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Cloud at Customer

# Integrating Oracle Cloud at Customer into Your Network

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## Disclaimer

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## Introduction

Oracle Cloud at Customer (OCC) and Exadata Cloud at Customer (ExaCC), both part of Cloud at Customer family, are designed to integrate easily into your data center network. Cloud at Customer connects to two types of routers in your data center, one for the clients' access (users' traffic), the other for management and monitoring by Oracle CloudOps. The router for clients' access should be configured for high availability and therefore includes two physical chassis, while the router for CloudOps management can be a single physical chassis.

The communication between your network and Cloud at Customer is routed (layer 3) through the Cloud at Customer Top-of-Rack switches (ToR). Communication over layer 3 greatly simplifies the integration with your network as it eliminates any possible conflict of VLAN or IP. It also eliminates the risk of misconfiguration leading to Spanning Tree loops. Finally, OCC supports software-defined networking by internally leveraging an overlay network technology, and external communication is routed (Layer 3).

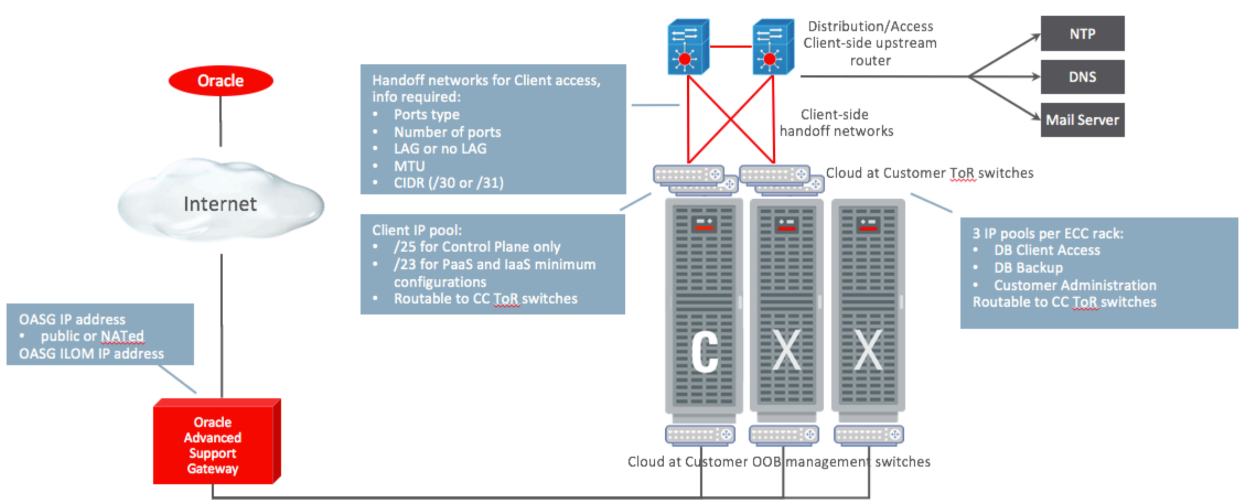


Figure 1 Illustration of the Datacenter Network Integration.

## Cloud at Customer in Your Network Architecture

Most enterprise data center network architecture follows a traditional and standard three tier design with a Core, Distribution, and Access tiers. Core and Distribution might be collapsed into a single tier. Cloud at Customer racks includes a pair of ToR switches that can be considered as Access switches that connect directly to your Distribution or Core switches.

You can also connect Cloud at Customer ToR switches to your Access switches (L2 or L3) that would be connected to your Distribution or Core switches. Cloud at Customer racks also includes an Out-of-Band management switch (OOB) that routes Oracle CloudOps management/monitoring traffic between Oracle Advanced Support Gateway (OASG) and Cloud at Customer components.

The upstream ports on the Cloud at Customer ToR switches are configured as Layer 3 ports and not Access ports (L2).

The following are the network routing requirements for a Cloud at Customer deployment:

» Egress traffic from Cloud at Customer to customer network is routed from Cloud at Customer ToR switches to customer's network. The source IP is from the Client IP pool (customer provided)

» Ingress traffic from customer network to Cloud at Customer is routed from customer network to Cloud at Customer ToR switches. The destination IP is from the Client IP pool (customer provided)

» The Cloud at Customer ToR switches route to the customer's DNS, NTP and Mail server (SMTP)

» The OASG to route to Internet and the Management IP pools assigned to each Cloud at Customer rack

As illustrated in Figure 2, there are four options to achieve the Cloud at Customer routing requirements:

1. The upstream ports on the ToR switches are connected directly to Layer 3 ports on Core/Distribution
2. The upstream ports on the ToR switches are connected to Layer 3 ports on an Access switch that is connected to the Core/Distribution
3. The upstream ports on the ToR switches are connected directly to Layer 2 ports on Core/Distribution. The routed packets transit through a VLAN and the router interface is the VLAN interface (Switch Virtual Interface - SVI)
4. The upstream ports on the ToR switches are connected to Layer 2 ports on an Access switch that is connected to the Core/Distribution. The routed packets transit through a VLAN defined on the Access switch and Core/Distribution and the router interface is the VLAN interface (SVI). In this case, your Access switch (layer 2) is a pass-thru between Cloud at Customer ToRs and VLAN interface (SVI) on Core/Distribution.

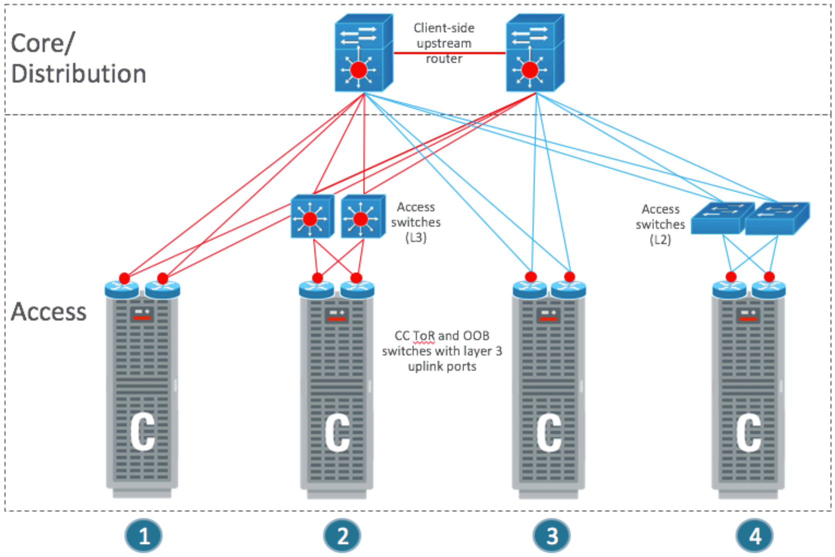


Figure 2 Illustration of the four options to meet the Cloud at Customer routing requirements.

With option 1, 3 and 4, in this paper, the Core/Distribution is referred to as the "**client-side upstream router**." With option 2, the L3 Access switch is the "**client-side upstream router**."

The client-side upstream router is part of your data center network infrastructure and is not provided nor managed by Oracle.

