

Oracle® Cloud at Customer

Deploying Oracle Database Exadata Cloud at Customer (Gen 1/OCI-C)



Release 18.4.6

E89135-08

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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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Oracle Cloud at Customer Deploying Oracle Database Exadata Cloud at Customer (Gen 1/OCI-C), Release 18.4.6

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Preface

This guide describes the site and network requirements to deploy Oracle Database Exadata Cloud at Customer in a customer data center.

This guide focuses specifically on Exadata Cloud at Customer and does not include information on other components such as the Oracle Advanced Support Gateway, or the Oracle Cloud Machine that provides the Cloud Control Plane. For these components see:

- [Oracle Advanced Support Gateway Documentation](#)
- Oracle Public Cloud Machine Customer Deployment Guide

Note:

This is the deployment guide for Gen 1 Exadata Cloud at Customer. Gen 1 is the first generation of Exadata Cloud at Customer, which is deployed in conjunction with [Oracle Cloud at Customer](#) using Oracle Cloud Infrastructure Classic (OCI-C).

If you are looking for Gen 2 Exadata Cloud at Customer, which is deployed in conjunction with [Oracle Cloud Infrastructure](#), please use the latest documentation for [Gen 2 Exadata Cloud at Customer](#).

Audience

This document is intended for data center and infrastructure engineers who are preparing to deploy Oracle Database Exadata Cloud at Customer.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Site Requirements

Learn about the site requirements for Exadata Cloud at Customer.

Topics

- [Space](#)
- [Weight](#)
- [Receiving](#)
- [Flooring](#)
- [Electrical Power](#)
- [Facility Power](#)
- [Temperature and Humidity](#)
- [Ventilation and Cooling](#)

Space

Learn about the space requirements for Exadata Cloud at Customer.

The space requirements for each Exadata Cloud at Customer X6 rack are as follows:

Description	Millimeters (mm)	Inches (")
Height	1998 mm	78.66"
Width	600 mm	23.62"
Depth	1200 mm	47.24"

The space requirements for each Exadata Cloud at Customer X7 rack are as follows:

Description	Millimeters (mm)	Inches (")
Height	2000 mm	78.74"
Width	601 mm	23.66"
Depth	1197 mm	47.13"

Weight

Learn about the weight of each Exadata Cloud at Customer rack.

The following table lists the weight of each Exadata Cloud at Customer X6 rack:

Model (X6)	Kilograms (kg)	Pounds (lbs)
Eighth Rack	367.6 kg	810.3 lbs
Quarter Rack	381.2 kg	840.5 lbs

Model (X6)	Kilograms (kg)	Pounds (lbs)
Half Rack	538.2 kg	1186.5 lbs
Full Rack	819.4 kg	1806.5 lbs

The following table lists the weight of each Exadata Cloud at Customer X7 rack:

Model (X7)	Kilograms (kg)	Pounds (lbs)
Base System	400.1 kg	882.2 lbs
Quarter Rack	413.2 kg	910.9 lbs
Half Rack	574.6 kg	1266.8 lbs
Full Rack	864.8 kg	1906.6 lbs

Receiving

Review the shipping details and access route requirements for Exadata Cloud at Customer.

Shipping Requirements

Before your Exadata Cloud at Customer arrives, make sure that the receiving area is large enough for each package.

The following are the package dimensions for each Exadata Cloud at Customer rack:

Description	Millimeters (mm)	Inches (")
Shipping height	2159 mm	85 inches
Shipping width	1219 mm	48 inches
Shipping depth	1575 mm	62 inches

If your loading dock meets the height and ramp requirements for a standard freight carrier truck, then a pallet jack will be used to unload the rack. If the loading dock does not meet the requirements, then 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.

Access Route Requirements



Note:

Racks should only be unpacked and moved by Oracle Field Services and the delivery team.

Consider the following to allow the delivery team to unpack and move the Exadata Cloud at Customer system effectively:

- Use a conditioned space to remove the packaging material to reduce particles before entering the data center.

