



Cisco Remote PHY System Bring Up

Finding Feature Information

Your software release may not support all the features that are documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. The Feature Information Table at the end of this document provides information about the documented features and lists the releases in which each feature is supported.

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

- [Hardware Compatibility Matrix for Cisco Remote PHY Device, on page 1](#)
- [Information about Bring Up, on page 2](#)
- [How to Bring Up, on page 2](#)
- [Updating the Default RPD Password , on page 10](#)

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 Remote PHY Device

Cisco HFC Platform	Remote PHY Device
Cisco GS7000 Super High Output Node	Cisco 1x2 / Compact Shelf RPD Software 2.1 and Later Releases
Cisco GS7000 Super High Output Intelligent Node (iNode)	Cisco 1x2 / Compact Shelf RPD Software 4.1 and Later Releases Cisco Intelligent Remote PHY Device 1x2 <ul style="list-style-type: none">• PID—iRPD-1X2=• PID—iRPD-1X2-PKEY=



Note The -PKEY suffix in the PID indicates units that enable the SCTE-55-2 Out-of-Band protocol support.

Information about Bring Up

Bring up process is prerequisite to the operation of the remote PHY system, just like the cable modem bring up in a DOCSIS system.

How to Bring Up

This section describes how to bring up RPD on Cisco cBR-8.

Configuring DHCP Server

You can choose to configure the DHCP server using any of the following methods.

Configuring DHCP Server using IPv4

To configure DHCP server using IPv4, follow the steps below:

1. Add option for CCAP-Core. Fill in the name, DHCP type, and vendor option string as shown in the figure below.

Design > DHCPv4 > Options

List/Add DHCP Option Definition Sets

Attribute	Value
Name*	rpd
DHCP Type*	V4
Description	
Vendor Option String	RPD
Vendor Option Regex String	
Vendor Option Enterprise Id	

2. Define option. Fill in the option number and name as shown in the figure below.

Design > DHCPv4 > Options

List/Add DHCP Option Definition Sets

Edit DHCP Option Definition Set *rpd*

rpd Option Definitions

List of Option Definitions for *rpd*

Number	Name
43	rpd-option-43
2	device-type
61	ccap-cores

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- Define suboption. Fill in the name, type and repeat of suboption 61 as shown in the following figure.

Design > DHCPv4 > Options

List/Add DHCP Option Definition Sets

Edit DHCP Option Definition Set *rpd*

rpd Option Definitions

Attribute	Value
Number*	61
Name*	ccap-cores
Description	
type*	IP address
repeat	1+

- Add the option into policy as shown in the following figure. Replace the IP address 120.102.15.1 in the figure to the DPIC port IP address.

DHCPv4 Vendor Options dhcp-cablelabs-config Select

Name	Number
Configured Options	[43] (rpd) rpd-option-43 (bin)

Configuring DHCP Server using IPv6 Stateless

The Cisco Remote PHY System supports the Stateless Address Auto Configuration (SLAAC). IPv6 address assignment of the RPD is governed by the configuration bits set in the ICMPv6 Router Advertisement (RA) message and the presence of a valid prefix in the Prefix Information Option (PIO). For more information about RPD IPv6 address assignment, refer to section 6.7 of Remote PHY Specification.

To configure DHCP server using IPv6 Stateless and enable SLAAC, follow the steps below:

1. Configure Prefix Type to “stateless” in CNR prefix.
2. Configure ICMPv6 Router RA message M Bit=0 and O Bit=1.

Edit Prefix 2001:93:3:58::0-RPD

2001:93:3:58::0-RPD		Leases	Reservations	Current Usage
<input type="button" value="Expand All"/> <input type="button" value="Collapse All"/> <input type="button" value="Default View"/> <input type="button" value="Show A-Z View"/>				
[-] Universal Settings				
Attribute	Value			
name*	2001:93:3:58::0-RPD			
vpn-id				
Prefix Type (dhcp-type)	stateless			
address*	2001:93:3:58::/64			

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Note It is recommended that you follow the DHCP options listed in *Table 2 - Router Advertisement M Bit and O Bit Settings For SLAAC* of section 6.7.1 (CM-SP-R-PHY-I10) or 6.6.1 (CM-SP-R-PHY-I11) in the Remote PHY Specification.