## Physical Connectivity

Client network traffic (Cloud users, application servers on your network) to Cloud at Customer goes through Cloud at Customer ToR switches. Each Cloud at Customer rack includes two ToR switches that connect to the client-side upstream router's SFP+ (10Gbps) or QSFP+ ports (40Gbps or 4*10Gbps), and Cloud at Customer ToR switches uplink ports are QSFP+. If you request to connect the QSFP+ ports of the upstream client-side router, Oracle will ship MPO-MPO cables, and the links will have a 40Gbps bandwidth. If you request to connect the SFP+ ports of the client-side upstream router, Oracle will ship MPO-4LC splitter cables, and each cable can carry four links with a 10Gbps bandwidth each.

Figure 3 illustrates the connection between the Cloud at Customer ToR switches from a single rack to the SFP+ ports of the client-side upstream router's physical chassis using MPO-4LC cables. Solid lines represent mandatory connections and dashed lines represent optional connections. Even though the minimum number of links is two, it is optimal to connect at least 4 links to your client-side upstream router, one LC cable from each MPO-4LC cable, for maximum availability. In Figure 3, this means connecting an LC cable represented by each color: red, green, blue, and orange. To maximize North-South network throughput, you would connect every LC cable to the client-side upstream router.

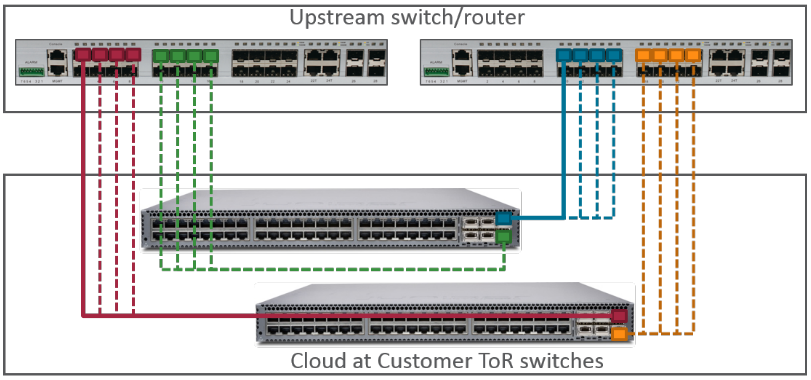


Figure 3 Connection of ToR switches to SFP+ ports of the upstream router

Figure 4 illustrates the connection between the Cloud at Customer ToR switches from a single rack to the QSFP+ ports of the client-side upstream router's physical chassis using MPO-MPO cables. Even though the minimum number of links is two, it is optimal to connect all 4 links to your client-side upstream router for maximum availability. In Figure 4, this means connecting all cables represented by each color: red, green, blue, and orange.

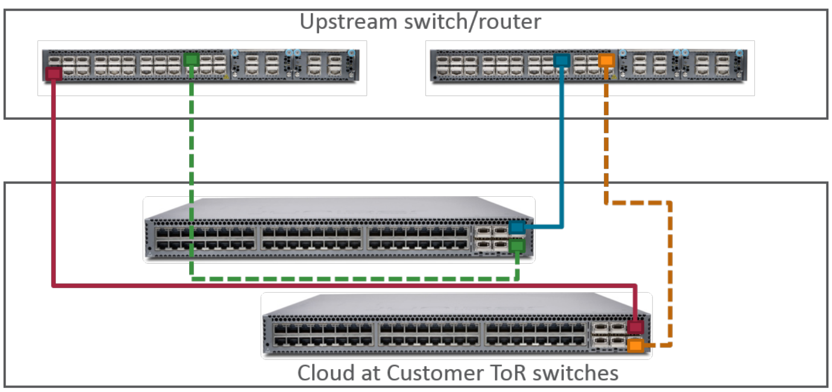


Figure 4 Connection of ToR switches to QSFP+ ports of the upstream router

## Ports Configuration

As mentioned in Cloud at Customer in Your Network Architecture, four options are available to connect the Cloud at Customer ToR switches to the upstream router. The network connecting the Cloud at Customer ToR uplink port and the upstream router port is the handoff network. The role of the handoff network is to interconnect routers (Cloud at Customer ToR and your upstream router), so they can exchange routed network packets.

Every uplink ports on the Cloud at Customer ToR switches are configured as Layer 3 ports. With option 1 and 2, the ToR switches uplink ports are connected upstream directly with a point-to-point configuration. With option 3 and 4, the ToR switches uplink ports are connected upstream via a VLAN that carries the handoff traffic. The subnets assigned to handoff networks are either a /30 or /31 for point-to-point configurations, or a larger subnet (/29 or /28) when a VLAN is configured to carry the handoff traffic.

Note: /31 subnets for point-to-point communication is only possible when your upstream router supports it.

One IP address from the handoff subnet is assigned to the upstream router port; another IP is assigned to the paired port on the Cloud at Customer ToR switch. When a VLAN is used to carry the handoff traffic (option 3 and 4), the upstream router IP is the VLAN interface (SVI).

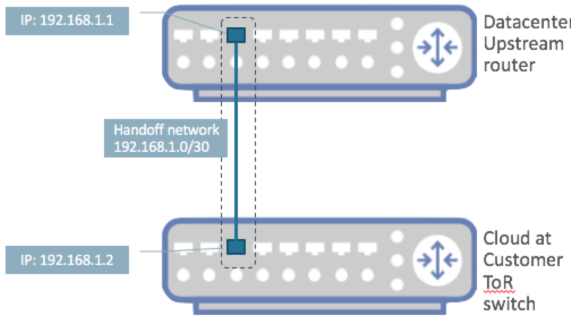


Figure 5 Illustration of Layer 3 ports configuration.

Ports can be grouped as Link Aggregation Groups (LAG) to reduce the number of required handoff subnets and simplify the routing management; however, this is optional. Three setups are supported:

1. Link aggregation is not used, each physical port is configured with its own handoff subnet. This setup is described in Client-side Upstream Switch/Router Connected to Cloud at Customer ToR with No Link Aggregation.
2. Link aggregation is used, two Link Aggregation Groups (LAGs) are configured for each Cloud at Customer rack. Each of the two physical chassis of the client-side upstream switch/router have their downstream ports set up as one LAG, one per physical chassis. Each LAG is associated with a handoff subnet. This setup is described in Client-side Upstream Switch/Router Configured with Two LAG per Cloud at Customer Rack.
3. Link aggregation is used, a single LAG is configured for each Cloud at Customer rack. The two physical chassis of the client-side upstream switch/router are configured as a vPC from Cisco (or Virtual Switch from Juniper), the downstream ports connected to a rack are set up as one LAG. Each LAG is associated with a handoff subnet. This setup is described in Client-side Upstream Switch/Router Configured with One LAG per Cloud at Customer Rack.

To optimize performance, upstream ports or LAG on the Cloud at Customer ToR switches needs their layer 3 MTU to match the layer 3 MTU on the downstream ports or LAG on the client-side upstream router. Therefore, we will request the layer 3 MTU set on the client-side upstream router. The maximum MTU value supported on the Cloud at Customer ToR switches ports is 9202.

### Client-side Upstream Switch/Router Connected to Cloud at Customer ToR with No Link Aggregation

Downstream ports from your client-side upstream switch/router are not configured with link aggregation, and each port requires a dedicated handoff subnet.

