



# Cisco Remote PHY Controller Profile and RPD Configuration

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The Remote PHY (R-PHY) Controller Profile includes upstream controller-profile and downstream controller-profile. Upstream controller-profile is used to specify the upstream (US) channels and related parameters, which are part of a specific profile, similar to the following:

- Channel width
- DOCSIS mode
- Frequency
- Minislot size
- Modulation-profile

The downstream controller-profile is used to specify the RF channels and their RF parameters that belong to a specific profile, including the following details:

- Channel type (DOCSIS, Video Sync, Video Async)
- Frequency
- RF output
- QAM-profile (annex, modulation, inter-leaver, symbol rate, and so on)

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.

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## Hardware Compatibility Matrix for Cisco Remote PHY Device



**Note** Unless otherwise specified, the hardware components introduced in a given Cisco Remote PHY Device Software Release are supported in all subsequent releases.

**Table 1: Hardware Compatibility Matrix for the Cisco 2x2 Remote PHY Device**

Cisco HFC Platform	Remote PHY Device
Cisco GS7000 BAU	Cisco 2x2 RPD Software 2.x and Later Releases Cisco Remote PHY Device 2x2 PID—RPD-2X2=

## Controller Profile and RPD

The Controller Profile functions in a similar way to the controller integrated-cable Slot/Bay/Port (for downstream controller) or upstream-cable Slot/Bay/Port (for upstream controller) in I-CMTS. However if a Controller Profile is not associated to an RPD, physical resources cannot be allocated.

You can either unicast or multicast this profile. Multicast profile is used for DS sharing. You can multicast the same traffic to all RPDs in the multicast group, or to applications such as switched digital video (SDV) or BC video.

An R-PHY configuration consists of one principal core interface and one auxiliary core interface. The principal core specifies the DPIC interface to which the RPD connects. Auxiliary core interfaces specify the external DPIC interfaces that can be used for downstream sharing. Auxiliary core is used in this release only for video multicast and video OOB.

Configuring Controller Profile and cable RPD are the prerequisites for configuring R-PHY video.

The following table lists the DSCP value for different kinds of items.

Item	Per-Hop-Behavior (PHB)	DSCP Value
DOCSIS data (L2TP)	Best Effort	0
PTP	EF	46
GCP	Best Effort	0
MAP/UCD (L2TP, DOCSIS control)	EF	46
BWR and RNG-REG	EF	46

Item	Per-Hop-Behavior (PHB)	DSCP Value
Video	CS4	32
MDD (L2TP, DOCSIS control), voice	CS5	40

## RPD Configurations

Compared to the iCMTS configuration, R-PHY configuration supports the following features:

- Up to 512 RPDs per CBR-8 chassis and 64 RPDs per CBR-CCAP-LC-40G-R line card
- 128 separate service groups per CBR-8 chassis
- 32 downstream controllers and up to 768 downstream channels per CBR-CCAP-LC-40G-R line card
- Up to 158 downstream channels (0-157) per downstream controller
- 64 upstream controllers and 128 upstream channels per CBR-CCAP-LC-40G-R line card

In the R-PHY configuration, the following mapping relationships are supported between the controller and the port on RPD:

- Downstream 1:N ( $N \geq 2$ ) mapping: one DS controller is shared by several RPDs and one DS controller is mapped to one DS port of all these RPDs, that is “DS virtual split”, all these DS ports share the same signals from the same DS controller.
- Downstream N:1 mapping: several DS controllers are mapped into the same DS port of one RPD. Notice: the DS channels in these DS controller should use different rf-channel numbers
- Downstream N:N mapping: mixed 1:N and N:1 mapping. For example: several DS controllers are mapped into one DS port of one RPD. But at the same time they are “virtual split” DS controllers and are shared by several RPDs.
- Upstream 1:N ( $N \leq 8$ ) mapping: one US controller can be shared by N ( $N \leq 8$ ) US ports of multiple RPDs. Currently max two US ports are supported on one RPD, and for each US port, one US controller can be configured.

For the two US ports of one RPD, the same US controller number can be configured.




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**Note** Downstream 1:1 mapping is not supported under 512 RPD configuration, but still supported under smaller scale configuration.

