



Introduction

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

For software caveats that apply to the Cisco IOS Release 12.2(33)SCF 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)SCF is generally available for field deployment. However, we recommend that you validate and qualify Cisco IOS Release 12.2(33)SCF 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 1-2](#)
- [New and Changed Information, page 1-10](#)
- [MIBs, page 1-27](#)
- [Limitations and Restrictions, page 1-28](#)
- [Important Notes, page 1-30](#)
- [Obtaining Documentation and Submitting a Service Request, page 1-33](#)

System Requirements

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

- [Memory Requirements, page 1-2](#)
- [Hardware Supported, page 1-3](#)
- [Verifying the Software Version, page 1-6](#)
- [Upgrading to a New Software Release, page 1-6](#)
- [Microcode Software, page 1-6](#)
- [Feature Support, page 1-7](#)

Memory Requirements

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



Note

Effective with Cisco IOS Release 12.2(33)SCC, 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)SCF 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 PRE2 ²	PRE2	ubr10k2-k9p6u2-mz	128 MB	1.0 GB	RAM
DOCSIS Base 3 DES image and Lawful Intercept for Cisco PRE4	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 = Performance Routing Engine

Hardware Supported

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

- [Cable Interface Line Cards Supported, page 1-3](#)
- [Microcode Software, page 1-6](#)
- [Other Hardware Supported, page 1-5](#)

Cable Interface Line Cards Supported

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

Table 1-2 Cable Interface Line Cards Supported in Cisco IOS Release 12.2(33)SCF

Supported Cable Interface Line Card	Minimum Cisco IOS Release Required	Processor Engine
Cisco uBR10-MC5X20H—maximum 8	Cisco IOS Release 12.2SCA	PRE2/PRE4
Cisco UBR-MC20X20V—maximum 8	Cisco IOS Release 12.2SCC	PRE2/PRE4
Cisco uBR-MC3GX60V—maximum 8	Cisco IOS Release 12.2SCE	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. For more information about preventing electrostatic discharge (ESD) damage, see:

<http://www.cisco.com/warp/public/109/cable-linecard-handling.pdf>

- 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.

Cisco uBR10012 Universal Broadband Router Line Cards Supported

The Cisco uBR10012 universal broadband router supports up to four network line cards with any combination of the following cards:

- Cisco Half-Height Gigabit Ethernet (HHGE) line card
- Cisco uBR10012 OC-48 DPT/POS interface module

**Note**

Cisco HHGE line card is supported only with PRE2.

Other Hardware Supported

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

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)SCF  
EXPERIMENTAL IMAGE ENGINEERING C10K_WEEKLY BUILD, synced to  
MAYFLOWER_BASE_FOR_V122_33_SF_THROTTLE  
Copyright (c) 1986-2011 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/warp/public/cc/pd/iosw/prodlit/957_pp.htm

To choose a new Cisco IOS software release based on information about defects that affect that software, use 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)SCF is the ubr10k-fpd-pkg.122-33.SCF pkg file.

Table 4 12.2(33)SCB 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

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	<p>Describes a set of Cisco CMTS documents and contains links to the referenced documents.</p> <p>Go to the following link to access this document: http://www.cisco.com/c/en/us/td/docs/cable/cmts/ubr10012/roadmap/u10krdmp.html</p>
Command Reference	<p>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.</p> <p>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</p>
Design Guides	<p>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.</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-implementation-design-guides-list.html</p>
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

Guide	Description
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://www.cisco.com/go/fn>

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)SCF:

- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF5, page 1-11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF4, page 1-11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF3, page 1-11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF2, page 1-11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF1, page 1-11](#)
- [New Hardware Features in Cisco IOS Release 12.2\(33\)SCF, page 1-11](#)

- [Hardware Features Integrated into Cisco IOS Release 12.2\(33\)SCF, page 1-12](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF5, page 1-12](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF4, page 1-12](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCF4, page 1-13](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCF4, page 1-13](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF3, page 1-13](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCF3, page 1-13](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF2, page 1-13](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCF2, page 1-15](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCF2, page 1-16](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF1, page 1-16](#)
- [Features Integrated into Cisco IOS Release 12.2\(33\)SCF1, page 1-17](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCF1, page 1-18](#)
- [New Software Features in Cisco IOS Release 12.2\(33\)SCF, page 1-18](#)
- [Modified Software Features in Cisco IOS Release 12.2\(33\)SCF, page 1-27](#)

New Hardware Features in Cisco IOS Release 12.2(33)SCF5

There are no new hardware features in Cisco IOS Release 12.2(33)SCF5.

