

# Configuring Cable Modulation Profiles on Cisco CMTSs

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## Introduction

Cisco cable modem termination systems (CMTSs) can handle modulation profiles for the RF configuration of a voice and data cable modem plant. Cisco IOS® Software is designed with a default modulation profile that is optimal in most conditions. Therefore, do not change the default configuration. However, if the modulation needs are different for the customer plant, Cisco IOS Software has the ability to customize and to configure the modulation profiles to suit the customer needs.



**Caution:** Only an expert, who understands modulation changes and Data-over-Cable Service Interface Specifications (DOCSIS), should modify these parameters. Otherwise, changes can cause disruption or the degradation of services because the commands affect the physical layer.

This document explains the configuration commands to change the modulation profile. The document also provides the **show** commands that you use to verify the configured parameters.

The CMTS Cisco IOS Software releases have one preconfigured modulation profile resident in memory, which defines a typical profile for Quadrature Phase-Shift Keying (QPSK) modulation. The Cisco uBR7100, uBR7200, and uBR10000 series CMTSs support up to eight cable modulation profiles. Profile 1 is the default.

Issue the **show cable modulation-profile** command in order to see the default configured

parameters:

```
ubr7246#show cable modulation-profile
```

Mod	IUC	Type	Preamb length	Diff enco	FEC T	FEC CW	Scrambl seed	Max B	Guard time	Last CW	Scrambl	Pr of
					BYTES	size		size	size	short		
1	request	qpsk	64	no	0x0	0x10	0x152	0	8	no	yes	95
1	initial	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	89
1	station	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	89
1	short	qpsk	72	no	0x5	0x4B	0x152	6	8	no	yes	94
1	long	qpsk	80	no	0x8	0xDC	0x152	0	8	no	yes	93

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

This document is not restricted to specific software or hardware versions.

### Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Syntax Description

### The cable modulation-profile Command

In order to define a modulation profile, issue the [cable modulation-profile](#) global configuration command. In order to remove the specified modulation profile, issue the [no cable modulation-profile](#) command.

- **cable modulation-profile** *profile* {iuc | mix | qam-16 | qpsk} fec-tbytes fec-len burst-len guard-t mod scrambler seed diff pre-len last-cw uw-len
- **no cable modulation-profile** *profile* {iuc | mix | qam-16 | qpsk} fec-tbytes fec-len burst-len guard-t mod scrambler seed diff pre-len last-cw uw-len

**Note:** These commands should each be on *one* line.

**Note:** All these options are available in Cisco IOS Software Release 12.1(1)EC and later. In earlier releases, only the initial, long, request, short, or station options were available. There may be later releases of Cisco IOS Software Release 12.0T or 12.0SC that incorporate all the features.

**Table 1 – Parameter Descriptions**

Parameter	Description
	Modulation profile number—Valid values are from 1 to 8, where 1 is the default modulation profile.

<i>profile</i>	<b>Note:</b> In order to use this command correctly, enter a line with all parameters for each upstream burst type. An incomplete burst profile causes unreliable operation or loss of modem connectivity.
<b>mix</b>	Creates a default QPSK/16-QAM <sup>1</sup> mix modulation profile where short and long grant bursts are sent with the use of 16-QAM, while request, initial ranging, and station maintenance bursts are sent with the use of QPSK. The burst parameters are set to their default values for each burst type.
<b>qam-16</b>	Creates a default 16-QAM modulation profile, where all bursts are sent with the use of 16-QAM. The burst parameters are set to their default values for each burst type.
<b>qpsk</b>	Creates a default QPSK modulation profile, where all bursts are sent with the use of QPSK. The burst parameters are set to their default values for each burst type.
<i>fec-bytes</i>	<p>The number of bytes that can be corrected per the FEC<sup>2</sup> code word—Valid values are from 0 to 10, where 0 means no FEC.</p> <p>This is the number of bytes that the FEC decoder can correct within a code word. A code word consists of information bytes (k bytes) and parity bytes for error correction. The number of parity bytes is equal to two times the number of correctable errors (T). The size of T is dictated by channel impairments.</p>
<i>fec-len</i>	<p>FEC code word information bytes length—Valid values are from 16 to 253 bytes.</p> <p>This value specifies the number of information bytes (k bytes) per FEC code word.</p>
<i>burst-len</i>	<p>Maximum burst length in minislots—Valid values are from 0 to 255, where 0 means no limit.</p> <p>This is used to determine the breakpoint between packets that use the short data grant burst profile and packets that use the long data grant burst profile. If the required upstream time to transmit a packet is greater than this value, the long data grant burst profile is used. If the time is less than or equal to this value, the short data grant burst profile</p>

