

Cisco uBR7200 – QoS/MAC Enhancements for Voice and Fax Calls: DOCSIS 1.0+

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Contents

Introduction

Prerequisites

- Requirements
- Components Used
- Conventions

Brief Theory Summary

What Happens When the ITCM Registers with the CMTS?

What Happens When You Want to Place a Voice Call?

Configuration: the Different Steps to Follow

- Profiles In CMTS
- Profiles In Cable Modems

Troubleshooting and Tips

Related Information

Introduction

This document explains how to configure and troubleshoot the Quality of Service (QoS) enhancements on the Cisco uBR7200 universal broadband router, to support voice and fax traffic. To implement this feature, you need Cisco IOS® Software Release 12.0.7XR2, or a release from the branch 12.1.1T , 12.1(1a)T1, or later.

Prerequisites

Requirements

Readers of this document should have knowledge of these topics:

- Data-over-Cable Service Interface Specifications (DOCSIS)
- Cisco IOS software
- Voice over IP (VoIP)

Components Used

The information in this document is based on these software and hardware versions:

- Cisco IOS Software Release 12.0.7XR2, or a release from the branch 12.1.1T, 12.1(1a)T1, or later.
- Cisco uBR7200
- DOCSIS-compliant Integrated Telephony Cable Modem (ITCM)

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Brief Theory Summary

DOCSIS 1.0+ implementation is DOCSIS 1.0 with QoS extensions for supporting real-time voice, fax, and video on a LAN.

DOCSIS 1.0+ is not a new or intermediate specification by cable labs. The whole DOCSIS 1.0+ architecture is a time-to-market solution provided by Cisco and certain cable modem (CM) vendors until DOCSIS 1.1 specifications and development are widely available.

DOCSIS 1.0+ provides additional QoS features for real-time voice, fax, and data packets from the ITCMs. These are the private extensions added to DOCSIS 1.0 in DOCSIS 1.0+:

- Two new CM-initiated dynamic MAC messages: Dynamic Service Addition (DSA) and Dynamic Service Deletion (DSD). These messages allow dynamic Service IDs (SIDs) to be created and deleted at runtime on a per-call basis.
- Unsolicited Grant Service (constant bit rate [CBR]-scheduling) on the upstream. This service provides a high quality QoS channel for the upstream CBR voice and fax packets from the ITCM.

For any given ITCM, the ability to provide separate downstream rates is based on the IP-precedence value in the packet. This helps in separating voice, signaling, and data traffic going to the same ITCM for rate-shaping purposes.

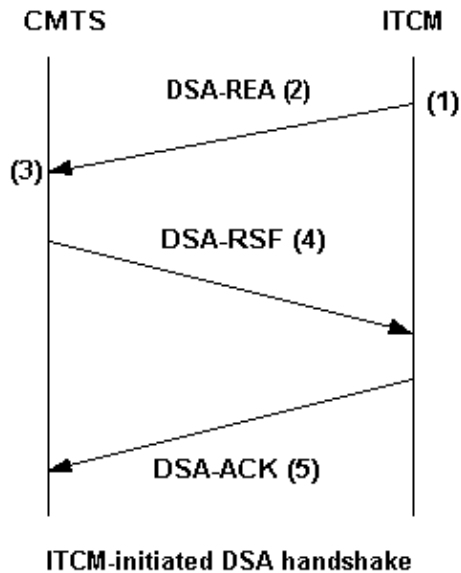
What Happens When the ITCM Registers with the CMTS?

When the Cable Modem Termination System (CMTS) receives the registration request, it creates a local database entry for the ITCM. A static SID is immediately assigned to the ITCM for the data service. For the phone line service, the CMTS creates some deferred service flows (for subsequent activation) in the database entry of the ITCM. No SIDs are assigned for the phone line service during registration.

Note: The number of deferred flows created by CMTS for ITCM at the time of registration depends on the value of the Number of Phone Lines parameter provisioned for the cable modem. The value can be any number starting from 0 (for example: 0, 1, 2, 3, and so forth).

What Happens When You Want to Place a Voice Call?

