Install the software

This chapter contains the following sections:

Install a software

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.

Licensing for Cisco 8000 Series Secure Routers

Cisco 8000 Series Secure Routers support platform-based licensing, a way of grouping licenses and devices based on platform-classes. A platform class is a hierarchical categorization based on the product family and place in the network. In this platform-based licensing model, Essentials and Advantage licenses are available. License portability is supported across devices within the same platform class and usage of the same license across different modes is also possible.

For more information, see Cisco 8000 Series Secure Routers Licensing.

Provisioning files

The consolidated package on a router consists of a collection of subpackages and a provisioning file titled `packages.conf`. To run the software, the usual method used is to boot the consolidated package, which is copied into memory, expanded, mounted, and run within memory. The provisioning file's name can be renamed but subpackage file's names cannot be renamed. The provisioning file and subpackage files must be kept in

the same directory. The provisioning file does not work properly if any individual subpackage file is contained within a different directory.

Note An exception to this is that if a new or upgraded module firmware package is subsequently installed, it need not be in the same directory as the provisioning file.

Configuring a router to boot, using the provisioning file packages.conf, is beneficial because no changes have to be made to the boot statement after the Cisco IOS XE software is upgraded.

File systems

The following table provides a list of file systems that can be seen on the Cisco 8100 Series Secure Routers.

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.
nvram:	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.
usb0:	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 usb0: port.

Use the **?** help option, or use the **copy** command in command reference guides, if you find a file system that is not listed in the table above.

Autogenerated file directories and files

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

Table 2: Autogenerated 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.
lost+found directory	This directory is created on bootup if a system check is performed. Its appearance is completely normal and does not indicate any issues with the router.
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 autogenerated directories

Important information about autogenerated directories include:

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

Note Altering autogenerating files on the bootflash: may have unpredictable consequences for system performance.

- Crashinfo, core, and trace files can be deleted.

Flash storage

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

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

Configuring the configuration register for autoboot

The configuration register can be used to change router behavior. This includes controlling how the router boots. Set the configuration register to 0x0 to boot into ROM, by using one of the following commands:

- In Cisco IOS configuration mode, use the **config-reg** 0x0 command.
- From the ROMMON prompt, use the **confreg** 0x0 command.

For more information about the configuration register, see Configuring a router to boot the consolidated package via TFTP using the boot command, on page 9.

Note Setting the configuration register to 0x2102 will set the router to autoboot the Cisco IOS XE software.

Note The console baud rate is set to 9600 after changing the **confreg** to 0x2102 or 0x0. If you cannot establish a console session after setting **confreg**, or garbage output appears, change the setting on your terminal emulation software to 9600.

LED indicators

For information on LEDs on the router, see the LED Indicators section of the Hardware Installation Guide for the Cisco 8100 Series Secure Routers.

How to install and upgrade the software

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.

Managing and configuring a consolidated package using copy and boot commands

To upgrade a consolidated package, copy the consolidated package to the **bootflash:** directory on the router using the **copy** command. After making this copy of the consolidated package, configure the router to boot using the consolidated package file.