- Make sure that the entire access route to the installation site is free of raised-pattern flooring that can cause vibration.
- Make sure that the entire access route to the installation site does not contain any incline that exceeds 6 degrees.
- Allow enough space for unpacking it from its shipping cartons.
- Make sure that there is enough clearance and clear pathways for moving the Exadata Cloud at Customer and Cloud Control Plane racks from the unpacking location to the installation location.

Flooring

Learn about the flooring requirements for Exadata Cloud at Customer.

Oracle recommends that the Exadata Cloud at Customer system be installed on raised flooring. The site floor and the raised flooring must be able to support the total weight of Exadata Cloud at Customer.

The following table lists the floor load requirements.

Description	Kilograms (kg)	Pounds (lbs)
Maximum allowable weight of installed rack equipment	952.5 kg	2100 lbs
Maximum allowable weight of installed power distribution units	52.16 kg	115 lbs
Maximum dynamic load (maximum allowable weight of installed equipment including PDUs)	1004.66 kg	2215 lbs

Note:

Open tiles are typically required for electrical access.

Electrical Power

Learn about the electrical power specifications and requirements for Exadata Cloud at Customer.

Exadata Cloud at Customer 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 an Exadata Cloud at Customer:

- 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 the system, dedicated power distribution system and power-conditioning equipment should be used. Lightning arresters or power cables should be used to protect from electrical storms.

Each rack has two pre-installed Power Distribution Units (PDUs). The PDUs accept different power sources. You must select the type of PDU that meets the requirements for your data center.

Available PDUs

The following list outlines the available PDUs for Exadata Cloud at Customer depending on your region:

- **Americas, Japan, and Taiwan**
 - Low-Voltage 15kVA Single-Phase
 - Low-Voltage 15kVA Three-Phase
 - Low-Voltage 22kVA Single-Phase
 - Low-Voltage 24kVA Three-Phase
- **Europe, the Middle East and Africa (EMEA), and Asia Pacific (APAC), except for Japan and Taiwan**
 - High-Voltage 15kVA Three-Phase
 - High-Voltage 22kVA Single-Phase
 - High-Voltage 24kVA Three-Phase

Low-voltage PDU electrical specifications

The following table lists the low-voltage PDU specifications. The listed specifications are for each PDU. Each rack contains two PDUs.

Specification	15 kVA, 1 phase	15 kVA, 3 phase	22 kVA, 1 phase	24 kVA, 3 phase
Voltage	200 - 240 VAC	200 - 208 VAC 3ph	200 - 240 VAC	200 - 208 VAC 3ph
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Current	24A maximum per input	40A maximum per phase	36.8 A maximum per input	34.6 A maximum per phase
Power Rating	15 kVA	14.4 kVA	22 kVA	25 kVA
Output Current	72A (3 x 24A)	69A (3 x 23A)	110.4 A (3 x 36.8 A)	120A (6 x 20A)
Outlets	42 x C13; 6 x C19	42 x C13; 6 x C19	42 x C13; 6 x C19	42 x C13; 6 x C19
Number of Inputs	3 x 30A, 1 phase	1 x 60A, 3 phase	3 x 50 A, 1 phase	2 x 60A, 3 phase
Data Center Receptacle	NEMA L6-30	IEC309 60A 4 PIN 250VAC 3ph IP67	Hubbell CS8264C	IEC309 60A 4 PIN 250VAC 3ph IP67

High-voltage PDU electrical specifications

The following table lists the high-voltage PDU specifications. The listed specifications are for each PDU. Each rack contains two PDUs.

Specification	15 kVA, 3 phase	22 kVA, 1 phase	24 kVA, 3 phase
Voltage	220/380 - 240/415 VAC 3ph	220 - 240 VAC	220/380 - 240/415 VAC 3ph
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Current	25A maximum per phase	32A maximum per input	18A maximum per phase
Power Rating	14.4 kVA	22 kVA	25 kVA
Output Current	62.7A (3 x 20.9A)	96A (3 x 32A)	109A (6 x 18.1A)
Outlets	42 x C13; 6 x C19	42 x C13; 6 x C19	42 x C13; 6 x C19
Number of Inputs	1 x 25A, 3 phase	3 x 32A, 1 phase	2 x 25A, 3 phase
Data Center Receptacle	IEC309 32A 5 PIN 230/400V 3ph IP44	IEC309 32A 3 PIN 250 VAC IP44	IEC309 32A 5 PIN 230/400V 3ph IP44

Facility Power

Review the facility electrical power requirements for Exadata Cloud at Customer.

