



Bring Up NCS 1010 Network

This chapter describes two ways to bring up an NCS 1010 network, Manual Bringup of NCS 1010 and Automatic Bring up of NCS 1010 using ZTP.

- [Bringup NCS 1010 Manually, on page 1](#)
- [Bringup NCS 1010 Using ZTP, on page 38](#)

Bringup NCS 1010 Manually

Perform the configurations in the following sequence to manually bring up NCS 1010.

- [DHCP Configuration, on page 1](#)
- [Manual Configuration Workflow, on page 5](#)
- [Cross-connect Configuration, on page 21](#)



Note When you boot up the NCS 1010 device for the first time, the ZTP process starts automatically and runs in the background. If the device is configured manually, the ZTP process continues to run in the background. If the ZTP process is not terminated gracefully, after an RP reload or power cycle, interfaces on the device can enter the *shutdown* state. To avoid this issue, it is suggested to disable the ZTP process gracefully. Use the following commands to disable the ZTP:

```
RP/0/RP0/CPU0:ios#ztp terminate
"ZTP Exited"
RP/0/RP0/CPU0:ios#ztp clean
RP/0/RP0/CPU0:ios#ztp disable
```

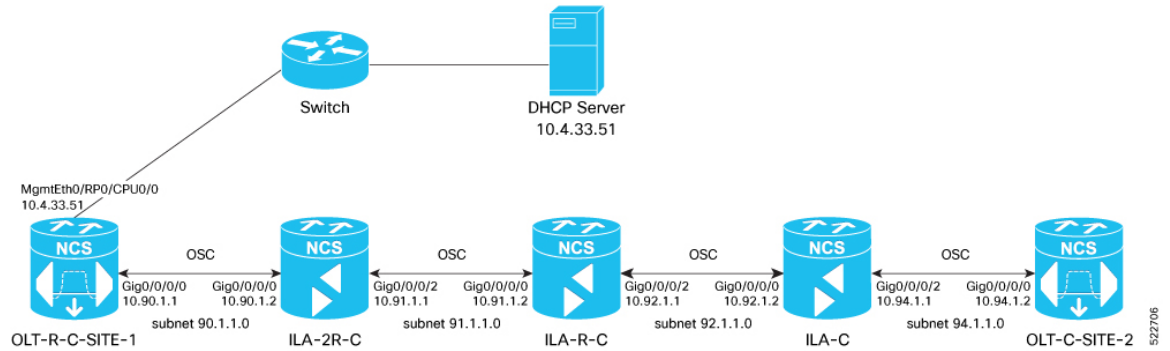
DHCP Configuration

DHCP configuration is required for both manual configuration and ZTP configuration.

To run iPXE and ZTP, you need a DHCP server. To configure a DHCP server, you must edit the `dhcpd.conf` file available at `/etc/dhcp/`. This configuration file stores the network information such as the path to the script, location of the ISO install file, location of the provisioning configuration (`.cfg`) file, and serial number or the MAC address of the chassis.

In the following example, the settings in the `dhcpd.conf` refers to the span connecting OLT-R-C-SITE-1 to OLT-C-SITE-2.

Figure 1: NetworkTopology Diagram



Note Restart the `dhcpd` service using the `service dhcpd restart` command every time you edit the `dhcpd.conf` file.

Add the following settings to the `dhcpd.conf` file :



Note The ZTP configuration files (*.cfg) that are referenced in the `dhcpd.conf` file are detailed in [ZTP Configuration Files Creation, on page 41](#).

```
# DHCP Server Configuration file
ddns-update-style none;
option domain-name "cisco.com";
option domain-name-servers dns-blr1.cisco.com;

default-lease-time 6000;
max-lease-time 72000;

log-facility local7;

option space VendorInfo;

option VendorInfo.clientId code 1 = string;

option VendorInfo.authCode code 2 = unsigned integer 8;

option VendorInfo.md5sum code 3 = string;

option vendor-specific code 43 = encapsulate VendorInfo;

option space cisco-vendor-id-vendor-class code width 1 length width 1;
option vendor-class.cisco-vendor-id-vendor-class code 9 = {string};
option bootstrap_servers code 143 = text;

ddns-update-style none;

#iPXE https specific configs
option space ipxe;
option ipxe-encap-opts code 175 = encapsulate ipxe;
option ipxe.crosscert code 93 = string;
```

```
option ipxe.crosscert "http://10.127.60.159/pub/mirror/ca.ipxe.org/auto";

#ZTP over OSC Configuration

subnet 10.90.1.0 netmask 255.255.255.0 {
    option domain-name-servers dns-blr1.cisco.com;
    option domain-name "cisco.com";
    option routers 10.90.1.1;
    #option netbios-name-serv;
}

subnet 10.91.1.0 netmask 255.255.255.0 {
    option domain-name-servers dns-blr1.cisco.com;
    option domain-name "cisco.com";
    option routers 10.91.1.1;
    #option netbios-name-serv;
}

subnet 10.92.1.0 netmask 255.255.255.0 {
    option domain-name-servers dns-blr1.cisco.com;
    option domain-name "cisco.com";
    option routers 10.92.1.1;
    #option netbios-name-serv;
}

subnet 10.94.1.0 netmask 255.255.255.0 {
    option domain-name-servers dns-blr1.cisco.com;
    option domain-name "cisco.com";
    option routers 10.94.1.1;
    #option netbios-name-serv;
}

#DHCP Relay Configuration

host OLT-R-C-SITE-1 {
    hardware ethernet 38:fd:f8:66:09:52;
    if exists user-class and option user-class = "iPXE" {
        filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
    } else {
        filename "http://10.4.33.51/NCS1010_CFG/OLT-R-C-SITE-1.cfg";
    }
    fixed-address 10.4.33.131;
}

host ILA-2R-C {
    hardware ethernet 38:fd:f8:66:08:f6;
    fixed-address 10.90.1.2;
    if exists user-class and option user-class = "iPXE" {
        filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
    }
    vendor-option-space VendorInfo;
    option VendorInfo.clientId "xr-config";
    option VendorInfo.authCode 0;
    option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-2R-C.cfg";
}

host ILA-R-C {
    hardware ethernet 38:fd:f8:66:09:f2;
    fixed-address 10.91.1.2;
```

```

if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
}
vendor-option-space VendorInfo;
option VendorInfo.clientId "xr-config";
option VendorInfo.authCode 0;
option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-R-C.cfg";

}

host ILA-C {
hardware ethernet 38:fd:f8:66:09:7d;
fixed-address 10.92.1.2;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
}
vendor-option-space VendorInfo;
option VendorInfo.clientId "xr-config";
option VendorInfo.authCode 0;
option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-C.cfg";

}

host OLT-C-SITE-2 {
hardware ethernet 38:fd:f8:66:06:79;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS010/ncs1010-x64.iso";
} else {
    filename "http://10.4.33.51/NCS1010_CFG/OLT-C-SITE-2.cfg";
}
fixed-address 192.0.2.121;
}

```

To create the static routes in the DHCP server, use the following commands:

```
route add -net OLT-OSC-ip gw OLT-MGMT-ip netmask 255.255.255.255 dev eth3
```

```
route add -net ILA-OSC-ip gw OLT-MGMT-ip netmask 255.255.255.255 dev eth3
```

```

[root@vxr-ncs1010-02 ~]# route add -net 10.90.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.90.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.91.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.91.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.92.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.92.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.94.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.94.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3

```

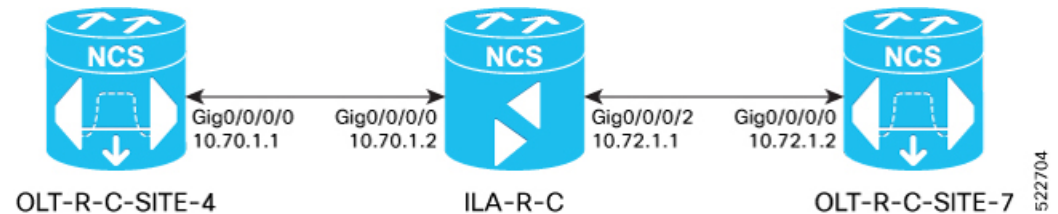
10.4.33.131 is the management IP address for the gateway node.

Manual Configuration Workflow

This section details how to manually bring up the nodes. Verification outputs have been added at various steps. The iPXE boot process via the BIOS interface has been used for this example.

The example used in this section is:

Figure 2: Network Topology Diagram



Note Before you use the iPXE boot, ensure that the DHCP server is set and is running. Create a `dhcpd.conf` file specific to the nodes in the network topology diagram. To see a sample `dhcpd.conf` file, see [DHCP Configuration, on page 1](#).

The boot process is initiated via the BIOS interface as follows:

1. The node is reloaded or can undergo a power cycle.
2. Press **Esc** to enter BIOS.
3. Select the **Save & Exit** tab of BIOS.
4. Choose **UEFI: iPXE Network Boot**.

```
Software Boot OK, Validated
```

```
iPXE initialising devices...ok
```

```
iPXE 1.0.0+ (c2215) -- Open Source Network Boot Firmware -- http://ipxe.org
Features: DNS HTTP TFTP VLAN EFI ISO9660 ISO9660_grub Menu
Trying net0-2051,net0-2052 and net0-2053...
net0-2051: 38:fd:f8:66:07:1b using NII on NII-PCI06:00.0 (open)
  [Link:down, TX:0 TXE:0 RX:0 RXE:0]
  [Link status: Unknown (http://ipxe.org/1a086194)]
Configuring (net0-2051 38:fd:f8:66:07:1b)..... ok
net0: fe80::3afd:f8ff:fe66:71b/64
net1: fe80::3afd:f8ff:fe66:71e/64 (inaccessible)
net2: fe80::3afd:f8ff:fe66:71f/64 (inaccessible)
net3: fe80::3afd:f8ff:fe66:720/64 (inaccessible)
net0-2051: 10.4.33.124/255.255.0.0 gw 10.4.33.1
net0-2051: fe80::3afd:f8ff:fe66:71b/64
net0-2051: 2002:420:54ff:93:3afd:f8ff:fe66:71b/64 gw fe80::6a9e:bff:feb8:6f4a
net0-2052: fe80::3afd:f8ff:fe66:71b/64
net0-2053: fe80::3afd:f8ff:fe66:71b/64
Filename: http://10.4.33.51/OLT4/ncs1010-x64.iso
http://10.4.33.51/OLT4/ncs1010-x64.iso... ok
Booting /EFI/BOOT/bootx64.efi
Welcome to GRUB!
```

```

Verifying (cd0)/EFI/BOOT/grub.cfg...
(cd0)/EFI/BOOT/grub.cfg verified using Pkcs7 signature.

015001H Booting `Install IOS-XR'

Booting from ISO image..
Loading Kernel..
Verifying /boot/bzImage...
/boot/bzImage verified using attached signature.
Loading initrd..
Verifying /boot/initrd.img...
/boot/initrd.img verified using Pkcs7 signature.
[ 1.989141] usbhid 1-1:1.0: couldn't find an input interrupt endpoint
2022 Jul 25 08:55:45.362 UTC: Prepare install environment
2022 Jul 25 08:55:45.365 UTC: Preparing installation environment
2022 Jul 25 08:55:45.819 UTC: Bootstrap watchdog punch start
2022 Jul 25 08:55:45.822 UTC: Wait for install device
2022 Jul 25 08:55:45.827 UTC: Create, format and mount partitions
2022 Jul 25 08:55:45.838 UTC: Creating partitions on /dev/sda
2022 Jul 25 08:55:45.867 UTC: Running disk_layout script for PID NCS1010
.
.snipped
.
.
[ OK ] Started IOS-XR ISO Installation.
[ 45.293622] xrnginstall[1292]: 2022 Jul 25 09:03:56.211 UTC: xrnginstall completed
successfully
[ OK ] Started Cisco Directory Services.
Starting Lightning Fast Webserver With Light System Requirements...
[ OK ] Started Lightning Fast Webserver With Light System Requirements.
Starting NOS Bootup FPD Upgrade Service...
[ OK ] Started NOS Bootup FPD Upgrade Service.
Starting IOS-XR Reaperd and Process Manager...
[ OK ] Started IOS-XR Reaperd and Process Manager.
Starting Setting Cgroups...
[ OK ] Started Shutdown start service.
[ OK ] Started Setting Cgroups.
[ OK ] Started Kdump.
[ OK ] Reached target Multi-User System.
[ OK ] Reached target XR installation and startup.
Starting Update UTMP about System Runlevel Changes...
[ OK ] Started Update UTMP about System Runlevel Changes.

ios con0/RP0/CPU0 is now available
!!!!!!!!!!!!!!!!!!!!!! NO root-system username is configured. Need to configure root-system
username. !!!!!!!!!!!!!!!!!!!!!!!

```

5. Enter a root username and password.



Note Setting the root system username and password causes the system to exit the ZTP process.

```
--- Administrative User Dialog ---
```

```
Enter root-system username:
```

```
% Entry must not be null.
```

```
Enter root-system username: cisco
```

```
Enter secret: RP/0/RP0/CPU0:Jul 25 09:08:37.522 UTC: ifmgr[234]:
```

```
%PKT_INFRA-LINK-3-UPDOWN : Interface GigabitEthernet0/0/0/0, changed state to Up
RP/0/RP0/CPU0:Jul 25 09:08:45.519 UTC: osa_driver[338]: %PKT_INFRA-FM-2-FAULT_CRITICAL
: ALARM_CRITICAL :RX-LOS-P :CLEAR :Osc0/0/0/0:
```

```
% Entry must not be null.
Enter secret:
Enter secret again:
Use the 'configure' command to modify this configuration.
User Access Verification

Username: cisco
Password:
RP/0/RP0/CPU0:ios#
```

6. Assign a hostname to the node.

```
RP/0/RP0/CPU0:ios#config
RP/0/RP0/CPU0:ios(config)#hostname OLT-R-C-SITE-4
RP/0/RP0/CPU0:ios(config)#commit
RP/0/RP0/CPU0:ios(config)#exit
```

7. View the interface status.

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh ipv4 interface brief
Mon Jul 25 09:14:23.072 UTC
```

Interface	IP-Address	Status	Protocol	Vrf-Name
GigabitEthernet0/0/0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/0	unassigned	Shutdown	Down	default
PTP0/RP0/CPU0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/1	unassigned	Shutdown	Down	default
PTP0/RP0/CPU0/1	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/2	unassigned	Shutdown	Down	default

IP addresses must be assigned to the interfaces and the state must be changed to Up.

8. Assign IP addresses, for management, Gigabitethernet, and loopback interfaces.

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#config
Mon Jul 25 09:14:55.867 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#interface MgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#ipv4 address 10.4.33.124 255.255.255.0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#no shutdown
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#exit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#interface MgmtEth 0/RP0/CPU0/2
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#ipv4 address 10.127.59.153 255.255.255.0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#no shutdown
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#exit
RP/0/RP0/CPU0:OLT-R-C-SITE-4-4#sh ipv4 interface brief
Mon Jul 25 09:17:14.247 UTC
```

Interface	IP-Address	Status	Protocol	Vrf-Name
GigabitEthernet0/0/0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/0	10.4.33.124	Up	Up	default
PTP0/RP0/CPU0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/1	unassigned	Shutdown	Down	default
PTP0/RP0/CPU0/1	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/2	10.127.59.153	Up	Up	default

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#configure
Mon Jul 25 09:17:33.503 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#interface GigabitEthernet 0/0/0/0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#ipv4 address 10.70.1.1 255.255.255.0
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#exit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#interface loopback 0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#ipv4 address 10.124.1.1 255.255.255.255
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#end
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh ipv4 interface brief
Mon Jul 25 09:20:06.585 UTC
```

Interface	IP-Address	Status	Protocol	Vrf-Name
Loopback0	10.124.1.1	Up	Up	default
GigabitEthernet0/0/0/0	10.70.1.1	Shutdown	Down	default
MgmtEth0/RP0/CPU0/0	10.4.33.124	Up	Up	default
PTP0/RP0/CPU0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/1	unassigned	Shutdown	Down	default
PTP0/RP0/CPU0/1	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/2	10.127.59.153	Up	Up	default

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#config
Mon Jul 25 09:20:20.669 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#interface GigabitEthernet 0/0/0/0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#no shutdown
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-if)#end
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh ipv4 interface brief
Mon Jul 25 09:20:06.585 UTC
```

Interface	IP-Address	Status	Protocol	Vrf-Name
Loopback0	10.124.1.1	Up	Up	default
GigabitEthernet0/0/0/0	10.70.1.1	Up	Up	default
MgmtEth0/RP0/CPU0/0	10.4.33.124	Up	Up	default
PTP0/RP0/CPU0/0	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/1	unassigned	Shutdown	Down	default
PTP0/RP0/CPU0/1	unassigned	Shutdown	Down	default
MgmtEth0/RP0/CPU0/2	10.127.59.153	Up	Up	default

9. Configure OSPF.

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#config
Mon Jul 25 09:20:35.600 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config)#router ospf 1
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf)#distribute link-state instance-id 0 throttle
5
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf)#router-id 10.124.1.1
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf)#network point-to-point
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf)#area 0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar)#interface loopback 0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#exit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar)#interface GigabitEthernet 0/0/0/0
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-4(config-ospf-ar-if)#end
```

10. To view the OSPF neighbours:

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh ospf neighbor
Mon Jul 25 09:22:58.684 UTC
```

```
* Indicates MADJ interface
# Indicates Neighbor awaiting BFD session up
```

```
Neighbors for OSPF 1
```



```

Neighbor ID      Pri   State           Dead Time   Address      Interface
10.137.1.1      1     FULL/ -        00:00:38   10.70.1.2
GigabitEthernet0/0/0/0
    Neighbor is up for 00:00:20

```

```
Total neighbor count: 1
```



Note This output is displayed when the ILA-R-C node is brought up.

11. To view the status of the OSC controller:

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh controllers osc 0/0/0/0
Mon Jul 25 09:24:52.753 UTC
```

```
Controller State: Up
```

```
Transport Admin State: In Service
```

```
Laser State: On
```

```
Alarm Status:
-----
Detected Alarms: None
```

```
Alarm Statistics:
-----
RX-LOS-P = 2
TX-POWER-FAIL-LOW = 0
```

```
Parameter Statistics:
-----
Total TX Power = 0.09 dBm
Total RX Power = -17.82 dBm
```

```
Configured Parameters:
-----
```

12. To view the span loss:

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc span-loss
Mon Jul 25 09:25:09.572 UTC
```

```

Controller name           : Ots0/0/0/0
Neighbour RID             : 10.137.1.1
Apparent Rx Span Loss     : 15.9 dB
Rx Span Loss (with pumps off) : 19.2 dB
Rx Span Loss (with pumps off) measured at : 2022-07-25 09:24:37
Estimated Rx Span Loss    : NA
Apparent Tx Span Loss     : 16.0 dB
Tx Span Loss (with pumps off) : 16.8 dB
Tx Span Loss (with pumps off) measured at : 2022-07-25 09:23:12
Estimated Tx Span Loss    : NA

```



Note The optical applications such as Raman tuning, link tuner, gain estimator, and APC are disabled by default. To enable the optical applications, use the **automatic-link-bringup** as seen in the next step.