Each Cloud at Customer rack has 16 connections to the data center gateway. The implementation of a single Cloud at Customer rack requires sixteen handoff subnets and the double for two Cloud at Customer racks.

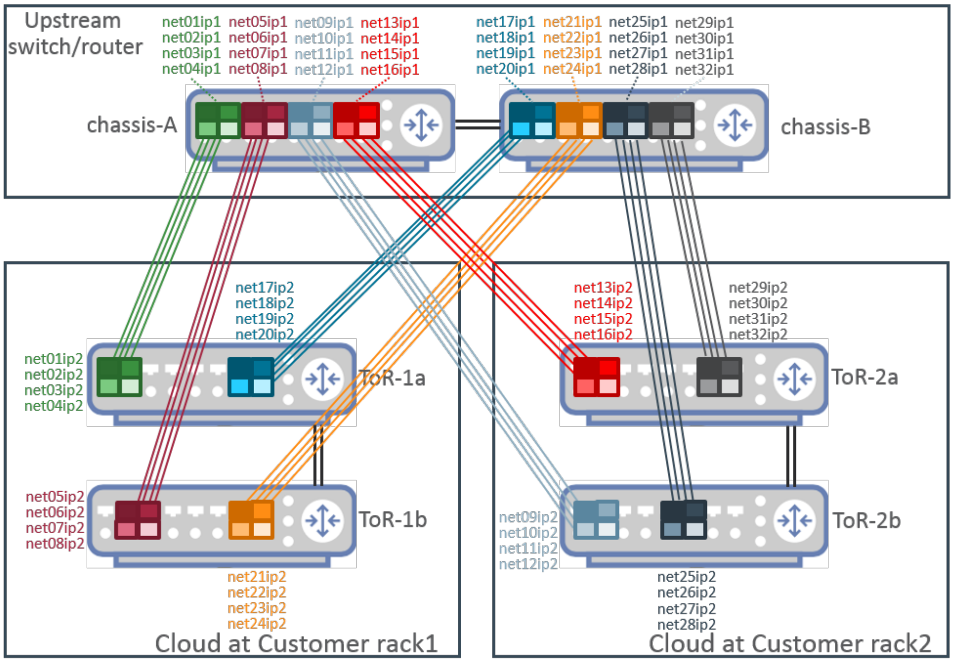


Figure 6. Illustration of the connection between ToR and upstream router without link aggregation.

The following is an example of the configuration of the green ports on the Upstream router chassis-A.

Sample configuration with Cisco:

```
interface tengigabitethernet 1/1
 no switchport
 mtu 9198
 ip address 192.168.1.1 255.255.255.252
!
interface tengigabitethernet 1/2
 no switchport
 mtu 9198
 ip address 192.168.1.5 255.255.255.252
!
interface tengigabitethernet 1/3
 no switchport
 mtu 9198
 ip address 192.168.1.9 255.255.255.252
!
interface tengigabitethernet 1/4
 no switchport
 mtu 9198
 ip address 192.168.1.13 255.255.255.252
!
```

Sample configuration with Juniper:

```
interfaces {
    xe-0/0/1 {
       mtu 9216;
       unit 0 {
           family inet {
```

```
                address 192.168.1.1/30;
            }
        }
    }
    xe-0/0/2 {
        mtu 9216;
        unit 0 {
            family inet {
                address 192.168.1.5/30;
            }
        }
    }
    xe-0/0/3 {
        mtu 9216;
        unit 0 {
            family inet {
                address 192.168.1.9/30;
            }
        }
    }
    xe-0/0/4 {
        mtu 9216;
        unit 0 {
            family inet {
                address 192.168.1.13/30;
            }
        }
    }
}
```

### Client-side Upstream Switch/Router Configured with Two LAG per Cloud at Customer Rack

On each physical chassis of the upstream switch/router, you configure the downstream ports to each Cloud at Customer rack as a Link Aggregation Group (LAG). Those ports are connected to different physical chassis of the Cloud at Customer ToR switches in a single Cloud at Customer rack, and the upstream ports on the Cloud at Customer ToR switches are also configured as a LAG. The LAG on the ToR switches can spread the two physical chassis because the ToR switches are configured as a virtual chassis within each Cloud at Customer racks.

Each LAG requires a handoff subnet. One IP from the handoff subnet is assigned to the upstream router, and the other will be assigned to Cloud at Customer ToR switches.

Figure 7 illustrates the connection between the Client-side upstream switch/router and two Cloud at Customer racks with two LAG for each Cloud at Customer rack. The implementation of a single Cloud at Customer rack requires two handoff subnets and the double for two Cloud at Customer racks.

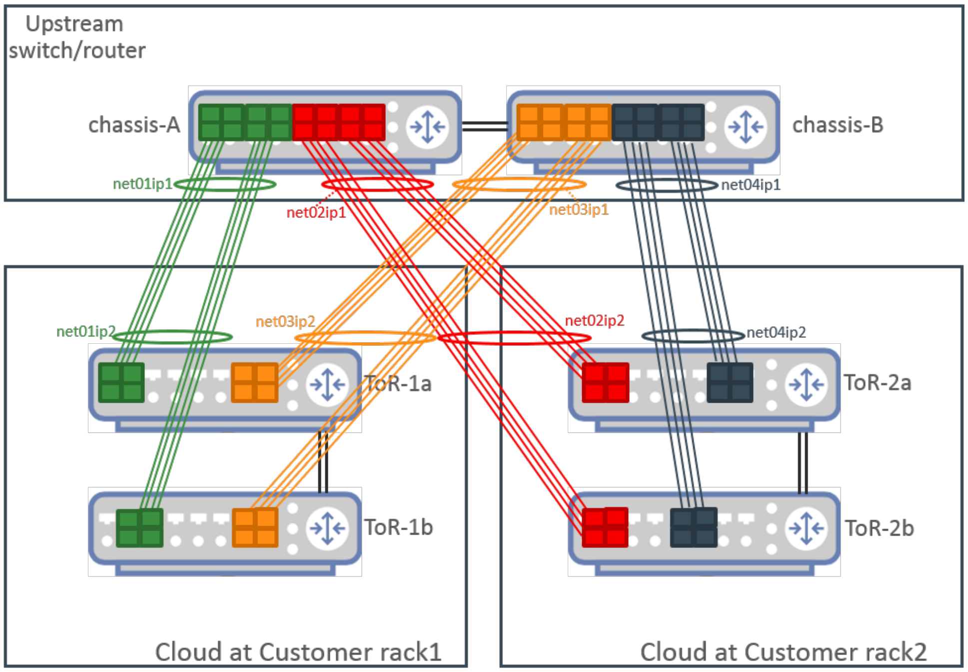


Figure 7 Illustration of the connection between ToR and upstream router without 2 LAG.

Each group of ports connected to Cloud at Customer ToR switches, represented in different colors in Figure 7, have to be configured as a Link Aggregation Group (LAG). On both the Client-side upstream router and the Cloud at Customer ToR switches, each group is configured with one IP address on both sides of the connection. Those IPs are required for the OCC installation.

The following is an example of a configuration of a LAG with the green ports on the Upstream router chassis-A.

