



## Managing RPDs

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Smart PHY provides a single pane of glass to easily onboard Remote PHY Devices (RPDs). See:

- [Managing RPD Associations, on page 2](#)
- [Remote PHY Device Association, on page 4](#)
- [Service Definitions, on page 11](#)
- [Provisioning an RPD for Video Support, on page 18](#)
- [cBR-8 Configuration Reconciliation, on page 24](#)
- [Viewing RPD History, on page 25](#)
- [Managing RF Power Adjust Profiles, on page 25](#)

# Managing RPD Associations

*Table 1: Feature History*

Feature Name	Release information	Description
Modernized and Refreshed UI for RPD Association	Cisco Smart PHY 22.2	<p>Modifications in the RPD Association Smart PHY UI:</p> <ul style="list-style-type: none"> <li>• Filtering based on all, provisioned and unprovisioned RPDs</li> <li>• Status for assigned RPDs</li> <li>• Import or export the database from/to local operations hub cluster or remote server.</li> <li>• (Optional) Password protect the database files (following password creation rules) during import and export operations.</li> <li>• Ability to view the history of Operations in a table format.</li> <li>• Enhanced search facility to search based on imported or exported RPD data.</li> <li>• Export the history of operations information.</li> </ul>
US Port Description	Cisco Smart PHY 22.3	<p>Smart PHY can be used to set a description for the Upstream Port level. Description can be set while creating and editing RPD operations. RPD-US Port Description can be set at Port 0, Port 1 or both Port 0 and Port 1 based on RPD segmentation (1x1, 1x2 and 2x2). RPD US Port Description can be Imported &amp; Exported. US Port Description is not a service impacting change.</p>

Feature Name	Release information	Description
Shelf and Base Power Enhancements	Cisco Smart PHY 22.3	When RPD is provisioned as a "SHELF", the 'type shelf' CLI is pushed to both Principal and Aux Core(s). Along with Base-power, if Tilt Pivot Freq and Tilt Slope are configured, then they are also be pushed to all the cores.
Configure US RF base-power level	Cisco Smart PHY 22.4	You can configure Upstream RF Base Power level. The valid range is -20 to 40 (dBmV).

The **RPD Associations** page enables you to add, organize, and update information about CMTS and RPD devices in the network. For more information, see:

- [Remote PHY Device Association, on page 4](#)
- [Creating Service Definitions](#)

Once an RPD is provisioned, the RPD may undergo state transitions as shown in the following table:

**Table 2: RPD State Summary**

RPD Summary	RPD State	Description
ERRORED	ConfigNotFound	RPD assignment is incomplete or not specified in the Cisco Smart PHY application.
ERRORED	ConfigPushError	Unable to push the RPD configuration to the CCAP core.
ERRORED	ConfigReadError	Unable to obtain the existing CCAP core configuration.
ERRORED	ConfigurationError	Assigned incorrect RPD in the Cisco Smart PHY application.
ERRORED	GcpRedirectError	Received an error from the RPD when redirecting to the CCAP core.
ERRORED	NotProvisioned	Cisco cBR-8 router is not provisioned with the RPD configuration. RPD configuration is not pushed to the Cisco cBR-8 router.
ERRORED	Offline	RPD is offline. However, RPD configuration is pushed to the CCAP core.
ERRORED	OFFLINE	RPD is offline.
ERRORED	ResourceAllocationError	Unable to allocate resources to an RPD for the assigned CCAP core or interface.
ERRORED	SSHKEYFETCH_FAILED	Unable to obtain the SSH key.

