



MC16 Modem Card for uBR7200

Feature Summary

This feature describes the new functionality provided by the MC16 modem card.

Benefits

This feature extends the usability of the uBR7200-class of routers.

Platforms

This feature is supported on the Cisco uBR7200-class of routers.

Prerequisites

Complete the basic configuration of the Cisco uBR7246 as described in the *Cisco uBR7246 Universal Broadband Router Features* feature module.

Supported MIBs and RFCs

The Cisco uBR7246 universal broadband features support the RF Interface Management Information Base (MIB). For descriptions of supported MIBs and how to use MIBs, see Cisco's MIB website on CCO at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>. No RFCs are supported by this feature.

Configuration Tasks

The configuration tasks required by this version of the Cisco uBR7246 cable router are the same as those described in the *Cisco uBR7246 Universal Broadband Router Installation and Configuration Guide* and the *Voice, Video, and Home Applications Configuration Guide*.

Verify

The verification tasks required by this version of the Cisco uBR7246 cable router are the same as those described in the *Cisco uBR7246 Universal Broadband Router Installation and Configuration Guide* and the *Voice, Video, and Home Applications Configuration Guide*.

Note the following:

- The controller must report being up.
- The comparison of the number of errors versus the number of error-free packets is a measure of the link quality. The percentage of errors should be less than 1%.

Configuration Examples

Refer to the *Cisco uBR7246 Universal Broadband Router Installation and Configuration Guide* and the *Voice, Video, and Home Applications Configuration Guide* for configuration examples.

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.3 command references.

- **cable downstream modulation**
- **cable downstream rate-limit**
- **cable upstream admission-control**
- **cable upstream minislot-size**
- **cable upstream rate-limit**
- **show interface cable upstream**
- **test cable atp**

cable downstream modulation

To set the modulation rate for a downstream port on a cable modem card, use the **cable downstream modulation** cable interface configuration command:

```
cable downstream modulation { 64qam | 256qam }
```

Syntax Description

64qam	Modulation is 6 bits per downstream symbol rate.
256qam	Modulation is 8 bits per downstream symbol rate.

Default

64qam.

Command Mode

Cable interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3 XA.

Downstream modulation defines the modulation type used for downstream traffic. Specifying the symbol rate indirectly influences the interface speed; at 64qam, the interface speed is 6xx bits/second. Specifying 256qam sets the interface speed to 8xx bits/second.

Example

The following example sets the downstream modulation:

```
Router(config)# interface cable 6/0  
Router(config-if)# cable downstream modulation 256qam
```

cable downstream rate-limit

To enable Data Over Cable Services Interface Specification (DOCSIS) rate limiting on downstream traffic, use the **cable downstream rate-limit** interface configuration command. Use the **no** form of this command to disable DOCSIS rate-limiting on downstream traffic.

```
cable downstream rate-limit [token-bucket | weighted-discard] exp-weight  
no cable downstream rate-limit
```

Syntax Description

token-bucket	(Optional) Specifies the token bucket filter algorithm.
weighted-discard	(Optional) Specifies the weighted discard algorithm.
<i>exp-weight</i>	(Optional) Specifies the weight for the exponential moving average of loss rate. Valid values are from 1 to 4.

Default

cable downstream rate-limit, which enforces strict DOCSIS-compliant rate limiting.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6)NA. When you enter this command without an option, it enables strict DOCSIS-compliant rate limiting, which sets the burst rate to the interface speed.

Example

The following example applies the token bucket filter algorithm:

```
Router(config-if)# cable downstream rate-limit token-bucket
```

Related Commands

cable upstream rate-limit

cable upstream admission-control

To specify the percentage overbooking rate, use the **cable upstream admission-control** interface configuration command. Use the **no** form of this command to disable upstream admission control.

cable upstream *portnum* **admission-control** *percentage*
no cable upstream *portnum* **admission-control**

Syntax Description

<i>portnum</i>	Specifies the upstream port.
admission-control <i>percentage</i>	Limits overbooking. Valid values are from 100 to 10000 percent.

Default

Disabled.

Command Mode

Interface Configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6)NA.

Example

The following example limits overbooking on upstream port 4 to 1000%:

```
Router(config-if)# cable upstream 4 admission-control 1000
```

cable upstream minislot-size

To specify a minislot size, use the **cable upstream minislot-size** interface configuration command. Use the **no** form of this command to set the default minislot size of 8 if this is valid for the current channel width setting.

cable upstream *portnum* **minislot-size** *size*
no cable upstream *portnum* **minislot-size**

Syntax Description

<i>portnum</i>	Specifies the upstream port.
<i>size</i>	Specifies the minislot size in number of time ticks. Valid minislot sizes are 2 (32 symbols), 4 (64 symbols), 8 (128 symbols), 16 (256 symbols), 32 (512 symbols), 64 (1024 symbols), and 128 (2048 symbols).

