



Introduction

This release notes contain information about downloading and installing Cisco IOS Release 12.2(33)SCG. It also provides new and changed information, hardware support, limitations and restrictions, and caveats for Cisco IOS Release 12.2(33)SCG.

For software caveats that apply to the Cisco IOS Release 12.2(33)SCG on the Cisco uBR7200 series routers, see the corresponding release notes for Cisco uBR7200 Series Routers.

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 Release 12.2(33)SCG is generally available for field deployment. However, we recommend that you validate and qualify Cisco IOS Release 12.2(33)SCG 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, page 1](#)
- [New and Changed Information, page 10](#)
- [MIBs, page 27](#)
- [Limitations and Restrictions, page 27](#)
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System Requirements

These sections describe the system requirements for Cisco IOS Release 12.2(33)SCG:

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- [Hardware Supported, page 2](#)
- [Verifying the Software Version, page 5](#)
- [Upgrading to a New Software Release, page 5](#)

- [Microcode Software, page 6](#)
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Memory Requirements

This section describes the memory requirements for Cisco IOS Release 12.2(33)SCG.



Note

Effective with Cisco IOS Release 12.2(33)SCG, the image size is greater than 65 MB and requires TFTP servers capable of downloading large images.

[Table 1-1](#) displays the memory recommendations for the Cisco uBR10012 universal broadband router with Cisco IOS Release 12.2(33)SCG feature sets.

Table 1-1 *Memory Recommendations for the Cisco uBR10012 Router*

Feature Set	Cisco uBR10012 Route Processor	Software Image	Recommended Flash Memory	Recommended DRAM Memory ¹	Runs From
DOCSIS Base 3 DES image and Lawful Intercept for Cisco PRE4 ²	PRE4	ubr10k4-k9p6u2-mz	128 MB	2.0 GB	RAM
DOCSIS BPI and Lawful Intercept for Cisco PRE4	PRE4	ubr10k4-k8p6u2-mz	128 MB	2.0 GB	RAM

1. DRAM memory is not configurable on the Cisco uBR10012 router.
2. PRE = Processor Routing Engine

Hardware Supported

The following sections list the hardware supported on various Cisco IOS Releases:

- [Cable Interface Line Cards Supported, page 2](#)
- [Microcode Software, page 6](#)
- [Other Hardware Supported, page 5](#)

Cable Interface Line Cards Supported

[Table 1-2](#) provides information about the supported cable interface line cards and processor engines in Cisco IOS Release 12.2(33)SCG.

Table 1-2 *Supported Cable Interface Line Cards and Processor Engines*

Supported Line Card	Supported Processor Engine
Cisco UBR-MC5X20H—maximum 8	PRE4
Cisco UBR-MC20X20—maximum 8	PRE4
Cisco uBR-MC3GX60V—maximum 8	PRE4

OIR of Cable Interface Line Cards on the Cisco uBR10012 Universal Broadband Router

The Cisco uBR10012 series universal broadband routers support online insertion and removal (OIR) of cable interface line cards only when exchanging cable interface line cards of the same type.

Effective with Cisco IOS Release 12.2(33)SCC, OIR compatibility between the Cisco uBR10-MC5X20 and the Cisco UBR-MC20X20V line cards is supported. The OIR compatibility procedure translates the configuration from one format to another during the OIR process.

Prerequisites for Performing OIR

- Save the line card configuration before starting the OIR.
- Perform OIR when the CMTS is up and running.
- Change the standby card (if available) to HOT state.
- Save the startup configuration file before any reload of the system (if there is a need to reload), after a successful OIR.

Restrictions During OIR Process



Note

The Cisco uBR-MC3GX60V line card does not support OIR compatibility. To upgrade to the Cisco uBR-MC3GX60V line card from the Cisco uBR10-MC5X20H or Cisco UBR-MC20X20V line cards, you must remove the existing configuration of the line card using the **no card** command and create a new configuration for the Cisco uBR-MC3GX60V line card.

- OIR upgrade cannot be performed when the standby PRE is being loaded.
- OIR downgrade from the Cisco UBR-MC20X20V line card to the Cisco uBR10-MC5X20 line card may fail in certain scenarios when the frequency and RF power settings on the Cisco UBR-MC20X20V line card are incompatible with the Cisco uBR10-MC5X20 card.

Performing an OIR of a Cable Interface Line Card

- Step 1** In global configuration mode, enter the **cr10k card oir-compatibility** command for the cable interface line card to perform an OIR, as shown in the following example:

```
Router(config)# cr10k card 8/0 oir-compatibility
```

This command helps preserve the configuration and performs some internal synchronization to make sure that the OIR runs successfully.



Note

Effective with Cisco IOS Release 12.2(33)SCC, OIR compatibility is automatically ON for all slots of the line cards.

- Step 2** Save the configuration to ensure the transition, as shown in the following example:

```
Router# copy running-config startup-config
```

- Step 3** Turn the power off to the line card using the **cable power off** command for the slot that is being replaced, as shown in the following example:

```
Router# cable power off 8/0
Line Card 8/0 is POWERED OFF
```

This powers off the line card gracefully.

Step 4 Before removing the card, verify that the proper grounding instructions have been followed for the card.

Step 5 Remove the line card.

Step 6 Replace it with the new line card in the slot.

Step 7 Enter the **cable power on** command to power up the line card, as shown in the following example:

```
Router# cable power on 8/0
```

Step 8 Enter the **show interface cable** command and verify that the card and line protocol is “up” as shown in the following example:

```
Router# show interface cable 8/0/0
```

```
Cable8/0/0 is up, line protocol is up
Hardware is BCM3210 ASIC, address is 000a.13e8.1ca8 (bia 000a.13e8.1a60)
Internet address is 10.1.1.3/24
MTU 1500 bytes, BW 27000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
Encapsulation, loopback not set, keepalive not set
ARP type: ARPA, ARP Timeout 04:00:00
Last input 4d07h, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Queuing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 1834000 bits/sec, 2385 packets/sec
5 minute output rate 1982000 bits/sec, 2431 packets/sec
 24461542 packets input, 2348214388 bytes, 0 no buffer
  Received 1979 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
24854257 packets output, 2536222931 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
```

Step 9 Enter the **show controllers cable** command and verify the hardware status, as shown in the following example:

```
Router# show controllers cable 8/0/0
```

```
Cable8/0/0 JIB hardware status:
  JIB Downstream port  Enabled
  JIB Upstream  port 0  Enabled
  JIB Upstream  port 1  Enabled
  JIB Upstream  port 2  Enabled
  JIB Upstream  port 3  Enabled
Cable8/0/0 Upconverter is Enabled Output is Enabled
Model: 74-3153-02 Serial Number: 0WAV090200A1 CLEI Code: FFFFFFFF
HW Rev: PC2D0109 SW Rev: 203, NVRAM Rev: 021 ECI numb
```



Note To verify the hardware status of the Cisco UBRMC20X20V cable line cards, it is recommended that you run the **show controller integrated-cable 8/0/0 brief** command instead of the **show controllers cable** command.

Step 10 Verify the configuration with the **show running-configuration** command.

Other Hardware Supported

Table 1-3 provides information about other hardware supported in Cisco IOS Release 12.2SC.