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## Prerequisites for Configuring Controller Profile and RPD

The following restrictions are applicable to configuring controller profiles:

- All channels within the profiles of an RPD must be unique. Frequencies must not overlap each other.
- The principal core must contain at least one DOCSIS downstream profile

- Auxiliary core should contain only video and out-of-band profiles
- A DS controller can be associated to only one profile

## Restrictions for Configuring Controller Profile and RPD

The following restrictions are applicable to configuring upstream controller profiles:

- Legacy controller configuration commands are not supported
- Legacy controller configuration cannot be shown in running-configuration

## Restrictions for Configuring Mixed Annex Mode

The Cisco Remote PHY 220 includes two embedded images to support a mix variety of Annex types. These Annex types are supported.

- Image for Annex B type supports:
  - Up to 64 Annex B broadcast channels
  - Up to 64 Annex B narrowcast channels (DOCSIS or Unicast Video)
  - Up to 32 Annex A narrowcast channels with the rest being Annex B, as long as the total narrowcast spectrum (Annex A and Annex B) does not exceed 384MHz bandwidth per port
- Image for Annex A type supports:
  - Up to 48 Annex A broadcast channels
  - Up to 48 Annex A and C narrowcast channels (DOCSIS or Unicast Video)
  - Up to 32 Annex B narrowcast channels with the rest being Annex A, as long as the total narrowcast spectrum (Annex A and Annex B) does not exceed 384MHz bandwidth per port
- Downstream channels are grouped into eight channels that must have the same PHY parameters (modulation, interleaver, and symbol rate).
- All configured broadcast channels must be from the same Annex type.
- All configured broadcast channels Annex type must match the active Annex image.
  - The first broadcast channel sets the annex type.
  - If the first broadcast channel configured doesn't match the active Annex image, the image is automatically swapped.
- If more than 32 channels are configured which do not match the Annex type of the active image, RPD sends an alert to manually swap Annex image. To swap images, perform these steps.

```
Router# configure terminal
Router(config)# fpga
Router(config-fpga)# set-video-annex <Annex_A | Annex_B>

Reboot RPD.
```

# Configure Controller Profile and RPD

## Creating Modulation Profiles

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 section describes how to create modulation profiles for the different modes of DOCSIS operations, using the preconfigured modulation profile options.

## Modulation Profile Modifications for Cisco Remote PHY 220

To configure modulation profile, you can run this command:

```
cable modulation-profile profile atdma request fec-tbyte fec-len burst-len guard-t modulation scrambler seed
diff | no-diff pre-len last-cw
```



### Important

For Cisco Remote PHY 220, the preamble length depends on the modulation that you set. For 16QAM modulation, the preamble must have values— $64 \times 2^n$  (0, 1, 2) bits. For QPSK modulation, the preamble must have values— $32 \times 2^n$  (0, 1, 2, 3) bits.

**Table 2: Parameter Descriptions**

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

Parameter	Description
atdma	DOCSIS 2.0 Advanced Time Division Multiple Access (A-TDMA) mode
request	<p>Interval usage code. Valid entries depend on the mode of operation:</p> <ul style="list-style-type: none"> <li>• If the upstream is configured for DOCSIS 1.0 and DOCSIS 1.1 modulation profiles, the valid values are initial, long, request, reqdata, short, or station.</li> <li>• If the upstream is configured for DOCSIS 1.x and DOCSIS 2.0 mixed modulation profiles, the valid values are a-long, a-short, a-ugs, initial, long, request, reqdata, short, or station.</li> <li>• If the upstream is configured for DOCSIS 2.0 A-TDMA modulation profiles, the valid values are a-long, a-short, a-ugs, initial, long, request, reqdata, short, or station.</li> </ul> <p>The reqdata burst type is included as a placeholder for scripts that might reference it, but the DOCSIS MAC scheduler on the Cisco CMTS does not use this type of burst.</p> <p>When you are using the initial and station bursts for DOCSIS 2.0 A-TDMA mode, qam-8, qam-32, and qam-64 modulation profiles are available in hidden mode only.</p>
fec-tbytes	The number of bytes that can be corrected per FEC code word. 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.
fec-len	FEC code-word length. Valid values are from 16 to 253.
burst-len	Maximum burst length in minislots. Valid values are from 0 to 255, where 0 means no limit.
guard-t	Guard time in symbols—The time between successive bursts. Valid values are from 0 to 255 symbols. This is the blank time at the end of a burst transmission that exists to ensure that one burst ends before another burst starts.