New Hardware Features in Cisco IOS Release 12.2(33)SCF4

There are no new hardware features in Cisco IOS Release 12.2(33)SCF4.

New Hardware Features in Cisco IOS Release 12.2(33)SCF3

There are no new hardware features in Cisco IOS Release 12.2(33)SCF3.

New Hardware Features in Cisco IOS Release 12.2(33)SCF2

There are no new hardware features in Cisco IOS Release 12.2(33)SCF2.

New Hardware Features in Cisco IOS Release 12.2(33)SCF1

There are no new hardware features in Cisco IOS Release 12.2(33)SCF1.

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

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

Hardware Features Integrated into Cisco IOS Release 12.2(33)SCF

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

- [New 3300 W AC Power Entry Module](#)
- [New 3300 W DC Power Entry Module](#)
- [New Fan Assembly Module](#)

New Software Features in Cisco IOS Release 12.2(33)SCF5

There are no new software features in Cisco IOS Release 12.2(33)SCF5.

New Software Features in Cisco IOS Release 12.2(33)SCF4

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCF4.

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.html

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-faiover 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.html

Features Integrated into Cisco IOS Release 12.2(33)SCF4

The following feature introduced in an earlier Cisco IOS Release is now supported in Cisco IOS Release 12.2(33)SCF4:

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

Modified Software Features in Cisco IOS Release 12.2(33)SCF4

There are no modified software features in Cisco IOS Release 12.2(33)SCF4.

New Software Features in Cisco IOS Release 12.2(33)SCF3

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCF3.

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

Modified Software Features in Cisco IOS Release 12.2(33)SCF3

There are no modified software features in Cisco IOS Release 12.2(33)SCF3.

New Software Features in Cisco IOS Release 12.2(33)SCF2

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCF2.

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

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

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)SCF2, 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

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

Features Integrated into Cisco IOS Release 12.2(33)SCF2

The following features introduced in an earlier Cisco IOS Release is now supported in Cisco IOS Release 12.2(33)SCF2:

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

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_rtpo_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

Modified Software Features in Cisco IOS Release 12.2(33)SCF2

There are no modified software features in Cisco IOS Release 12.2(33)SCF2.

New Software Features in Cisco IOS Release 12.2(33)SCF1

This section describes the new cable software features in Cisco IOS Release 12.2(33)SCF1.

Dynamic Bonding Change for DOCSIS3.0 Static Modem

Effective with Cisco IOS Release 12.2(33)SCF1, the DOCSIS 3.0 static modem count-based load balancing is enhanced to use the dynamic bonding change (DBC) to modify parameters of DOCSIS 3.0 cable modem with multiple transmit channel (MTC) mode or multiple receive channel (MRC) mode without a primary channel change.

The **cable load-balance docsis30-enable** command is introduced to enable the DOCSIS 3.0 static modem count-based load balancing.

For more information about this feature, see *Load Balancing, Dynamic Channel Change, and Dynamic Bonding 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, and

Restricted/General Load Balancing and Narrowband Dynamic Bandwidth Sharing with Downstream Dynamic Load Balancing feature guide at the following URL:

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

The IPv6 prefix stability is only supported with Cisco Network Registrar (CNR) version 8.1 or higher.

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 Unitary DHCPv6 Leasequery feature is only supported with Cisco Network Registrar (CNR) version 7.2 or higher.

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

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

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

Features Integrated into Cisco IOS Release 12.2(33)SCF1

The following features introduced in an earlier Cisco IOS Release is now supported in Cisco IOS Release 12.2(33)SCF1

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

Support for 256 Legacy LBGs

To support effective configuration of legacy 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

Modified Software Features in Cisco IOS Release 12.2(33)SCF1

There are no modified software features in Cisco IOS Release 12.2(33)SCF1.

