



## Bring-up Cisco NCS 1004

After installing the hardware, boot the Cisco NCS 1004 system. You can connect to the XR console port and power on the system. NCS 1004 completes the boot process using the pre-installed operating system (OS) image. If no image is available, NCS 1004 can be booted using the iPXE boot, an external bootable USB drive, or Golden ISO.

After booting, create the root username and password, and then use it to log on to the XR console. From the XR console, access the System Admin console to configure system administration settings.



**Note** The output of the examples in the procedures is not from the latest software release. The output will change for any explicit references to the current release.

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## Boot NCS 1004

The various boot options in NCS 1004 are as follows:

1. Boot using SSD (hard disk)

2. Boot using USB drive
3. Boot using iPXE
4. Boot using ZTP
5. Boot using Golden ISO

If there is no bootable image in all of the above boot options, reboot the system.

## Boot NCS 1004

Use the console port to connect to NCS 1004. By default, the console port connects to the XR mode. If necessary, you can establish subsequent connections through the management port, after it is configured.

### Procedure

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Connect a terminal to the console port of the RP.   |
| <b>Step 2</b> | Start the terminal emulation program on your workstation.<br><br>The console settings are 115,200 bps, 8 data bits, 1 stop bit and no parity.   |
| <b>Step 3</b> | Power on NCS 1004.<br><br>To turn on the power shelves, press the power switch up. As NCS 1004 boots up, you can view the boot process details at the console of the terminal emulation program.  |
| <b>Step 4</b> | Press <b>Enter</b> .<br><br>The boot process is complete when the system prompts you to enter the root-system username. If the prompt does not appear, wait for a while to give NCS 1004 more time to complete the initial boot procedure; then press <b>Enter</b> .<br><br><b>Important</b><br>If the boot process fails, it may be because the preinstalled image on the NCS 1004 is corrupt. In this case, you can boot NCS 1004 using an external bootable USB drive. |
- 

## Boot NCS 1004 Using USB Drive

The bootable USB drive is used to reimage NCS 1004 for system upgrade or to boot the NCS 1004 in case of boot failure. A bootable USB drive is created by copying a compressed boot file into a USB drive. The USB drive becomes bootable after the contents of the compressed file are extracted.

You can complete this task using the Windows, Linux, or MAC operating systems available on your local machine. The exact operation to be performed for each generic step that is outlined here depends on the operating system in use.

**Before you begin**

- You need a USB drive with a storage capacity of at least 4 GB.
- The USB drive should have a single partition.
- NCS 1004 software image can be downloaded from Software Download page on Cisco.com.
- Copy the compressed boot file from the software download page at Cisco.com to your local machine. The filename for the compressed boot file is in the format *ncs1004-usb-boot-<release\_number>.zip*. For example, *ncs1004-usb-boot-7.0.1.zip*.

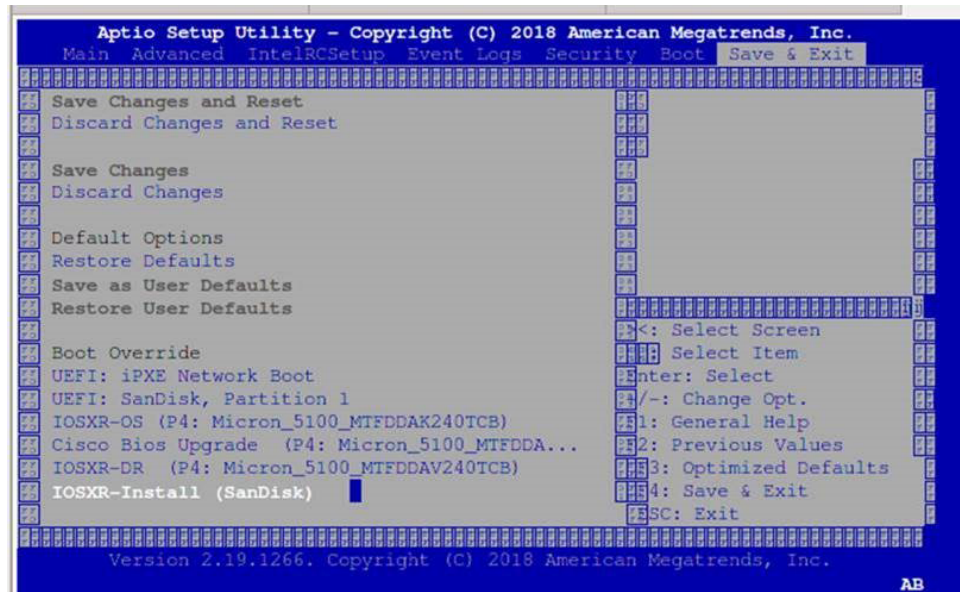
**Procedure**

- Step 1** Connect the USB drive to your local machine and format it with the FAT32 file system.
- Step 2** Copy the compressed boot file to the USB drive.
- Step 3** Verify that the copy operation is successful. To verify, compare the file size at source and destination. Also, verify the MD5 checksum value.
- Step 4** Extract the content of the compressed boot file by unzipping it in the USB drive. This makes the USB drive a bootable drive.

**Note**

You must extract the contents of the zipped file ("EFI" and "boot" directories) directly in the root folder of the USB drive. If the unzipping application places the extracted files in a new folder, move the "EFI" and "boot" directories to the root folder of the USB drive.