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
Mon Jul 25 09:25:20.687 UTC
```

```
Controller                : Ots0/0/0/0
Raman-Tuning Status      : DISABLED
Tuning Complete Timestamp : N/A
Estimated Max Possible Gain : N/A dB
Raman Gain Target        : N/A dB
Gain Achieved on Tuning Complete : N/A dB
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:25:39.292 UTC
```

```
Controller      : Ots0/0/0/0
APC Status    : DISABLED
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc link-tuner
Mon Jul 25 09:25:43.437 UTC
```

```
Controller      : Ots0/0/0/0
Link Tuner Status : DISABLED
Last PSD computation: NA
```

```
-----
Setpoint          : Computed PSD
                  (dBm/12.5 GHz)
-----
```

```
-----
01                NaN
02                NaN
03                NaN
04                NaN
05                NaN
06                NaN
07                NaN
08                NaN
09                NaN
10                NaN
11                NaN
12                NaN
13                NaN
14                NaN
15                NaN
16                NaN
17                NaN
18                NaN
19                NaN
20                NaN
21                NaN
22                NaN
23                NaN
24                NaN
25                NaN
26                NaN
27                NaN
28                NaN
29                NaN
30                NaN
31                NaN
32                NaN
33                NaN
-----
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc gain-estimator
Mon Jul 25 09:25:47.566 UTC
```

```

Controller                : Ots0/0/0/0
Ingress Gain Estimator Status : DISABLED
Ingress Estimated Gain    : NA
Ingress Estimated Gain Mode : NA
RP/0/RP0/CPU0:OLT-R-C-SITE-4#
    
```

13. To enable automatic link bringup, use the following command:

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#config
Mon Jul 25 09:30:38.919 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-4 (config)#optical-line-control
RP/0/RP0/CPU0:OLT-R-C-SITE-4 (config-olc)#
RP/0/RP0/CPU0:OLT-R-C-SITE-4 (config-olc)#automatic-link-bringup
RP/0/RP0/CPU0:OLT-R-C-SITE-4 (config-olc)#commit
    
```

14. Use the following show commands to verify the state of the operations.

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
Mon Jul 25 09:31:51.508 UTC
    
```

```

Controller                : Ots0/0/0/0
Raman-Tuning Status       : WORKING - MEASUREMENT
Tuning Complete Timestamp : N/A
Estimated Max Possible Gain : N/A dB
Raman Gain Target         : N/A dB
Gain Achieved on Tuning Complete : N/A dB
    
```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:31:56.769 UTC
    
```

```

Controller      : Ots0/0/0/0
APC Status      : BLOCKED

Node RID        : 10.124.1.1
Internal State  : BLOCKED
Blocked Reason  : [ AMPLI-SHUT ]
    
```

```

Node RID        : 10.137.1.1
Internal State  : DISCREPANCY
    
```

```

Node RID        : 10.129.1.1
Internal State  : DISCREPANCY
    
```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh alarms brief system active
Mon Jul 25 09:33:18.887 UTC
    
```

```

-----
Active Alarms
-----
Location          Severity      Group          Set Time          Description
-----
0/PM1             Major        Environ        07/25/2022 09:04:20 UTC  Power Module
Error (PM_VIN_VOLT_OOR)

0/PM1             Major        Environ        07/25/2022 09:04:20 UTC  Power Module
Output Disabled (PM_OUTPUT_DISABLED)
    
```

```

0          Major      Environ      07/25/2022 09:04:20 UTC    Power Group
redundancy lost

0/0        Critical   Controller  07/25/2022 09:05:29 UTC    Ots0/0/0/1 -
Loss of Signal - Payload

0/0/NXR0   Minor        Software   07/25/2022 09:28:20 UTC    Ots0/0/0/0 -
APC Reached out-of-range condition in RX direction

0/0/NXR0   Major        Software   07/25/2022 09:31:37 UTC    Ots0/0/0/0 -
Raman Tuning procedure is running

0/0        Critical   Controller  07/25/2022 09:32:08 UTC    Ots0/0/0/0 -
Output OTS Power Reading Below The Fail-Low Threshold

0/0        Critical   Controller  07/25/2022 09:32:53 UTC    Ots0/0/0/1 -
Output OTS Power Reading Below The Fail-Low Threshold

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh alarms b s a | i 0/0RP/0/RP0/CPU0:Jul 25 09:33:23.520
UTC: osa_driver[338]: %PKT_INFRA-FM-2-FAULT_CRITICAL : ALARM_CRITICAL :TX-POWER-FAIL-LOW
:CLEAR :Ots0/0/0/1:
/0/0
Mon Jul 25 09:33:25.863 UTC
0/0/NXR0   Minor        Software   07/25/2022 09:28:20 UTC    Ots0/0/0/0 -
APC Reached out-of-range condition in RX direction

0/0/NXR0   Major        Software   07/25/2022 09:31:37 UTC    Ots0/0/0/0 -
Raman Tuning procedure is running

0/0        Critical   Controller  07/25/2022 09:32:08 UTC    Ots0/0/0/0 -
Output OTS Power Reading Below The Fail-Low Threshold

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc link-tuner
Mon Jul 25 09:33:38.414 UTC
Controller      : Ots0/0/0/0
Link Tuner Status : OPERATIONAL
Last PSD computation: 2022-07-25 09:33:13
-----
Setpoint      : Computed PSD
                (dBm/12.5 GHz)
-----
01             -7.8
02             -7.7
03             -7.7
04             -7.7
05             -7.6
06             -7.6
07             -7.6
08             -7.5
09             -7.5
10             -7.5
11             -7.4
12             -7.4
13             -7.4
14             -7.3

```

```

15          -7.3
16          -7.3
17          -7.3
18          -7.2
19          -7.2
20          -7.2
21          -7.1
22          -7.1
23          -7.1
24          -7.1
25          -7.0
26          -7.0
27          -6.9
28          -6.9
29          -6.9
30          -6.9
31          -6.8
32          -6.8
33          -6.8

```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc gain-estimator
Mon Jul 25 09:33:45.445 UTC
Controller          : Ots0/0/0/0
Ingress Gain Estimator Status      : BLOCKED
Ingress Estimated Gain          : NA
Ingress Estimated Gain Mode     : NA
Ingress Gain Estimation Timestamp : NA

```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:33:58.419 UTC

```

```

Controller          : Ots0/0/0/0
APC Status              : WORKING
Correcting Node     : 10.124.1.1

Node RID            : 10.124.1.1
Internal State      : CORRECTING

Node RID            : 10.137.1.1
Internal State      : DISCREPANCY

Node RID            : 10.129.1.1
Internal State      : DISCREPANCY

```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
Mon Jul 25 09:34:03.907 UTC

```

```

Controller          : Ots0/0/0/0
Raman-Tuning Status        : WORKING - MEASUREMENT
Tuning Complete Timestamp          : N/A
Estimated Max Possible Gain        : N/A dB
Raman Gain Target                   : N/A dB
Gain Achieved on Tuning Complete   : N/A dB

```

```

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
Mon Jul 25 09:36:52.841 UTC

```

```

Controller          : Ots0/0/0/0
Raman-Tuning Status        : WORKING - CALCULATION
Tuning Complete Timestamp          : N/A

```

```

Estimated Max Possible Gain      : N/A dB
Raman Gain Target                : 13.1 dB
Gain Achieved on Tuning Complete : N/A dB

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:37:16.073 UTC

Controller      : Ots0/0/0/0
APC Status      : WORKING
Correcting Node : 10.124.1.1

Node RID        : 10.124.1.1
Internal State  : CORRECTING

Node RID        : 10.137.1.1
Internal State  : DISCREPANCY

Node RID        : 10.129.1.1
Internal State  : DISCREPANCY

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
Mon Jul 25 09:37:34.745 UTC

Controller      : Ots0/0/0/0
Raman-Tuning Status      : WORKING - CALCULATION
Tuning Complete Timestamp      : N/A
Estimated Max Possible Gain     : 20.6 dB
Raman Gain Target               : 13.1 dB
Gain Achieved on Tuning Complete : N/A dB

RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc gain-estimator
Mon Jul 25 09:40:06.404 UTC
Controller      : Ots0/0/0/0
Ingress Gain Estimator Status : BLOCKED
Ingress Estimated Gain          : NA
Ingress Estimated Gain Mode     : NA
Ingress Gain Estimation Timestamp : NA

```

15. After the processes are complete, the status changes to IDLE for APC and gain estimator. The Raman tuning status changes to TUNED. The empty channels are loaded with noise by ASE.

```

P/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:43:00.639 UTC

Controller      : Ots0/0/0/0
APC Status      : IDLE

Node RID        : 10.124.1.1
Internal State  : IDLE

Node RID        : 10.137.1.1
Internal State  : IDLE

Node RID        : 10.129.1.1
Internal State  : IDLE

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc gain-estimator
Mon Jul 25 09:45:05.539 UTC
Controller      : Ots0/0/0/0
Ingress Gain Estimator Status   : IDLE
Ingress Estimated Gain          : 10.9 dB
Ingress Estimated Gain Mode     : Normal

```

Ingress Gain Estimation Timestamp : 2022-07-25 09:40:12

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc raman-tuning
 Mon Jul 25 09:45:51.487 UTC

Controller : Ots0/0/0/0
 Raman-Tuning Status : TUNED
 Tuning Complete Timestamp : 2022-07-25 09:40:12
 Estimated Max Possible Gain : 20.6 dB
 Raman Gain Target : 13.1 dB
 Gain Achieved on Tuning Complete : 13.0 dB

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc-local regulation-info controller ots 0\$
 Mon Jul 25 09:47:42.611 UTC

Controller : Ots0/0/0/0
 Domain Manager : 10.129.1.1
 Internal Status : IDLE
 Direction : RX
 PSD Minimum : -24.0 (dBm/12.5 GHz)
 Gain Range : Normal
 Last Correction : 2022-07-25 09:43:44

Device Parameters	Min	Max	Configuration
Operational			
Ingress Ampli Gain (dB)	10.9	23.9	16.7
16.7			
Ingress Ampli Tilt (dB)	-5.0	3.4	-1.0
-0.9			
RX Ampli Power (dBm)	-	25.0	-
24.3			
RX VOA Attenuation (dB)	0.0	0.0	0.0
0.0			
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-
-			

Channel Target Frequency PSD (THz) (dBm/12.5 GHz)	Channel Current Width PSD (GHz) (dBm/12.5 GHz)	Channel Discrepancy ID (dB)	Channel Source Attn Config (dB)	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)
191.375000	75.00	64	ASE	13	-16.5
-	-24.8	0.0	25.0		
191.449997	75.00	63	ASE	37	-16.6
-	-24.9	0.0	25.0		
191.524994	75.00	62	ASE	61	-16.6
-	-24.9	0.0	25.0		
191.600006	75.00	61	ASE	85	-16.6
-	-25.0	0.0	25.0		
191.675003	75.00	60	ASE	109	-16.7
-	-25.1	0.0	25.0		
191.750000	75.00	59	ASE	133	-16.8
-	-25.2	0.0	25.0		
191.824997	75.00	58	ASE	157	-16.9
-	-25.3	0.0	25.0		
191.899994	50.00	57	ASE	181	-16.8
-	-25.2	0.0	25.0		
191.975006	75.00	56	ASE	205	-17.0

-	-25.4	0.0	25.0			
192.050003	75.00	-	ASE	229	-17.2	
-	-25.6	0.0	25.0			
192.125000	75.00	-	ASE	253	-17.2	
-	-25.6	0.0	25.0			
192.199997	75.00	-	ASE	277	-17.3	
-	-25.7	0.0	25.0			
192.274994	75.00	-	ASE	301	-17.3	
-	-25.7	0.0	25.0			
192.350006	75.00	-	ASE	325	-17.3	
-	-25.7	0.0	25.0			
192.425003	75.00	-	ASE	349	-17.5	
-	-25.9	0.0	25.0			
192.500000	75.00	-	ASE	373	-17.4	
-	-25.8	0.0	25.0			
192.574997	75.00	-	ASE	397	-17.7	
-	-26.1	0.0	25.0			
192.649994	75.00	-	ASE	421	-17.8	
-	-26.1	0.0	25.0			
192.725006	75.00	-	ASE	445	-17.7	
-	-26.1	0.0	25.0			
192.800003	75.00	-	ASE	469	-17.7	
-	-26.0	0.0	25.0			
192.875000	75.00	-	ASE	493	-17.8	
-	-26.1	0.0	25.0			
192.949997	75.00	-	ASE	517	-17.8	
-	-26.2	0.0	25.0			
193.024994	75.00	-	ASE	541	-17.9	
-	-26.2	0.0	25.0			
193.100006	75.00	-	ASE	565	-18.0	
-	-26.3	0.0	25.0			
193.175003	75.00	-	ASE	589	-17.8	
-	-26.2	0.0	25.0			
193.250000	75.00	-	ASE	613	-17.8	
-	-26.2	0.0	25.0			
193.324997	75.00	-	ASE	637	-17.9	
-	-26.2	0.0	25.0			
193.399994	75.00	-	ASE	661	-17.8	
-	-26.0	0.0	25.0			
193.475006	75.00	-	ASE	685	-17.6	
-	-25.8	0.0	25.0			
193.550003	75.00	35	ASE	709	-17.4	
-	-25.7	0.0	25.0			
193.625000	75.00	-	ASE	733	-17.2	
-	-25.5	0.0	25.0			
193.699997	75.00	-	ASE	757	-17.2	
-	-25.4	0.0	25.0			
193.774994	75.00	-	ASE	781	-17.1	
-	-25.3	0.0	25.0			
193.850006	75.00	-	ASE	805	-17.0	
-	-25.2	0.0	25.0			
193.925003	75.00	-	ASE	829	-17.0	
-	-25.2	0.0	25.0			
194.000000	75.00	-	ASE	853	-17.1	
-	-25.3	0.0	25.0			
194.074997	75.00	-	ASE	877	-16.9	
-	-25.1	0.0	25.0			
194.149994	75.00	-	ASE	901	-17.0	
-	-25.1	0.0	25.0			
194.225006	75.00	-	ASE	925	-17.1	
-	-25.1	0.0	25.0			
194.300003	75.00	-	ASE	949	-17.2	
-	-25.3	0.0	25.0			
194.375000	75.00	-	ASE	973	-17.3	

-	-25.3	0.0	25.0			
194.449997	75.00	-	ASE	997	-17.5	
-	-25.5	0.0	25.0			
194.524994	75.00	-	ASE	1021	-17.5	
-	-25.5	0.0	25.0			
194.600006	75.00	-	ASE	1045	-17.7	
-	-25.7	0.0	25.0			
194.675003	75.00	-	ASE	1069	-17.8	
-	-25.8	0.0	25.0			
194.750000	75.00	-	ASE	1093	-17.8	
-	-25.8	0.0	25.0			
194.824997	75.00	18	ASE	1117	-17.8	
-	-25.8	0.0	25.0			
194.899994	75.00	-	ASE	1141	-17.8	
-	-25.8	0.0	25.0			
194.975006	75.00	16	ASE	1165	-17.7	
-	-25.8	0.0	25.0			
195.050003	75.00	15	ASE	1189	-17.7	
-	-25.8	0.0	25.0			
195.125000	75.00	14	ASE	1213	-17.5	
-	-25.7	0.0	25.0			
195.199997	75.00	13	ASE	1237	-17.6	
-	-25.8	0.0	25.0			
195.274994	75.00	12	ASE	1261	-17.6	
-	-25.8	0.0	25.0			
195.350006	75.00	11	ASE	1285	-17.5	
-	-25.7	0.0	25.0			
195.425003	75.00	10	ASE	1309	-17.5	
-	-25.6	0.0	25.0			
195.500000	75.00	9	ASE	1333	-17.5	
-	-25.6	0.0	25.0			
195.574997	75.00	8	ASE	1357	-17.6	
-	-25.7	0.0	25.0			
195.649994	75.00	7	ASE	1381	-17.5	
-	-25.6	0.0	25.0			
195.725006	75.00	6	ASE	1405	-17.4	
-	-25.5	0.0	25.0			
195.800003	75.00	5	ASE	1429	-17.6	
-	-25.5	0.0	25.0			
195.875000	75.00	4	ASE	1453	-17.7	
-	-25.6	0.0	25.0			
195.949997	75.00	3	OCh	1477	-17.7	
-	-25.5	0.0	25.0			
196.024994	75.00	2	ASE	1501	-17.9	
-	-25.6	0.0	25.0			
196.100006	75.00	1	OCh	1525	-18.2	
-	-25.7	0.0	25.0			

ASE - Noise Loaded Channel

OCh - Optical Channel

RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc span-loss

Mon Jul 25 09:51:46.279 UTC

```

Controller name           : Ots0/0/0/0
Neighbour RID             : 10.137.1.1
Apparent Rx Span Loss    : 6.2 dB
Rx Span Loss (with pumps off) : 19.2 dB
Rx Span Loss (with pumps off) measured at : 2022-07-25 09:32:37
Estimated Rx Span Loss   : 19.2 dB
Apparent Tx Span Loss    : 4.9 dB
Tx Span Loss (with pumps off) : 16.8 dB
Tx Span Loss (with pumps off) measured at : 2022-07-25 09:23:12
Estimated Tx Span Loss   : 17.0 dB

```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc apc
Mon Jul 25 09:51:56.858 UTC
```

```
Controller      : Ots0/0/0/0
APC Status     : IDLE
```

```
Node RID       : 10.124.1.1
Internal State : IDLE
```

```
Node RID       : 10.137.1.1
Internal State : IDLE
```

```
Node RID       : 10.129.1.1
Internal State : IDLE
```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-4#sh olc link-tuner
Mon Jul 25 09:52:00.272 UTC
```

```
Controller      : Ots0/0/0/0
```

```
Link Tuner Status : OPERATIONAL
```

```
Last PSD computation: 2022-07-25 09:33:13
```

```
-----
Setpoint        : Computed PSD
                  (dBm/12.5 GHz)
-----
```

```
01              -7.8
02              -7.7
03              -7.7
04              -7.7
05              -7.6
06              -7.6
07              -7.6
08              -7.5
09              -7.5
10              -7.5
11              -7.4
12              -7.4
13              -7.4
14              -7.3
15              -7.3
16              -7.3
17              -7.3
18              -7.2
19              -7.2
20              -7.2
21              -7.1
22              -7.1
23              -7.1
24              -7.1
25              -7.0
26              -7.0
27              -6.9
28              -6.9
29              -6.9
30              -6.9
31              -6.8
32              -6.8
33              -6.8
```

16. Repeat steps 1 through 15 to configure the ILA-R-C and OLT-R-C-SITE-7 nodes.
17. Configure the cross-connects for the OLT-R-C-SITE-4 and OLT-R-C-SITE-7 nodes. For a sample cross-connect configuration, see [Cross-connect Configuration, on page 21](#).

The following sample displays the running configuration of the OLT-R-C-SITE-4 node that was configured earlier.

```
!! IOS XR Configuration 7.7.1.34I
!! Last configuration change at Mon Jul 25 09:31:37 2022 by cisco
!
hostname OLT-R-C-SITE-4
username cisco
  group root-lr
  group cisco-support
  secret 10
$6$apz9n/xzmQjA5n/.$1bqshQ3JznivW1890NY4e7s5ckBTzVxKk8..gz0Ms70e5DYNBGa4hSzKVSoi0EggK8OIgBebdtXopXzU4kPSb1
!
call-home
  service active
  contact smart-licensing
  profile CiscoTAC-1
    active
  destination transport-method email disable
  destination transport-method http
!
!
interface Loopback0
  ipv4 address 10.124.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
  ipv4 address 10.4.33.124 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
  shutdown
!
interface MgmtEth0/RP0/CPU0/2
  ipv4 address 10.127.59.153 255.255.255.0
!
interface GigabitEthernet0/0/0/0
  ipv4 address 10.70.1.1 255.255.255.0
!
interface PTP0/RP0/CPU0/0
  shutdown
!
interface PTP0/RP0/CPU0/1
  shutdown
!
router ospf 1
  distribute link-state instance-id 0 throttle 5
  router-id 10.124.1.1
  network point-to-point
  area 0
    interface Loopback0
      !
    interface GigabitEthernet0/0/0/0
      !
!
!
optical-line-control
  automatic-link-bringup
!
end
```

The following sample displays the running configuration of the ILA-R-C node.

```
hostname ILA-R-C
username cisco
  group root-lr
  group cisco-support
```

```

secret 10
$6$kkAus0AXCicX9s0.$eOFMOC3oIJO8yoGC6SeZR5SUyy1A2XThloqu4BKtazw8Tmg0xccyhq0p43q5UVHXMZHoNppSiX/R14WF4EZka/
password 7 05080F1C221C1F5B4A
!
call-home
service active
contact smart-licensing
profile CiscoTAC-1
  active
  destination transport-method email disable
  destination transport-method http
!
!
interface Loopback0
ipv4 address 10.137.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.137 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.157 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.70.1.2 255.255.255.0
!
interface GigabitEthernet0/0/0/2
ipv4 address 10.72.1.1 255.255.255.0
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
!
router ospf 1
  distribute link-state instance-id 0 throttle 5
  router-id 10.137.1.1
  network point-to-point
  redistribute connected
  area 0
    interface Loopback0
    !
    interface GigabitEthernet0/0/0/0
    !
    interface GigabitEthernet0/0/0/2
    !
  optical-line-control
  automatic-link-bringup
!
End

```

The following sample displays the running configuration of the OLT-R-C-SITE-7 node.

```

hostname OLT-R-C-SITE-7
username cisco
group root-lr
group cisco-support
secret 10
$6$USjBp0rPHhqI9p0.$adQMoHZ6N8KqfHtgCFx00IcxN5F.QxeyzXsoJ2IKeJx4tU/hhEmTcrEJL2z5Z1UA79CPMjdrECaTtmXBswm0s/
password 7 110A101614425A5E57

```

```

!
call-home
service active
contact smart-licensing
profile CiscoTAC-1
  active
  destination transport-method email disable
  destination transport-method http
!
!
interface Loopback0
ipv4 address 10.129.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.127 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
ipv4 address dhcp
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.151 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.72.1.2 255.255.255.0
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
!
router ospf 1
distribute link-state instance-id 0 throttle 5
router-id 10.129.1.1
network point-to-point
area 0
  interface Loopback0
  !
  interface GigabitEthernet0/0/0/0
  !
!
!
optical-line-control
automatic-link-bringup
!
end

```

Cross-connect Configuration

The OTS-OCH controllers are not created by default when the cards (NCS1K-ILA-2R-C, NCS1K-ILA-R-C, NCS1K-ILA-C, NCS1K-OLT-R-C, and NCS1K-OLT-C) are brought up. The LINE OTS-OCH controllers can be created using the **hw-module** command.

Optical Cross Connections can be configured only on OLT nodes. In these nodes, the OTS-OCH controller is not created automatically on the Add/Drop ports (COM side). The optical cross connect configuration defines the line side OTS-OCH channel as the source and creates an OTS-OCH controller on the ADD/Drop port to which the cross connection is made. The channel ID must be the same for both the LINE side and COM side OTS-OCH controller.

To illustrate the creation of the cross-connects, we are going to create a single channel from OLT-R-C-SITE-1 to OLT-C-SITE-8 in the topology diagram. The channel is mapped to **191.45 THz**.

