General Troubleshooting

Certain software releases have reached end-of-life status. For more information, see the End-of-Life and End-of-Sale Notices.

This chapter provides procedures for troubleshooting the most common problems encountered when operating an NCS 1002. To troubleshoot specific alarms, see Alarm Troubleshooting. If you cannot find what you are looking for, contact Cisco Technical Support (1 800 553-2447).

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Validating and Troubleshooting Installation of the Software Packages

Step 1 **show version**

Displays the software version and details such as system uptime.

Example:

```
RP/0/RP0/CPU0:ios# show version
Wed Nov 11 06:08:46.785 UTC

Cisco IOS XR Software, Version 6.0.0.22I
Copyright (c) 2013-2015 by Cisco Systems, Inc.

Build Information:
 Built By     : xxxxx
 Built On     : Fri Nov 13 17:08:39 IST 2015
 Build Host   : agl-ads-111
 Workspace    : /nobackup/xxxxx/idprom
 Version      : 6.0.0.22I
 Location     : /opt/cisco/XR/packages/

cisco NCS1K () processor
System uptime is 3 hours, 3 minutes
```

Step 2 **show install repository**

Displays a list of all the installed software packages on the NCS 1002.

Example:

```
RP/0/RP0/CPU0:ios# show install repository
Wed Nov 11 06:05:33.699 UTC
1 package(s) in XR repository:
    ncs1k-xr-6.0.0.22I
```

Step 3 **show install active**

Displays a list of all the installed and active software packages on the NCS 1002.

The following sample output displays active software packages in the EXEC mode.

Example:

```
RP/0/RP0/CPU0:ios# show install active
Wed Nov 11 06:06:40.221 UTC
Node 0/RP0/CPU0 [RP]
  Boot Partition: xr_lv0
  Active Packages: 1
  ncs1k-xr-6.0.0.22I version=6.0.0.22I [Boot image]
```

The following sample output displays active software packages in the system admin EXEC mode.

```
sysadmin-vm:0_RP0# show install active
Wed Nov  11 06:06:47.804 UTC
 Node 0/RP0 [RP]
 Active Packages: 1
 ncs1k-sysadmin-6.0.0.22I version=6.0.0.22I [Boot image]
```

Step 4 **show install committed**

Displays a list of all committed software packages on the NCS 1002.

The committed software packages are the software packages that are booted on an NCS 1002 reload. Committed packages are the packages that are persistent across reloads. If you install and activate a package, it remains active until the next reload. If you commit a package set, all packages in that set remain active across reloads until the package set is replaced with another committed package set.

The following sample output displays the committed software packages in the EXEC mode.

Example:

```
RP/0/RP0/CPU0:ios# show install committed
Wed Nov 11 06:07:53.181 UTC
Node 0/RP0/CPU0 [RP]
  Boot Partition: xr_lv0
  Committed Packages: 1
        ncs1k-xr-6.0.0.22I version=6.0.0.22I [Boot image]
```

The following sample output displays the committed software packages in the system admin EXEC mode.

```
sysadmin-vm:0_RP0# show install committed
Wed Nov  11 06:08:02.409 UTC
 Node 0/RP0 [RP]
    Committed Packages: 1
       ncs1k-sysadmin-6.0.0.22I version=6.0.0.22I [Boot image]
```

Step 5 **show install log**

Displays information on the history of the installation operations. This command provides information about both successful and failed installation operations on the NCS 1002. You can also verify a Service Maintenance Update (SMU) installation using this command.

Example:

```
RP/0/RP0/CPU0:ios# show install log 49 detail
Wed Dec  9 01:19:18.680 UTC
Dec 09 01:19:07 Install operation 49 started by root:
 install add source tftp://10.105.236.167 ncs1k-k9sec.rpm
Dec 09 01:19:08 Action 1: install add action started
Dec 09 01:19:08 ERROR! Either file is not proper or error in getting rpm metadata from rpm file

Dec 09 01:19:08 ERROR!! failed to complete install add precheck

Dec 09 01:19:09 Install operation 49 aborted
Dec 09 01:19:10 Ending operation 49
```

In the above example, either a wrong rpm package is used or the rpm package is corrupted.

For failure on install add source, check that the package is correctly named and is available at the location.

What to do next

If the expected active software packages are not displayed, install the packages (if required) and activate the packages using the **install activate** *package_name* command.

Troubleshooting Problems with Node

Node is Unreachable

Step 1 Verify cable connectivity.

Step 2 Verify that the power supply is on.

Step 3 Reboot the NCS 1002.

Step 4 Verify the hardware module and inventory data. For more information, see Verifying the Status of Hardware Modules, on page 4.

Console and Node are Not Responsive

Console problems occur when the NCS 1002 becomes unresponsive to an input at the console port. If the console is not responsive, it means that a high priority process prevents the console driver from responding to input.

Step 1 Verify cable connectivity.

Step 2 Verify that the power supply is on.

Step 3 Verify the NCS 1002 LED status. If all LEDs are down, it might be an issue with the power supply.

Step 4 Verify that the CPU is inserted properly.

Step 5 Reboot the NCS 1002.

Verifying the Status of Hardware Modules

You can verify the state of the hardware modules in the following scenarios:

- Node is not reachable.
- Node recovers from a problem.
- Node had a power cycle.
- Node reboot.
- Node upgrade.
- Node settles down after the Cisco IOS XR has continuously reloaded.

Step 1 **show platform**

When you execute this command from the Cisco IOS XR EXEC mode, the status of the Cisco IOS XR is displayed.

Verify that the node state is Operational and the admin state is UP.

Example:

```
RP/0/RP0/CPU0:ios# show platform
Wed Nov 11 01:22:28.953 UTC
Node name         Node type             Node state        Admin state   Config state
-------------------------------------------------------------------------------
0/RP0             NCS1K-CNTLR-K9        OPERATIONAL       UP            NSHUT
```

a) If the Cisco IOS XR is not operational, no output is shown in the result. In this case, verify the state of service domain router (SDR) on the node using the **show sdr** command.

The following example shows sample output from the **show sdr** command in Cisco IOS XR EXEC mode.

```
RP/0/RP0/CPU0:ios# show sdr
RP/0/RP0/CPU0:ios#sh sdr
Tue Nov 10 22:57:20.921 UTC
Type                  NodeName       NodeState      RedState       PartnerName
-------------------------------------------------------------------------------
RP                    0/RP0/CPU0     IOS XR RUN     ACTIVE         NONE
NCS1K-CNTLR-K9        0/RP0          OPERATIONAL                   N/A
```

The following example shows sample output from the **show sdr** command in system admin EXEC mode.

```
sysadmin-vm:0_RP0# show sdr
Tue Nov  10 22:56:41.225 UTC
sdr default-sdr
 location 0/RP0/VM1
  sdr-id             2
  IP Address of VM   192.0.2.3
  MAC address of VM  E2:3A:DD:0A:8D:03
  VM State           RUNNING
  start-time         2020-11-06T10:41:52.340092+00:00
  Last Reload Reason FIRST_BOOT
  Reboot Count       1
```

Step 2 **admin**

Enters system admin EXEC mode.

Example:

```
RP/0/RP0/CPU0:ios# admin
```

Step 3 **show platform**

Displays information and status for each node in the system.

Example:

```
sysadmin-vm:0_RP0# show platform
Tue Feb 27 10:26:58.763 UTC
Location Card Type    HW State  SW State    Config State
------------------------------------------------------------------------------
0/0     NCS1002     OPERATIONAL N/A         NSHUT
0/RP0   NCS1002--RP OPERATIONAL OPERATIONAL NSHUT
0/FT0   NCS1K-FTA   OPERATIONAL N/A         NSHUT
0/FT1   NCS1K-FTA   OPERATIONAL N/A         NSHUT
```

Verify that all the modules of the NCS 1002 are displayed in the result. The software state and the hardware state must be OPERATIONAL.

The various hardware and software states are:

Hardware states:

- OPERATIONAL—Node is operating normally and is fully functional
- POWERED_ON—Power is on and the node is booting up
- FAILED—Node is powered on but has experienced some internal failure
- PRESENT—Node is in the shutdown state
- OFFLINE—User has changed the node state to OFFLINE. The node is accessible for diagnostics

Software states:

- OPERATIONAL—Software is operating normally and is fully functional
- SW_INACTIVE—Software is not completely operational
- FAILED—Software is operational but the card has experienced some internal failure

Step 4 **show platform detail**

Displays the hardware and software states, and other details of the node.

Example:

```
sysadmin-vm:0_RP0# show platform detail
Wed Aug 5 09:49:06.521 UTC
Platform Information for 0/0
PID : NCS1002
Description : "Network Convergence System 1000 Controller"
VID/SN : V01
HW Oper State : OPERATIONAL
SW Oper State : N/A
Configuration : "NSHUT RST"
HW Version : 0.1
Last Event : HW_EVENT_OK
Last Event Reason : "HW Event OK"
Platform Information for 0/RP0
PID : NCS1002--RP
Description : "Network Convergence System 1000 Controller"
VID/SN : V01
HW Oper State : OPERATIONAL
SW Oper State : OPERATIONAL
Configuration : "NSHUT RST"
HW Version : 0.1
Last Event : UNKNOWN
Last Event Reason : UNKNOWN
```

Step 5 **show inventory**

Displays the details of the physical entities of the NCS 1002 along with the details of QSFPs and CFPs when you execute this command in the Cisco IOS XR EXEC mode.

You can verify if any QSFP or CFP has been removed from the NCS 1002.