- Step 5** Insert the USB drive in one of the USB ports of NCS 1004.
- Step 6** Reboot NCS 1004 using power cycle or console.
- Step 7** Press Esc to enter BIOS.
- Step 8** Select the **Save & Exit** tab of BIOS.



**Step 9 Choose IOS -XR Install.**

The system detects USB and boots the image from USB.

**Admin Console:**

```
GNU GRUB version 2.00
Press F2 to goto grub Menu..
```

**Booting from USB..**

```
Loading Kernel..
```

```
Validating End Entity Certificate...
```

```
Validating SubCA Certificate...
```

```
Validating Root Certificate...
```

```
Loading initrd..
```

```
Validating End Entity Certificate...
```

```
Validating SubCA Certificate...
```

```
Validating Root Certificate...
```

```
CiscoSec: Image signature verification completed.
```

**XR Console:**

```
CiscoSec: Image signature verified.
```

```
[ 9.957281] i8042: No controller found
```

```
Starting udev
```

```
udev[972]: failed to execute '/etc/udev/scripts/network.sh' '/etc/udev/scripts/network.sh':
No such file or directory
```

```
Populating dev cache
```

```
Running postinst /etc/rpm-postinsts/100-dnsmasq...
```

```
update-rc.d: /etc/init.d/run-postinsts exists during rc.d purge (continuing)
```

```
Removing any system startup links for run-postinsts ...
```

```
/etc/rcS.d/S99run-postinsts
```

```
Configuring network interfaces... done.
```

**Step 10 Remove the USB drive. The NCS 1004 reboots automatically.**

```
Setting maximal mount count to -1
```

```
Setting interval between checks to 0 seconds
```

```
Fri Dec 11 20:35:56 UTC 2015: Install EFI on /dev/mb_disk4
```

```
Fri Dec 11 20:35:57 UTC 2015: Install finished on mb_disk
```

```
Rebooting system after installation ...
```

```
[ 116.973666] reboot: Restarting system
```

```
Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.
```

```
BIOS Date: 11/29/2015 12:02:45 Ver: 0ACBZ1110
```

```
Press <DEL> or <ESC> to enter setup.
```

```
CiscoSec: Image signature verified.
```

```
GNU GRUB version 2.00
```

```
Press F2 to goto grub Menu..
```

```
Booting from Disk..
```

```
Loading Kernel..
```

```
Validating End Entity Certificate...
```

```
Validating SubCA Certificate...
```

```
Validating Root Certificate...
```

```
Loading initrd..
```

```
Validating End Entity Certificate...
```

```

Validating SubCA Certificate...

Validating Root Certificate...
CiscoSec: Image signature verification completed.
Initrd, addr=0xff69a000, size=0x955cb0
[ 1.745686] i8042: No controller found

```

---

## Boot Using iPXE

iPXE is a pre-boot execution environment that is included in the network card of the management interfaces and works at the system firmware (UEFI) level of the chassis. iPXE is used to reimage the system, and boot the chassis in case of boot failure or in the absence of a valid bootable partition. iPXE downloads the ISO image, proceeds with the installation of the image, and finally bootstraps inside the new installation.



**Note** The time taken for iPXE to download the ISO image depends on the network speed. Ensure that the network speed is sufficient to complete the image download in less than 10 minutes. The chassis reloads if the image is not downloaded by 10 minutes.

---

iPXE acts as a bootloader and provides the flexibility to choose the image that the system will boot based on the Platform Identifier (PID), the Serial Number, or the management mac-address. You must define iPXE in the DHCP server configuration file.

## Setup DHCP Server

A DHCP server must be configured for IPv4, IPv6, or both communication protocols.



**Note** For DHCPv6, a routing advertisement (RA) message must be sent to all nodes in the network that indicates which method is to be used to obtain the IPv6 address. Configure Router-advertise-daemon (radvd, install using `yum install radvd`) to allow the client to send the DHCP request. For example:

```

interface eth3
{
    AdvSendAdvert on;
    MinRtrAdvInterval 60;
    MaxRtrAdvInterval 180;
    AdvManagedFlag on;
    AdvOtherConfigFlag on;
    prefix 2001:1851:c622:1::/64
    {
        AdvOnLink on;
        AdvAutonomous on;
        AdvRouterAddr off;
    };
};

```

---

To setup a DHCP server:

1. Create the `dhcpd.conf` file (for IPv4, IPv6 or both communication protocols), `dhcpv6.conf` file (for IPv6) or both in the `/etc/` directory. 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 file, serial number, MAC address of the chassis.
2. Test the server once the DHCP server is running:

For example, for ipv4:

- a. Use MAC address of the chassis:

```
host ncs1004
{
  hardware ethernet ab:cd:ef:01:23:45;
  fixed-address <ip address>;
  filename "http://<httpserver-address>/<path-to-image>/ncs1004-mini-x.iso";
}
```

Ensure that the above configuration is successful.

- b. Use serial number of the chassis:

```
host demo {
  option dhcp-client-identifier "<chassis-serial-number>";
  filename "http://<IP-address>/<hardware-platform>-mini-x.iso";
  fixed-address <IP-address>;
}
```

The serial number of the chassis is derived from the BIOS and is used as an identifier.