Configuration for OLT-R-C-SITE-1

```
P/0/RP0/CPU0:OLT-R-C-SITE-1#config
Tue Jul 26 06:30:25.087 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:33:03.824 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:33:13.093 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	NXC

```
RP/0/RP0/CPU0:OLT-R-C-SITE-1#config
Tue Jul 26 06:33:29.885 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#add-drop-channel ots-Och 0/0/0/3/63
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#commit
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#end
RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:34:27.110 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	ACTIVE

Configuration for ILA-2R-C

```
RP/0/RP0/CPU0:ILA-2R-C#config
Tue Jul 26 06:35:12.145 UTC
RP/0/RP0/CPU0:ILA-2R-C(config)#hw-module location 0/0/NXR0 inline-ampli
```

```
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila)#grid-mode flex
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#commit
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-2R-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:36:33.333 UTC
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)
63	191.450000	75.000

```
RP/0/RP0/CPU0:ILA-2R-C#sh controllers ots-Och 0/0/0/63
Tue Jul 26 06:36:41.935 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

Total RX Power = -13.40 dBm
Total TX Power = 0.99 dBm

Configured Parameters:

```
RP/0/RP0/CPU0:ILA-2R-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 06:36:52.466 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

Total RX Power = -5.50 dBm
Total TX Power = 2.29 dBm

Configured Parameters:

Configuration for ILA-R-C

```
RP/0/RP0/CPU0:ILA-R-C#config
Tue Jul 26 06:36:45.377 UTC
RP/0/RP0/CPU0:ILA-R-C(config)#hw-module location 0/0/NXR0 inline-ampli grid-mode flex
```

```
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#commit
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-R-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:37:08.127 UTC
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)
63	191.450000	75.000

```
RP/0/RP0/CPU0:ILA-R-C#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:08:07.280 UTC
```

Controller State: Up

Transport Admin State: In Service

```
Alarm Status:
-----
Detected Alarms: None
```

```
Parameter Statistics:
-----
Total RX Power = -12.40 dBm
Total TX Power = 1.19 dBm
```

```
Configured Parameters:
-----
```

```
RP/0/RP0/CPU0:ILA-R-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 07:08:10.854 UTC
```

Controller State: Up

Transport Admin State: In Service

```
Alarm Status:
-----
Detected Alarms: None
```

```
Parameter Statistics:
-----
Total RX Power = -9.10 dBm
Total TX Power = 1.39 dBm
```

```
Configured Parameters:
-----
```

Configuration for ILA-C

```
RP/0/RP0/CPU0:ILA-C#config
Tue Jul 26 06:38:56.584 UTC
RP/0/RP0/CPU0:ILA-C(config)#hw-module location 0/0/NXR0 inline-ampli grid-mode flex

RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
```



```

RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#commit
Tue Jul 26 06:39:24.378 UTC
RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-C#
RP/0/RP0/CPU0:ILA-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:39:43.874 UTC

Location:                0/0/NXR0

Status:                   Provisioned

Flex Grid Info

Channel Number           Centre Frequency (THz)           Channel Width (GHz)
63                     191.450000                       75.000

RP/0/RP0/CPU0:ILA-C#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:10:32.333 UTC

Controller State: Up

Transport Admin State: In Service

Alarm Status:
-----
Detected Alarms: None

Parameter Statistics:
-----
Total RX Power = -15.80 dBm
Total TX Power = -0.60 dBm

Configured Parameters:
-----

RP/0/RP0/CPU0:ILA-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 07:10:38.238 UTC

Controller State: Up

Transport Admin State: In Service

Alarm Status:
-----
Detected Alarms: None

Parameter Statistics:
-----
Total RX Power = -11.00 dBm
Total TX Power = -1.60 dBm

Configured Parameters:
-----

```

Configuration for OLT-C-SITE-2

```

RP/0/RP0/CPU0:OLT-C-SITE-2#config
Tue Jul 26 06:38:54.139 UTC
RP/0/RP0/CPU0:OLT-C-SITE-2(config)#hw-module location 0/0/NXR0 terminal-ampli
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt)#grid-mode flex
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75

```

```
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#commit
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-C-SITE-2#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:39:23.878 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	NXC

```
RP/0/RP0/CPU0:OLT-C-SITE-2#config
Tue Jul 26 06:48:25.732 UTC
RP/0/RP0/CPU0:OLT-C-SITE-2(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#add-drop-channel ots-Och 0/0/0/30/63
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#commit
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-2#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:10:28.928 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

Total RX Power = -11.80 dBm

Total TX Power = 0.99 dBm

Cross Connect Info:

Add-Drop Channel = Ots-Och0/0/0/30/63

Configured Parameters:

```
RP/0/RP0/CPU0:OLT-C-SITE-2#sh controllers ots-Och 0/0/0/30/63
Tue Jul 26 07:10:33.899 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

```
-----
Total RX Power = -4.50 dBm
Total TX Power = -2.20 dBm
```

Cross Connect Info:

```
-----
line Channel = Ots-Och0/0/0/0/63
```

Configured Parameters:

Configuration for OLT-C-SITE-5

```
RP/0/RP0/CPU0:OLT-C-SITE-5#config
Tue Jul 26 06:50:27.739 UTC
Current Configuration Session Line User Date Lock
00001000-000044b2-00000000 con0_RP0_C cisco Fri Jul 22 11:53:12 2022
RP/0/RP0/CPU0:OLT-C-SITE-5(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:50:54.786 UTC
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-C-SITE-5#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:51:01.966 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

```
Location: 0/0/NXR0
```

```
Status: Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
1	196.100000	75.000	ACTIVE
3	195.950000	75.000	ASE
5	195.800000	75.000	ASE
17	194.900000	75.000	ACTIVE
59	191.750000	75.000	ACTIVE
61	191.600000	75.000	ACTIVE
62	191.525000	75.000	ASE
63	191.450000	75.000	NXC
64	191.375000	75.000	ACTIVE

```
RP/0/RP0/CPU0:OLT-C-SITE-5#config
Tue Jul 26 06:51:05.833 UTC
Current Configuration Session Line User Date Lock
00001000-000044b2-00000000 con0_RP0_C cisco Fri Jul 22 11:53:12 2022
RP/0/RP0/CPU0:OLT-C-SITE-5(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#add-drop-channel ots-Och 0/0/0/30/63
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#commit
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-5#
RP/0/RP0/CPU0:OLT-C-SITE-5#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:12:50.904 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

Total RX Power = -11.00 dBm
Total TX Power = 1.89 dBm

Cross Connect Info:

Add-Drop Channel = Ots-Och0/0/0/30/63

Configured Parameters:

RP/0/RP0/CPU0:OLT-C-SITE-5#sh controllers ots-Och 0/0/0/30/63
Tue Jul 26 07:12:54.871 UTC

Controller State: Up

Transport Admin State: In Service

Alarm Status:

Detected Alarms: None

Parameter Statistics:

Total RX Power = -3.70 dBm
Total TX Power = -2.70 dBm

Cross Connect Info:

line Channel = Ots-Och0/0/0/0/63

Configured Parameters:

Configuration for OLT-C-SITE-8

```
RP/0/RP0/CPU0:OLT-C-SITE-8#config
Tue Jul 26 06:56:26.764 UTC
Current Configuration Session Line      User      Date                               Lock
00001000-0000345b-00000000      con0_RP0_C cisco     Fri Jul 22 11:54:38 2022
RP/0/RP0/CPU0:OLT-C-SITE-8(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#add-drop-channel ots-Och 0/0/0/3/63
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#commit
Tue Jul 26 06:56:46.290 UTC
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-8#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:57:06.011 UTC
```

Legend:
NXC - Channel not cross-connected

ACTIVE - Channel cross-connected to data port
 ASE - Channel filled with ASE
 FAILED - Data channel failed, pending transition to ASE

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
1	196.100000	75.000	ACTIVE
3	195.950000	75.000	NXC
5	195.800000	75.000	ACTIVE
17	194.900000	75.000	ACTIVE
59	191.750000	75.000	ACTIVE
63	191.450000	75.000	ACTIVE
64	191.375000	75.000	ACTIVE

RP/0/RP0/CPU0:OLT-C-SITE-8#sh controllers ots-Och 0/0/0/0/63
 Tue Jul 26 06:57:28.630 UTC

Controller State: Up

Transport Admin State: In Service

Alarm Status:

 Detected Alarms: None

Parameter Statistics:

 Total RX Power = -13.20 dBm
 Total TX Power = -1.50 dBm

Cross Connect Info:

 Add-Drop Channel = Ots-Och0/0/0/3/63

Configured Parameters:

RP/0/RP0/CPU0:OLT-C-SITE-8#sh controllers ots-Och 0/0/0/3/63
 Tue Jul 26 06:57:35.129 UTC

Controller State: Up

Transport Admin State: Automatic In Service

Alarm Status:

 Detected Alarms: None

Parameter Statistics:

 Total RX Power = -7.50 dBm
 Total TX Power = -21.80 dBm

```

Cross Connect Info:
-----
line Channel = Ots-Och0/0/0/0/63

```

```

Configured Parameters:
-----

```

After the cross-connects are created on the OLT nodes, APC regulates the power on each node. The APC status moves from WORKING to IDLE when the process completes. Use the **show olc apc** command to view the status of the operation. The following samples are for OLT-C-SITE-8.

```

RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc
Tue Jul 26 06:57:16.020 UTC

```

```

Controller      : Ots0/0/0/0
APC Status    : WORKING
Correcting Node : 10.123.1.1

```

```

Node RID       : 10.125.1.1
Internal State : IDLE

```

```

Node RID       : 10.123.1.1
Internal State : CORRECTING

```

```

RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc
Tue Jul 26 06:59:11.985 UTC

```

```

Controller      : Ots0/0/0/0
APC Status    : IDLE

```

```

Node RID       : 10.125.1.1
Internal State : IDLE

```

```

Node RID       : 10.123.1.1
Internal State : IDLE

```

After the APC process is complete, the link comes up. You can view the details using the **sh olc apc-local regulation-info controller ots** command on the near-end and far-end nodes.

OLT-R-C-SITE-1:

```

RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh olc apc-local regulation-info controller ots 0/0/0/0
Tue Jul 26 07:02:57.244 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.131.1.1
Internal Status : IDLE
Direction      : TX
PSD Minimum     : -22.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-07-26 06:34:43

```

Device Parameters	Min	Max	Configuration	Operational
Egress Ampli Gain (dB)	15.3	29.3	17.9	17.9
Egress Ampli Tilt (dB)	-5.0	4.3	-1.6	-1.6
TX Ampli Power (dBm)	-	22.3	-	21.6
TX VOA Attenuation (dB)	0.0	20.0	1.3	1.3
Egress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Frequency (THz)	Channel Slice Width (GHz)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
Discrepancy							

191.375000	75.00	-	ASE	13	-21.2	-5.7	-5.7
0.0	7.3						
191.449997	75.00	63	OCh	37	-21.5	-5.7	-5.9
0.2	19.0						
191.524994	75.00	-	ASE	61	-21.3	-5.7	-5.7
0.0	7.3						
191.600006	75.00	-	ASE	85	-21.2	-5.6	-5.6
0.0	7.3						
191.675003	75.00	-	ASE	109	-21.2	-5.6	-5.6
0.0	7.4						
191.750000	75.00	-	ASE	133	-21.1	-5.5	-5.5
0.0	7.3						
191.824997	75.00	-	ASE	157	-21.1	-5.5	-5.5
0.0	7.3						
191.899994	75.00	-	ASE	181	-21.1	-5.5	-5.5
0.0	7.3						
191.975006	75.00	-	ASE	205	-21.2	-5.5	-5.5
0.0	7.4						
192.050003	75.00	-	ASE	229	-21.1	-5.4	-5.4
0.0	7.2						
192.125000	75.00	-	ASE	253	-21.1	-5.4	-5.4
0.0	7.2						
192.199997	75.00	-	ASE	277	-21.0	-5.4	-5.4
0.0	7.2						
192.274994	75.00	-	ASE	301	-21.1	-5.4	-5.4
0.0	7.2						
192.350006	75.00	-	ASE	325	-21.0	-5.3	-5.3
0.0	7.0						
192.425003	75.00	-	ASE	349	-21.0	-5.3	-5.3
0.0	6.9						
192.500000	75.00	-	ASE	373	-21.0	-5.3	-5.4
0.1	7.0						
192.574997	75.00	-	ASE	397	-20.9	-5.3	-5.3
0.0	7.0						
192.649994	75.00	-	ASE	421	-20.9	-5.2	-5.2
0.0	7.0						
192.725006	75.00	-	ASE	445	-20.9	-5.2	-5.2
0.0	6.9						
192.800003	75.00	-	ASE	469	-20.9	-5.2	-5.2
0.0	6.9						
192.875000	75.00	-	ASE	493	-20.9	-5.2	-5.2
0.0	6.9						
192.949997	75.00	-	ASE	517	-20.8	-5.1	-5.1
0.0	6.8						
193.024994	75.00	-	ASE	541	-20.9	-5.1	-5.1
0.0	6.8						
193.100006	75.00	-	ASE	565	-20.9	-5.1	-5.1
0.0	6.7						
193.175003	75.00	-	ASE	589	-20.9	-5.1	-5.1
0.0	6.6						
193.250000	75.00	-	ASE	613	-20.8	-5.0	-5.0
0.0	6.5						
193.324997	75.00	-	ASE	637	-20.9	-5.0	-5.1
0.0	6.6						
193.399994	75.00	-	ASE	661	-20.8	-5.0	-5.0
0.0	6.5						
193.475006	75.00	-	ASE	685	-20.9	-5.0	-5.0
0.0	6.5						
193.550003	75.00	-	ASE	709	-20.9	-4.9	-4.9
0.0	6.5						
193.625000	75.00	-	ASE	733	-20.9	-4.9	-4.9
0.0	6.5						
193.699997	75.00	-	ASE	757	-20.9	-4.9	-4.9
0.0	6.5						
193.774994	75.00	-	ASE	781	-21.0	-4.9	-4.9
0.0	6.6						
193.850006	75.00	-	ASE	805	-20.9	-4.8	-4.8
0.0	6.5						
193.925003	75.00	-	ASE	829	-21.0	-4.8	-4.8
0.0	6.6						
194.000000	75.00	-	ASE	853	-21.0	-4.8	-4.8
0.0	6.6						
194.074997	75.00	-	ASE	877	-21.0	-4.8	-4.7
0.0	6.6						
194.149994	75.00	-	ASE	901	-21.0	-4.7	-4.7
0.0	6.7						
194.225006	75.00	-	ASE	925	-21.0	-4.7	-4.7
0.0	6.8						
194.300003	75.00	-	ASE	949	-21.1	-4.7	-4.7
0.0	6.9						
194.375000	75.00	-	ASE	973	-21.0	-4.7	-4.6
0.0	6.9						
194.449997	75.00	-	ASE	997	-21.0	-4.6	-4.6
0.0	6.9						

Cross-connect Configuration

194.524994	75.00	-	ASE	1021	-21.1	-4.6	-4.7
0.0	7.0						
194.600006	75.00	-	ASE	1045	-21.1	-4.6	-4.6
0.0	6.9						
194.675003	75.00	-	ASE	1069	-21.1	-4.6	-4.6
0.0	6.9						
194.750000	75.00	-	ASE	1093	-21.1	-4.5	-4.5
0.0	6.8						
194.824997	75.00	-	ASE	1117	-21.0	-4.5	-4.5
0.0	6.7						
194.899994	75.00	17	OCh	1141	-21.2	-4.5	-4.5
0.0	19.5						
194.975006	75.00	-	ASE	1165	-21.1	-4.5	-4.5
0.0	6.6						
195.050003	75.00	-	ASE	1189	-21.0	-4.4	-4.4
0.0	6.4						
195.125000	75.00	-	ASE	1213	-21.1	-4.4	-4.4
0.0	6.4						
195.199997	75.00	-	ASE	1237	-21.1	-4.4	-4.4
0.0	6.3						
195.274994	75.00	-	ASE	1261	-21.2	-4.4	-4.5
0.1	6.3						
195.350006	75.00	-	ASE	1285	-21.2	-4.3	-4.3
0.0	6.2						
195.425003	75.00	-	ASE	1309	-21.3	-4.3	-4.3
0.0	6.2						
195.500000	75.00	-	ASE	1333	-21.3	-4.3	-4.3
0.0	6.2						
195.574997	75.00	-	ASE	1357	-21.5	-4.3	-4.4
0.1	6.3						
195.649994	75.00	-	ASE	1381	-21.5	-4.2	-4.3
0.0	6.4						
195.725006	75.00	-	ASE	1405	-21.5	-4.2	-4.1
-0.1	6.5						
195.800003	75.00	-	ASE	1429	-21.7	-4.2	-4.2
0.0	6.8						
195.875000	75.00	-	ASE	1453	-21.9	-4.2	-4.3
0.1	7.1						
195.949997	75.00	-	ASE	1477	-21.8	-4.2	-4.0
-0.1	7.1						
196.024994	75.00	2	ASE	1501	-21.9	-4.1	-4.1
0.0	7.3						
196.100006	75.00	-	ASE	1525	-21.9	-4.1	-4.0
-0.1	7.4						

```

Controller          : Ots0/0/0/0
Domain Manager      : 10.126.1.1
Internal Status     : IDLE
Direction           : RX
PSD Minimum         : -22.0 (dBm/12.5 GHz)
Gain Range          : Normal
Last Correction     : 2022-07-26 06:57:17

```

Device Parameters	Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	10.9	23.9	10.9	10.9
Ingress Ampli Tilt (dB)	-5.0	5.0	-1.6	-1.6
RX Ampli Power (dBm)	-	25.0	-	24.2
RX VOA Attenuation (dB)	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Frequency (THz)	Channel Width (GHz)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000	75.00	-	ASE	13	-11.1	-	-25.5
0.0	25.0						
191.449997	75.00	63	OCh	37	-11.1	-8.0	-8.1
0.0	2.9						
191.524994	75.00	-	ASE	61	-11.0	-	-25.4
0.0	25.0						
191.600006	75.00	-	ASE	85	-11.0	-	-25.2
0.0	25.0						
191.675003	75.00	-	ASE	109	-11.0	-	-25.3
0.0	25.0						
191.750000	75.00	-	ASE	133	-11.0	-	-25.4
0.0	25.0						
191.824997	75.00	-	ASE	157	-11.4	-	-25.6

0.0	25.0						
191.899994	75.00	-	ASE	181	-11.4	-	-25.6
0.0	25.0						
191.975006	75.00	-	ASE	205	-11.1	-	-25.4
0.0	25.0						
192.050003	75.00	-	ASE	229	-11.0	-	-25.3
0.0	25.0						
192.125000	75.00	-	ASE	253	-11.1	-	-25.4
0.0	25.0						
192.199997	75.00	-	ASE	277	-11.4	-	-25.6
0.0	25.0						
192.274994	75.00	-	ASE	301	-11.5	-	-25.7
0.0	25.0						
192.350006	75.00	-	ASE	325	-11.3	-	-25.7
0.0	25.0						
192.425003	75.00	-	ASE	349	-11.5	-	-25.7
0.0	25.0						
192.500000	75.00	-	ASE	373	-11.6	-	-25.8
0.0	25.0						
192.574997	75.00	-	ASE	397	-11.6	-	-25.7
0.0	25.0						
192.649994	75.00	-	ASE	421	-11.7	-	-25.9
0.0	25.0						
192.725006	75.00	-	ASE	445	-11.8	-	-26.1
0.0	25.0						
192.800003	75.00	-	ASE	469	-11.9	-	-26.1
0.0	25.0						
192.875000	75.00	-	ASE	493	-11.8	-	-26.0
0.0	25.0						
192.949997	75.00	-	ASE	517	-12.0	-	-26.2
0.0	25.0						
193.024994	75.00	-	ASE	541	-12.0	-	-26.1
0.0	25.0						
193.100006	75.00	-	ASE	565	-11.9	-	-26.1
0.0	25.0						
193.175003	75.00	-	ASE	589	-12.0	-	-26.3
0.0	25.0						
193.250000	75.00	-	ASE	613	-11.9	-	-26.1
0.0	25.0						
193.324997	75.00	-	ASE	637	-11.9	-	-26.1
0.0	25.0						
193.399994	75.00	-	ASE	661	-12.0	-	-26.2
0.0	25.0						
193.475006	75.00	-	ASE	685	-12.0	-	-26.2
0.0	25.0						
193.550003	75.00	-	ASE	709	-12.0	-	-26.1
0.0	25.0						
193.625000	75.00	-	ASE	733	-11.9	-	-26.0
0.0	25.0						
193.699997	75.00	-	ASE	757	-11.6	-	-25.8
0.0	25.0						
193.774994	75.00	-	ASE	781	-11.6	-	-25.7
0.0	25.0						
193.850006	75.00	-	ASE	805	-11.5	-	-25.6
0.0	25.0						
193.925003	75.00	-	ASE	829	-11.4	-	-25.6
0.0	25.0						
194.000000	75.00	-	ASE	853	-11.5	-	-25.6
0.0	25.0						
194.074997	75.00	-	ASE	877	-11.6	-	-25.6
0.0	25.0						
194.149994	75.00	-	ASE	901	-11.7	-	-25.6
0.0	25.0						
194.225006	75.00	-	ASE	925	-11.8	-	-25.6
0.0	25.0						
194.300003	75.00	-	ASE	949	-12.0	-	-25.8
0.0	25.0						
194.375000	75.00	-	ASE	973	-12.0	-	-25.8
0.0	25.0						
194.449997	75.00	-	ASE	997	-12.1	-	-25.9
0.0	25.0						
194.524994	75.00	-	ASE	1021	-12.2	-	-25.9
0.0	25.0						
194.600006	75.00	-	ASE	1045	-12.2	-	-26.0
0.0	25.0						
194.675003	75.00	-	ASE	1069	-12.2	-	-26.0
0.0	25.0						
194.750000	75.00	-	ASE	1093	-12.3	-	-26.0
0.0	25.0						
194.824997	75.00	-	ASE	1117	-12.4	-	-26.1
0.0	25.0						
194.899994	75.00	17	OCh	1141	-12.3	-8.0	-8.1
-0.1	2.0						
194.975006	75.00	-	ASE	1165	-12.1	-	-26.0
0.0	25.0						
195.050003	75.00	-	ASE	1189	-12.0	-	-25.9