Sample configuration with Cisco:

```
interface port-channel 1
ip address 192.168.1.1/30
!
interface TenGigabitEthernet 1/1
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/2
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/3
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/4
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/5
no switchport
channel-group 1
!
```

```
interface TenGigabitEthernet 1/6
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/7
no switchport
channel-group 1
!
interface TenGigabitEthernet 1/8
no switchport
channel-group 1
!
```

Sample configuration with Juniper:

```
interfaces {
    xe-0/0/1 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/2 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/3 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/4 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/5 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/6 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/7 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
        }
    }
    xe-0/0/8 {
        ether-options {
            auto-negotiation;
            802.3ad ae0;
```

```
            }
        }
        ae1 {
            description aggregated_ethernet_0;
            mtu 9216;
            aggregated-ether-options {
                lacp {
                    active;
                }
            }
            unit 0 {
                family inet {
                    address 192.168.1.1/30;
                }
            }
        }
    }
```

### Client-side Upstream Switch/Router Configured with One LAG per Cloud at Customer Rack

This setup is only available if your upstream switch/router is from Cisco or Juniper at this point.

The physical chassis of the upstream switch/router are configured as a vPC with Cisco or a virtual switch with Juniper. The downstream ports from the vPC or virtual switch to each Cloud at Customer rack are configured as a Link Aggregation Group (LAG). The upstream ports on the Cloud at Customer ToR switches are also configured as a LAG.

Figure 8 illustrates the connection between the Client-side upstream switch/router and two Cloud at Customer racks with one LAG for each Cloud at Customer rack. The implementation of a single Cloud at Customer rack requires one handoff subnet, and two for two Cloud at Customer racks.

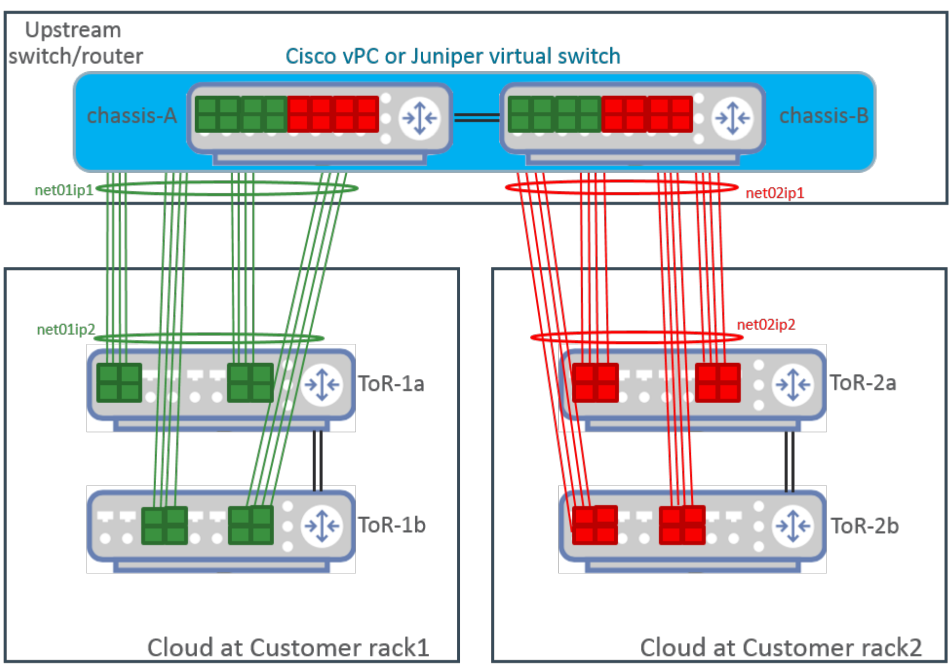


Figure 8 Illustration of the connection between ToR and upstream router with one cross-chassis LAG.

Each group of ports connected to Cloud at Customer ToR switches, represented in different colors in Figure 8, have to be configured as a Link Aggregation Group (LAG). On both the Client-side upstream router and the Cloud at Customer ToR switches, each group is configured with one IP address on both sides of the connection. Those IPs are required for the OCC installation.

## Routing Configuration

Users interact with OCC through IP addresses assigned to Cloud Services API and UI as well as Client IPs assigned to Cloud instances (Virtual Machines). All those IPs are routable from your network, and they are part of the Client IP pool you provide for the OCC installation. Your data center router and Cloud at Customer ToR switches route packets with a destination IP from the Client IP pool as described in Figure 10.

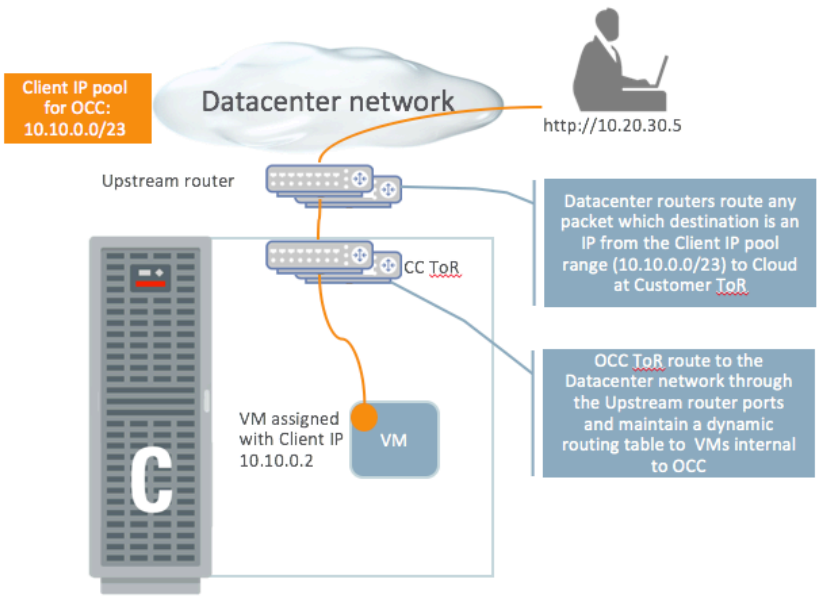


Figure 9 Communication between users and Cloud instances on OCC

When users or servers on your network communicate with Client IP addresses on OCC, your gateway distributes the network packets among all Cloud at Customer ToR upstream ports using Equal-cost multi-path routing (ECMP). Your Datacenter gateway must be configured with static routes to the same Client IP pool destination, pointing to different next-hops.

Note: Dynamic routing with BGP is also supported, for more information contact your Oracle technical representative.