To display the RPD get IPv6 address by SLAAC, use the **show dhcp** command.

```
R-PHY#show dhcp
Interface  IP-Address          Subnet-Mask
vbh0      2001:93:3:58:1204:9fff:fecl:100  ffff:ffff:ffff:ffff::
```

Details:

```
-----
Interface:          vbh0
AddrType:           IPv6<Stateless>
TimeServers:        2001:20:1:1::33
TimeOffset:         28800
LogServers:         2001:20:1:1::33
CCAPCores:          2001:93:3:58::1
```

Configuring DHCP Server using IPv6 Stateful

To configure DHCP server using IPv6 Stateful, follow the steps below:

1. Configure Prefix Type to “dhcp” in CNR prefix. See the following image.
2. Configure ICMPv6 Router RA message M Bit=1.

To display the RPD get IPv6 address by Stateful method, use the **show dhcp** command.

```
R-PHY#show dhcp
Interface  IP-Address          Subnet-Mask
vbh0      2001:93:3:58::d8   ffff:ffff:ffff:ffff::
```

Details:

```
-----
Interface:          vbh0
AddrType:           IPv6<Stateful>
TimeServers:        2001:20:1:1::33
TimeOffset:         28800
LogServers:         2001:20:1:1::33
CCAPCores:         2001:93:3:58::1
```

Configuring Dying Gasp

Cisco RPD 8.4 supports the Dying Gasp feature, allowing you to receive a UDP syslog message notification when a Node RPD loses power.

Dying Gasp is enabled by default on RPD firmware version 8.4 or later, and if the power-controller firmware is at version 2.05 or later.

To enable Dying Gasp, ensure that the default power-controller firmware is version 2.05 or later.

A syslog message example is as follows:

```
Feb 14 17:06:37 SYSTEM.CRITICAL 2020-02-14 22:08:30
POWER OFF ALARM NOTIFICATION; RPD-ID: 00:01:02:03:04:05
```

The RPD sends multiple copies of the message to the syslog server as it loses power. This ensures that the syslog server receives the notification.

Complete the following steps to configure Dying Gasp:

1. Configure the Node RPD syslog server information through the DHCP server.

Ensure that you use a valid IP address for the syslog server that is reachable from the RPD. An invalid IP address can cause loss of service.

2. Update Node RPD power controller firmware to version V2.05. Run the following CLI on the RPD to update the power controller firmware:

```
firmware power-controller [update|version|verify]
```

For example:

```
R-PHY# firmware power-controller
update          update adm1260 firmware
verify         verify the firmware in chip
version        show adm1260 firmware version
```

```
R-PHY# firmware power-controller version
chip 0: version:V2.03
chip 1: version:V2.03
chip 2: version:V2.03
```

The **firmware power-controller verify** verification function compares the power-controller firmware with the current RPD release.

```
R-PHY# firmware power-controller verify
Verify input Ihex file for chip 0: OK
Verify input Ihex file for chip 1: OK
Verify input Ihex file for chip 2: OK
Successful verification of /firmware/Adm1260_v2_05.hex, checking firmware version next
chip 0: version:V2.05 file 0: version:V2.05
chip 1: version:V2.05 file 1: version:V2.05
chip 2: version:V2.05 file 2: version:V2.05
chip 0, verifying eeprom: OK
chip 1, verifying eeprom: OK
chip 2, verifying eeprom: OK
```

```
R-PHY#
```

```
R-PHY#firmware power-controller update
Verify input Ihex file for chip 0: OK
Verify input Ihex file for chip 1: OK
Verify input Ihex file for chip 2: OK
Successful verification of /firmware/Adm1260_v2_05.hex, checking firmware version next
chip 0: version:V2.03 file 0: version:V2.05
chip 1: version:V2.03 file 1: version:V2.05
chip 2: version:V2.03 file 2: version:V2.05
Warning, if you choose to continue, you must maintain power on for at least 30 seconds
```

```
Are you sure to continue with firmware update? [No/Yes]Yes
chip 0, erasing eeprom
chip 0, programming eeprom
chip 1, erasing eeprom
chip 1, programming eeprom
chip 2, erasing eeprom
chip 2, programming eeprom
chip 0, verifying eeprom: OK
chip 1, verifying eeprom: OK
chip 2, verifying eeprom: OK
all done
```

```
R-PHY#
```

The update process takes less than 30 seconds. The RPD might turn unusable if it loses power, is reset, or rebooted during this process. Replace the RPD when it becomes unusable.



Note When the RPD detects drop in input power, it sends a syslog message to the configured syslog server (Step 1). This drop in power may be the first stage of a complete power failure, or a partial temporary reduction in total system capacity. The RPD continues to send the syslog message in either case.

3. Check the version and verify using the **firmware power-controller verify** command to see that the power-controller is running version 2.05 or later.