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

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

802.1Q QoS Support on GiGE WAN

The 802.1Q QoS Support on GiGE WAN feature introduces QoS on the Gigabit Ethernet WAN interface for 802.1Q packets, enabling the user to set priority bits to prioritize traffic.

The following commands are new or modified for 802.1Q QoS Support on GiGE WAN feature:

- **class**
- **class-map**
- **policy-map**
- **match cos**
- **set cos**

For more information about 802.1Q QoS Support on GiGE WAN feature, see the *MQC QoS on the Cisco CMTS Routers* feature guide at the following URL:

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

Automatic ROMMON Upgrade for Cisco Cable Interface Line Cards

The Automatic ROM Monitor (ROMMON) Upgrade feature enables the Cisco uBR10012 cable interface line cards to automatically update the ROMMON image whenever a newer version is available.

The ROMMON is a bootstrap program that initializes the hardware and boots up the Cisco IOS software when the Cisco CMTS (or cable interface line card) is powered on or rebooted. It is an integral part of the cable interface line card firmware, which provides basic services such as CPU initialization, memory mapping, and image relocation. The ROMMON image may require updates due to feature additions or enhancements. The Automatic ROMMON Upgrade feature enables the line card to upgrade the ROMMON image without user intervention. The user is informed about the upgrade status through error or warning messages.

The following new commands are introduced for the Automatic ROM Monitor (ROMMON) Upgrade feature:

- **cable linecard auto-rommon-downgrade**
- **cable linecard auto-rommon-upgrade**

For more information about this feature, see *Automatic ROMMON Upgrade for Cisco Cable Interface Line Cards* feature guide at the following URL:

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

Cable Modem Upstream RF Adaptation

The Cable Modem Upstream RF Adaptation feature uses per cable modem physical layer statistics to identify and automatically move cable modems to another logical upstream channel within the same physical port. This is to prevent unnecessary channel-wide parameter changes, which reduces throughput, disrupts traffic flow for all modems, and causes modems to go offline in extreme cases.

The following commands are new or modified for the Cable Modem Upstream RF Adaptation feature:

- **cable rf-adapt timer**
- **cable upstream rf-adapt**
- **cable upstream rf-adapt(logical channel)**
- **cable upstream threshold**
- **cable upstream threshold hysteresis**
- **cable upstream threshold rf-adapt**
- **show cable rf-adapt**
- **show cable modem**
- **show cable modem access-group**
- **show cable modem calls**
- **show cable modem connectivity**
- **show cable modem counters**
- **show cable modem docsis version**

- **show cable modem domain-name**
- **show cable modem errors**
- **show cable modem flap**
- **show cable modem ipv6**
- **show cable modem mac**
- **show cable modem maintenance**
- **show cable modem offline**
- **show cable modem phy**
- **show cable modem primary channel**
- **show cable modem registered**
- **show cable modem rf-adapt**
- **show cable modem rogue**
- **show cable modem summary**
- **show cable modem type**
- **show cable modem unregistered**
- **show cable modem vendor**
- **show cable modem wideband**

For more information on this feature, see *Cable Modem Upstream RF Adaptation* feature guide at: http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cm_upstream_rf_adaptation.html

Channel Interface for Physical RF Channel

In Cisco IOS Release 12.2(33)SCF, the ifIndex MIB object that pointed to the modular or integrated interfaces now points to the cable interface and RF channels Simple Network Management Protocol (SNMP) ifIndex of the Cisco uBR-MC3GX60V, Cisco UBR-MC20X20V, Cisco uBR-MC88V line cards, and Shared Port Adapters (SPA). Following are the MIBs and their tables where the ifIndex object points to the RF channel SNMP IF index:

- DOCS-IF-MIB—docsIfDownstreamChannelTable, docsIfCmtsChannelUtilizationTable, and docsIfCmtsDownChannelCounterTable
- CLAB-TOPO-MIB—clabTopoChFnCfgTable
- CISCO-CABLE-WIDEBAND-MIB—CcwbfFiberNodeTable
- DOCS-DRF-MIB—docsDrfDownstreamTable, docsDrfDownstreamCapabilitiesTable, and docsDrfChannelBlockTable.