For example:

- Number of Cloud at Customer racks = 2
- Number of links between data center gateway and each Cloud at Customer racks = 4
- Link aggregation configured = No
- Client IP pool = 10.10.0.0/23
- The routing table on the data center gateway would look like the following (these are not actual commands):
    - ECMP enabled
    - route 10.10.0.0/23 nexthop <subnet01-ip2>

- route 10.10.0.0/23 nexthop <subnet02-ip2>
- route 10.10.0.0/23 nexthop <subnet03-ip2>
- route 10.10.0.0/23 nexthop <subnet04-ip2>
- route 10.10.0.0/23 nexthop <subnet05-ip2>
- route 10.10.0.0/23 nexthop <subnet06-ip2>
- route 10.10.0.0/23 nexthop <subnet07-ip2>
- route 10.10.0.0/23 nexthop <subnet08-ip2>

This is an example of the routing configuration on a Cisco router:

```
ip cef load-sharing per-packet

ip route 10.10.0.0 255.255.254.0 192.168.1.2
ip route 10.10.0.0 255.255.254.0 192.168.1.6
ip route 10.10.0.0 255.255.254.0 192.168.1.10
ip route 10.10.0.0 255.255.254.0 192.168.1.14
ip route 10.10.0.0 255.255.254.0 192.168.1.18
ip route 10.10.0.0 255.255.254.0 192.168.1.22
ip route 10.10.0.0 255.255.254.0 192.168.1.26
ip route 10.10.0.0 255.255.254.0 192.168.1.30
```

This is an example of the routing configuration on a Juniper router:

```
routing-options {
    nonstop-routing;
    static {
        route 10.10.0.0/23 {
            qualified-next-hop 192.168.1.2;
            qualified-next-hop 192.168.1.6;
            qualified-next-hop 192.168.1.10;
            qualified-next-hop 192.168.1.14;
            qualified-next-hop 192.168.1.18;
            qualified-next-hop 192.168.1.22;
            qualified-next-hop 192.168.1.26;
            qualified-next-hop 192.168.1.30;
              preference 5;
        }
    }
    forwarding-table {
        export load-balance-all;
    }
}

policy-options {
    policy-statement load-balance-all {
        then {
            load-balance per-packet;
        }
    }
}
```

Note: Thanks to ECMP, network packets are distributed across all ToR switches connected to the data center gateway. If a path fails due to a port or cable failure, the corresponding route is disabled. Network packets reach their destination on any Cloud at Customer racks via a redundant spine switch that connects every ToR switches across all Cloud at Customer racks. The spine switches are sized not to block network IO.

## Required Datacenter Services

### DNS

OCC embeds a DNS server used for the name resolution of hostnames assigned to Compute or PaaS instances and Cloud Storage account API. Your DNS should be configured to forward any request for resolution of <cloudID>.oraclecloudatcustomer.com to the OCC DNS (which IP address would be provided to you).

Note: Your PaaS service and Compute instances can be configured to use your own domain, and your DNS is used to resolve the hostname and domain you assign to your instances. However the <cloudID>.oraclecloudatcustomer.com domain is used for the Oracle Cloud Portal and APIs from Cloud at Customer.

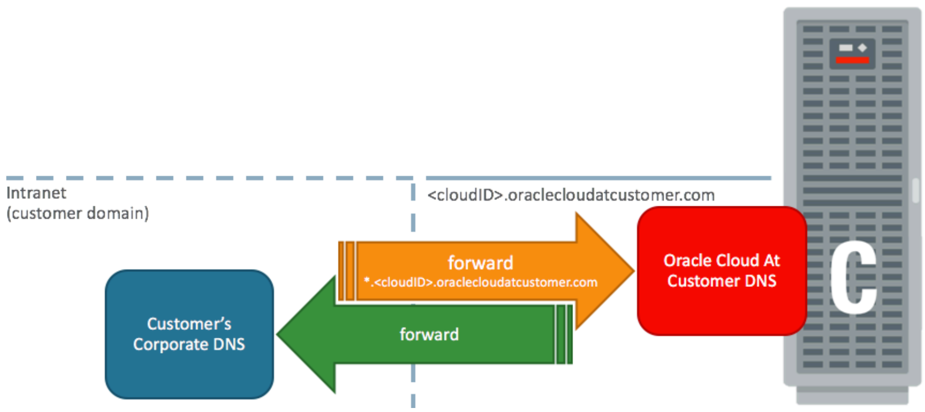


Figure 10 Illustration of DNS configuration.

This is an example of the configuration required on Bind DNS server:

```
zone "s123456.oraclecloudatcustomer.com" {
    type forward;
    forward only;
    forwarders {
        10.136.240.4;
        10.136.240.5;
    };
};
```

### SMTP

A Mail server (SMTP) is required for sending cloud notifications to users, and it needs to be routable from the Cloud at Customer ToR switches. Notifications occur when Oracle Cloud accounts are activated, when a new user is created, or when users reset a password. For OCC installation, information for its FQDN (or IP address) along with port # (and credentials if required) are needed. If firewall rules are preventing OCC to reach the SMTP server, you need to allow the traffic.

### NTP

NTP service is required for time synchronization of ExaCC Databases Virtual Machines. NTP servers from your network need to have a stratum between 1 and 6 and need to be routable from the Cloud at Customer ToR switches. If firewall rules are preventing OCC to reach the NTP servers, you need to allow the traffic.

## Examples of Diagrams for OCC Network Integration

Before a Cloud at Customer deployment, Oracle will work with you on a diagram such as the ones below, to describe how OCC is connected to your network and how the network communication will be done.

### SFP+ - no LAG

- » ToR switches upstream ports connected directly to the Customer's client-side upstream routers (SFP+ ports) with MPO-4LC cables
- » 4 physical paths are configured between each rack ToR switches and the client-side upstream routers
- » Each Cloud at Customer ToR upstream port is configured with an IP from a client-side handoff network to connect to a port of the client-side router, configured with an IP from the same client-side handoff network
- » Static routes are defined on the client-side routers to reach the IP pools for OCC and ExaCC via every IP on ports on the Cloud at Customer ToRs; Load Balancing is provided by ECMP
- » IP pools are reachable via every Cloud at Customer ToR

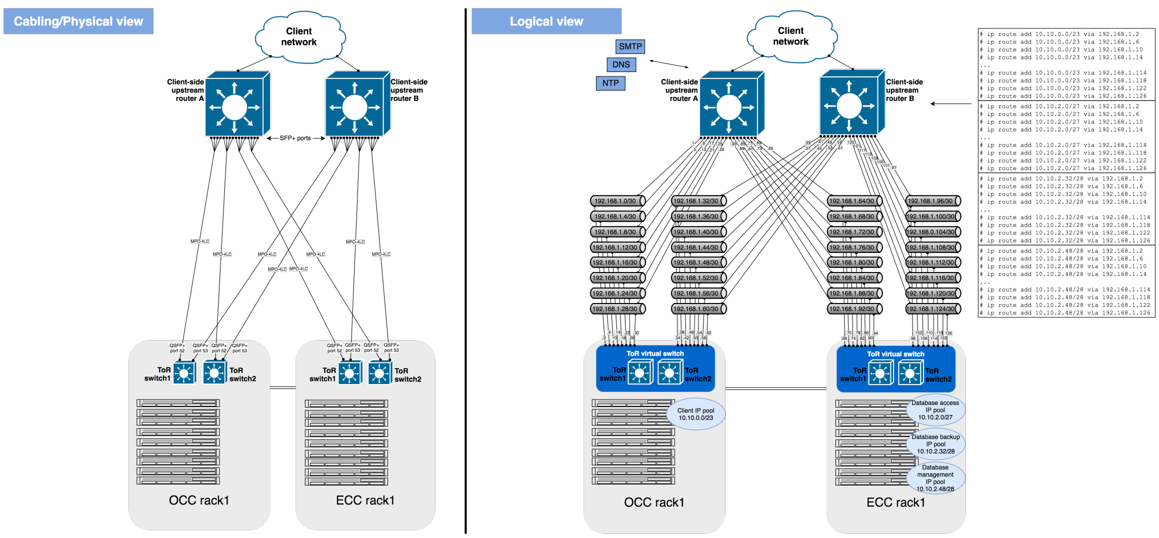


Figure 11  Illustration of the physical and logical views of the SFP+ - no LAG network integration.