1. ITCM gets a new voice or fax call and determines the QoS parameters for that call using the codec type G.711 or G.729 received from the higher-layer voice-call-signaling protocol.
2. The ITCM sends a DSA request (DSA-REQ) to the uBR, requesting a new dynamic SID.
3. CMTS accesses the ITCM's database information (using the MAC address in the DSA-REQ message) and checks to see if this ITCM has any inactive or unadmitted (deferred) service flow. If the ITCM has an unused deferred flow and if the upstream (US) channel (to which ITCM is connected) has enough capacity to admit a new periodic CBR slot as requested in the DSA-REQ, then a new dynamic SID is created by CMTS.
4. CMTS responds to the ITCM request with a DSA response (DSA-RSP).
5. ITCM acknowledges the DSA-RSP. (The CMTS expects a DSA acknowledgment [DSA-ACK] from the ITCM every time it sends a DSA response.)



6. When the voice or fax call is cleared, ITCM sends a DSD-REQ MAC message to the CMTS, specifying the dynamic SID to be deleted.
7. CMTS deletes the dynamic SID and sends a DSD-RSP to the ITCM. For more explanation of DOCSIS 1.0+, refer to Frequently Asked Questions on DOCSIS 1.0+.

Configuration: the Different Steps to Follow

The example configuration in this document uses this network setup:



Cisco IOS Software Release 12.1(1a)T1 runs on the cable modems and on the Cisco uBR7246.

Profiles In CMTS

QoS Profile

At the CMTS, two special (voice- and fax-related) QoS profiles are dynamically configured and are available to the CMTS QoS code at any given time. These QoS profiles (G711 and G729) are configured with the special scheduling parameters for G.711 or G.729 type coder-decoders (codecs). The CMTS can obtain the specific parameters such as grant-size and grant-interval from the contents of the DSA-REQ message requesting this special scheduling treatment. You must configure QoS profile templates on CMTS for each unique codec parameter combination.

Note: QoS profiles for codecs G.711 and G.729 are dynamically created as soon as you configure phone lines in the configuration file of cable modems. They receive a default grant-interval of 20 milliseconds and a grant-size of 31.22 kbps (for G.729) and 87.2 kbps (for G.711).

This is the output from the **show cable qos profile** command when at least one phone line is configured in the configuration file of the cable modems:

```
# show cable qos profile
```

ID	Prio	Max upstream bandwidth	Guar upstream bandwidth	Max downstream bandwidth	Max transmit burst	TOS mask	TOS value	Created by	Privacy B enabled	IP prec. rate enabled
3	7	31200	31200	0	0	0x0	0x0	cmts	yes	no
4	7	87200	87200	0	0	0x0	0x0	cmts	yes	no

If ITCM vendors use versions of the G.711 or G.729 codecs that are different from those used in that example, you must statically configure QoS profile templates on CMTS for each unique codec parameter combination (unsolicited grant-size and grant-interval).

This table shows you how to calculate the unsolicited grant-size and grant-intervals (for codecs G.711 and G.729):

QoS Profile for G.711 Codec	
These are the corresponding numbers for a G.711 QoS profile:	
Unsolicited grant size	229 bytes
Unsolicited grant interval	20 ms
Reserved/peak rate	87.2 kbps

QoS Profile for G.729 Codec	
This is how you calculate the total size of the DOCSIS cable MAC frame:	
G.729 codec output per interval	20 bytes
Routing Table Protocol (RTP) header	12 bytes
User Datagram Protocol (UDP) header	8 bytes
IP header	20 bytes
Ethernet frame header and cyclic redundancy check (CRC)	18 bytes
DOCSIS Cable MAC header	11 bytes (assuming that the 5 byte privacy extended header is compulsory)

Total DOCSIS Cable MAC frame size	89 bytes
The grant interval of 20 milliseconds directly follows from the framing or packetization delay of the G.729 codec. The upstream reserved rate is obtained by only considering the Ethernet-level bandwidth usage of each G.729 codec output. This works out to a 78-byte Ethernet frame every 20 milliseconds, which equals 31.2 kbps.	

In the Troubleshooting and Tips section, an example is provided to show you what happens in **debug** output if the grant-size or the grant-interval is not correctly specified for the codec used.

You can check your modulation profiles using the **show cable qos profile x verbose** command.