Example:

```
RP/0/RP0/CPU0:ios# show inventory
RP/0/RP0/CPU0:ios#show inventory
Fri May 18 10:46:51.323 UTC
NAME: "0/0", DESCR: "Network Convergence System 1002 20 QSFP28/QSFP+ slots"
PID: NCS1002-K9        , VID: V03, SN: CAT2116B170

NAME: "0/0-Optics0/0/0/1", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: SPQCELRCDFB       , VID: 01 , SN: G9I2011804

NAME: "0/0-Optics0/0/0/4", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: TR-FC13L-N00      , VID: 01 , SN: INGAJ0930306

NAME: "0/0-Optics0/0/0/6", DESCR: "Cisco CFP2 DWDM Pluggable Optics"
PID: ONS-CFP2-WDM      , VID: V01 , SN: OUK1936006S

NAME: "0/0-Optics0/0/0/7", DESCR: "Cisco 4x10GE QSFP+ LR-S Pluggable Optics Module"
PID: QSFP-4X10G-LR-S   , VID: V02 , SN: INL20410069

NAME: "0/0-Optics0/0/0/8-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC1907074R

NAME: "0/0-Optics0/0/0/9", DESCR: "Cisco 40GE QSFP+ SR4 Pluggable Optics Module"
PID: QSFP-40G-SR4      , VID: V03 , SN: JFQ20332088

NAME: "0/0-Optics0/0/0/10", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: SPQCELRCDFB       , VID: 01 , SN: GAV2008935

NAME: "0/0-Optics0/0/0/11-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC190707YP

NAME: "0/0-Optics0/0/0/17-LANE1", DESCR: "Cisco 10G SFP SR Pluggable Optics Module"
PID: SFP-10G-SR        , VID: V03 , SN: JUR1904073P

NAME: "0/0-Optics0/0/0/18", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: FTLC1151RDPL      , VID: A0 , SN: UVE1C6C

NAME: "0/0-Optics0/0/0/19", DESCR: "Cisco CFP2 DWDM Pluggable Optics"
PID: ONS-CFP2-WDM      , VID: V05 , SN: OVE204404PA

NAME: "0/0-Optics0/0/0/21", DESCR: "Cisco 4x10GE QSFP+ LR-S Pluggable Optics Module"
PID: QSFP-4x10G-LR-S   , VID: V01 , SN: INL20200012

NAME: "0/0-Optics0/0/0/22-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC190707YS

NAME: "0/0-Optics0/0/0/23", DESCR: "Cisco 40GE QSFP+ SR4 Pluggable Optics Module"
PID: QSFP-40G-SR4      , VID: V03 , SN: JFQ2033201H

NAME: "0/0-Optics0/0/0/24", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: FTLC1151RDPL      , VID: A0 , SN: UWD2QMM

NAME: "0/0-Optics0/0/0/25-LANE1", DESCR: "Cisco 10G SFP ER Pluggable Optics Module"
PID: SFP-10G-ER        , VID: V02 , SN: ONT213100BW

NAME: "0/RP0", DESCR: "Network Convergence System 1000 Controller"
PID: NCS1K-CNTLR       , VID: V04, SN: CAT2052B0FZ

NAME: "Rack 0", DESCR: "Network Convergence System 1002 20 QSFP28/QSFP+ slots"
PID: NCS1002-K9        , VID: V03, SN: CAT2116B170

NAME: "0/FT0", DESCR: "Network Convergence System 1000 Fan"
PID: NCS1K-FTA         , VID: V01, SN: N/A

NAME: "0/FT1", DESCR: "Network Convergence System 1000 Fan"
```

```
PID: NCS1K-FTA          , VID: V01, SN: N/A

NAME: "0/FT2", DESCR: "Network Convergence System 1000 Fan"
PID: NCS1K-FTA          , VID: V01, SN: N/A

NAME: "0/PM0", DESCR: "Network Convergence System 1000 2KW AC PSU"
PID: NCS1K-2KW-AC       , VID: V01, SN: POG2041J0BW

NAME: "0/PM1", DESCR: "Network Convergence System 1000 2KW AC PSU"
PID: NCS1K-2KW-AC       , VID: V01, SN: POG2041J01C
```

What to do next

Verify the software version of the NCS 1002. For more information, see Verifying the Software Version, on page 8

Verifying the Software Version

The NCS 1002 is shipped with a pre-installed Cisco IOS XR software. Verify that the latest version of the software is installed. If a newer version is available, perform a system upgrade. This will install the newer version of the software and provide the latest feature set on the NCS 1002.

show version

Displays the software version and details such as system uptime in the Cisco IOS XR EXEC mode.

Example:

```
RP/0/RP0/CPU0:ios# show version
Tue Nov 10 23:02:37.683 UTC

Cisco IOS XR Software, Version 6.0.0.26I
Copyright (c) 2013-2015 by Cisco Systems, Inc.

Build Information:
 Built By     : xxxx
 Built On     : Tue Dec  1 17:02:18 PST 2015
 Build Host   : build-lnx-100
 Workspace    : /auto/build-lnx-106-san1/r60x-ws6/nightly_r60x/151201B_ncs1k/workspace
 Version      : 6.0.0.26I
 Location     : /opt/cisco/XR/packages/

cisco NCS1K () processor
System uptime is 4 days, 12 hours, 20 minutes
```

What to do next

Verify the result to ascertain whether a system upgrade is required. If the upgrade is required, see the *System Setup and Software Installation Guide for Cisco NCS 1000 Series*.

Troubleshooting the Management Interface

Before you begin

Management interface should be configured.

Step 1 **show interfaces mgmtEth** *instance*

Displays the management interface configuration.

Example:

```
RP/0/RP0/CPU0:ios# show interfaces MgmtEth 0/RP0/CPU0/0
Fri Nov 13 19:42:29.716 UTC
MgmtEth0/RP0/CPU0/0 is administratively down, line protocol is administratively down
  Interface state transitions: 0
  Hardware is Management Ethernet, address is badb.adba.d098 (bia badb.adba.d098)
  Internet address is 10.58.227.183/24
  MTU 1514 bytes, BW 100000 Kbit (Max: 100000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 100Mb/s, CX, link type is autonegotiation
  loopback not set,
  ARP type ARPA, ARP timeout 04:00:00
  Last input never, output never
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 0 broadcast packets, 0 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 total output drops
     Output 0 broadcast packets, 0 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

a) In the above result, the management interface is administratively down. Use the **no shut** command to enable the management interface.

The following example shows sample output from the **show running-config interface mgmtEth** command when the management interface is in the no shut state.

```
RP/0/RP0/CPU0:ios#show running-config interface mgmtEth 0/RP0/CPU0/0
Fri Nov 13 19:42:54.368 UTC
interface MgmtEth0/RP0/CPU0/0
 ipv4 address 10.58.227.183 255.255.255.0
!
```

You can also use the **show interfaces summary** and **show interfaces brief** commands in the Cisco IOS XR EXEC mode to verify the management interface status.

- The following example shows sample output from the **show interfaces summary** command.

```
RP/0/RP0/CPU0:ios# show interfaces summary
Sun Nov 15 19:31:46.469 UTC
```

```
Interface Type          Total    UP       Down     Admin Down
--------------          -----    --       ----     ----------
ALL TYPES               2        2        0        0
--------------
IFT_ETHERNET            1        1        0        0
IFT_NULL                1        1        0        0
```

- The following example shows sample output from the **show interfaces brief** command.

```
RP/0/RP0/CPU0:ios# show interfaces brief
Sun Nov 15 19:31:41.806 UTC

               Intf       Intf        LineP              Encap  MTU        BW
               Name       State       State               Type (byte)    (Kbps)
--------------------------------------------------------------------------------
                Nu0          up          up               Null  1500          0
     Mg0/RP0/CPU0/0          up          up               ARPA  1514     100000
```

Step 2 When the line protocol is down, you must verify the Layer 3 connectivity. You can perform the following steps.

a) Check the Ethernet cable connection and physical connectivity of the NCS 1002 to get the line protocol up.
b) Ensure ARP connectivity.
c) Use the **ping** command to check reachability and network connectivity on the IP network.
d) Verify the static IP and default gateway configuration.

Troubleshooting Slice Provisioning

Step 1 **show hw-module slice** *slicenumber*

Displays details of the slice provisioning.

Example:

```
RP/0/RP0/CPU0:ios# show hw-module slice 3
Fri Nov  6 10:12:16.684 UTC
Slice ID:               3
Status:                 Provisioning Failed [ETNA Config Failure]
Client Bitrate:         100
Trunk Bitrate:          100
```

In the above example, the slice provisioning has failed because of an ETNA configuration failure.

Some of the failure reasons that can appear in the command output are:

- CFG INIT Config Failure—Indicates DP FPGA download issue.
- PPM Config Failure—Indicates PPM Driver failure.
- CDR Config Failure—Indicates CDR failure.
- ETNA Config Failure—Indicates ETNA device or programming failure.
- DP FPGA Config Failure—Indicates DP FPGA programming failure.

Step 2 **upgrade hw-module slice** *slice_number* **re-provision**

Reprovisions the slice.

Step 3 Reload the Cisco IOS-XR if reprovisioning the slice does not work.

Troubleshooting Environmental Parameters

Some of the common environmental problems are listed below.

- Fan failure
- Fan not detected
- Fan speed problem
- Power module fails
- Power module not detected
- Temperature of the device exceeds a threshold value
- Voltage of the device exceeds a threshold value

Step 1 **admin**

Enters system admin EXEC mode.

Example:

```
RP/0/RP0/CPU0:ios# admin
```

Step 2 **show environment** [**all** | **fan** | **power** | **voltages** | **current** | **temperatures**] [**location** | *location*]

Displays the environmental parameters of the NCS 1002.

Example:

The following example shows sample output from the **show environment** command with the **fan** keyword.

```
sysadmin-vm:0_RP0# show environment fan
Wed Nov  11 02:04:58.161 UTC
=====================================
                        Fan speed (rpm)
Location     FRU Type           FAN_0
-------------------------------------
0/FT0        NCS1K-FTA           4800
0/FT1        NCS1K-FTA           4800
0/FT2        NCS1K-FTA           4680
0/PM1        NCS1K-2KW-AC        8064
```

The table below lists the temperature threshold values for the different fan speeds.

Fan speed (rpm)	Rising Min Temperature (°C)	Rising Max Temperature (°C)	Falling Max Temperature (°C)	Falling Min Temperature (°C)
4800	-127	28	27	-127
5500	29	30	29	28
8500	31	36	35	30
10500	37	41	40	36
12500	42	44	43	41
14500	45	127	127	44

The following example shows sample output from the **show environment** command with the **temperatures** keyword.

```
sysadmin-vm:0_RP0# show environment temperatures location 0/RP0
Tue Feb  27 10:32:38.967 UTC
================================================================================
Location  TEMPERATURE                 Value   Crit Major Minor Minor Major  Crit
                      Sensor         (deg C)   (Lo) (Lo)   (Lo)   (Hi)   (Hi)   (Hi)
--------------------------------------------------------------------------------
0/RP0
              Thermistor 1              27    -10     0      0     55     55     85
              Thermistor 2              28    -10     0      0     55     55     85
             Hot Spot Temperature       26    -10     0      0     55     55     85
```

The following example shows sample output from the **show environment** command with the **power** keyword.

```
sysadmin-vm:0_RP0# show environment power
Tue Feb  13 15:29:54.827 UTC
================================================================================
CHASSIS LEVEL POWER INFO: 0
================================================================================
   Total output power capacity (Group 0 + Group 1) :       0W +    2000W
   Total output power required                     :     225W
   Total power input                               :     895W
   Total power output                              :     833W

Power Group 1:
================================================================================
   Power       Supply     ------Input----   ------Output---      Status
   Module      Type        Volts     Amps    Volts     Amps
================================================================================
   0/PM1       2kW-AC      229.5      3.9     12.0     69.4    OK

Total of Power Group 1:        895W/  3.9A       833W/ 69.4A

================================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
================================================================================
   0/0          S-L-NCS1K-P0           70           -       RESERVED
   0/RP0        NCS1002--RP            35           -       ON
   0/FT0        NCS1K-FTA              40           -       ON
   0/FT1        NCS1K-FTA              40           -       ON
   0/FT2        NCS1K-FTA              40           -       ON
```

The following example shows sample output from the **show environment** command with the **voltages** keyword.

```
sysadmin-vm:0_RP0# show environment voltages location 0/RP0
Thu Aug  6  09:35:09.211 UTC
================================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                     (mV)    (Lo) (Lo)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/RP0
        ! VP1P0_CPU                   1200    900   950  1050  1100
        ! CPU_CORE_VCC               1200    900   950  1050  1100
        ! CPU_CORE_VNN               1200    900   950  1050  1100
        ! VP1P1                      1200    990  1050  1160  1210
          VP1P2                      1200   1080  1140  1260  1320
        ! VP1P35_DDR                 1200   1220  1280  1420  1490
        ! VP1P35                     1200   1220  1280  1420  1490
        ! VP1P5                      1200   1350  1430  1580  1650
        ! VP1P8_CPU                  1200   1620  1710  1890  1980
        ! VP3P3_STBY                 1200   2970  3140  3470  3630
        ! VP3P3                      1200   2970  3140  3470  3630
        ! VP5P0                      1200   4500  4750  5250  5500
        ! VP12P0                     1200  10800 11400 12600 13200
        ! VREF                       1200   2430  2570  2840  2970
        ! 12V Input Voltage          1200   8000 10000 14000 16000
```

Step 3 **show inventory**

Displays inventory information for all the physical entities of the NCS 1002.