RPD Summary	RPD State	Description
GCP	GcpRedirected	Received an ACK from the RPD for the CCAP core redirect message. This redirect message captures the result of the redirect request, which is initiated by the Cisco Smart PHY application, along with the hostname, the IP address, and the interface of the redirected core.
GCP	GcpRedirectedWithException	Received an ACK from the RPD for the CCAP core redirect message. However, one of the following errors occurred: <ul style="list-style-type: none"> <li>• RouterVersionIncompatible</li> <li>• StaticRouteNotConfigured</li> </ul>
GCP	GcpRedirectStarted	RPD configuration is pushed to the CCAP core and the RPD is redirected to that core.
GCP	GcpRedirectStartedWithException	RPD configuration is pushed to the CCAP core and the process of redirecting the RPD to that core starts. However, one of the following errors occurs: <ul style="list-style-type: none"> <li>• RouterVersionIncompatible</li> <li>• StaticRouteNotConfigured</li> </ul>
GCP	GcpUp	Received GCP message from the RPD.
ONLINE	Online	RPD is online for the CCAP core.
PROCESSING	ConfigPush	Configuration push to CCAP is in progress.
PROCESSING	DeletePending	RPD pairing deletion is pending.
PROCESSING	NORMALOPS_PROGRESS	The CCAP is returning to Normal Operation.
PROCESSING	RECONCILIATION_PROGRESS	Reconciliation in progress
PROCESSING	SSHKEYFETCH_IN_PROGRESS	The process of obtaining the SSH key is in progress.
UNKNOWN	UNKNOWN	Unknown RPD State
WARNING	OnlineWithException	RPD is online, but NDF or NDR fails.
WARNING	PartialOnline	Partial services are available.
WARNING	RouterVersionIncompatible	RPD software version is incompatible with the CCAP core version.
WARNING	StaticRouteNotConfigured	Static route is not configured.

## Remote PHY Device Association

The remote PHY device association feature enables you to create either a remote PHY device or in bulk using CSV upload.

Use the following table to configure the fields under **Create Remote PHY Device Association**:

**Table 3: Creating Remote PHY Device Association**

Field	Description
<b>General</b>	
RPD Name	Enter the RPD name. Smart PHY uses this name in the <b>cable rpd</b> command.
RPD MAC Address	Enter the MAC address of the RPD.
Node Segmentation	Select one of the following Node segmentation options: <ul style="list-style-type: none"> <li>• 1x1</li> <li>• 1x2</li> <li>• 2x2</li> </ul>
Service Definition	Select the Service Definition as created in the <b>Service Definitions</b> page. If Cisco Smart PHY does not manage the principal CCAP core and if the <b>Principal Core</b> field is empty, then the <b>Service Definition</b> field is optional.
Tags	You can select one or more of the existing tags or create new tags and add it to the RPD Association.
<b>RPD Association Policies</b>	
Allow Shelf Specific Configurations	Select the check box to configure Cisco Remote PHY Shelf 7200, Cisco Remote PHY Shelf 300, or Cisco Remote PHY Shelf 600. Cisco cBR-8 routers running IOS XE Gibraltar 16.12.1z or later support this feature. Select this check box to enable the following fields: <ul style="list-style-type: none"> <li>• <b>Base Power (dBmV)</b></li> <li>• <b>Tilt Pivot Freq (Hz)</b></li> <li>• <b>Tilt Slope (dBmV)</b></li> </ul> <p><b>Note</b> When RF parameters and Auxiliary cores are configured for Shelf RPDs, Base Power, Tilt Pivot Frequency and Tilt Slope values are automatically configured for Aux Cores. These values are derived from DOCSIS Principal Core. RPD does not restart after updating these parameters.</p>
Enforce Compatibility with IOS XE 17.6.1	If you select this check box, then Smart PHY generates Cisco IOS XE Bengaluru 17.6.1 compatible controller configurations for Cisco cBR-8 routers running versions of Cisco IOS XE earlier than 17.6.1.
<b>Service Definition Overrides</b>	
Do not Apply Network Delay	If you select this check box, then Smart PHY does not apply the selected Service Definition's Network Delay configuration to this Association. If the Network Delay is configured in the selected Service Definition, checking this box impacts the service.

