



Installing the Software

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Overview

Installing software on the router involves installing a consolidated package (bootable image). This consists of a bundle of subpackages (modular software units), with each subpackage controlling a different set of functions.

These are the two main methods to install the software:

- **Managing and Configuring a Router to Run Using Consolidated Packages** —This method allows for individual upgrade of subpackages and generally has reduced boot times compared to the method below. Use this method if you want to individually upgrade a module's software.
- **Managing and Configuring a Router to Run Using Individual Packages** —This simple method is similar to a typical Cisco router image installation and management that is supported across Cisco routers.

It is better to upgrade software in a planned period of maintenance when an interruption in service is acceptable. The router needs to be rebooted for a software upgrade to take effect.

There are different types of licenses for the device that are discussed in the next sections.

Licensing

This section contains the following:

Cisco Software Licensing

Cisco software licensing consists of processes and components to activate Cisco IOS software feature sets by obtaining and validating Cisco software licenses.

You can enable licensed features and store license files in the bootflash of your router. Licenses pertain to consolidated packages, technology packages, or individual features.

The ESR6300 does not support the Right to Use licenses, and supports only the Specific License Reservation (SLR)

Consolidated Packages

To obtain software images for the router, go to: <http://software.cisco.com/download/navigator.html>



Note All of the IOS-XE feature set may not apply to the ESR6300. Some features may not have been implemented yet, or are not appropriate for this platform.

An image-based license is used to help bring up all the subsystems that correspond to a license. This license is enforced only at boot time.

One of the following image-based licenses can be pre-installed on the ESR6300 router:

- Network-Essentials
- Network-Advantage
- HSecK9

To configure the license level, for example the network-advantage, use the following CLI:

```
Router#config terminal  
Router (config)#license boot level network-advantage  
Do you want to accept terms? Y
```



Note Network-Essentials and Network-Advantage licenses are mutually exclusive. To configure one, remove the other using **no license boot level <>** option in the privileged exec mode. The router will need to be reloaded for the configuration to take effect.

License Installation on the ESR6300

The ESR6300 license consists of two required parts:

- Feature License
- Throughput License

The feature license is either Network-Essentials or Network-Advantage. The throughput license can be either 50Mbps, 250Mbps or 2Gbps.



Note For the 2Gbps throughput level, an additional feature license, HSEck9 is required to comply with export restriction requirements.

Network-Essentials

The **Network-Essentials** technology package includes the baseline features. It also supports security features.

Features that are available in this license are:

- Traffic segmentation (VPN, VRF, VLAN)
- Crypto Tunnels
- IPSec
- IKEv2
- SSL-VPN
- DHCP
- QoS
- ACL
- EIGRP
- IGMP
- HTTP
- IP Multicast
- Radius
- TACACS
- OSPF
- RIP
- HSRP

The PIDs for the different levels of throughput for the Network-Essentials license are as follows.

- SL-6300-NE/DEF-K9 - Has a throughput level of 50Mbps.
- SL-6300-NE/PERF-K9 - Has a throughput level of 250Mbps
- SL-6300-NE/BOOS-K9 - Has a boosted throughput level of 2Gbps

The **Network-Essentials_npe** technology package (npe = No Payload Encryption) includes all the features in the Network-Essentials technology package without the payload encryption functionality. This is to fulfill export restriction requirements. The Network-Essentials_npe is available only in the Network-Essentials_npe image. The difference in features between the Network-Essentials package and the Network-Essentials_npe package is therefore the set of payload encryption features such as IPsec and Secure VPN.

Network-Advantage

The **Network-Advantage** technology package includes all crypto features.

The Network-Advantage license contains all of the features of the Network-Essentials license, plus the following.

- MPLS
- BFD
- RSVP
- RSRB
- SDLC
- IP SLA
- STUN
- TCP optimization
- App-aware QoS policies and troubleshooting

The PIDs for the different levels of throughput for the Network-Advantage license are as follows.

- SL-6300-NA/DEF-K9 - Has a throughput level of 50Mbps.
- SL-6300-NA/PERF-K9 - Has a throughput level of 250Mbps
- SL-6300-NA/BOOS-K9 - Has a boosted throughput level of 2Gbps

The **Network-Advantage_npe** package (npe = No Payload Encryption) includes all the features in the **Network-Advantage** technology package without the payload-encryption functionality. This is to fulfill export restriction requirements. The **Network-Advantage_npe** package is available only in the **Network-Advantage_npe** image. The difference in features between the **Network-Advantage** package and the **Network-Advantage_npe** package is therefore the set of payload-encryption-enabling features such as IPsec and Secure VPN.