Review the following requirements:

- Electrical work and installations must comply with applicable local, state, or national electrical codes.
- Contact your facilities manager or 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 Power Distribution Units (PDUs). Dedicated AC breaker panels are required for all power circuits that supply power to the PDUs.
- 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 m (13.12 feet) long, and 1 to 1.5 m (3.3 to 4.9 feet) of the cord will be routed within the rack cabinet. The installation site AC power receptacle must be within 2 m (6.6 feet) of the rack.
- 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.
- The Exadata Cloud at Customer cabinet is shipped with grounding-type power cords (three-wire). 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 IEC documents, for the correct grounding method.
- Make sure that the facility administrator or qualified electrical engineer verifies the grounding method for the building, and performs the grounding work.

Temperature and Humidity

Review the temperature and humidity requirements for Exadata Cloud at Customer systems.

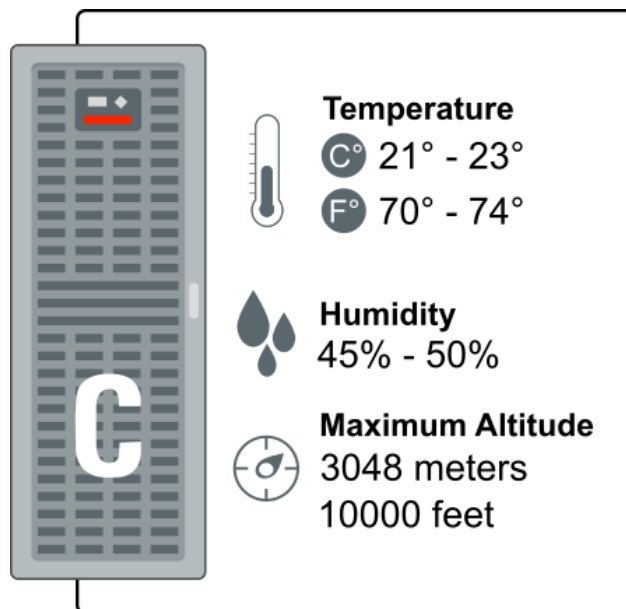
Set conditions to the optimal temperature and humidity ranges to minimize the chance of downtime. Operating the system for extended periods near the operating or non-operating range limits could significantly increase hardware component failure.

The ambient temperature range of 21 to 23 degrees Celsius (70 to 74 degrees Fahrenheit) is optimal for server reliability and operator comfort. Operating in this temperature range provides a safety buffer in the event that the air conditioning system goes down for a period of time.

Most computer equipment can operate in a range of 20 to 80 percent of relative humidity, 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 in the event of air conditioner control failure.
- Helps avoid failures or temporary malfunctions caused by intermittent interference from electrostatic discharges that may occur when relative humidity is too low (below 35 percent).

The following diagram summarizes the optimal operating conditions for Exadata Cloud at Customer.



The following table lists the temperature, humidity and altitude requirements for Exadata Cloud at Customer.

Condition	Operating Requirement	Non-operating Requirement	Optimal Requirement
Temperature	5 to 32 degrees Celsius (59 to 89.6 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, non-condensing	Up to 93 percent relative humidity.	For optimal data center rack cooling, 45 to 50 percent, non-condensing.
Altitude	3048 meters (10000 feet) maximum	12000 meters (40000 feet).	Ambient temperature is reduced by 1 degree Celsius per 300 m above 900 m altitude above sea level.

 **Note:**

Studies have shown 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 an Exadata Cloud at Customer system.

Ventilation and Cooling

Learn about the ventilation and cooling requirements for Exadata Cloud at Customer.

Always provide adequate space in front of 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 warm air out the rear of the rack. There is no air flow requirement for the left and right sides due to front-to-back cooling.