	is used.
<i>guard-t</i>	<p>Guard time in symbols—The time between successive bursts. Valid values are from 0 to 255 symbols.</p> <p>This is the blank time at the end of a burst transmission that exists to ensure that one burst ends before another burst starts.</p>
<i>mod</i>	<p>Modulation—Valid options are <b>16qam</b> and <b>qpsk</b>.</p> <p>Modulation type is used to select between 4 bits per modulation symbol (16-QAM) or 2 bits per modulation symbol (QPSK). 16-QAM uses both phase and amplitude to carry information. QPSK carries information in the phase of the signal carrier. 16-QAM requires approximately <math>7 \text{ dB}^3</math> higher <math>\text{C/N}^4</math> in order to achieve the same <math>\text{BER}^5</math> as QPSK. But 16-QAM transfers information at two times the rate of QPSK.</p>
<i>scrambler</i>	<p>Enable or disable scrambler—Valid options are <b>scrambler</b> and <b>no-scrambler</b>.</p> <p>Scrambler is used to create an almost random sequence of transmission symbols, which ensures an even spectral distribution of energy that is transmitted within the channel. The scrambler seed is an initial value that is used to start the pseudorandomizer to scramble the bits. Because both the transmitter and the receiver know the seed value, the scrambling can be reversed at the receiver to leave only the original data.</p>
<i>seed</i>	Scrambler seed, in hexadecimal format—Valid values are from 0x0000 to 0x7FFF.
<i>diff</i>	<p>Enable or disable differential encoding—Valid options are <b>diff</b> and <b>no-diff</b>.</p> <p>Differential encoding is a technique wherein the information is transmitted by the phase change between two modulation symbols instead of by the absolute phase of a symbol. This technique makes the absolute phase of the received signal insignificant and effectively doubles the BER for the same C/N.</p>
	Preamble length in bits—Valid values are from 2 to 128.

<i>pre-len</i>	Preamble length (and preamble offset) are used to define a synchronizing string of modulation symbols, which lets the receiver find the phase and timing of the transmitted burst.
<i>last-cw</i>	How FEC is handled for last code word—Valid options are <b>fixed</b> for fixed code-word length and <b>shortened</b> for shortened last code word.
<i>uw-len</i>	Upstream unique word length—Valid options are <b>uw8</b> for 8-bit unique words or <b>uw16</b> for 16-bit unique code words.

<sup>1</sup> QAM = quadrature amplitude modulation

<sup>2</sup> FEC = forward error correction

<sup>3</sup> dB = decibels

<sup>4</sup> C/N = carrier-to-noise

<sup>5</sup> BER = bit error rate

## Defaults

The default is modulation profile 1.

## Command Modes

The command mode is global configuration.

**Table 2 – Command History**

Cisco IOS Software Release	Modification
11.3 NA	This command was introduced.
12.0(7)XR2	This command was used.
12.0(6)SC and 12.1 (3a)EC1	The <b>mix</b> , <b>qpsk</b> and <b>16qam</b> options were added.

## Usage Guidelines

A modulation profile is a collection of six burst profiles that are sent out in an Upstream Channel Descriptor (UCD) message. These profiles configure modem transmit parameters for these upstream message types:

- Request
- Initial maintenance

- Station maintenance
- Short grant
- Long grant

You can issue the **no cable modulation-profile** command in order to remove all modulation profiles except the default modulation profile 1. In the case of modulation profile 1, the **no cable modulation-profile** command sets all the parameters in a burst to default values.