### Example

```
host 10.89.205.202 {
  hardware ethernet 40:55:39:56:0c:e8;
  if exists user-class and option user-class = "iPXE" {
    filename "http://10.89.205.127/box1/ncs1004-mini-x-7.0.1.iso";
  } else {
    filename "http://10.89.205.127/box1/StartupConfig.cfg";
  }
  fixed-address 10.89.205.202;
}
```

## Boot Using iPXE

Before you use the iPXE boot, ensure that:

- DHCP server is set and is running.
- You have logged in to the System Admin console using the **admin** command.

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

```
hw-module location all bootmedia network reload
```

### Example:

```
sysadmin-vm:0_RP0# hw-module location all bootmedia network reload
Tue Feb 12 15:29:57.376 UTC
Reload hardware module ? [no,yes]
```

The following example shows the output of the command:

```

iPXE 1.0.0+ (3e573) -- Open Source Network Boot Firmware -- http://ipxe.org
Features: DNS HTTP TFTP VLAN EFI ISO9660 NBI Menu
Trying net0...
net0: c4:72:95:a6:14:e1 using dh8900cc on PCI01:00.1 (open)
[Link:up, TX:0 TXE:0 RX:0 RXE:0]
Configuring (net0 c4:72:95:a6:14:e1)..... Ok << Talking to DHCP/PXE server to
  obtain network information
net0: 10.37.1.101/255.255.0.0 gw 10.37.1.0
net0: fe80::c672:95ff:fea6:14e1/64
net0: 2001:1800:5000:1:c672:95ff:fea6:14e1/64 gw fe80::20c:29ff:febf:b9fe
net1: fe80::c672:95ff:fea6:14e3/64 (inaccessible)
Next server: 10.37.1.235
Filename: http://10.37.1.235/ncs1004/ncs1004-mini-x.iso
http://10.37.1.235/ ... 58% << Downloading file as indicated by DHCP/PXE server to boot
install image

```

## Boot Using Zero Touch Provisioning (ZTP)

Zero Touch Provisioning (ZTP) is used to deploy minimal configurations on several chassis. You can use ZTP to boot, set up, and configure the system. Configurations such as configuring the management Ethernet interface, installing SMUs, applications, and optional packages can be automated using ZTP. ZTP does not execute if a username is already configured in the system.

ZTP auto provisioning involves:

- **Configuration:** Downloads and executes the configuration files. The first line of the file must contain `!! IOS XR` for ZTP to process the file as a configuration.
- **Script:** Downloads and executes the script files. These script files include a programmatic approach to complete a task. For example, scripts created using IOS XR commands to perform patch upgrades. The first line of the file must contain `#!/bin/bash` or `#!/bin/sh` for ZTP to process the file as script.

You can either use the ZTP bash script or the ZTP configuration file.

```

host ncs1004 {
    #hardware ethernet 00:a0:c9:00:00:00;
    option dhcp-client-identifier "<chassis-serial-number>";
        filename "http://<IP-address>/<folder>/ncs1004-ztp.script";
        #filename "http://<IP-address>/<folder>/ncs1004-ztp.cfg";
}

```

The following is the sample content of the ZTP bash script.

```

#!/bin/bash
#
# NCS1004 Demo Sample
# ZTP installation of config and day-0 SMU's
#
source ztp_helper

wget http://downloads.sourceforge.net/project/yourcode/application.tgz
#install the downloaded application.tgz

#Run XR CLI's from the script
`xrcmd "show version"`

```

The following is the sample content of the ZTP configuration file. You can automate all the configurations.

```
!! IOS XR Configuration version = 7.0.1
!
telnet vrf default ipv4 server max-servers 20
!
vty-pool default 0 20 line-template default
!
interface MgmtEth0/RP0/CPU0/0
  ipv4 address dhcp
  no shutdown
!
router static
  address-family ipv4 unicast
    0.0.0.0/0 10.77.132.1
!
end
```

## Boot NCS 1004 Using Golden ISO

Golden ISO is a feature that is provided to the user to build the customized ISO using mini ISO, required SMUs, and IOS XR configuration.

Before the introduction of Golden ISO feature, you must perform the following three steps, to install a new image.

1. Boot the system with mini ISO. You can do this task using iPXE or USB boot.
2. Install, add, and activate all the relevant SMUs and optional packages on to NCS 1004. NCS 1004 reloads on reload of any SMUs.
3. Apply IOS XR configuration.

### Benefits of Golden ISO

- Saves installation effort and time.
- The system is available in a single command and boot.

You can build the Golden ISO using ‘gisobuild.py’ script available at /pkg/bin/gisobuild.py location.

### Limitations

- install operation over IPv6 is not supported.

### Build Golden ISO

You can use the following command to build the Golden ISO.

```
gisobuild.py -i./ncs1004-mini-x.iso -r ./rpm-directory -c ./xr-config -l label
```

*rpm-directory* - Directory where SMUs (xr, calvados, and host) are copied.

*xr-config* - IOS XR configuration to be applied to the system after booting.

*label* - Label of the Golden ISO.