Modulation Profile

You can change the modulation profile to maximize the number of voice calls that you can get per upstream channel. This is a modulation profile that you can use:

```
cable modulation-profile 5

!--- This configuration line is entered on one line:

cable modulation-profile 5 short 2 52 35 8
  qpsk scrambler 152 diff 72 shortened uw8
interface Cable3/0
cable upstream 5 minislot-size 4
cable upstream 5 modulation-profile 5
```

Configuration of CMTS

```
cable modulation-profile 5 request 0 16 1 8 qpsk scrambler 152 no-diff 64 fixed uw16
cable modulation-profile 5 initial 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 5 station 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 5 short 6 75 6 8 16qam scrambler 152 no-diff 144 fixed uw8
cable modulation-profile 5 long 8 220 0 8 16qam scrambler 152 no-diff 160 fixed uw8
cable qos profile 5 ip-precedence 5 max-downstream 128
no cable qos permission update

!--- This command was created automatically during CM registration;
!--- no cable qos permission creates 2 phone lines with IP precedence 5 and
!--- with 128K for max downstream, as specified in CM configuration file.

cable qos permission modems
cable time-server
!
interface Ethernet2/0
  ip address 10.200.68.3 255.255.255.0
!
interface Cable3/0
  ip address 10.200.70.17 255.255.255.240
  secondary ip address 10.200.69.1 255.255.255.240
  no keepalive
  cable downstream annex B
  cable downstream modulation 64qam
  cable downstream interleave-depth 32
  cable upstream 0 shutdown
  cable upstream 1 shutdown
  cable upstream 2 shutdown
  cable upstream 3 shutdown
  cable upstream 4 shutdown
  cable upstream 5 frequency 30000000
  cable upstream 5 power-level 0
  cable upstream 5 minislot-size 4
  cable upstream 5 modulation-profile 5
  no cable upstream 5 shutdown
  cable dhcp-giaddr policy
  cable helper-address 10.200.68.11
!
ip classless
```

Profiles In Cable Modems

DOCSIS Cable Modem Configuration File

Prepare the configuration file for cable modems using the DOCSIS customer premises equipment (CPE) Configurator. Specify the number of phone lines that you want. For the Cisco uBR924 cable modem, this value can be 0, 1, or 2, where 0 represents data-only with no voice ports and where 1 and 2 represent the number of phones. Specify the IP precedence settings used for separating voice and signaling from data and the rate limit.

In this example, the voice-transport precedence value (4) is set to a downstream rate limit of 128 kbps:

```
Value = 4; Rate Limit (kps) = 128000
```

Configuring the Dial Peers in the Cable Modem If You Use Static Configuration

Configure the dial peers and specify the IP precedence that you want to use for voice and fax traffic.

Configuration for Cable Modem 1

```
voice-port 0
input gain -2
cptone xx
!
voice-port 1
input gain -2
cptone xx
!
!
dial-peer voice 1 pots
destination-pattern 444
port 0
!
dial-peer voice 2 voip
destination-pattern 555
session-target ipv4:10.200.69.3

!--- IP address of CM2 s cable interface.

ip precedence 5
```

Configuration for Cable Modem 2

```
voice-port 0
input gain -2
cptone xx
!
voice-port 1
input gain -2
cptone xx
!
!
dial-peer voice 1 pots
destination-pattern 555
port 0
!
dial-peer voice 2 voip
destination-pattern 444
session target ipv4:10.200.69.10

!--- IP address of CM1 s cable interface.

ip precedence 5
```

Troubleshooting and Tips

This section provides useful **debug** and **show** commands for troubleshooting your configuration.

Note: Before issuing **debug** commands, refer to Important Information on Debug Commands.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

These are some useful **debug** commands:

- **debug cable dynsrv** To debug all dynamic MAC messages (such as DSA-REQ, DSA-RSP, DSA-ACK, DSD-REQ, DSD-RSP) handling at the CMTS.
- **debug cable scheduler unsolicited-grants** To debug the average delay and maximum delay jitter on the unsolicited grants received.
- **debug cable scheduler admission-control** To see the MAC scheduler s attempt to admit and unadmit a CBR slot.

Note: The new **debug** commands can only be enabled per interface or per SID. This makes the debug more manageable. Do not forget to enable **debug cable interface cable x/y** or **debug cable interface cable x/y SID** with each debug that you want.