Field	Description
Override DSG Tunnel Group IDs	If you select this check box, Smart PHY overrides the selected Service Definition's DOCSIS Set-Top Gateway (DSG) Tunnel Group (TG) identifications list with the entries entered here. Separate the entries must with a semicolon.
<b>CCAP Cores &amp; RF Parameters</b>	
<b>DOCSIS Principal Core</b>	
Device Name	Select the name of the managed cBR-8 router or the unmanaged CCAP Core, which is the Principal CCAP Core for the RPD. If you choose a managed Principal Core, then the Core must provide the RPD with data and narrowband digital forward (NDF)/narrowband digital return (NDR) services. This core may also provide the following services: <ul style="list-style-type: none"> <li>• Out-of-band (OOB) SCTE 55–1</li> <li>• Video services: If there is no separate auxiliary Video Core.</li> </ul>
Interface	If the Principal Core is a managed Cisco cBR-8 router, then select the DPIC interface used to deliver the data service. Leave this field empty if there is no Principal Core or if the Principal Core is unmanaged.
<b>First and Second Logical DS/US Pairing</b>	
RPD DS Port (Downstream Physical Port)	Select the Downstream RPD port of the logical pairing. The two options are 0 or 1. Select 0 for the first pairing. This is not applicable to the second pairing for 1x1 or 1x2 node segmentation. You can select 0 or 1 for 2x2 node segmentation.
RPD US Port (Upstream Physical Port)	Select the Upstream RPD Port of the logical pairing. The two options are 0 or 1. This is not applicable to second pairing for 1x1 node segmentation.
DS Service Group	Enter the name of the Downstream Service Group. All RPDs with the same data service group share the downstream controller for Data Service (Virtual Splitting for Data). This is not applicable to second pairing for 1x1 or 1x2 node segmentation.
US Service Group	Enter the name of the Upstream Service Group. Upstream data service group allows multiple RPDs to share the same upstream controller for upstream data traffic. Not applicable to second pairing for 1x1 node segmentation.
US Port Description	Enter a brief description for US Port, while creating and editing RPD operations. Description can be set at Port 0, Port 1 or both Port 0 and Port 1 based on RPD segmentation (1x1, 1x2 and 2x2).
<b>Out-of-band Core</b>	
Device Name	Enter the name of the Cisco cBR-8 router which is the CCAP core for the RPD that provides out-of-band (OOB) SCTE 55–1 service and NDF/NDR services. This field must match either the <b>DOCSIS Principal Core</b> or the auxiliary <b>Video Core</b> . Leave this field empty if the OOB 55–1 and NDF/NDR services are not used.
Interface	Select the DPIC interface to be used for out-of-band 55–1 and NDF/NDR service. If the OOB 55–1 and NDF/NDR services are not used, then leave this field empty.