**Note** You must copy /pkg/bin/gisobuild.py from NCS 1004 to the Linux environment and use the following command to build the Golden ISO image.

```
python gisobuild.py -i ./ncs1004-mini-x-7.0.1.04I.iso -r. -c startup_new.cfg -l v2
System requirements check [PASS]
Golden ISO build process starting...

Platform: ncs1004 Version: 7.0.1.04I

XR-Config file (/bh/bosshogg_images/r701/701_04I_DT_IMAGE/giso/startup_new.cfg) will be
encapsulated in Golden ISO.

Scanning repository [/bh/bosshogg_images/r701/701_04I_DT_IMAGE/giso]...

Building RPM Database...
Total 1 RPM(s) present in the repository path provided in CLI

Following XR x86_64 rpm(s) will be used for building Golden ISO:

(+) ncs1004-k9sec-2.1.0.0-r70104I.x86_64.rpm

...RPM compatibility check [PASS]

Building Golden ISO...
Summary .....

XR rpms:
ncs1004-k9sec-2.1.0.0-r70104I.x86_64.rpm

XR Config file:
router.cfg

...Golden ISO creation SUCCESS.

Golden ISO Image Location:
/bh/bosshogg_images/r701/701_04I_DT_IMAGE/giso/ncs1004-goldenk9-x-7.0.1.04I-v2.iso

Detail logs:
/bh/bosshogg_images/r701/701_04I_DT_IMAGE/giso/Giso_build.log-2019-03-20:15:47:19.516203
```

**Golden ISO file is created in the following format:**

*platform-name-golden-x.iso-version.label* (does not contain security(\*k9sec\*.rpm) rpm)

**Example:** ncs1004-golden-x-7.0.1.014I-V1.iso

*platform-name-goldenk9-x.iso-version.label* (contains security(\*k9sec\*.rpm) rpm)

**Example:** ncs1004-goldenk9-x-7.0.1.014I-V1.iso

# Verify Boot Operation

## Procedure

---

### show version

#### Example:

```
RP/0/RP0/CPU0:ios# show version
Thu Apr 30 21:57:48.371 IST
Cisco IOS XR Software, Version 7.2.1 Copyright (c) 2013-2020 by Cisco Systems, Inc.
```

#### Build Information:

```
Built By      : ahoang
Built On      : Wed Apr 29 19:22:26 PDT 2020
Built Host    : iox-lnx-023
Workspace     : /auto/srcarchive14/prod/7.2.1/ncs1004/ws
Version       : 7.2.1
Location      : /opt/cisco/XR/packages/
Label        : 7.2.1
```

```
cisco NCS-1004 () processor
System uptime is 5 hours 25 minutes
```

Compare the displayed version with the boot image version. The versions must be the same.

---

## Boot NCS 1004 Using Golden ISO for Open ROADM

The following topics describe on how to boot NCS 1004 using golden ISO for Open ROADM:

- GISO for Open ROADM
- Build GISO Image for Open ROADM
- Create USB File for Open ROADM
- Boot NCS 1004 using USB File for Open ROADM
- Verify Boot Operation for Open ROADM

## GISO for Open ROADM

From Release 7.3.1 onwards, NCS 1004 supports GISO images for new Open ROADM deployments. The GISO image is bundled with the following files:

- Mini ISO image
- Open ROADM RPM
- OTN-XP RPM

- Startup configuration file

The new Open ROADM deployment mandatorily requires a startup configuration file to enable open ROADM. The start up configuration file contains the following information:

- DHCP client configuration for IPv4 and IPv6 addresses
- SSH sever configuration
- XR Netconf configuration
- Telnet configuration for IPv4 and IPv6 addresses

## Build GISO Image for Open ROADM

The mini ISO file, RPM directory, and the startup configuration file should be placed in the same path.

To build the new Golden ISO for open ROADM, use the following command:

```
gisobuild.py -i ./ncs1004-mini-x.iso -r ./rpm-directory -c ./xr-config -l label
```

Example

```
gisobuild.py -i ./ncs1004-mini-xr-7.3.1.iso -r ./RPMS -c ./giso.startup.txt -l V1
```

- *gisobuild.py* – Python script to run the GISO image. You can download the script from the [Github](#) site.
- *ncs1004-mini-x.iso* – Mini ISO NCS 1004 file, for example ncs1004-mini-xr-7.3.1.iso.
- *rpm-directory* - RPM directory where the RPM files such as OPEN ROADM RPM and OTN-XP RPM files are stored.

### Sample RPM files:

- *OPEN ROADM RPM* - ncs1004-tp-sw-1.0.0.0-r731.rpm
- *OTN-XP RPM* - ncs1004-sysadmin-otn-xp-dp-7.3.1-r731.rpm
- *xr-config* - IOS XR start up configuration file, for example, *giso.startup.txt*. This file has Open ROADM specific configurations that are to be applied to the system after booting.
- *label* - Label of the Golden ISO image.

### Sample

```
python gisobuild.py -i ./ncs1004-mini-x-7.3.1.iso -r./RPMS-c giso.startup.txt -l v1
System requirements check [PASS]
Golden ISO build process starting...
```

```
Platform: ncs1004 Version: 7.3.1
```

```
XR-Config file (/bh/bosshogg_images/r731/731_image/giso/giso.startup.txt) will be encapsulated
in Golden ISO.
```

```
Scanning repository [/bh/bosshogg_images/r731/731_image/giso]...
```

```
Building RPM Database...
```

```
Total 1 RPM(s) present in the repository path provided in CLI
```

```
Following XR x86_64 rpm(s) will be used for building Golden ISO:
```

```
(+) ncs1004-k9sec-2.1.0.0-r731.x86_64.rpm

...RPM compatibility check [PASS]

Building Golden ISO...
Summary .....

XR rpms:
ncs1004-k9sec-2.1.0.0-r731.x86_64.rpm

XR Config file:
giso.startup.txt

...Golden ISO creation SUCCESS.

Golden ISO Image Location:
/bh/bosshogg_images/r731/731_image/giso/ncs1004-goldenk9-x-7.3.1-v1.iso

Detail logs: /bh/bosshogg_images/r731/731_image/giso/Giso_build.log-2021-03-10:15:47:19.516203
```

## Create USB File for Open ROADM

Once the Golden ISO image is available, you need to create a bootable compressed USB file. Use this USB file to boot NCS 1004.

