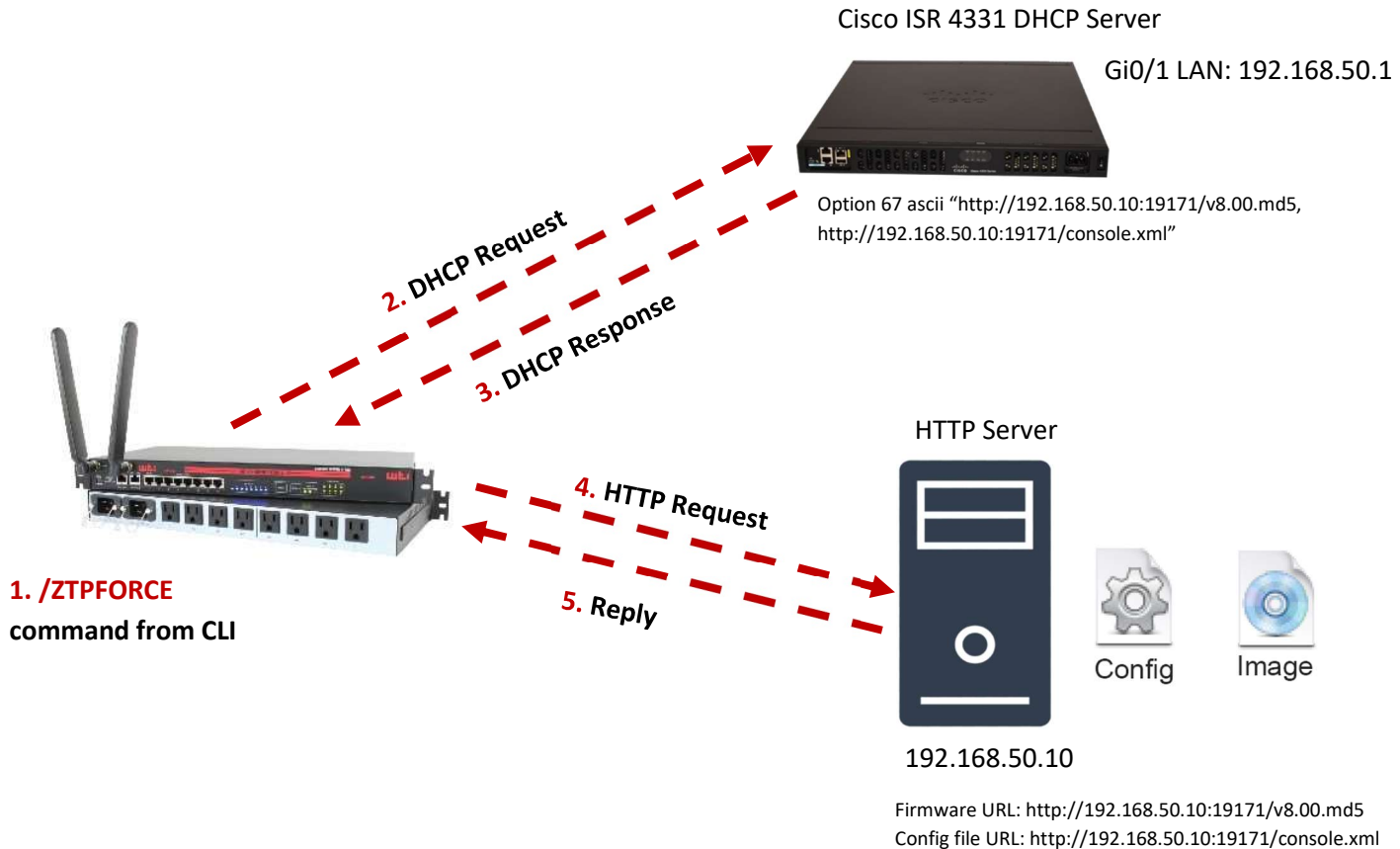


Zero Touch Provisioning (ZTP) with Cisco ISR 4331 DHCP Server (v8.00 and above)



Preparation

Cisco ISR 4331 – setup and configure Cisco ISR as a DHCP Server with option 67 define. Below is the sample configuration.

```
ip dhcp pool ZTP_Pool
  network 192.168.50.0 255.255.255.0
  default-router 192.168.50.1
  dns-server 8.8.8.8
  option 67 ascii "http://192.168.50.10:19171/v8.00.md5,http://192.168.50.10:19171/console.xml"
```

HTTP or TFTP server– create an .XML configuration file and obtain the latest firmware upgrade file from: <https://ftp.wti.com/firmware/>. Publish these files on a file server that understands HTTPS/HTTP or TFTP protocols as sample below.

Firmware URL: http://HTTP_SERVER_IP/v8.00.md5
Config file URL: http:// HTTP_SERVER_IP/console.xml

Firmware: tftp://TFTP_SERVER_IP/v8.00.md5
Config file: tftp://TFTP_SERVER_IP/console.xml

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How ZTP works

This section explains in detail how the WTI device uses DHCP to obtain initial setup.

The unit you are using ZTP for needs it to be in an un-configured state, which is only obtained in the following ways:

Firmware programming at factory (no IP addresses, Subnet masks, Gateways, DHCP and no Cellular APN defined).