SFP+ - LAG

» ToR switches upstream ports connected directly to the Customer's Client-side upstream routers (SFP+ ports) with MPO-4LC cables
» 4 physical paths are configured between each rack ToR switches and the client-side upstream routers
» Each Cloud at Customer rack is configured with 2 LAG, the first one is connected to a LAG on Client-side routers A and the second one is connected to a LAG on the Client-side routers B
» Each LAG on Cloud at Customer ToRs is configured with an IP from a client-side handoff network to connect to a LAG on the client-side routers, configured with an IP from the same client-side handoff network
» Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP
» IP pools are reachable via every Cloud at Customer ToR

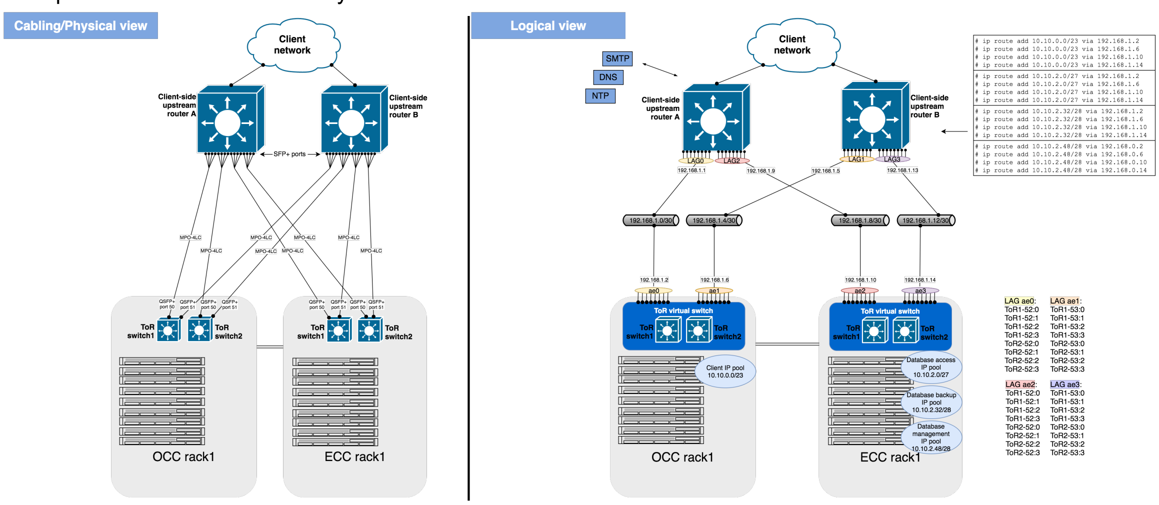


Figure 12 Illustration of the physical and logical views of the SFP+ - LAG network integration.

### QSFP+ - no LAG

» ToR switches upstream ports connected directly to the Customer's client-side upstream routers (QSFP+ ports) with MPO-MPO cables

» The throughput on each link is 40Gbps, QSFP+ transceivers on the ToR switches and client-side upstream routers support 40Gbps

» 4 physical paths are configured between each rack ToR switches and the client-side upstream routers

» Each Cloud at Customer ToR upstream port is configured with an IP from a client-side handoff network to connect to a port of the client-side router, configured with an IP from the same client-side handoff network

» Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP

» IP pools are reachable via every Cloud at Customer ToR

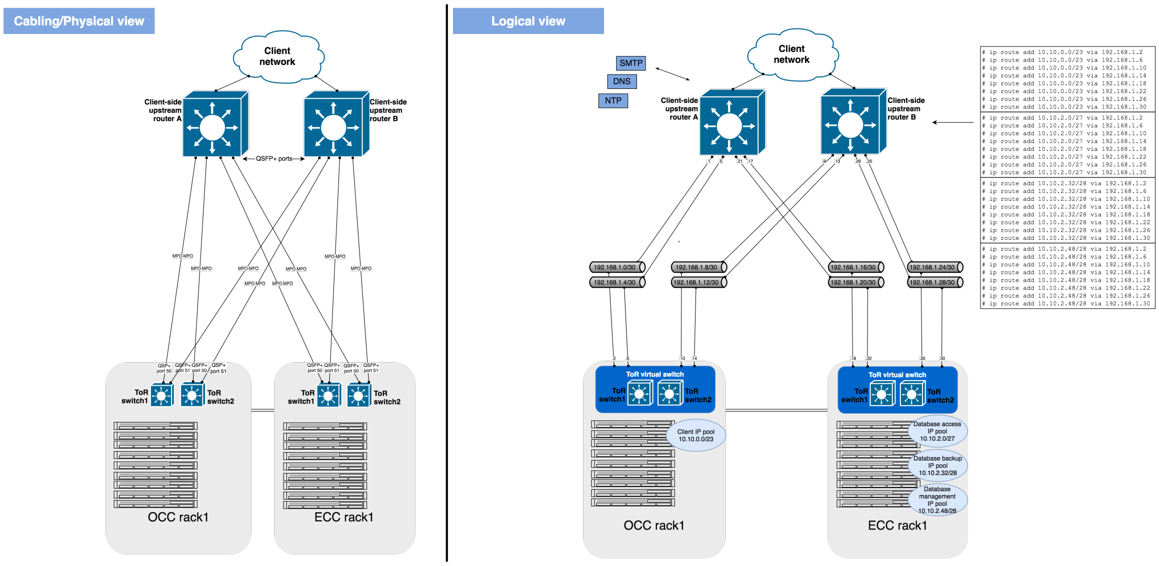


Figure 13 Illustration of the physical and logical views of the QSFP+ - no LAG network integration.