Exadata Cloud at Customer systems have been designed to function while mounted in a natural convection air flow. The following requirements must be followed to meet the environmental specification:

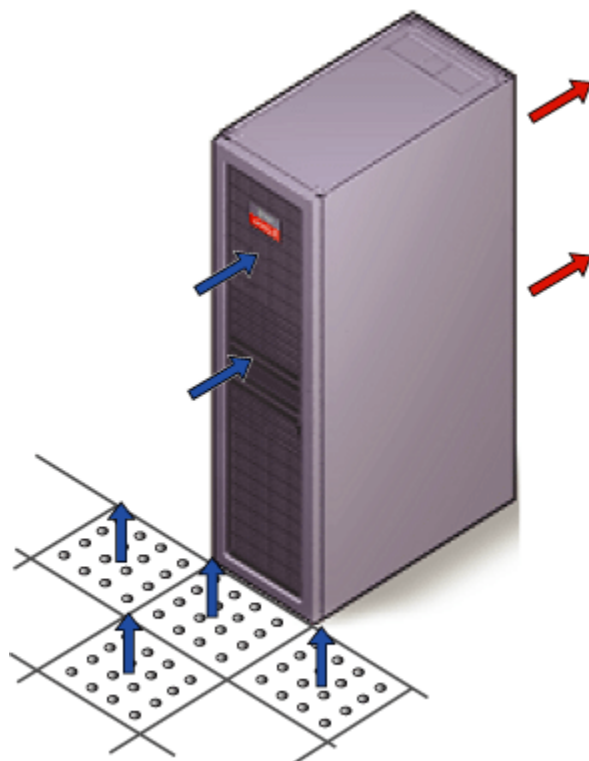
- Ensure there is adequate air flow through the server.
- Ensure the server has front-to-back cooling. Cool air is drawn in at the front and warm air is let out at the rear.
- Allow a minimum clearance of 914 mm (36 inches) at the front of the server, and 914 mm (36 inches) at the rear of the server for ventilation.

Use perforated tiles, approximately 400 CFM/tile, in front of the rack for cold air intake. The tiles can be arranged in any order in front of the rack, as long as 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. The following is the recommended number of floor tiles:

- Four floor tiles for an Exadata Cloud at Customer Full Rack.
- Three floor tiles for an Exadata Cloud at Customer Half Rack.
- One floor tile for an Exadata Cloud at Customer Quarter Rack, Eighth Rack or Base System.

The following diagram shows a typical configuration of perforated floor tiles for an Exadata Cloud at Customer Full Rack in a typical data center.



The following table lists the cooling requirement for each Exadata Cloud at Customer X6 rack:

Model (X6)	BTU/hr	KJ/hr
Eighth Rack	Typical: 7,845 BTU/hr Maximum: 11,207 BTU/hr	Typical: 8,276 KJ/hr Maximum: 11,823 KJ/hr
Quarter Rack	Typical: 9,575 BTU/hr Maximum: 13,679 BTU/hr	Typical: 10,102 KJ/hr Maximum: 14,432 KJ/hr
Half Rack	Typical: 18,709 BTU/hr Maximum: 26,727 BTU/hr	Typical: 19,738 KJ/hr Maximum: 28,197 KJ/hr
Full Rack	Typical: 33,489 BTU/hr Maximum: 47,842 BTU/hr	Typical: 35,331 KJ/hr Maximum: 50,473 KJ/hr

The following table lists the cooling requirement for each Exadata Cloud at Customer X7 rack:

Model (X7)	BTU/hr	KJ/hr
Base System	Typical: 8,467 BTU/hr Maximum: 12,096 BTU/hr	Typical: 8,933 KJ/hr Maximum: 12,761 KJ/hr
Quarter Rack	Typical: 10,376 BTU/hr Maximum: 14,822 BTU/hr	Typical: 10,946 KJ/hr Maximum: 15,638 KJ/hr
Half Rack	Typical: 20,309 BTU/hr Maximum: 29,013 BTU/hr	Typical: 21,426 KJ/hr Maximum: 30,609 KJ/hr
Full Rack	Typical: 36,690 BTU/hr Maximum: 52,414 BTU/hr	Typical: 38,708 KJ/hr Maximum: 55,297 KJ/hr

2

Network Requirements

This chapter describes the network requirements for Oracle Database Exadata Cloud at Customer.