```
RP/0/RP0/CPU0:ios# show inventory
RP/0/RP0/CPU0:ios#show inventory
Fri May 18 10:46:51.323 UTC
NAME: "0/0", DESCR: "Network Convergence System 1002 20 QSFP28/QSFP+ slots"
PID: NCS1002-K9        , VID: V03, SN: CAT2116B170

NAME: "0/0-Optics0/0/0/1", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: SPQCELRCDFB       , VID: 01 , SN: G9I2011804

NAME: "0/0-Optics0/0/0/4", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: TR-FC13L-N00      , VID: 01 , SN: INGAJ0930306

NAME: "0/0-Optics0/0/0/6", DESCR: "Cisco CFP2 DWDM Pluggable Optics"
PID: ONS-CFP2-WDM      , VID: V01 , SN: OUK1936006S

NAME: "0/0-Optics0/0/0/7", DESCR: "Cisco 4x10GE QSFP+ LR-S Pluggable Optics Module"
PID: QSFP-4X10G-LR-S   , VID: V02 , SN: INL20410069

NAME: "0/0-Optics0/0/0/8-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC1907074R

NAME: "0/0-Optics0/0/0/9", DESCR: "Cisco 40GE QSFP+ SR4 Pluggable Optics Module"
PID: QSFP-40G-SR4      , VID: V03 , SN: JFQ20332088

NAME: "0/0-Optics0/0/0/10", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: SPQCELRCDFB       , VID: 01 , SN: GAV2008935

NAME: "0/0-Optics0/0/0/11-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC190707YP

NAME: "0/0-Optics0/0/0/17-LANE1", DESCR: "Cisco 10G SFP SR Pluggable Optics Module"
PID: SFP-10G-SR        , VID: V03 , SN: JUR1904073P

NAME: "0/0-Optics0/0/0/18", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: FTLC1151RDPL      , VID: A0 , SN: UVE1C6C

NAME: "0/0-Optics0/0/0/19", DESCR: "Cisco CFP2 DWDM Pluggable Optics"
PID: ONS-CFP2-WDM      , VID: V05 , SN: OVE204404PA
```

```
NAME: "0/0-Optics0/0/0/21", DESCR: "Cisco 4x10GE QSFP+ LR-S Pluggable Optics Module"
PID: QSFP-4x10G-LR-S   , VID: V01 , SN: INL20200012

NAME: "0/0-Optics0/0/0/22-LANE1", DESCR: "Cisco 10G SFP LR Pluggable Optics Module"
PID: SFP-10G-LR        , VID: V01 , SN: SPC190707YS

NAME: "0/0-Optics0/0/0/23", DESCR: "Cisco 40GE QSFP+ SR4 Pluggable Optics Module"
PID: QSFP-40G-SR4      , VID: V03 , SN: JFQ2033201H

NAME: "0/0-Optics0/0/0/24", DESCR: "Non-Cisco QSFP28 100G LR4 Pluggable Optics Module"
PID: FTLC1151RDPL      , VID: A0 , SN: UWD2QMM

NAME: "0/0-Optics0/0/0/25-LANE1", DESCR: "Cisco 10G SFP ER Pluggable Optics Module"
PID: SFP-10G-ER        , VID: V02 , SN: ONT213100BW

NAME: "0/RP0", DESCR: "Network Convergence System 1000 Controller"
PID: NCS1K-CNTLR       , VID: V04, SN: CAT2052B0FZ

NAME: "Rack 0", DESCR: "Network Convergence System 1002 20 QSFP28/QSFP+ slots"
PID: NCS1002-K9        , VID: V03, SN: CAT2116B170

NAME: "0/FT0", DESCR: "Network Convergence System 1000 Fan"
PID: NCS1K-FTA         , VID: V01, SN: N/A

NAME: "0/FT1", DESCR: "Network Convergence System 1000 Fan"
PID: NCS1K-FTA         , VID: V01, SN: N/A

NAME: "0/FT2", DESCR: "Network Convergence System 1000 Fan"
PID: NCS1K-FTA         , VID: V01, SN: N/A

NAME: "0/PM0", DESCR: "Network Convergence System 1000 2KW AC PSU"
PID: NCS1K-2KW-AC      , VID: V01, SN: POG2041J0BW

NAME: "0/PM1", DESCR: "Network Convergence System 1000 2KW AC PSU"
PID: NCS1K-2KW-AC      , VID: V01, SN: POG2041J01C
```

What to do next

Environment parameter anomalies are logged in the syslog. Hence, if an environment parameter displayed in the **show environment** command output is not as expected, check the syslog using the **show logging** command. The syslog provides details on any logged problems.

Troubleshooting Firmware Upgrade Failure

Step 1 **show hw-module fpd**

Verify the firmware version. Displays the firmware information of various hardware components of the NCS 1002.

The following example is for Release 6.0.1:

Example:

```
  RP/0/RP0/CPU0:ios# show hw-module fpd
Tue Apr 12 09:04:14.935 UTC
FPD Versions
=================
```

```
Location Card type HWver FPD device ATR Status Running Programd
--------------------------------------------------------------------------------
0/0     NCS1002 2.4 CDSP_PORT_05        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_06        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_12        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_13        CURRENT 3.56 3.56
0/0     NCS1002     CDSP_PORT_19        UPGD FAIL
0/0     NCS1002 2.4 CDSP_PORT_20        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_26        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_27        CURRENT 3.56 3.56
0/0     NCS1002     CFP2_PORT_05        NOT READY
0/0     NCS1002 2.0 CFP2_PORT_06        CURRENT 4.38 4.38
0/0     NCS1002     CFP2_PORT_12        NOT READY
0/0     NCS1002     CFP2_PORT_13        NOT READY
0/0     NCS1002     CFP2_PORT_19        NOT READY
0/0     NCS1002 2.1 CFP2_PORT_20        CURRENT 5.19 5.19
0/0     NCS1002     CFP2_PORT_26        NOT READY
0/0     NCS1002     CFP2_PORT_27        NOT READY
0/0     NCS1002 0.1 CTRL_BKP_LOW  B     CURRENT 1.22
0/0     NCS1002 0.1 CTRL_BKP_UP   B     CURRENT 1.22
0/0     NCS1002 0.1 CTRL_FPGA_LOW       CURRENT 1.22 1.22
0/0     NCS1002 0.1 CTRL_FPGA_UP        CURRENT 1.22 1.22
0/RP0 NCS1K-CNTLR-K9 0.1 BIOS_Backup BS CURRENT 13.10
0/RP0 NCS1K-CNTLR-K9 0.1 BIOS_Primary S CURRENT 13.10 13.10
0/RP0 NCS1K-CNTLR-K9 0.1 Daisy_Duke_BKP BS CURRENT 0.15
0/RP0 NCS1K-CNTLR-K9 0.1 Daisy_Duke_FPGA S CURRENT 0.15 0.15
```

In the above output, the Status of the CDSP_PORT_19 is UPGD FAIL. For more information on the different states of the firmware, see Verifying the Firmware Version, on page 16.

Step 2 **show hw-module slice** *slice_number*

Displays the slice and Datapath FPGA (DP FPGA) information of the NCS 1002.

The following example is for Release 6.0.1:

Example:

```
  RP/0/RP0/CPU0:ios# show hw-module slice 2
Tue Apr 12 09:09:24.527 UTC
Slice ID: 2
Status: Provisioned
Client Bitrate: 40
Trunk Bitrate: 200
DP FPGA Version: F-203
HW Status: CURRENT

Client Port - Trunk Port CoherentDSP0/0/0/20
Traffic Split Percentage

FortyGigECtrlr0/0/0/14 100
FortyGigECtrlr0/0/0/15 100
FortyGigECtrlr0/0/0/16 100
FortyGigECtrlr0/0/0/17 100
FortyGigECtrlr0/0/0/18 100
```

In the above output, DP FPGA Version indicates the image of the datapath FPGA. Here, F-203 is the image version of the 40 G image. The CURRENT value of the HW Status parameter indicates that the firmware version is the latest.

T indicates 10 G and H indicates 100 G image versions. If Need UPG appears in the output, you must upgrade the slice to get the updated DP FPGA using the **upgrade hw-module slice** *slice_number* **re-provision** command.

What to do next

Upgrade the required firmware by using the **upgrade hw-module location 0/0 fpd** *fpd_device_name* command or update all the FPDs using the **upgrade hw-module location all fpd** *fpd_device_name* command in the Cisco IOS XR EXEC mode. After an upgrade is completed, the Status column shows RLOAD REQ if the ISO image requires reload.

If Reload is Required

If the FPGA location is 0/RP0, use the **admin hw-module location 0/RP0 reload** command. This command reboots only the CPU. Hence, the traffic is not impacted. If the FPGA location is 0/0, use the **admin hw-module location all reload** command. This command reboots the chassis. Hence, the traffic is impacted. After the reload is completed, the new FPGA runs the current version.

Verifying the Firmware Version

The firmware on various hardware components of the NCS 1002 must be compatible with the installed Cisco IOS XR image. Incompatibility might cause the NCS 1002 to malfunction.

Step 1 **show hw-module fpd**

Verify the firmware version. Displays the firmware information of various hardware components of the NCS 1002.

In Release 6.0.1, the following example displays the firmware information of various hardware components of the NCS 1002.

Example:

```
  RP/0/RP0/CPU0:ios# show hw-module fpd
Tue Apr 12 09:04:14.935 UTC
FPD Versions
=================
Location Card type HWver FPD device ATR Status Running Programd
--------------------------------------------------------------------------------
0/0     NCS1002 2.4 CDSP_PORT_05        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_06        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_12        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_13        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_19        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_20        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_26        CURRENT 3.56 3.56
0/0     NCS1002 2.4 CDSP_PORT_27        CURRENT 3.56 3.56
0/0     NCS1002     CFP2_PORT_05        NOT READY
0/0     NCS1002 2.0 CFP2_PORT_06        CURRENT 4.38 4.38
0/0     NCS1002     CFP2_PORT_12        NOT READY
0/0     NCS1002     CFP2_PORT_13        NOT READY
0/0     NCS1002     CFP2_PORT_19        NOT READY
0/0     NCS1002 2.1 CFP2_PORT_20        CURRENT 5.19 5.19
0/0     NCS1002     CFP2_PORT_26        NOT READY
0/0     NCS1002     CFP2_PORT_27        NOT READY
0/0     NCS1002 0.1 CTRL_BKP_LOW  B     CURRENT 1.22
0/0     NCS1002 0.1 CTRL_BKP_UP   B     CURRENT 1.22
0/0     NCS1002 0.1 CTRL_FPGA_LOW       CURRENT 1.22 1.22
```