In Cisco IOS Release 12.2(33)SCF, the following MIBs are modified to support:

- ENTITY-MIB—The ifIndex object (entAliasMappingIdentifier), in addition to pointing to the cable interfaces, now points to the RF channel SNMP IF Index in the EntAliasMappingTable.
- IF-MIB—Attributes are added to point to the RF channel interfaces in the tables ifTable, ifXtable and ifStackTable.

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

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

DOCSIS 3.0 CNiR Measurement

Cisco IOS Release 12.2(33)SCF now supports DOCSIS 3.0 carrier-to-noise plus interference ratio (CNiR) measurement. The term CNiR is part of the CableLabs nomenclature, and is same as the Carrier-to-noise ratio (CNR). Therefore these two terms, CNR and CNiR, can be used interchangeably.

In the previous releases, the CNR (CNiR) measurement was supported for only those upstream (US) channels that had Spectrum Management feature enabled. Starting with Cisco IOS Release 12.2(33)SCF, the CNR (CNiR) measurement is supported for all US channels, irrespective of whether Spectrum Management feature is enabled or not on the US channels.

The output of the **show cable modem cnr** command is modified.

For detailed information about the DOCSIS 3.0 CNiR Measurement feature, see the *Spectrum Management and Advanced Spectrum Management for the Cisco CMTS Routers* feature guide at the following URL:

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

DOCSIS 3.0 Load Balancing

This feature has the following enhancements over DOCSIS 2.0 load balancing:

- Information on the wideband and upstream bonded (WB/UB) modems is provided in the **show cable load-balance docsis-group** command output.
- Information on UB modems is provided in the **show cable load-balance docsis-group modem-list** command output.
- Information on downstream/receive channel configuration (RCC), and upstream/transmit channel set is provided separately in the **show cable load-balance docsis-group pending list** command output.
- Wideband downstream information is no longer considered in the narrowband cable modem (NBCM) total for wideband modems.
- Logical channels are combined into physical channels.
- Interface and channel states for load balance group (LBG) assignment are no longer considered.
- Service-flow method is removed.
- Multiple Transmit Channel (MTC) information is now added in the LBG ID assignment.

The **show cable load-balance docsis-group** command was modified to support DOCSIS 3.0 Load Balancing feature.

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

DWDM Support on Cisco uBR10012 Routers

Starting with Cisco IOS Release 12.2(33)SCF, the following the small form-factor pluggable (SFP) modules are supported on the Cisco uBR10012 routers:

- XFP-10G-MM-SR=
- DWDM-XFP-50.12=
- DWDM-XFP-30.33=

For more information, see the *Cisco uBR10012 Universal Broadband Router SIP and SPA Hardware Installation Guide* and *Cisco uBR10012 Universal Broadband Router SIP and SPA Software Configuration Guide* at the following URLs:

http://www.cisco.com/en/US/docs/interfaces_modules/shared_port_adapters/install_upgrade/uBR10012/hwsipspa.html

http://www.cisco.com/en/US/docs/interfaces_modules/shared_port_adapters/configuration/ubr10012/12.3_23_bc/sipsp_d3.html

Fairness Across DOCSIS Interfaces

The Fairness Across DOCSIS Interfaces feature introduces an adaptive mechanism to effectively distribute reservable bandwidth for committed information rate (CIR) flows and fair bandwidth for best-effort (BE) service flows across adjacent bonding groups (BGs).