Table 1-3 Other Hardware Supported in Cisco IOS Release 12.2SC

Hardware	Cisco uBR10012 Router	Minimum Cisco IOS Release
Cisco Wideband SIP and Cisco Wideband SPA	Yes	Cisco IOS Release 12.2(33)SCA
Cisco uBR10012 universal broadband router DTCC card	Yes	Cisco IOS Release 12.2(33)SCB
Cisco uBR10012 universal broadband router TCC+ card	Yes	Cisco IOS Release 12.2(33)SCA
Cisco 10000 Series SIP-600 and WAN SPAs (5-Port Gigabit Ethernet and the 1-Port 10 Gigabit Ethernet SPAs)	Yes	Cisco IOS Release 12.2(33)SCB
Cisco 10000 Series SIP-600 with the Cisco Wideband SPA	Yes	Cisco IOS Release 12.2(33)SCB

Verifying the Software Version

To determine the version of the Cisco IOS software running on your Cisco universal broadband router, log in to the router and enter the **show version EXEC** command:

```
Router# show version
```

```
Cisco IOS Software, 10000 Software (UBR10K4-K9P6U2-M), Version 12.2(33)SCG
EXPERIMENTAL IMAGE ENGINEERING C10K_WEEKLY BUILD, synced to
MAYFLOWER_BASE_FOR_V122_33_SF_THROTTLE
Copyright (c) 1986-2012 by Cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 12.4(12.2r)T, RELEASE SOFTWARE (fc1)
```

Upgrading to a New Software Release

For information about selecting a new Cisco IOS software release, see "How to Choose a Cisco IOS Software Release" at the following location:

http://www.cisco.com/en/US/products/sw/iosswrel/ps1834/products_tech_note09186a00800fb9d9.shtml

For information about upgrading the Cisco universal broadband routers, see the *Software Installation and Upgrade Procedures* document at the following location:

http://www.cisco.com/en/US/products/hw/routers/ps133/products_tech_note09186a0080094c07.shtml

For Cisco IOS upgrade ordering instructions, see:

http://www.cisco.com/web/ordering/or13/order_customer_help_high_level_listing.html

To choose a new Cisco IOS software release based on information about defects that affect that software, use Cisco Bug Search Tool (BST) at the following URL:

<https://tools.cisco.com/bugsearch/>

Microcode Software

This section describes microcode software that is supported for the Cisco uBR10012 router.

SPA FPD Image Packages for the Cisco uBR10012

The field-programmable device (FPD) image packages are used to update the shared port adapter (SPA) FPD images. If a discrepancy exists between a SPA FPD image and the Cisco IOS image that is running on the router, the SPA is deactivated until this discrepancy is resolved.


Note

The maximum time to upgrade the FPD image on one SPA is 2 minutes. The total FPD upgrade time depends on the number of SPAs.


Note

The FPD image package that is used to upgrade SPAs on a router that runs Cisco IOS Release 12.2(33)SCG is theubr10k-fpd-pkg.122-33.SCG pkg file.

Table 1-4 Cisco IOS Release 12.2SC Shared Port Adapter FPD Image Package Contents

Supported SPAs	FPD ID	FPD Component Name	FPD Component Version	Minimum Required Hardware Version
5-Port Gigabit Ethernet SPA	1	I/O FPGA	1.10	0.0
1-Port 10-Gigabit Ethernet SPA	1	I/O FPGA	1.9	0.0
Cisco Wideband SPA	1	BLAZE FPGA	1285.1446	0.0

Upgrading from PRE2 to PRE4 Processors


Note

Starting with Cisco IOS Release 12.2(33)SCG, only PRE4 is supported.

A cold start of the router is required for an upgrade to a PRE4 from a PRE2 on a Cisco uBR10012 universal broadband router from a different release train, such as Cisco IOS Release 12.3(23)BC or other BC releases.

For more information, see *Cisco uBR10012 Universal Broadband Router Performance Routing Engine Module* at:

http://www.cisco.com/en/US/docs/interfaces_modules/cable/performance_routing_engine/installation/guide/pre5096.html

Upgrading from Cisco IOS Release 12.3BC or Earlier Cisco IOS Software Release

For more information, see the *Cisco uBR10012 Router Release Notes for Cisco IOS Release 12.2(33)SCA* at the following URL:

http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_release_notes_list.html

Feature Support

Cisco IOS 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 software images are included in a release. Each feature set contains a specific set of Cisco IOS features.



Caution

Cisco IOS 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.

Cisco CMTS User Documentation References for Cisco IOS Release 12.2SC

Table 1-5 provides information about the important user guides in Cisco IOS Release 12.2SC.

Table 1-5 Important Guides in Cisco IOS Release 12.2SC

Guide	Description
Documentation Roadmap	Describes a set of Cisco CMTS documents and contains links to the referenced documents. Go to the following link to access this document: http://www.cisco.com/c/en/us/td/docs/cable/cmts/ubr10012/roadmap/u10krdmp.html
Command Reference	Provides information about the software commands used to configure a Cisco CMTS. Includes command syntax, default value, value range, command mode, usage guidelines, and examples. Go to the following link to access this document: http://www.cisco.com/c/en/us/td/docs/cable/cmts/cmd_ref/b_cmts_cable_cmd_ref.html
Design Guides	Describes how to plan, install, and configure a Cisco CMTS. Contains information about the supported technologies, interfaces and protocols and can also contain special installation considerations, network diagrams, example applications, system design, and environmental recommendations. Go to the following link to access this document set: http://www.cisco.com/c/en/us/support/video/ubr10000-series-universal-broadband-routers/products-implementation-design-guides-list.html

Guide	Description
Install and Upgrade Guides	<p>Provides step-by-step instructions for installing or upgrading a Cisco CMTS. Also includes line card installation guides, shipping documents, safety information, and quick-start guides for experienced users.</p> <p>Go to the following link to access this document set: http://www.cisco.com/c/en/us/support/video/ubr10000-series-universal-broadband-routers/products-installation-guides-list.html</p> <p>Important guides in this section are:</p> <ul style="list-style-type: none"> • Cisco uBR10012 Universal Broadband Router Hardware Installation Guide • Cisco uBR10012 Universal Broadband Router SIP and SPA Hardware Installation Guide
Configuration Guides	<p>Contains detailed, step-by-step instructions for configuring a Cisco CMTS, including software feature guides, configuration examples, network diagrams, and technical concepts.</p> <p>Go to the following link to access this document set: http://www.cisco.com/en/US/products/hw/cable/ps2209/products_installation_and_configuration_guides_list.html</p> <p>Important guides in this section are:</p> <ul style="list-style-type: none"> • Cisco uBR10012 Universal Broadband Router SIP and SPA Software Configuration Guide • Cisco IOS CMTS Cable Software Configuration Guide, Release 12.2SC
Error and System Messages	<p>Lists error and system messages for a Cisco CMTS, including any recommended user action for each message.</p> <p>Go to the following link to access this document: http://www.cisco.com/en/US/docs/cable/cmts/system/message/uberrmes.html</p>
Troubleshooting Guides	<p>Provides problem-solving techniques for a Cisco CMTS, including methods to identify problems based on symptoms and recommended actions for resolution.</p> <p>Go to the following link to access this document set: http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_troubleshooting_guides_list.html</p> <p>Important guides in this section are:</p> <ul style="list-style-type: none"> • http://www.cisco.com/c/en/us/td/docs/cable/cmts/ubr10012/troubleshooting/guide_SC_HW/u10trbk_SC.html • Online Offline Diagnostics - Field Diagnostics on Cisco uBR10012 Router User's Guide

Cisco Feature Navigator

The Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or by feature set (software image). Under the release section, you can compare Cisco IOS software releases side-by-side to display both the features unique to each software release and the features that the releases have in common.