```
0/0     NCS1002 0.1 CTRL_FPGA_UP        CURRENT 1.22 1.22
0/RP0 NCS1K-CNTLR-K9 0.1 BIOS_Backup BS CURRENT 13.10
0/RP0 NCS1K-CNTLR-K9 0.1 BIOS_Primary S CURRENT 13.10 13.10
0/RP0 NCS1K-CNTLR-K9 0.1 Daisy_Duke_BKP BS CURRENT 0.15
0/RP0 NCS1K-CNTLR-K9 0.1 Daisy_Duke_FPGA S CURRENT 0.15 0.15
```

In the above output, some of the significant fields are:

- FPD Device—Name of the hardware component such as FPD, CFP, and so on.
- ATR—Attribute of the hardware component. Some of the attributes are:
  - B—Backup Image
  - S—Secure Image
  - P—Protected Image
- Status—Upgrade status of the firmware. The different states are:
  - CURRENT—The firmware version is the latest version.
  - READY—The firmware of the FPD is ready for an upgrade.
  - NOT READY—The firmware of the FPD is not ready for an upgrade.
  - NEED UPGD—A newer firmware version is available in the installed image. It is recommended that an upgrade be performed.
  - RLOAD REQ—The upgrade has been completed, and the ISO image requires a reload.
  - UPGD DONE—The firmware upgrade is successful.
  - UPGD FAIL—The firmware upgrade has failed.
  - BACK IMG—The firmware is corrupted. Reinstall the firmware.
  - UPGD SKIP—The upgrade has been skipped because the installed firmware version is higher than the one available in the image.
- Running—Current version of the firmware running on the FPD.

Note CFP2 upgrade is not supported in 6.0.

Step 2 **show hw-module slice** *slice_number*

Displays the slice and Datapath FPGA (DP-FPGA) information of the NCS 1002.

In Release 6.0.1, the following example displays the slice and DP-FPGA of the NCS 1002.

Example:

```
  RP/0/RP0/CPU0:ios# show hw-module slice 2
Tue Apr 12 09:09:24.527 UTC
Slice ID: 2
Status: Provisioned
Client Bitrate: 40
Trunk Bitrate: 200
DP FPGA Version: F-203
HW Status: CURRENT
```

```
Client Port - Trunk Port CoherentDSP0/0/0/20
Traffic Split Percentage

FortyGigECtrlr0/0/0/14 100
FortyGigECtrlr0/0/0/15 100
FortyGigECtrlr0/0/0/16 100
FortyGigECtrlr0/0/0/17 100
FortyGigECtrlr0/0/0/18 100
```

In the above output, DP FPGA Version indicates the image of the datapath FPGA. Here, F-203 is the image version of the 40 G image. The CURRENT value of the HW Status parameter indicates that the firmware version is the latest.

T indicates 10 G and H indicates 100 G image versions. If Need UPG appears in the output, you must upgrade the slice to get the updated DP FPGA using the **upgrade hw-module slice** *slice_number* **re-provision** command.

The different Status are:

- Provisioned—Indicates slice is provisioned
- Provisioning in progress—Indicates slice provisioning is in progress
- Not provisioned—Indicates slice is not provisioned
- Provisioning Failed—Indicates slice provisioning has failed. For more information, see Troubleshooting Slice Provisioning, on page 10.

Troubleshooting Optical Connectivity

The following topics are discussed:

Using Loopbacks

Use loopbacks to test newly created circuits before running live traffic or to logically locate the source of a network failure.

Note Internal and line loopback modes are supported only on 10 G client Ethernet and trunk Coherent DSP ports.

Line loopback

A line loopback tests the line interface unit (LIU) of the device, the electrical interface assembly (EIA), and related cabling. After applying a line loopback on a port, use a test set to run traffic over the loopback. A successful line loopback isolates the LIU, the EIA, or the cabling plant as the potential cause of a network problem. You can verify issues related to the fiber and pluggables using this loopback.

Internal loopback

An internal loopback tests the data path as it passes through various components of the device and loops back. After applying an internal loopback on a port, use a test set to run traffic over the loopback. You can verify issues related to the programming of the device using this loopback.

You can use loopback to troubleshoot some of the following problems in the client or trunk ports.

- No incoming traffic
- Link is down
- Incoming cyclic redundancy check (CRC) errors
- No outgoing traffic
- LOS at the trunk port

For 10 G mode, individual ports can be put in loopback (internal or line) on a per lane basis by applying the corresponding configuration on the 10G controller.

Before you begin

To create a loopback on a port, the port must be in the maintenance administrative state.

Step 1 **configure**

Enters the configuration mode.

Example:

```
RP/0/RP0/CPU0:ios# configure
```

Step 2 **controller** *controllertype R/S/I/P*

Enters the Ethernet controller configuration mode.

Example:

```
RP/0/RP0/CPU0:ios(config)# controller TenGigECtrlr 0/0/0/11/1
```

Step 3 **sec-admin-state maintenance**

Configures the Ethernet controller in the maintenance administrative state.

Example:

```
RP/0/RP0/CPU0:ios(config-eth-ctrlr)# sec-admin-state maintenance
```

Step 4 **commit**

Saves the configuration changes and remains within the configuration session.

Example:

```
RP/0/RP0/CPU0:ios(config-eth-ctrlr)# commit
```

Step 5 You can configure either terminal (internal) loopback or facility (line) loopback.

a) **loopback internal**

Configures internal loopback.

Example:

```
RP/0/RP0/CPU0:ios(config-eth-ctrlr)# loopback internal
```

b) **loopback line**

Configures line loopback.

Example:

```
RP/0/RP0/CPU0:ios(config-eth-ctrlr)# loopback line
```

Step 6 **commit**

Saves the configuration changes and remains within the configuration session.

Example:

```
RP/0/RP0/CPU0:ios(config-eth-ctrlr)# commit
```

Step 7 You can verify the internal or line loopback configuration using the following show commands.

a) **show controllers** *controllertype R/S/I/P*

Displays status and configuration information about the controller.

Note In the maintenance mode, all alarms are suppressed and the **show alarms** command will not show the alarms details. Use the **show controllers** *controllertype R/S/I/P* to view the client and trunk alarms.

Example:

The following example shows the line loopback configured on the Ethernet controller.

```
RP/0/RP0/CPU0:ios# show controllers TenGigECtrlr 0/0/0/1/1
Tue Dec  1 19:19:47.620 UTC
Operational data for interface TenGigECtrlr0/0/0/1/1:

State:
    Administrative state: enabled
    Operational state: Down (Reason: State undefined)
    LED state: Red On
    Maintenance: Enabled
    AINS Soak: None
    Laser Squelch: Disabled
Phy:
    Media type: Not known
    Alarms:
        Current:
            Loss of Frequency Sync Data
Autonegotiation disabled.
Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: Line
    Inter-packet gap: standard (12)
```

b) **show running-config**

Displays the NCS 1002 configuration.

Example:

```
RP/0/RP0/CPU0:ios# show running-config
...
<snip>
controller TenGigECtrlr0/0/0/1/1
 loopback line
 sec-admin-state maintenance
```

```
...
<snip>
```

Using Link Layer Discovery Protocol Snooping

LLDP snooping is enabled on the Ethernet controllers when you provision the controllers. You can use LLDP snooping to troubleshoot problems in the client ports. For example, to verify the far end device connected to the client interface. You can troubleshoot connectivity issues using LLDP snooping using the following procedure.

show controllers *controller* **lldp-snoop**

Displays the MAC address. Verify that the MAC address displayed is same as the MAC address of the traffic generating port. In Release 6.0.1, you can view more details about the LLDP neighbor.

Example:

```
RP/0/RP0/CPU0:ios# show controllers fortyGigECtrlr 0/0/0/7 lldp-snoop
Thu Aug  30 02:47:18.208 UTC

         LLDP Neighbor Snoop Data
-----------------------------------------------
Capability codes:
        (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
        (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Local Controller:     fortyGigECtrlr0/0/0/7

Source MAC Address:   0010.9400.0001

Chassis ID:           192.0.2.2

Port ID:              0010.9400.0001

Port Description:     Spirent Port

System Name:          not advertised

System Description:   Spirent Test Center

Hold Time(TTL):       99 seconds

System Capabilities:  N/A

Enabled Capabilities: N/A

Management Address:   not advertised

LLDP Packet Drop      FALSE
enabled:

RX LLDP Packet        88
Count:

RP/0/RP0/CP0:         ios#
```

Using Trail Trace Identifier

A Trail Trace Identifier (TTI) is used for verifying the optical connection on the trunk side.

Use the following procedure to configure and verify the TTI.

Step 1 **controller coherentDSP** *R/S/I/P* **tti** {**sent** | **expected**} **ascii** *string*

Configures the transmit and expected TTI strings. The ASCII text string can be a maximum of 64 characters. The TTI string has to be configured on both the trunk ports that are inter-connected to each other. If a pattern mismatch occurs, a TIM alarm is raised.

Note Source Access Point Identifier (SAPI), Destination Access Point Identifier (DAPI), and operator inputs are not supported.

Example:

```
RP/0/RP0/CPU0:ios(config)# controller coherentDSP 0/0/0/12 tti sent ascii abc
RP/0/RP0/CPU0:ios(config)# controller coherentDSP 0/0/0/12 tti expected ascii abc
```

Step 2 **show controller coherentDSP** *R/S/I/P*

Displays details of the coherent DSP controller. Verify the transmit and expected TTI strings.

Example:

```
RP/0/RP0/CPU0:ios# show controll coherentDSP 0/0/0/6
Tue Nov 17 22:57:20.724 UTC

Port                                        : CoherentDSP 0/0/0/6
Controller State                            : Down
Secondary State                             : Normal
Derived State                               : In Service
Loopback mode                               : None
BER Thresholds                              : SF = 1.0E-5  SD = 1.0E-7
Performance Monitoring                      : Enable

Alarm Information:
LOS = 2 LOF = 1 LOM = 2
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0        SF_BER = 0
SD_BER = 0      BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms                             : LOS

OTU TTI Sent
     OPERATOR SPECIFIC  ASCII               : abc
                                            :
     OPERATOR SPECIFIC HEX                  : 61626300000000000000000000000000
                                            : 00000000000000000000000000000000
OTU TTI Received
     OPERATOR SPECIFIC  ASCII               : abc
                                            :
```

```
     OPERATOR SPECIFIC HEX                      : 61626300000000000000000000000000
                                                : 00000000000000000000000000000000
OTU TTI Expected
     OPERATOR SPECIFIC  ASCII                   : abc
                                                :
     OPERATOR SPECIFIC HEX                      : 61626300000000000000000000000000
                                                : 00000000000000000000000000000000
FEC mode                                        : Soft-Decision 7
Network SRLG values                             : Not Configured
```

Step 3 **show alarms brief card location** *R/S/I/P* **active**

Displays details of the alarms in brief. Verify the transmit and expected TTI strings.

Example:

```
RP/0/RP0/CPU0:ios# show alarms brief card location 0/RP0/CPU0 active
Sat Feb 17 11:45:24.590 UTC

------------------------------------------------------------------------------
Active Alarms
------------------------------------------------------------------------------
Location Severity Group   Set Time             Description



------------------------------------------------------------------------------


  0/0       Minor    OTN    02/17/2015 11:44:22  CoherentDSP0/0/0/13 - Section Monitoring Trail Trace
 Indentifier Mismatch
```

What to do next

1. If the transmit or expected string was changed, restore the original string.
2. Use a loopback. For more information, see Using Loopbacks, on page 18.

Troubleshooting the Trunk Port

Step 1 **show controller coherentDSP** *R/S/I/P*

Displays details of the coherent DSP controller.

Example:

```
RP/0/RP0/CPU0:ios# show controller coherentDSP 0/0/0/6
Tue Nov 17 22:57:20.724 UTC

Port                                            : CoherentDSP 0/0/0/6
Controller State                                : Down
Secondary State                                 : Normal
Derived State                                   : In Service
Loopback mode                                   : None
BER Thresholds                                  : SF = 1.0E-5  SD = 1.0E-7
```

```
Performance Monitoring                          : Enable

Alarm Information:
LOS = 2 LOF = 1 LOM = 2
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0        SF_BER = 0
SD_BER = 0      BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms                                 : LOS

OTU TTI Sent
     OPERATOR SPECIFIC  ASCII                   :
                                                :
     OPERATOR SPECIFIC HEX                      : 00000000000000000000000000000000
                                                : 00000000000000000000000000000000
OTU TTI Expected
     OPERATOR SPECIFIC  ASCII                   :
                                                :
     OPERATOR SPECIFIC HEX                      : 00000000000000000000000000000000
                                                : 00000000000000000000000000000000
FEC mode                                        : Soft-Decision 7
Network SRLG values                             : Not Configured
```

In the above output, you can verify the state of the controller and also verify the alarms related to the trunk port.

Step 2 **show controller optics** *R/S/I/P*

Displays details of the optics controller.

Example:

```
RP/0/RP0/CPU0:ios# show controller optics  0/0/0/6
Tue Nov 17 22:54:38.244 UTC
 Controller State: Down
 Transport Admin State: In Service
 Laser State: On
 LED State: Red
 Optics Status
         Optics Type:  DWDM optics
         DWDM Carrier Info: C-Band, MSA ITU Channel=69, Frequency=192.70THz,
         Wavelength=1555.747nm
         Alarm Status:
         -------------
         Detected Alarms: None
         LOS/LOL/Fault Status:
         ---------------------
         Detected LOS/LOL/FAULT: None

         Alarm Statistics:
         HIGH-RX-PWR = 1            LOW-RX-PWR = 0
         HIGH-TX-PWR = 0            LOW-TX-PWR = 2
         HIGH-LBC = 5               HIGH-DGD = 0
         OOR-CD = 0                 OSNR = 0
         WVL-OOL = 0
         Laser Bias Current = 3.0 %
         Actual TX Power = -0.76 dBm
         RX Power = -40.00 dBm

<truncated>
         Chromatic Dispersion 65 ps/nm
         Configured CD-MIN -70000 ps/nm  CD-MAX 70000 ps/nm
         Second Order Polarization Mode Dispersion = 259.00 ps^2
         Optical Signal to Noise Ratio = 29.50 dB
         Polarization Dependent Loss = 0.00 dB
```

```
Polarization Change Rate = 3.00 rad/s
Differential Group Delay = 7.30 ps
```

In the above output, you can verify the state of the controller, LED state, wavelength, TX power, RX power, OSNR, and the alarms.

Step 3 If there is an LOS alarm on the trunk port:

a) Verify the fiber continuity to the port of the NCS 1002 and fix the fiber connection.

b) Verify the wavelength and the channel mapping of the optics controllers. For more information, see Verifying Wavelength and Channel Mapping for Optics Controllers, on page 28.

What to do next

1. Verify the performance monitoring parameters of the Optics, and coherent DSP controllers. For more information, see Verifying the Performance Monitoring Parameters of Controllers, on page 29.
2. Use loopbacks. For more information, see Using Loopbacks, on page 18.
3. Use TTI. For more information, see Using Trail Trace Identifier, on page 22.

Troubleshooting Breakout Ports

The client port can be enabled in normal mode or breakout mode. When the client bit rate is 10G, the mode is breakout mode. You must map a lane to a 10G port.

Before you begin

All the five client ports of the slice need to be configured with the same bit rate.

Step 1 **show controllers optics** *R/S/I/P* **pm current 15-min optics** *lanenumber*

Displays the PM data for the optics controller.

In the following example, Lane 1 is monitored within the Optics 0/1/0/0 corresponding to the 10G Ethernet controller 0/1/0/0/1.

Example:

```
RP/0/RP0:ios# show controllers optics 0/1/0/0 pm current 15-min optics 1
Tue Feb 10 14:59:06.945 UTC
Optics in the current interval {14:45:00 - 14:59:05 Tue Feb 15 2015]

Optics current bucket type : Valid
          MIN     AVG     MAX     Threshold(Min)  TCA(enable)  Threshold(Max)  TCA(enable)

LBC[mA] : 735     735     735     0               NO           0               NO
OPT[dBm]:-1.23   -1.23   -1.23    2.5             NO           3.5             NO
OPR[dBm]:-1.07   -1.07   -1.07   -23.98           NO          -7.5             NO
```

In the following example, Lane 2 is monitored within the Optics 0/1/0/0 corresponding to the 10G Ethernet controller 0/1/0/0/2.

```
RP/0/RP0:ios# show controllers optics 0/1/0/0 pm current 15-min optics 2
Tue Feb 10 14:59:10.936 UTC
Optics in the current interval {14:45:00 - 14:59:11 Tue Feb 15 2015]

Optics current bucket type : Valid
          MIN     AVG    MAX    Threshold(Min) TCA(enable) Threshold(Max) TCA(enable)

LBC[mA] : 770     770    770    0              NO           0             NO
OPT[dBm]:-1.25   -1.25  -1.25   2.5            NO          3.5            NO
OPR[dBm]:-1.41   -1.41  -1.41  -23.98          NO         -7.5            NO
```

Step 2 **show controllers optics***R/S/I/P*

Displays details about the optics controller.

In the following example, you can view the parameters for each lane of the Optics 0/2/0/0 controller.

Example:

```
RP/0/RP0/CPU0:ios# show controllers optics 0/2/0/0
Tue Feb 13 15:35:34.051 UTC
optics: Driver is not sending wave channel number and grey wavelength.
Controller State: Administratively Down
Transport Admin State: Out Of Service
Laser State: Off
LED State: Off
Optics Status
Optics Type: Grey optics
Alarm Status:
Detected Alarms: None
LOS/LOL/Fault Status:
Detected LOS/LOL/FAULT: None
Alarm Statistics:
HIGH-RX-PWR = 0 LOW-RX-PWR = 0
HIGH-TX-PWR = 0 LOW-TX-PWR = 0
HIGH-LBC = 0
Performance Monitoring: Enable
Rx Low Threshold = -12.0 dBm
Rx High Threshold = 4.9 dBm
Tx Low Threshold = -10.1 dBm
Tx High Threshold = 3.5 dBm
Configured Tx Power = 0.00 dBm
LBC High Threshold = 98 percentage
Polarization parameters not supported by optics
Network SRLG values:
Not Configured
Lane Laser Bias TX Power RX Power
---- ---------- ---------- ----------
1 18.9 % -1.04 dBm -7.44 dBm
2 19.2 % -1.05 dBm -10.84 dBm
3 24.3 % -1.16 dBm -8.45 dBm
4 19.3 % -1.09 dBm -10.50 dBm
```

Step 3 **show tech-support ncs1k**

Collects the output logs.

What to do next

Verify the PM parameters of the Ethernet Controller. For more information on these parameters, see Verifying the Performance Monitoring Parameters of Controllers, on page 29.

Troubleshooting Breakout Patch Panel

Step 1 **show tech-support ncs1k**

Collects the output logs to troubleshoot breakout patch panel.

Step 2 Collect the logs of the following files to troubleshoot breakout patch panel. These files are present under XR bash prompt.

/var/log/pp_srv.log and **/var/log/pp_client.log**

Troubleshooting a Failed Commit Configuration

Use the following command to troubleshoot a configuration failure.

1. **Solution** Use the **show configuration failed** command to get information on why the configuration failed.

```
RP/0/RP0/CPU0:ios(config)# show configuration failed
Wed Dec  9 06:05:39.694 UTC
!! SEMANTIC ERRORS: This configuration was rejected by
!! the system due to semantic errors. The individual
!! errors with each failed configuration command can be
!! found below.


controller Optics0/0/0/13
 dwdm-carrier 100MHz-grid frequency 1911500
!!% Invalid argument: Wavelength change is allowed only in shutdown or maintenance state
!
end
```

Removing and Re-inserting DIMMs on the Controller Card

There are two DIMMs on the controller card (NCS1K-CNTLR=). If one DIMM is displaced, BIOS will boot; however, Cisco IOS XR does not boot due to insufficient memory. If both DIMMs are displaced, BIOS will not boot. In both the scenarios, it is recommended to remove and re-insert DIMMs on the controller card.

Before you begin

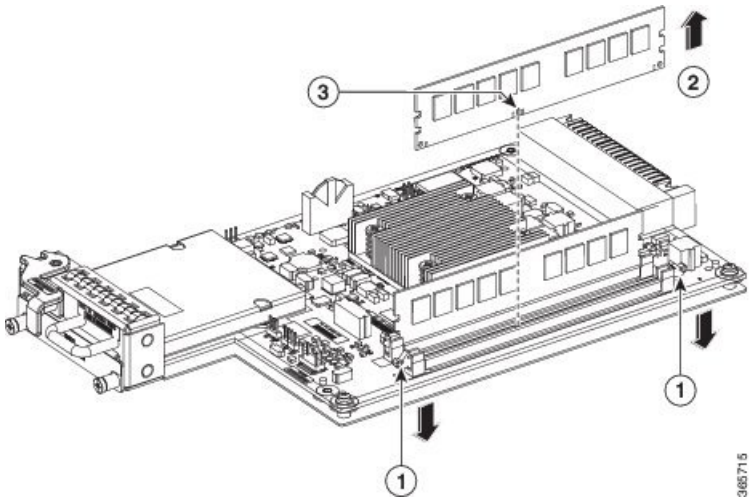
Follow the standard electrostatic discharge (ESD) rules according to local site practice before replacing DIMMs.

Step 1 Remove DIMMs - Push the connector latches down.

Step 2 Re-insert DIMMs - Push DIMM down into the connector by pressing on two points close to the far ends of DIMM.

Step 3 Verify correct insertion - The two connector latches must be closed if DIMM has been correctly inserted. Pull DIMM up to verify.

Figure 1: Remove and Re-insert DIMMs



1	Push connector latches down
2	Pull DIMM up
3	Align when installing DIMM

Verifying Wavelength and Channel Mapping for Optics Controllers

Some of the troubleshooting scenarios where you need to verify the wavelength and channel mapping of the optics controllers are:

- Verify the connection between the NCS 1002 and a line system.
- Troubleshoot problems with the traffic.
- Clear an LOS.

show controllers optics R/S/I/P dwdm-carrrier-map

Displays the wavelength and channel mapping for optics controllers.

