



# Software Upgrade

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This chapter describes the iNode software upgrade process.

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## Overview

The methods used for triggering and transferring software images are initiated and completed in a manner similar to a cable modem software download. There are two ways to trigger the software upgrade. The first method involves an automatic software upgrade during boot-up of the iNode. The second method includes a planned upgrade of one or more iNodes, using the SNMP SCTE-HMS-COMMON-MIB commonReset to initiate a warm reboot. With either method, upon boot-up a software upgrade is started.

The iNode contains two memory partitions for holding a Primary and Secondary software image. A new image will be downloaded into the partition marked as Secondary if the upgrade image name in the inode.cfg file is not currently loaded in either partition. After the download operation has successfully completed, the partition containing the desired software image is marked as the Primary partition and the iNode is rebooted into that partition.

The downloaded image is a monolithic image that contains the Linux Kernel and the Root File System needed to upgrade the iNode. Prior to release, the monolithic image is signed with the Cisco digital signature. Signatures are used for image validation prior to installation on the iNode. Following validation, and only if the specified image does not already exist on the iNode, the image is downloaded to flash memory. If for any reason the download fails, the current working image continues to execute on the iNode.

Each time the iNode boots a “boot counter” is incremented. The “boot counter” is reset when a successful Software Download operation has been completed. If the iNode is in a cyclic reset condition where the “boot counter” reaches a limit of 7 boot attempts the U-Boot module will revert the Secondary partition to a Primary partition state and mark the current partition as defective. This is a “fall-back” feature to ensure the iNode is able to boot correctly and recover from a defective image.

Figure 1: iNode SW Download Sequence IPv4

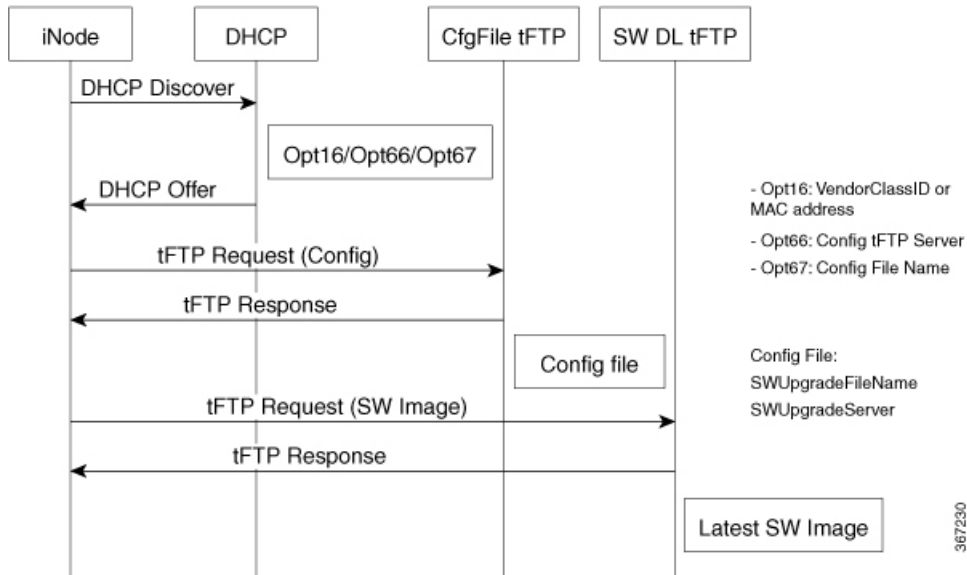
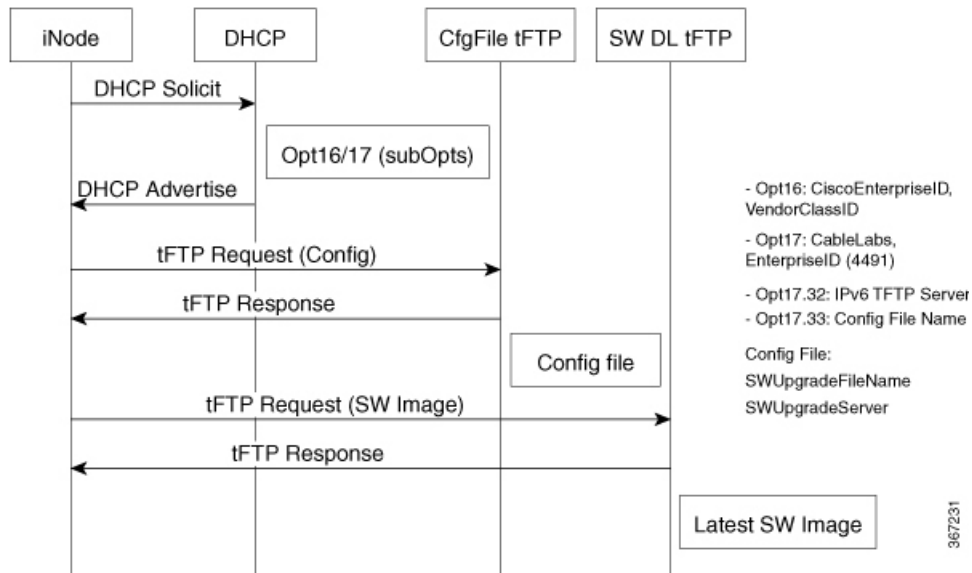