If the firmware is already up to date, the update process terminates without overwriting. If the command fails for any reason, run the command again before power cycling or rebooting the RPD. Failure to program completely before power cycling may result in an unusable RPD.

Configuring PTP

To configure PTP, use the following example as reference:

On the Cisco cBR-8 router:

```
interface Loopback1588
  ip address 159.159.159.4 255.255.255.255
interface TenGigabitEthernet5/1/3 /* connect to ASR903 */
  ip address 192.104.10.4 255.255.255.0

ip route 10.90.3.93 255.255.255.255 192.104.10.93 /* route to ASR903 loopback ip */

ptp clock ordinary domain 0
  servo tracking-type R-DTI
  clock-port slave-from-903 slave
  delay-req interval -4
  sync interval -5
  sync one-step
  transport ipv4 unicast interface Lo1588 negotiation
  clock source 10.90.3.93 /* ASR903 loopback ip */

ptp r-dti 1
  ptp-domain 0 /* same domain number with ptp server */
  clock-port 1
  ethernet 1 /* default value is same index with clock-port index, for RPD, ethernet
1=vbh0, ethernet 2=vbh1 */
  clock-source 10.90.3.93 gateway 93.3.10.2 /* clock-source is ASR903 loopback ip,
gateway is ASR903 BDI ID for node */
```

On ASR903 router as PTP primary clock:

```
ptp clock ordinary domain 0
  clock-port Master-to-all-cBR8 master
  sync interval -5
  sync one-step
  transport ipv4 unicast interface Lo1588 negotiation

interface Loopback1588
  ip address 10.90.3.93 255.255.255.255

interface GigabitEthernet0/3/5
  no ip address
  negotiation auto
  cdp enable
  service instance 31 ethernet /* 31 is vlan id */
  encapsulation dot1q 31
  rewrite ingress tag pop 1 symmetric
  bridge-domain 31
  service instance 32 ethernet
  encapsulation dot1q 32
  rewrite ingress tag pop 1 symmetric
  bridge-domain 32
```

```

interface BDI31 /* for cBR, SUP PIC */
 ip address 192.104.10.93 255.255.255.0
 no shut
interface BDI32 /* For RPD */
 ip address 93.3.10.2 255.255.255.0
 no shut

ip route 159.159.159.4 255.255.255.255 192.104.10.48 /* route to cbr-8 loopback ip */

```

Configuring cBR-8

To configure the cBR-8 to bring up the RPD, use the following example as reference:

```

/* D-PIC TenGiga interface config */
interface TenGigabitEthernet0/1/0
 ip address 93.3.10.1 255.255.255.0
 ip helper-address 20.1.0.33

/* Downstream/Upstream controller profile */
cable downstream controller-profile 101
rf-chan 0 95
 type DOCSIS
 frequency 381000000
 rf-output NORMAL
 qam-profile 1
 docsis-channel-id 1

cable upstream controller 201
 us-channel 0 channel-width 1600000 1600000
 us-channel 0 docsis-mode atdma
 us-channel 0 minislots-size 4
 us-channel 0 modulation-profile 221
 no us-channel 1 shutdown

/* RPD configuration */
cable rpd node1
 identifier 0004.9f03.0061
 core-interface Te0/1/0
 rpd-ds 0 downstream-cable 0/0/0 profile 101
 rpd-us 0 upstream-cable 0/0/0 profile 201
 r-dti 1
 rpd-event profile 0
 rpd-55dl-us-event profile 0

interface Cable0/0/0
 load-interval 30
 downstream Downstream-Cable 0/0/0 rf-channel 0-23
 upstream 0 Upstream-Cable 0/0/0 us-channel 0
 upstream 1 Upstream-Cable 0/0/0 us-channel 1
 upstream 2 Upstream-Cable 0/0/0 us-channel 2
 upstream 3 Upstream-Cable 0/0/0 us-channel 3
 cable upstream bonding-group 1
 upstream 0
 upstream 1
 upstream 2
 upstream 3
 attributes 80000001
 cable bundle 1
 cable ip-init ipv6
interface Wideband-Cable0/0/0:0
 cable bundle 1
 cable rf-channels channel-list 0-7 bandwidth-percent 10

```



```
interface Wideband-Cable0/0/0:1
  cable bundle 1
  cable rf-channels channel-list 8-15 bandwidth-percent 10
  cable fiber-node 200
  downstream Downstream-Cable 0/0/0
  upstream Upstream-Cable 0/0/0
```

Setting Device Alias

Configuring an RPD for the first time using the command **cable rpd name** triggers RPD provisioning. In Cisco IOS XE Gibraltar 16.12.1z and later releases, the RPD name configured during RPD configuration on the Cisco cBR is set as the device alias of the RPD. Device Alias is an alias for the RPD device, used by device configuration and management systems.