Cross-connect Configuration

```

0.0      25.0
195.125000 75.00 - ASE 1213 -12.0 - -25.9
0.0      25.0
195.199997 75.00 - ASE 1237 -12.0 - -26.0
0.0      25.0
195.274994 75.00 - ASE 1261 -11.8 - -25.7
0.0      25.0
195.350006 75.00 - ASE 1285 -11.7 - -25.6
0.0      25.0
195.425003 75.00 - ASE 1309 -11.6 - -25.5
0.0      25.0
195.500000 75.00 - ASE 1333 -11.7 - -25.6
0.0      25.0
195.574997 75.00 - ASE 1357 -11.8 - -25.4
0.0      25.0
195.649994 75.00 - ASE 1381 -11.4 - -25.1
0.0      25.0
195.725006 75.00 - ASE 1405 -11.5 - -25.1
0.0      25.0
195.800003 75.00 - ASE 1429 -11.7 - -25.1
0.0      25.0
195.875000 75.00 - ASE 1453 -11.8 - -25.0
0.0      25.0
195.949997 75.00 - ASE 1477 -11.6 - -24.7
0.0      25.0
196.024994 75.00 2 ASE 1501 -11.9 -9.0 -8.9
-0.1     4.5
196.100006 75.00 - ASE 1525 -11.9 - -24.8
0.0      25.0

```

OLT-C-SITE-8:

```

RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc-local regulation-info controller ots 0/0/0 tX
Tue Jul 26 06:59:33.786 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.125.1.1
Internal Status : IDLE
Direction      : TX
PSD Minimum    : -24.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-07-26 06:57:09

```

Device Parameters	Min	Max	Configuration	Operational
Egress Ampli Gain (dB)	16.0	30.0	20.3	20.3
Egress Ampli Tilt (dB)	-5.0	3.0	-1.5	-1.5
TX Ampli Power (dBm)	-	23.0	-	22.1
TX VOA Attenuation (dB)	0.0	20.0	5.5	5.5
Egress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Frequency (THz)	Channel Channel Slice Width Attn Config (GHz)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000	75.00	64	OCh	13	-23.0	-8.6	-8.6
0.0	20.2						
191.449997	75.00	63	OCh	37	-23.0	-8.6	-8.6
0.0	18.3						
191.524994	75.00	-	ASE	61	-23.0	-8.6	-8.6
0.0	7.7						
191.600006	75.00	-	ASE	85	-23.1	-8.6	-8.7
0.1	7.8						
191.675003	75.00	-	ASE	109	-23.0	-8.6	-8.6
0.0	7.6						
191.750000	75.00	59	OCh	133	-23.0	-8.5	-8.6
0.0	20.0						
191.824997	75.00	-	ASE	157	-23.1	-8.5	-8.5
0.0	7.8						
191.899994	75.00	-	ASE	181	-23.0	-8.5	-8.5
0.0	7.7						
191.975006	75.00	-	ASE	205	-23.0	-8.5	-8.5
0.0	7.7						
192.050003	75.00	-	ASE	229	-23.0	-8.4	-8.4
0.0	7.6						
192.125000	75.00	-	ASE	253	-23.0	-8.4	-8.5
0.0	7.7						
192.199997	75.00	-	ASE	277	-23.1	-8.4	-8.5
0.1	7.8						

192.274994	75.00	-	ASE	301	-22.9	-8.4	-8.3
0.0	7.6						
192.350006	75.00	-	ASE	325	-22.9	-8.3	-8.4
0.0	7.5						
192.425003	75.00	-	ASE	349	-22.9	-8.3	-8.3
0.0	7.5						
192.500000	75.00	-	ASE	373	-22.8	-8.3	-8.3
0.0	7.5						
192.574997	75.00	-	ASE	397	-23.0	-8.3	-8.4
0.1	7.6						
192.649994	75.00	-	ASE	421	-22.8	-8.2	-8.2
0.0	7.4						
192.725006	75.00	-	ASE	445	-22.8	-8.2	-8.3
0.0	7.4						
192.800003	75.00	-	ASE	469	-22.9	-8.2	-8.3
0.1	7.5						
192.875000	75.00	-	ASE	493	-22.8	-8.2	-8.3
0.1	7.5						
192.949997	75.00	-	ASE	517	-22.7	-8.1	-8.0
-0.1	7.3						
193.024994	75.00	-	ASE	541	-22.7	-8.1	-8.2
0.0	7.3						
193.100006	75.00	-	ASE	565	-22.7	-8.1	-8.1
0.0	7.2						
193.175003	75.00	-	ASE	589	-22.7	-8.1	-8.2
0.1	7.2						
193.250000	75.00	-	ASE	613	-22.7	-8.1	-8.1
0.0	7.2						
193.324997	75.00	-	ASE	637	-22.6	-8.0	-8.0
0.0	7.0						
193.399994	75.00	-	ASE	661	-22.7	-8.0	-8.1
0.0	7.1						
193.475006	75.00	-	ASE	685	-22.7	-8.0	-8.0
0.0	7.1						
193.550003	75.00	-	ASE	709	-22.6	-8.0	-7.9
0.0	7.1						
193.625000	75.00	-	ASE	733	-22.6	-7.9	-7.9
0.0	7.1						
193.699997	75.00	-	ASE	757	-22.7	-7.9	-7.9
0.0	7.1						
193.774994	75.00	-	ASE	781	-22.6	-7.9	-7.9
0.0	7.0						
193.850006	75.00	-	ASE	805	-22.8	-7.9	-8.0
0.1	7.2						
193.925003	75.00	-	ASE	829	-22.6	-7.8	-7.8
0.0	7.0						
194.000000	75.00	-	ASE	853	-22.8	-7.8	-8.0
0.1	7.1						
194.074997	75.00	-	ASE	877	-22.7	-7.8	-7.8
0.0	7.1						
194.149994	75.00	-	ASE	901	-22.8	-7.8	-7.8
0.0	7.2						
194.225006	75.00	-	ASE	925	-22.8	-7.8	-7.8
0.0	7.2						
194.300003	75.00	-	ASE	949	-22.9	-7.7	-7.8
0.0	7.3						
194.375000	75.00	-	ASE	973	-22.8	-7.7	-7.7
0.0	7.3						
194.449997	75.00	-	ASE	997	-22.9	-7.7	-7.8
0.1	7.4						
194.524994	75.00	-	ASE	1021	-22.7	-7.7	-7.5
-0.1	7.2						
194.600006	75.00	-	ASE	1045	-22.8	-7.6	-7.6
0.0	7.3						
194.675003	75.00	-	ASE	1069	-22.8	-7.6	-7.6
0.0	7.3						
194.750000	75.00	-	ASE	1093	-22.8	-7.6	-7.6
0.0	7.2						
194.824997	75.00	-	ASE	1117	-22.8	-7.6	-7.5
0.0	7.1						
194.899994	75.00	17	OCh	1141	-22.9	-7.5	-7.5
0.0	18.8						
194.975006	75.00	-	ASE	1165	-22.8	-7.5	-7.5
0.0	7.0						
195.050003	75.00	-	ASE	1189	-22.9	-7.5	-7.5
0.0	7.1						
195.125000	75.00	-	ASE	1213	-22.8	-7.5	-7.4
0.0	6.9						
195.199997	75.00	-	ASE	1237	-22.9	-7.4	-7.4
0.0	6.8						
195.274994	75.00	-	ASE	1261	-22.9	-7.4	-7.4
0.0	6.8						
195.350006	75.00	-	ASE	1285	-23.0	-7.4	-7.4
0.0	6.9						
195.425003	75.00	-	ASE	1309	-23.1	-7.4	-7.4
0.0	7.0						

Cross-connect Configuration

195.500000	75.00	-	ASE	1333	-23.1	-7.3	-7.4
0.0	6.8						
195.574997	75.00	-	ASE	1357	-23.1	-7.3	-7.3
0.0	6.8						
195.649994	75.00	-	ASE	1381	-23.3	-7.3	-7.4
0.1	7.0						
195.725006	75.00	-	ASE	1405	-23.3	-7.3	-7.4
0.1	7.1						
195.800003	75.00	5	OCh	1429	-23.3	-7.2	-7.2
0.0	19.1						
195.875000	75.00	-	ASE	1453	-23.5	-7.2	-7.2
0.0	7.3						
195.949997	75.00	-	ASE	1477	-23.6	-7.2	-7.2
0.0	7.4						
196.024994	75.00	-	ASE	1501	-23.8	-7.2	-7.3
0.1	7.6						
196.100006	75.00	1	OCh	1525	-23.7	-7.2	-7.1
0.0	19.4						

ASE - Noise Loaded Channel
OCh - Optical Channel

```
RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc-local regulation-info controller ots 0/0/0/0 rx
Tue Jul 26 06:59:42.151 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.123.1.1
Internal Status : DISCREPANCY
Direction      : RX
PSD Minimumum  : -24.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-07-26 06:59:39
```

Device Parameters	Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	12.0	25.0	19.7	19.7
Ingress Ampli Tilt (dB)	-5.0	1.8	0.4	0.4
RX Ampli Power (dBm)	-	25.0	-	24.2
RX VOA Attenuation (dB)	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Discrepancy	Channel Channel Slice Frequency Width Attn Config	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD	Target PSD	Current PSD
(dB)	(THz) (GHz)				(dBm/12.5 GHz)	(dBm/12.5 GHz)	(dBm/12.5 GHz)
191.375000	75.00	64	OCh	13	-20.7	-8.0	-8.1
0.1	5.1						
191.449997	75.00	63	OCh	37	-20.6	-8.0	-22.4
14.4	15.3						
191.524994	75.00	62	ASE	61	-20.6	-	-25.6
0.0	25.0						
191.600006	75.00	61	OCh	85	-20.6	-	-25.6
0.0	25.0						
191.675003	75.00	-	ASE	109	-20.4	-	-25.4
0.0	25.0						
191.750000	75.00	59	OCh	133	-20.4	-8.0	-8.1
0.0	5.4						
191.824997	75.00	-	ASE	157	-20.4	-	-25.4
0.0	25.0						
191.899994	75.00	-	ASE	181	-20.5	-	-25.5
0.0	25.0						
191.975006	75.00	-	ASE	205	-20.4	-	-25.4
0.0	25.0						
192.050003	75.00	-	ASE	229	-20.4	-	-25.4
0.0	25.0						
192.125000	75.00	-	ASE	253	-20.3	-	-25.3
0.0	25.0						
192.199997	75.00	-	ASE	277	-20.4	-	-25.4
0.0	25.0						
192.274994	75.00	-	ASE	301	-20.5	-	-25.4
0.0	25.0						
192.350006	75.00	-	ASE	325	-20.1	-	-25.2
0.0	25.0						
192.425003	75.00	-	ASE	349	-20.2	-	-25.3
0.0	25.0						
192.500000	75.00	-	ASE	373	-20.3	-	-25.3
0.0	25.0						
192.574997	75.00	-	ASE	397	-20.4	-	-25.4
0.0	25.0						

192.649994	75.00	-	ASE	421	-20.4	-	-25.3
0.0	25.0						
192.725006	75.00	-	ASE	445	-20.3	-	-25.3
0.0	25.0						
192.800003	75.00	-	ASE	469	-20.3	-	-25.3
0.0	25.0						
192.875000	75.00	-	ASE	493	-20.3	-	-25.4
0.0	25.0						
192.949997	75.00	-	ASE	517	-20.3	-	-25.3
0.0	25.0						
193.024994	75.00	-	ASE	541	-20.2	-	-25.3
0.0	25.0						
193.100006	75.00	-	ASE	565	-20.3	-	-25.4
0.0	25.0						
193.175003	75.00	-	ASE	589	-20.3	-	-25.3
0.0	25.0						
193.250000	75.00	-	ASE	613	-20.3	-	-25.5
0.0	25.0						
193.324997	75.00	-	ASE	637	-20.2	-	-25.3
0.0	25.0						
193.399994	75.00	-	ASE	661	-20.4	-	-25.5
0.0	25.0						
193.475006	75.00	-	ASE	685	-20.4	-	-25.5
0.0	25.0						
193.550003	75.00	-	ASE	709	-20.5	-	-25.6
0.0	25.0						
193.625000	75.00	-	ASE	733	-20.4	-	-25.5
0.0	25.0						
193.699997	75.00	-	ASE	757	-20.3	-	-25.4
0.0	25.0						
193.774994	75.00	-	ASE	781	-20.4	-	-25.5
0.0	25.0						
193.850006	75.00	-	ASE	805	-20.4	-	-25.5
0.0	25.0						
193.925003	75.00	-	ASE	829	-20.3	-	-25.4
0.0	25.0						
194.000000	75.00	-	ASE	853	-20.3	-	-25.4
0.0	25.0						
194.074997	75.00	-	ASE	877	-20.4	-	-25.5
0.0	25.0						
194.149994	75.00	-	ASE	901	-20.5	-	-25.5
0.0	25.0						
194.225006	75.00	-	ASE	925	-20.4	-	-25.4
0.0	25.0						
194.300003	75.00	-	ASE	949	-20.4	-	-25.5
0.0	25.0						
194.375000	75.00	-	ASE	973	-20.4	-	-25.4
0.0	25.0						
194.449997	75.00	-	ASE	997	-20.4	-	-25.5
0.0	25.0						
194.524994	75.00	-	ASE	1021	-20.4	-	-25.4
0.0	25.0						
194.600006	75.00	-	ASE	1045	-20.4	-	-25.4
0.0	25.0						
194.675003	75.00	-	ASE	1069	-20.4	-	-25.5
0.0	25.0						
194.750000	75.00	-	ASE	1093	-20.4	-	-25.4
0.0	25.0						
194.824997	75.00	-	ASE	1117	-20.4	-	-25.4
0.0	25.0						
194.899994	75.00	17	OCh	1141	-20.2	-8.0	-8.0
0.0	2.1						
194.975006	75.00	-	ASE	1165	-20.3	-	-25.5
0.0	25.0						
195.050003	75.00	-	ASE	1189	-20.2	-	-25.5
0.0	25.0						
195.125000	75.00	-	ASE	1213	-20.3	-	-25.6
0.0	25.0						
195.199997	75.00	-	ASE	1237	-20.3	-	-25.6
0.0	25.0						
195.274994	75.00	-	ASE	1261	-20.2	-	-25.6
0.0	25.0						
195.350006	75.00	-	ASE	1285	-20.2	-	-25.6
0.0	25.0						
195.425003	75.00	-	ASE	1309	-20.0	-	-25.5
0.0	25.0						
195.500000	75.00	-	ASE	1333	-20.1	-	-25.6
0.0	25.0						
195.574997	75.00	-	ASE	1357	-20.1	-	-25.6
0.0	25.0						
195.649994	75.00	-	ASE	1381	-19.9	-	-25.5
0.0	25.0						
195.725006	75.00	-	ASE	1405	-19.8	-	-25.4
0.0	25.0						
195.800003	75.00	5	ASE	1429	-19.9	-8.0	-7.9
0.0	1.8						

195.875000	75.00	-	ASE	1453	-19.8	-	-25.3
0.0	25.0						
195.949997	75.00	3	ASE	1477	-19.7	-	-25.2
0.0	25.0						
196.024994	75.00	-	ASE	1501	-19.7	-	-25.0
0.0	25.0						
196.100006	75.00	1	OCh	1525	-19.5	-8.0	-8.1
0.0	6.0						

ASE - Noise Loaded Channel
OCh - Optical Channel

Bringup NCS 1010 Using ZTP

Perform the configurations in the following sequence to bring up NCS 1010 using ZTP.

- [DHCP Configuration, on page 1](#)
- [ZTP Configuration Files Creation, on page 41](#)
- [ZTP Configuration Workflow, on page 48](#)
- [Cross-connect Configuration, on page 21](#)

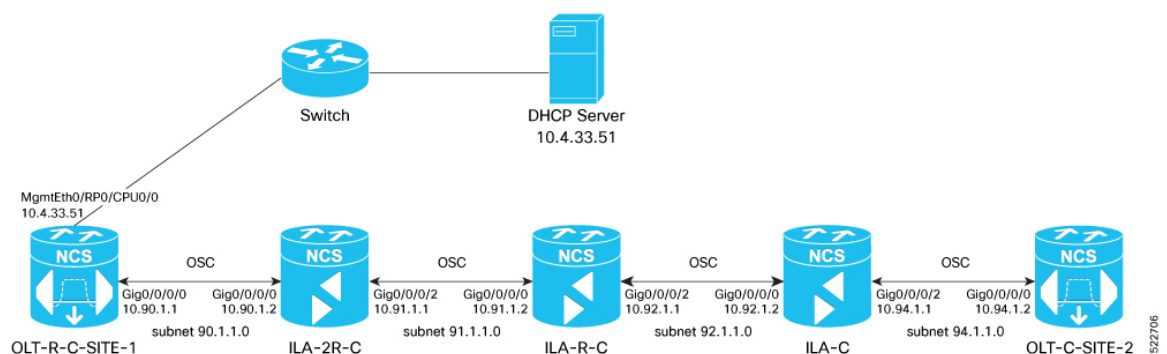
DHCP Configuration

DHCP configuration is required for both manual configuration and ZTP configuration.

To run iPXE and ZTP, you need a DHCP server. To configure a DHCP server, you must edit the `dhcpd.conf` file available at `/etc/dhcp/`. This configuration file stores the network information such as the path to the script, location of the ISO install file, location of the provisioning configuration (`.cfg`) file, and serial number or the MAC address of the chassis.

In the following example, the settings in the `dhcpd.conf` refers to the span connecting OLT-R-C-SITE-1 to OLT-C-SITE-2.

Figure 3: Network Topology Diagram



Note Restart the `dhcpd` service using the `service dhcpd restart` command every time you edit the `dhcpd.conf` file.

Add the following settings to the `dhcpd.conf` file :



Note The ZTP configuration files (*.cfg) that are referenced in the dhcpd.conf file are detailed in [ZTP Configuration Files Creation, on page 41](#).

```
# DHCP Server Configuration file
ddns-update-style none;
option domain-name "cisco.com";
option domain-name-servers dns-blr1.cisco.com;

default-lease-time 6000;
max-lease-time 72000;

log-facility local7;

option space VendorInfo;

option VendorInfo.clientId code 1 = string;

option VendorInfo.authCode code 2 = unsigned integer 8;

option VendorInfo.md5sum code 3 = string;

option vendor-specific code 43 = encapsulate VendorInfo;

option space cisco-vendor-id-vendor-class code width 1 length width 1;
option vendor-class.cisco-vendor-id-vendor-class code 9 = {string};
option bootstrap_servers code 143 = text;

ddns-update-style none;

#iPXE https specific configs
option space ipxe;
option ipxe-encap-opts code 175 = encapsulate ipxe;
option ipxe.crosscert code 93 = string;
option ipxe.crosscert "http://10.127.60.159/pub/mirror/ca.ipxe.org/auto";

#ZTP over OSC Configuration

subnet 10.90.1.0 netmask 255.255.255.0 {
  option domain-name-servers dns-blr1.cisco.com;
  option domain-name "cisco.com";
  option routers 10.90.1.1;
  #option netbios-name-serv;
}

subnet 10.91.1.0 netmask 255.255.255.0 {
  option domain-name-servers dns-blr1.cisco.com;
  option domain-name "cisco.com";
  option routers 10.91.1.1;
  #option netbios-name-serv;
}

subnet 10.92.1.0 netmask 255.255.255.0 {
  option domain-name-servers dns-blr1.cisco.com;
  option domain-name "cisco.com";
  option routers 10.92.1.1;
  #option netbios-name-serv;
}

subnet 10.94.1.0 netmask 255.255.255.0 {
  option domain-name-servers dns-blr1.cisco.com;
  option domain-name "cisco.com";
```

```

option routers 10.94.1.1;
#option netbios-name-serv;
}

#DHCP Relay Configuration

host OLT-R-C-SITE-1 {
hardware ethernet 38:fd:f8:66:09:52;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
} else {
    filename "http://10.4.33.51/NCS1010_CFG/OLT-R-C-SITE-1.cfg";
}
fixed-address 10.4.33.131;
}

host ILA-2R-C {
hardware ethernet 38:fd:f8:66:08:f6;
fixed-address 10.90.1.2;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
}
vendor-option-space VendorInfo;
option VendorInfo.clientId "xr-config";
option VendorInfo.authCode 0;
option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-2R-C.cfg";
}

host ILA-R-C {
hardware ethernet 38:fd:f8:66:09:f2;
fixed-address 10.91.1.2;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
}
vendor-option-space VendorInfo;
option VendorInfo.clientId "xr-config";
option VendorInfo.authCode 0;
option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-R-C.cfg";
}

host ILA-C {
hardware ethernet 38:fd:f8:66:09:7d;
fixed-address 10.92.1.2;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS1010/ncs1010-x64.iso";
}
vendor-option-space VendorInfo;
option VendorInfo.clientId "xr-config";
option VendorInfo.authCode 0;
option bootfile-name "http://10.4.33.51/NCS1010_CFG/ILA-C.cfg";
}

host OLT-C-SITE-2 {
hardware ethernet 38:fd:f8:66:06:79;
if exists user-class and option user-class = "iPXE" {
    filename "http://10.4.33.51/NCS010/ncs1010-x64.iso";
}
}

```



```

} else {

    filename "http://10.4.33.51/NCS1010_CFG/OLT-C-SITE-2.cfg";
}
fixed-address 192.0.2.121;
}

```

To create the static routes in the DHCP server, use the following commands:

```
route add -net OLT-OSC-ip gw OLT-MGMT-ip netmask 255.255.255.255 dev eth3
```

```
route add -net ILA-OSC-ip gw OLT-MGMT-ip netmask 255.255.255.255 dev eth3
```

```

[root@vxr-ncs1010-02 ~]# route add -net 10.90.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.90.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.91.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.91.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.92.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.92.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.94.1.1 gw 10.4.33.131 netmask 255.255.255.255
dev eth3
[root@vxr-ncs1010-02 ~]# route add -net 10.94.1.2 gw 10.4.33.131 netmask 255.255.255.255
dev eth3

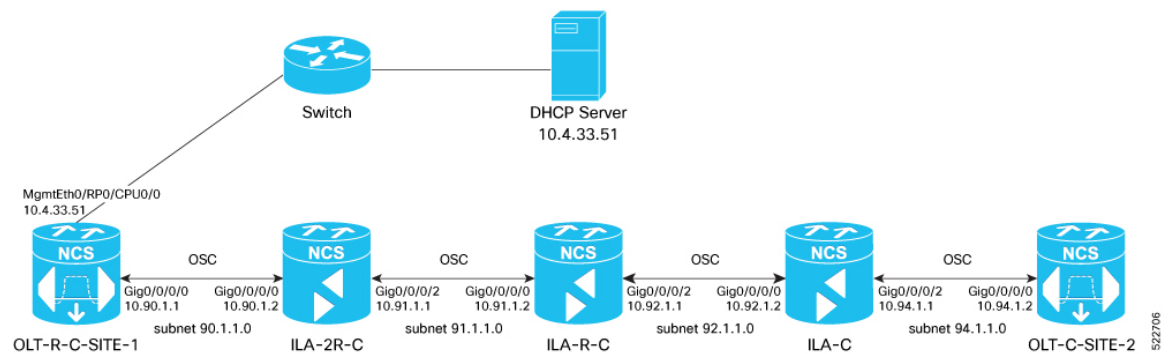
```

10.4.33.131 is the management IP address for the gateway node.