The following example shows the consolidated package file being copied to the **bootflash:** file system via TFTP. The config register is then set to boot using **boot system** commands, and the **boot system** commands instruct the router to boot using the consolidated package stored in the **bootflash:** file system. The new configuration is then saved using the **copy running-config startup-config** command, and the system is then reloaded to complete the process.

```
Router# dir bootflash:
Directory of bootflash:/

915713  drwx            49152   Sep 4 2025 04:38:55 +00:00  tracelogs
654081  drwx             4096   Sep 3 2025 07:13:05 +00:00  .installer
19      -rw-               30   Sep 3 2025 07:04:12 +00:00  throughput_monitor_params
130819  drwx             4096   Sep 3 2025 07:04:09 +00:00  license_evlog
13      -rw-           143021   Sep 3 2025 07:04:08 +00:00  memleak.tcl
130817  drwx             4096   Sep 3 2025 07:04:01 +00:00  .prst_sync
12      -rwx             3050   Sep 3 2025 07:03:52 +00:00  mode_event_log
1046529  drwx             4096   Sep 3 2025 07:03:20 +00:00  sysboot
130832  drwx             4096  Aug 22 2025 04:16:36 +00:00  .product_analytics
44      -rw-        770581540  Aug 15 2025 03:44:43 +00:00
c81g2be-universalk9.17.18.01a.0.176.SSA.bin
392452  drwx             4096  Aug 15 2025 03:31:43 +00:00  .geo
43      -rw-             1426  Aug 15 2025 03:30:09 +00:00  .iomcu_autoupgd.log
42      -rw-         12028620  Aug 15 2025 03:27:35 +00:00
c81g2be_rel_rommon_1718_1r_20250717.SSA.pkg
21      -rw-        772960084  Aug 15 2025 03:26:56 +00:00
c81g2be-universalk9.2025-08-05_18.44_mingfli_0x2e_iomcu_upd.SSA.bin
130821  drwx             4096  Aug 15 2025 02:40:45 +00:00  pnp-tech
11      -rw-              255  Aug 15 2025 02:38:57 +00:00  .iox_dir_list
1046534  drwx             4096  Mar 28 2025 03:27:33 +00:00  .dbpersist
392449  drwx             4096  Mar 28 2025 03:25:27 +00:00  .rollback_timer
41      -rw-             6734  Mar 28 2025 03:25:07 +00:00  packages.conf
34      -rw-             6734  Mar 28 2025 03:24:43 +00:00
c81g2be-universalk9.17.17.01eftr3.20250305.for_Charon_MFG_Pilot_Build.SPA.conf
25      -rw-         83144848  Mar 28 2025 03:24:35 +00:00
c81g2be-rpboot.17.17.01eftr3.SPA.pkg
23      drwx             4096  Mar 28 2025 03:24:30 +00:00  .images
22      drwx             4096  Mar 28 2025 03:21:18 +00:00  iox_host_data_share
523266  drwx             4096  Mar 28 2025 03:21:14 +00:00  core
17      drwx             4096  Mar 28 2025 03:21:13 +00:00  .attrib
392451  drwx             4096  Mar 28 2025 03:20:57 +00:00  guest-share
915812  drwx             4096  Mar 28 2025 03:20:54 +00:00  onep
261635  drwx             4096  Mar 28 2025 03:20:54 +00:00  pnp-info
16      drwx             4096  Mar 28 2025 03:20:49 +00:00  virtual-instance
14      -rw-            34967  Mar 28 2025 03:20:44 +00:00  ios_core.p7b
15      -rw-             1939  Mar 28 2025 03:20:44 +00:00  trustidrootx3_ca_062035.ca
523265  drwx             4096  Mar 28 2025 03:20:08 +00:00  SHARED-IOX
261633  drwx             4096  Mar 28 2025 03:20:08 +00:00  pcap
30      -rw-        663396352   Mar 3 2025 14:12:26 +00:00
c81g2be-mono-universalk9.17.17.01eftr3.SPA.pkg
29      -rw-            49152   Mar 3 2025 14:10:18 +00:00
c81g2be-firmware_pse_si3470a.17.17.01eftr3.SPA.pkg
28      -rw-           200704   Mar 3 2025 14:10:18 +00:00
c81g2be-firmware_charon_mcu.17.17.01eftr3.SPA.pkg



Router# copy tftp: bootflash:
Address or name of remote host []? 172.17.16.81
Source filename []? auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin
Destination filename [c81g2be-universalk9.17.18.01a.SPA.bin]?
Accessing tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin...
Loading auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin from 172.17.16.81 (via
GigabitEthernet0/0/0):
[OK - 770579420 bytes]

770579420 bytes copied in 981.504 secs (785101 bytes/sec)

Router# dir bootflash:
Directory of bootflash:/
```

```
654081  drwx             4096   Sep 4 2025 06:46:09 +00:00  .installer
45      -rw-        770579420   Sep 4 2025 06:45:15 +00:00
c81g2be-universalk9.17.18.01a.SPA.bin
915713  drwx            49152   Sep 4 2025 06:31:00 +00:00  tracelogs
19      -rw-               30   Sep 3 2025 07:04:12 +00:00  throughput_monitor_params
130819  drwx             4096   Sep 3 2025 07:04:09 +00:00  license_evlog
13      -rw-           143021   Sep 3 2025 07:04:08 +00:00  memleak.tcl
130817  drwx             4096   Sep 3 2025 07:04:01 +00:00  .prst_sync
12      -rwx             3050   Sep 3 2025 07:03:52 +00:00  mode_event_log
1046529  drwx             4096   Sep 3 2025 07:03:20 +00:00  sysboot
130832  drwx             4096  Aug 22 2025 04:16:36 +00:00  .product_analytics
44      -rw-        770581540  Aug 15 2025 03:44:43 +00:00
c81g2be-universalk9.17.18.01a.0.176.SSA.bin
392452  drwx             4096  Aug 15 2025 03:31:43 +00:00  .geo
43      -rw-             1426  Aug 15 2025 03:30:09 +00:00  .iomcu_autoupgd.log
42      -rw-         12028620  Aug 15 2025 03:27:35 +00:00
c81g2be_rel_rommon_1718_1r_20250717.SSA.pkg
21      -rw-        772960084  Aug 15 2025 03:26:56 +00:00
c81g2be-universalk9.2025-08-05_18.44_mingfli_0x2e_iomcu_upd.SSA.bin
130821  drwx             4096  Aug 15 2025 02:40:45 +00:00  pnp-tech
11      -rw-              255  Aug 15 2025 02:38:57 +00:00  .iox_dir_list