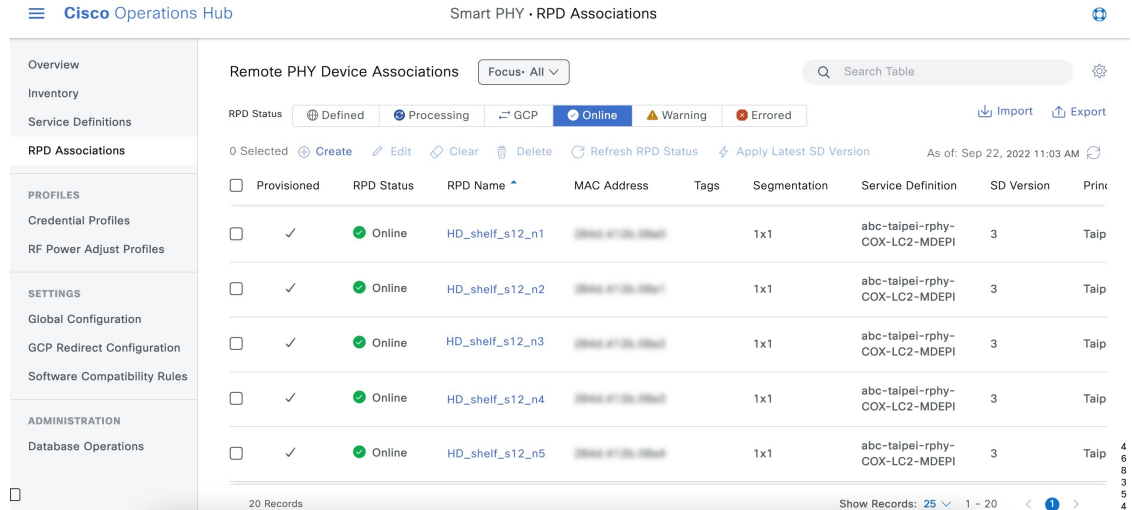
Field	Description
Override OOB VOM & VARP ID	If you select this check box, then Smart PHY overrides the selected Service Definition's OOB Downstream & Upstream parameters (VOM ID, VOM Profile, VARP ID, and VARP Profile) with the values entered here.
Downstream VOM ID	OOB 55–1 Downstream Virtual out-of-band Modulator (VOM) Identification (ID). If you populate this field, it overrides the value in the Service Definition. Enter a value from 1 through 20.
Downstream VOM Profile	OOB 55–1 Downstream VOM profile. If you populate this field, it overrides the value in the Service Definition. Enter a value from 1 through 4294967295.
Upstream VARP ID	OOB 55–1 Upstream Virtual Advanced Return Path Demodulator (VARP) ID. If you populate this field, it overrides the value in the Service Definition. Enter a value from 1 through 32.
Upstream VARP Profile	OOB 55–1 Upstream VARP profile for first logical Downstream or Upstream (DS/US) pairing. If you populate this field, it overrides the value in the Service Definition. The upstream VARP profile (upstreamVarpdProfile) and the second upstream VARP profile (secondUpstreamVarpdProfile) can have the same value. For more details, see <a href="#">Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2, on page 19</a> . Enter a value from 1 through 4294967295.
Second Upstream VARP Profile	OOB 55–1 Upstream VARP profile for second logical Downstream or Upstream (DS/US) pairing. If you populate this field, it overrides the value in the Service Definition. The upstream VARP profile (upstreamVarpdProfile) and the second upstream VARP profile (secondUpstreamVarpdProfile) can have the same value. For more details, see <a href="#">Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2, on page 19</a> . Enter a value from 1 through 4294967295.
<b>Video Configuration</b>	
Device Name	Enter the name of the Cisco cBR-8 router, which is the auxiliary CCAP core for the RPD that provides video services. Leave this field empty if the principal core provides the video services.
Interfaces	Select the DPIC interfaces to be used for Video Services.

Field	Description
Video Service Groups	<p>Video service group (VSG) names. Video is forwarded only in the downstream direction. Not applicable to second pairing for 1x1 or 1x2 node segmentation. Important: Cisco Smart PHY does not allow you to configure a VSG on a Downstream Port 1 (ds1) with <code>broadcast</code> keyword through the Cisco cBR-8 CLI. If you try to configure a VSG on a Downstream Port 1 (ds1) with <code>broadcast</code> keyword, then the CLI shows an error. Cisco Smart PHY maps a VSG to a video interface based on the order of the VSGs and interfaces if a VSG can map to more than one interface:</p> <ul style="list-style-type: none"> <li>• A VSG can map to more than one video interface if the video interface list includes both ports 0 and 2 or both ports 4 and 6 of one Cisco cBR-8 Series 8x10G Remote PHY Digital Physical Interface Card (CBR-DPIC-8X10G).</li> <li>• Cisco Smart PHY maps the first VSG to a matching Principal Core interface if present; otherwise, it maps the first VSG to the first matching video interface.</li> <li>• Cisco Smart PHY maps second, third, and fourth VSGs to the highest numbered matching video interfaces.</li> </ul> <p>Cisco Smart PHY reorders video interfaces and VSGs, so that a video interface that matches the Principal Core interface and the associated VSGs are listed first.</p>
<b>RF Parameters</b>	
Base Power (dBmV)	<p>Configure the base channel power level. Enter the value based on the type of RPD.</p> <ul style="list-style-type: none"> <li>• Node RPDs: 20-22</li> <li>• Shelf RPDs: 24-61</li> </ul>
Tilt Pivot Freq (Hz)	Configure the frequency of the tilt pivot point. The valid range is 0-121800000. Tilt pivot point is the maximum frequency point where the Tilt Slope is applicable.
Tilt Slope (dBmV)	Configure the tilt slope. The valid range is 0-8.
RF Power Adjust Profile	You can override the RF Power Adjust Profile. This is optional. For more information, see <a href="#">Managing RF Power Adjust Profiles</a> .
US Base Power RX (dBmV)	Configure Upstream RF Base Power level. Valid range is -20 to 40 dBmV.
<b>Additional Cores</b>	
Device Name	You can add additional unmanaged Cores to the GCP Redirect list by selecting them here. You can select multiple additional cores. You can configure multiple unmanaged Cores. If an unmanaged core is already selected as the <b>DOCSIS Principal Core</b> , it cannot be configured again as an additional core. Thus, the unmanaged Principal Core and the unmanaged Additional Core fields are mutually exclusive. If a DOCSIS Principal Core supports dynamic addition of more Cores, then you can configure it through Smart PHY Global Configuration and avoid RPD reboot.
<b>RPD Software</b>	