To access the Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check verifies that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password is e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<https://tools.cisco.com/RPF/register/register.do>

The Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

<http://tools.cisco.com/ITDIT/CFN/jsp/index.jsp>

For frequently asked questions about the Cisco Feature Navigator, see the FAQs at the following URL:

<http://www.cisco.com/support/FeatureNav/FNFAQ.html>

Determining Which Software Images Support a Specific Feature

To identify the software images (feature sets) in Cisco IOS Release 12.2(33)SC that support a specific feature:

-
- Step 1** Go to the Cisco Feature Navigator home page. Enter your Cisco.com login.
 - Step 2** Click **Search by Feature**.
 - Step 3** To find a feature, use either **Filter by full or partial feature name** or search for available features in alphabetical order. Either a list of features that match the search criteria or a list of features that begin with the number or letter selected from the ordered list is displayed in the text box.
 - Step 4** Select a feature from the Available Features pane, and click **Add** to add a feature to the Selected Features pane.



Note To learn more about a feature in the list, click **Show Descriptions**.

Repeat this step to add additional features. A maximum of 20 features can be chosen for a single search.

- Step 5** Click **Continue** when you are finished selecting features.
 - Step 6** From the Major Release drop-down menu, choose **12.2SC**.
 - Step 7** From the Release drop-down menu, choose the appropriate maintenance release.
 - Step 8** From the Platform Family drop-down menu, select the appropriate hardware platform. The **Search Results** table lists all the software images (feature sets) that support the selected feature.
-

Determining Which Features Are Supported in a Specific Software Image

To determine the features supported in a specific software image (feature set) in Cisco IOS Release 12.2(33)SC:

-
- Step 1** Go to the Cisco Feature Navigator home page. Enter your Cisco.com login.
 - Step 2** Click **Compare Images**.
 - Step 3** From the Software drop-down menu in the **Select First Image Parameters** pane, choose **IOS**.

- Step 4** From the Major Release drop-down menu, choose **12.2SC**.
- Step 5** From the Release Number drop-down menu, choose the appropriate maintenance release.
- Step 6** From the Platform Family drop-down menu, choose the appropriate hardware platform.
- Step 7** From the Feature Set drop-down menu, choose the appropriate feature set. The **Search Results** table lists all the features that are supported by the selected feature set (software image).
-

New and Changed Information

The following sections list the new and modified hardware and software features supported on the Cisco uBR10012 universal broadband routers in Cisco IOS Release 12.2(33)SCG:

- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG7, page 10](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG6, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG5, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG4, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG3, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG2, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG1, page 11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCG, page 11](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG7, page 11](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG6, page 11](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG5, page 12](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG4, page 12](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG3, page 12](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG2, page 13](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG1, page 14](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCG, page 15](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCG5, page 22](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCG1, page 22](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCG, page 23](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCG1, page 27](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCG, page 27](#)

New Hardware Features in Cisco IOS Release 12.2(33)SCG7

There are no new hardware features in Cisco IOS Release 12.2(33)SCG7.

New Hardware Features in Cisco IOS Release 12.2(33)SCG6

There are no new hardware features in Cisco IOS Release 12.2(33)SCG6.

New Hardware Features in Cisco IOS Release 12.2(33)SCG5

There are no new hardware features in Cisco IOS Release 12.2(33)SCG5.

New Hardware Features in Cisco IOS Release 12.2(33)SCG4

There are no new hardware features in Cisco IOS Release 12.2(33)SCG4.

New Hardware Features in Cisco IOS Release 12.2(33)SCG3

There are no new hardware features in Cisco IOS Release 12.2(33)SCG3.

New Hardware Features in Cisco IOS Release 12.2(33)SCG2

There are no new hardware features in Cisco IOS Release 12.2(33)SCG2.

New Hardware Features in Cisco IOS Release 12.2(33)SCG1

There are no new hardware features in Cisco IOS Release 12.2(33)SCG1.

New Hardware Features in Cisco IOS Release 12.2(33)SCG

There are no new hardware features in Cisco IOS Release 12.2(33)SCG.

New Software Features in Cisco IOS Release 12.2(33)SCG7

There are no new hardware features in Cisco IOS Release 12.2(33)SCG7.

New Software Features in Cisco IOS Release 12.2(33)SCG6

This section describes the new cable software feature in Cisco IOS Release 12.2(33)SCG6:

Standby DTCC card failure alarm

Effective with Cisco IOS Release 12.2(33) SCG6, if the clock status of the standby DTCC reference is lost or bad, a warning message is reported.

The Standby DTCC card failure alarm feature allows the IOS to check the status of the standby DTCC periodically and report a warning message. If the clock status of the standby DTCC reference is lost or bad, the following message is displayed:

```
“%UBR10KTCC-4-BADCLK_STANDBY_TCC: No available external clock reference on the standby DTCC card “
```

For more details, see Cisco IOS CMTS Cable System Messages Guide at the URL:
<http://www.cisco.com/en/US/docs/cable/cmts/system/message/uberrchap3.html>

New Software Features in Cisco IOS Release 12.2(33)SCG5

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCG5:

MIB Enhancements for USCB CM

In Cisco IOS Release 12.2(33)SCG5, MIB enhancements for upstream channel bonding group (USCB) cable modems (CMs) is implemented. The MIB enhancement provides Transmit Channel Set (TCS) and service flow information.

For more information, see Cisco CMTS Universal Broadband Router Series MIB Specifications Guide at:

http://www.cisco.com/en/US/docs/cable/cmts/mib/12_2sc/reference/guide/ubrmibv5.html

Upstream Drop Classifier

A set of matching criteria is applied by the cable modems to packets to determine if a packet should be dropped. This set of matching criteria when applied to upstream traffic, is called the Upstream Drop Classifier (UDC). The CMTS only enables the UDC feature on the cable modems.

Effective with Cisco IOS Release 12.2(33)SCG5, the UDC feature can be enabled for all cable modems on any interface of a Cisco uBR10012 or Cisco 7200 Series router by using the **cable udc-capability** command in interface configuration mode.

The following command was introduced or modified:

- **cable udc-capability**
- **show cable modem**

For more information on the UDC feature, refer to the *Configuring Upstream Cable Interface Features on the Cisco CMTS Routers* guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_upstrm_if.html

New Software Features in Cisco IOS Release 12.2(33)SCG4

There are no new software features in Cisco IOS Release 12.2(33)SCG4.

New Software Features in Cisco IOS Release 12.2(33)SCG3

There are no new software features in Cisco IOS Release 12.2(33)SCG3.

New Software Features in Cisco IOS Release 12.2(33)SCG2

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCG2.

Cable Modem System Description

The **show cable modem sysDescr** command, introduced in Cisco IOS Release 12.2(33)SCG2, provides the system description of a single cable modem without enabling remote query on the Cisco CMTS router. The **show cable modem sysDescr** command displays result for IPv4 cable modems only.

In Cisco IOS Release 12.2(33)SCG1 and earlier, you cannot view the system description of a single cable modem. Instead, you can view system descriptions of all cable modems after enabling remote query on the Cisco CMTS router using the **cable modem remote-query** command in global configuration mode. This might impact system performance because it queries all the cable modems connected to the Cisco CMTS router.

For more details about the **show cable modem sysDescr** command, see the *Cisco IOS CMTS Cable Command Reference* at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_16_show_cable_m_to_show_cable_u.html

Copy and Paste Support for TDMA to A-TDMA Upgrade

To have the 6400 kHz channel width accepted by pasting the configuration only once, Cisco IOS Release 12.2(33)SCG2 introduces the Copy and Paste Support for TDMA to A-TDMA Upgrade feature. If 6400 kHz is set as channel width in TDMA mode or mixed TDMA/A-TDMA mode, DOCSIS mode automatically changes to A-TDMA-only (DOCSIS 2.0) mode.