1046534  drwx             4096  Mar 28 2025 03:27:33 +00:00  .dbpersist
392449  drwx             4096  Mar 28 2025 03:25:27 +00:00  .rollback_timer
41      -rw-             6734  Mar 28 2025 03:25:07 +00:00  packages.conf
34      -rw-             6734  Mar 28 2025 03:24:43 +00:00
c81g2be-universalk9.17.17.01eftr3.20250305.for_Charon_MFG_Pilot_Build.SPA.conf
25      -rw-         83144848  Mar 28 2025 03:24:35 +00:00
c81g2be-rpboot.17.17.01eftr3.SPA.pkg
23      drwx             4096  Mar 28 2025 03:24:30 +00:00  .images
22      drwx             4096  Mar 28 2025 03:21:18 +00:00  iox_host_data_share
523266  drwx             4096  Mar 28 2025 03:21:14 +00:00  core
17      drwx             4096  Mar 28 2025 03:21:13 +00:00  .attrib
392451  drwx             4096  Mar 28 2025 03:20:57 +00:00  guest-share
915812  drwx             4096  Mar 28 2025 03:20:54 +00:00  onep
261635  drwx             4096  Mar 28 2025 03:20:54 +00:00  pnp-info
16      drwx             4096  Mar 28 2025 03:20:49 +00:00  virtual-instance
14      -rw-            34967  Mar 28 2025 03:20:44 +00:00  ios_core.p7b
15      -rw-             1939  Mar 28 2025 03:20:44 +00:00  trustidrootx3_ca_062035.ca
523265  drwx             4096  Mar 28 2025 03:20:08 +00:00  SHARED-IOX
261633  drwx             4096  Mar 28 2025 03:20:08 +00:00  pcap
30      -rw-        663396352   Mar 3 2025 14:12:26 +00:00
c81g2be-mono-universalk9.17.17.01eftr3.SPA.pkg
29      -rw-            49152   Mar 3 2025 14:10:18 +00:00
c81g2be-firmware_pse_si3470a.17.17.01eftr3.SPA.pkg
28      -rw-           200704   Mar 3 2025 14:10:18 +00:00
c81g2be-firmware_charon_mcu.17.17.01eftr3.SPA.pkg


Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# boot system flash bootflash:c81g2be-universalk9.17.18.01a.SPA.bin
Router(config)# config-reg 0x2102
Router(config)# exit

Router# show run | include boot
boot-start-marker
boot system flash bootflash:c81g2be-universalk9.17.18.01a.SPA.bin
boot-end-marker

Router# copy run start
Destination filename [startup-config]? Building configuration...
[OK]
```

```
Router# reload
Proceed with reload? [confirm]
Sep  4 07:50:38.121: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: process
exit with reload chassis code


[BootramDDR v7 RELEASE SOFTWARE (P) compiled 2025-07-16T12:06:41-07:00]


System Bootstrap, Version 17.18(1r), RELEASE SOFTWARE
Copyright (c) 1994-2025 by cisco Systems, Inc.

Current image running: Boot ROM0

Last reset cause: LocalSoft
C8140-G2 platform with 4194304 Kbytes of main memory
......
Located bootflash:c81g2be-universalk9.17.18.01a.SPA.bin
############################################################################################################################################################################################################################################################################################################

Package header rev 3 structure detected
IsoSize = 690106368
Performing Integrity Check ...
Performing Signature Verification ...
Image validated
Sep  4 07:51:46.744: %SYS-4-ROUTER_RUNNING_BUNDLE_BOOT_MODE: R0/0: Warning: Booting with
bundle mode will be deprecated in the near future. Migration to install mode is required.
Sep  4 07:51:56.307: %BOOT-5-OPMODE_LOG: R0/0: binos: System booted in AUTONOMOUS mode

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           170 West Tasman Drive
           San Jose, California 95134-1706



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cisco C8140-G2 (1RU) processor with 1327599K/6147K bytes of memory.
Processor board ID FCW2913Y00D
Router operating mode: Autonomous
1 Virtual Ethernet interface
10 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
20270079K bytes of flash memory at bootflash:.


 WARNING: ** NOTICE **  The H.323 protocol is no longer supported from IOS-XE release 17.6.1.
 Please consider using SIP for multimedia applications.



Press RETURN to get started!

Router>enable
Router#show version
Cisco IOS XE Software, Version 17.18.01a
Cisco IOS Software [IOSXE], c81g2be Software (ARMV8EL_LINUX_IOSD-UNIVERSALK9-M), Version
17.18.1a, RELEASE SOFTWARE (fc5)
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or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: 17.18(1r)
Router uptime is 1 minute
Uptime for this control processor is 2 minutes
System returned to ROM by Reload Command
System image file is "bootflash:c81g2be-universalk9.17.18.01a.SPA.bin"
Last reload reason: Reload Command



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.
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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.


Technology Package License Information:

------------------------------------------------------------------
Technology     Type         Technology-package Technology-package
                            Current           Next Reboot
------------------------------------------------------------------
Smart License  Perpetual    essentials        essentials

The current crypto throughput level is 250000 kbps (Aggregate)


Smart Licensing Status: Smart Licensing Using Policy

cisco C8140-G2 (1RU) processor with 1327599K/6147K bytes of memory.
Processor board ID FCW2913Y00D
Router operating mode: Autonomous
1 Virtual Ethernet interface
10 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
20270079K bytes of flash memory at bootflash:.

Configuration register is 0x2102
```