Feature Support Caveats

The following features are not supported on the ESR6300:

- No support for MacSec or DLEP in the release.(MQC: modular quality of service command line).
- Layer2 COS to DSCP mapping does not work due to no ASIC chipset support for the feature.
- Copper FE SFPs are not supported on ESR6300.
- Copper GE SFPs are only supported in config terminal > service internal > service unsupported-transceiver mode.
- Cisco does not claim IP Mobility for Ethernet support on the ESR6300.
- Auto-negotiation for 10Mbps, 100Mbps, 1000Mbps in full-duplex mode is supported. For half duplex, support is only on 10Mbps and 100Mbps.

- Booting the golden configuration from a USB is NOT supported in 17.1.1, however it is available in 17.2.1.
- Refer to the Cisco approved vendor list [AVL] for Cisco USBs. Kingston USB 3.0 works as well. Ensure the USB has a single partition and ext2, fat16 or fat32 format only.
- There is no WebUI support for Day 0 or Day 1
- For Security: No support for TLS, TrustSec, MacSec , CWS [Cloud Web Security], IDS/IPS.

How to Install the Software for Cisco IOS XE

To install the software, use one of the following methods to use the software from a consolidated package or an individual package. Also see *Overview* section.

- *Managing and Configuring a Router to Run Using a Consolidated Package* section
- *Managing and Configuring a Router to Run Using Individual Packages* section
- *Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example* section

The device can be booted from a number of different resources, which can be found by using the following command:

```
Router(config)#boot config ?
 bootflash:  URL of the config file
 flash:      URL of the config file
 nvram:      URL of the config file
 usbflash0:  URL of the config file
 webui:      URL of the config file
```

The following is an example of booting from a config file from flash:

```
Router(config)#boot config flash0:startup-config
```

Starting with IOS-XE Release 17.2.1, support has been added for booting from the USB.

The syntax for the boot command is:

```
boot config usbflash0:<file name>
```

For example:

```
Router(config)#boot config usbflash0:startup-config
Router(config)#
Router#write memory
Building configuration...
[OK]
*Feb 10 10:20:11.990: %SYS-2-PRIVCFG_ENCRYPT: Successfully encrypted private config file
```

The environment variable CONFIG_FILE in the following example confirms that the startup-config is set to boot from usbflash0.

```
Router#show boot
BOOT variable =
CONFIG_FILE variable = usbflash0:startup-config
BOOTLDR variable does not exist
```

```
Configuration register is 0x1820
Standby not ready to show bootvar
```

Booting from the USB Feature Summary

- Once the `CONFIG_FILE` is set to a non-default value, the `nvram:startup-config` command is aliased to this new location.
- Any change made to the config file in `usbflash` will be reflected in `nvram:startup-config` as well.
- The EXEC command `erase nvram:startup-config` erases the contents of NVRAM, and deletes the file referenced by `CONFIG_FILE` variable.
- If the USB is unplugged after setting the `boot config usbflash0: <filename>` variable, then the day 0 default configuration will take effect.
- When the configuration is saved using the `copy system:running-config nvram:startup-config` command, the device saves a complete version of the configuration file to the location specified by the `CONFIG_FILE` environment variable, and a distilled version to NVRAM. A distilled version is one that does not contain access list information.

Booting from ROMMON

The following configuration steps need to be taken in order to boot from the USB.

From the ROMMON prompt, execute `set CONFIG_FILE=usbflash0: <filename>`

For example:

```
rommon 2 > set CONFIG_FILE=usbflash0:my_startupcfg
rommon 3 > sync
rommon 4 > set
PS1=rommon ! >
MCU_UPGRADE=SKIP
THRPUT=
LICENSE_BOOT_LEVEL=
RET_2_RTS=
MCP_STARTUP_TRACEFLAGS=00000000:00000000
BSI=0
RANDOM_NUM=1275114933
BOOT=flash:Jun5_1.SSA,12
RET_2_RCALTS=951454376
CONFIG_FILE=usbflash0:my_startupcfg
```

Continue booting the IOS image as usual from the ROMMON prompt.

Upgrading the Cisco IOS XE Release

When the device boots up with Cisco IOS XE image for the first time, the device checks the installed version of the ROMMON, and upgrades if the system is running an older version. During the upgrade, do not power cycle the device. The system automatically power cycles the device after the new ROMMON is installed.

Once ROMMON is upgraded, the device will check if the MCU is upgraded. Once that is complete, the device will boot up with the Cisco IOS XE image as normal.

After the installation, the system will boot up with the Cisco IOS XE image as normal.



Note When the device boots up for first time and if the device requires an upgrade, the entire boot process may take several minutes. This process will be longer than a normal boot due to the ROMMON and/or MCU upgrade.