Parameter	Description
modulation	Creates a 16-QAM or QPSK modulation profile depending on the values you set.
scrambler	Enable or disable scrambler—Valid options are scrambler and no-scrambler. 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.
seed	Scrambler seed, in hexadecimal format—Valid values are from 0x0000 to 0x7FFF.
diff	Enable or disable differential encoding—Valid options are diff and no-diff. 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.
pre-len	Preamble length in bits—Valid values are from 2 to 128. 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.
last-cw	How FEC is handled for last code word—Valid options are fixed for fixed code-word length and shortened for shortened last code word.

## Configure Upstream Controller Profile

To configure the upstream controller-profile, use the cable upstream controller-profile command, as given in the following example:

```
Router#cable upstream controller-profile 4
  cable def-phy-burst 0
  us-channel 0 chan-class-id 0
  us-channel 0 channel-width 1600000 1600000
  us-channel 0 docsis-mode atdma
  us-channel 0 equalization-coefficient
  us-channel 0 frequency 50000000
  us-channel 0 hop-priority frequency modulation channel-width
  us-channel 0 ingress-noise-cancellation 100
  us-channel 0 maintain-psd
  us-channel 0 max-logical-chans 1
```

```

us-channel 0 minislots-size 4
us-channel 0 modulation-profile 221
us-channel 0 power-level 0
us-channel 0 rng-holdoff 0
us-channel 0 shutdown
us-channel 0 specs-v1 error-adaptive-profile 1
us-channel 0 threshold cnr-profiles 25 13
us-channel 0 threshold corr-fec 3
us-channel 0 threshold hysteresis 3
us-channel 0 threshold snr-profiles 25 13
us-channel 0 threshold uncorr-fec 1
...
end

```

## Verify Upstream Controller Profile Configuration

To verify the Upstream controller profile configuration, use the **show cable downstream controller-profile** command or **show running-config | section upstream controller-profile <ID>** command, as shown in the following example:

```

Router#show cable upstream controller-profile 0
Load for five secs: 2%/0%; one minute: 3%; five minutes: 3%
Time source is NTP, 15:14:27.916 CST Fri Feb 24 2017

Upstream controller-profile 0
Description:
Upstream controller-profile 0 is being used by controller Upstream-Cable:
8/0/1, 8/0/0
  Controller Upstream-Cable
  ...
  Upstream-channel 0
    chan-class-id           : 0x0
    channel-width           : 1600000 1600000
    docsis-mode             : atdma
    ...

```

Example for the **show running-config | section upstream controller-profile <ID>** command

```

Router#show running-config | s cable upstream controller-profile 0
cable upstream controller-profile 0
  us-channel 0 channel-width 1600000 1600000
  us-channel 0 docsis-mode atdma
  us-channel 0 equalization-coefficient
  us-channel 0 frequency 6000000
  us-channel 0 minislots-size 4
  us-channel 0 modulation-profile 221
  no us-channel 0 shutdown
  us-channel 1 channel-width 1600000 1600000
  us-channel 1 docsis-mode atdma
  us-channel 1 equalization-coefficient
  us-channel 1 frequency 7600000
  us-channel 1 minislots-size 4
  us-channel 1 modulation-profile 221
  no us-channel 1 shutdown
  us-channel 2 channel-width 1600000 1600000
  us-channel 2 docsis-mode atdma
  us-channel 2 equalization-coefficient
  us-channel 2 frequency 9200000
  us-channel 2 minislots-size 4
  us-channel 2 modulation-profile 221
  no us-channel 2 shutdown
  us-channel 3 channel-width 1600000 1600000
  us-channel 3 docsis-mode atdma

```



```

us-channel 3 equalization-coefficient
us-channel 3 frequency 10800000
us-channel 3 minislots-size 4
us-channel 3 modulation-profile 221
no us-channel 3 shutdown
us-channel 4 channel-width 1600000 1600000
us-channel 4 docsis-mode atdma
us-channel 4 frequency 12400000
us-channel 4 minislots-size 4
us-channel 4 modulation-profile 221
no us-channel 4 shutdown
us-channel 5 channel-width 1600000 1600000
us-channel 5 docsis-mode atdma
us-channel 5 frequency 14000000
us-channel 5 minislots-size 4
us-channel 5 modulation-profile 221

```

## Configure RPD for US Controller Profile

To configure RPD for associating an upstream controller-profile, using the **rp-ds** *<port-id>* **Upstream-Cable** *<slot/sub-slot/controller>* [*profile <id>*] command, as given in the following example:

```

Router#cable rpd 1
  identifier 0004.9f00.0743
  core-interface Te8/1/0
  principal
    rpd-us 0 upstream-cable 8/0/0 profile 0
    rpd-us 1 upstream-cable 8/0/1 profile 4
  r-dti 11
  rpd-event profile 0
  rpd-55d1-us-event profile 0
---
end

```

The Remote PHY (R-PHY) Controller Profile now provides a new summary that displays the Per RPD us port description. The summary helps distinguish between the different controllers that share the same description of us-channels.