**Caution:** Changes to modulation profiles cause changes to the physical layer. Because changes to physical layer characteristics affect router performance and function, have only an expert user handle this task.

In order to use the **cable modulation-profile** command correctly, enter a line with all parameters for each upstream burst type. An incomplete burst profile causes unreliable operation or loss of modem connectivity.



**Caution:** If you turn off the scrambler, you can cause packet loss. Therefore, turn the scrambler off only in lab test environments.

Errors or incompatible configurations in the burst profiles cause modems to either:

- Drop connectivity
- Drop short or long data packets
- Fail to connect to the network

It is possible to build a burst profile set for which no implementation of a DOCSIS receiver can receive the transmissions of the modem.

The data rates of 160 K symbol/second and 2560 K symbol/second are highly sensitive to unique word length, preamble length, and FEC sizing. Incorrect choices for these values can cause poor or no connectivity at these symbol rates.

## Configuration Samples

### Customized Example

The example in this section is a modulation profile for mixed modulation. The initial, request, and station maintenance messages are sent as QPSK, and the short and long data packets are sent as 16-QAM. 16-QAM modulation is more bandwidth-efficient than QPSK, but QPSK is more robust than 16-QAM.

In this example, the request burst has these values by definition:

- *fec-tbytes*: 0
- *fec-len*: 16 KB

- *burst-len*: 1
- *guard-t*: 8
- *mod*: **qpsk**
- Scrambler enabled
- *seed*: 152
- Differential encoding disabled
- *pre-len*: 64 bits
- *last-cw*: **fixed**
- *uw-len*: **uw8**

The remaining initial, station, short, and long bursts are defined in similar fashion for profile 2.

```
ubr7246#configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

ubr7246(config)#cable modulation-profile 2 request 0 16 1 8 qpsk
                    scrambler 152 no-diff 64 fixed uw8
ubr7246(config)#cable modulation-profile 2 initial 5 34 0 48 qpsk
                    scrambler 152 no-diff 128 fixed uw16
ubr7246(config)#cable modulation-profile 2 station 5 34 0 48 qpsk
                    scrambler 152 no-diff 128 fixed uw16
ubr7246(config)#cable modulation-profile 2 short 6 75 6 8 16qam
                    scrambler 152 no-diff 144 fixed uw8
ubr7246(config)#cable modulation-profile 2 long 8 220 0 8 16qam
                    scrambler 152 no-diff 160 fixed uw8
ubr7246(config)#^Z

ubr7246#
```

**Note:** The commands in this output should each be on *one* line.

**Note:** Use the **modulation profile** command in order to create all the bursts (request, initial, station, short, and long) for this modulation profile. If you fail to do so, you can cause performance problems or service interruption.

This example uses this equipment:

**Table 2 – Configuration Example Equipment**

Name	Model	Usage	Software Version	Image Name
Cable Head End Station	uBR7246	CMTS	Cisco IOS Software Release 12.1 (1a)	ubr7200-ik1st-mz.121-1a.T1
			Cisco IOS	ubr920-

Home Office	uBR924	Cable Modem	Software Release 12.2 (1)	k8o3v6y5-mz.122-1.bin
	PC	DHCP Server	WinNT <sup>1</sup> Server 4.0	Cisco Network Registrar 3.5
		TFTP Server	WinNT Server 4.0	Cisco TFTP
		ToD <sup>2</sup> Server	WinNT Server 4.0	Any NTP <sup>3</sup> or ToD server

<sup>1</sup> WinNT = Microsoft Windows NT

<sup>2</sup> ToD = Time of Day

<sup>3</sup> NTP = Network Time Protocol

This example configuration shows the entire configuration of the uBR7246. The commands that appear in boldface are the commands that are relevant to the configuration of modulation profiles:

<b>uBR7246 Configuration</b>
<pre>ubr7246#<b>show run</b>  Building configuration... Current configuration: ! version 12.1 no service pad service timestamps debug uptime service timestamps log uptime no service password-encryption service compress-config ! hostname ubr7246 ! enable password ww ! <b>cable modulation-profile 2 request 0 16 1 8 qpsk scrambler 152 no-diff 64 fixed uw8</b> <b>cable modulation-profile 2 initial 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16</b> <b>cable modulation-profile 2 station 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16</b> <b>cable modulation-profile 2 short 6 75 6 8 16qam scrambler 152 no-diff 144 fixed uw8</b> <b>cable modulation-profile 2 long 8 220 0 8 16qam scrambler 152 no-diff 160 fixed uw8</b>  !--- <i>Note: These commands should each be on one line.</i>  no cable qos permission create no cable qos permission update cable qos permission modems cable time-server</pre>

```

!
!
!
!
ip subnet-zero
no ip domain-lookup
!
interface Ethernet2/0
 ip address 172.16.30.20 255.255.255.192
!
interface Cable3/0
 ip address 192.168.5.1 255.255.255.0 secondary
 ip address 10.2.3.1 255.255.255.0
 no keepalive
 cable downstream rate-limit token-bucket shaping
 cable downstream annex B
 cable downstream modulation 256qam
 cable downstream interleave-depth 32
 cable upstream 0 frequency 20000000
 cable upstream 0 power-level 0
 cable upstream 0 modulation-profile 2
 no cable upstream 0 shutdown
 cable upstream 1 shutdown
 cable upstream 2 shutdown
 cable upstream 3 shutdown
 cable upstream 4 shutdown
 no cable upstream 5 shutdown
 cable source-verify dhcp
 cable dhcp-giaddr policy
 cable helper-address 172.16.30.3
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.30.1
no ip http server
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 password ww
 login tacacs
!
end

```

In order to be complete, this document also shows the configuration of one of the uBR924 cable modems. This is the basic bridge configuration that the cable modems receive after they come on line and obtain an IP address from the DHCP server:

### uBR924 Configuration

```

uBR924-445b#show run

Building configuration...
version 12.2
no service single-slot-reload-enable
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname uBR924-445b

```

```
!  
logging rate-limit console 10 except errors  
!  
clock timezone - -8  
ip subnet-zero  
no ip routing  
no ip finger  
!  
ip audit notify log  
ip audit PO max-events 100  
no ip dhcp-client network-discovery  
call RSVP-sync  
!  
!  
!  
interface Ethernet0  
 ip address 10.2.3.3 255.255.255.0  
 no ip route-cache  
 bridge-group 59  
 bridge-group 59 spanning-disabled  
!  
interface cable-modem0  
 no ip route-cache  
 bridge-group 59  
 bridge-group 59 spanning-disabled  
 h323-gateway voip interface  
 h323-gateway voip id 3620-gk ipaddr 172.16.30.5 1718  
 h323-gateway voip h323-id test2  
!  
ip classless  
ip http server  
no ip http cable-monitor  
!  
snmp-server packetsize 4096  
snmp-server manager  
!  
voice-port 0  
 input gain -2  
 output attenuation 0  
!  
voice-port 1  
 input gain -2  
 output attenuation 0  
!  
dial-peer voice 1 pots  
 destination-pattern 3333  
 port 0  
!  
dial-peer voice 2 pots  
 destination-pattern 4444  
 port 1  
!  
dial-peer voice 10 voip  
 destination-pattern 1111  
 session target ras  
!  
gateway  
!  
!  
line con 0  
 transport input none  
line vty 0 4  
!  
!
```

```
end
```

## Modulation Profile Built-In Templates

In order to simplify the definition of new modulation profiles, you can use the **cable modulation-profile** command. This command quickly creates a complete modulation profile on the basis of one of three predefined templates. These are the three templates:

- **qpsk**—This template is a modulation profile that is optimized for all interval usage codes (IUCs) to use QPSK.
- **qam-16**—This template is a modulation profile that is optimized for all IUCs to use 16-QAM.