```
RP/0/RP0/CPU0:ios# show controllers optics 0/0/0/11 dwdm-carrrier-map
Thu Aug 27 15:59:00.385 UTC
DWDM Carrier Band:: C-Band
MSA ITU channel range supported: 1~97
DWDM Carrier Map table
-----------------------------------------------------
ITU Ch G.694.1 Frequency Wavelength
Num Ch Num (THz) (nm)
-----------------------------------------------------
1 60 196.10 1528.773
-----------------------------------------------------
2 59 196.05 1529.163
-----------------------------------------------------
3 58 196.00 1529.553
-----------------------------------------------------
4 57 195.95 1529.944
-----------------------------------------------------
5 56 195.90 1530.334
-----------------------------------------------------
6 55 195.85 1530.725
-----------------------------------------------------
7 54 195.80 1531.116
-----------------------------------------------------
8 53 195.75 1531.507
-----------------------------------------------------
9 52 195.70 1531.898
-----------------------------------------------------
10 51 195.65 1532.290
-----------------------------------------------------
11 50 195.60 1532.681
-----------------------------------------------------
12 49 195.55 1533.073
-----------------------------------------------------
13 48 195.50 1533.465
-----------------------------------------------------
14 47 195.45 1533.858
-----------------------------------------------------
15 46 195.40 1534.250
-----------------------------------------------------
16 45 195.35 1534.643
-----------------------------------------------------
17 44 195.30 1535.036
-----------------------------------------------------
18 43 195.25 1535.429
-----------------------------------------------------
19 42 195.20 1535.822
-----------------------------------------------------
20 41 195.15 1536.216
-----------------------------------------------------
<snip>
```

Verifying the Performance Monitoring Parameters of Controllers

Performance monitoring (PM) parameters are used by service providers to gather, store, set thresholds for, and report performance data for early detection of problems. The user can retrieve both current and historical PM counters for the various controllers in 10 seconds, 15 minutes and 1 day intervals.

show controllers *controllertype R/S/I/P* {**pm** {**current** | **history**} {**15-min** | **24-hour**} {**optics** | **ether** | **fec** | **otn**} *linenumber* }

Note For Ethernet controllers, only ingress statistics are supported.

The following sample output displays the current performance monitoring parameters of the Optics controller in 15 minute intervals.

Example:

```
RP/0/RP0:ios# show controllers optics 0/1/0/0 pm current 15-min optics 1
Tue Feb 10 14:59:06.945 UTC
Optics in the current interval {14:45:00 - 14:59:05 Tue Feb 15 2015]

Optics current bucket type : Valid
          MIN     AVG    MAX    Threshold(Min) TCA(enable) Threshold(Max) TCA(enable)

LBC[mA] : 735     735    735    0              NO           0             NO
OPT[dBm]:-1.23   -1.23  -1.23   2.5            NO          3.5            NO
OPR[dBm]:-1.07   -1.07  -1.07  -23.98          NO         -7.5            NO
```

The following sample output displays the historical performance monitoring parameters of the Ethernet controller in 24 hour intervals.

Example:

```
RP/0/RP0/CPU0:ios# show controllers HundredGigECtrlr 0/0/0/11 pm current 24-hour ether
Thu Nov 12 04:16:40.598 UTC

ETHER in the current interval [00:00:00 - 04:16:40 Thu Nov 12 2020]

ETHER current bucket type : Invalid

 RX-UTIL[%]:      98.49 Threshold : 0.00        TCA(enable) : NO

 RX-PKT :  46296223036  Threshold :   0 TCA(enable) : NO

 STAT-PKT :           0  Threshold :   0 TCA(enable) : NO

 OCTET-STAT : 60897581359118    Threshold :   0 TCA(enable) : NO

 OVERSIZE-PKT :       0  Threshold :   0 TCA(enable) : NO

 FCS-ERR :            0  Threshold :   0 TCA(enable) : NO

 LONG-FRAME :        0   Threshold :   0 TCA(enable) : NO

 JABBER-STATS :       0  Threshold :   0 TCA(enable) : NO

 64-OCTET :           0  Threshold :   0 TCA(enable) : NO

 65-127-OCTET :       0  Threshold :   0 TCA(enable) : NO

 128-255-OCTET :      0  Threshold :   0 TCA(enable) : NO

 256-511-OCTET :      0  Threshold :   0 TCA(enable) : NO
<snip>
```

The following sample output displays the current performance monitoring parameters of the coherent DSP controller in 15 minute intervals.

Example:

```
RP/0/RP0/CPU0:ios# show controllers coherentDSP 0/0/0/13 pm current 15-min otn
Thu Nov 12 04:14:50.475 UTC

g709 OTN in the current interval [ 4:00:00 - 04:14:50 Thu Nov 12 2020]

OTN current bucket type : Valid
    ES-NE   : 0         Threshold : 500      TCA(enable)  : YES
    ESR-NE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-NE  : 0         Threshold : 500      TCA(enable)  : YES
    SESR-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-NE  : 0         Threshold : 500      TCA(enable)  : YES
    BBE-NE  : 0         Threshold : 10000    TCA(enable)  : YES
    BBER-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-NE   : 0         Threshold : 10       TCA(enable)  : YES

    ES-FE   : 0         Threshold : 500      TCA(enable)  : YES
    ESR-FE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-FE  : 0         Threshold : 500      TCA(enable)  : YES
    SESR-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-FE  : 0         Threshold : 500      TCA(enable)  : YES
    BBE-FE  : 0         Threshold : 10000    TCA(enable)  : YES
    BBER-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-FE   : 0         Threshold : 10       TCA(enable)  : YES
```

The following sample output displays the current performance monitoring parameters of the coherent DSP controller for FEC in 15 minute intervals.

Example:

```
RP/0/RP0/CPU0:ios# show controllers coherentDSP 0/0/0/26 pm current 15-min fec
Thu Nov 12 01:22:48.953 UTC

g709 FEC in the current interval [ 1:15:00 - 01:22:49 Thu Nov 12 2020]

FEC current bucket type : Valid
    EC-BITS   : 619592625       Threshold : 903330         TCA(enable)  : YES
    UC-WORDS  : 0               Threshold : 5              TCA(enable)  : YES

                  MIN       AVG        MAX    Threshold  TCA     Threshold   TCA
                                               (min)    (enable)   (max)   (enable)
PreFEC BER  :  4.7E-06    6.2E-06    8.5E-06     0       NO         0       NO
PostFEC BER : <1.0E-15   <1.0E-15   <1.0E-15     0       NO         0       NO
```

Verifying and Troubleshooting Headless State Settings

NCS 1002 has a CPU that can be removed. It can carry traffic for at least 72 hours without the CPU. The functioning of the data path without CPU is termed as a headless operation.

Use the following commands to verify or troubleshoot headless state settings or hitless restart problems.

Step 1 **show hw-module slice** *slice_number* **internal**

Displays internal details of the slice and verifies if hitless restart is enabled on the slice. If hitless restart is enabled, the slice is initialized in the stateful (hitless restart) mode during the next CPU Online Insertion and Removal (OIR), or reload

operation and traffic is not impacted. If hitless restart is not enabled, the slice is initialized in the stateless mode and traffic is impacted.

Example:

```
RP/0/RP0/CPU0:ios# show hw-module slice 1 internal
Thu Nov 19 03:46:35.968 UTC
Slice ID:               1
Status:                 Provisioned
Client Bitrate:         10
Trunk Bitrate:          100

Headless Internal Information:
        State data: 0xA1B2C3D4
```

In the above example, the State data is 0xA1B2C3D4. If the value of the State data is 0xA1B2C3D4, the slice starts in the stateful mode and there is no impact on the traffic during the device CPU OIR or reload operation.

Example:

```
RP/0/RP0/CPU0:ios#show hw-module slice 1 internal
Fri Dec  4 09:52:08.823 UTC
Slice ID:               1
Status:                 Not Provisioned
Client Bitrate:         32767
Trunk Bitrate:          0
Headless Internal Information:
        State data: 0x0
```

In the above example, the State data is 0x0. Hence, the slice restarts in stateless mode.

After you provision the slice and the ports, use the above command to check if stateful mode is enabled on the slice.

The system can restart due to one of the following conditions:

- CPU OIR
- Device reload
- IOS-XR reload
- System admin reload
- mxp_driver process restart

Hitless restart or the headless functionality is enabled only if the slice is successfully provisioned. This mode is disabled if any one of the following configurations are in progress or have failed on the slice:

- **shutdown** or **no shutdown** of optics, Ethernet, or coherent DSP controllers.
- Transmit power configurations
- DWDM carrier frequency configuration
- Client and trunk loopback configurations
- FEC mode configuration
- Transmit TTI configuration
- Expected TTI configuration

During CPU OIR, or a reload operation, if a slice is initialized in the stateful mode and any datapath hardware component is not accessible, the headless feature cancels the reprovisioning of the slice to prevent any traffic impact.

Example:

```
RP/0/RP0/CPU0:ios#  show hw-module slice 0 internal
Tue Feb  9 05:24:48.075 UTC
Slice ID:               0
Status:                 Reprovisioning Aborted [DP Access Failure - hitless reload]
Client Bitrate:         10
Trunk Bitrate:          100

Headless Internal Information:
        State data: 0xA1B2C3D4
```

Step 2 **show alarm brief card location** *location* **active**

Displays active alarms. You can verify if the equipment fail alarm is raised on the slice. This alarm is raised on the slice if the slice is not in a proper state or any hardware component is not accessible.

Example:

```
RP/0/RP0/CPU0:ios#show alarms brief card location 0/RP0/CPU0 active
Fri Jan 29 06:25:06.919 UTC

------------------------------------------------------------------------------
Active Alarms
------------------------------------------------------------------------------
Location        Severity     Group            Set Time               Description


------------------------------------------------------------------------------
0/0             Critical     Slice            01/29/2016 06:23:46    Equipment Failure Slice 2


0/0             Critical     Controller       01/29/2016 05:58:28    Optics0/0/0/0 - Improper Removal
```

What to do next

Collect the output of the **show tech ncs1k detail** command if any the following conditions occur:

- Equipment fail alarm is raised.
- Stateful mode is disabled for an unknown reason.

Monitoring Headless Statistics

In the headless mode, the data path and statistics are maintained for at least 72 hours. These statistics are automatically cleared during the next reload or CPU-OIR operation.

Use this procedure to display the statistics collected during the last headless operation.

show controllers *controllertype R/S/I/P* **headless-stats**

Displays the statistics collected during the last headless operation. The collected statistics are preserved for a slice until the hardware module configuration is removed or changed on that slice.

Example:

The following example displays the statistics collected for the Ethernet controller during the last headless operation.

```
RP/0/RP0/CPU0:ios# show controllers fortyGigECtrlr 0/0/0/7 headless-stats
Thu Aug 30 06:32:58.936 UTC

Started in Stateful mode: Yes
Headless Start Time: Thu Aug 30 06:31:09 2018
Headless End   Time: Thu Aug 30 06:32:34 2018
Ethernet Headless Statistics
    RxPktsOverSized        : 0
    RxPktsBadFcs           : 0
    RxErrorJabbers         : 0
    RxPktsMulticast        : 3
    RxPktsBroadcast        : 0
    RxPktsUnicast          : 2020282144
    RxPktsUnderSized       : 0
    RxPkts                 : 2020282147
    RxBytesGood            : 387949441048
    RxPktsGood             : 2020282147
    RxRecvFragments        : 0
    RxPkts64Bytes          : 0
    RxPkts65To127Bytes     : 3
    RxPkts128to255Bytes    : 2004490979
    RxPkts256To511Bytes    : 15791165
    RxPkts512To1023Bytes   : 0
    RxPkts1024To1518Bytes  : 0
    RxTotalBytes           : 387949441096
    RxPktsDrop             : 0
    RxPause                : 0
    TxPkts                 : 2020283895
    TxTotalBytes           : 387949776554
    TxPktsUndersized       : 0
    TxPktsOversized        : 0
    TxPktsFragments        : 0
    TxPktsJabber           : 0
    TxPktsBadFcs           : 0
    TxPause                : 0
    RxLldpkts              : 3
```

The following example displays the statistics collected for the coherent DSP controller during the last headless operation.