Default

8.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6)NA.



Caution Using values of 64 or 128 for higher symbol rates such as 1280 Ksymb/sec or 2560 Ksymb/sec can cause performance problems. Depending on your current setting's symbol rate, you should select the minislot size (in ticks) that yields a minislot size of 32 or 64 symbols.

Example

The following example sets the minislot size on upstream port 4 to 16 (or 256 symbols):

```
Router(config-if)# cable upstream 4 minislot-size 16
```

cable upstream rate-limit

To set DOCSIS rate limiting for an upstream port on a cable modem card, use the **cable upstream rate-limit** interface configuration command. Use the **no** form of this command to disable DOCSIS rate limiting for an upstream port on a cable modem card.

```
cable upstream portnum rate-limit [token-bucket]  
no cable upstream portnum rate-limit
```

Syntax Description

<i>portnum</i>	Specifies the upstream port.
token-bucket	(Optional) Applies the token bucket filter algorithm.

Default

Cable upstream *portnum* rate-limit, which enforces strict DOCSIS-compliant rate limiting.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6)NA.

Example

The following example uses the token bucket filter algorithm for upstream port 4:

```
Router(config-if)# cable upstream 4 rate-limit token-bucket
```

Related Commands

cable downstream rate-limit

show interface cable

To display cable interface information, use the **show interface cable** privileged EXEC command:

show interface cable *slot/port* **upstream**

Syntax Description

<i>port/slot</i>	Identifies the uBR7200 chassis slot number and downstream port number. Valid values are from 3 to 6.
upstream	(Optional) Displays cable upstream port information for a cable modem.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3 XA.

Sample Display

The following is sample output for the cable modem located in slot 6/port 0 from the **show interface cable** command:

```
router# show interface cable 6/0
Cable6/0 is up, line protocol is up
Hardware is BCM3210 FPGA, address is 00e0.1e5f.7a60 (bia 00e0.1e5f.7a60)
Internet address is 1.1.1.3/24
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
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
 10908 packets input, 855000 bytes, 0 no buffer
  Received 3699 broadcasts, 0 runts, 0 giants, 0 throttles
   3 input errors, 3 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  5412 packets output, 646488 bytes, 0 underruns
   0 output errors, 0 collisions, 13082 interface resets
   0 output buffer failures, 0 output buffers swapped out
```

Table 1 describes the fields shown in the **show interface cable** display.

Table 1 Show Interface Cable Field Descriptions

Field	Description
Cable slot/port is up/...administratively down	Indicates whether the interface hardware is currently active or taken down by the administrator.
line protocol is up/...administratively down	Indicates whether the software processes that handle the line protocol believe the interface is usable or if it has been taken down by the administrator.
hardware	Hardware type and address.
Internet address	Internet address followed by subnet mask.
MTU	Maximum Transmission Unit (MTU) of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255, calculated as an exponential average over 5 minutes. (For example, 255/255 is 100% reliability.)
load	Load on the interface as a fraction of 255, calculated as an exponential average over 5 minutes. (For example, 255/255 is complete saturation.)
Encapsulation	Encapsulation method assigned to this interface.
ARP type	Type of Address Resolution Protocol (ARP) and timeout value assigned.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
Last clearing of "show interface" counters	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) were last reset to zero.
Queueing strategy	Displays the type of queueing configured for this interface. In The following example output, the type of queueing configured is First In First Out (FIFO).
Output queue	Number of packets in the output queue. The format of this number is A/B, where A indicates the number of packets in the queue and B indicates the maximum number of packets allowed in the queue.
drops	Indicates the number of packets dropped due to a full queue.
input queue/drops	Number of packets in the input queue. The format of this number is A/B, where A indicates the number of packets in the queue and B indicates the maximum number of packets allowed in the queue.
drops	Indicates the number of packets dropped due to a full queue.
Five minute input rate Five minute output rate	Average number of bits and packets transmitted per second in the last five minutes.
packets input	Total number of error-free packets received by the system.
bytes input	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.

Table 1 Show Interface Cable Field Descriptions (Continued)

Field	Description
no buffer	Number of received packets discarded because there was no buffer space in the main system.
Received broadcast	Total number of broadcast or multicast packets received by the interface.
runt	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Includes runts, giants, no buffers, CRC, frame, overrun, and ignored counts.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received.
frame	Number of packets received incorrectly having a CRC error and a non-integer number of octets.
overrun	Number of times the receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times the transmitter has been running faster than the receiving device can handle.
output errors	Sum of all errors that prevented the final transmission of packets out of the interface being examined.
collisions	Not applicable for the Cisco uBR7246.
interface resets	Number of times an interface has been completely reset.
output buffer failures	Number of times the output buffer has failed.
output buffer swapped out	Number of times the output buffer has been swapped out.