Topics

- [Networks and Network Services](#)
- [IP Addresses](#)
- [Uplinks](#)
- [Network Cabling](#)

Networks and Network Services

Learn about the network requirements for Exadata Cloud at Customer.

Network Requirements

Exadata Cloud at Customer utilizes various different networks to provide secure and reliable network connectivity for different application and management functions. The following list outlines the minimum network requirements to install an Exadata Cloud at Customer system:

 **Note:**

Each network described below requires its own separate VLAN and subnet.

- **Oracle cloud management network**

This network connects Exadata Cloud at Customer servers and switches to the Cloud Control Plane and the Oracle Advanced Support Gateway, and is used by Oracle exclusively for administrative work on all Oracle-managed infrastructure components of Exadata Cloud at Customer.

Each database server and Exadata Storage Server has two network interfaces connected to the Oracle cloud management network. One provides management access to the server through one of the embedded 1/10 GbE Ethernet ports (NET0). The other provides access to the Integrated Lights-Out Management (ILOM) subsystem through a dedicated ILOM Ethernet port. Exadata Cloud at Customer is delivered with the ILOM and NET0 ports connected to the Ethernet switch in the rack. Cabling or configuration changes to these interfaces are not permitted.

- **Client network**

This network connects the Exadata Cloud at Customer database servers to your existing client network and is used for client access to the database servers.

Applications access databases on Exadata Cloud at Customer through this network using Single Client Access Name (SCAN) and Oracle RAC Virtual IP (VIP) interfaces.

The client access network uses a pair of 10 GbE interfaces, which are connected to the customer network through a pair of top-of-rack switches. Depending on your overall Exadata Cloud at Customer configuration, the top-of-rack switches may reside in the same Exadata Cloud at Customer rack, or in another Exadata Cloud at Customer rack, or in the Cloud Control Plane rack.

The database servers support channel bonding to provide higher bandwidth or availability for client connections to Exadata Cloud at Customer. Oracle recommends channel bonding for the client access network. For the connection to your corporate network, you must provide network switches capable of supporting your chosen bonding mode. For example, if mode 4 (IEEE 802.3ad Link Aggregation) is configured, then you must supply and configure network switches capable of supporting this bonding mode.

By default, at the operating system level inside DomU on each database server, the network interfaces supporting the client access network are identified as `eth6` and `eth7` on quarter and eighth rack systems, or as `eth4` and `eth5` on half and full rack systems. When bonding is used the corresponding bonded interface is identified as `bondeth0`.

- **Backup network**

This network is similar to the client access network, as it connects the Exadata Cloud at Customer database servers to your existing network. It can be used for access to the database servers for various purposes, including backups and bulk data transfers.

By default, the backup network uses a pair of network interfaces that support up to 10 GbE, which are connected to the customer network through a pair of top-of-rack switches.

Channel bonding is supported for the backup network to provide higher bandwidth or availability, and Oracle recommends channel bonding for the backup network. For the connection to your corporate network, you must provide network switches capable of supporting your chosen bonding mode. For example, if mode 4 (IEEE 802.3ad Link Aggregation) is configured, then you must supply and configure network switches capable of supporting this bonding mode.

By default, at the operating system level inside DomU on each database server, the network interfaces supporting the backup network are identified as `eth2` and `eth3` on quarter and eighth rack systems, or as `eth6` and `eth7` on half and full rack systems. When bonding is used the corresponding bonded interface is identified as `bondeth1`.

- **InfiniBand private network**

This network connects the database servers and Exadata Storage Servers using the InfiniBand switches on the rack. Each server contains two InfiniBand network interfaces (IB0 and IB1) that are connected to InfiniBand switches on the rack. Oracle Database uses this network for Oracle RAC cluster interconnect traffic and for accessing data on Exadata Storage Servers. This non-routable network is fully contained in Exadata Cloud at Customer, and does not connect to your existing network.

Data Center Network Services

Exadata Cloud at Customer requires the following data center network services:

- **DNS server**

As part of the deployment process, you will work in combination with Oracle to determine the host names and IP addresses to be used when deploying Exadata Cloud at Customer.