Note You can configure device alias of an RPD via MIB docsRphyCtrlRpdInitProvCtrlDeviceAlias. After an RPD reset, the device alias resets. The Cisco cBR sets the RPD name configured during RPD provisioning as the device alias.

The following example shows the use of **cable rpd name**.

```
/* RPD configuration */
cable rpd node1
  identifier 0000.5e00.0061
  core-interface Te0/1/0
    rpd-ds 0 downstream-cable 0/0/0 profile 101
    rpd-us 0 upstream-cable 0/0/0 profile 201
  r-dti 1
  rpd-event profile 0
  rpd-55d1-us-event profile 0
```

The following example shows the device alias.

```
Router#show cable rpd 0000.5e00.0061 identification
RPD ID                               : 0000.5e00.0061
Vendor Name                           : Cisco
Vendor Id                              : 9
Model Number                           : GS7K-RPD-1X2
Device Mac Address                     : 0000.5e00.0061
Current Sw Version                     : v8.3_20200516060512
Boot Rom Version                       : Primary: U-Boot 2016.01 (Sep 11 2019 - 13:02:25
+0800) *;Golden: U-Boot 2016.01 (Feb 16 2017 - 09:03:06 +0800);
Device Description                     : RPD
Device Alias                           : node1
Serial Number                          : CAT2038E3U0
Us Burst Receiver Vendor Id            : 4413
Us Burst Receiver Model Number         : BCM31610
Us Burst Receiver Driver Version       : V11
Us Burst Receiver Serial Number        : 00000000
Rpd Rcp Protocol Version               : 1.0
Rpd Rcp Schema Version                 : 1.0.13
Hw Revision                            : 2.0
Current Sw Image Last Update           : 2020-05-17 08:43:02.02
Current Sw Image Name                   : RPD_V8_3_THROTTLE_20200516_103309.itb.sign.SSA
Current Sw Image Server Address        : 192.0.2.21
Current Sw Image Server Type           : IPV4
Current Sw Image Index                 : 0
Asset Id                               : Asset-2
```

```
Vsp Selector           :
Status                 : Active
```

Updating the Default RPD Password

You should update the default RPD access credentials immediately after you log in to the RPD. From RPD 7.7, it is mandatory to update the SSH login password.

If you continue to use the default password, all downstream channels become inactive. A warning message appears of the Cisco cBR core and an event is generated for default password usage. The event is generated for RPD 6.7 and later. The RPD sends this event to the primary core to which it is connected.

The following message appears when you log in to the RPD y using the default credentials:

```
2020-01-13 04:48:26,584-rpd_logging.py-119-ERROR-0x80090807:Service Disabled - PLEASE CHANGE
RPD SSH PASSWORD IMMEDIATELY - default login credentials detected in use
2020-01-13 04:48:26,586-cli_main.py-216-WARNING-Default password detected in use
```

```
*****
***** SERVICE IMPACTING *****
***** PLEASE READ *****
*****
Default login credentials detected in use.
In order to enhance the security of your network,
default login credentials must be changed on this RPD.
```

```
@@@ RPD SERVICE HAS BEEN DISABLED !!! @@@
```

```
*****
***** CHANGE SSH PASSWORD *****
***** IMMEDIATELY *****
*****
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
SECURITY WARNING: ssh password login is accessible!
Please use pubkey login and set password login off!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
Welcome to Cisco R-PHY
```

```
R-PHY>
```

Check the current SSH account details using the following command. If you use the default credentials, you can see a similar output:

```
R-PHY#show ssh account
Account Num: 3
Current SSH Accounts:
admin *** Warning ! Default Password in Use ***
test
new
```

When the downstream port is inactive due to the use of default credentials, the OFDM channel and the QAM channel also become inactive. To check whether the downstream port is inactive, use the following command:

```
R-PHY#show downstream port configuration
Admin: UP
Muted: MUTED
BasePower: 21 dBmV

R-PHY#show downstream channel configuration
Chan State Frequency Type Annex Modulation Rate Interleave Power Muted

Chan State Type StartFreq Width PlcFreq CPrefix RollOff Interleave Spacing
Power Muted
158 UP OFDM 645000000 192000000 651000000 1024 128 16 50kHz
21.0 MUTED
```

*NOTE: Start frequency and channel width do not cover guardband override scenario.

