



Perform Disaster Recovery

The topics covered in this chapter are:

- [Boot using USB Drive, page 1](#)
- [Boot using iPXE, page 3](#)

Boot using USB Drive

The bootable USB drive is used to re-image the router for the purpose of system upgrade or boot the router in case of boot failure. The bootable USB drive can be created using a compressed boot file.

Create a Bootable USB Drive Using Compressed Boot File

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.



Note

In case of failure to read or boot from USB drive, ensure that the drive is inserted correctly. If the drive is inserted correctly and still fails to read from USB drive, check the contents of the USB on another system.

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

Before You Begin

- Have access to a USB drive with a storage capacity that is between 8GB (min) and 32 GB (max). USB 2.0 and USB 3.0 are supported.

- Copy the compressed boot file from the software download page at cisco.com to your local machine. The file name for the compressed boot file is in the format `ncs5k-usb-boot-<release_number>.zip`. For example, `ncs5k-usb-boot-6.0.zip`.

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- Step 1** Connect the USB drive to your local machine and format it with FAT32 or MS-DOS file system using the Windows Operating System or Apple MAC Disk Utility.
- 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. Additionally, verify the MD5 checksum value.
- Step 4** Extract the content of the compressed boot file by unzipping it inside the USB drive. This converts the USB drive to a bootable drive.
- Note** The content of the zipped file ("EFI" and "boot" directories) should be extracted directly into root of the USB drive. If the unzipping application places the extracted files in a new folder, move the "EFI" and "boot" directories to root of the USB drive.
- Step 5** Eject the USB drive from your local machine.
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What to Do Next

Use the bootable USB drive to boot the router or upgrade its image.

Boot the Router Using USB

The router can be booted using an external bootable USB drive. This might be required when the router is unable to boot from the installed image. A boot failure may happen when the image gets corrupted. During the USB boot, process the router gets re-imaged with the version available on the USB drive.



Note During the USB boot process, the router is completely re-imaged with the ISO image version present in the bootable USB drive. All existing configurations are deleted because the disk 0 content is erased. No optional packages are installed during the upgrade process; they need to be installed after the upgrade is complete.

Before You Begin

- Create a bootable USB drive. See [Create a Bootable USB Drive Using Compressed Boot File](#), on page 1.

- Ensure that an external connection unit (ECU) with two solid-state drives (SSDs) is present.

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- Step 1** Connect the USB drive to the active RP.
- Step 2** Connect to the console
- Step 3** Power the router.
- Step 4** Press **Esc** to pause the boot process and get the RPs to BIOS menu.
- Step 5** Select the USB from the boot menu on the RP to which the USB is connected to. The image is copied in internal disk, and the router is restarted automatically.
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What to Do Next

- After the booting process is complete, specify the root username and password.
- Install the required optional packages.

Boot using iPXE

iPXE is a pre-boot execution environment that is embedded in the router and works at the BIOS level. iPXE is used to re-image the system, boot the router in case of boot failure or in the absence of a valid bootable partition.

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

Zero Touch Provisioning

Zero Touch Provisioning (ZTP) helps in auto provisioning after the software installation of the router using iPXE.

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 a script.



Note

ZTP is supported only on the management port `0/RP0/CPU0/0`. The port `0/RP0/CPU0/1` is not supported.

Setup DHCP Server

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

Before You Begin

- Consult your network administrator or system planner to procure IP addresses and a subnet mask for the management interface.
- Physical port Ethernet 0 on RP is the management port. Ensure that the port is connected to management network.
- Enable firewall to allow the server to process DHCP packets.
- For DHCPv6, a Routing advertisement (RA) message must be sent to all nodes in the network that indicates which method to use to obtain the IPv6 address. Configure Router-advertise-daemon (radvd, install using yum install radvd) to allow the client to send 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;
    };
};
```

- The HTTP server can be in the same server as that of the DHCP server, or can be on a different server. After the IP address is assigned from DHCP server, the router must connect to the HTTP server to download the image.

Step 1 Create the `dhcpd.conf` file (for IPv4, IPv6 or both communication protocols), `dhcpv6.conf` file (for IPv6) or both in the `/etc/` or `/etc/dhcp` 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 router.

Step 2 Test the server once the DHCP server is running. For example, for IPv4:

- Use MAC address of the router:

```
host ncs5k
{
    hardware ethernet <router-mac-address>;
    fixed-address <ip address>;
    filename "http://<httpserver-address>/<path-to-image>/ncs5k-mini-x.iso";
}
```

Ensure that the above configuration is successful.

- Use serial number of the router:

```
host ncs5k
{
    option dhcp-client-identifier "<router-serial-number>";
    filename "http://<IP-address>/<path-to-image>/ncs5k-mini-x.iso";
    fixed-address <IP-address>;
}
```

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

DHCP Configuration with iPXE and ZTP

The following example shows a sample DHCP server configuration including iPXE and ZTP:

```
host <host-name>
{
hardware ethernet <router-serial-number or mac-id>;
fixed-address <ip-address>;
  if exists user-class and option user-class = "iPXE" {
    # Image request, so provide ISO image
    filename "http://<ip-address>/<directory>/ncs5k-mini-x.iso";
  } else
  {
    # Auto-provision request, so provide ZTP script or configuration
    filename "http://<ip-address>/<script-directory-path>/ncs5k-ztp.script";
    #filename "http://<ip-address>/<script-directory-path>/ncs5k-ztp.cfg
  }
}
```



Note Either the ZTP .script file or the .cfg file can be provided at a time for auto-provisioning.

With this configuration, the system boots using ncs5k-mini-x.iso during installation, and then download and execute ncs5k-ztp.script when XR LXC is up.

Boot the Router using iPXE

Before your use the iPXE boot, ensure that:

- DHCP server is set and is running. For more information, see [Setup DHCP Server, on page 4](#).
- You have logged in to the System Admin console using the **admin** command.

Run the following command to invoke iPXE boot to reimage the router:

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

Example:

```
sysadmin-vm:0_RP0# hw-module location all bootmedia network reload
Wed Dec 23 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:feb:b9fe
net1: fe80::c672:95ff:fea6:14e3/64 (inaccessible)
Next server: 10.37.1.235
```

```
Filename: http://10.37.1.235/ncs5k/ncs5k-mini-x.iso  
http://10.37.1.235/ncs5k/ncs5k-mini-x.iso ... 58% << Downloading file as indicated by  
DHCP/PXE server to boot install image
```