These are some useful **show** commands:

- **show interfaces cable x/y SID**
- **show interfaces cable x/y upstream n**
- **show cable qos profile**
- **show cable qos profile z verbose**

Make a phone call from CM1 to CM2 and analyze what happens:

```
big-cmts# debug cable dynsrv
```

```
CMTS dynsrv debugging is on
```

```
big-cmts# debug cable interface cable 3/0
```

```
!--- Each of these timestamped lines of output appear on one line:
```

```
*May 5 05:15:36.531: DSA-REQ-RECD: OrgMac->0050.734e.b5b1 OrgId->52
*May 5 05:15:36.531: DSx-STATE-CREATED: OrgMac->0050.734e.b5b1 OrgId->52
*May 5 05:15:36.531: DSA-REQ TLV Information:
*May 5 05:15:36.531: Type Subtype Subtype Length Value
*May 5 05:15:36.531: 24 10
*May 5 05:15:36.531: 19 2 89
*May 5 05:15:36.531: 20 4 20000
*May 5 05:15:36.531: 80 69
*May 5 05:15:36.531: DSA-REQ: Requested QoS Parameter Information:
*May 5 05:15:36.531: Srv Flow Ref: 0 Grant Size: 89 Grant Intvl: 20000
*May 5 05:15:36.531: Requested QoS parameters match QoS Profile:3 (G729)
*May 5 05:15:36.531: DSA-REQ-SID-ASSIGNED: CM 0050.734e.b5b1 SID 11
*May 5 05:15:36.531: DSA-RSP-SEND: OrgMac->0050.734e.b5b1 OrgId->52
*May 5 05:15:36.531: DSA-RSP msg TLVs
*May 5 05:15:36.531: Type:Length:Value
*May 5 05:15:36.531: US QoS Encodings 24:8
*May 5 05:15:36.531: SID 3:2:11
*May 5 05:15:36.531: Service Flow Reference 1:2:0
*May 5 05:15:36.531: DSA-RSP hex dump:
*May 5 05:15:36.531: 0x0000: C2 00 00 26 00 00 00 50 73 4E B5 B1 00 10 0B AF
```

```

*May 5 05:15:36.531: 0x0010: BC 54 00 14 00 00 03 01 10 00 00 34 00 18 08 03
*May 5 05:15:36.531: 0x0020: 02 00 0B 01 02 00 00 00
*May 5 05:15:36.535: DSA-RSP-SENT: CM->0050.734e.b5b1 TranscId->52
*May 5 05:15:36.539: DSA-ACK-RECD:
                        OrgMac->0050.734e.b5b1 OrgId->52 ConfCode->0
*May 5 05:15:36.539: DYN-SRV-STATE-DESTROYED :
                        OrgMac->0050.734e.b5b1 OrgId->52
*May 5 05:15:42.779: DSA-REQ-RECD: OrgMac->0050.7366.1bdb OrgId->51
*May 5 05:15:42.779: DSx-STATE-CREATED: OrgMac->0050.7366.1bdb OrgId->51
*May 5 05:15:42.779: DSA-REQ TLV Information:
*May 5 05:15:42.779: Type Subtype Subtype Length Value
*May 5 05:15:42.779: 24 10
*May 5 05:15:42.779: 19 2 89
*May 5 05:15:42.779: 20 4 20000
*May 5 05:15:42.779: 80 69
*May 5 05:15:42.779: DSA-REQ: Requested QoS Parameter Information:
*May 5 05:15:42.779: Srv Flow Ref: 0 Grant Size: 89 Grant Intvl: 20000
*May 5 05:15:42.779: Requested QoS parameters match QoS Profile:3 (G729)

!--- If the configured Unsolicited Grant size or Unsolicited Grant interval
!--- are not correct.

*May 5 05:15:42.779: DSA-REQ-SID-ASSIGNED: CM 0050.7366.1bdb SID 12

!--- You see Requested QoS doesn't match any profile here.

*May 5 05:15:42.779: DSA-RSP-SEND: OrgMac->0050.7366.1bdb OrgId->51

!--- TIP: check the configured QoS Profile with the
!--- show qos profile x verbose command.

*May 5 05:15:42.779: DSA-RSP MSG TLVs
*May 5 05:15:42.779: Type:Length:Value

!--- Also, if you forgot to specify the number of phone lines you want
!--- in CM config file.

*May 5 05:15:42.779: US QoS Encodings 24:8

!--- You see QoS profile matched but DSA-REQ is rejected here.

*May 5 05:15:42.779: SID 3:2:12
*May 5 05:15:42.779: Service Flow Reference 1:2:0
*May 5 05:15:42.779: DSA-RSP hex dump:
*May 5 05:15:42.779: 0x0000: C2 00 00 26 00 00 00 50 73 66 1B DB 00 10 0B AF
*May 5 05:15:42.779: 0x0010: BC 54 00 14 00 00 03 01 10 00 00 33 00 18 08 03
*May 5 05:15:42.779: 0x0020: 02 00 0C 01 02 00 00 00
*May 5 05:15:42.779: DSA-RSP-SENT: CM->0050.7366.1bdb TranscId->51
*May 5 05:15:42.787: DSA-ACK-RECD:
                        OrgMac->0050.7366.1bdb OrgId->51 ConfCode->0
*May 5 05:15:42.787: DYN-SRV-STATE-DESTROYED :
                        OrgMac->0050.7366.1bdb OrgId->51