**Note:** Cisco does not recommend the use of this modulation profile.

- **mix**—This template is a modulation profile that is optimized to use 16-QAM for data traffic and QPSK for maintenance and request traffic.

Use **mix** in order to gain the robustness of QPSK for maintenance traffic and the speed of 16-QAM for data traffic. In order to create a new modulation profile that uses one of these templates, issue the **cable modulation-profile** command. These sections of this document show the use of the **cable modulation-profile** command:

- [QPSK Modulation Profile Example](#)
- [16-QAM Modulation Profile Example](#)
- [Mixed Modulation Profile Example](#)

### QPSK Modulation Profile Example

In order to configure a CMTS with the QPSK template, issue the **cable modulation-profile profile qpsk** command in global configuration. This output shows the use of the command:

```
ubr7246#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ubr7246(config)#cable modulation-profile 2 qpsk
ubr7246(config)#end
```

After you issue this command, the CMTS loads all the preconfigured settings for this profile. These settings appear in the configuration:

```
ubr7246#show run | include modulation-profile 2

cable modulation-profile 2 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fi
cable modulation-profile 2 initial 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 2 station 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 2 short 5 75 6 8 qpsk scrambler 152 no-diff 72 fixe
cable modulation-profile 2 long 8 220 0 8 qpsk scrambler 152 no-diff 80 fixe
```

**Note:** Notice that all the IUCs were built automatically with QPSK modulation.

**Note:** After you issue the **cable modulation-profile profile {mix | qam-16 | qpsk}** command, you can manually alter some of the parameters.

## 16-QAM Modulation Profile Example

In order to configure a CMTS with the 16-QAM template, issue the **cable modulation-profile profile qam-16** command in global configuration. This output shows the use of the command:

```
ubr7246#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ubr7246(config)#cable modulation-profile 3 qam-16
ubr7246(config)#end
```

After you issue this command, the CMTS loads all the preconfigured settings for this profile. These settings appear in the configuration:

```
ubr7246#show run | include modulation-profile 3
cable modulation-profile 3 request 0 16 0 8 16qam scrambler 152 no-diff 128
cable modulation-profile 3 initial 5 34 0 48 16qam scrambler 152 no-diff 256
cable modulation-profile 3 station 5 34 0 48 16qam scrambler 152 no-diff 256
cable modulation-profile 3 short 6 75 6 8 16qam scrambler 152 no-diff 144 fi
cable modulation-profile 3 long 8 220 0 8 16qam scrambler 152 no-diff 160 fi
```

## Mixed Modulation Profile Example

There is a more efficient template, which combines QPSK and 16-QAM modulation profiles and is more robust at a higher speed.

In order to configure a CMTS with the mixed template, issue the **cable modulation-profile profile mix** command in global configuration. This output shows the use of the command:

```
ubr7246#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ubr7246(config)#cable modulation-profile 4 mix
ubr7246(config)#end
```

After you issue this command, the CMTS loads all the preconfigured settings for this profile. These settings appear in the configuration:

```
ubr7246#show run | include modulation-profile 4
cable modulation-profile 4 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fi
cable modulation-profile 4 initial 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 4 station 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 4 short 6 75 6 8 16qam scrambler 152 no-diff 144 fi
cable modulation-profile 4 long 8 220 0 8 16qam scrambler 152 no-diff 160 fi
```

**Note:** Notice that the short and long IUCs use 16-QAM. The request, initial, and station use QPSK.

**Note:** The default unique word setting for long and short IUCs in the mixed profile is unique word 8 (UW8). Cisco recommends the use of UW16. The use of a longer UW helps in noisy situations and

reduces uncorrectable FEC error generation.