The following is sample output for the upstream cable interface located in slot 6/port 0 from the **show interface cable upstream** command:

```
router# show interface cable 6/0 upstream
Cable6/0: Upstream 0 is up
  Received 3699 broadcasts, 0 multicasts, 28586 unicasts
  0 discards, 0 errors, 0 unknown protocol
  21817 packets input, 0 corrected, 0 uncorrectable
  0 noise, 0 microreflections
  Guaranteed-rate service queue depth:0
  Best-effort service queue depth:0
  Total Modems On This Upstream Channel:3 (3 active)
  Current Total Bandwidth Reserved:192000 bps
  Current Admission Control Status: ENFORCED
  Percentage of Oversubscription: 200%
  Reservation Limit (with Oversubscription):5120000 bps
  Last Minislot Stamp (current_time_base):190026   FLAG:1
  Last Minislot Stamp (scheduler_time_base):200706   FLAG:1
```

Table 2 describes the fields shown in the **show interface cable upstream** display.

Table 2 Show Interface Cable Upstream Field Descriptions

Field	Description
Cable	Identifying the cable interface.
Upstream is up/...administratively down	Indicates the administrative state of the upstream interface.
Received broadcasts	Number of broadcast packets received through this upstream interface.
multicasts	Number of multicast packets received through this upstream interface.
unicasts	Number of unicast packets received through this interface.
discards	Number of packets discarded by this interface.
errors	Sum of all errors that prevented upstream transmission of packets through this interface
unknown protocol	Number of packets received that were generated using a protocol unknown to the Cisco uBR7246.
packets input	Number of packets received through this upstream interface that were free from errors.
corrected	Number of error packets received through this upstream interface that were corrected.
uncorrectable	Number of error packets received through this upstream interface that could not be corrected.
noise	Number of upstream packets corrupted by line noise.
microreflections	Number of upstream packets corrupted by microreflections.
Guaranteed-rate service queue depth	Number of bandwidth requests queued up in the Guarantee-rate queue. This queue is only available to modems that have a reserved minimum upstream rate in their Class of Service.
Best-effort service queue depth	Number of bandwidth requests queued up in the Best-effort queue. This queue is available to all modems that do not have any reserved rate on the upstream.

Table 2 Show Interface Cable Upstream Field Descriptions (Continued)

Field	Description
Total Modems On This Upstream Channel:	Number of cable modems currently sharing this upstream channel. This field also shows how many of these modems are active.
Current Total Bandwidth Reserved	Total amount of bandwidth reserved by all modems sharing this upstream channel that require bandwidth reservation. The Class of Service for these modems specifies some non-zero value for the guaranteed-upstream rate. When one of these modems is admitted on the upstream, this field value is incremented by this guaranteed-upstream rate value.
Current Admission Control Status	Indicates the status of admission control on the upstream channel. Users enable admission control via the admission control CLI.
Percentage of Oversubscription	Amount of oversubscription to allow on this upstream channel. Oversubscription is expressed as a percentage of the raw capacity of the channel. In the example shown, an oversubscription rate of 200% on a 2.56Mbps channel allows the cumulative bandwidth reservation on this channel to reach 5.12Mbps before modems configured with non-zero reserved upstream rates are denied service.
Reservation Limit (with Oversubscription)	Maximum cumulative bandwidth reservation allowable before rejecting new modems. In the example shown, this reservation limit with oversubscription is 5.12Mbps.
Last Minislot Stamp (current_time_base)	Indicates the current minislot count at the CMTS. FLAG indicates the timebase reference. This field is used by developers.
Last Minislot Stamp (scheduler_time_base)	Indicates the furthest minislot count allocated at the indicated time. FLAG indicates the timebase reference. This field is used by developers.

Related Commands

You can use the master indexes or search online to find documentation of related commands.

- show interface cable sid**
- show interface cable signal-quality**

test cable atp

To run the acceptance test procedure on a port, use the **test cable atp** privileged EXEC configuration command.

```
test cable atp cable-interface test-id
```

Syntax Description

<i>cable-interface</i>	Specifies upstream cable interface by slot and port number.
<i>test-id</i>	Identifies a test specified in the automatic test procedure ATP documentation. The ATP documentation describes a collection of tests and the categories into which these tests are divided.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(6)NA. You should read and understand the ATP documentation before using this command.

The ATP tests are organized into categories such as PHY, MP, MAC, and the like. Tests within each category are labeled PHY01, PHY02, ..., MAC01, MAC02, etc. If you run a test from the CLI, you can omit the leading zero in the test ID.