```

```

cmts# show interfaces cable 3/0 SID

```

SID	Prim SID	Type	Online State	Admin Status	QoS	Create Time	IP Address	MAC Address
1		stat	online	enable	5	04:26:35	10.200.69.3	0050.734e.b5b1
2		stat	online	enable	5	04:26:47	10.200.69.10	0050.7366.1bdb
13	1	dyn		enable	3	05:22:20		
14	2	dyn		enable	3	05:22:20		

Two dynamic SIDs have been created for the voice call. They use QoS ID 3, which is the G729 profile.

```

cmts# show cable qos profile

```


ID	Prio	Max upstream bandwidth	Guar upstream bandwidth	Max downstream bandwidth	Max transmit burst	TOS mask	TOS value	Created by	Privacy B enabled	IP prec. rate enabled
1	0	0	0	0	0	0x0	0x0	cmts(r)	no	no
2	0	64000	0	1000000	0	0x0	0x0	cmts(r)	no	no
3*	7	32000	320000	0	0	0x0	0x0	cmts	yes	no
4**	7	87200	87200	0	0	0x0	0x0	cmts	yes	no
5	1	1000000	0	2000000	1600	0x0	0x0	cm	no	yes

```
!--- * Profile for the G.729 codec.
!--- ** Profile for the G.711 codec.
```

For downstream traffic, you still use the primary SID (profile for data) and the corresponding QoS profile. (The IP precedence rate limiting provides a form of differentiation between voice and data. It is enabled for the downstream QoS profile number 5.)

Within DOCSIS 1.0+, the IP precedence settings are used for separating voice and signaling from data. In the case of a call where one endpoint is outside of the cable network, it is the responsibility of the outside network to ensure that all voice packets are appropriately colored before forwarding them to the CMTS. In the case of a call where both endpoints are on the cable network, it is the responsibility of the endpoint (customer) originating the traffic to color the voice packets before launching them into the network.

Note: You can use the **IP ToS overwrite** command (available since early uBR7200 releases) to set a non-default type of service (ToS) value in upstream packets received on SIDs belonging to CBR profiles. That way, an operator can be sure that packets received on dynamic CBR SIDs will have the right pattern before they are forwarded into the WAN link by the uBR7200 (this protects against ITCM doing any wrong coloring).

Consider this example:

```
cmts(config)# cable qos profile 3 tos-overwrite 0xE0 0xA0

value : 0xA0

!--- First 3 bits of ToS field: 101, which is an IP precedence of 5.

mask : 0xE0

!--- Remember that IP precedence uses the first 3 bits of the ToS field
!--- from the IPv4 header.

big-cmts# show interfaces cable 3/0 upstream 5

Cable3/0: Upstream 5 is up
Received 254 broadcasts, 0 multicasts, 20229 unicasts
0 discards, 66907 errors, 0 unknown protocol
20483 packets input, 1 uncorrectable
101 noise, 0 microreflections
Total Modems On This Upstream Channel : 2 (2 active)
Default MAC scheduler
Queue[Rng Polls] 0/20, fifo queueing, 0 drops
Queue[Cont Mslots] 0/104, FIFO queueing, 1 drop
Queue[CIR Grants] 0/20, fair queueing, 0 drops
Queue[BE Grants] 0/30, fair queueing, 0 drops
Queue[Grant Shpr] 0/30, calendar queueing, 0 drops
Reserved slot table currently has 2 CBR entries
Req IEs 3645087, Req/Data IEs 0
Init Mtn IEs 56729, Stn Mtn IEs 3196
Long Grant IEs 80084, Short Grant IEs 202
Avg upstream channel utilization : 4%
```

