# Introduction

This release notes contain information about downloading and installing Cisco IOS XE Release 16.6.x and its maintenance releases. It also provides new and changed information, hardware support, limitations and restrictions, and caveats for Cisco IOS XE Release 16.6.x and its maintenance releases.

We recommend that you view the field notices for this release to see if your software or hardware platforms are affected. If you have an account on Cisco.com, you can find field notices at http://www.cisco.com/en/US/customer/support/tsd_products_field_notice_summary.html .

If you do not have a Cisco.com login account, you can find field notices at http://www.cisco.com/en/US/support/tsd_products_field_notice_summary.html .

**Note** Cisco IOS XE Release 16.6.x is generally available for field deployment. However, we recommend that you validate and qualify Cisco IOS XE Release 16.6.x in a limited field trial with your specific network configuration requirements in order to ensure a smoother, faster, and successful field deployment.

This chapter includes the following sections:

# System Requirements

These sections describe the system requirements for Cisco IOS XE Everest 16.6.x:

## Memory Requirements for Cisco IOS XE Release 16.6.1

The following table displays the memory recommendations for the Cisco cBR Series Converged Broadband Routers with Cisco IOS XE Release 16.6.1 feature sets.

*Table 1: Memory Recommendations for the Cisco cBR Series Converged Broadband Routers*

| Feature Set | Cisco cBR Route Processor | Software Image | RecommendedFlash Memory | RecommendedDRAM Memory | RunsFrom |
|---|---|---|---|---|---|
| CISCO IOS-XE universalk9 | Cisco cBR8 (CBR) Processor | cbrsup-universalk9.03.15.00.S.155-2.S-std.SPA.bin | 8G | 48G | Bootflash: |
| CISCO IOS-XE CLC K9 | Cisco cBR8 (CYLONS) Processor | cbrsup-universalk9.03.15.00.S.155-2.S-std.SPA.bin | 8G | 16G | Supervisor |

# Memory Requirements for Cisco IOS XE Release 16.6.2

The following table displays the memory recommendations for the Cisco cBR Series Converged Broadband Routers with Cisco IOS XE Release 16.6.2 feature sets.

*Table 2: Memory Recommendations for the Cisco cBR Series Converged Broadband Routers*

| Feature Set | Cisco cBR Route Processor | Software Image | Recommended Flash Memory | Recommended DRAM Memory | Runs From |
|---|---|---|---|---|---|
| CISCO IOS-XE universalk9 | Cisco cBR8 (CBR) Processor | cbrsup-universalk9.03.15.00.S.155-2.S-std.SPA.bin | 8G | 48G | Bootflash: |
| CISCO IOS-XE CLC K9 | Cisco cBR8 (CYLONS) Processor | cbrsup-universalk9.03.15.00.S.155-2.S-std.SPA.bin | 8G | 16G | Supervisor |

# Hardware Supported for Cisco IOS XE Release 16.6.x

For detailed information about the hardware supported in Cisco IOS XE Release 16.6.x and its maintenance releases, see:

http://www.cisco.com/c/en/us/td/docs/cable/cbr/installation/guide/b_cbr_how_and_what_to_order.html.

**Note** The Cisco cBR chassis must house line cards with either Downstream DOCSIS 3.0 PHY modules or Downstream DOCSIS 3.1 PHY modules. Mixed configuration is not supported.

# Determining the Software Version for Cisco IOS XE Release 16.6.1

To determine the version of the Cisco IOS XE software running on your Cisco cBR Series Converged Broadband Routers, , log in and enter the **show version** EXEC command:

```
BXB-PSIT#show version
Load for five secs: 16%/3%; one minute: 21%; five minutes: 21%
Time source is NTP, 10:55:04.284 EDT Fri Jul 28 2017
Cisco IOS XE Software, Version 16.06.01
Cisco IOS Software [Everest], cBR  Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version
16.6.1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
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Compiled Sat 22-Jul-17 05:48 by mcpre


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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: IOS-XE ROMMON

BXB-PSIT uptime is 1 day, 14 hours, 41 minutes
Uptime for this control processor is 1 day, 14 hours, 45 minutes
System returned to ROM by reload at 10:59:52 EDT Tue Jul 25 2017
System restarted at 20:13:52 EDT Wed Jul 26 2017
System image file is "harddisk:cbrsup-universalk9.16.06.01.SPA.bin"
Last reload reason: PowerOn



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If you require further assistance please contact us by sending email to
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Cisco cBR-8 (CBR) processor (revision CBR) with 10430706K/6147K bytes of memory.
Processor board ID FXS2038Q3GE
16 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
50331648K bytes of physical memory.
7739391K bytes of eUSB flash at bootflash:.
97620247K bytes of SATA hard disk at harddisk:.
0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x0 (will be 0x2 at next reload)
```

```
BXB-PSIT#
```