## QSFP+ - LAG

» ToR switches upstream ports connected directly to the Customer's client-side upstream routers (QSFP+ ports) with MPO-MPO cables

» The throughput on each link is 40Gbps, QSFP+ transceivers on the ToR switches and client-side upstream routers support 40Gbps

» 4 physical paths are configured between each rack ToR switches and the client-side upstream routers

» Each Cloud at Customer rack is configured with 2 LAG, the first one is connected to a LAG on Client-side routers A and the second one is connected to a LAG on the Client-side routers B

» Each LAG on Cloud at Customer ToRs is configured with an IP from a client-side handoff network to connect to a LAG on the client-side routers, configured with an IP from the same client-side handoff network

» Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP

» IP pools are reachable via every Cloud at Customer ToR

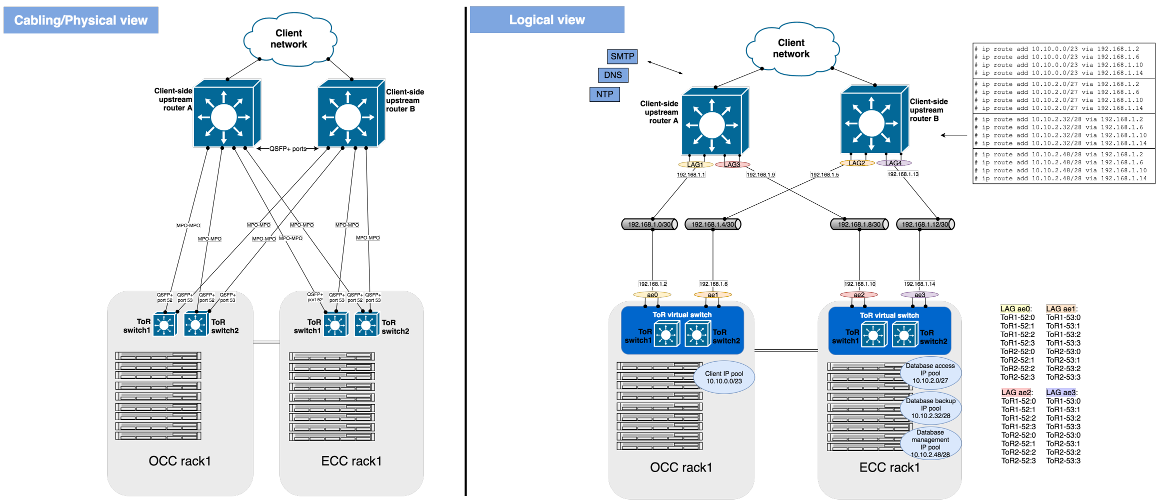


Figure 14  Illustration of the physical and logical views of the QSFP+ - LAG network integration.

## SFP+ - VLAN - No LAG

» ToR switches upstream ports connected via Layer 2 Access switches to the Customer's client-side upstream routers (SFP+ ports) with MPO-4LC cables

» 4 physical paths are configured between each rack ToR switches and layer 2 Access switches connected to the Upstream router

» Each Cloud at Customer ToR upstream port is configured with an IP from a client-side handoff network to connect to the client-side router, configured with an IP from the same client-side handoff network

» Static routes are defined on the client-side routers to reach the IP pools for OCC and ExaCC via every IP on ports on the Cloud at Customer ToRs; Load Balancing is provided by ECMP

» IP pools are reachable via every Cloud at Customer ToR

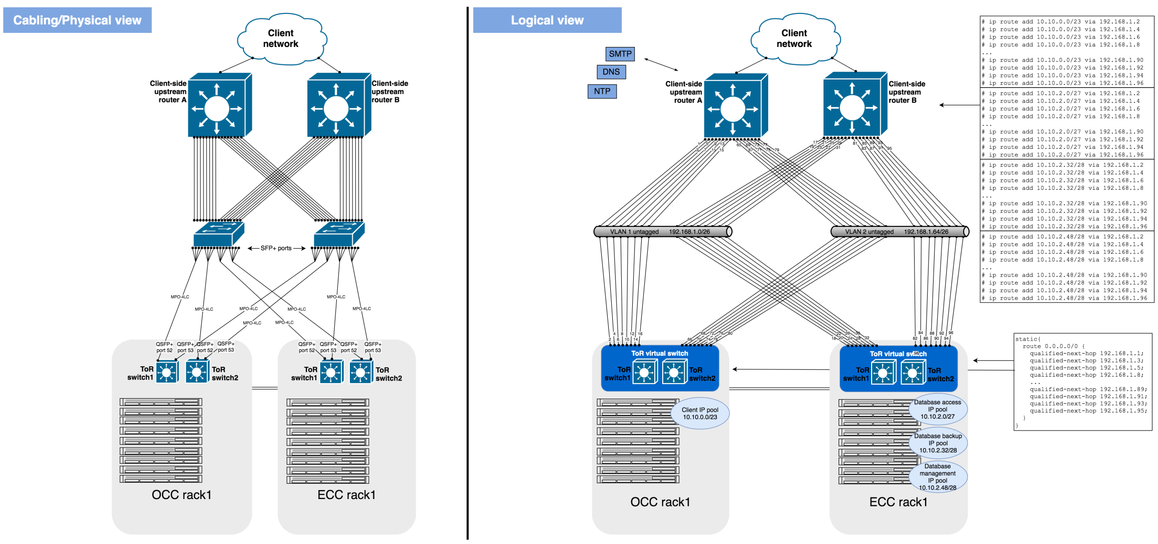


Figure 15  Illustration of the physical and logical views of the SFP+ - VLAN - No LAG network integration.

## SFP+ - VLAN - LAG

- ToR switches upstream ports connected via Layer 2 Access switches to the Customer's Client-side upstream routers (SFP+ ports) with MPO-4LC cables
- 4 physical paths are configured between each rack ToR switches and layer 2 Access switches connected to the Upstream router
- Each Cloud at Customer rack is configured with 2 LAG, the first one is connected to a LAG on Access Switch A and the second one is connected to a LAG on Access switch B
- VLANs are defined the Access switches, their purpose is to transport the handoff communication between the Cloud at Customer ToRs and the Upstream router, the VLAN interface (SVI) is the Upstream router interface
- Each LAG on Cloud at Customer ToRs is configured with an IP from the handoff network to connect to a LAG on the Access switch
- Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP
- IP pools are reachable via every Cloud at Customer ToR

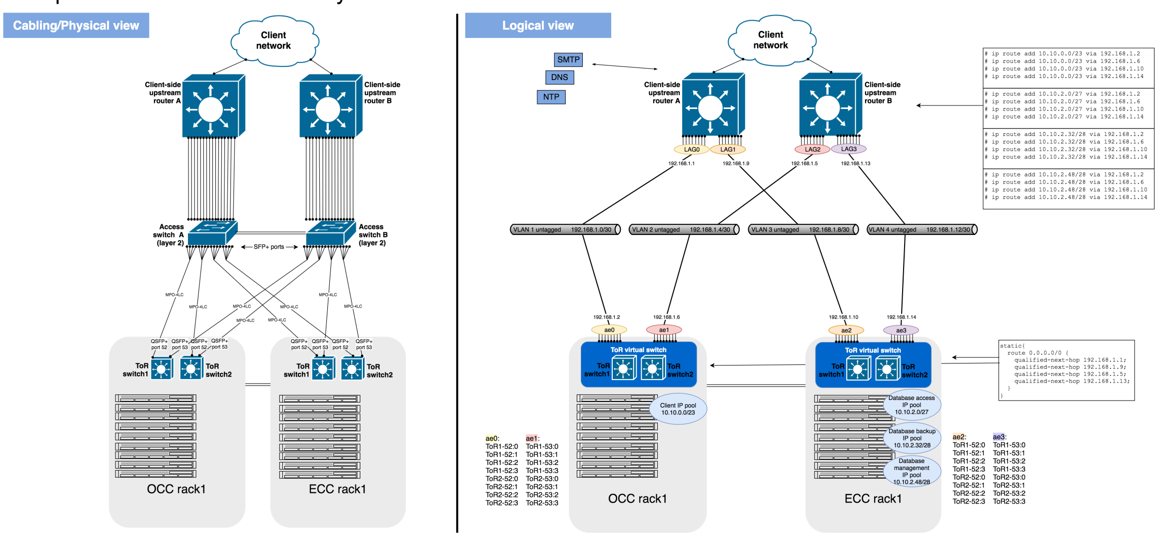


Figure 16 Illustration of the physical and logical views of the SFP+ - VLAN - LAG network integration.