Activate the Downstream Port

You can activate the downstream port using one of the following methods:

- Disable the SSH password and set up the RPD to use server generated SSH keys.
- Change the password for the admin user.
- Create a new user and delete the admin user.

Disable SSH Password

Disable the SSH password and set up the RPD to use server generated SSH keys.

1. Generate a new NMS key on SSH server

```
$ cat ~/.ssh/id_rsa.pub

$ ssh-keygen -t rsa

$ cat ~/.ssh/id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAQEAtQCXVFmRIwemejbTx0+U8taMq5n4Zetu
71xb+dtHV8Rr0wejiK1YJkT93n9hcBxsjHRu76bLp991+DDNL3+Th1jwnMQC1CsdvRmGXoe
Gf1mT9aTlGDf/ RW9ZywY9t8Kep9VnANu2DWSoh0wg2pe49HFOJAbGfuFOvPEdwZGGDMQNws
Eq/3xAQjBxajQqfgu4IqjVzKoo4PM/xx9X4Z1aMwxS3DvyN7L800o33mCDNsasl3SslIjMSNfq
YpwOFvQve8c2onrYHUx2p3BwQOb/b0FzFQhZMTBxm/pDMXq/fkkD0uguk1xOGnqAATMJsSHIN
OUOdvbzhhrFRBBM4NzqQG5kNt7KvnWgxE7HdalERvMyBC2MCGbFShMQFyWmHBPPmLIxK98W
XutoR8fzss+4hingZ4X9DMMNwTQ6WOzjuKq6iU= userid@example.cisco.com
```

2. Add this new NMS key to the RPD through RPD CLI

```
R-PHY#conf t
R-PHY(config)#ssh pubkey add ?
LINE NMS's pubkey
R-PHY(config)#ssh pubkey add ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAQEAtQCXVFmRIwemejbTx0+U8taM
q5n4Zetu71xb+dtHV8Rr0wejiK1YJkT93n9hcBxsjHRu76bLp991+DDNL3+Th1jwnMQC1
CsdvRmGXoeGf1mT9aTlGDf/YfKxZMozMnR9q1GJFXLRaWGMsCR1llnV6IkFyh59P9Udkd
SSWv+QL8lCftWBmMnyt/CkqL98NK0Vp0gIYRv7UKCwhK40c8X7PhzxcmKVFTUv3bf9VIP
NA2esgzKDFpoJZkqCjrnXU1Xu00j8Twci7f0ytSrFvVKuWp4XZbVDPWGH90BOQR8gKHmq
urP3nFp0v0k3Nf4UvStuOOQi2h0mAf+9wzm+ab41ToadUbMawHyFYyuU= xxx@xxx.xxx.com
R-PHY(config)#end
```

```
R-PHY#show ssh nms-pubkey ssh-rsa AAAAB3NzaC1yc2EAAAABIWAAAgEAtQCXVFm
RIwemejbTx0+U8taMq5n4Zetu71xb+dtHV8Rr0wejiK1YJkt93n9hcBxsjHRu76bLp99l
+DDNL3+THljwnMQC1CsdvRmGXoeGflmT9aTlGdf/YfKxZMozMnr9q1GJFXlRAwGmsCR1l
lnV6IkFyh59P9UdkdSSWv+QL8lCftWBmMnyt/CkqL98NK0Vp0gIYRv7UKCwhK40c8X7Ph
zxCmKVFTUv3bf9VIPNA2esgzKDFpRvMyBC2MCGbFShmQFyWmHBHPPmLIxK98WXutoR8fzz
s+4hingZ4X9DMMNwTQ6WOzjuKq6iU= xxx@xxx.xxx.com
```

3. Disable RPD SSH password login

```
R-PHY#conf terminal
R-PHY(config)#ssh password ?
off          disable ssh password login
on           enable ssh password login
R-PHY(config)#ssh password off
Successfully Disabled Password, SoftReset in 10 seconds
```

Change the Password for the Admin User

```
R-PHY#config terminal
R-PHY(config)#ssh chpasswd admin
Please enter password for 'admin':
Please re-enter your password:
chpasswd: password for 'admin' changed

Successfully Changed from Default Password, SoftReset in 10 seconds
```

Create a New User and Delete the Admin User

```
R-PHY(config)#ssh add rpdadmin
Changing password for rpdadmin
New password:
Retype password:
passwd: password for rpdadmin changed by root
R-PHY(config)#ssh delete admin
Warning: Are you sure to delete this account? [No/Yes]
yes
delete account 'admin' successfully
R-PHY(config)#

Successfully Deleted user admin, SoftReset in 10 seconds
```