```
RP/0/RP0/CPU0:ios# show controllers coherentDSP 0/0/0/12 headless-stats

Fri Dec 11 12:06:23.831 UTC

Started in Stateful mode: Yes
Headless Start Time: Fri Dec 11 11:21:23 2015
Headless End   Time: Fri Dec 11 11:23:59 2015
OTN Headless Statistics
    SmBip    :    0
    SmBei    :    0
    Fec EC   :    4294967295
    Fec UC   :    0
```

In the above example, the important fields are:

- Started in Stateful Mode—Indicates whether the slice corresponding to the controller port is in a stateful or stateless mode during the last CPU OIR, or reload operation.

- Headless Start Time—Time at which the NCS 1002 entered the headless mode of operation.
- Headless End Time—Time at which the NCS 1002 came out of the headless mode.
- SmBip—Section Monitoring Backward Error Indicator
- SmBei—Section Monitoring Bit Interleaved Parity
- Fec EC—Forward error correction Errors Corrected
- Fec UC—Forward Error Correction Uncorrected Words

Slices that start in the stateful mode are not reset during the last CPU OIR, or reload operation. Hence, the traffic is not interrupted on these slices. Slices that start in the stateless mode are reset. Hence, the traffic is interrupted on these slices. Slices that are successfully provisioned are in stateful mode. Headless start time and end time values are valid only if the slice corresponding to the controller is in a stateful mode.

Using SNMP for Troubleshooting

The supported MIBs in NCS 1002 are:

- CISCO-CONFIG-MAN-MIB
- CISCO-ENHANCED-MEMPOOL-MIB
- CISCO-PROCESS-MIB
- CISCO-SYSLOG-MIB
- ENTITY-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-IF-EXTENSION-MIB
- RMON-MIB
- CISCO-ENTITY-SENSOR-MIB
- CISCO-OPTICAL-MIB
- CISCO-OTN-IF-MIB
- LLDP-MIB

The CISCO-OTN-IF-MIB defines the managed objects for physical layer characteristics and the performance statistics of the OTN interfaces.

The CISCO-OPTICAL-MIB defines the managed objects for physical layer characteristics and the performance statistics of the optical interfaces.

For information on Cisco IOS XR SNMP Best Practices, see http://www.cisco.com/c/en/us/td/docs/ios_xr_sw/iosxr_r3-9-1/mib/guide/crs-gsr_appe.html.

Use the following commands in EXEC mode to verify and monitor the SNMP for network monitoring and management.

- **show snmp**—Displays the status of SNMP communications.
- **show snmp mib access**—Displays the counters per OID that indicate the number of times an operation was done on an OID.
- **show snmp mib access time**—Displays the timestamp of the last operation on an OID.
- **show snmp trace requests**—Displays a log of the high level PDU processing trace points.
- **debug snmp packet**—Displays information about every SNMP packet sent or received by the NCS 1002.
- **debug snmp requests**—Displays information about every SNMP request made by the SNMP manager.

Using Netconf for Troubleshooting

Netconf provides mechanisms to install, manipulate, and delete the configuration of network devices. The Netconf protocol provides a set of operations to manage device configurations and retrieve device state information.

Use the following commands in EXEC mode to retrieve device state information.

Before you begin

- Verify the installation of k9sec package.
- Generate the crypto key for SSH using the **crypto key generate dsa** command.

Note If you access NCS 1002 after regenerating the crypto key, you must remove the **~/.ssh/known_hosts** file as there will be a key mismatch between the host and the NCS 1002.

- Configure SSH.

```
RP/0/RP0/CPU0:ios# configure
RP/0/RP0/CPU0(config)# ssh server v2
RP/0/RP0/CPU0(config)# ssh server netconf port 830
RP/0/RP0/CPU0(config)# ssh server netconf  vrf default
```

Note Port 830 is the default Netconf port.

- Configure Netconf.

```
RP/0/RP0/CPU0:ios# configure
RP/0/RP0/CPU0(config)# netconf-yang agent ssh
```

Step 1 **show netconf-yang clients**

Displays the client details for netconf-yang.

Example:

```
RP/0/RP0/CPU0:ios# show netconf-yang clients
Tue Dec  8 07:49:14.846 UTC
Netconf clients
client session ID|     NC version|    client connect time|        last OP time|        last OP type|
    <lock>|
       1188487019|            1.1|         0d 16h 56m 50s|            01:17:13|                get|
        No|
       3445210079|            1.1|         0d 16h 56m 38s|            01:16:54|                get|
        No|
       3027026318|            1.1|         0d 16h 56m  1s|            01:16:50|                get|
        No|
       2653293062|            1.1|         0d 16h 56m 33s|            01:16:53|                get|
        No|
         96573454|            1.1|         0d 16h 56m 15s|            01:17:13|                get|
        No|
       2771481091|            1.1|         0d 16h 56m 45s|            01:17:14|                get|
        No|
```

Step 2 **show netconf-yang statistics**

Displays the statistical details for netconf-yang.

Example:

```
RP/0/RP0/CPU0:ios# show netconf-yang statistics
Tue Dec  8 07:49:45.506 UTC
Summary statistics
                         # requests|             total time|   min time per request|   max time per
 request|   avg time per request|
other                             0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
close-session                     0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
kill-session                      0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
get-schema                        0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
get                           11161|       0h  0m 48s 332ms|       0h  0m  0s   0ms|       0h  0m
0s  27ms|       0h  0m  0s   0ms|
get-config                        0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
edit-config                       0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
commit                            0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
cancel-commit                     0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
lock                              0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
unlock                            0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
discard-changes                   0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
validate                          0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
0s   0ms|       0h  0m  0s   0ms|
xml parse                     11161|       0h  0m  5s 717ms|       0h  0m  0s   0ms|       0h  0m
0s   2ms|       0h  0m  0s   0ms|
netconf processor             11161|       0h  0m 48s 332ms|       0h  0m  0s   0ms|       0h  0m
0s  27ms|       0h  0m  0s   0ms|
YFW                           11161|       0h  7m 32s 350ms|       0h  0m  0s  10ms|       0h  0m
0s  97ms|       0h  0m  0s   0ms|
pending requests                  0|       0h  0m  0s   0ms|       0h  0m  0s   0ms|       0h  0m
```

```
0s   0ms|       0h  0m  0s   0ms|
Statistics for session with ID: 1188487019
<snip>
```

Step 3 **show netconf-yang trace**

Debugs and verifies Netconf.

Example:

```
RP/0/RP0/CPU0:ios# show netconf-yang trace
Tue Dec  8 07:50:54.590 UTC
[12/08/15 07:30:37.851 UTC 1046d3 4942] TRC: nc_sm_session_find_session_id:1386 Found session 3027026318
 0x1852f68
[12/08/15 07:30:37.851 UTC 1046d4 4942] DBG: nc_sm_yfw_response_cb:2816 Received OK response for
session-id '3027026318', for message-id '856615', which has 'NO ERROR' and 'DATA'
[12/08/15 07:30:37.851 UTC 1046d5 4942] TRC: nc_sm_yfw_response_complete:2700 DATA element in chunk
 state: CONTINUE
[12/08/15 07:30:37.851 UTC 1046d6 4942] TRC: nc_pxs_send:223 SERVER->CLIENT 688 (iov: 0x1ae7bd8)
[12/08/15 07:30:37.851 UTC 1046d7 4942] TRC: nc_sm_yfw_response_handle:2638 malloc_trim called (rc
= 1)
[12/08/15 07:30:37.851 UTC 1046d8 4942] TRC: nc_sm_yfw_response_cb:2906 More responses to come for
msg id '856615'
[12/08/15 07:30:37.852 UTC 1046d9 13229] TRC: nc_px_fdout_handler:563 SSH PIPE OUTPUT cond: 0x2, fd
 129, ctx 0x60d800
[12/08/15 07:30:37.859 UTC 1046da 4942] TRC: nc_sm_session_find_session_id:1386 Found session 3027026318
 0x1852f68
[12/08/15 07:30:37.859 UTC 1046db 4942] DBG: nc_sm_yfw_response_cb:2816 Received OK response for
session-id '3027026318', for message-id '856615', which has 'NO ERROR' and 'DATA'
[12/08/15 07:30:37.859 UTC 1046dc 4942] TRC: nc_sm_yfw_response_complete:2700 DATA element in chunk
 state:
<snip>
```

Verifying Alarms

show alarms brief [**card** [**location** *location*] | **rack | system**] [**active | clients | history | stats**]]
show alarms detail [**card** [**location** *location*] | **rack | system**] [**active | clients | history | stats**]]

Displays alarms in brief or detail.

Example:

```
RP/0/RP0/CPU0:ios# show alarms brief card location 0/RP0/CPU0 active
Mon Dec 14 00:01:29.499 UTC

------------------------------------------------------------------------------
Active Alarms
------------------------------------------------------------------------------
Location        Severity     Group            Set Time               Description

------------------------------------------------------------------------------
0/0             Minor        Controller       12/10/2015 07:49:41    Optics0/0/0/0 - Optics Low
Receive Power
0/0             Critical     Controller       02/13/2001 13:34:32 Optics0/0/0/7 - Improper Removal
0/0             Critical     Controller       02/13/2001 13:34:32 Optics0/0/0/8 - Improper Removal
0/0             Critical     Controller       02/13/2001 13:34:32 Optics0/0/0/9 - Improper Removal
0/0             Critical     Controller       02/13/2001 13:34:32 Optics0/0/0/10 - Improper Removal
```

```
0/0             Critical     Controller       02/13/2001 13:34:32 Optics0/0/0/20 - Improper Removal
0/0             Major        Ethernet         02/13/2001 13:34:34 HundredGigECtrlr0/0/0/14 - Carrier
 Loss On The LAN
```

Note In the maintenance mode, all alarms are suppressed and the **show alarms** command will not show the alarms details. Use the **show controllers** *controllertype R/S/I/P* command to view the client and trunk alarms.

What to do next

For more information about alarms and steps to clear them, see the Alarm Troubleshooting.

Using Onboard Failure Logging

Onboard Failure Logging (OBFL) collects and stores boot, environmental, and critical hardware data in the nonvolatile flash memory of the CPU controller card. This information is used for troubleshooting, testing, and diagnosis if a failure or other error occurs. This data provides improved accuracy in hardware troubleshooting and root cause isolation analysis. The data collected includes field-replaceable unit (FRU) serial number, OS version, total run time, boot status, temperature and voltage at boot, temperature and voltage history, and other board specific errors.

show logging onboard {**fmea** | **inventory** | **temperature** | **uptime** | **voltage**}

Displays OBFL data.

Example:

The following example shows the uptime information.