In this release, Cisco supports only a subset of all of the tests.

Examples

The following example tests the upstream cable interface located in slot 4/port 0. Note that for this example, you must refer to the ATP documentation for specifics on running this test. Other tests will prompt you.

```
Router# test cable atp cable 4/0 1.1.1 4  
Please follow the spec and perform the manual procedure
```

Some tests, such as the one shown below, produce voluminous output:

```

Router# test cable atp c6/0 0010.7b43.aab9 8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/8/8 ms
*** 1-1. Normal TLV order UCD test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 1-1. Normal TLV order UCD test passed.
Continue to next step?[confirm]
*** 1-2. Reversed TLV order UCD test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 1-2. Reversed TLV order UCD test passed.
Continue to next step?[y/n][confirm]
*** 1-3. Random TLV order(96 55 85) UCD test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/27/104 ms
*** 1-3. Random TLV order(1 3 2) UCD test passed.
Continue to next step?[confirm]
*** 2-1. unrecognizable UCD param (type 5) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/27/104 ms
*** 2-1. unrecognizable UCD param (type 5) test passed.
Continue to next step?[confirm]
*** 2-2. null UCD param (len 0, type 6) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 2-2. null UCD param (len 0, type 6) test passed.
Continue to next step?[confirm]
*** 2-3. negative UCD param (type 129, len 1) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 2-3. negative UCD param (type 129, len 1) test passed.
Continue to next step?[confirm]
*** 2-4. undefined burst descriptor(type 12; in Request msg) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/25/96 ms
*** 2-4. undefined burst descriptor(type 12; in Request msg) test passed.
Continue to next step?[confirm]
*** 2-5. Null burst descriptor(len 0, type 12; in Request msg) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 2-5. Null burst descriptor(len 0, type 12; in Request msg) test passed.
Continue to next step?[confirm]
*** 2-6. negative burst descriptor(type 129, len 1; in Request msg) test
started.

```

```

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/27/104 ms
*** 2-6. negative burst descriptor(type 129, len 1; in Request msg) test passed.

Continue to next step?[confirm]
*** 2-7. undefined burst descriptor(type 12; in Short Data msg) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 2-7. undefined burst descriptor(type 12; in Short Data msg) test passed.
Continue to next step?[confirm]
*** 2-8. Null burst descriptor(len 0, type 12; in Short Data msg) test started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/27/104 ms
*** 2-8. Null burst descriptor(len 0, type 12; in Short Data msg) test passed.
Continue to next step?[confirm]
*** 2-9. negative burst descriptor(type 129, len 1; in Short Data msg) test
started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 2-9. negative burst descriptor(type 129, len 1; in Short Data msg) test
passed.
Continue to next step?[confirm]
*** 3-1. Number of burst profiles test(#burst desc.in UCD > # burst profiles in
MAP) started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 3-1. Number of burst profiles test(#burst desc.in UCD > # burst profiles in
MAP) passed.
Continue to next step?[confirm]
*** 4-1. Long Grant without max. burst size test(Short Grant size=1) started.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/26/100 ms
*** 4-1. Long Grant without max. burst size test(Short Grant size=1) passed.
Continue to next step?[confirm]
*** 5-6. UCD count less than MAP change count test started.
UCD count:19, next MAP change count:20
Station maintenance req failed
UCD count:19, next MAP change count restored:19
*** 5-6. UCD count less than MAP change count test passed.
Continue to next step?[confirm]
*** 5-7. Stopping UCD test started.
CM T1 timeout and reset (y/n)?[confirm]
wait for CM to come up again.
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 19.1.25.195, timeout is 2 seconds:
..!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/34/112 ms
*** 5-7. Stopping UCD test passed.
Continue to next step?[confirm]
*** 5-1. UCD without stn mnt desc test started.
CM are sending responds to CMTS
ATP TEST Non-Standard UCD (MAC-08) FAILED

```

What to Do Next

For more information on the Cisco uBR7246, refer to the *Voice, Video, and Home Applications Configuration Guide* and the *Cisco uBR7246 Universal Broadband Router Feature Enhancements* feature module.

For instructions on the advanced configuration of the port adapters installed in your Cisco uBR7246, refer to the respective installation documents that shipped with each port adapter. This documentation is also available on the Cisco Documentation CD-ROM and on CCO.

For instructions on the advanced configuration of the cable modem cards, refer to the document *Cisco uBR7246 Universal Broadband Router Cable Modem Card Installation and Configuration*. This document accompanies every Cisco cable modem card that is shipped from the factory as an installed item in a Cisco uBR7246 or as a FRU. The document is also available on the Cisco Documentation CD-ROM and on CCO.