ZTP Configuration Files Creation

You can build the ZTP configuration files based on your network requirements. The sample ZTP files created below are used to configure the nodes from OLT-R-C-SITE-1 to OLT-C-SITE-2 as shown in the figure below. You can create similar ZTP configuration files for the rest of the NCS 1010 nodes.

Figure 4: Network Topology Diagram



Note You can remotely manage an ILA node that is not connected to a management network through an OLT gateway node via an OSC interface. ZTP can be initiated from a remote node through DHCP relay. For more information see, [Remote Node Management in NCS 1010](#).

Build the ZTP configuration files by typing the following in Notepad and save them as .cfg files in the DHCP server.

OLT-R-C-SITE-1 node:

```
!! IOS XR Configuration 7.7.1.31I
!! Last configuration change at Mon Jul  4 11:10:16 2022 by cisco
!
hostname OLT-R-C-SITE-1
logging console informational
username cisco
group root-lr
group cisco-support
password 7 01100F17585B575D72
!
grpc
port 57400
!

dhcp ipv4
profile r1 relay
  helper-address vrf default 10.4.33.51 giaddr 10.90.1.1
!
interface GigabitEthernet0/0/0/0 relay profile r1

interface Loopback0
ipv4 address 10.131.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.131 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.22 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.90.1.1 255.255.255.0
!

router static
address-family ipv4 unicast
  0.0.0.0/0 10.4.33.1
  0.0.0.0/0 10.127.59.1
!
!
router ospf 1
distribute link-state
network point-to-point
redistribute connected
area 0
  interface Loopback0
  !
  interface GigabitEthernet0/0/0/0
  !
ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default

optical-line-control
automatic-link-bringup
```

!

Save this file as **OLT-R-C-SITE-1.cfg**.

ILA-2R-C node:

```
!! IOS XR Configuration 7.7.1.31I
!! Last configuration change at Fri Jul 1 05:44:39 2022 by cisco
!
hostname ILA-2R-C
logging console debugging
domain name cisco.com
domain name-server 198.51.100.123
username cisco
group root-lr
group cisco-support
password 7 070C285F4D59485744
!
grpc
!
line console
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
line default
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
dhcp ipv4
profile r1 relay
  helper-address vrf default 10.4.33.51 giaddr 10.91.1.1
!
interface GigabitEthernet0/0/0/2 relay profile r1
!
!
netconf-yang agent
ssh
!
interface Loopback0
ipv4 address 10.128.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.128 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
ipv4 address dhcp
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.24 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.90.1.2 255.255.255.0
!
interface GigabitEthernet0/0/0/2
ipv4 address 10.91.1.1 255.255.255.0
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
```

```

!
router static
address-family ipv4 unicast
 0.0.0.0/0 10.4.33.1
 0.0.0.0/0 10.127.59.1
!
!
router ospf 1
distribute link-state instance-id 0 throttle 5
network point-to-point
redistribute connected
area 0
 interface Loopback0
  !
 interface GigabitEthernet0/0/0/0
  !
 interface GigabitEthernet0/0/0/2
  !
!
!
optical-line-control
automatic-link-bringup

ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default
end

!! Last configuration change at Mon Jul 4 08:22:51 2022 by cisco

```

Save this file as **ILA-2R-C.cfg**.

ILA-R-C node:

```

!! IOS XR Configuration 7.7.1.31I
!! Last configuration change at Fri Jun 3 06:26:03 2022 by cisco
!
hostname ILA-R-C
username test
password 7 094F471A1A55464058
!
username cisco
group root-lr
group cisco-support
password 7 110A101614425A5E57
!
grpc
!
line console
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
line default
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!

dhcp ipv4
profile r1 relay
 helper-address vrf default 10.4.33.51 giaddr 10.92.1.1
!
interface GigabitEthernet0/0/0/2 relay profile r1

```

```

!
!

netconf-yang agent
ssh
!
interface Loopback0
ipv4 address 10.134.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.134 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.28 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.91.1.2 255.255.255.0
!
interface GigabitEthernet0/0/0/2
ipv4 address 10.92.1.1 255.255.255.0
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
!
router static
address-family ipv4 unicast
  0.0.0.0/0 10.4.33.1
  0.0.0.0/0 10.127.59.1
!
!
router ospf 1
distribute link-state instance-id 0 throttle 5
network point-to-point
redistribute connected
area 0
  interface Loopback0
  !
  interface GigabitEthernet0/0/0/0
  !
  interface GigabitEthernet0/0/0/2
  !
!
!
optical-line-control
automatic-link-bringup
ssh server rate-limit 600
!
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default
end

```

Save this file as **ILA-R-C.cfg**.

ILA-C node:

```

Building configuration...
!! IOS XR Configuration 7.7.1.31I

```

```

!! Last configuration change at Fri Jun  3 06:26:55 2022 by cisco
!
hostname ILA-C
logging console informational
username cisco
group root-lr
group cisco-support
password 7 01100F17585B575D72
!
grpc
!
line console
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
line default
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
dhcp ipv4
profile r1 relay
  helper-address vrf default 10.4.33.51 giaddr 10.94.1.1
!
interface GigabitEthernet0/0/0/2 relay profile r1
!

netconf-yang agent
ssh
!
interface Loopback0
ipv4 address 10.122.1.1 255.255.255.255
!
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.122 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
shutdown
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.54 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.92.1.2 255.255.255.0
!
interface GigabitEthernet0/0/0/2
ipv4 address 10.94.1.1 255.255.255.0
!
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
!
router static
address-family ipv4 unicast
  0.0.0.0/0 10.4.33.1
  0.0.0.0/0 10.127.59.1
!
!
router ospf 1
distribute link-state

```

```

segment-routing mpls
network point-to-point
redistribute connected
area 0
  interface Loopback0
  !
  interface GigabitEthernet0/0/0/0
  !
  interface GigabitEthernet0/0/0/2
  !

ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default
optical-line-control
automatic-link-bringup
end

```

Save this file as **ILA-C.cfg**.

OLT-C-SITE-2 node:

```

!! IOS XR Configuration 7.7.1.31I
!! Last configuration change at Mon Jul  4 08:22:51 2022 by cisco
!
hostname OLT-C-SITE-2
username cisco
group root-lr
group cisco-support
password 7 02050D4808565E731F
!
grpc
!
line console
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
line default
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
interface Loopback0
ipv4 address 10.126.1.1 255.255.255.255
!

interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.4.33.126 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/1
ipv4 address 10.127.59.98 255.255.255.0
!
interface MgmtEth0/RP0/CPU0/2
ipv4 address 10.127.59.98 255.255.255.0
!
interface GigabitEthernet0/0/0/0
ipv4 address 10.94.1.2 255.255.255.0
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown

```

```

!
router static
address-family ipv4 unicast
 0.0.0.0/0 10.4.33.1
 0.0.0.0/0 10.127.59.1
!
!
router ospf 1
distribute link-state instance-id 0 throttle 5
network point-to-point
redistribute connected
area 0
 interface Loopback0
  !
 interface GigabitEthernet0/0/0/0
  !
!

optical-line-control
automatic-link-bringup

ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default
end

```

Save this file as `OLT-C-SITE-2.cfg`.

These configuration files are referenced in the `dhcpd.conf` file.

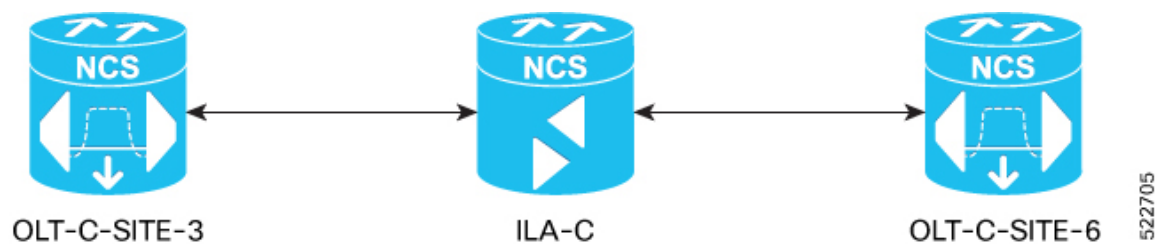
For more information on ZTP, see [Boot Using Zero Touch Provisioning](#).

ZTP Configuration Workflow

This section details how to bringup NCS 1010 nodes using ZTP. Verification outputs have been added at various steps. The iPXE CLI boot process has been used for this example.

The example used in this section is part of the overall network topology.

Figure 5: Network Topology Diagram



Note Before you use the iPXE boot, ensure that the DHCP server is set and is running. Create a `dhcpd.conf` file and the required ZTP configuration files specific to the nodes in the network topology diagram shown above. For samples of the `dhcpd.conf` file and the ZTP configuration files, see [DHCP Configuration, on page 1](#) and [ZTP Configuration Files Creation, on page 41](#).

1. Run the following CLI command to invoke the iPXE boot process to reimage the chassis:



Note This command deletes the existing configuration on the node.

```
RP/0/RP0/CPU0:ios#reload bootmedia network location 0/RP0/CPU0 noprompt
Mon Aug 1 11:49:27.269 UTC

Preparing system for backup. This may take a few minutes especially for large
configurations.
  Status report: node0_RP0_CPU0: START TO BACKUP
RP/0/RP0/CPU0:ios# Status report: node0_RP0_CPU0: BACKUP HAS COMPLETED SUCCESSFULLY
[Done]
[ OK ] Stopped Docker Application Container Engine.
[ OK ] Stopped target Network is Online.
[ OK ] Stopped target Network.
      Stopping Network Service...
[ OK ] Stopped Network Service.
      Stopping D-Bus System Message Bus...
.
.
snipped
.
.
[ OK ] Stopped Patch Sirius specific OS-SDK.
[ OK ] Reached target Shutdown.
[513293.089137] reboot: Restarting system

..
System Initializing..
..

ERROR: Class:0; Subclass:10000; Operation: 1004

CPU Rese

..
System Initializing..

NCS1010, Initializing Devices

Bootng from Primary Flash
Aldrin: Skipping reprogram

Version 2.19.1266. Copyright (C) 2022 American Megatrends, Inc.
BIOS Date: 05/20/2022 10:47:39 Ver: 0ACHI0410
Press <DEL> or <ESC> to enter setup.
TAM Chipguard Validate Observed DB Error: 0x48

WARNING!!! TAM: Empty Chip DB

Software Boot OK, Validated

iPXE initialising devices...ok

iPXE 1.0.0+ (c2215) -- Open Source Network Boot Firmware -- http://ipxe.org
Features: DNS HTTP TFTP VLAN EFI ISO9660 ISO9660_grub Menu
Trying net0-2051,net0-2052 and net0-2053...
net0-2051: 38:fd:f8:66:09:49 using NII on NII-PCI06:00.0 (open)
```

```

[Link:down, TX:0 TXE:0 RX:0 RXE:0]
[Link status: Unknown (http://ipxe.org/1a086194)]
Configuring (net0-2051 38:fd:f8:66:09:49)..... ok
net0: fe80::3afd:f8ff:fe66:949/64
.
.
snipped
.
.
[ OK ] Started Cisco Directory Services.
[ OK ] Started Lightning Fast Webserver With Light System Requirements.
        Starting NOS Bootup FPD Upgrade Service...
[ OK ] Started NOS Bootup FPD Upgrade Service.
        Starting IOS-XR Reaperd and Process Manager...
[ OK ] Started IOS-XR Reaperd and Process Manager.
        Starting Setting Cgroups...
[ OK ] Started Shutdown start service.
[ OK ] Started Setting Cgroups.
[ OK ] Started Kdump.
[ OK ] Reached target Multi-User System.
        Starting Update UTMP about System Runlevel Changes...
[ OK ] Reached target XR installation and startup.
[ OK ] Started Update UTMP about System Runlevel Changes.

```

ios con0/RP0/CPU0 is now available

Press RETURN to get started.

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:

<http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

```

RP/0/RP0/CPU0:Aug  1 12:02:22.779 UTC: ifmgr[338]: %PKT_INFRA-LINK-3-UPDOWN : Interface
GigabitEthernet0/0/0/0, changed state to Down
RP/0/RP0/CPU0:Aug  1 12:02:23.100 UTC: osa_driver[254]: %PKT_INFRA-FM-4-FAULT_MINOR :
ALARM_MINOR :PROV-INPROGRESS :DECLARE :Oms0/2/0/8:
RP/0/RP0/CPU0:Aug  1 12:02:23.101 UTC: osa_driver[254]: %PKT_INFRA-FM-4-FAULT_MINOR :
ALARM_MINOR :PROV-INPROGRESS :DECLARE :Oms0/2/0/9:
.
.
snipped
.
.

```

```

!!!!!!!!!!!!!!!!!!!!!! NO root-system username is configured. Need to configure root-system
username. !!!!!!!!!!!!!!!!!!!!!!!

```

--- Administrative User Dialog ---

```

Enter root-system username: cisco
Enter secret:
Enter secret again:
Use the 'configure' command to modify this configuration.
User Access Verification

Username: cisco
Password:

RP/0/RP0/CPU0:ios#show running-config
Mon Aug  1 12:10:54.415 UTC
Building configuration...
!! IOS XR Configuration 7.7.1
!! Last configuration change at Mon Aug  1 12:10:44 2022 by SYSTEM
!
username cisco
  group root-lr
  group cisco-support
  secret 10
$6$lyk2E/DA/IH.3E/.$zxY.C0dcpFVwRQ.N5GKpNXFx1ExAHYtnF45MvsBzhNVy15TyleF1x.Xbx1c8.JPMubwGlFkauRfeqAAjPrOTr1
!
call-home
  service active
  contact smart-licensing
  profile CiscoTAC-1
    active
    destination transport-method email disable
    destination transport-method http
!
!
interface MgmtEth0/RP0/CPU0/0
  ipv6 enable
!
interface MgmtEth0/RP0/CPU0/1
  ipv6 enable
!
interface MgmtEth0/RP0/CPU0/2
  ipv6 enable
!
interface GigabitEthernet0/0/0/0
  ipv6 enable
!
interface PTP0/RP0/CPU0/0
  shutdown
!
interface PTP0/RP0/CPU0/1
  shutdown
!
end

```

2. To remove all the ZTP logs and saved settings, use the following command:

```

RP/0/RP0/CPU0:ios#ztp clean
Mon Aug  1 12:11:07.816 UTC
This would remove all ZTP temporary files.
Would you like to proceed? [no]: yes
2022-08-01 12:11:10.674178:          ztp[ 1900, t 1900]: ERROR: ztp_proc_start
          : 104: Failed to start process with error: 'processmgr' detected
the 'warning' condition 'The target process is already running.'
All ZTP operation files have been removed.

```

```
ZTP logs are present in /var/log/ztp*.log for logrotate.
Please remove manually if needed.
If you now wish ZTP to run again from boot, do 'conf t/commit replace' followed by reload.
RP/0/RP0/CPU0:ios#
```

3. To invoke ZTP manually, use the following command:

```
RP/0/RP0/CPU0:ios#ztp initiate
Mon Aug 1 12:11:24.572 UTC
Initiating ZTP may change your configuration.
Interfaces might be brought up if they are in shutdown state
Would you like to proceed? [no]: yes
ZTP will now run in the background.
RP/0/RP0/CPU0:ios#show logging | i ztp
Mon Aug 1 12:12:05.736 UTC
RP/0/RP0/CPU0:Aug 1 12:02:10.074 UTC: pyztp2[196]: %INFRA-ZTP-6-START : ZTP has started.
Interfaces might be brought up if they are shutdown
RP/0/RP0/CPU0:Aug 1 12:03:18.574 UTC: pyztp2[196]: %INFRA-ZTP-6-DISCOVERY_COMPLETED :
Discovery successful on MgmtDhcp4Fetcher. Will proceed with fetching.
.
.
snipped
.
.
RP/0/RP0/CPU0:Aug 1 12:12:40.784 UTC: osa_driver[254]: %PKT_INFRA-FM-4-FAULT_MINOR :
ALARM_MINOR :PROV-INPROGRESS :CLEAR :Oms0/2/0/13:
RP/0/RP0/CPU0:Aug 1 12:12:42.011 UTC: config[69106]: %MGBL-CONFIG-6-DB_COMMIT :
Configuration committed by user 'ZTP'. Use 'show configuration commit changes 1000000018'
to view the changes.
RP/0/RP0/CPU0:Aug 1 12:12:50.103 UTC: pyztp2[196]: %INFRA-ZTP-6-PROVISIONING_COMPLETED
: Provisioning successful
RP/0/RP0/CPU0:Aug 1 12:12:52.464 UTC: ospf[1036]: %ROUTING-OSPF-5-ADJCHG : Process 1,
Nbr 10.121.1.1 on GigabitEthernet0/0/0/0 in area 0 from LOADING to FULL, Loading Done,
vrf default vrfid 0x60000000
RP/0/RP0/CPU0:Aug 1 12:12:57.733 UTC: olc[159]: %PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR
:APC-BLOCKED :CLEAR :Ots0/0/0/0:
RP/0/RP0/CPU0:Aug 1 12:12:58.997 UTC: pyztp2[196]: %INFRA-ZTP-4-EXITED : ZTP exited
```

4. To view the running configuration on OLT-C-SITE-3:

```
RP/0/RP0/CPU0:OLT-C-SITE-3#show running-config
Mon Aug 1 12:13:07.535 UTC
Building configuration...
!! IOS XR Configuration 7.7.1
!! Last configuration change at Mon Aug 1 12:12:28 2022 by ZTP
!
hostname OLT-C-SITE-3
logging console informational
username cisco
 group root-lr
 group cisco-support
 password 7 1511021F077A7A767B67
!
grpc
 port 57400
 no-tls
!
address-family ipv4 unicast
!
line console
 exec-timeout 0 0
 absolute-timeout 0
 session-timeout 0
```

```

!
line default
  exec-timeout 0 0
  absolute-timeout 0
  session-timeout 0
!
.
.
snipped
.
.
!
!
ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server vrf default
ssh server netconf vrf default
auto-ip-ring
end

```

5. Use the following show commands to view the status of the optical applications that are running on OLT-C-SITE-3:

```

RP/0/RP0/CPU0:OLT-C-SITE-3#show olc apc
Mon Aug  1 12:13:15.379 UTC

```

```

Controller      : Ots0/0/0/0
APC Status      : WORKING
Correcting Node : 10.120.1.1

```

```

Node RID        : 10.120.1.1
Internal State  : CORRECTING

```

```

Node RID        : 10.121.1.1
Internal State  : DISCREPANCY

```

```

RP/0/RP0/CPU0:OLT-C-SITE-3#show olc apc
Mon Aug  1 12:20:48.513 UTC

```

```

Controller      : Ots0/0/0/0
APC Status      : IDLE

```

```

Node RID        : 10.120.1.1
Internal State  : IDLE

```

```

Node RID        : 10.121.1.1
Internal State  : IDLE

```

```

RP/0/RP0/CPU0:OLT-C-SITE-3#show olc span-loss
Mon Aug  1 12:23:19.827 UTC

```

```

Controller name           : Ots0/0/0/0
Neighbour RID             : 10.121.1.1
Rx Span Loss              : 10.3 dB
Rx Span Loss (with pumps off) : NA
Rx Span Loss (with pumps off) measured at : NA
Estimated Rx Span Loss    : NA
Tx Span Loss              : 15.3 dB
Tx Span Loss (with pumps off) : NA
Tx Span Loss (with pumps off) measured at : NA
Estimated Tx Span Loss    : NA

```

```
RP/0/RP0/CPU0:OLT-C-SITE-3#show olc gain-estimator
Mon Aug 1 12:23:27.016 UTC
Controller                : Ots0/0/0/0
Ingress Gain Estimator Status : IDLE
Ingress Estimated Gain      : 17.0 dB
Ingress Estimated Gain Mode  : Normal
Ingress Gain Estimation Timestamp : 2022-08-01 12:14:05
```

```
RP/0/RP0/CPU0:OLT-C-SITE-3#show olc link-tuner
Mon Aug 1 12:23:32.651 UTC
Controller                : Ots0/0/0/0
Link Tuner Status        : OPERATIONAL
Last PSD computation: 2022-08-01 12:14:29
```

```
-----
Setpoint                  : Computed PSD
                          (dBm/12.5 GHz)
-----
```

```
-----
01                        -6.4
02                        -6.4
03                        -6.3
04                        -6.3
05                        -6.3
06                        -6.2
07                        -6.2
08                        -6.2
09                        -6.1
10                        -6.1
11                        -6.1
12                        -6.0
13                        -6.0
14                        -6.0
15                        -5.9
16                        -5.9
17                        -5.8
18                        -5.8
19                        -5.8
20                        -5.7
21                        -5.7
22                        -5.7
23                        -5.6
24                        -5.6
25                        -5.6
26                        -5.5
27                        -5.5
28                        -5.4
29                        -5.4
30                        -5.4
31                        -5.3
32                        -5.3
33                        -5.3
-----
```