Issue the **cable modulation-profile *profile*** command in order to change the unique word from UW8 to UW16. This is the output of **show run | include modulation-profile 4** command after you change the unique word from UW8 to UW16:

```
ubr7246#show run | include modulation-profile 4

cable modulation-profile 4 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fi
cable modulation-profile 4 initial 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 4 station 5 34 0 48 qpsk scrambler 152 no-diff 128
cable modulation-profile 4 short 6 75 6 8 16qam scrambler 152 no-diff 144 fi
cable modulation-profile 4 long 8 220 0 8 16qam scrambler 152 no-diff 160 fi
```

The section [The show cable modulation-profile Command](#) details the use of the **show cable modulation-profile** command. Issue this command after you configure modulation profiles in order to ensure that the CMTS correctly understood all the parameters.

## Related Commands

### The cable upstream modulation-profile Command

In order to assign a modulation profile to an interface, issue the **cable upstream *n* modulation-profile interface** configuration command. In order to assign the default primary modulation profile (profile 1) to the interface, issue the **no cable upstream *n* modulation-profile interface** command.

- **cable upstream *n* modulation-profile *primary-profile-number* [*secondary-profile-number*]**
- **no cable upstream *n* modulation-profile *primary-profile-number* [*secondary-profile-number*]**

**Table 4 – Parameter Descriptions**

Parameter	Description
<i>n</i>	Port number on the cable modem slot Port numbers begin with a 0.
<i>primary-profile number</i>	Default modulation profile that is added to the interface
<i>secondary-profile number</i>	Additional modulation profile that is added to the interface

### Defaults

The default is the primary modulation profile (profile 1).

### Command Modes

The command mode is interface configuration.

**Table 5 – Command History**

Cisco IOS	
-----------	--

Software Release	Modification
11.3 NA	This command was first introduced.
12.0(7)XR2 and 12.1(1a) T1	This command was introduced into the Cisco IOS Software Release 12.x trains.
12.1(3a)EC1	This command was modified to add the <i>primary-profile-number</i> and <i>secondary-profile-number</i> parameters in order to enable the Dynamic Upstream Modulation feature.
12.1(5)EC	This command was introduced for the Cisco uBR7100 series universal broadband routers.
12.1(7)CX	This command was enhanced for the Cisco uBR-MC16S line card.

### Usage Guidelines

You can configure modulation profiles with fixed upstream frequencies or on interfaces with assigned spectrum groups. The Dynamic Upstream Modulation feature uses modulation profiles in order to track upstream signal quality. The feature checks that the upstream signal can support the configured modulation scheme and adjusts to a more robust modulation scheme, if necessary. When return path conditions improve, the feature returns the upstream channel to the higher modulation scheme.

When you configure Dynamic Upstream Modulation and spectrum groups on the same interface, Cisco uBR-MC1xC and Cisco uBR-MC16S cable modem cards attempt corrective actions in this order:

1. Modulation switchover
2. Frequency hopping
3. Channel width reduction

### Example

This example assigns the primary modulation profile 2 and the secondary modulation profile 1 to port (interface) 0:

```
Router(config-if)#cable upstream 0 modulation-profile 2 1
```

### The show cable modulation-profile Command

The syntax for this command is [show cable modulation-profile \[profile\] \[iuc-code\]](#).

**Table 6 – Parameter Descriptions**

Parameter	Description

<i>profile</i>	(Optional) Profile number—Valid values are from 1 to 8.
<i>iuc-code</i>	(Optional) Internal usage code—Valid options are: <ul style="list-style-type: none"> <li>• <b>request</b>—Request burst (IUC 1)</li> <li>• <b>reqdata</b>—Request/data burst (IUC 2)</li> <li>• <b>initial</b>—Initial ranging burst (IUC 3)</li> <li>• <b>station</b>—Station ranging burst (IUC 4)</li> <li>• <b>short</b>—Short grant burst (IUC 5)</li> <li>• <b>long</b>—Long grant burst (IUC 6)</li> </ul>

### Defaults

There is no default behavior nor default values.

### Command Modes

The command mode is privileged EXEC.