To create the USB file using the GISO image, use the following command:

```
./create_usb_zip ncs1004 ncs1004-golden-x-7.3.1-V1.iso
```

The bootable compressed USB file is created. You must copy the boot file from the system to the USB drive. Use the following procedure to copy the compressed USB file, extract the content, and reboot NCS 1004.

## Boot NCS 1004 using USB File for Open ROADM

The bootable USB drive is used to reimage NCS 1004 for system upgrade or to boot the NCS 1004 in case of boot failure. A bootable USB drive is created by copying a compressed boot file into a USB drive. The USB drive becomes bootable after the contents of the compressed file are extracted.

You can complete this task using the Windows, Linux, or MAC operating systems available on your local machine. The exact operation to be performed for each generic step that is outlined here depends on the operating system in use.

### Before you begin

- You need a USB drive with a storage capacity of at least 8 GB.
- The USB drive should have a single partition.
- NCS 1004 software image can be downloaded from Software Download page on Cisco.com.
- Copy the compressed boot file from the software download page at Cisco.com to your local machine. The filename for the compressed boot file is in the format *ncs1004-usb-boot-<release\_number>.zip*. For example, *ncs1004-usb-boot-7.1.3.zip*.
- Plug in the USB drive into the USB 0 port of NCS 1004.

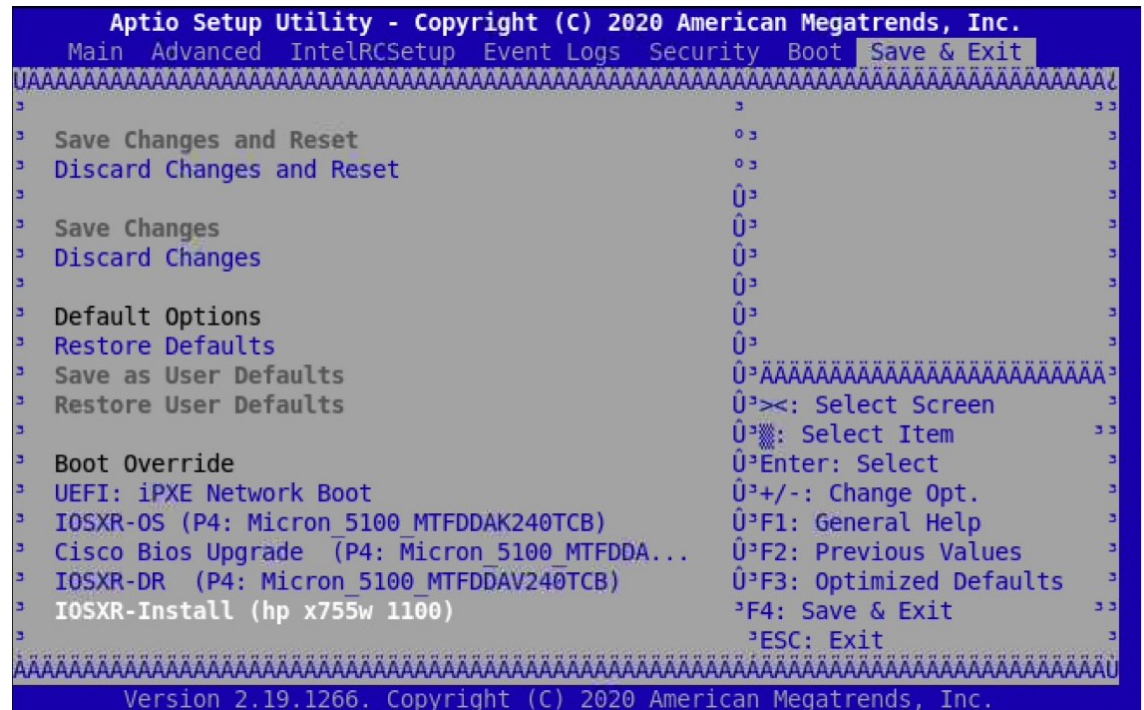
## Procedure

- Step 1** Connect the USB drive to your local machine and format it with the FAT32 file system.
- Step 2** Copy the compressed boot file to the USB drive.
- Step 3** Verify that the copy operation is successful. To verify, compare the file size at source and destination. Also, verify the MD5 checksum value.
- Step 4** Extract the content of the compressed boot file by unzipping it in the USB drive. This makes the USB drive a bootable drive.

### Note

You must extract the contents of the zipped file ("EFI" and "boot" directories) directly in the root folder of the USB drive. If the unzipping application places the extracted files in a new folder, move the "EFI" and "boot" directories to the root folder of the USB drive.

- Step 5** Insert the USB drive in one of the USB ports of NCS 1004.
- Step 6** Reboot NCS 1004 using power cycle or console.
- Step 7** Press Esc to enter BIOS.
- Step 8** Select the **Save & Exit** tab of BIOS.