6. To view the running configuration on OLT-C-SITE6:

```
RP/0/RP0/CPU0:OLT-C-SITE6#show running-config
Tue Aug 2 05:07:27.989 UTC
Building configuration...
!! IOS XR Configuration 7.7.1.33I
!! Last configuration change at Mon Aug 1 12:29:44 2022 by cisco
!
hostname OLT-C-SITE6
logging console informational
username cisco
group root-lr
group cisco-support
```

```
password 7 02050D4808565E731F1A
!
grpc
port 57400
no-tls
!
line console
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
line default
exec-timeout 0 0
absolute-timeout 0
session-timeout 0
!
vty-pool default 0 99 line-template default
ntp
server 10.4.33.51 burst iburst
!
alias fpd show hw-module fpd
alias plat show platform
alias alarm show alarms brief system active
call-home
service active
contact smart-licensing
profile CiscoTAC-1
active
destination transport-method email disable
destination transport-method http
!
!
netconf-yang agent
ssh
!
.
.
snipped
.
.
!
!
interface PTP0/RP0/CPU0/0
shutdown
!
interface PTP0/RP0/CPU0/1
shutdown
!
router static
address-family ipv4 unicast
0.0.0.0/0 10.4.33.1
!
!
router ospf 1
distribute link-state instance-id 0 throttle 5
network point-to-point
redistribute connected
area 0
interface Loopback0
!
interface GigabitEthernet0/0/0/0
!
!
netconf agent tty
```

```

!
ssh server rate-limit 600
ssh server session-limit 110
ssh server v2
ssh server netconf vrf default
optical-line-control
  automatic-link-bringup

```

7. Use the following show commands to view the status of the optical applications that are running on OLT-C-SITE6:

```

RP/0/RP0/CPU0:OLT-C-SITE6#show olc apc
Mon Aug 1 12:23:46.224 UTC

```

```

Controller      : Ots0/0/0/0
APC Status      : IDLE

```

```

Node RID        : 10.121.1.1
Internal State  : IDLE

```

```

Node RID        : 10.120.1.1
Internal State  : IDLE

```

```

RP/0/RP0/CPU0:OLT-C-SITE6#show olc span-loss
Mon Aug 1 12:24:06.632 UTC

```

```

Controller name           : Ots0/0/0/0
Neighbour RID            : 10.120.1.1
Rx Span Loss              : 15.3 dB
Rx Span Loss (with pumps off) : NA
Rx Span Loss (with pumps off) measured at : NA
Estimated Rx Span Loss    : NA
Tx Span Loss              : 10.3 dB
Tx Span Loss (with pumps off) : NA
Tx Span Loss (with pumps off) measured at : NA
Estimated Tx Span Loss    : NA

```

```

RP/0/RP0/CPU0:OLT-C-SITE6#show olc gain-estimator
Mon Aug 1 12:23:50.246 UTC

```

```

Controller           : Ots0/0/0/0
Ingress Gain Estimator Status : IDLE
Ingress Estimated Gain : 19.0 dB
Ingress Estimated Gain Mode : Normal
Ingress Gain Estimation Timestamp : 2022-07-19 07:58:12

```

```

RP/0/RP0/CPU0:OLT-C-SITE6#show olc link-tuner
Mon Aug 1 12:24:00.355 UTC

```

```

Controller      : Ots0/0/0/0
Link Tuner Status : OPERATIONAL
Last PSD computation: 2022-08-01 12:14:05

```

```

-----
Setpoint           : Computed PSD
                   (dBm/12.5 GHz)
-----s-----

```

```

01                -8.0
02                -8.0
03                -8.0
04                -8.0
05                -7.9
06                -7.9
07                -7.9
08                -7.9
09                -7.8
10                -7.8

```



```

11          -7.8
12          -7.8
13          -7.7
14          -7.7
15          -7.7
16          -7.6
17          -7.6
18          -7.6
19          -7.6
20          -7.5
21          -7.5
22          -7.5
23          -7.4
24          -7.4
25          -7.4
26          -7.4
27          -7.3
28          -7.3
29          -7.3
30          -7.3
31          -7.2
32          -7.2
33          -7.2

```

```
RP/0/RP0/CPU0:OLT-C-SITE6#
```

8. Configure the optical cross-connects for OLT-C-SITE-3 and OLT-C-SITE6. We are going to create a single channel from OLT-C-SITE-3 to OLT-C-SITE6 . The channel is mapped to **193.925 THz**.

Configuration for OLT-C-SITE-3

```

RP/0/RP0/CPU0:OLT-C-SITE-3#config
Tue Jul 26 06:30:25.087 UTC
RP/0/RP0/CPU0:OLT-C-SITE-3(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RRP/0/RP0/CPU0:OLT-C-SITE-3(config-hwmod-olt-flexi)#channel-id 30 centre-freq 193.925
width 75
RP/0/RP0/CPU0:OLT-C-SITE-3(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:33:03.824 UTC
RP/0/RP0/CPU0:OLT-C-SITE-3(config-hwmod-olt-flexi)#end

RP/0/RP0/CPU0:OLT-C-SITE-3#config
Tue Jul 26 06:33:29.885 UTC
RP/0/RP0/CPU0:OLT-C-SITE-3(config)#controller ots-Och 0/0/0/0/30
RP/0/RP0/CPU0:OLT-C-SITE-3(config-Ots)#add-drop-channel ots-Och 0/0/0/3/30
RP/0/RP0/CPU0:OLT-C-SITE-3(config-Ots)#commit
RP/0/RP0/CPU0:OLT-C-SITE-3(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-3#sh hw-module location 0/0/NXR0 terminal-ampli
Mon Aug 1 12:36:23.954 UTC

```

Legend:

```

NXC      - Channel not cross-connected
ACTIVE   - Channel cross-connected to data port
ASE      - Channel filled with ASE
FAILED   - Data channel failed, pending transition to ASE

```

```
Location:          0/0/NXR0
```

```
Status:           Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency(THz)	Channel Width(GHz)	Channel Status
30	193.925000	75.000	ACTIVE

```
RP/0/RP0/CPU0:OLT-C-SITE-3#
```

Configuration for OLT-C-SITE-6

```
RP/0/RP0/CPU0:OLT-C-SITE-6#config
Tue Jul 26 06:30:25.087 UTC
RP/0/RP0/CPU0:OLT-C-SITE-6(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RP/0/RP0/CPU0:OLT-C-SITE-6(config-hwmod-olt-flexi)#channel-id 30 centre-freq 193.925
width 75
RP/0/RP0/CPU0:OLT-C-SITE-6(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:33:03.824 UTC
RP/0/RP0/CPU0:OLT-C-SITE-6(config-hwmod-olt-flexi)#end
```

```
RP/0/RP0/CPU0:OLT-C-SITE-6#config
Mon Aug 1 12:42:09.686 UTC
```

```
RP/0/RP0/CPU0:OLT-C-SITE-6(config)#controller ots-Och 0/0/0/30
RP/0/RP0/CPU0:OLT-C-SITE-6(config-Ots)#add-drop-channel ots-Och 0/0/0/3/30
RP/0/RP0/CPU0:OLT-C-SITE-6(config-Ots)#commit
RP/0/RP0/CPU0:OLT-C-SITE-6(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-6#sh hw-module location 0/0/NXR0 terminal-ampli
Mon Aug 1 12:36:23.954 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

```
Location: 0/0/NXR0
```

```
Status: Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
30	193.925000	75.000	ACTIVE

```
RP/0/RP0/CPU0:OLT-C-SITE-6#
```

After the cross-connects are created on the OLT nodes, APC regulates the power on each node. The APC status moves from WORKING to IDLE when the process completes. Use the **show olc apc** command to view the status of the operation. The following samples are for OLT-C-SITE-3.

```
RP/0/RP0/CPU0:OLT-C-SITE-3#show olc apc
Mon Aug 1 12:33:15.671 UTC
```

```
Controller      : Ots0/0/0/0
APC Status      : WORKING
Correcting Node : 10.120.1.1
```

```
Node RID        : 10.120.1.1
Internal State   : CORRECTING
```

```
Node RID        : 10.121.1.1
Internal State   : DISCREPANCY
```

```
RP/0/RP0/CPU0:OLT-C-SITE-3#show olc apc
Mon Aug 1 12:39:57.187 UTC
```

```
Controller      : Ots0/0/0/0
APC Status      : IDLE
```

```
Node RID      : 10.120.1.1
Internal State : IDLE
```

```
Node RID      : 10.121.1.1
Internal State : IDLE
```

```
RP/0/RP0/CPU0:OLT-C-SITE-3#
```

After the APC process is complete, the link comes up. You can view the details using the **sh olc apc-local regulation-info controller ots** command on the near-end and far-end nodes.

OLT-C-SITE-3:

```
RP/0/RP0/CPU0:OLT-C-SITE-3#sh olc apc-local regulation-info controller ots 0/0/0 rx
Mon Aug 1 12:44:42.887 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.121.1.1
Internal Status : IDLE
Direction      : RX
PSD Minimum     : -22.0 (dBm/12.5 GHz)
Gain Range      : Normal
Last Correction : 2022-08-01 12:35:29
```

Device Parameters	Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	12.0	25.0	17.7	17.7
Ingress Ampli Tilt (dB)	-5.0	3.4	0.4	0.4
RX Ampli Power (dBm)	-	25.0	-	24.5
RX VOA Attenuation (dB)	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Discrepancy Frequency (THz) (dB)	Channel Channel Slice Width Attn Config (GHz) (dB)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000	75.00	-	ASE	13	-18.4	-	-25.6
0.0	25.0						
191.449997	75.00	-	ASE	37	-18.3	-	-25.4
0.0	25.0						
191.524994	75.00	-	ASE	61	-18.4	-	-25.7
0.0	25.0						
191.600006	75.00	-	ASE	85	-18.3	-	-25.5
0.0	25.0						
191.675003	75.00	-	ASE	109	-18.2	-	-25.5
0.0	25.0						
191.750000	75.00	-	ASE	133	-18.2	-	-25.5
0.0	25.0						
191.824997	75.00	-	ASE	157	-18.2	-	-25.5
0.0	25.0						
191.899994	75.00	-	ASE	181	-18.1	-	-25.5
0.0	25.0						
191.975006	75.00	-	ASE	205	-18.2	-	-25.6
0.0	25.0						
192.050003	75.00	-	ASE	229	-18.1	-	-25.4
0.0	25.0						
192.125000	75.00	-	ASE	253	-18.0	-	-25.4
0.0	25.0						
192.199997	75.00	-	ASE	277	-18.1	-	-25.5
0.0	25.0						
192.274994	75.00	-	ASE	301	-18.0	-	-25.5
0.0	25.0						
192.350006	75.00	-	ASE	325	-18.0	-	-25.5
0.0	25.0						
192.425003	75.00	-	ASE	349	-17.9	-	-25.4
0.0	25.0						
192.500000	75.00	-	ASE	373	-18.0	-	-25.4
0.0	25.0						
192.574997	75.00	-	ASE	397	-18.0	-	-25.5
0.0	25.0						
192.649994	75.00	-	ASE	421	-18.0	-	-25.4
0.0	25.0						

192.725006	75.00	-	ASE	445	-17.9	-	-25.3
0.0	25.0						
192.800003	75.00	-	ASE	469	-17.8	-	-25.2
0.0	25.0						
192.875000	75.00	-	ASE	493	-17.9	-	-25.4
0.0	25.0						
192.949997	75.00	-	ASE	517	-17.9	-	-25.3
0.0	25.0						
193.024994	75.00	-	ASE	541	-17.9	-	-25.4
0.0	25.0						
193.100006	75.00	-	ASE	565	-17.9	-	-25.4
0.0	25.0						
193.175003	75.00	-	ASE	589	-17.8	-	-25.4
0.0	25.0						
193.250000	75.00	-	ASE	613	-17.9	-	-25.4
0.0	25.0						
193.324997	75.00	-	ASE	637	-17.8	-	-25.3
0.0	25.0						
193.399994	75.00	-	ASE	661	-17.7	-	-25.2
0.0	25.0						
193.475006	75.00	-	ASE	685	-17.8	-	-25.3
0.0	25.0						
193.550003	75.00	-	ASE	709	-17.9	-	-25.4
0.0	25.0						
193.625000	75.00	-	ASE	733	-17.8	-	-25.3
0.0	25.0						
193.699997	75.00	-	ASE	757	-17.7	-	-25.2
0.0	25.0						
193.774994	75.00	-	ASE	781	-17.7	-	-25.1
0.0	25.0						
193.850006	75.00	-	ASE	805	-17.7	-	-25.2
0.0	25.0						
193.925003	75.00	30	OCh	829	-18.0	-9.4	-9.1
-0.2	3.8						
194.000000	75.00	-	ASE	853	-17.6	-	-25.1
0.0	25.0						
194.074997	75.00	-	ASE	877	-17.6	-	-25.1
0.0	25.0						
194.149994	75.00	-	ASE	901	-17.7	-	-25.1
0.0	25.0						
194.225006	75.00	-	ASE	925	-17.7	-	-25.1
0.0	25.0						
194.300003	75.00	-	ASE	949	-17.8	-	-25.1
0.0	25.0						
194.375000	75.00	-	ASE	973	-17.6	-	-25.1
0.0	25.0						
194.449997	75.00	-	ASE	997	-17.7	-	-25.0
0.0	25.0						
194.524994	75.00	-	ASE	1021	-17.5	-	-25.0
0.0	25.0						
194.600006	75.00	-	ASE	1045	-17.6	-	-25.1
0.0	25.0						
194.675003	75.00	-	ASE	1069	-17.6	-	-25.0
0.0	25.0						
194.750000	75.00	-	ASE	1093	-17.6	-	-25.0
0.0	25.0						
194.824997	75.00	-	ASE	1117	-17.6	-	-25.2
0.0	25.0						
194.899994	75.00	-	ASE	1141	-17.6	-	-25.2
0.0	25.0						
194.975006	75.00	-	ASE	1165	-17.6	-	-25.3
0.0	25.0						
195.050003	75.00	-	ASE	1189	-17.5	-	-25.3
0.0	25.0						
195.125000	75.00	-	ASE	1213	-17.6	-	-25.5
0.0	25.0						
195.199997	75.00	-	ASE	1237	-17.6	-	-25.7
0.0	25.0						
195.274994	75.00	-	ASE	1261	-17.5	-	-25.7
0.0	25.0						
195.350006	75.00	-	ASE	1285	-17.5	-	-25.7
0.0	25.0						
195.425003	75.00	-	ASE	1309	-17.5	-	-25.8
0.0	25.0						
195.500000	75.00	-	ASE	1333	-17.5	-	-25.9
0.0	25.0						
195.574997	75.00	-	ASE	1357	-17.5	-	-25.8
0.0	25.0						
195.649994	75.00	-	ASE	1381	-17.4	-	-25.7
0.0	25.0						
195.725006	75.00	-	ASE	1405	-17.5	-	-25.7
0.0	25.0						
195.800003	75.00	-	ASE	1429	-17.5	-	-25.6
0.0	25.0						
195.875000	75.00	-	ASE	1453	-17.6	-	-25.6
0.0	25.0						

195.949997	75.00	-	ASE	1477	-17.4	-	-25.4
0.0	25.0						
196.024994	75.00	-	ASE	1501	-17.6	-	-25.4
0.0	25.0						
196.100006	75.00	-	ASE	1525	-17.6	-	-25.3
0.0	25.0						

ASE - Noise Loaded Channel
 OCh - Optical Channel

RP/0/RP0/CPU0:OLT-C-SITE-3#

OLT-C-SITE-6:

```
RP/0/RP0/CPU0:OLT-C-SITE6#sh olc apc-local regulation-info controller ots 0/0/0/0 rx
Mon Aug 1 12:42:41.213 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.120.1.1
Internal Status : IDLE
Direction      : RX
PSD Minimumum  : -22.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-08-01 12:36:44
```

Device Parameters	Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	12.0	25.0	20.4	20.4
Ingress Ampli Tilt (dB)	-5.0	1.3	0.3	0.3
RX Ampli Power (dBm)	-	25.0	-	24.0
RX VOA Attenuation (dB)	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Discrepancy Frequency (THz) (dB)	Channel Channel Slice Width Attn Config (GHz) (dB)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000	75.00	-	ASE	13	-21.6	-	-25.6
0.0	25.0						
191.449997	75.00	-	ASE	37	-21.5	-	-25.6
0.0	25.0						
191.524994	75.00	-	ASE	61	-21.5	-	-25.6
0.0	25.0						
191.600006	75.00	-	ASE	85	-21.5	-	-25.6
0.0	25.0						
191.675003	75.00	-	ASE	109	-21.4	-	-25.6
0.0	25.0						
191.750000	75.00	-	ASE	133	-21.6	-	-25.8
0.0	25.0						
191.824997	75.00	-	ASE	157	-21.6	-	-25.8
0.0	25.0						
191.899994	75.00	-	ASE	181	-21.5	-	-25.8
0.0	25.0						
191.975006	75.00	-	ASE	205	-21.3	-	-25.7
0.0	25.0						
192.050003	75.00	-	ASE	229	-21.4	-	-25.8
0.0	25.0						
192.125000	75.00	-	ASE	253	-21.5	-	-25.9
0.0	25.0						
192.199997	75.00	-	ASE	277	-21.4	-	-25.9
0.0	25.0						
192.274994	75.00	-	ASE	301	-21.3	-	-25.8
0.0	25.0						
192.350006	75.00	-	ASE	325	-21.3	-	-25.9
0.0	25.0						
192.425003	75.00	-	ASE	349	-21.4	-	-26.0
0.0	25.0						
192.500000	75.00	-	ASE	373	-21.3	-	-26.0
0.0	25.0						
192.574997	75.00	-	ASE	397	-21.4	-	-26.0
0.0	25.0						
192.649994	75.00	-	ASE	421	-21.3	-	-25.9
0.0	25.0						

192.725006	75.00	-	ASE	445	-21.3	-	-26.0
0.0	25.0						
192.800003	75.00	-	ASE	469	-21.3	-	-26.0
0.0	25.0						
192.875000	75.00	-	ASE	493	-21.3	-	-26.0
0.0	25.0						
192.949997	75.00	-	ASE	517	-21.3	-	-26.0
0.0	25.0						
193.024994	75.00	-	ASE	541	-21.2	-	-25.8
0.0	25.0						
193.100006	75.00	-	ASE	565	-21.3	-	-26.0
0.0	25.0						
193.175003	75.00	-	ASE	589	-21.2	-	-26.0
0.0	25.0						
193.250000	75.00	-	ASE	613	-21.2	-	-25.9
0.0	25.0						
193.324997	75.00	-	ASE	637	-21.2	-	-25.9
0.0	25.0						
193.399994	75.00	-	ASE	661	-21.3	-	-26.0
0.0	25.0						
193.475006	75.00	-	ASE	685	-21.2	-	-25.9
0.0	25.0						
193.550003	75.00	-	ASE	709	-21.1	-	-25.9
0.0	25.0						
193.625000	75.00	-	ASE	733	-21.2	-	-25.9
0.0	25.0						
193.699997	75.00	-	ASE	757	-21.2	-	-25.9
0.0	25.0						
193.774994	75.00	-	ASE	781	-21.2	-	-25.9
0.0	25.0						
193.850006	75.00	-	ASE	805	-21.1	-	-25.8
0.0	25.0						
193.925003	75.00	30	OCh	829	-21.2	-9.4	-9.4
0.0	2.1						
194.000000	75.00	-	ASE	853	-21.1	-	-25.8
0.0	25.0						
194.074997	75.00	-	ASE	877	-21.1	-	-25.8
0.0	25.0						
194.149994	75.00	-	ASE	901	-21.0	-	-25.7
0.0	25.0						
194.225006	75.00	-	ASE	925	-21.0	-	-25.7
0.0	25.0						
194.300003	75.00	-	ASE	949	-21.0	-	-25.7
0.0	25.0						
194.375000	75.00	-	ASE	973	-21.0	-	-25.7
0.0	25.0						
194.449997	75.00	-	ASE	997	-21.0	-	-25.7
0.0	25.0						
194.524994	75.00	-	ASE	1021	-21.0	-	-25.6
0.0	25.0						
194.600006	75.00	-	ASE	1045	-21.0	-	-25.7
0.0	25.0						
194.675003	75.00	-	ASE	1069	-21.0	-	-25.7
0.0	25.0						
194.750000	75.00	-	ASE	1093	-21.0	-	-25.6
0.0	25.0						
194.824997	75.00	-	ASE	1117	-20.8	-	-25.6
0.0	25.0						
194.899994	75.00	-	ASE	1141	-20.9	-	-25.6
0.0	25.0						
194.975006	75.00	-	ASE	1165	-21.0	-	-25.8
0.0	25.0						
195.050003	75.00	-	ASE	1189	-20.9	-	-25.7
0.0	25.0						
195.125000	75.00	-	ASE	1213	-20.8	-	-25.6
0.0	25.0						
195.199997	75.00	-	ASE	1237	-20.7	-	-25.7
0.0	25.0						
195.274994	75.00	-	ASE	1261	-20.8	-	-25.8
0.0	25.0						
195.350006	75.00	-	ASE	1285	-20.9	-	-25.9
0.0	25.0						
195.425003	75.00	-	ASE	1309	-20.7	-	-25.9
0.0	25.0						
195.500000	75.00	-	ASE	1333	-20.7	-	-26.0
0.0	25.0						
195.574997	75.00	-	ASE	1357	-20.6	-	-25.9
0.0	25.0						
195.649994	75.00	-	ASE	1381	-20.6	-	-26.0
0.0	25.0						
195.725006	75.00	-	ASE	1405	-20.7	-	-26.0
0.0	25.0						
195.800003	75.00	-	ASE	1429	-20.6	-	-26.0
0.0	25.0						
195.875000	75.00	-	ASE	1453	-20.6	-	-25.9
0.0	25.0						