# Determining the Software Version for Cisco IOS XE Release 16.6.2

To determine the version of the Cisco IOS XE software running on your Cisco cBR Series Converged Broadband Routers, , log in and enter the **show version** EXEC command:

```
BXB-PSIT#show version
Load for five secs: 16%/3%; one minute: 21%; five minutes: 21%
Time source is NTP, 10:55:04.284 EDT Fri Jul 28 2017
Cisco IOS XE Software, Version 16.06.02
Cisco IOS Software [Everest], cBR  Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version
16.6.1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
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Compiled Sat 22-Jul-17 05:48 by mcpre


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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: IOS-XE ROMMON

BXB-PSIT uptime is 1 day, 14 hours, 41 minutes
Uptime for this control processor is 1 day, 14 hours, 45 minutes
System returned to ROM by reload at 10:59:52 EDT Tue Jul 25 2017
System restarted at 20:13:52 EDT Wed Jul 26 2017
System image file is "harddisk:cbrsup-universalk9.16.06.01.SPA.bin"
Last reload reason: PowerOn



This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
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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.

Cisco cBR-8 (CBR) processor (revision CBR) with 10430706K/6147K bytes of memory.
Processor board ID FXS2038Q3GE
16 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
50331648K bytes of physical memory.
7739391K bytes of eUSB flash at bootflash:.
97620247K bytes of SATA hard disk at harddisk:.
```

```
OK bytes of WebUI ODM Files at webui:.

Configuration register is 0x0 (will be 0x2 at next reload)

BXB-PSIT#
```

# Microcode Software for Cisco IOS XE Release 16.6.1

This section describes microcode software that is supported for the Cisco cBR Series Converged Broadband Routers.

For more information, see the Upgrading the Cisco cBR Series Converged Broadband Routers for Cisco IOS XE Everest 16.6.x guide.

# Microcode Software for Cisco IOS XE Release 16.6.2

This section describes microcode software that is supported for the Cisco cBR Series Converged Broadband Routers.

*Table 3: Firmware Packages and Versions Supported in Cisco IOS XE Everest 16.6.2*

| Component | Programmable Device | Software Version | Upgrade Package |
|---|---|---|---|
| CBR-CCAP-SUP-160G | Rommon version | 16.6(1r)S | Auto upgrade |
| CBR-CCAP-SUP-160G | CPLD version | 16052011 | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G | CPLD version | 00000025 | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G | Rommon version | 2011.03.18 | Auto upgrade |
| CBR-CCAP-LC-40G | PSOC | 4.6 | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G Gemini-1 LC[1] | MicroController Version | 1.E | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G Gemini-1 LC[2] | Apollo version | 2.F | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G Gemini-2 LC[3] | MicroController Version | 3.19 | based318sp_with_166firmware.pkg |
| CBR-CCAP-LC-40G Gemini-2 LC[4] | Apollo version | 4.484B | based318sp_with_166firmware.pkg |
| Node | U-Boot | Feb 16 2017 - 09:03:06 +0800 | Upgrade is not required |
| Node | IOFPGA | 0x0252 | Upgrade is not required |
| Remote PHY Compact Shelf RPD | U-Boot | 2016.01(Apr 12 2017 - 09:13:28 +0800) | Upgrade is not required |

| Component | Programmable Device | Software Version | Upgrade Package |
|---|---|---|---|
| Remote PHY Compact Shelf RPD | IOFPGA | 0x0354 | Upgrade is not required |
| Remote PHY Compact Shelf PSIO | CPLD version | 9 | Upgrade is not required. Check with `show group info`. |

[1] CBR-D30-DS-MOD
[2] CBR-D30-DS-MOD
[3] CBR-D31-DS-MOD
[4] CBR-D31-DS-MOD

For more information, see Upgrading the Cisco cBR Series Converged Broadband Routers for Cisco IOS XE Everest 16.6.x guide.

# Feature Support

Cisco IOS XE software is packaged in feature sets that consist of software images that support specific platforms. The feature sets available for a specific platform depend on which Cisco IOS XE software images are included in a release. Each feature set contains a specific set of Cisco IOS XE features.