The following commands are new or modified for the Fairness Across DOCSIS Interfaces feature:

- **cable acfe enable**
- **cable acfe max-eir-ratio**
- **cable acfe max-bonus-bandwidth**
- **debug cable acfe**
- **debug cable acfe filter**
- **show cable acfe controller**
- **show cable acfe interface**
- **show cable acfe summary**
- **show cable admission-control**
- **show cr10k-rp controller**
- **show interface integrated-cable**
- **show interface modular-cable**
- **show interface wideband-cable**

For more information about this feature, see the *Fairness Across DOCSIS Interfaces* feature guide at the following URL: http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_acfe.html

Inter Line Card RF Spanning

The Inter Line Card RF Spanning feature supports sharing of downstream channels across line cards installed on the Cisco uBR10012 router. This feature is an extension to the existing downstream channel sharing functionality supported within the bonding groups configured on a single line card. This feature enables you to associate downstream channels of a line card to a service group that is hosted on a different line card.

The following commands are new or modified for the Inter Line Card RF Spanning feature:

- **show cable active-reman**
- **show cable multicast db**

For more information about the Inter Line Card RF Spanning feature, see the *IGMP-Triggered VDOC Broadcast Support on the Cisco CMTS Routers* feature guide at the following URL:

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

IPC Enhancements

In Cisco IOS Release 12.2(33)SCF, inter-process communication (IPC) is enhanced to provide better bandwidth to support new applications.

The **service** keyword is added to the **show cmts ipc-cable client base** command to display all the IPC service structures for all slots and subslots in the system. This information includes IPC port information, such as service type and port ID, retry and timeout information of the IPC messages, and watermark information in the request queue.

The **show cmts ipc-cable client base** command was modified to support the IPC enhancement.

For more information about IPC enhancements, see *Cisco IOS CMTS Cable Command Reference* guide at the following URL:

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_17_show_ch_to_show_cr.html

IPv6 CPE Router Support on the Cisco CMTS

In Cisco IOS Release 12.2(33)SCF, the IPv6 CPE router support is provided on the Cisco CMTS. The IPv6 CPE router is a node primarily for home or small office use that connects the end-user network to a service provider network. It is also referred to as the home router. The IPv6 CPE router is responsible for implementing IPv6 routing; that is, the IPv6 CPE router looks up the IPv6 destination address in its routing table and determines to which interface it should send the packet.

The following commands are new or modified for the IPv6 CPE Router Support on the Cisco CMTS feature:

- **show ipv6 route**
- **show ipv6 cef platform**

For more information about the IPv6 CPE Router Support on the Cisco CMTS 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

IPv6: 6PE & 6VPE

The 6PE & 6VPE feature represents an implementation of the provider edge (PE) based VPN model. This feature allows service providers to provide an IPv6 VPN service that does not require an upgrade or reconfiguration of the PE routers in the IPv4 MPLS core. The resulting IPv6 VPN service has a configuration and operation that is virtually identical to the current IPv4 VPN service.

For more information about 6PE & 6VPE 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

JIB3US Partial Reset

The fatal interrupts received from the hardware components on the cable line cards result in reset and reload of the line cards, which triggers switchover and partial system downtime. The JIB3US Partial Reset feature significantly reduces this recovery time.

The cable line cards that use this feature include:

- Cisco UBR-MC20X20V

- Cisco uBR-MC3GX60V
- Cisco uBR-MC88V

The **show controllers cable jib** command was introduced for the JIB3US Partial Reset feature.

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

http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_17_show_ch_to_show_cr.html

L2VPN Pseudowire Redundancy

The L2VPN Pseudowire Redundancy feature enables you to configure a backup pseudowire in case the primary pseudowire fails.

The following commands are new or modified for the L2VPN Pseudowire Redundancy feature:

- **backup delay**
- **backup peer**
- **cable l2-vpn xconnect backup force-switchover**
- **show cable l2vpn xconnect**
- **show mpls l2transport vc**
- **show xconnect**

For more information about L2VPN Pseudowire Redundancy feature, see the *MPLS Pseudowire for Cable L2VPN* feature guide at the following URL:

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

MPLS Short-Pipe Mode

The MPLS Short-Pipe Mode feature introduces quality of service (QoS) service on the WAN interface for MPLS EXP bits, enabling the user to set priority bits for traffic prioritization.