```

195.949997    75.00    -    ASE    1477    -20.5    -    -25.8
   0.0        25.0
196.024994    75.00    -    ASE    1501    -20.6    -    -25.7
   0.0        25.0
196.100006    75.00    -    ASE    1525    -20.5    -    -25.6
   0.0        25.0

ASE - Noise Loaded Channel
OCh - Optical Channel

RP/0/RP0/CPU0:OLT-C-SITE6#

```

Cross-connect Configuration

The OTS-OCH controllers are not created by default when the cards (NCS1K-ILA-2R-C, NCS1K-ILA-R-C, NCS1K-ILA-C, NCS1K-OLT-R-C, and NCS1K-OLT-C) are brought up. The LINE OTS-OCH controllers can be created using the **hw-module** command.

Optical Cross Connections can be configured only on OLT nodes. In these nodes, the OTS-OCH controller is not created automatically on the Add/Drop ports (COM side). The optical cross connect configuration defines the line side OTS-OCH channel as the source and creates an OTS-OCH controller on the ADD/Drop port to which the cross connection is made. The channel ID must be the same for both the LINE side and COM side OTS-OCH controller.

To illustrate the creation of the cross-connects, we are going to create a single channel from OLT-R-C-SITE-1 to OLT-C-SITE-8 in the topology diagram. The channel is mapped to **191.45 THz**.

Configuration for OLT-R-C-SITE-1

```

P/0/RP0/CPU0:OLT-R-C-SITE-1#config
Tue Jul 26 06:30:25.087 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:33:03.824 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:33:13.093 UTC

```

Legend:

```

NXC    - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE    - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE

```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	NXC

```

RP/0/RP0/CPU0:OLT-R-C-SITE-1#config
Tue Jul 26 06:33:29.885 UTC
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#add-drop-channel ots-Och 0/0/0/3/63
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#commit

```

```
RP/0/RP0/CPU0:OLT-R-C-SITE-1(config-Ots)#end
RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:34:27.110 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

```
Location: 0/0/NXR0
```

```
Status: Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	ACTIVE

Configuration for ILA-2R-C

```
RP/0/RP0/CPU0:ILA-2R-C#config
Tue Jul 26 06:35:12.145 UTC
RP/0/RP0/CPU0:ILA-2R-C(config)#hw-module location 0/0/NXR0 inline-ampli
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila)#grid-mode flex
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#commit
RP/0/RP0/CPU0:ILA-2R-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-2R-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:36:33.333 UTC
```

```
Location: 0/0/NXR0
```

```
Status: Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)
63	191.450000	75.000

```
RP/0/RP0/CPU0:ILA-2R-C#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 06:36:41.935 UTC
```

```
Controller State: Up
```

```
Transport Admin State: In Service
```

Alarm Status:

```
-----
```

```
Detected Alarms: None
```

Parameter Statistics:

```
-----
```

```
Total RX Power = -13.40 dBm
```

```
Total TX Power = 0.99 dBm
```

Configured Parameters:

```
-----
```

```
RP/0/RP0/CPU0:ILA-2R-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 06:36:52.466 UTC
```



```

Controller State: Up

Transport Admin State: In Service

Alarm Status:
-----
Detected Alarms: None

Parameter Statistics:
-----
Total RX Power = -5.50 dBm
Total TX Power = 2.29 dBm

Configured Parameters:
-----

```

Configuration for ILA-R-C

```

RP/0/RP0/CPU0:ILA-R-C#config
Tue Jul 26 06:36:45.377 UTC
RP/0/RP0/CPU0:ILA-R-C(config)#hw-module location 0/0/NXR0 inline-ampli grid-mode flex
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#commit
RP/0/RP0/CPU0:ILA-R-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-R-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:37:08.127 UTC

```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)
63	191.450000	75.000

```

RP/0/RP0/CPU0:ILA-R-C#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:08:07.280 UTC

```

Controller State: Up

Transport Admin State: In Service

```

Alarm Status:
-----
Detected Alarms: None

```

```

Parameter Statistics:
-----
Total RX Power = -12.40 dBm
Total TX Power = 1.19 dBm

```

```

Configured Parameters:
-----

```

```

RP/0/RP0/CPU0:ILA-R-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 07:08:10.854 UTC

```

```
Controller State: Up
Transport Admin State: In Service
```

```
Alarm Status:
-----
Detected Alarms: None
```

```
Parameter Statistics:
-----
Total RX Power = -9.10 dBm
Total TX Power = 1.39 dBm
```

```
Configured Parameters:
-----
```

Configuration for ILA-C

```
RP/0/RP0/CPU0:ILA-C#config
Tue Jul 26 06:38:56.584 UTC
RP/0/RP0/CPU0:ILA-C(config)#hw-module location 0/0/NXR0 inline-ampli grid-mode flex

RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#channel-id 63 centre-freq 191.45 width 75
RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#commit
Tue Jul 26 06:39:24.378 UTC
RP/0/RP0/CPU0:ILA-C(config-hwmod-ila-flexi)#end
RP/0/RP0/CPU0:ILA-C#
RP/0/RP0/CPU0:ILA-C#sh hw-module location 0/0/NXR0 inline-ampli
Tue Jul 26 06:39:43.874 UTC
```

```
Location:          0/0/NXR0
Status:            Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)
63	191.450000	75.000

```
RP/0/RP0/CPU0:ILA-C#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:10:32.333 UTC
```

```
Controller State: Up
Transport Admin State: In Service
```

```
Alarm Status:
-----
Detected Alarms: None
```

```
Parameter Statistics:
-----
Total RX Power = -15.80 dBm
Total TX Power = -0.60 dBm
```

```
Configured Parameters:
-----
```

```
RP/0/RP0/CPU0:ILA-C#sh controllers ots-Och 0/0/0/2/63
Tue Jul 26 07:10:38.238 UTC
```

```
Controller State: Up

Transport Admin State: In Service
```

```
Alarm Status:
-----
Detected Alarms: None
```

```
Parameter Statistics:
-----
Total RX Power = -11.00 dBm
Total TX Power = -1.60 dBm
```

```
Configured Parameters:
-----
```

Configuration for OLT-C-SITE-2

```
RP/0/RP0/CPU0:OLT-C-SITE-2#config
Tue Jul 26 06:38:54.139 UTC
RP/0/RP0/CPU0:OLT-C-SITE-2(config)#hw-module location 0/0/NXR0 terminal-ampli
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt)#grid-mode flex
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#commit
RP/0/RP0/CPU0:OLT-C-SITE-2(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-C-SITE-2#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:39:23.878 UTC
```

```
Legend:
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

```
Location:          0/0/NXR0

Status:            Provisioned
```

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
2	196.025000	75.000	ASE
17	194.900000	75.000	ACTIVE
63	191.450000	75.000	NXC

```
RP/0/RP0/CPU0:OLT-C-SITE-2#config
Tue Jul 26 06:48:25.732 UTC
RP/0/RP0/CPU0:OLT-C-SITE-2(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#add-drop-channel ots-Och 0/0/0/30/63
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#commit
RP/0/RP0/CPU0:OLT-C-SITE-2(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-2#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 07:10:28.928 UTC
```

```
Controller State: Up

Transport Admin State: In Service
```

```
Alarm Status:
-----
Detected Alarms: None
```

Parameter Statistics:

```
-----
Total RX Power = -11.80 dBm
Total TX Power = 0.99 dBm
```

Cross Connect Info:

```
-----
Add-Drop Channel = Ots-Och0/0/0/30/63
```

Configured Parameters:

```
-----
RP/0/RP0/CPU0:OLT-C-SITE-2#sh controllers ots-Och 0/0/0/30/63
Tue Jul 26 07:10:33.899 UTC
```

Controller State: Up

Transport Admin State: In Service

Alarm Status:

```
-----
Detected Alarms: None
```

Parameter Statistics:

```
-----
Total RX Power = -4.50 dBm
Total TX Power = -2.20 dBm
```

Cross Connect Info:

```
-----
line Channel = Ots-Och0/0/0/0/63
```

Configured Parameters:

Configuration for OLT-C-SITE-5

```
RP/0/RP0/CPU0:OLT-C-SITE-5#config
Tue Jul 26 06:50:27.739 UTC
Current Configuration Session Line User Date Lock
00001000-000044b2-00000000 con0_RP0_C cisco Fri Jul 22 11:53:12 2022
RP/0/RP0/CPU0:OLT-C-SITE-5(config)#hw-module location 0/0/NXR0 terminal-ampli grid-mode
flex
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#channel-id 63 centre-freq 191.45 width
75
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#commit
Tue Jul 26 06:50:54.786 UTC
RP/0/RP0/CPU0:OLT-C-SITE-5(config-hwmod-olt-flexi)#end
RP/0/RP0/CPU0:OLT-C-SITE-5#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:51:01.966 UTC
```

Legend:

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

Location: 0/0/NXR0

Status: Provisioned

Flex Grid Info

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
1	196.100000	75.000	ACTIVE
3	195.950000	75.000	ASE
5	195.800000	75.000	ASE
17	194.900000	75.000	ACTIVE
59	191.750000	75.000	ACTIVE
61	191.600000	75.000	ACTIVE
62	191.525000	75.000	ASE
63	191.450000	75.000	NXC
64	191.375000	75.000	ACTIVE

```
RP/0/RP0/CPU0:OLT-C-SITE-5#config
```

```
Tue Jul 26 06:51:05.833 UTC
```

```
Current Configuration Session Line User Date Lock
```

```
00001000-000044b2-00000000 con0_RP0_C cisco Fri Jul 22 11:53:12 2022
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5(config)#controller ots-Och 0/0/0/0/63
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#add-drop-channel ots-Och 0/0/0/30/63
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#commit
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5(config-Ots)#end
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5#
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5#sh controllers ots-Och 0/0/0/0/63
```

```
Tue Jul 26 07:12:50.904 UTC
```

```
Controller State: Up
```

```
Transport Admin State: In Service
```

```
Alarm Status:
```

```
-----
```

```
Detected Alarms: None
```

```
Parameter Statistics:
```

```
-----
```

```
Total RX Power = -11.00 dBm
```

```
Total TX Power = 1.89 dBm
```

```
Cross Connect Info:
```

```
-----
```

```
Add-Drop Channel = Ots-Och0/0/0/30/63
```

```
Configured Parameters:
```

```
-----
```

```
RP/0/RP0/CPU0:OLT-C-SITE-5#sh controllers ots-Och 0/0/0/30/63
```

```
Tue Jul 26 07:12:54.871 UTC
```

```
Controller State: Up
```

```
Transport Admin State: In Service
```

```
Alarm Status:
```

```
-----
```

```
Detected Alarms: None
```

```
Parameter Statistics:
```

```
-----
```

```
Total RX Power = -3.70 dBm
Total TX Power = -2.70 dBm
```

```
Cross Connect Info:
```

```
-----
line Channel = Ots-Och0/0/0/0/63
```

```
Configured Parameters:
```

Configuration for OLT-C-SITE-8

```
RP/0/RP0/CPU0:OLT-C-SITE-8#config
Tue Jul 26 06:56:26.764 UTC
Current Configuration Session Line User Date Lock
00001000-0000345b-00000000 con0_RP0_C cisco Fri Jul 22 11:54:38 2022
RP/0/RP0/CPU0:OLT-C-SITE-8(config)#controller ots-Och 0/0/0/0/63
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#add-drop-channel ots-Och 0/0/0/3/63
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#commit
Tue Jul 26 06:56:46.290 UTC
RP/0/RP0/CPU0:OLT-C-SITE-8(config-Ots)#end
RP/0/RP0/CPU0:OLT-C-SITE-8#sh hw-module location 0/0/NXR0 terminal-ampli
Tue Jul 26 06:57:06.011 UTC
```

```
Legend:
```

```
NXC - Channel not cross-connected
ACTIVE - Channel cross-connected to data port
ASE - Channel filled with ASE
FAILED - Data channel failed, pending transition to ASE
```

```
Location: 0/0/NXR0
```

```
Status: Provisioned
```

```
Flex Grid Info
```

Channel Number	Centre Frequency (THz)	Channel Width (GHz)	Channel Status
1	196.100000	75.000	ACTIVE
3	195.950000	75.000	NXC
5	195.800000	75.000	ACTIVE
17	194.900000	75.000	ACTIVE
59	191.750000	75.000	ACTIVE
63	191.450000	75.000	ACTIVE
64	191.375000	75.000	ACTIVE

```
RP/0/RP0/CPU0:OLT-C-SITE-8#sh controllers ots-Och 0/0/0/0/63
Tue Jul 26 06:57:28.630 UTC
```

```
Controller State: Up
```

```
Transport Admin State: In Service
```

```
Alarm Status:
```

```
-----
Detected Alarms: None
```

```
Parameter Statistics:
```

```
-----
Total RX Power = -13.20 dBm
Total TX Power = -1.50 dBm
```

```

Cross Connect Info:
-----
Add-Drop Channel = Ots-Och0/0/0/3/63

Configured Parameters:
-----

RP/0/RP0/CPU0:OLT-C-SITE-8#sh controllers ots-Och 0/0/0/3/63
Tue Jul 26 06:57:35.129 UTC

Controller State: Up

Transport Admin State: Automatic In Service

Alarm Status:
-----
Detected Alarms: None

Parameter Statistics:
-----
Total RX Power = -7.50 dBm
Total TX Power = -21.80 dBm

Cross Connect Info:
-----
line Channel = Ots-Och0/0/0/0/63

Configured Parameters:
-----

```

After the cross-connects are created on the OLT nodes, APC regulates the power on each node. The APC status moves from WORKING to IDLE when the process completes. Use the **show olc apc** command to view the status of the operation. The following samples are for OLT-C-SITE-8.

```

RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc
Tue Jul 26 06:57:16.020 UTC

Controller      : Ots0/0/0/0
APC Status    : WORKING
Correcting Node : 10.123.1.1

Node RID       : 10.125.1.1
Internal State : IDLE

Node RID       : 10.123.1.1
Internal State : CORRECTING

RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc
Tue Jul 26 06:59:11.985 UTC

Controller      : Ots0/0/0/0
APC Status    : IDLE

Node RID       : 10.125.1.1
Internal State : IDLE

Node RID       : 10.123.1.1
Internal State : IDLE

```

After the APC process is complete, the link comes up. You can view the details using the **sh olc apc-local regulation-info controller ots** command on the near-end and far-end nodes.

OLT-R-C-SITE-1:

```
RP/0/RP0/CPU0:OLT-R-C-SITE-1#sh olc apc-local regulation-info controller ots 0/0/0/0
Tue Jul 26 07:02:57.244 UTC
Controller          : Ots0/0/0/0
Domain Manager     : 10.131.1.1
Internal Status    : IDLE
Direction         : TX
PSD Minimum       : -22.0 (dBm/12.5 GHz)
Gain Range        : Normal
Last Correction    : 2022-07-26 06:34:43
```

Device Parameters	Min	Max	Configuration	Operational
Egress Ampli Gain (dB)	15.3	29.3	17.9	17.9
Egress Ampli Tilt (dB)	-5.0	4.3	-1.6	-1.6
TX Ampli Power (dBm)	-	22.3	-	21.6
TX VOA Attenuation (dB)	0.0	20.0	1.3	1.3
Egress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Frequency (THz)	Channel Slice Width Attn Config (GHz)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000	75.00	-	ASE	13	-21.2	-5.7	-5.7
0.0	7.3						
191.449997	75.00	63	OCh	37	-21.5	-5.7	-5.9
0.2	19.0						
191.524994	75.00	-	ASE	61	-21.3	-5.7	-5.7
0.0	7.3						
191.600006	75.00	-	ASE	85	-21.2	-5.6	-5.6
0.0	7.3						
191.675003	75.00	-	ASE	109	-21.2	-5.6	-5.6
0.0	7.4						
191.750000	75.00	-	ASE	133	-21.1	-5.5	-5.5
0.0	7.3						
191.824997	75.00	-	ASE	157	-21.1	-5.5	-5.5
0.0	7.3						
191.899994	75.00	-	ASE	181	-21.1	-5.5	-5.5
0.0	7.3						
191.975006	75.00	-	ASE	205	-21.2	-5.5	-5.5
0.0	7.4						
192.050003	75.00	-	ASE	229	-21.1	-5.4	-5.4
0.0	7.2						
192.125000	75.00	-	ASE	253	-21.1	-5.4	-5.4
0.0	7.2						
192.199997	75.00	-	ASE	277	-21.0	-5.4	-5.4
0.0	7.2						
192.274994	75.00	-	ASE	301	-21.1	-5.4	-5.4
0.0	7.2						
192.350006	75.00	-	ASE	325	-21.0	-5.3	-5.3
0.0	7.0						
192.425003	75.00	-	ASE	349	-21.0	-5.3	-5.3
0.0	6.9						
192.500000	75.00	-	ASE	373	-21.0	-5.3	-5.4
0.1	7.0						
192.574997	75.00	-	ASE	397	-20.9	-5.3	-5.3
0.0	7.0						
192.649994	75.00	-	ASE	421	-20.9	-5.2	-5.2
0.0	7.0						
192.725006	75.00	-	ASE	445	-20.9	-5.2	-5.2
0.0	6.9						
192.800003	75.00	-	ASE	469	-20.9	-5.2	-5.2
0.0	6.9						
192.875000	75.00	-	ASE	493	-20.9	-5.2	-5.2
0.0	6.9						
192.949997	75.00	-	ASE	517	-20.8	-5.1	-5.1
0.0	6.8						
193.024994	75.00	-	ASE	541	-20.9	-5.1	-5.1
0.0	6.8						
193.100006	75.00	-	ASE	565	-20.9	-5.1	-5.1
0.0	6.7						
193.175003	75.00	-	ASE	589	-20.9	-5.1	-5.1
0.0	6.6						
193.250000	75.00	-	ASE	613	-20.8	-5.0	-5.0

0.0	6.5								
193.324997	75.00	-	ASE	637	-20.9	-5.0	-5.1		
0.0	6.6								
193.399994	75.00	-	ASE	661	-20.8	-5.0	-5.0		
0.0	6.5								
193.475006	75.00	-	ASE	685	-20.9	-5.0	-5.0		
0.0	6.5								
193.550003	75.00	-	ASE	709	-20.9	-4.9	-4.9		
0.0	6.5								
193.625000	75.00	-	ASE	733	-20.9	-4.9	-4.9		
0.0	6.5								
193.699997	75.00	-	ASE	757	-20.9	-4.9	-4.9		
0.0	6.5								
193.774994	75.00	-	ASE	781	-21.0	-4.9	-4.9		
0.0	6.6								
193.850006	75.00	-	ASE	805	-20.9	-4.8	-4.8		
0.0	6.5								
193.925003	75.00	-	ASE	829	-21.0	-4.8	-4.8		
0.0	6.6								
194.000000	75.00	-	ASE	853	-21.0	-4.8	-4.8		
0.0	6.6								
194.074997	75.00	-	ASE	877	-21.0	-4.8	-4.7		
0.0	6.6								
194.149994	75.00	-	ASE	901	-21.0	-4.7	-4.7		
0.0	6.7								
194.225006	75.00	-	ASE	925	-21.0	-4.7	-4.7		
0.0	6.8								
194.300003	75.00	-	ASE	949	-21.1	-4.7	-4.7		
0.0	6.9								
194.375000	75.00	-	ASE	973	-21.0	-4.7	-4.6		
0.0	6.9								
194.449997	75.00	-	ASE	997	-21.0	-4.6	-4.6		
0.0	6.9								
194.524994	75.00	-	ASE	1021	-21.1	-4.6	-4.7		
0.0	7.0								
194.600006	75.00	-	ASE	1045	-21.1	-4.6	-4.6		
0.0	6.9								
194.675003	75.00	-	ASE	1069	-21.1	-4.6	-4.6		
0.0	6.9								
194.750000	75.00	-	ASE	1093	-21.1	-4.5	-4.5		
0.0	6.8								
194.824997	75.00	-	ASE	1117	-21.0	-4.5	-4.5		
0.0	6.7								
194.899994	75.00	17	OCh	1141	-21.2	-4.5	-4.5		
0.0	19.5								
194.975006	75.00	-	ASE	1165	-21.1	-4.5	-4.5		
0.0	6.6								
195.050003	75.00	-	ASE	1189	-21.0	-4.4	-4.4		
0.0	6.4								
195.125000	75.00	-	ASE	1213	-21.1	-4.4	-4.4		
0.0	6.4								
195.199997	75.00	-	ASE	1237	-21.1	-4.4	-4.4		
0.0	6.3								
195.274994	75.00	-	ASE	1261	-21.2	-4.4	-4.5		
0.1	6.3								
195.350006	75.00	-	ASE	1285	-21.2	-4.3	-4.3		
0.0	6.2								
195.425003	75.00	-	ASE	1309	-21.3	-4.3	-4.3		
0.0	6.2								
195.500000	75.00	-	ASE	1333	-21.3	-4.3	-4.3		
0.0	6.2								
195.574997	75.00	-	ASE	1357	-21.5	-4.3	-4.4		
0.1	6.3								
195.649994	75.00	-	ASE	1381	-21.5	-4.2	-4.3		
0.0	6.4								
195.725006	75.00	-	ASE	1405	-21.5	-4.2	-4.1		
-0.1	6.5								
195.800003	75.00	-	ASE	1429	-21.7	-4.2	-4.2		
0.0	6.8								
195.875000	75.00	-	ASE	1453	-21.9	-4.2	-4.3		
0.1	7.1								
195.949997	75.00	-	ASE	1477	-21.8	-4.2	-4.0		
-0.1	7.1								
196.024994	75.00	2	ASE	1501	-21.9	-4.1	-4.1		
0.0	7.3								
196.100006	75.00	-	ASE	1525	-21.9	-4.1	-4.0		
-0.1	7.4								

```

Controller      : Ots0/0/0/0
Domain Manager  : 10.126.1.1
Internal Status : IDLE
Direction      : RX
PSD Minimum     : -22.0 (dBm/12.5 GHz)
Gain Range      : Normal
Last Correction : 2022-07-26 06:57:17
    
```