⚠

**Caution**    Cisco IOS XE images with strong encryption (including, but not limited to 168-bit [3DES] data encryption feature sets) are subject to U.S. government export controls and have limited distribution. Strong encryption images to be installed outside the United States are likely to require an export license. Customer orders may be denied or subject to delay because of U.S. government regulations. When applicable, the purchaser or user must obtain local import and use authorizations for all encryption strengths. Please contact your sales representative or distributor for more information, or send an e-mail to export@cisco.com.

# New Software Features in Cisco IOS XE Everest 16.6.2

There are no new software features in Cisco IOS XE Everest 16.6.2.

# New Software Features in Cisco IOS XE Everest 16.6.1

### BFS QAM Configuration

The BFS provides a mechanism for a standardized downloading of applications, games, images, and other data formats required by the applications. The BFS QAM enables the router to transfer the broadcast data from an EC to the target platform such as a set-top unit.

### Expanded GQI Protocol Support

Cisco cBR-8 routers support the Generic QAM Interface (GQI) version 1, version 1 Extension, and version 2. The GQI v1 Extension provides a more neutral distribution path to non-cisco SRM products. This version

supports type-2 commands, three announce messages, and offers a filtering mechanism to alleviate flooding the SRM with events. GQIv1 extension also supports more than 255 QAM carriers on each LED.

### Remote PHY DOCSIS 3.1 OFDM Channel Configuration

Cisco cBR routers support DS OFDM channels in an R-PHY system. The OFDM-channel-support includes one OFDM channel for each Remote PHY device (RPD) with a channel bandwidth up to 192 MHz and the modulation up to 4096 QAM.

### Capped License Enforcement

The capped license enforcement feature allows you to set a limit to the number of licenses for each licensed feature on Cisco cBR-8.

### Dynamic Multicast Replication Session

When users enable IPTV service on the Cisco cBR routers, to enhance the performance, the Cisco cBR routers support caching of dynamic multicast sessions, provide faster multicast forwarding, and provides faster and efficient IP Communicator messages.

### Remote PHY PowerKey VOD

The line cards in R-PHY mode on Cisco cBR-8 supports session-based PowerKey VOD. PowerKEY VOD allows the operator to provide secure, encrypted video streams to a particular subscriber over the RF plant.

### DOCSIS 3.1 Upstream

This feature supports DOCSIS 3.1 upstream on Cisco cBR-8 router. It includes the support for OFDMA channel, OFDMA channel bonding, upstream profile selection, upstream path selection, and so on.

### DOCSIS 3.1 Downstream Resiliency for OFDM Channel

This feature supports the DOCSIS 3.1 downstream resiliency for OFDM channel. When the cable modem reports RF channel failure, downstream resiliency will take corresponding actions.

### D3.1: Multiple OFDM channels per port: 16 per LC

This allows the profile override to be specified for a particular downstream OFDM channel. Thus with 2 OFDM downstream channels on a single CM, each channel can have a unique profile override.

# New Software Features in Cisco IOS XE Everest 16.6.2

There are no new software features in Cisco IOS XE Everest 16.6.2.

# Modified Software Features in Cisco IOS XE Everest 16.6.1

### Lawful Intercept

The maximum value of cTap2MediationTimeout is updated to 260640 minutes.

### Cisco Remote PHY Out-of-Band

Cisco RPD 2.1 system supports OOB 55-2. The OOB 55-2 system has a scheduled TDMA upstream, which is intolerant to packet network latency.

## Modified Software Features in Cisco IOS XE Everest 16.6.2

There are no modified software features in Cisco IOS XE Everest 16.6.2.

# MIBs

To locate and download MIBs for selected platforms, Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL:

https://mibs.cloudapps.cisco.com/ITDIT/MIBS/servlet/index

## New and Changed MIB Information in Cisco IOS-XE Everest 16.6.1

The DOCS-IF31-MIB and CISCO-DOCS-EXT-MIB was changed in Cisco IOS-XE Everest 16.6.1.

## New and Changed MIB Information in Cisco IOS-XE Everest 16.6.2

There are no new or changed MIB information in Cisco IOS-XE Everest 16.6.2.

# Best Practice Manual of Procedure for Cisco IOS XE Everest 16.6.x Upgrade

See the Upgrading the Cisco cBR Series Converged Broadband Routers for Cisco IOS XE Everest 16.6.x guide.

# Cisco cBR Series Converged Broadband Routers Documentation References

Go to the following link to access the technical documents:

http://www.cisco.com/c/en/us/support/video/cbr-series-converged-broadband-routers/tsd-products-support-series-home.html

# Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation.

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the What's New in Cisco Product Documentation RSS feed. The RSS feeds are a free service.