The host names and IP addresses for the Oracle cloud management network, client access network, backup network, and customer administration network, along with all single client access name (SCAN) addresses, and VIP addresses, are registered in an Oracle owned and managed Domain Name System (DNS) implementation that resides in the Cloud Control Plane.

You are required to configure DNS zone delegation on your corporate DNS servers so that all requests related to Exadata Cloud at Customer are forwarded to the Oracle owned and managed DNS.

- **NTP server**

At least one reliable NTP server is required and should be accessible on the Oracle cloud management network and the customer administration network. At deployment time, all servers and switches in Exadata Cloud at Customer are configured to reference the same NTP servers so that the Exadata Cloud at Customer servers and switches are synchronized to the same time. The NTP sever configuration can also be changed after initial deployment if required.

IP Addresses

Learn about the IP address requirements for Exadata Cloud at Customer.

Exadata Cloud at Customer requires a number of host names and IP addresses during initial configuration. The precise number of IP addresses required for a particular network, such as the Oracle cloud management network, depends on the size of the system and the number of virtual machine (VM) clusters that are configured on the system. The network configuration details, including host names and IP addresses, used during installation is generated from information you supply to Oracle.

Configure the new IP addresses in your existing networks only after you have completed the configuration information with an Oracle representative. In addition, all IP addresses must be statically assigned IP addresses, not dynamically assigned (DHCP) addresses.

The following table outlines the IP address requirements:

Network Type	IP Address Requirements	Base System, Eighth Rack, or Quarter Rack	Half Rack	Full Rack
Client network	1 IP address for client access on each database server. 1 IP address for the Oracle clusterware virtual IP (VIP) on each database server. 3 IP addresses for Single Client Network Access (SCAN) VIPs.	7 for each VM cluster.	11 for each VM cluster.	19 for each VM cluster.
Backup network	1 IP address for each database server.	2 for each VM cluster.	4 for each VM cluster.	8 for each VM cluster.

Uplinks

Learn about uplink requirements for Exadata Cloud at Customer.

An Oracle Cloud at Customer environment with Exadata Cloud at Customer has the following uplink requirements.

- To support the Oracle cloud management network, there is a requirement to connect the Ethernet switch in the Exadata Cloud at Customer rack to the Cloud Control Plane, which is in turn connected to the Oracle Advanced Support Gateway.
- The physical network connections for the client network and the backup network are all concentrated through a pair of top-of-rack switches. Depending on your overall Exadata Cloud at Customer configuration, the top-of-rack switches may reside in one or more Exadata Cloud at Customer racks, or in the Cloud Control Plane rack.

As a minimum, you require uplinks to connect the Cloud Control Plane top-of-rack switches to your corporate network. However, depending on your configuration, you may also choose to configure additional uplinks from the Exadata Cloud at Customer top-of-rack switches to your corporate network. Additional uplinks provide greater redundancy and can protect against some types of network failures. Additional uplinks also provide greater network bandwidth between your corporate network and your Exadata Cloud at Customer environment.

For each set of uplinks, Oracle recommends at least two physical connections; that is, at least one link from each top-of-rack switch to your corporate network. However, for greater resilience and increased bandwidth, Oracle recommends 4 uplinks to connect the top-of-rack switches to a pair of customer-supplied network switches. In this configuration, the connections are to be arranged so that each top-of-rack switch is connected to both customer switches, and each customer switch is connected to both top-of-rack switches. Oracle recommends this arrangement to ensure that no single point of failure exists in the physical network, and also to provide sufficient network bandwidth for network-intensive applications.

Network Cabling

Learn about network cabling requirements for Exadata Cloud at Customer.

Every Exadata Cloud at Customer rack is shipped with all of the network equipment and cables that are required to support the Exadata Cloud at Customer environment. This includes cables and transceivers needed to connect Exadata Cloud at Customer to a set of top-of-rack switches, and the cables and transceivers needed to support connectivity between multiple sets of top-of-rack switches. Oracle also provides cables (MPO-MPO or MPO-4LC) needed to connect the top-of-rack switches to your corporate network. For these cables, Oracle will provide the required transceivers for connection to the top-of-rack switches. However, the customer is responsible to provide the required transceivers for connection to the customer-supplied switches.