The following commands are new or modified for the MPLS Short-Pipe Mode feature:

- **match mpls experimental topmost**
- **set mpls experimental topmost**
- **show policy-map interface**
- **show cable l2-vpn xconnect**

For more information about MPLS Short-Pipe Mode feature, see the *MQC QoS on the Cisco CMTS Routers* feature guide at the following URL:

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

Service Independent Intercept-routed CPE Support

Starting with Cisco IOS Release 12.2(33)SCF, Service Independent Intercept (SII) taps can be configured to an IP address learned from a customer-premises equipment (CPE) router.

For more information, see the *Service Independent Intercept on the Cisco CMTS Routers* feature guide at the following URL:

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

show cable modem Command Enhancements

In Cisco IOS Release 12.2(33)SCF, the following **show** commands are enhanced:

- **show cable modem**
- **show cable modem qos**
- **show cable modem wideband channel**
- **show interfaces cable qos paramset**
- **show interfaces cable service-flow qos**

For detailed information about these commands, see the *Cisco IOS CMTS Command Reference* guide at the following URL:

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

Upstream Bandwidth Request Rate Limiting

The Cisco CMTS Upstream (US) scheduler may report high CPU consumption because of extensive incoming bandwidth request processing. The Upstream Bandwidth Request Rate Limiting feature, which controls the CPU consumption of the US scheduler by monitoring the number of incoming bandwidth requests, and dropping excessive bandwidth requests.

The **cable upstream rate-limit-bwreq exempted-priority** command was introduced for the Upstream Bandwidth Request Rate Limiting feature.

For detailed information about the Upstream Bandwidth Request Rate Limiting feature, see the *Upstream Scheduler Mode for the Cisco CMTS Routers* feature guide at the following URL:

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

VDOC: Robustness, Scalability & Debuggability

The following commands have been modified to verify the enhanced performance of the multicast feature:

- **clear cable multicast statistics counter**
- **show cable multicast db**
- **show cable multicast statistics failure**
- **show interface cable multicast-session latency**
- **show interface modular-cable multicast-session latency**
- **show interface integrated-cable multicast-session latency**
- **show interface wideband-cable multicast-session latency**

For more information about these commands, see *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

Video over DOCSIS Load Balancing for DOCSIS 2.0 Cable Modems

The Internet Group Management Protocol (IGMP)-triggered Dynamic Channel Change (DCC) load balancing is introduced to avoid rejection of new video streams, either due to bandwidth constraints or repeated admission control failures on an interface. If there are admission control failures during a session request, the load balancing infrastructure provides a list of downstream channels to which the cable modem (CM) can be moved. Downstream channels that already carry the existing session replication are given preference.

The following commands are modified for the Video over DOCSIS Load Balancing for DOCSIS 2.0 Cable Modems feature:

- **show cable load-balance**
- **show cable load-balance docsis-group**

For more information, see the *Video over DOCSIS Load Balancing for DOCSIS 2.0 Cable Modems* feature guide at the following URL:

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

Voice MGPI Support

The voice multiple grants per interval (MGPI) feature enables the Cisco CMTS router to map multiple PacketCable or PacketCable Multimedia (PCMM) gates (application flows) to a single DOCSIS service flow using Unsolicited Grant Service (UGS) traffic profiles of the same cable modem. The application manager uses the UGS traffic profiles to explicitly set the number of grants per interval and place several application flows on a single gate. This results in an aggregated view for event messages, volume, and time usage limits.

The following commands are new or modified for the Voice MGPI feature:

- **cable dynamic-qos trace**
- **debug cable dynamic-qos subscriber**
- **debug cable dynamic-qos trace**
- **show cable dynamic-qos trace**
- **show interface cable dynamic-service statistics**
- **show interface cable packetcable statistics**
- **show packetcable cms**

For more information about the Voice MGPI feature, see the *PacketCable and PacketCable Multimedia on the Cisco CMTS Routers* feature guide at the following URL:

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

Voice Support Over DOCSIS 3.0 E-MTAs

Beginning with Cisco IOS Release 12.2(33)SCF, PacketCable and PacketCable Multimedia (PCMM) services are supported on embedded multimedia terminal adapters (E-MTAs). An E-MTA is a network element that contains the interface to a physical voice device, a network interface, and all signaling and encapsulation functions required for the VoIP transport, class features signaling, and QoS signaling.