Figure 2: iNode SW Download Sequence IPv6



## System Requirements

- DHCP server is configured to provide the iNode with an IPv4 and Options 60, 66, 67 and/or an IPv6 IP address with Options 16, 17.16, 17.32, 17.33.
- IPv4/IPv6 TFTP server is configured to provide a DOCSIS TLV configuration file and any software images to be downloaded to the node.
- Capability to create a DOCSIS TLV Configuration file.

# Software Architecture

The iNode supports the storage of up to two images. This provides the capability to fall back to the last known good image in the event of a catastrophic failure during the download process. The U-boot keeps track of the number of failures and when the iNode is unable to boot from a new image after 7 attempts, it falls back to execute the last known working image.

As the iNode comes up and sets up the root file system, it contacts the DHCP server to obtain its IP address, the vendor class identifier used by the iNode, the IP address of the TFTP server and the name of the DOCSIS configuration file to be downloaded from the TFTP server. The iNode supports IPv4 and IPv6 using the IPv6 SLACC or Stateful address modes.

When the iNode boots, it attempts to obtain its IP address and DHCP options once a minute using a CRON job until either an IPv4 address or an IPv6 address is obtained. If the iNode is operating in a dual stack environment, IPv6 will be given priority over IPv4.

Once an IP address is obtained, the iNode will attempt a software download operation.

The format of the DOCSIS TLV configuration file varies depending on the IP protocol (IPv4 or IPv6) used and the desired software download actions to be performed.

Since the download is only performed following initialization after a reboot/reset condition, an SNMP trigger allows the operator to force a reboot and download a new image, provided that the DOCSIS TLV configuration file has been modified to reference a new image and the new image has been placed on the TFTP server.

The SNMP reset may be initiated by setting SCTE-HMS-COMMON-MIB::commonReset.0 to integer 1 for reset(1) OID 1.3.6.1.4.1.5591.1.3.1.7.0

## IPv4/IPv6 DHCP Server Configuration

Several DHCP Servers are available to provide the iNode an IP Address and Options. Refer to the [Prepare IPv4/IPv6 DHCP Server to Support iNode](#) for IPv4 and/or IPv6 DHCP Options for the iNode.

## Resolving Software Download Issues

This section describes issues commonly encountered during software download, along with their associated causes and possible remedies.

### Download Does Not Start

Several conditions may cause a download to be rejected by the iNode before the image transfer begins.

- Invalid DOCSIS TLV configuration file
- File not available on the TFTP server
- TFTP server error or invalid TFTP server IP address
- Unsigned or incorrectly signed software image

Resolution:

- Verify that the iNode has received the requested IP address from the DHCP server.
- Verify that the TFTP server IP address used in the DOCSIS TLV configuration file is correct and can be reached.
- Verify that the specified software image is not already running on the iNode.