Avg percent contention slots : 92%
Avg percent initial ranging slots : 4%
Avg percent minislots lost on late MAPs : 0%
Total channel bw reserved 64000 bps
CIR admission control not enforced
Current minislot count : 3101850 Flag: 0
Scheduled minislot count : 3102029 Flag: 0

cmts# debug cable scheduler

CMTS scheduler debugging is on

big-cmts# show debug

*May 5 05:24:41.991: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs
*May 5 05:24:51.995: SID:14 max-jitter:2 msecs, avg-jitter:1 msecs
*May 5 05:25:02.015: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs
*May 5 05:25:12.035: SID:13 max-jitter:2 msecs, avg-jitter:1 msecs
*May 5 05:25:22.055: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs
*May 5 05:25:32.075: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs
*May 5 05:25:42.091: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs
*May 5 05:25:52.095: SID:13 max-jitter:2 msecs, avg-jitter:0 msecs

cmts# show cable qos profile 3 verbose

Profile Index 3
Name G729
Upstream Traffic Priority 7
Upstream Maximum Rate (BPS) 32000
Upstream Guaranteed Rate (BPS) 32000
Unsolicited Grant Size (bytes) 89
Unsolicited Grant Interval (usecs) 20000
Upstream Maximum Transmit Burst (bytes) 0
IP Type of Service Overwrite Mask 0x0
IP Type of Service Overwrite Value 0x0
Downstream Maximum Rate (BPS) 0
Created By cmts
Baseline Privacy Enabled yes

big-cmts# show cable qos profile 4 verbose

Profile Index 4
Name G711
Upstream Traffic Priority 7
Upstream Maximum Rate (BPS) 87200
Upstream Guaranteed Rate (BPS) 87200
Unsolicited Grant Size (bytes) 229
Unsolicited Grant Interval (usecs) 20000
Upstream Maximum Transmit Burst (bytes) 0
IP Type of Service Overwrite Mask 0x0
IP Type of Service Overwrite Value 0x0
Downstream Maximum Rate (BPS) 0
Created By cmts
Baseline Privacy Enabled yes

Line is released:

The phone line is released: a user hangs up.

big-cmts# show debug

CMTS:
CMTS dynsrv debugging is on

CMTS specific:
Debugging is on for Cable3/0

```
big-cmts# show debug
```

!--- Each of these timestamped lines of output appear on one line:

```
*May 5 05:29:45.659: DSD-REQ-RECD: I/F Cable3/0/U5: OrgMac->0050.734e.b5b1
*May 5 05:29:45.659: OrgId->54 sfid 13
*May 5 05:29:45.659: DYN-SID-DELETED:
    SID:13 Inpkts:5047 InOctets:393749 Bwreqs:12 Grants:22270
*May 5 05:29:45.659: DSD-RSP Message Hex Dump:
*May 5 05:29:45.659: 0x0000: C2 00 00 20 00 00 00 50 73 4E B5 B1 00 10 0B AF
*May 5 05:29:45.659: 0x0010: BC 54 00 0E 00 00 03 01 16 00 00 36 00 00 00 00
*May 5 05:29:45.659: 0x0020: 00 0D
*May 5 05:29:45.659: DSD-RSP-SENT: To CM->0050.734e.b5b1 TranscId->54
*May 5 05:29:48.023: DSD-REQ-RECD: I/F Cable3/0/U5: OrgMac->0050.7366.1bdb
*May 5 05:29:48.023: OrgId->53 sfid 14
*May 5 05:29:48.023: DYN-SID-DELETED:
    SID:14 Inpkts:6512 InOctets:508085 Bwreqs:2 Grants:22378
```

!--- The dynamic SIDs are deleted.

```
*May 5 05:29:48.023: DSD-RSP Message Hex Dump:
*May 5 05:29:48.023: 0x0000: C2 00 00 20 00 00 00 50 73 66 1B dB 00 10 0B AF
*May 5 05:29:48.023: 0x0010: BC 54 00 0E 00 00 03 01 16 00 00 35 00 00 00 00
*May 5 05:29:48.023: 0x0020: 00 0E
*May 5 05:29:48.023: DSD-RSP-SENT: To CM->0050.7366.1bdb TranscId->53
```