To default a WTI unit issue the following command:

```
/l, (3 option)
```

Or

```
/ZTPFORCE
```

Internally this creates the file `/flash/.ztpyes`, removing `/flash/.ztpnever` and then rebooting

When an un-configured WTI boots, it performs these steps to find a configuration:

The WTI device transmits a DHCP DISCOVER request onto its primary Network Interface (eth0). This DHCP request will carry a Vendor Class Identifier in the form WTI-modeltype-model-name (for example, "WTI-CONSOLE-CPM-800-1-EA-PT9-PL8") and its parameter request list will include option 43 (Vendor-Specific Information).

On receipt of a DHCP OFFER, the device will use the information in the offer to assign an IPv4 address to its primary Network Interface, add a default route, and prepare its DNS resolver.

Here the WTI device will look for one of two things:

1. Option 43

If the offer also contained an option 43 with sub-option 1, the device interprets the sub-option as a URL to configuration files to try to restore.

If a configuration file URL was provided (sub-option 1), the configuration file is downloaded; a quick syntax check is performed, then set into place as the current configuration. The configuration URL must end in `.xml` or it is skipped.

Next, if a firmware image URL was provided (sub-option 2) the system now runs the upgrade process for the URL until one of the URLs succeeds (the image was flashed or matched to existing flash). The firmware URL must end in `.md5` or it is skipped.

2. Option 67

If there is Option 67 (bootfile-name) returned from the DHCP server the WTI device will parse this return for the firmware and configuration file.

Zero Touch Provisioning (ZTP) with Cisco ISR 4331 DHCP Server (v8.00 and above)

On your DHCP server the format for Option 67 (bootfile-name) must be:

Option bootfile-name

<https://192.168.0.1:18027/binary/image.md5,https://192.168.0.1:18027/config/filename.xml>

Where the first parameter is the upgrade file and the second parameter is the configuration file and they are separated by a comma (,).

If there is only a firmware file, then just the firmware file would be listed. If there is only the configuration file, there must be a comma first and then the location of the configuration file

Below is sample format to define option 67 in Cisco ISR

For Firmware Only

option 67 ascii "<http://192.168.50.10:19171/v8.00.md5>" (For HTTP/HTTPS)

option 67 ascii "<tftp://192.168.50.10/v8.00.md5>" (For TFTP)

For Both Firmware and Config .XML file

option 67 ascii "<http://192.168.50.10:19171/v8.00.md5>,<http://192.168.50.10/console.xml>" (For HTTP/HTTPS)

option 67 ascii "<tftp://192.168.50.10:19171/v8.00.md5>,<tftp://192.168.50.10/console.xml>" (For TFTP)

For Config .XML file only

option 67 ascii "<http://192.168.50.10:19171/console.xml>" (For HTTP/HTTPS)

option 67 ascii "<tftp://192.168.50.10:19171/console.xml>" (For TFTP)

Note: There are three variables that can be used for the Firmware and XML file that can help customize the process, please see **Appendix 1**.

The firmware image is downloaded, WTI will checksum and flash the firmware image. If the Check fails, the downloaded file is abandoned and operation continues.

The curl program is used to download the URLs.

If all goes well the system will reboot with the new firmware and configuration file activated.

Note: If a URL failed, the system will wait for 30 seconds before retrying again. It will retry the URLs up to 10 times. After the 10th retry, the system reboots. If the system has been manually configured in the meantime, the retries stop and ZTP is disabled.

Note: If no option 43 or option 67 is received over DHCP, no URLs are downloaded and no reboots occur: the system must be manually configured. Once configured (manually or by ZTP), a WTI device will no longer request

Zero Touch Provisioning (ZTP) with Cisco ISR 4331 DHCP Server (v8.00 and above)

option 43 or option 67 from the DHCP server, and it will ignore any option 43 or option 67 configuration URLs presented to it.

APPENDIX 1

Starting with Console Products (DSM, CPM, REM) Versions 8.04 and above, three variables can be inserted into the Firmware or XML string that can help customize the operation of the ZTP process.

SERIALNUMBER – A unique number assigned to the WTI device at the factory.

MACADDRESS – The unique Mac Address of the first Ethernet port of the WTI device.

FAMILY – The type of WTI device, either “console”, “power” or “afs” used to determine what kind of firmware to upload.

These following examples could be used in your DHCP server.

Example 1:

```
option 67 ascii "\",http://192.168.50.10/FAMILY.xml"
```

When the ascii string gets sent to the WTI, it will be interpreted and sent as:

```
http://192.168.50.10/console.xml
```

Example 2:

```
option 67 ascii "\",http://192.168.50.10/SERIALNUMBER.xml"
```

When the ascii string gets sent to the WTI, it will be interpreted and sent as:

```
http://192.168.50.10/01430121.xml
```

Example 3:

```
option 67 ascii  
"http://192.168.50.10/getmyfirmware.py?fam=FAMILY,http://192.168.50.10/getmyconfig.py?serial=SERIALNUMBER&mac=MACADDRESS"
```

When the ascii string gets sent to the WTI device, it will be interpreted and sent as:

```
http://192.168.50.10/getmyfirmware.py?fam=console
```

```
http://192.168.50.10/getmyconfig.py?serial=01430121&mac=1C:BA:8C:DF:F7:83
```