```
sysadmin-vm:0_RP0# show logging onboard uptime
Sat Nov  28 17:53:24.796 UTC

OBFL Uptime Information For : 0/RP0
  NOTE: Read Operation in progress; Incomplete Data Displayed
       * indicates incomplete time-sync while record was written
       ! indicates time reset backwards while system was running
  ----------------------------------------------------------------------------------------
       UPTIME CARD INFORMATION
  ----------------------------------------------------------------------------------------
       Entity Name                :  Value
  ----------------------------------------------------------------------------------------
      Previous Chassis SN         : ABC_CHA_SN
      Current Chassis SN          : CHANGE-ME-
      Previous R/S/I              : 0/0/0
      Current R/S/I               : 0/0/0
      Write Interval              : 15 (min)
      First Power On TS           : 10/08/2015 06:47:10
      Last Erase TS               : --/--/---- --:--:--
      Rack Change Count           : 1
      Slot Change Count           : 4

  ----------------------------------------------------------------------------------------
       UPTIME INFORMATION
  ----------------------------------------------------------------------------------------
   Start Time Stamp     |  End Time Stamp      | Card Uptime info
   mm/dd/yyyy hh:mm:ss | mm/dd/yyyy hh:mm:ss | Weeks.Days.Hrs.Min.Sec
```

```
 --------------------------------------------------------------------------------
  11/27/2015 20:44:32 | 11/27/2015 22:11:18 | 0.0.1.26.46
  11/27/2015 22:11:18 | 11/28/2015 17:21:59 | 0.0.19.10.41
  11/28/2015 17:21:59 | 11/28/2015 17:51:59 | 0.0.0.30.0
```

Capturing Logs

Step 1 **show logging**

Displays the contents of the logging buffers. You can also view details of FPD upgrade failures.

Example:

```
RP/0/RP0/CPU0:ios# show logging
Sat Nov 28 22:12:45.450 UTC
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
    Console logging: level debugging, 2720 messages logged
    Monitor logging: level debugging, 281 messages logged
    Trap logging: level informational, 0 messages logged
    Buffer logging: level debugging, 3332 messages logged

Log Buffer (2097152 bytes):
<snip>
```

a) **logging buffered** *size*

Configures the size of the logging buffer. The range is from 2097152 to 125000000 bytes.

Example:

```
RP/0/RP0/CPU0:ios(config)#logging buffered 3000000
```

Step 2 **show tech-support** and **show tech-support ncs1k**

Creates a .tgz file that contains the dump of the configuration and show command outputs. This file provides system information for the Cisco Technical Support.

Example:

```
RP/0/RP0/CPU0:ios# show tech-support ncs1k
Fri Nov 13 17:31:23.360 UTC
++ Show tech start time: 2015-Nov-13.173123.UTC ++
Fri Nov 13 17:31:25 UTC 2015 Waiting for gathering to complete
.
Fri Nov 13 17:33:32 UTC 2015 Compressing show tech output
Show tech output available at 0/RP0/CPU0 : /harddisk:/showtech/showtech-ncs1k-2015-Nov-13.173123.UTC.tgz
```

Step 3 **show tech-support alarm-mgr**

Collects the Cisco support file for the alarm manager component.

Example:

```
RP/0/RP0/CPU0:ios#show tech-support alarm-mgr
Sat Jan 30 21:41:53.894 UTC
```

```
++ Show tech start time: 2016-Jan-30.214154.UTC ++
Sat Jan 30 21:41:56 UTC 2016 Waiting for gathering to complete
Sat Jan 30 21:44:02 UTC 2016 Compressing show tech output
Show tech output available at 0/RP0/CPU0 :
/harddisk:/showtech/showtech-alarm_mgr-2016-Jan-30.214154.UTC.tgz
++ Show tech end time: 2016-Jan-30.214402.UTC ++
```

Step 4 **show tech-support ptah**

Collects the Cisco support file for the Physical Transport Alarm Hardware (PTAH) component.

Example:

```
RP/0/RP0/CPU0:ios#show tech-support ptah file disk0:
Sat Jan 30 21:50:33.016 UTC
++ Show tech start time: 2016-Jan-30.215033.UTC ++
Sat Jan 30 21:50:35 UTC 2016 Waiting for gathering to complete
Sat Jan 30 21:52:41 UTC 2016 Compressing show tech output
Show tech output available at 0/RP0/CPU0 : /harddisk:/showtech-ptah-2016-Jan-30.215033.UTC.tgz
++ Show tech end time: 2016-Jan-30.215242.UTC ++
```

Step 5 **show proc mxp_driver | inc Job**

Captures the job ID of the mxp_driver process, which is the NCS 1002 muxponder driver process.

Example:

```
RP/0/RP0/CPU0:ios#show proc mxp_driver | inc Job
Sat Jan 30 21:46:26.584 UTC
                  Job Id: 189
```

Step 6 **show ptah trace all jid** *job_id*

Captures the interaction traces between the mxp_driver process and PTAH.

Example:

```
RP/0/RP0/CPU0:ios#show ptah trace all jid 189 location 0/RP0/CPU0 | file
disk0:show_ptah_trace_189_job.log
Sat Jan 30 21:47:29.633 UTC
[OK]
RP/0/RP0/CPU0:ios#dir disk0:
Sat Jan 30 21:47:47.661 UTC

Directory of disk0:
 8114 drwxr-xr-x 2   4096 Jan 30 00:12 ztp
   12 lrwxrwxrwx 1     12 Jan 30 00:09 config -> /misc/config
16225 drwxr-xr-x 2   4096 Jan 30 21:44 showtech
   11 drwxr-xr-x 2   4096 Jan 30 00:09 core
   23 -rwx------ 1 295238 Jan 30 21:47 show_ptah_trace_189_job.log
 8115 drwxr-xr-x 2   4096 Jan 30 01:05 nvgen_traces
 8113 drwx------ 2   4096 Jan 30 00:10 clihistory

1005620 kbytes total (935528 kbytes free)
```

What to do next

You should gather the above information before calling the Cisco Technical Assistance Center (TAC).

Verifying Process Details and Crash Dump

Step 1 **show processes**

Displays information about active processes.

Example:

The following example shows the output of the **show processes** command in the EXEC mode.

```
RP/0/RP0/CPU0:ios# show processes
!! File saved at 17:22:13 UTC Fri Nov 13 2015 by root
JID    TID  Stack  pri  state        NAME             rt_pri
1      1       0K  20   Sleeping     init             0
66449  913     0K  20   Sleeping     oom.sh           0
66470  934     0K  20   Sleeping     cgroup_oom.sh    0
66471  935     0K  20   Sleeping     oom.sh           0
66495  959     0K  0    Sleeping     cgroup_oom       0
66495  997     0K  0    Sleeping     lwm_debug_threa  0
66495  998     0K  0    Sleeping     cgroup_oom       0
<snip>
```

The following example shows the output of the **show processes** command in the system admin EXEC mode.

```
sysadmin-vm:0_RP0# show processes all location 0/rp0
Sat Nov  28 22:52:27.441 UTC
------------------------------------------------------------------------
node:      0/RP0
------------------------------------------------------------------------
LAST STARTED            STATE    RE-     MANDA-  MAINT- NAME(IID) ARGS
                                 START   TORY    MODE
------------------------------------------------------------------------
11/28/2015 17:21:29.000 Run      1                      aaad(0)
11/28/2015 17:21:32.000 Run      1                      ael_mgbl(0)
11/28/2015 17:21:29.000 Run      1       M              calv_alarm_mgr(0)
11/28/2015 17:21:29.000 Run      1       M              cm(0)
11/28/2015 17:21:29.000 Run      1       M              confd_helper(0) -t token -v -d -w 400 -b 30
 -p 600 -r 10 -f 10
11/28/2015 17:21:29.000 Run      1                      ctrl_driver(0) -i atom -u |1f10:1.0 -l
|1f11:2.0
11/28/2015 17:21:29.000 Run      1                      dd_driver(0)
<snip>
```

Step 2 **show processes** *process-name*

Displays detailed information about a process.

Example:

```
RP/0/RP0/CPU0:ios#show processes mxp_driver
Sat Feb 11 03:05:49.468 UTC
                  Job Id: 148
                     PID: 3795
         Executable path: /opt/cisco/XR/packages/ncs1k-os-support-2.0.0.0-r61101I/rp/bin/mxp_driver
              Instance #: 1
              Version ID: 00.00.0000
                 Respawn: ON
           Respawn count: 1
            Last started: Fri Feb 10 11:59:20 2017
           Process state: Run
           Package state: Normal
                    core: MAINMEM
```

```
               Max. core: 0
                   Level: 200
               Placement: None
            startup_path:
/opt/cisco/XR/packages/ncs1k-os-support-2.0.0.0-r61101I/rp/startup/mxp_driver.startup
                   Ready: 134.140s
        Process cpu time: 0.000 user, 15061.040 kernel, 15061.040 total
JID    TID  Stack  pri  state        NAME             rt_pri
148    3795    0K  20   Sleeping     Infra Agent      0
148    4176    0K  20   Sleeping     lwm_debug_threa  0
148    4177    0K  20   Sleeping     mxp_driver       0
148    4181    0K  20   Sleeping     lwm_service_thr  0
148    4182    0K  20   Sleeping     qsm_service_thr  0
148    4223    0K  20   Sleeping     mxp_driver       0
148    4351    0K  20   Sleeping     pm_ui thread     0
148    4353    0K  20   Sleeping     Infra Agent      0
148    4366    0K  20   Sleeping     Infra Agent      0
148    4378    0K  20   Sleeping     ptah_common_eve  0
148    4439    0K  20   Sleeping     async            0
148    4522    0K  20   Sleeping     Infra Agent      0
148    4543    0K  20   Sleeping     Infra Agent      0
148    4554    0K  20   Sleeping     Infra Agent      0
148    5110    0K  20   Sleeping     PrvAgt Slice 0   0
148    5111    0K  20   Sleeping     PrvAgt Slice 1   0
148    5112    0K  20   Sleeping     PrvAgt Slice 2   0
148    5113    0K  20   Sleeping     PrvAgt Slice 3   0
148    5114    0K  20   Sleeping     Fmea Agent       0
148    5115    0K  20   Sleeping     Pm Agent         0
148    5116    0K  20   Sleeping     Sw Poller Agent  0
148    5117    0K  20   Sleeping     Alarm Agent      0
148    5118    0K  20   Sleeping     Infra Agent      0
148    5119    0K  20   Sleeping     Squelch Agent    0
148    5120    0K  20   Sleeping     Dap Server       0
148    5121    0K  20   Sleeping     Infra Agent      0
148    5122    0K  20   Sleeping     Infra Agent      0
------------------------------------------------------------------------------
```

Step 3 **show context**

Displays information about process crashes.

Example:

```
RP/0/RP0/CPU0:ios# show context
Thu Apr  23 08:42:32.328 UTC
**********************************************************
Location : 0/RP0
**********************************************************
Core location: 0/RP0:/misc/disk1

Core for pid = 1463 (aaad)
Core for process: aaad_1463.by.11.20150423-083922.sysadmin-vm:0_RP0.009d5.core.gz
Core dump time: 2015-04-23 08:39:23.058000000 +0000
Process:
Core was generated by `/opt/cisco/calvados/bin/aaad'.

Build information:
### XR Information

User = aaaa
Host = agl-ads-2232
Workspace = /nobackup/aaaa/xspeed-new
Lineup = proj:xspeed
XR version = 6.0.0.01I
```

```
[…]
Signal information:
Program terminated with signal 11, Segmentation fault.

Faulting thread: 1463

Registers for Thread 1463
rax:    0xfffffffffffffffc
rbx:    0x23a34e0
[…]

Backtrace for Thread 1463
#0  0x00007fa1fd1c8b43 in epoll_wait+0x33 from /lib64/libc-2.12.so
#1  0x00007fa1ff6992f6 in ?? () from /usr/lib64/libevent-2.0.so.5.0.1
[…]
<snip>
```