Configuring a router to boot the consolidated package via TFTP using the boot command

```
Router# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#boot system
tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin
Router(config)#config-register 0x2102
Router(config)#exit

Router# show run | include boot
boot-start-marker
boot system tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin
boot-end-marker
diagnostic bootup level minimal
Router#

Router# copy running-config startup-config
Destination filename [startup-config]? Building configuration...
[OK]
```

```
Router# reload
Proceed with reload? [confirm]
Sep  3
[BootramDDR v7 RELEASE SOFTWARE (P) compiled 2025-07-16T12:06:41-07:00]


System Bootstrap, Version 17.18(1r), RELEASE SOFTWARE
Copyright (c) 1994-2025 by cisco Systems, Inc.

Current image running: Boot ROM0

Last reset cause: LocalSoft
C8140-G2 platform with 4194304 Kbytes of main memory
......
          IP_ADDRESS: 192.168.45.2
      IP_SUBNET_MASK: 255.255.255.0
     DEFAULT_GATEWAY: 192.168.45.1
         TFTP_SERVER: 172.17.16.81
           TFTP_FILE:
auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin/c81g2be-universalk9.17.18.01a.SPA.bin

        TFTP_MACADDR: A4:A5:84:4A:98:C0
          ETHER_PORT: 0
Downloading tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin
|---------+---------+---------+---------+---------|
..................................................
Located tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin
##################################################################################################################################################

Package header rev 3 structure detected
IsoSize = 690106368
Performing Integrity Check ...
Performing Signature Verification ...
Image validated
Sep  3 07:03:42.337: %SYS-4-ROUTER_RUNNING_BUNDLE_BOOT_MODE: R0/0: Warning: Booting with
bundle mode will be deprecated in the near future. Migration to install mode is required.
Sep  3 07:03:52.038: %BOOT-5-OPMODE_LOG: R0/0: binos: System booted in AUTONOMOUS mode

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           San Jose, California 95134-1706



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cisco C8140-G2 (1RU) processor with 1327599K/6147K bytes of memory.
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Press RETURN to get started!


Router>enable
Router#show version
Cisco IOS XE Software, Version 17.18.01a
Cisco IOS Software [IOSXE], c81g2be Software (ARMV8EL_LINUX_IOSD-UNIVERSALK9-M), Version
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documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: 17.18(1r)
Router uptime is 0 minutes
```

```
Uptime for this control processor is 1 minute
System returned to ROM by Reload Command
System image file is
"tftp://172.17.16.81/auto/tftp-users/user/c81g2be-universalk9.17.18.01a.SPA.bin"
Last reload reason: Reload Command



This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
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Technology Package License Information:

------------------------------------------------------------------
Technology     Type         Technology-package Technology-package
                            Current            Next Reboot
------------------------------------------------------------------
Smart License  Perpetual    essentials         essentials

The current crypto throughput level is 250000 kbps (Aggregate)


Smart Licensing Status: Smart Licensing Using Policy

cisco C8140-G2 (1RU) processor with 1327599K/6147K bytes of memory.
Processor board ID FCW2913Y00D
Router operating mode: Autonomous
1 Virtual Ethernet interface
10 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
20270079K bytes of flash memory at bootflash:.

Configuration register is 0x2102


Router#
```