The next output shows what happens if one of these parameters (grant-size or grant-interval for the codec you want to use) is misconfigured. In this example, we change the grant-size for profile G729 from 89 to 80:

```
cmts(config)# cable qos profile 3 grant-size 80
```

```
cmts# show cable qos profile 3 verbose
```

```
Profile Index 3
Name G729
Upstream Traffic Priority 7
Upstream Maximum Rate (BPS) 31200
Upstream Guaranteed Rate (BPS) 31200
Unsolicited Grant Size (bytes) 80
Unsolicited Grant Interval (usecs) 20000
Upstream Maximum Transmit Burst (bytes) 0
IP Type of Service Overwrite Mask 0x0
IP Type of Service Overwrite Value 0x0
Downstream Maximum Rate (BPS) 0
Created By cmts
Baseline Privacy Enabled yes
```

```
big-cmts# show debug
```

!--- Each of these timestamped lines of output appear on one line:

```
*May 10 04:20:57.885: DSA-REQ-RECD: OrgMac->0050.734e.b5b1 OrgId->59
*May 10 04:20:57.885: DSx-STATE-CREATED: OrgMac->0050.734e.b5b1 OrgId->59
*May 10 04:20:57.885: DSA-REQ TLV Information:
*May 10 04:20:57.885: Type Subtype Subtype Length Value
*May 10 04:20:57.885: 24 10
*May 10 04:20:57.885: 19 2 89
*May 10 04:20:57.885: 20 4 20000
*May 10 04:20:57.885: 80 69
*May 10 04:20:57.885: DSA-REQ: Requested QoS Parameter Information:
*May 10 04:20:57.885: Srv Flow Ref: 0 Grant Size: 89 Grant Intvl: 20000
*May 10 04:20:57.885: DSA-REQ-REJECT OrgMac->0050.734e.b5b1 OrgId->59:
*May 10 04:20:57.885: No CMTS QoS profile matching requested parameters
```

!--- Request is rejected, because there is no QoS profile.

```
*May 10 04:20:57.885: DSA-RSP-SENT: CM->0050.734e.b5b1 TranscId->59
*May 10 04:20:57.889: DSA-ACK-RECD:
                        OrgMac->0050.734e.b5b1 OrgId->59 ConfCode->0
*May 10 04:20:57.889: DYN-SRV-STATE-DESTROYED :
                        OrgMac->0050.734e.b5b1 OrgId->59
```

!--- The state is destroyed.

```
*May 10 04:20:57.905: DSA-REQ-RECD: OrgMac->0050.7366.1bdb OrgId->58
*May 10 04:20:57.905: DSx-STATE-CREATED: OrgMac->0050.7366.1bdb OrgId->58
*May 10 04:20:57.905: DSA-REQ TLV Information:
*May 10 04:20:57.905: Type Subtype Subtype Length Value
*May 10 04:20:57.905: 24 10
*May 10 04:20:57.905: 19 2 89
*May 10 04:20:57.905: 20 4 20000
*May 10 04:20:57.905: 80 69
*May 10 04:20:57.905: DSA-REQ: Requested QoS Parameter Information:
*May 10 04:20:57.905: Srv Flow Ref: 0 Grant Size: 89 Grant Intvl: 20000
*May 10 04:20:57.905: DSA-REQ-REJECT OrgMac->0050.7366.1bdb OrgId->58:
*May 10 04:20:57.905: No CMTS QoS profile matching requested parameters
*May 10 04:20:57.909: DSA-RSP-SENT: CM->0050.7366.1bdb TranscId->58
*May 10 04:20:57.913: DSA-ACK-RECD:
                        OrgMac->0050.7366.1bdb OrgId->58 ConfCode->0
*May 10 04:20:57.913: DYN-SRV-STATE-DESTROYED : OrgMac->0050.7366.1bdb Org
```

```
big-cmts# show interfaces cable 3/0 upstream 5
```

```
Cable3/0: Upstream 5 is up
```

!--- Output suppressed.

```
Reserved slot table currently has 0 CBR entries
```

!--- Output suppressed.

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