For more information about the Voice Support Over DOCSIS 3.0 E-MTAs feature, see the *PacketCable and PacketCable Multimedia on the Cisco CMTS Routers* feature guide at the following URL:

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

VRF Steering for Cisco CMTS Routers

The VRF Steering for Cisco CMTS Routers feature allows provisioning of data traffic from cable modems to be contained to a specified VRF instance. This feature addresses the need to accommodate more IPv4 addresses when customers run out of IPv4 addresses for their customer premise equipment (CPE). This solution helps customers expand their existing IP address space until they move to the IPv6 address mode.

The following commands are new or modified for the VRF Steering for Cisco CMTS Routers feature:

- **cable source-route**
- **cable vrf-steering cable-modem**
- **ip vrf**
- **show ip arp vrf**

For more information about this feature, see the *VRF Steering for Cisco CMTS Routers* feature guide at the following URL :

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

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

This section lists the modified software features in Cisco IOS Release 12.2(33)SCF.

Online Offline Diagnostics - Field Diagnostics

Online Offline Diagnostics - Field Diagnostics is supported on the Cisco UBR10-MC20X20V cable interface line card.

For more information, see *Online Offline Diagnostics - Field Diagnostics on Cisco uBR10012 Router Users Guide* at the following URL:

<http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/troubleshooting/fdub10k.html>

Software Features Integrated into Cisco IOS Release 12.2(33)SCF

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

- [Configurable DFO Retry Count](#)
- [Extended Transmit Power](#)
- [RFC4388 Compliance DHCP Lease Query](#)

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)SCF

The Cisco universal broadband routers include or add support for the following MIBs in Cisco IOS Release 12.2(33)SCF:

- ENTITY-MIB
- IF-MIB

Limitations and Restrictions

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

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

- 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.

PCMCIA

While performing an OIR of the PCMCIA disk on PRE2, the System Event Archive (SEA) application and other applications such as IPDR write details to the PCMCIA disk on PRE2.

Before performing the OIR, the multiple system operator (MSO) must disable the write access to the PCMCIA disk on PRE2 using the **cable filesystem [enable | disable]** command. For more information, see the [CSCsz77977](#).

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 workaround 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(3)SCF

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.

Changes in Cisco IOS Release 12.2(33)SCF



Note

This section describes important changes in various Cisco IOS Releases that differ from support found in earlier software releases supported by the Cisco CMTS routers. This section is subject to change and is not intended to cover all changes found in the software. There may be other changes within the software that are not identified here, such as within the new and modified features. Closely read this release notes in their entirety, as well as review the related caveats documents for more information.

Table 6 identifies some of the key changes that you should consider when running Cisco IOS Release 12.2(33)SCF.

Table 6 Important Changes in Cisco IOS Release 12.2SC

Change Description	Release Introduced
Clearing Address Resolution Protocol (ARP) Entries Using the clear arp command can take about 15 seconds to remove all ARP table entries.	12.2(33)SCA
Point-to-Point over Ethernet Configuration For Point-to-Point over Ethernet (PPoE) configuration on the Cisco uBR7200 series routers, the bba-group command replaces the vpdn-group command. The software automatically converts an existing vpdn-group configuration to bba-group global configuration. After the configuration of bba-group , you cannot configure PPoE at the virtual private dialup network (VPDN) level. You need to use the bba-group configuration.	12.2(33)SCA
Reverse Path Forwarding RPF on the Cisco uBR10012 router requires configuration of the ip verify unicast source reachable-via rx allow-default command to properly interpret default routes.	12.2(33)SCA
Scheduling Engine The DOCSIS Weighted Fair Queuing (WFQ) Scheduler replaces the Versatile Traffic Management System (VTMS) scheduler operation on the Cisco uBR10012 router. For more information, see the feature documentation at: http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/ubr_docsis_wfq_sch.html	12.2(33)SCB
DOCSIS CM-STATUS messages are enabled by default.	12.2(33)SCB