For example, the **show cable modem rpd all summary** command displays the following information:

```
Router#show cable modem rpd all summary
```

```

Load for five secs: 5%/0%; one minute: 5%; five minutes: 5%
No time source, *15:36:49.777 UTC Thu Mar 8 2018

```

```

RPD ID: badb.ad13.417c
Interface          Cable Modem          Description
Total Reg Oper  Unreg Offline Wideband initRC  initD  initIO  initO
C9/0/4/U0 0 1 0 0 1 0 0 1 0 0 0 badb.ad13.417c us
C9/0/4/U1 0 2 0 0 2 0 0 2 0 0 0 badb.ad13.417c us
C9/0/4/U3 0 1 0 0 1 0 0 1 0 0 0 badb.ad13.417c us
C9/0/5/U0 1 2 0 0 2 0 0 2 0 0 0 badb.ad13.417c us
C9/0/5/U1 1 1 0 0 1 0 0 1 0 0 0 badb.ad13.417c us

```

```

RPD ID: badb.ad13.41fa
Interface          Cable Modem          Description
Total Reg Oper  Unreg Offline Wideband initRC  initD  initIO  initO
C9/0/2/U0 2 2 0 0 2 0 1 1 0 0 1 badb.ad13.41fa

```

```

us 0
C9/0/2/U1 1 0 0 1 0 0 1 0 0 0 badb.ad13.41fa
us 0
C9/0/2/U3 1 0 0 1 0 0 1 0 0 0 badb.ad13.41fa
us 0
C9/0/3/U1 1 0 0 1 0 0 1 0 0 0 badb.ad13.41fa
us 1
C9/0/3/U2 2 0 0 2 0 0 2 0 0 0 badb.ad13.41fa
us 1
C9/0/3/U3 1 0 0 1 0 0 1 0 0 0 badb.ad13.41fa
us 1

```



**Note** The length of configurable limitation is 20 characters while there are 80 characters reserved.

## Configure Downstream Controller Profile

The 2x2 RPD supports segmented and non-segmented (broadcast) controller profiles. By default, the downstream controller profiles are segmented. To make the controller-profile non-segmented, the *broadcast* keyword can be used in the downstream controller-profile configuration. Non-segmented (broadcast) controller-profiles send the data to all four RF ports of the node (segmented controller profiles send data to the left and right ports). Use cases for broadcast controller profiles are linear (broadcast) video services or a video service group that covers all four ports.

To configure downstream controller profile, use the following commands:

```

configure terminal
cable downstream controller-profile <profile ID>
multicast-pool <id>
broadcast
rf-chan 64 88
type video <SYNC | ASYNC>
qam-profile 7
frequency 111000000
rf-output NORMAL
rf-chan 89 127
type VIDEO <SYNC | ASYNC>
qam-profile 7
frequency 710000000
rf-output NORMAL

```

The *multicast-pool <id>* defines the DEPI multicast group. The type video <SYNC / ASYNC> defines synchronous or asynchronous mode.

## Verify Downstream Controller Profile Configuration

To verify the Downstream controller profile configuration, use the show cable downstream controller-profile command as shown in the following example:

```

Router#show running-config | section downstream controller-profile
cable downstream controller-profile 0
rf-chan 0 3
type DOCSIS
frequency 111000000
rf-output NORMAL
qam-profile 1
docsis-channel-id 1

```

## Configure RPD for DS Controller Profile

The 2x2 RPD supports segmented DS configuration, that allows you to configure a second downstream controller. An example of a second downstream controller is highlighted in the below configuration.

```
configure terminal
cable rpd RPD01
identifier 0004.9f31.0435
core-interface Te3/1/0
principal
rpd-ds 0 downstream-cable 6/0/16 profile 4
rpd-ds 0 downstream-cable 6/0/18 profile 17 (Broadcast channel Profile)
rpd-ds 1 downstream-cable 6/0/17 profile 4
rpd-us 0 upstream-cable 6/0/16 profile 6
rpd-us 1 upstream-cable 6/0/17 profile 6
r-dti 64
rpd-event profile 1
```

The **rpd-ds 0 downstream-cable 3/0/0 profile 1** associates *controller 3/0/0* with *profile 1*, which is a DOCSIS profile.