The following example illustrates the boot process of a consolidated package:

```

Router# configure terminal
Router(config)#boot system bootflash:ESR 6300-universalk9.17.1.1.SPA.bin
Router(config)#config-register 0x2102
Router(config)#exit
Router#
*Nov 7 00:07:06.784: %SYS-5-CONFIG_I: Configured from console by console
Router#
Router#show run | inc license
license udi pid ESR 6300-K9 sn FCW2150TH0F
license boot level network-advantage
Router#
Router#reload ?
  /noverify Don't verify file signature before reload.
  /verify   Verify file signature before reload.
  at        Reload at a specific time/date
  cancel    Cancel pending reload
  in        Reload after a time interval
  pause     Pause during reload
  reason    Reload reason
  <cr>     <cr>

Router#reload /verify

System configuration has been modified. Save? [yes/no]: yes
Building configuration...

[OK]
*Nov 7 00:08:48.101: %SYS-2-PRIVCFG_ENCRYPT: Successfully encrypted private config file
Verifying file integrity of bootflash:/ESR 6300-universalk9.16.10.01.SPA.bin.....
.....

Embedded Hash   SHA1 : B0315BDC4F545D624BB128CE0FFAA468E6EF7587
Computed Hash   SHA1 : B0315BDC4F545D624BB128CE0FFAA468E6EF7587
Starting image verification
Hash Computation: 100%Done!
Computed Hash   SHA2: 03febcc07fbeaded664f2f5ef87f6c3
                5b343e6f7aecdd70e50e5203909aec8f
                3d276529d2a6af6859d4c77237f812d5
                0da93678edc942c8874edca2d5224101

Embedded Hash   SHA2: 03febcc07fbeaded664f2f5ef87f6c3
                5b343e6f7aecdd70e50e5203909aec8f
                3d276529d2a6af6859d4c77237f812d5
                0da93678edc942c8874edca2d5224101

Digital signature successfully verified in file bootflash:/ESR
6300-universalk9.16.10.01.SPA.bin
Signature Verified

Proceed with reload? [confirm]

*Jul 9 06:43:37.910: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command. Jul 9 14:43:59.134: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting:
process exit with reload chassis code

```

```
watchdog watchdog0: watchdog did not stop!
reboot: Restarting system
```

Press RETURN to get started!

ROMMON Images

A ROMMON image is a software package used by ROM Monitor (ROMMON) software on a router. The software package is separate from the consolidated package normally used to boot the router.

An independent ROMMON image (software package) may occasionally be released and the router can be upgraded with the new ROMMON software. For detailed instructions, see the documentation that accompanies the ROMMON image.



Note A new version of the ROMMON image is not necessarily released at the same time as a consolidated package for a router.

File Systems

The following table provides a list of file systems that can be seen on the Cisco ESR6300 router.

Table 1: Router File Systems

| File System | Description |
|-------------|--|
| bootflash: | Boot flash memory file system. |
| flash: | Alias to the boot flash memory file system above. |
| cns: | Cisco Networking Services file directory. |
| nvrn: | Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM. |
| obfl: | File system for Onboard Failure Logging (OBFL) files. |
| system: | System memory file system, which includes the running configuration. |
| tar: | Archive file system. |
| tmpsys: | Temporary system files file system. |
| usbflash0: | The Universal Serial Bus (USB) flash drive file systems. Note The USB flash drive file system is visible only if a USB drive is installed in the usb port. |

Use the ? help option if you find a file system that is not listed in the table above.

Auto-generated File Directories and Files

This section discusses the auto-generated files and directories that can be created, and how the files in these directories can be managed.

Table 2: auto-generated Files

| File or Directory | Description |
|---------------------|--|
| crashinfo files | Crashinfo files may appear in the bootflash: file system. These files provide descriptive information of a crash and may be useful for tuning or troubleshooting purposes. However, the files are not part of router operations, and can be erased without impacting the functioning of the router. |
| core directory | The storage area for .core files. If this directory is erased, it will automatically regenerate itself at bootup. The .core files in this directory can be erased without impacting any router functionality, but the directory itself should not be erased. |
| tracelogs directory | The storage area for trace files. Trace files are useful for troubleshooting. If the Cisco IOS process fails, for instance, users or troubleshooting personnel can access trace files using diagnostic mode to gather information related to the Cisco IOS failure. Trace files, however, are not a part of router operations, and can be erased without impacting the router's performance. |

Important Notes About auto-generated Directories

Important information about auto-generated directories include:

- auto-generated files on the bootflash: directory should not be deleted, renamed, moved, or altered in any way unless directed by Cisco customer support.



Note Altering auto-generating files on the bootflash: may have unpredictable consequences for system performance.

- Crashinfo files and files in the core and tracelogs directory can be deleted.

Flash Storage

Subpackages are installed to local media storage, such as flash. For flash storage, use the **dir bootflash:** command to list the file names.



Note Flash storage is required for successful operation of a router.

LED Indicators

For LED information on the router, see the LED section of the [ESR6300 Hardware Technical Manual](#).