The following commands were modified:

- **cable upstream channel-width**
- **cable upstream docsis-mode**

For more information, see *Configuring Upstream Cable Interface Features on the Cisco CMTS Routers* configuration guide at:

- http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_upstrm_if.html

Downstream Wideband Resiliency Trap

Downstream Wideband Resiliency Trap feature enables SNMP traps for Wideband Resiliency-related events and setting of the trap interval.

The following commands were introduced or modified:

- **cable resiliency traps-interval**
- **snmp-server enable traps docsis-resil**
- **snmp-server host traps docsis-resil**

For more information, see the *Wideband Modem Resiliency* feature guide at:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_wm_resiliency.html

The following MIB tables and objects are added for the wideband resiliency feature. These MIB objects can be queried when the Cisco CMTS detects a RF channel impairment:

- **cdxWBResilRFChangeDampenTime**

- cdxWBResilRFChangeTriggerPercentage
- cdxWBResilRFChangeTriggerCount
- cdxWBResilRFChangeTriggerMoveSecondary

The following traps have been added:

- cdxWBResilRFDown
- cdxWBResilRFUp
- cdxWBResilCMPartialServiceNotif
- cdxWBResilCMFullServiceNotif
- cdxWBResilEvent

For more information, see *Cisco CMTS Universal Broadband Router Series MIB Specifications Guide 12.2SC* at:

http://www.cisco.com/en/US/docs/cable/cmts/mib/12_2sc/reference/guide/ubrmibv5.htm

Physical Channel Interface Mapping

This feature provides an SNMP interface to access information between the physical channel interface and the primary channel interface. The following MIB objects of the CISCO-DOCS-EXT-MIB object can be queried for information about the physical channel interface and the primary channel interface.

- cdxRFtoPrimaryChannelMappingTable
- cdxPrimaryChanneltoRFMappingTable

For more information, see *Cisco CMTS Universal Broadband Router Series MIB Specifications Guide 12.2SC* at:

http://www.cisco.com/en/US/docs/cable/cmts/mib/12_2sc/reference/guide/ubrmibv5.html

Reload PXF in the Standby PRE Periodically

Reload PXF in the Standby PRE feature fixes most of the double-hit IRAM parity errors by reloading the Parallel Express Forwarding (PXF) in the standby PRE. The PXF can be reloaded periodically, or by a process based on timeout events, in the standby PRE.

The following new command was added:

periodic rel-pxf enable

For more information, see Route Processor Redundancy feature guide at:

<http://www.cisco.com/en/US/docs/cable/cmts/feature/u10krpr.html>

New Software Features in Cisco IOS Release 12.2(33)SCG1

Load Balancing for the Cisco uBR-MC3GX60V Line Card and Cisco Wideband SPA

Effective with Cisco IOS Release 12.2(33)SCG1, the Cisco uBR-MC3GX60V line card and up to five Cisco Wideband SPAs can be configured to the same LBG. You can:

- Include all the downstreams and upstreams of the SPA cards and the Cisco uBR-MC3GX60V line card in the same LBG.

- Configure the MAC domain to include the SPA cards and the Cisco uBR-MC3GX60V line card.
- Configure the fiber node to include all the downstreams and upstreams of the SPA cards and the Cisco uBR-MC3GX60V line card.

For more information about this feature, see the Load Balancing, Dynamic Channel Change, and Dynamic Bonding Change on the Cisco CMTS Routers guide at:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_load-bal_dcc_support_TSD_Island_of_Content_Chapter.html

Multiple IAPDs in a Single Advertise

To set up multiple, logically-separate networks for a cable modem, multiple Identity Association for Prefix Delegations (IA_PDs) are required. Cisco IOS Release 12.2(33)SCG1 supports assignment of multiple IAPDs to a cable modem subscriber in a single Advertise or Reply message. When a CPE requests Identity Association for Non-temporary Address (IA_NA) or IA_PD, the Cisco Network Registrar determines the number of IA_NAs, IA_PDs, or both IA_NAs and IA_PDs, and sends the addresses in response.

The output of the **show cable modem ipv6** command is changed to support the Multiple IAPDs in a Single Advertise feature.

For more information about the Multiple IAPDs in a Single Advertise feature, see the IPv6 on Cable feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_ipv6_support_TSD_Island_of_Content_Chapter.html

For more information on the command, see *Cisco IOS CMTS Cable Command Reference* at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_16_show_cable_m_to_show_cable_u.html

New Software Features in Cisco IOS Release 12.2(33)SCG

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCG.

Background Synchronization

To improve Simple Network Management Protocol (SNMP) performance, Cisco IOS Release 12.2(33)SCG introduces the Background Synchronization feature that synchronizes the SNMP MIB information between the line card and the route processor (RP). When SNMP queries are sent to the Cisco CMTS routers, the Cisco CMTS router retrieves the data from the route processor. The interprocess communication (IPC) is not used to retrieve the information, thus improving SNMP performance.

The following commands were introduced or modified:

- **cable bgsync**
- **cable bgsync active**
- **clear cable bgsync counters**
- **show cable bgsync**

For more information, see Cisco CMTS Universal Broadband Router Series MIB Specifications Guide 12.2SC:

- http://www.cisco.com/en/US/docs/cable/cmts/mib/12_2sc/reference/guide/ubrmibv5.html

DOCSIS 3.0 DSG MDF Support

The DOCSIS 3.0 DSG Multicast DSID Forwarding (MDF) feature uses DSG DA-to-DSID Association Entry type, length, value (TLV 13) in the MAC domain descriptor (MDD) message to communicate the association between a downstream service identifier (DSID) and a group MAC address used for DSG tunnel traffic. This is automatically supported on the Cisco CMTS router.

You can use the **cable multicast mdf-disable** command with the **dsg** keyword in global configuration mode to disable MDF capability on all DSG embedded cable modems.

For more information about this feature, see the Advanced Mode DOCSIS Set-Top Gateway 1.2 for the Cisco CMTS Routers feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_docsis_gw12.html

Downstream Channel Sharing Across Cisco uBR-MC3GX60V Line Cards and Cisco Wideband SPAs

Starting with Cisco IOS Release 12.2(33)SCG, Cisco uBR-MC3GX60V cable interface line cards and the Cisco Wideband Shared Port Adapter (SPA) can coexist on a single chassis and share downstream channels. MAC domains hosted on the Cisco uBR-MC3GX60V line card can include downstream channels from the Cisco Wideband SPA.

The following commands were introduced or modified:

- **show cable cgd-associations**
- **show cable mac-domain cgd-associations**
- **show cable mac-domain downstream-service-group**
- **show controllers cable**
- **show pxf cpu queue wb-spa**
- **show pxf cpu statistics**

For more information on how to configure the Cisco Wideband SPA with the Cisco uBR-MC3GX60V line card, see Configuring the Cisco uBR-MC3GX60V Cable Interface Line Card at the following URL:

http://www.cisco.com/en/US/docs/interfaces_modules/cable/broadband_processing_engines/ubr_mc3gx60v/configuration/guide/mc3g60_cfg.html

For additional information about this feature, see the Cisco DOCSIS 3.0 Downstream Solution Design and Implementation Guide at the following URL:

http://www.cisco.com/en/US/docs/cable/cmts/wideband/solution/guide/release_2.0/ds_solu.html

Downstream Resiliency Bonding Group

Downstream Resiliency Bonding Group feature allows CMs with multiple impaired RF channels to be allocated to a dynamically-created wideband interface, which ensures that the performance of the wideband CMs is not drastically affected.