The **rpd-ds 0 downstream-cable 3/0/1 profile 2** associates *controller 3/0/1* with *profile 3*, which is a video profile.

The *core-interface Te3/1/0* defines an auxiliary interface for this RPD. This auxiliary interface is used to configure downstream sharing across line cards.

## Verify RPD Association with Controller Profile

To verify the downstream controller profile association with RPD, use the **show running-config | section cable rpd <ID>** command as shown in the following example:

```
Router#show running-config | section cable rpd RPD01
cable rpd toi-test1
identifier 0000.1cbf.0000
core-interface Te2/1/0
principal
rpd-ds 0 downstream-cable 2/0/9 profile 0
rpd-event profile 0
rpd-55d1-us-event profile 0
```

## Configure Downstream Sharing

This configuration is optional. DS sharing is used for multicast (MC) traffic. To configure downstream sharing, use the following commands:

```
configure terminal
cable rpd RPD01
core-interface Te3/1/0
principal
rpd-ds 0 downstream-cable 3/0/1 profile 2
cable rpd RPD02
core-interface te3/1/0
principal
rpd-ds 0 downstream-cable 3/0/1 profile 2
```



**Note** All RDPs in the same multicast group should have the same controller and profile association.

## Configure Controller in Fiber Node

To configure the controllers in fiber-node, use the **cable fiber-node** command, as given in the following example:

```
cable fiber-node 113
  downstream Downstream-Cable 8/0/0
  upstream Upstream-Cable 8/0/1
```

## Verify CM RPD Association

To verify the RPD associated with the cable modem, use the **show cable modem rpd** command as shown in the following example:

```
Router# show cable modem rpd 0004.9f03.0249
Load for five secs: 4%/2%; one minute: 3%; five minutes: 4%
Time source is NTP, 10:48:11.763 CST Tue Feb 28 2017
```

MAC Address	IP Address	I/F	MAC State	Prim Sid	RxPwr (dBmv)	Timing Offset	Num CPE	I P	D
0023.be5a.bb6c	10.10.10.12	C6/0/0/UB	w-online	5	0.00	862	0	N	
1859.3356.8876	10.10.10.13	C6/0/0/UB	w-online	6	0.50	907	0	N	

## Display GCP Related Information

To display Generic Control Plane (GCP) related information of the RPD, use the command as shown in the following example:

```
Router#show cable rpd 0004.9f03.0280 Te3/1/0 gcp-state
```

MAC Address	IP Address	I/F	State	Role	HA	Name
0004.9f03.0280	10.10.10.11	Te3/1/0	ready	Pri	Act	2

```
A06#show cable rpd 0004.9f03.0280 Te3/1/0 gcp-state
```

MAC Address	IP Address	I/F	State	Role	HA	Name
0004.9f03.0280	10.10.10.11	Te3/1/0	ready	Pri	Act	2

```
Router#show cable rpd name node te1/1/0 gcp-session
```

```
GCP Session ID : 10
Core Address   : 10.100.10.11:8190
RPD Address    : 10.10.10.11:60656
Next Hop MAC   : 0004.9F00.0901
Session State  : Active
```

```
Packet Statistics:
=====
Rx           : 5038
Tx           : 5034
Rx Dropped  : 0
Tx Dropped  : 0
```

## Message Statistics:

```

=====
Rx          : 5948
Tx          : 5954
Rx Dropped : 7
Tx Dropped : 0
Rx Illegal  : 0
Tx Illegal  : 0

```

## Router#show cable rpd 120.102.6.7 te9/1/1 gcp-transaction

```

Load for five secs: 3%/1%; one minute: 4%; five minutes: 4%
No time source, *10:22:57.158 CST Thu Mar 16 2017