- Step 9** Choose **IOS -XR Install**.
- The system detects USB and boots the image from USB.

```
TAM: Chip DB Verified
CiscoSec: Image Signature Verified
GNU GRUB version 2.00
Press F2 to goto grub Menu..
```

```

Booting from USB..
Loading Kernel..
Kernel Secure Boot Validation Result: PASSED
Loading initrd...
Initrd Secure Boot Validation Result: PASSED
Starting udev....
Running postinst /etc/rpm-postinsts/100-dnsmasq...
Sun Mar  7 19:22:30 UTC 2021: pd_download_giso
Write at Address 0x7bbe000098 (mmap addr 0x7fe08ec87000(0x98)) value 0x1 len 4 width 4 byte

Write at Address 0x7bbe000098 (mmap addr 0x7f54fc88b000(0x98)) value 0x2 len 4 width 4 byte

  Watchdog timer reset done, next reset needed within 10 minutes
Golden ISO type = 1.1 and PKG_VER = 1.0
Current Boot: IOSXR-Install
Current Boot: USB...
  * First booting, filesystem will be relabeled...
Finished Calvados patch for lxc
Starting to prepare calvados logical volume---
  Create sub partition on /dev/panini_vol_grp/calvados_lv0
  Create data sub partition on /dev/panini_vol_grp/calvados_data_lv0
  File system creation on /dev/panini_vol_grp/calvados_lv0 took 6 seconds
  Install sysadmin-vm image on /dev/panini_vol_grp/calvados_lv0
  RP based installation
  Starting Calvados patch for lxc for sysadmin-vm
  Uninstalling rpm task-nxos-core
  Uninstalling rpm gdb
  Uninstalling rpm smartmontools
NCS1004: Complete Patch Calvados
Enable selinux to relabel filesystem from initramfs
Checking SELinux security contexts:
  * First booting, filesystem will be relabeled...
  Finished Calvados patch for lxc
  Installing sysadmin-vm image size of 1.9G took 53 seconds
---Starting to prepare repository---
  File system creation on /dev/cpu_disk2 took 3 seconds
  Check for unwanted iso and remove if required.
  Copying /iso/host.iso to repository /iso directory
  Copying /iso/ncs1004-sysadmin.iso to repository /iso directory
  Copy Sysadmin rpms to repository
  Copy XR rpms to repository
  Copy giso info.txt to repository
  Copying /iso/ncs1004-xr.iso to repository /iso directory
  Copying all ISOs to repository took 12 seconds
  Install EFI on /dev/cpu_disk4
pd_notify_img_install_done
Checking disk error for: sdb
  Chassis disk smartctl -a output
  Chassis disk smartctl output done
  Disk model: Micron_5100_MTFDDAV240TCB
  No failures found in dmesg
  Checking Chassis disk mount failures.
  No mount failures found in Chassis disk /dev/sdb2
  No mount failures found in Chassis disk /dev/BHDisasterRecovery/golden_image
  Chassis disk partitions exist
  Install finished on cpu_disk

```

**Step 10** Remove the USB drive. The NCS 1004 reboots automatically.

```

Rebooting system after installation ...
[201.715171] reboot: Restarting system
ERROR: Class:0; Subclass:10000; Operation: 1004

```

```
NCS1004: Initilizing Devices
Version 2.19.1266. Copyright (C) 2020 American Megatrends, Inc.
BIOS Date: 10/23/2020 09:03:42 Ver: 0ACHI470
Press <DEL> or <ESC> to enter setup
TAM: Chip DB
CiscoSec: Image Signature Verified
GNU GRUB version 2.00
Press F2 to goto grub Menu..
Booting from Disk..
Loading Kernel..
Kernel Secure Boot Validation Result: PASSED
Loading initrd..
Initrd Secure Boot Validation Result: PASSED
[3.836637] i8042: No controller found
Enable selinux to relabel filesystem from initramfs

Load IMA appraise policy: OK

Switching to new root and running init.

Sourcing /etc/sysconfig/udev

Starting udev: [ OK ]

Starting udev

Running postinst /etc/rpm-postinsts/100-dnsmasq...

update-rc.d: /etc/init.d/run-postinsts exists during rc.d purge (continuing)

Removing any system startup links for run-postinsts
/etc/rcS.d/S99run-postinsts
Configuring network interfaces... done.
Starting system message bus: dbus.
Starting OpenBSD Secure Shell server: sshd
    generating ssh RSA key...
    generating ssh ECDSA key...
    generating ssh DSA key...
    generating ssh ED25519 key...
sshd start/running, process 3559
Starting rpcbind daemon...done.
Starting kdump:[ OK ]
Starting random number generator daemon.
Starting system log daemon...0
Starting kernel log daemon...0
tftpd-hpa disabled in /etc/default/tftpd-hpa
Starting internet superserver: xinetd.
Starting S.M.A.R.T. daemon: smartd.
Starting Lighttpd Web Server: lighttpd.
Starting libvirtd daemon: [ OK ]
Starting crond: OK
Starting cgrouper-init
Network ieobc_br defined from /etc/init/ieobc_br_network.xml
Network local_br defined from /etc/init/local_br_network.xml
Network xr_local_br defined from /etc/init/xr_local_br_network.xml
Network ieobc_br started
```

```
Network local_br started
Network xr_local_br started
mcelog start/running, process 4647
diskmon start/running, process 4653
Creating default host password file
Start serial incoming on , Clearing ..
initctl: Unknown instance: /dev/ttyS0
Connecting to 'default-sdr--1' console
bootlogd: ioctl(/dev/pts/2, TIOCCONS): Device or resource busy
Running postinst /etc/rpm-postinsts/100-dnsmasq...
update-rc.d: /etc/init.d/run-postinsts exists during rc.d purge (continuing)
Removing any system startup links for run-postinsts ...
    /etc/rcS.d/S99run-postinsts
Configuring network interfaces... done.
Starting system message bus: dbus.
Starting OpenBSD Secure Shell server: sshd
    generating ssh RSA key...
    generating ssh ECDSA key...
    generating ssh DSA key...
    generating ssh ED25519 key...
sshd start/running, process 2197
Starting rpcbind daemon...done.
Starting random number generator daemon.
Starting system log daemon...0
Starting kernel log daemon...0
tftpd-hpa disabled in /etc/default/tftpd-hpa
Starting internet superserver: xinetd.
net.ipv4.ip_forward = 1
Libvirt not initialized for container instance
Starting crond: OK
SIOCADDRT: File exists
Start serial incoming on , Clearing ..
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.
```