For information about this feature, see the Downstream Resiliency Bonding Group at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_ds_resiliency.html

The following commands were introduced or modified:

- **cable resiliency ds-bonding**
- **cable ds-resiliency**
- **show cable modem resiliency**
- **show cable resiliency**

For further information, see the Cisco IOS CMTS Cable Command Reference Guide at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

FQDN and DSG Name Process

You can specify either a fully-qualified domain name (FQDN) or IP address for Advanced Mode DOCSIS Set-Top Gateway (A-DSG) classifier multicast group and source addresses in Cisco IOS Release 12.2(33)SCG and later. The FQDN functionality uses a hostname in place of the source IP address, and let the DNS server determine which source is sending the multicast traffic.

Every DNS record contains a time to live (TTL) value set by the server administrator, and this may vary from seconds to weeks. The DSG name process supersedes the TTL value criterion to update A-DSG classifiers on the Cisco CMTS router. This process enables the Cisco CMTS router to query the DNS server for faster classifier updates.

The following commands were introduced or modified:

- **cable dsg cfr**
- **cable dsg name-update-interval**
- **cable dsg tg default-priority**
- **cable dsg tg priority**
- **cable downstream dsg disable**
- **cable downstream dsg tg**
- **debug cable dsg**
- **show cable dsg cfr**
- **show cable dsg host**
- **show cable dsg static-group bundle**
- **show interface cable dsg downstream**

For further information, see the feature guide at

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_docsis_gw12.html

and the Cisco IOS CMTS Cable Command Reference Guide at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Index and DS Resource Debug Enhancements

In Cisco IOS Release 12.2(33)SCG, some CLIs have been introduced and modified to enable ease of debugging and tracing of index allocations.

The following command was introduced:

cable logging downstream-index

The following commands were modified:

- **clear cable logging**
- **show cable logging**
- **show controllers modular-cable**

For further information, see the Cisco IOS CMTS Cable Command Reference Guide at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Input MQC Support on the Cable Bundle Interfaces

The Input MQC Support on the Cable Bundle Interfaces feature enables you to differentiate upstream traffic on the cable bundle or sub-bundle interface and set a corresponding "qos-group". This "qos-group" is used at the output WAN interface to classify and set MPLS EXP bits that are different from the ToS and DSCP value of IP packets.

For detailed information about the Input MQC Support on the Cable Bundle Interfaces, see the IOS feature guide: MQC QoS on the Cisco CMTS Routers at the following link:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_mqc_qos.html

Inter-area MPLS TE Tunnel Support On CMTS

The Inter-area MPLS TE Tunnel Support on the Cisco CMTS feature allows you to establish Multiprotocol Label Switching (MPLS) traffic engineering (TE) tunnels that span multiple Interior Gateway Protocol (IGP) areas and levels. The IGP can be either Intermediate System-to-Intermediate System (IS-IS) or Open Shortest Path First (OSPF).

The Inter-area MPLS TE Tunnel feature is supported on the Cisco CMTS from Cisco IOS Release 12.2(33)SCG onwards with the following restrictions.

- Fast Reroute, Traffic Engineering-DiffServ Aware (DS-TE), Shared Risk Link Groups (SRLG), Auto Tunnel, Auto Mesh, Label-switched Path (LSP) Attributes and Bandwidth Override, Exp-based routing over tunnels, Path-option PROTECT/VERBATIM, TE Fast Tunnel interface down and Auto Bandwidth are not supported on the Cisco CMTS.
- Multicast is not supported on the Cisco CMTS. (Multicast traffic never flows on the label-switched paths (LSPs); it is transferred through native interface. If multicast traffic flows through the network, you can use the 'mpls traffic-eng multicast-intact' command to instruct reverse path forwarding (RPF) check without TE tunnel. However, this method works only with autoroute feature. Since, autoroute is disabled in inter-area, multicast cannot work.)

For detailed information about the Inter-area MPLS TE Tunnel, see the IOS feature guide: MPLS Traffic Engineering: Interarea Tunnels at the following link:

http://www.cisco.com/en/US/docs/ios-xml/ios/mp_te_path_setup/configuration/15-1s/mp-te-interarea-un.html

IOFPGA Firmware Auto Upgrade on Cisco ESR-PRE4 Modules

Starting with Cisco IOS Release 12.2(33)SCG and later releases, the Field-Programmable Gate Array (FPGA) image is automatically upgraded on standby Performance Routing Engine 4 (PRE4) modules. This upgrade occurs when the Cisco uBR10012 router boots up. To disable the automatic upgrade of the FPGA image on the standby PRE4 modules, use the **upgrade fpga auto-upgrade** command.

The following commands were introduced or modified:

- **upgrade fpga auto-upgrade**
- **upgrade fpga auto-upgrade show**

For more information, see the Cisco uBR10012 Universal Broadband Router Performance Routing Engine Module:

http://www.cisco.com/en/US/docs/interfaces_modules/cable/performance_routing_engine/installation/guide/pre5096.html

IPDR Enhancement

Starting with Cisco IOS Release 12.2(33)SCG, the Internet Protocol Detail Record (IPDR) Exporter parameters such as keepalive timer count, maximum number of unacknowledged records, and unacknowledged timeout interval value can be configured using the following commands:

- **ipdr exporter keepalive**—Sets the keepalive timer count value on the IPDR Exporter.
- **ipdr exporter max-unacked**—Sets the maximum number of unacknowledged records on the IPDR Exporter.
- **ipdr exporter ack-timeout**—Sets the time interval for acknowledged records on the IPDR Exporter.

The following commands were introduced or modified:

- **ipdr exporter keepalive**
- **ipdr exporter max-unacked**
- **ipdr exporter ack-timeout**
- **ipdr template**

For more information, see IPDR Streaming Protocol on the Cisco CMTS Routers

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ipdr_feature_ps2209_TSD_Products_Configuration_Guide_Chapter.html

IPv6 Address Packet Intercept

The IPv6 Address Packet Intercept feature provides lawful intercept of cable modems and CPEs provisioned with IPv6 addresses. This feature taps all the packets received and sent from the system. The intercepted packets are sent to the MD with the content connection identifier (CCCID) specified by the tapping rule.

For detailed information about the IPv6 Address Packet Intercept, see the IOS feature guide: Service Independent Intercept on the Cisco CMTS Routers guide at the following link:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_siiv2.html

ISSU Enhancement

Starting with Cisco IOS Release 12.2(33)SCG, it is not mandatory to use the **issu linecard process stop** command before using the **issu abortversion** and **issu linecard abortversion** commands.

The **show issu state detail** command was added to the **show tech-support** command on the Cisco uBR10012 router.

The following command was introduced or modified:

- **show tech-support**

For more information, see Cisco IOS In Service Software Upgrade Process at the following URL:
http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_issu.html

MPLS QoS via TLV for non-L2VPN Service Flow

The MPLS QoS via TLV for non-L2VPN Service Flow feature is a QoS enhancement based on MPLS Traffic Class (TC) bits for MPLS L3VPN. This feature is introduced in Cisco IOS Release 12.2(33)SCG to mark TC bits for MPLS L3VPN imposition packets and classify DS packets based on TC bits of MPLS disposition packets, using vendor-specific TLVs.