```

RPD ID	I/F	TRANS ID	GCP MSG TYPE	RCP MSG TYPE	TIMESTAMP
0004.9f31.1007 10:22:54.440	Te9/1/1	7452	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:54.415	Te9/1/1	7452	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:54.240	Te9/1/1	7451	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:54.215	Te9/1/1	7451	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:54.040	Te9/1/1	7450	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:54.015	Te9/1/1	7450	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:53.836	Te9/1/1	7449	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:53.815	Te9/1/1	7449	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:50.236	Te9/1/1	7448	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:50.215	Te9/1/1	7448	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:50.038	Te9/1/1	7447	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:50.015	Te9/1/1	7447	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:49.839	Te9/1/1	7446	GCP_MSG_ID_EDS_RSP	TYPE_REX	2017-03-16
0004.9f31.1007 10:22:49.815	Te9/1/1	7446	GCP_MSG_ID_EDS	TYPE_REX	2017-03-16

## Display DEPI Related Information

To display the Downstream External PHY Interface (DEPI) related information, use the command as shown in the following example:

```
Router#show cable rpd depi
```

```

DEPI Tunnel and Session Information Total tunnels 1 sessions 26
LocTunID  RemTunID  Remote Device  State  Remote Address  Sessn L2TP Class
Count
338514820  671581873  0004.9f00.0901  est    10.10.10.11    26    rphy-l2tp-gl...

LocID      RemID      Pseudowire      State  Last Chg Uniq ID  Type Mode RemSt
0x41040008 0x00000B02 US1/0/0:2(R)    est    00:34:57 21    P    PSP  UP
0x41010000 0x00000600 US1/0/0:0(D)    est    00:34:57 11    P    PSP  UP
0x00002006 0x00000405 DS1/0/0:5      est    00:34:57 6     P    PSP  UP
0x00002004 0x00000403 DS1/0/0:3      est    00:34:57 4     P    PSP  UP

```

```

0x4100000C 0x00000D03 US1/0/0:3 (M)    est    00:34:57 23      P    PSP  UP
0x00002002 0x00000401 DS1/0/0:1    est    00:34:57 2      P    PSP  UP
0x00002007 0x00000406 DS1/0/0:6    est    00:34:57 7      P    PSP  UP
0x00002008 0x00000407 DS1/0/0:7    est    00:34:57 8      P    PSP  UP
0x4101000C 0x00000603 US1/0/0:3 (D)    est    00:34:57 24     P    PSP  UP
0x41000004 0x00000D01 US1/0/0:1 (M)    est    00:34:57 15     P    PSP  UP
0x00002001 0x00000400 DS1/0/0:0    est    00:34:57 1      P    PSP  UP
0x41080008 0x00000F02 US1/0/0:2 (S)    est    00:34:57 22     P    PSP  UP
0x41010004 0x00000601 US1/0/0:1 (D)    est    00:34:57 16     P    PSP  UP
0x41020000 0x00000800 US1/0/0:0 (B)    est    00:34:57 12     P    PSP  UP
0x00002009 0x00000408 DS1/0/0:8    est    00:34:57 9      P    PSP  UP
0x41010008 0x00000602 US1/0/0:2 (D)    est    00:34:57 20     P    PSP  UP
0x41000008 0x00000D02 US1/0/0:2 (M)    est    00:34:57 19     P    PSP  UP
0x4108000C 0x00000F03 US1/0/0:3 (S)    est    00:34:57 26     P    PSP  UP
0x00002003 0x00000402 DS1/0/0:2    est    00:34:57 3      P    PSP  UP
0x41080000 0x00000F00 US1/0/0:0 (S)    est    00:34:57 14     P    PSP  UP
0x41040004 0x00000B01 US1/0/0:1 (R)    est    00:34:57 17     P    PSP  UP
0x41080004 0x00000F01 US1/0/0:1 (S)    est    00:34:57 18     P    PSP  UP
0x41000000 0x00000D00 US1/0/0:0 (M)    est    00:34:56 10     P    PSP  UP
0x00002005 0x00000404 DS1/0/0:4    est    00:34:56 5      P    PSP  UP
0x4104000C 0x00000B03 US1/0/0:3 (R)    est    00:34:56 25     P    PSP  UP
0x41040000 0x00000B00 US1/0/0:0 (R)    est    00:34:56 13     P    PSP  UP

```

```
outer#show cable rpd 0004.9f03.0214 te7/1/0 depi tunnel
```

```
Load for five secs: 7%/2%; one minute: 6%; five minutes: 6%
No time source, *12:41:44.228 CST Mon Mar 20 2017
```

```

LocTunID   RemTunID   Remote Device   State   Remote Address   Sessn L2TP Class
              Count
3388764998 1054297851 0004.9f03.0214 est     10.10.10.11     29    rphy-l2tp-gl...

