (Gbps) of client network bandwidth to Oracle Big Data Appliance.

Using Splitter Cables for Connecting to the 40 Gbps Physical Ports

Although you can create up to eight 10 GbE connections for each gateway switch, its physical ports are 40 Gbps QSFP ports. Each gateway switch has two of these physical ports reserved for 10 GbE connectivity. The ports are equipped with QSFP transceivers that take an optical cable with a MTP/MPO connector. On the site network side are typically 10 Gbps ports with SFP+ transceivers that take LC connectors. For these connections, you can use splitter cables that have a single male MTP/MPO connector on one end and four pairs of LC connectors on the other end. Each 10 Gbps SFP+ transceiver takes a duplex LC connector for a total of four pairs. Thus, you can use a single splitter cable to create up to four 10 GbE connections. However, all four duplex LC connectors do not require a connection to the site network.

The splitter cables are not provided with Oracle Big Data Appliance and must be ordered separately from Oracle. They are available in lengths of 10, 20, and 50 meters.

Oracle recommends that you order the SFP+ transceivers used at the site end of the 10 GbE network from the same manufacturer as the 10 GbE switch.

Configuring Multiple Racks into a Single Hadoop Cluster

When multiple Oracle Big Data Appliance racks are connected to form a single Hadoop cluster, Oracle strongly recommends that you spread the 10 GbE connections across the switches in different racks. Every gateway switch in every rack must have at least one 10 GbE connection. Oracle does not recommend that the 10 GbE connections to the switches in a single rack be used for all the Oracle Big Data Appliance servers in all the racks, although that configuration may be possible.

What About Data Centers without a 10 GbE Infrastructure?

If your data center does not have a 10 GbE infrastructure, you can still connect Oracle Big Data Appliance to it by using an external switch that supports both 10 GbE (or 40 GbE) and 1 GbE. The Sun Network 10 GbE Switch 72p and numerous third-party switches provide this capability. You can connect the Sun Network QDR InfiniBand Gateway Switches to a 10 GbE or 40 GbE port and connect the data center to a 1 GbE port in the external switch.

Factory Network Settings

This initial network configuration is set at the factory for Oracle Big Data Appliance:

- **Gateway:** 192.168.1.254 in all devices as required
- **Subnet Mask:** 255.255.255.0 in all devices as required
- **IP Address Range:** 192.168.1.1 to 192.168.1.211

Table 3–1 lists the default IP addresses for Oracle Big Data Appliance.

Table 3–1 Default IP Addresses for Oracle Big Data Appliance

Host	Administrative IP Addresses	ILOM IP Addresses	InfiniBand Bonded IP Addresses
bda18	192.168.1.18	192.168.1.118	192.168.10.18
bda17	192.168.1.17	192.168.1.117	192.168.10.17
bda16	192.168.1.16	192.168.1.116	192.168.10.16
bda15	192.168.1.15	192.168.1.115	192.168.10.15
bda14	192.168.1.14	192.168.1.114	192.168.10.14
bda13	192.168.1.13	192.168.1.113	192.168.10.13
bda12	192.168.1.12	192.168.1.112	192.168.10.12
bda11	192.168.1.11	192.168.1.111	192.168.10.11
bda10	192.168.1.10	192.168.1.110	192.168.10.10
bdasw-ib3	192.168.1.203	--	--
KVM Tray	--	--	--
KVM Switch	--	--	--
Cisco Switch	192.168.1.200	--	--
bdasw-ib2	192.168.1.202	--	--

Table 3–1 (Cont.) Default IP Addresses for Oracle Big Data Appliance

Host	Administrative IP Addresses	ILOM IP Addresses	InfiniBand Bonded IP Addresses
bda09	192.168.1.9	192.168.1.109	192.168.10.9
bda08	192.168.1.8	192.168.1.108	192.168.10.8
bda07	192.168.1.7	192.168.1.107	192.168.10.7
bda06	192.168.1.6	192.168.1.106	192.168.10.6
bda05	192.168.1.5	192.168.1.105	192.168.10.5
bda04	192.168.1.4	192.168.1.104	192.168.10.4
bda03	192.168.1.3	192.168.1.103	192.168.10.3
bda02	192.168.1.2	192.168.1.102	192.168.10.2
bda01	192.168.1.1	192.168.1.101	192.168.10.1
bdasw-ib1	196.168.1.201	--	--
PDU A	192.168.1.210	--	--
PDU B	192.168.1.211	--	--

Port Assignments

Table 3–2 identifies the port numbers used by Oracle Big Data Appliance software. Ensure that these ports are free before you configure the network.

Table 3–2 Oracle Big Data Appliance Port Numbers

Port	Used by
2	ssh
80	yumrepos (only during installation)
111	portmap
668	rpc.statd
3306	MySQL Database
5000	Oracle NoSQL Database registration
5001	Oracle NoSQL Database administration
5010 to 5020	Oracle NoSQL Database processes
6481	xinetd (service tag)
8139	Puppet nodes
8140	Puppet parent
20910	Oracle Data Integrator agent
30920	Automated Service Monitor (ASM)

Table 3–3 lists the ports used by Cloudera's Distribution including Apache Hadoop (CDH). For additional details about these port assignments, go to the Cloudera website at

<http://ccp.cloudera.com/display/CDHDOC/Configuring+Ports+for+CDH3>

Table 3–3 CDH Port Numbers

Port	Component	Service	Access
0	HDFS	Thrift Plugin DataNode	--
0	MapReduce	TaskTracker	Localhost
1004	HDFS	Secure DataNode	External
1006	HDFS	Secure DataNode	External
2181	HBase	HQuorumPeer	--
2181	ZooKeeper	Server	External
2888	HBase	HQuorumPeer	--
2888	ZooKeeper	Server	Internal
3181	Flume	ZooKeeper Server	--
3182	Flume	ZooKeeper Server	--
3183	Flume	ZooKeeper Server	--
3888	HBase	HQuorumPeer	--
3888	ZooKeeper	Server	Internal
8001	Hue	Job Submission Server	Internal
8002	Hue	Beeswax Server	Internal
8003	Hue	Beeswax Metastore	Internal
8005	Oozie	Server	Internal
8020	HDFS	NameNode	External
8021	MapReduce	JobTracker	External
8080	HBase	REST Service	External
8088	Hue	Server	External
9083	Hive	Metastore	External
9090	HBase	ThriftServer	External
9290	MapReduce	JobTracker Thrift Plugin	Internal
10000	Hive	HiveServer	External
10090	HDFS	Thrift Plugin NameNode	--
10091	MapReduce	JobTracker Authorization Plugin	Internal
10092	HDFS	Authorization Plugin NameNode	--
10094	Oozie	Server Authorization Plugin	Internal
11000	Oozie	Server	External
16000	Sqoop	Metastore	External
35853	Flume	Node	--
35862	Flume	Node	--
35871	Flume	Master	--
35872	Flume	Master	--
45678	Flume	Master	--
50010	HDFS	DataNode	External

Table 3–3 (Cont.) CDH Port Numbers

Port	Component	Service	Access
50020	HDFS	DataNode	External
50030	MapReduce	JobTracker	External
50060	MapReduce	TaskTracker	External
50070	HDFS	NameNode	External
50075	HDFS	DataNode	External
50090	HDFS	Secondary NameNode	Internal
50470	HDFS	Secure NameNode	External
50495	HDFS	Secure Secondary NameNode	Internal
57890	Flume	Master	--
60000	HBase	Master	External
60010	HBase	Master	External
60020	HBase	RegionServer	External
60030	HBase	RegionServer	External