---

## Verify Boot Operation for Open ROADM

### Procedure

---

**show version**



**Example:**

```
RP/0/RP0/CPU0:ios#show version
Sun Mar  7 19:31:38.139 UTC
Cisco IOS XR Software, Version 7.3.1
Copyright (c) 2013-2021 by Cisco Systems, Inc.

Build Information:
Built By      : ingunawa
Built On     : Thu Feb 25 19:10:10 PST 2021
Built Host   : iox-lnx-070
Workspace    : /auto/srcarchive17/prod/7.3.1/ncs1004/ws
Version      : 7.3.1
Location     : /opt/cisco/XR/packages/
Label       : 7.3.1-0

cisco NCS-1004 () processor
System uptime is 1 minute
```

Compare the displayed version with the boot image version. The versions must be the same.

---

## Bring-Up Line Card

### Procedure

---

- |               |   |
|---------------|---|
| <b>Step 1</b> | Insert the line card into slot.   |
| <b>Step 2</b> | Wait until the LED on the line card turns Green.  |
| <b>Step 3</b> | Configure OTN-XP card with LC MODE.<br><br>See <a href="#">LC Mode on OTN-XP Card</a> .                                   |
| <b>Step 4</b> | Upgrade the FPDs of the line card depending on the output of <b>show hw-module location 0/line-card-slot fpd</b> command. |
- 

## Disaster Recovery

When you replace the CPU or NCS 1004 chassis, the Disaster Recovery feature allows you to restore the node configuration with minimum downtime. The feature works without console access. Before replacing CPU, use the **graceful-recovery backup initiate** command to back up the XR configuration. The node will also back up the running XR configuration after 20 mins. After reboot, the node backs up the XR configuration immediately.

### CPU Replacement

You must consider the following points for CPU replacement.

- The node runs in headless mode.

- You can insert the CPU with SSD and the node starts to boot the OS from CPU SSD.
- The version of the images in CPU or chassis SSD are compared.
- If the version is different, configuration is taken from chassis SSD as the chassis golden image has priority.
- If the version is same, the node boots up. This version comparison happens upon each reboot including power cycle.
- The configuration is always taken from the chassis. If the chassis SSD is not functional, the node boots with only the CPU.

### Chassis Replacement

You must consider the following points for chassis replacement.

- Chassis replacement involves minimum downtime.
- When the chassis is obtained, you can connect the CPU and boot. After receiving the empty chassis through RMA, you can insert the CPU and same configuration is restored.
- CPU swap from other units is also supported; however, the chassis image and configuration will be replaced in the CPU.

## Health Check for Proper Backup ISO Image

Table 1: Feature History

Feature Name	Release Information	Feature Description
Health Check for Proper Backup ISO Image	Cisco IOS XR Release 7.5.2	This feature primitively validates the backup ISO image to be used during Disaster Recovery. The validation happens before copying the image to the CPU disk and motherboard disks, and thereafter the copied image is audited every 12 hours. Image corruption triggers the <b>Disaster recovery is disabled due to corrupted ISO</b> alarm. This Health Check feature ensures error-free booting of NCS 1004 chassis during disaster recovery operations.



**Note** To clear "Clear the DISASTER-RECOVERY-DISABLED Alarm", log in to the Technical Support Website at <http://www.cisco.com/c/en/us/support/index.html> for more information or call Cisco TAC (1 800 553-2447).



**Note** Verify that there is no **Disaster recovery is disabled due to corrupted ISO** alarm using the **show alarms** command before sending the CPU for RMA.

## Access the System Admin Console

All the system administration and hardware management setups are performed from the System Admin console.

### Procedure

**Step 1** Login to the XR console as the root user.

**Step 2** Type **Ctrl + O** to access the console logs.

**Example:**

```
RP/0/RP0/CPU0:ios# Ctrl + O
```

```
RP/0/RP0/CPU0:ios#  
Disconnecting from 'default-sdr--1' console. Continue(Y/N)?
```

```
Y  
Connecting to 'sysadmin' console
```

```
System Admin Username: root  
Password:  
root connected from 127.0.0.1 using console on sysadmin-vm:0_RP0  
sysadmin-vm:0_RP0#
```

After you enter the System Admin console, the prompt changes to:

```
sysadmin-vm:0_RP0#
```

## Configure Management Interface

To use the management interface for system management and remote communication, you must configure an IP address and subnet mask for the management Ethernet interface. To communicate with devices on other networks (such as remote management stations or TFTP servers), you must configure a default (static) route for NCS 1004.