For detailed information about the MPLS QoS via TLV for non-L2VPN Service Flow, see the IOS feature guide: Service Flow Mapping to MPLS-VPN on the Cisco CMTS Routers at the following link:
http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_svcflw_map_vpn.html

Optimized Downstream Queues for High Speed Services

Starting with Cisco IOS Release 12.2(33)SCG, the default queue size for the DOCSIS service flows (with bandwidth greater than 150 Mbps) is increased from 255 to higher values based on the bandwidth on the cable downstream interfaces. Additionally, the queue limit for all service flows can also be adjusted using the cable queue-limit command.

For more information, see the DOCSIS WFQ Scheduler on the Cisco CMTS Routers at:
http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_docsis_wfq_sch.html
and the Cisco IOS CMTS Cable Command Reference at:
http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

SFP Module Link Status Traps and DEPI Tunnel Control MIB

Starting with Cisco IOS Release 12.2(33)SCG, the Downstream External PHY Interface (DEPI) tunnel in the RF channel can be configured using SNMP on the Cisco uBR10012 router. The ccwbRFChanQamDepiTunnel and ccwbRFChanQamTsid MIB objects are added to the ccwbRFChannelTable of the CISCO-CABLE-WIDEBAND MIB to support this.

Starting with Cisco IOS Release 12.2(33)SCG, two traps are introduced in the CISCO-CABLE-WIDEBAND MIB to monitor the small form-factor pluggable (SFP) link status changes when it is inserted or removed from the shared port adapter (SPA) or cable line cards. The ccwbSFPLinkTrapEnable trap notification is introduced to enable this trap. The ccwbSFPLinkDownNotification and ccwbSFPLinkUpNotification traps are used to monitor the link status changes on the SFP module.

The following commands was introduced or modified:

- **snmp-server enable traps cable**

For more information, see Cisco CMTS Universal Broadband Router Series MIB Specifications Guide 12.2SC:

http://www.cisco.com/en/US/docs/cable/cmts/mib/12_2sc/reference/guide/ubrmibv5.html

Upstream Channel Bonding show CLI Enhancement

In Cisco IOS Release 12.2(33)SCG, some of the upstream channel bonding (USCB) show commands were modified to provide more information.

The following command were modified:

- **description (bonding-group)**
- **show cable modem partial-service**
- **show cable modem tcs summary**
- **show cable modem wideband**
- **show cable modem wideband phy**
- **show cable upstream service-flow summary**
- **show interface cable upstream**

For further information, see the Cisco IOS CMTS Cable Command Reference Guide at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Upstream Channel Resiliency for RTPS Service Flows

Starting with Cisco IOS Release 12.2(33)SCG, for a Multiple Transmit Channel (MTC) modem, the Real-time Polling Service (RTPS) upstream service flows on an impaired upstream channel is moved to another good upstream channel in the cable modem without resetting the cable modem.

The following command was introduced:

- **cable upstream resiliency sf-move**

For detailed information, see the Upstream Channel Bonding feature guide at:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_uscb.html

Features Integrated into Cisco IOS Release 12.2(33)SCG6

The following feature introduced in an earlier Cisco IOS Release are now supported in Cisco IOS Release 12.2(33)SCG6:

Disabling Upstream Load Balancing for DOCSIS 3.0 Modems

Effective with Cisco IOS Release 12.2(33) SCH1, load balancing can be activated only on downstream channels. This ensures that upstream load balancing is not activated, allowing a maximum number of channels to be used to bring the upstream bonding cable modems online.

The Disabling Upstream Load Balancing for DOCSIS 3.0 Modems feature can be configured using the **downstream-only** keyword of the **cable load-balance docsis30-enable** command.

The following commands were modified:

- **cable load-balance docsis30-enable**
- **show cable load-balance**

For more details, see the *Load Balancing, Dynamic Channel Change, and Dynamic Bonding Change on the Cisco CMTS Routers* guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_load-bal_dcc.html

Features Integrated into Cisco IOS Release 12.2(33)SCG5

The following features introduced in an earlier Cisco IOS Release are now supported in Cisco IOS Release 12.2(33)SCG5:

Upstream Channel Descriptor TLV for Ranging Hold-off

The Upstream Channel Descriptor (UCD) Type, Length, Value (TLV) for Ranging Hold-off feature enables the CMTS router to hold off a cable modem from initial ranging based on TLV 18 and 19 specified in the upstream channel descriptor (UCD) messages. The router can hold off a cable modem from initial ranging only for 5 minutes. This feature is supported with DOCSIS 2.0 and later cable modems using upstream logical channels.

The following commands were introduced or modified:

- **cable load-balance exclude**
- **cable upstream chan-class-id**
- **cable upstream rng-holdoff**
- **show cable modem verbose**

For more information about this feature, see the *Cable Modem Steering on the Cisco CMTS Routers* feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_cm_steer.html

Features Integrated into Cisco IOS Release 12.2(33)SCG1

The following features introduced in an earlier Cisco IOS Release are now supported in Cisco IOS Release 12.2(33)SCG1:

DEPI CIN Failover

The **depi cin-failover** command enables CIN failure triggered line card switchover when DEPI control plane is used, and N+1 is configured. When the CPU utilization is high, DEPI CIN failover may get rejected. Starting Cisco IOS Release 12.2(33)SCF4 and later, **cpu-threshold** values can be configured using the **depi cin-failover cpu-threshold** command.

For more information on the command, see *Cisco IOS CMTS Cable Command Reference* at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

For more information about this feature, see *M-CMTS DEPI Control Plane* feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/m-cmts_depi_control_plane_support_TSD_Island_of_Content_Chapter.html

DHCPv6 with Full 6VPE Support

The DHCPv6 with Full 6VPE Support feature introduced in Cisco IOS Release 12.2(33)SCF4 supports the following capabilities for IPv6 on the Cisco CMTS routers:

- Assignment of different prefixes to cable modem (CM) and customer premises equipment (CPE)

- DHCPv6 over Multiprotocol Label System-Virtual Private Network (MPLS-VPN)
- DHCPv6 relay Prefix Delegation (PD) VRF awareness

The following commands were modified:

- **clear ipv6 dhcp relay binding**
- **show ipv6 dhcp relay binding**

For more information about this feature, see the *IPv6 on Cable* feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_ipv6_support_TSD_Island_of_Content_Chapter.html

Features Integrated into Cisco IOS Release 12.2(33)SCG

The following features introduced in an earlier Cisco IOS Release are now supported in Cisco IOS Release 12.2(33)SCG:

Cable Modem Registration Throttling

The Cable Modem Registration Throttling feature improves the cable modem online speed at initial ranging stage by reducing CPU usage.

The following commands were introduced or modified:

- **cable throttle-modem**
- **show cable throttle-modem**

For more information about this feature, see the Cisco IOS CMTS Cable Command Reference guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Configurable DHCPv6 Relay Address

Cisco IOS Release 12.2(33)SCE5 introduces the Configurable DHCPv6 Relay Address feature on the Cisco CMTS routers. A DHCPv6 relay agent is used to send relay-forward messages from a source address to all configured relay destinations. The source address is either an IPv6 address provisioned on the network interface or a CMTS WAN IPv6 address. The relay destination can be a unicast address of a server, another relay agent, or a multicast address.

The **ipv6 dhcp relay destination** command was modified to support this feature.

For detailed information about this feature, see the IPv6 on Cable feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_ipv6.html

DOCSIS Extended Transmit Power Feature

The DOCSIS Extended Transmit Power feature, introduced in Cisco IOS Release 12.2(33)SCF2, supports extended upstream transmit power capability as defined in the DOCSIS3.0 Specification. This feature allows the cable modems to transmit at a high extended power level to counter the attenuation in the US channel.