**Table 7 – Command History**

Cisco IOS Software Release	Modification
11.3 XA	This command was first introduced.
12.(0)7XR2	This command was used.
12.1(3a)EC1	This command was supported and the <b>reqdata</b> type was added.

### Usage Guidelines

The **show cable modulation-profile** command displays modulation profile group information. A modulation profile is a collection of six burst profiles that are sent out in a UCD message. These profiles configure modem transmit parameters for these upstream message types:

- Request
- Reqdata
- Initial maintenance
- Station maintenance
- Short grant
- Long grant

This is sample output from the **show cable modulation-profile** command:

```
ubr7246#show cable modulation-profile 1

Mod IUC      Type Preamb Diff FEC      FEC      Scrambl Max  Guard Last Scrambl Pr
      length enco T        CW       seed     B    time CW      of
                               BYTES   size
1  request qpsk 64     no  0x0    0x10   0x152  1    8    no  yes   95
1  initial qpsk 128    no  0x5    0x22   0x152  0    48   no  yes   89
1  station qpsk 128    no  0x5    0x22   0x152  0    48   no  yes   89
1  short  qpsk 72     no  0x5    0x4B   0x152  6    8    no  yes   94
1  long   qpsk 80     no  0x8    0xDC   0x152  0    8    no  yes   93
```

This table describes the fields that display in the **show cable modulation-profile** command output:

**Table 8 – Field Descriptions**

Field	Description
Mod	<p>Modulation profile group number</p> <p>A modulation profile group is the set of burst profiles that define upstream transmit characteristics for the various types of upstream transmission classes.</p>
IUC	<p>Internal usage code</p> <p>Each upstream transmit burst belongs to a class, which is given a number that is called the IUC. Bandwidth maps messages by IUC codes that are used to allocate upstream time slots. These types are currently defined:</p> <ul style="list-style-type: none"> <li>• <b>request</b>—Request burst (IUC 1)</li> <li>• <b>reqdata</b>—Request/data burst (IUC 2)</li> <li>• <b>initial</b>—Initial ranging burst (IUC 3)</li> <li>• <b>station</b>—Station ranging burst (IUC 4)</li> <li>• <b>short</b>—Short grant burst (IUC 5)</li> <li>• <b>long</b>—Long grant burst (IUC 6)</li> </ul>
Type	Modulation type
Preamb length	Preamble length
Diff enco	Differential encoding enabled ( <i>yes</i> ) or not enabled ( <i>no</i> )
FEC T bytes	Number of bytes that can be corrected for each FEC code word
FEC k bytes	The number of information bytes within an FEC code word

FEC CW size	Size, in bytes, of the post-FEC code word  This is typically $k + 2T$ bytes, or the number of FEC Information Bytes ( $k$ ) plus two times the number of bytes that can be corrected within each FEC code word ( $T$ ).
Scrambl seed	Scrambler seed value, in hexadecimal format
Max B size	Maximum burst size
Guard time size	Time, in symbols, between successive bursts
Last CW short	Handling of FEC for shortened last code word
Scrambl	Scrambler enabled ( <i>yes</i> ) or not enabled ( <i>no</i> )
Preamb offset	The preamble value bits

### Example

In order to verify that the modulation profile that you configured has the correct parameters, issue the **show cable modulation-profile** command for profile 2.

```
ubr7246#show cable modulation-profile 2
```

Mod	IUC	Type	Preamb length	Diff enco	FEC T	FEC CW	Scrambl seed	Max B size	Guard time size	Last CW short	Scrambl	Pr of
2	request	qpsk	64	no	0x0	0x10	0x152	1	8	no	yes	44
2	initial	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	38
2	station	qpsk	128	no	0x5	0x22	0x152	0	48	no	yes	38
2	short	qam	144	no	0x6	0x4B	0x152	6	8	no	yes	86
2	long	qam	160	no	0x8	0xDC	0x152	0	8	no	yes	84

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## Related Information

- [Cisco uBR7200 Dynamic Upstream Modulation](#)
- [Cisco IOS CMTS Cable Command Reference Guide](#)
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