## SFP+ - multi-chassis LAG

» ToR switches upstream ports connected directly to the Customer's Client-side upstream routers (SFP+ ports) with MPO-4LC cables

» 4 physical paths are configured between each rack ToR switches and the client-side upstream routers

» Each Cloud at Customer rack is configured with a single LAG to communicate with the upstream Access switches

» The upstream upstream routers are configured as a vPC (Cisco) or Virtual switch (Juniper) to support cross-chassis LAGs

» Each LAG on Cloud at Customer ToRs is configured with an IP from a client-side handoff network to connect to a LAG on the client-side routers, configured with an IP from the same client-side handoff network

» Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP

» IP pools are reachable via every Cloud at Customer ToR

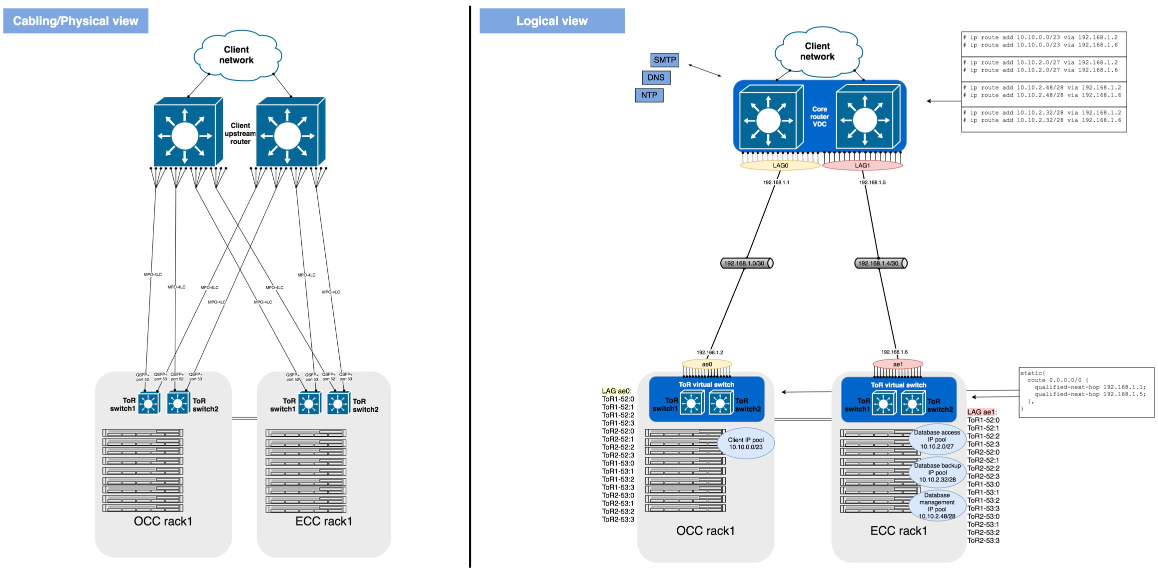


Figure 17 Illustration of the physical and logical views of the SFP+ - multi-chassis LAG network integration.

SFP+ - VLAN - multi-chassis LAG

» ToR switches upstream ports connected via Layer 2 Access switches to the Customer's Client-side upstream routers (SFP+ ports) with MPO-4LC cables
» 4 physical paths are configured between each rack ToR switches and layer 2 Access switches connected to the Upstream router
» Each Cloud at Customer rack is configured with a single LAG to communicate with the upstream Access switches
» The upstream access switches (and upstream router) are configured as a vPC (Cisco) or Virtual switch (Juniper) to support cross-chassis LAGs
» VLANs are defined the Access switches, their purpose is to transport the handoff communication between the Cloud at Customer ToRs and the Upstream router, the VLAN interface (SVI) is the Upstream router interface
» Each LAG on Cloud at Customer ToRs is configured with an IP from the handoff network to connect to a LAG on the Access switch
» Static routes are defined on the Client-side routers to reach the IP pools for OCC via every IP on the Cloud at Customer ToRs; Load Balancing is provided by ECMP
» IP pools are reachable via every Cloud at Customer ToR

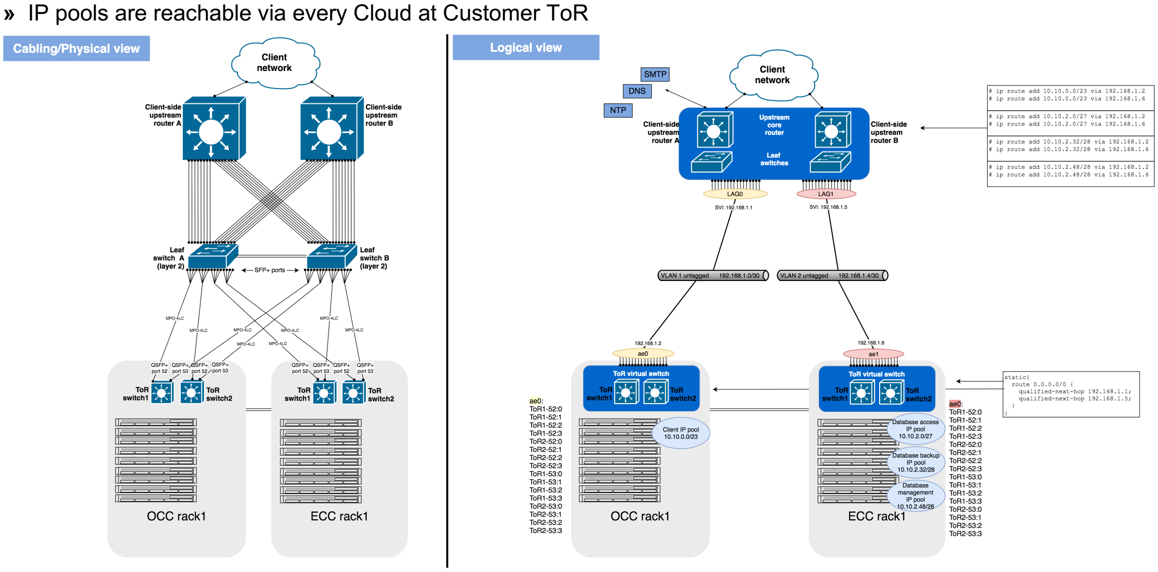


Figure 18 Illustration of the physical and logical views of the SFP+ - VLAN - multi-chassis LAG network integration.

## Next Steps

After reading this paper, the next step is to fill in Oracle Public Cloud Machine Assistant (PCMA), this is a tool that gathers the information discussed in this paper and required to install and configure OCC.

## Conclusion

In this paper, we describe how Cloud at Customer, which includes Oracle Cloud at Customer (OCC) and Exadata Cloud at Customer (ExaCC), integrates with your data center network.

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Integrated Cloud Applications & Platform Services



Integrating Oracle Cloud at Customer into Your Network
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