The following commands were introduced or modified:

- **cable upstream ext-power**
- **show cable modem extended-power**

For more information about this feature, see Upstream Channel Bonding feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_uscb.html

DSG Disablement for Hybrid STBs

In Cisco IOS Release 12.2(33)SCF2 and later, the **cable multicast mdf-disable** command with the **wb-incapable-cm** keyword disables multicast DSID forwarding (MDF) capability only on DOCSIS 2.0 hybrid cable modems. To disable MDF capability on all DOCSIS Set-Top Gateway (DSG) embedded cable modems, a new keyword, DSG, was introduced in Cisco IOS Release 12.2(33)SCF2.

For more information about this feature, see the DOCSIS 3.0 Multicast Support on the CMTS Routers feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_d30_mcast_support.html

DSx Support for L2VPN-enabled CMs

The Cisco IOS Release 12.2(33)SCF2 introduces Voice-Call Support on L2VPN CM feature. This feature enables the Cisco CMTS routers to support dynamic service flows on L2VPN-provisioned cable modems to permit voice calls from a non-L2VPN CPE.

To provide voice-call support on a L2VPN CM, you have to configure correct classifiers and create two static service flows (primary and secondary) using the cable modem configuration file.

For more information about this feature, see L2VPN Support over Cable feature guide at:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_l2vpn.html

MDF1 Support for DOCSIS 2.0 Hybrid Cable Modems

From Cisco IOS Release 12.2(33)SCE4 onwards, the MDF capability is enabled by default on DOCSIS 2.0 hybrid cable modems to allow IPv6 packet forwarding. The **cable multicast mdf-disable** command was modified by adding the keyword **wb-incapable-cm**. This new keyword allows the **cable multicast mdf-disable** command to disable MDF on a wideband incapable cable modem.

For more information about this feature, see the DOCSIS 3.0 Multicast Support on the CMTS Routers feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_d30_mcast_support.html

Move Secondary Service Flows to the Primary Channel Interface

This feature enables the Cisco CMTS router to move all unicast secondary service flows (of a cable modem) to the primary channel interface (modular or cable), when a downstream channel impairment is reported by a cable modem via a CM-STATUS message. Only those unicast secondary service flows, which share the same wideband interface as the primary service flow, are moved to the primary channel interface.

The **cable rf-change-trigger** command was modified to support this feature.

For more information about this feature, see the Wideband Modem Resiliency feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_wm_resiliency.html

Moving CMs Configured with IGMP and RSVP (test cable dcc force Command)

In earlier releases, the test cable dcc command did not support transaction for dynamic channel change (DCC) when the cable modem was configured with IGMP and RSVP. Starting with Cisco IOS Release 12.2(33)SCE6, the force keyword allows users to manually move cable modems configured with IGMP and RSVP, when the DCC init-tech is set to 0.

For more information about this command, see the Cisco IOS CMTS Cable Command Reference guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

PRE High Availability Enhancement

In Cisco IOS Release 12.2(33)SCE5, the PRE high availability is enhanced to address the PRE switchover issue in which both the PRE modules behave as the primary PRE modules. The line card uses a link loop mechanism when both the PRE modules behave as primary PRE modules. In this mechanism, the line card checks the packet sent from the active PRE module, and automatically does a switchover to the real active PRE. The link loop mechanism automatically connects to the new PRE module based on the MAC address, thus increasing robustness. This mechanism occurs before the IPC keepalive timeout mechanism occurs between the route processor and the line card.

The PRE high availability enhancement applies to both Stateful Switchover (SSO) and Route Processor Redundancy (RPR) modes on the Cisco uBR10012 router.

For detailed information on configuring Route Processor Redundancy, see Route Processor Redundancy for the Cisco uBR10012 Universal Broadband Router document at:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr10012_rtpro_red.html

For detailed information on configuring Stateful Switchover (SSO), see Stateful Switchover document at:

http://www.cisco.com/en/US/docs/ios/12_2s/feature/guide/fssso20s.html

Service Class Relay Agent Option

The Cisco IOS Release 12.2(33)SCF2 introduces support for the DHCP Relay Agent Information sub-option (DHCP Option 82, Suboption 9) enhancement to simplify provisioning of the CPE devices. Using this sub-option, the cable operators can relay the service class or QoS information of the CPE to the DHCP server to get an appropriate IP address.

The **cable dhcp-insert service-class** command was modified to support this feature.

For more information about this feature, see DHCP, ToD, and TFTP Services for the CMTS Routers feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_services.html

Support for 256 Legacy LBGs

To support effective configuration of legacy load balance groups (LBGs) on the Cisco uBR-MC3GX60V line card, the valid range for the legacy load balance group is changed in Cisco IOS Release 12.2(33)SCE4. In Cisco IOS Release 12.2(33)SCE3 and earlier, the valid range is from 1 to 80. In Cisco IOS Release 12.2(33)SCE4 and later, the valid range is from 1 to 256.

The following commands are new or modified:

- **cable load-balance group**
- **cable load-balance group (interface)**
- **cable load-balance group interval**
- **cable load-balance group policy ugs**
- **cable load-balance group threshold**
- **cable upstream load-balance group**
- **show cable load-balance**

For more information about this feature, see the Load Balancing and Dynamic Channel Change on the Cisco CMTS Routers feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_load-bal_dcc.html

Support for IPv6 Prefix Stability on the CMTS

Cisco IOS Release 12.2(33)SCF1 supports IPv6 prefix stability on the Cisco CMTS as specified in DOCSIS 3.0 MULPI CM-SP-MULPIv3.0-I15-110210 standard. The IPv6 prefix stability allows an IPv6 home router to move from one Cisco CMTS to another while retaining the same prefix.

The multiple service operators (MSOs) can use this feature to allow their business customers (with IPv6 routers) to retain the same IPv6 prefix during a node split.

For more information about this feature, see IPv6 on Cable feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_ipv6.html

Unitary DHCPv6 Leasequery

The Cisco IOS Release 12.2(33)SCF1 introduces support for Unitary DHCPv6 Leasequery protocol (RFC 5007) on the Cisco CMTS routers for upstream IPv6 source verification. This protocol verifies the authenticity of the IPv6 CPE behind a home or small office cable deployment.

The following commands are new or modified for Unitary DHCPv6 Leasequery feature:

- **cable ipv6 source-verify**
- **cable ipv6 source-verify leasequery-filter downstream**
- **debug cable ipv6 lq**
- **show cable leasequery-filter**

For more information, see Cable DHCP Leasequery feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmtsflt_dhcp_lsqr.html

Upstream Buffer Control for Maximum Queue Depth

Upstream traffic shaping uses queues to control the upstream data flow. The data packets are buffered in a queue on the CM to regulate traffic and avoid network congestion. Starting with Cisco IOS Release 12.2(33)SCF2, the Upstream Buffer Control for Maximum Queue Depth feature enables the Cisco CMTS to control the size of this queue (or buffer) by controlling the amount of data that can be enqueued for transmission at any point of time.

The following commands were added or modified:

- **cable service class**
- **show cable modem service-flow**
- **show cable service-class**

For more information about this feature, see *Configuring Upstream Cable Interface Features on the Cisco CMTS Routers* feature guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_upstrm_if.html

Modified Software Features in Cisco IOS Release 12.2(33)SCG1

There are no modified software features in Cisco IOS Release 12.2(33)SCG1.