```

**Table 3: show cable rpd depi Field Descriptions**

Field	Description
LocID	Local session ID.
RemID	Remote session ID.
US1/0/0:2(R)	US means UEPI session, DS means DEPI session. This string means UEPI session on line card slot 1, controller 0, rf-channel 2.
est in State	Established state.
P in Type	On primary line card.

## Troubleshooting Tips

Refer to the following troubleshooting tips if configuration errors occur.

If you configure DS controller profile and cable RPD, you can check the controller status, regardless of the status of the RPD. If the channel's state is DOWN, use verbose option to view the reason.

```

Router#show controllers downstream-Cable 6/0/1 rf-channel 20 <verbose>
Chan State Admin Frequency Type Annex Mod srate Interleaver dcid output
20 UP UP 231000000 VIDEO-SYNC B 256 5361 I128-J1 - NORMAL

```

# Configuration Examples

This section provides example configurations for the R-PHY Controller Profile.

## Example: Controller Profile Configuration

### Upstream Controller Profile Configuration

```
configure terminal
cable upstream controller-profile 2
  cable def-phy-burst 0
  us-channel 0 chan-class-id 0
  us-channel 0 channel-width 1600000 1600000
  us-channel 0 docsis-mode atdma
  us-channel 0 equalization-coefficient
  us-channel 0 frequency 50000000
  us-channel 0 hop-priority frequency modulation channel-width
  us-channel 0 ingress-noise-cancellation 100
  us-channel 0 maintain-psd
  us-channel 0 max-logical-chans 1
  us-channel 0 minislots-size 4
  us-channel 0 modulation-profile 221
  us-channel 0 power-level 0
  us-channel 0 rng-holdoff 0
  us-channel 0 shutdown
  us-channel 0 specsvl error-adaptive-profile 1
  us-channel 0 threshold cnr-profiles 25 13
  us-channel 0 threshold corr-fec 3
  us-channel 0 threshold hysteresis 3
  us-channel 0 threshold snr-profiles 25 13
  us-channel 0 threshold uncorr-fec 1
  ...
end
```

### Downstream Controller Profile Configuration

```
configure terminal
cable downstream controller-profile 1
multicast-pool 20
Rf-channel 0 15
Type docsis
Frequency 111000000
Rf-output NORMAL
Qam-profile 1
Docsis-channel-id 1
cable downstream controller-profile 2
multicast-pool 20
Rf-channel 20 47
Type video sync
Frequency 231000000
Rf-output NORMAL
Qam-profile 14
```

## Example: Downstream Sharing Configuration

```
cable rpd RPD01
identifier 0004.9f31.0979
```

```

core-interface te6/1/0
principal
rpd-ds 0 downstream-cable 6/0/0 profile 1
rpd-ds 0 downstream-cable 6/0/1 profile 2
rpd-us 0 upstream-cable 6/0/0 profile 1
r-dti 6
rpd-event profile 0
rpd-55d1-us-event profile 0
cable rpd RPD2
identifier 0004.9f31.1437
core-interface Te3/1/0
principal
rpd-ds 0 downstream-cable 3/0/0 profile 1
rpd-us 0 upstream-cable 3/0/0 profile 1
core-interface Te6/1/0
rpd-ds 0 downstream-cable 6/0/1 profile 2
r-dti 3
rpd-event profile 0
rpd-55d1-us-event profile 0

```

## Feature Information for Remote PHY Controller Profile and RPD Configuration

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.



**Note** The below table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

**Table 4: Feature Information for Remote PHY Controller Profile and RPD Configuration**

Feature Name	Releases	Feature Information
Large Scale Controller Support (32DS/64US) with node	Cisco 2x2 RPD Software 2.x	This feature was introduced on the Cisco 2x2 Remote PHY Device.
256 RPD Support per Chassis	Cisco 2x2 RPD Software 2.x	This feature was introduced on the Cisco 2x2 Remote PHY Device.
Controller profile configuration	Cisco 2x2 RPD Software 2.x	This feature was introduced on the Cisco 2x2 Remote PHY Device.
US 128 channels	Cisco 2x2 RPD Software 2.x	This feature was introduced on the Cisco 2x2 Remote PHY Device.