Table 6 **Important Changes in Cisco IOS Release 12.2SC**

Change Description	Release Introduced
SPA Interface Processor/Shared Port Adapters <ul style="list-style-type: none"> New syntax is supported for the Cisco 10000 Series SIP-600 and shared port adapters (SPAs). In many commands, the <i>slot/subslot</i> indexes have been replaced by <i>slot/bay</i>. FPD images that might be loaded on a Cisco Wideband SPA from 12.3(21)BC-based software images are incompatible with Cisco IOS Release 12.2(33)SCA. The FPD images needed to support Cisco IOS Release 12.2(33)SCB must be loaded on the Cisco Wideband SPA for it to successfully load in Cisco IOS Release 12.2(33)SCB. If you should attempt to bring up a Cisco Wideband SPA in Cisco IOS Release 12.2(33)SCB without successfully updating the compatible FPD image for that release, the SPA fails to reload. If this is done with the Cisco Wideband SPA installed in a Cisco Wideband SIP, the SIP begins to upgrade the SPA and stops communicating with the PRE on the Cisco uBR10012 router. For more information, see the “Upgrading Field-Programmable Devices” chapter of the <i>Cisco uBR10012 Universal Broadband Router SIP and SPA Software Configuration Guide</i> at: http://www.cisco.com/en/US/docs/interfaces_modules/shared_port_adapters/configuration/ubr10012/12.3_23_bc/10fpd.html 	12.2(33)SCB
Spatial Reuse Protocol (SRP) The Spatial Reuse Protocol (SRP) for the Cisco uBR10012 OC-48 line card is not supported.	12.2(33)SCB
Modular QoS CLI Change Between Cisco IOS Release 12.3BC and Cisco IOS Release 12.2SC and the DOCSIS WFQ Implementation The priority command does not have any arguments. You must use the police command to specify a guaranteed bandwidth.	12.2(33)SCC

Table 6 **Important Changes in Cisco IOS Release 12.2SC**

Change Description	Release Introduced
<p>Logical Channel Support</p> <p>To support logical channel feature, the ordering of the "channel-width" and "docsis-mode" parameters have changed in the cable upstream docsis-mode and cable upstream channel-width commands. Because "channel-width" is a physical channel level parameter, it must be configured before "docsis-mode", which is a logical channel level parameter.</p> <p>For more details on this feature, see the <i>SCDMA and Logical Channel Support on the Cisco CMTS Routers</i> at the following location:</p> <p>http://www.cisco.com/en/US/docs/ios/cable/configuration/guide/cmts_d30_scdma_lc.html</p>	12.2(33)SCC
<p>Behavior Change in DOCSIS Set-top Gateway Tunnel</p> <p>When the DOCSIS Set-top Gateway (DSG) is configured to have a quality of service (QoS) for the DSG tunnel, ensure that the default multicast QoS (MQoS) is configured by using the following command:</p> <p>cable multicast group-qos default scn <i>service class name</i> aggregate</p> <p>where <i>service class name</i> is any service class name.</p> <p>Note that:</p> <ul style="list-style-type: none"> • If the last service class name is not configured with the DSG tunnel, you are prompted to remove the default MQoS, if it is not required. • If the service class name is configured with the DSG tunnel when no default MQoS exists, the configuration is rejected and you are prompted to configure the default MQoS. • If you are using an earlier Cisco IOS image, then while upgrading to the Cisco IOS Release 12.2(33)SCC1, during reload if the service class name is configured with the DSG tunnel and the default MQoS does not exist, the default MQoS is automatically configured. • The wideband interface is used to send multicast traffic when no MQoS is configured. After you configure the default MQoS, the primary downstream channel is used to forward the multicast traffic. However, the multicast session on the wideband interface is not deleted. This may cause duplicate traffic to be sent for the same multicast stream. Wait for 180 seconds for the old session to time out. <p>This behavior is observed only when you toggle (enable/disable) the default MQoS.</p>	12.2(33)SCC1

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>.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation, as an RSS feed and deliver content directly to your desktop using a reader application. The RSS feeds are a free service.