Modified Software Features in Cisco IOS Release 12.2(33)SCG

There are no modified software features in Cisco IOS Release 12.2(33)SCG.

MIBs

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

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check verifies that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password is e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://tools.cisco.com/RPF/register/register.do>

For information about the MIBs supported by the Cisco universal broadband routers, see the *Cisco CMTS Universal Broadband Series Router MIB Specifications Guide*.

New and Changed MIB Information in Cisco IOS Release 12.2(33)SCG

The following MIB changed in Cisco IOS Release 12.2(33)SCG:

- CISCO-CABLE-WIDEBAND-MIB

Limitations and Restrictions

This section describes restrictions for the Cisco universal broadband routers in Cisco IOS Release 12.2(33)SC.

Unsupported Hardware

For a list of unsupported hardware, see the End-of-Life and End-of-Sale Notices at:

http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_eol_notices_list.html

Software Feature Restrictions

This section describes other important guidelines or restrictions to consider when running Cisco IOS Release 12.2SC that might not yet be documented in the supporting customer documentation.

DOCSIS 3.0 Load Balancing

In Cisco IOS Release 12.2(33)SCG, DOCSIS 3.0 load balancing is not supported on the Cisco Wideband SPA when the SPA co-exists with a Cisco uBR-MC3GX60V line card on the Cisco CMTS router.



Note

Effective with Cisco IOS Release 12.2(33)SCG1, the Cisco uBR-MC3GX60V line card and up to five Cisco Wideband SPAs can be configured to the same LBG.

DOCSIS

- You cannot configure a US connector to more than one fiber node.
- Multicast over DOCSIS L2VPN does not work for a DOCSIS 3.0-bonded cable modem (CM) when DOCSIS L2VPN is provisioned on a DOCSIS 3.0-bonded CM and downstream multicast traffic is sent over L2VPN. You can use a DOCSIS L2VPN classifier to classify multicast traffic on a secondary DS service flow with SF attributes (TLV 25.31/32) specifying primary DS for the CM. As a result, L2VPN multicast traffic uses the primary DS and L2VPN unicast traffic is forwarded over the primary bonding group. The service flow attribute feature is available in Cisco IOS Release 12.2SCB.

DTI Card Configuration

The Cisco uBR10012 universal broadband router TCC card does not work as expected when the startup configuration contains the configuration for a Cisco uBR10012 universal broadband router TCC+ card. To fix this issue, use the **no card slot/subslot 2cable-tccplus** command and then configure the DTI card.

MIBs Restrictions

- IP-MIB is implemented as read-only. Writing is not supported for ipv6IPForwarding or ipv6IpDefaultHopLimit.
- docsIf3MdCfgMcastDsidFwdEnabled object is implemented as read-only.
- cdxBWQueueMaxDepth object sometimes reports a value out of range. The supported range is from 0 to 64, but the object sometimes returns a value of 128 when queried.

PacketCable

Payload Header Suppression (PHS) is not supported on wideband Embedded Media Terminal Adapters (eMTAs) for dynamic downstream service flows.

PXF

Statistics for two different divert-rate limit (DRL) WAN-IP streams can momentarily overlap or collide and produce statistics that are lower than expected.

Redundancy

- Longer dropout times (about 6 seconds) can occur when you use the OIR method to trigger a cable line card switchover on the Cisco uBR10012 router. To repair or maintain a cable line card and get better switchover performance, use the **redundancy linecard-group switchover** command to trigger the line card switchover instead.
- Although the software does not prevent it, preconfiguring commands on a protect line card is not supported.
- A dynamic service-flow for a PacketCable call is not deleted during a line card switchover.
- Although the Cisco CMTS router is initially configured only for global N+1 redundancy, the **show running-configuration** command displays both global and legacy interface-level Hot-Standby Connection-to-Connection Protocol (HCCP) configuration when you change the redundancy mode configuration from SSO to RPR mode. If you switch back to SSO mode, both redundancy configurations are still shown.
- In very rare circumstances, after an N+1 switchover, upstream traffic that is using Baseline Privacy Interface (BPI) encryption is not received properly by the CMTS router. Input errors are logged on the interface and the **debug cable error** command shows error messages similar to the following:

```
Cable5/1/4: Bad rx packet. JIB status code 0xA
```

The issue occurs on upstream channels that use a shared connector, where the other upstream channel using the same shared connector is on another downstream and is shutdown. To workaround this issue, you can activate the downstream and other upstream channel using the same shared connector or temporarily unshare the upstream connector.

Wideband

If you configure a wideband interface with more than one MAC domain host sharing the committed information rate (CIR) bandwidth, then the total wideband interface CIR bandwidth gets fragmented among the MAC domain (MD) hosts sharing the wideband interface CIR bandwidth.

The WB interface CIR bandwidth can be shared by multiple MAC domain hosts, and these MAC domain hosts could potentially be on the same or different cable line cards. As admission control for WB interfaces occurs on cable line cards, the available CIR bandwidth gets partitioned and is given to the MD hosts causing the bandwidth fragmentation. However if a typical service flow CIR is very small compared to the total CIR of the wideband interface, then this fragmentation is not visible until the CIR usage reaches very high levels close to the total interface bandwidth.

With certain bandwidth percentage configuration and traffic distribution, the overall link utilization of dynamic bandwidth sharing (DBS) can be as low as 85 percent. For example, this can occur if the traffic rate on a wideband interface is smaller than its configured bandwidth percentage, but the traffic rate on a modular-cable interface is much larger than its bandwidth percentage. The packet drops occur only on

the modular-cable interface which has a larger amount of traffic than its bandwidth-percentage. To workaroud this scenario, configure a higher bandwidth percentage to the modular-cable interface, which is larger than or equal to its expected or average traffic rate.

Important Notes

Documentation Updates in Cisco IOS Release 12.2(33)SCG4

Effective with Cisco IOS Release 12.2(33)SCG4, the field Active Remote DS has been modified to Active DS in the output of **show cable cgd-associations** command.

Documentation Updates in Cisco IOS Release 12.2(33)SCG

Based on user feedback for ease of navigation, the *Cisco IOS CMTS Cable Software Configuration Guide, Release 12.2SC* is now split into eight different guides.

Each Software Configuration Guide comprises feature guides that belong to a specific technology area.

Cable Upstream DOCSIS Mode

Starting with Cisco IOS Release 12.2(33)SCG, the default upstream DOCSIS mode is ATDMA only.

For more information, see DOCSIS 2.0 A-TDMA Modulation Profiles for the Cisco CMTS Routers at: http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_ds20_atdma_pf.html

and Cisco IOS CMTS Cable Command Reference at:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

show interface gigabitethernet Command

The output of the **show interface gigabitethernet** command now displays the correct values for the *output flow-control status* and *input flow-control status*.

In previous Cisco IOS releases, the output of the **show interface gigabitethernet** command always displayed the value for *output flow-control status* as "unsupported", and value for *input flow-control status* as "XOFF" (when SPA handled received-pause-frames) or "XON" (when SPA did not handle received-pause-frames).

For more information, see the **show interface gigabitethernet** command at:

http://www.cisco.com/en/US/partner/docs/ios/cable/command/reference/cbl_18_show_d_to_show_i.html#wp1344403

IP Packets and Cisco CMTS Buffer Size

If the Cisco CMTS receives IP packets larger than its default buffer size (8192), the CMTS cannot process these packets. This causes IP fragment issues on the Cisco CMTS.

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* at: <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.

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