### Before you begin

- Consult your network administrator or system planner to procure IP addresses and a subnet mask for the management port.
- Ensure that the management port is connected to the management network.

## Procedure

---

**Step 1** **configure****Example:**

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

Enters XR configuration mode.

**Step 2** **interface mgmtEth *rack/slot/instance/port*****Example:**

```
RP/0/RP0/CPU0:ios(config)# interface mgmtEth 0/RP0/CPU0/0
```

Enters interface configuration mode for the management interface.

**Step 3** **ipv4 address *ipv4-address subnet-mask*****Example:**

```
RP/0/RP0/CPU0:ios(config-if)# ipv4 address 10.1.1.1 255.0.0.0
```

Assigns an IP address and a subnet mask to the interface.

**Step 4** **no shutdown****Example:**

```
RP/0/RP0/CPU0:ios(config-if)# no shutdown
```

Places the interface in an "up" state.

**Step 5** **exit****Example:**

```
RP/0/RP0/CPU0:ios(config-if)# exit
```

Exits the management interface configuration mode.

**Step 6** **router static address-family ipv4 unicast *0.0.0.0/0default-gateway*****Example:**

```
RP/0/RP0/CPU0:ios(config)# router static address-family ipv4 unicast 0.0.0.0/0 192.0.2.1
```

Specifies the IP address of the default gateway to configure a static route. This IP address must be used for communication with devices on other networks.

**Step 7** Use the **commit** or **end** command.

**commit**-Saves the configuration changes and remains within the configuration session.

**end**-Prompts user to take one of these actions:

- **Yes**-Saves configuration changes and exits the configuration session.
  - **No**-Exits the configuration session without committing the configuration changes.
  - **Cancel**-Remains in the configuration session without committing the configuration changes.
-

**What to do next**

[Configure Telnet](#) and [Configure SSH](#).

## Configure Telnet

This procedure allows you to establish a telnet session to the management interface port using its IP address.

**Procedure****Step 1**

**configure**

**Example:**

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

Enters the configuration mode.

**Step 2**

**telnet {ipv4 | ipv6} server max-servers *limit***

**Example:**

```
RP/0/RP0/CPU0:ios(config)# telnet ipv4 server max-servers 10
```

Specifies the number of allowable telnet servers (up to 100). By default, no telnet servers are allowed. You must configure this command to enable the use of telnet servers.

**Step 3**

Use the **commit** or **end** command.

**commit**-Saves the configuration changes and remains within the configuration session.

**end**-Prompts user to take one of these actions:

- **Yes**-Saves configuration changes and exits the configuration session.
- **No**-Exits the configuration session without committing the configuration changes.
- **Cancel**-Remains in the configuration session without committing the configuration changes.

**What to do next**

[Configure SSH](#)

## Configure SSH

This procedure allows you to establish an SSH connection to the management interface port using its IP address.

**Before you begin**

- Install the ncs1004-k9sec package on NCS 1004. For details about package installation, see [Install Packages](#).
- Generate the crypto key for SSH using the **crypto key generate dsa** command.

**Procedure****Step 1**     **configure****Example:**

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

Enters the configuration mode.

**Step 2**     **ssh server v2****Example:**

```
RP/0/RP0/CPU0:ios(config)# ssh server v2
```

Enables the SSH server to accept only SSHv2 client connections.

**Step 3**     Use the **commit** or **end** command.

**commit**-Saves the configuration changes and remains within the configuration session.

**end**-Prompts the user to take one of these actions:

- **Yes**-Saves configuration changes and exits the configuration session.
- **No**-Exits the configuration session without committing the configuration changes.
- **Cancel**-Remains in the configuration session without committing the configuration changes.

**Step 4**     **show ssh session details****Example:**

```
RP/0/RP0/CPU0:ios# show ssh session details
```

Displays a detailed report of the SSHv2 connections to and from NCS 1004.

```
Tue Feb 12 16:03:51.455 UTC
SSH version : Cisco-2.0
```

id	key-exchange	pubkey	incipher	outcipher	inmac
-----					
Incoming Sessions					
1	ecdh-sha2-nistp256	ecdsa-sha2-nistp256	aes128-ctr	aes128-ctr	hmac-sha2-256
hmac-sha2-256					
Outgoing sessions					

**What to do next**[Perform Clock Synchronization with NTP Server](#)

## Perform Clock Synchronization with NTP Server

There are independent system clocks for the XR and the System Admin. To ensure that these clocks do not deviate from true time, they must be synchronized with the clock of an NTP server. In this task, you will configure an NTP server for the XR. After the XR clock is synchronized, the System Admin clock automatically synchronizes with the XR clock.

**Before you begin**[Configure and connect to the management port.](#)**Procedure****Step 1** **configure****Example:**

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

Enters XR configuration mode.

**Step 2** **ntp server** *server\_address***Example:**

```
RP/0/RP0/CPU0:ios# ntp server 192.0.2.55
```

The XR clock is configured to be synchronized with the specified server.