Cross-connect Configuration

Device Parameters		Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	:	10.9	23.9	10.9	10.9
Ingress Ampli Tilt (dB)	:	-5.0	5.0	-1.6	-1.6
RX Ampli Power (dBm)	:	-	25.0	-	24.2
RX VOA Attenuation (dB)	:	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	:	0.0	25.0	-	-

Channel Center Discrepancy	Channel Frequency	Channel Slice Width Attn Config	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD	Target PSD	Current PSD
(dB)	(THz)	(GHz)				(dBm/12.5 GHz)	(dBm/12.5 GHz)	(dBm/12.5 GHz)
0.0	191.375000	75.00	-	ASE	13	-11.1	-	-25.5
0.0	191.449997	75.00	63	OCh	37	-11.1	-8.0	-8.1
0.0	191.524994	75.00	-	ASE	61	-11.0	-	-25.4
0.0	191.600006	75.00	-	ASE	85	-11.0	-	-25.2
0.0	191.675003	75.00	-	ASE	109	-11.0	-	-25.3
0.0	191.750000	75.00	-	ASE	133	-11.0	-	-25.4
0.0	191.824997	75.00	-	ASE	157	-11.4	-	-25.6
0.0	191.899994	75.00	-	ASE	181	-11.4	-	-25.6
0.0	191.975006	75.00	-	ASE	205	-11.1	-	-25.4
0.0	192.050003	75.00	-	ASE	229	-11.0	-	-25.3
0.0	192.125000	75.00	-	ASE	253	-11.1	-	-25.4
0.0	192.199997	75.00	-	ASE	277	-11.4	-	-25.6
0.0	192.274994	75.00	-	ASE	301	-11.5	-	-25.7
0.0	192.350006	75.00	-	ASE	325	-11.3	-	-25.7
0.0	192.425003	75.00	-	ASE	349	-11.5	-	-25.7
0.0	192.500000	75.00	-	ASE	373	-11.6	-	-25.8
0.0	192.574997	75.00	-	ASE	397	-11.6	-	-25.7
0.0	192.649994	75.00	-	ASE	421	-11.7	-	-25.9
0.0	192.725006	75.00	-	ASE	445	-11.8	-	-26.1
0.0	192.800003	75.00	-	ASE	469	-11.9	-	-26.1
0.0	192.875000	75.00	-	ASE	493	-11.8	-	-26.0
0.0	192.949997	75.00	-	ASE	517	-12.0	-	-26.2
0.0	193.024994	75.00	-	ASE	541	-12.0	-	-26.1
0.0	193.100006	75.00	-	ASE	565	-11.9	-	-26.1
0.0	193.175003	75.00	-	ASE	589	-12.0	-	-26.3
0.0	193.250000	75.00	-	ASE	613	-11.9	-	-26.1
0.0	193.324997	75.00	-	ASE	637	-11.9	-	-26.1
0.0	193.399994	75.00	-	ASE	661	-12.0	-	-26.2
0.0	193.475006	75.00	-	ASE	685	-12.0	-	-26.2
0.0	193.550003	75.00	-	ASE	709	-12.0	-	-26.1
0.0	193.625000	75.00	-	ASE	733	-11.9	-	-26.0
0.0	193.699997	75.00	-	ASE	757	-11.6	-	-25.8
0.0	193.774994	75.00	-	ASE	781	-11.6	-	-25.7

193.850006	75.00	-	ASE	805	-11.5	-	-25.6
0.0	25.0						
193.925003	75.00	-	ASE	829	-11.4	-	-25.6
0.0	25.0						
194.000000	75.00	-	ASE	853	-11.5	-	-25.6
0.0	25.0						
194.074997	75.00	-	ASE	877	-11.6	-	-25.6
0.0	25.0						
194.149994	75.00	-	ASE	901	-11.7	-	-25.6
0.0	25.0						
194.225006	75.00	-	ASE	925	-11.8	-	-25.6
0.0	25.0						
194.300003	75.00	-	ASE	949	-12.0	-	-25.8
0.0	25.0						
194.375000	75.00	-	ASE	973	-12.0	-	-25.8
0.0	25.0						
194.449997	75.00	-	ASE	997	-12.1	-	-25.9
0.0	25.0						
194.524994	75.00	-	ASE	1021	-12.2	-	-25.9
0.0	25.0						
194.600006	75.00	-	ASE	1045	-12.2	-	-26.0
0.0	25.0						
194.675003	75.00	-	ASE	1069	-12.2	-	-26.0
0.0	25.0						
194.750000	75.00	-	ASE	1093	-12.3	-	-26.0
0.0	25.0						
194.824997	75.00	-	ASE	1117	-12.4	-	-26.1
0.0	25.0						
194.899994	75.00	17	OCh	1141	-12.3	-8.0	-8.1
-0.1	2.0						
194.975006	75.00	-	ASE	1165	-12.1	-	-26.0
0.0	25.0						
195.050003	75.00	-	ASE	1189	-12.0	-	-25.9
0.0	25.0						
195.125000	75.00	-	ASE	1213	-12.0	-	-25.9
0.0	25.0						
195.199997	75.00	-	ASE	1237	-12.0	-	-26.0
0.0	25.0						
195.274994	75.00	-	ASE	1261	-11.8	-	-25.7
0.0	25.0						
195.350006	75.00	-	ASE	1285	-11.7	-	-25.6
0.0	25.0						
195.425003	75.00	-	ASE	1309	-11.6	-	-25.5
0.0	25.0						
195.500000	75.00	-	ASE	1333	-11.7	-	-25.6
0.0	25.0						
195.574997	75.00	-	ASE	1357	-11.8	-	-25.4
0.0	25.0						
195.649994	75.00	-	ASE	1381	-11.4	-	-25.1
0.0	25.0						
195.725006	75.00	-	ASE	1405	-11.5	-	-25.1
0.0	25.0						
195.800003	75.00	-	ASE	1429	-11.7	-	-25.1
0.0	25.0						
195.875000	75.00	-	ASE	1453	-11.8	-	-25.0
0.0	25.0						
195.949997	75.00	-	ASE	1477	-11.6	-	-24.7
0.0	25.0						
196.024994	75.00	2	ASE	1501	-11.9	-9.0	-8.9
-0.1	4.5						
196.100006	75.00	-	ASE	1525	-11.9	-	-24.8
0.0	25.0						

OLT-C-SITE-8:

```

RF/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc-local regulation-info controller ots 0/0/0/0 tX
Tue Jul 26 06:59:33.786 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.125.1.1
Internal Status : IDLE
Direction      : TX
PSD Minimumum  : -24.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-07-26 06:57:09
    
```

Device Parameters	Min	Max	Configuration	Operational
Egress Ampli Gain (dB)	16.0	30.0	20.3	20.3
Egress Ampli Tilt (dB)	-5.0	3.0	-1.5	-1.5
TX Ampli Power (dBm)	-	23.0	-	22.1
TX VOA Attenuation (dB)	0.0	20.0	5.5	5.5
Egress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Cross-connect Configuration

Channel Discrepancy	Center Frequency (THz)	Channel Channel Slice Width Attn Config (GHz)	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD (dBm/12.5 GHz)	Target PSD (dBm/12.5 GHz)	Current PSD (dBm/12.5 GHz)
191.375000 0.0	75.00 20.2	64	OCh	13	-23.0	-8.6	-8.6	
191.449997 0.0	75.00 18.3	63	OCh	37	-23.0	-8.6	-8.6	
191.524994 0.0	75.00 7.7	-	ASE	61	-23.0	-8.6	-8.6	
191.600006 0.1	75.00 7.8	-	ASE	85	-23.1	-8.6	-8.7	
191.675003 0.0	75.00 7.6	-	ASE	109	-23.0	-8.6	-8.6	
191.750000 0.0	75.00 20.0	59	OCh	133	-23.0	-8.5	-8.6	
191.824997 0.0	75.00 7.8	-	ASE	157	-23.1	-8.5	-8.5	
191.899994 0.0	75.00 7.7	-	ASE	181	-23.0	-8.5	-8.5	
191.975006 0.0	75.00 7.7	-	ASE	205	-23.0	-8.5	-8.5	
192.050003 0.0	75.00 7.6	-	ASE	229	-23.0	-8.4	-8.4	
192.125000 0.0	75.00 7.7	-	ASE	253	-23.0	-8.4	-8.5	
192.199997 0.1	75.00 7.8	-	ASE	277	-23.1	-8.4	-8.5	
192.274994 0.0	75.00 7.6	-	ASE	301	-22.9	-8.4	-8.3	
192.350006 0.0	75.00 7.5	-	ASE	325	-22.9	-8.3	-8.4	
192.425003 0.0	75.00 7.5	-	ASE	349	-22.9	-8.3	-8.3	
192.500000 0.0	75.00 7.5	-	ASE	373	-22.8	-8.3	-8.3	
192.574997 0.1	75.00 7.6	-	ASE	397	-23.0	-8.3	-8.4	
192.649994 0.0	75.00 7.4	-	ASE	421	-22.8	-8.2	-8.2	
192.725006 0.0	75.00 7.4	-	ASE	445	-22.8	-8.2	-8.3	
192.800003 0.1	75.00 7.5	-	ASE	469	-22.9	-8.2	-8.3	
192.875000 0.1	75.00 7.5	-	ASE	493	-22.8	-8.2	-8.3	
192.949997 -0.1	75.00 7.3	-	ASE	517	-22.7	-8.1	-8.0	
193.024994 0.0	75.00 7.3	-	ASE	541	-22.7	-8.1	-8.2	
193.100006 0.0	75.00 7.2	-	ASE	565	-22.7	-8.1	-8.1	
193.175003 0.1	75.00 7.2	-	ASE	589	-22.7	-8.1	-8.2	
193.250000 0.0	75.00 7.2	-	ASE	613	-22.7	-8.1	-8.1	
193.324997 0.0	75.00 7.0	-	ASE	637	-22.6	-8.0	-8.0	
193.399994 0.0	75.00 7.1	-	ASE	661	-22.7	-8.0	-8.1	
193.475006 0.0	75.00 7.1	-	ASE	685	-22.7	-8.0	-8.0	
193.550003 0.0	75.00 7.1	-	ASE	709	-22.6	-8.0	-7.9	
193.625000 0.0	75.00 7.1	-	ASE	733	-22.6	-7.9	-7.9	
193.699997 0.0	75.00 7.1	-	ASE	757	-22.7	-7.9	-7.9	
193.774994 0.0	75.00 7.0	-	ASE	781	-22.6	-7.9	-7.9	
193.850006 0.1	75.00 7.2	-	ASE	805	-22.8	-7.9	-8.0	
193.925003 0.0	75.00 7.0	-	ASE	829	-22.6	-7.8	-7.8	
194.000000 0.1	75.00 7.1	-	ASE	853	-22.8	-7.8	-8.0	
194.074997 0.0	75.00 7.1	-	ASE	877	-22.7	-7.8	-7.8	
194.149994 0.0	75.00 7.2	-	ASE	901	-22.8	-7.8	-7.8	
194.225006 0.0	75.00 7.2	-	ASE	925	-22.8	-7.8	-7.8	

194.300003	75.00	-	ASE	949	-22.9	-7.7	-7.8
0.0	7.3						
194.375000	75.00	-	ASE	973	-22.8	-7.7	-7.7
0.0	7.3						
194.449997	75.00	-	ASE	997	-22.9	-7.7	-7.8
0.1	7.4						
194.524994	75.00	-	ASE	1021	-22.7	-7.7	-7.5
-0.1	7.2						
194.600006	75.00	-	ASE	1045	-22.8	-7.6	-7.6
0.0	7.3						
194.675003	75.00	-	ASE	1069	-22.8	-7.6	-7.6
0.0	7.3						
194.750000	75.00	-	ASE	1093	-22.8	-7.6	-7.6
0.0	7.2						
194.824997	75.00	-	ASE	1117	-22.8	-7.6	-7.5
0.0	7.1						
194.899994	75.00	17	OCh	1141	-22.9	-7.5	-7.5
0.0	18.8						
194.975006	75.00	-	ASE	1165	-22.8	-7.5	-7.5
0.0	7.0						
195.050003	75.00	-	ASE	1189	-22.9	-7.5	-7.5
0.0	7.1						
195.125000	75.00	-	ASE	1213	-22.8	-7.5	-7.4
0.0	6.9						
195.199997	75.00	-	ASE	1237	-22.9	-7.4	-7.4
0.0	6.8						
195.274994	75.00	-	ASE	1261	-22.9	-7.4	-7.4
0.0	6.8						
195.350006	75.00	-	ASE	1285	-23.0	-7.4	-7.4
0.0	6.9						
195.425003	75.00	-	ASE	1309	-23.1	-7.4	-7.4
0.0	7.0						
195.500000	75.00	-	ASE	1333	-23.1	-7.3	-7.4
0.0	6.8						
195.574997	75.00	-	ASE	1357	-23.1	-7.3	-7.3
0.0	6.8						
195.649994	75.00	-	ASE	1381	-23.3	-7.3	-7.4
0.1	7.0						
195.725006	75.00	-	ASE	1405	-23.3	-7.3	-7.4
0.1	7.1						
195.800003	75.00	5	OCh	1429	-23.3	-7.2	-7.2
0.0	19.1						
195.875000	75.00	-	ASE	1453	-23.5	-7.2	-7.2
0.0	7.3						
195.949997	75.00	-	ASE	1477	-23.6	-7.2	-7.2
0.0	7.4						
196.024994	75.00	-	ASE	1501	-23.8	-7.2	-7.3
0.1	7.6						
196.100006	75.00	1	OCh	1525	-23.7	-7.2	-7.1
0.0	19.4						

ASE - Noise Loaded Channel
OCh - Optical Channel

```
RP/0/RP0/CPU0:OLT-C-SITE-8#sh olc apc-local regulation-info controller ots 0/0/0/0 rx
Tue Jul 26 06:59:42.151 UTC
Controller      : Ots0/0/0/0
Domain Manager  : 10.123.1.1
Internal Status : DISCREPANCY
Direction      : RX
PSD Minumum    : -24.0 (dBm/12.5 GHz)
Gain Range     : Normal
Last Correction : 2022-07-26 06:59:39
```

Device Parameters	Min	Max	Configuration	Operational
Ingress Ampli Gain (dB)	12.0	25.0	19.7	19.7
Ingress Ampli Tilt (dB)	-5.0	1.8	0.4	0.4
RX Ampli Power (dBm)	-	25.0	-	24.2
RX VOA Attenuation (dB)	0.0	0.0	0.0	0.0
Ingress WSS/DGE Attenuation (dB)	0.0	25.0	-	-

Channel Center Discrepancy	Channel Channel Slice	Channel ID	Channel Source	Spectrum Slice Num	Ampli-Input PSD	Target PSD	Current PSD
Frequency (THz)	Width (GHz)				(dBm/12.5 GHz)	(dBm/12.5 GHz)	(dBm/12.5 GHz)
191.375000	75.00	64	OCh	13	-20.7	-8.0	-8.1
0.1	5.1						

Cross-connect Configuration

191.449997	75.00	63	OCh	37	-20.6	-8.0	-22.4
14.4	15.3						
191.524994	75.00	62	ASE	61	-20.6	-	-25.6
0.0	25.0						
191.600006	75.00	61	OCh	85	-20.6	-	-25.6
0.0	25.0						
191.675003	75.00	-	ASE	109	-20.4	-	-25.4
0.0	25.0						
191.750000	75.00	59	OCh	133	-20.4	-8.0	-8.1
0.0	5.4						
191.824997	75.00	-	ASE	157	-20.4	-	-25.4
0.0	25.0						
191.899994	75.00	-	ASE	181	-20.5	-	-25.5
0.0	25.0						
191.975006	75.00	-	ASE	205	-20.4	-	-25.4
0.0	25.0						
192.050003	75.00	-	ASE	229	-20.4	-	-25.4
0.0	25.0						
192.125000	75.00	-	ASE	253	-20.3	-	-25.3
0.0	25.0						
192.199997	75.00	-	ASE	277	-20.4	-	-25.4
0.0	25.0						
192.274994	75.00	-	ASE	301	-20.5	-	-25.4
0.0	25.0						
192.350006	75.00	-	ASE	325	-20.1	-	-25.2
0.0	25.0						
192.425003	75.00	-	ASE	349	-20.2	-	-25.3
0.0	25.0						
192.500000	75.00	-	ASE	373	-20.3	-	-25.3
0.0	25.0						
192.574997	75.00	-	ASE	397	-20.4	-	-25.4
0.0	25.0						
192.649994	75.00	-	ASE	421	-20.4	-	-25.3
0.0	25.0						
192.725006	75.00	-	ASE	445	-20.3	-	-25.3
0.0	25.0						
192.800003	75.00	-	ASE	469	-20.3	-	-25.3
0.0	25.0						
192.875000	75.00	-	ASE	493	-20.3	-	-25.4
0.0	25.0						
192.949997	75.00	-	ASE	517	-20.3	-	-25.3
0.0	25.0						
193.024994	75.00	-	ASE	541	-20.2	-	-25.3
0.0	25.0						
193.100006	75.00	-	ASE	565	-20.3	-	-25.4
0.0	25.0						
193.175003	75.00	-	ASE	589	-20.3	-	-25.3
0.0	25.0						
193.250000	75.00	-	ASE	613	-20.3	-	-25.5
0.0	25.0						
193.324997	75.00	-	ASE	637	-20.2	-	-25.3
0.0	25.0						
193.399994	75.00	-	ASE	661	-20.4	-	-25.5
0.0	25.0						
193.475006	75.00	-	ASE	685	-20.4	-	-25.5
0.0	25.0						
193.550003	75.00	-	ASE	709	-20.5	-	-25.6
0.0	25.0						
193.625000	75.00	-	ASE	733	-20.4	-	-25.5
0.0	25.0						
193.699997	75.00	-	ASE	757	-20.3	-	-25.4
0.0	25.0						
193.774994	75.00	-	ASE	781	-20.4	-	-25.5
0.0	25.0						
193.850006	75.00	-	ASE	805	-20.4	-	-25.5
0.0	25.0						
193.925003	75.00	-	ASE	829	-20.3	-	-25.4
0.0	25.0						
194.000000	75.00	-	ASE	853	-20.3	-	-25.4
0.0	25.0						
194.074997	75.00	-	ASE	877	-20.4	-	-25.5
0.0	25.0						
194.149994	75.00	-	ASE	901	-20.5	-	-25.5
0.0	25.0						
194.225006	75.00	-	ASE	925	-20.4	-	-25.4
0.0	25.0						
194.300003	75.00	-	ASE	949	-20.4	-	-25.5
0.0	25.0						
194.375000	75.00	-	ASE	973	-20.4	-	-25.4
0.0	25.0						
194.449997	75.00	-	ASE	997	-20.4	-	-25.5
0.0	25.0						
194.524994	75.00	-	ASE	1021	-20.4	-	-25.4
0.0	25.0						
194.600006	75.00	-	ASE	1045	-20.4	-	-25.4
0.0	25.0						

194.675003	75.00	-	ASE	1069	-20.4	-	-25.5
0.0	25.0						
194.750000	75.00	-	ASE	1093	-20.4	-	-25.4
0.0	25.0						
194.824997	75.00	-	ASE	1117	-20.4	-	-25.4
0.0	25.0						
194.899994	75.00	17	OCh	1141	-20.2	-8.0	-8.0
0.0	2.1						
194.975006	75.00	-	ASE	1165	-20.3	-	-25.5
0.0	25.0						
195.050003	75.00	-	ASE	1189	-20.2	-	-25.5
0.0	25.0						
195.125000	75.00	-	ASE	1213	-20.3	-	-25.6
0.0	25.0						
195.199997	75.00	-	ASE	1237	-20.3	-	-25.6
0.0	25.0						
195.274994	75.00	-	ASE	1261	-20.2	-	-25.6
0.0	25.0						
195.350006	75.00	-	ASE	1285	-20.2	-	-25.6
0.0	25.0						
195.425003	75.00	-	ASE	1309	-20.0	-	-25.5
0.0	25.0						
195.500000	75.00	-	ASE	1333	-20.1	-	-25.6
0.0	25.0						
195.574997	75.00	-	ASE	1357	-20.1	-	-25.6
0.0	25.0						
195.649994	75.00	-	ASE	1381	-19.9	-	-25.5
0.0	25.0						
195.725006	75.00	-	ASE	1405	-19.8	-	-25.4
0.0	25.0						
195.800003	75.00	5	ASE	1429	-19.9	-8.0	-7.9
0.0	1.8						
195.875000	75.00	-	ASE	1453	-19.8	-	-25.3
0.0	25.0						
195.949997	75.00	3	ASE	1477	-19.7	-	-25.2
0.0	25.0						
196.024994	75.00	-	ASE	1501	-19.7	-	-25.0
0.0	25.0						
196.100006	75.00	1	OCh	1525	-19.5	-8.0	-8.1
0.0	6.0						

ASE - Noise Loaded Channel
OCh - Optical Channel