Field	Description
Principal Core SSD Profile	If the Principal Core is a managed cBR-8 router, then you can use this option to set the Secure Software Download (SSD) profile ID. If the Principal Core is unmanaged or you do not wish to set the SSD profile ID, leave this field empty.

Figure 1: RPD Associations



## RPD Associations

### Creating an RPD Association

You can create Remote PHY Devices Associations from Smart PHY's RPD Associations page.

- Step 1** At the main menu, select **Smart PHY > RPD Associations**.
- Step 2** Click **Create** to add a single RPD Association.  
The **Creating Remote PHY Device Association** page displays.
- Step 3** Enter the values to the fields as seen in [Table 3: Creating Remote PHY Device Association](#) .
- Step 4** Click **Save**.

### Clearing an RPD Association

You can clear one or multiple Remote PHY Device association records from Smart PHY's RPD Associations page.

When you perform the clear operation, all provisioning related configuration parameters (Node Segmentation, Service Definition, CCAP Cores, etc.) are removed from the association record. Additionally, Smart PHY removes all relevant CLI configuration commands from CCAP cores previously associated with the now cleared record. The only values retained in a cleared association record are: RPD Name, MAC Address, and Description.

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- Step 1** At the main menu, select **Smart PHY > RPD Associations**.
- Step 2** Check the box that corresponds to your RPD association record, then click **Clear**.
- Step 3** Review the warning message, then click **Clear** to proceed.
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## Deleting an RPD Association

You can delete one or multiple Remote PHY Devices Associations from Smart PHY's RPD Association page. When you perform the delete operation, Smart PHY removes all relevant CLI configuration commands from CCAP cores associated with the record before permanently deleting the association record. The only value that remains in the RPD Associations page after deletion is the RPD MAC Address.

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- Step 1** At the main menu, select **Smart PHY > RPD Associations**.
- Step 2** Check the box that corresponds to your RPD association record, then click **Delete**.
- Step 3** Review the warning message, then click **Delete** to proceed.

**Note** If you delete an RPD association record when one or more of its associated CCAP Cores is in maintenance or offline mode, Smart PHY will delete the record, but importantly Smart PHY does not remove relevant CLI configuration commands from the associated CCAP Cores. At the conclusion of the deletion, we highly recommend that you manually review the CLI configuration of the relevant CCAP Cores. Any CLI configuration pertaining to the RPD in question should be manually removed.

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## Refreshing RPD Status

You can refresh the status of Remote PHY Device from Smart PHY's RPD Associations page.

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- Step 1** At the main menu, select **Smart PHY > RPD Associations**.
- Step 2** Select an RPD and click **Refresh RPD Status** to refresh its status from the associated CCAP device.
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## Applying Latest SD Version

You can apply the latest version of Service Definitions to one or multiple Remote PHY Devices from Smart PHY's RPD Associations page.

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- Step 1** At the main menu, select **Smart PHY > RPD Associations**.
- Step 2** Select one or multiple RPDs.
- Step 3** Click **Apply Latest SD Version**.
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## Creating RPD Associations in Bulk Through CSV Import

You can provision RPDs in bulk, using the **Import** option available in the **RPD Associations** page.

**Step 1** At the main menu, select **Smart PHY > RPD Associations**.

**Step 2** Click **Import**.

**Step 3** Choose a CSV file containing RPD Association records. Ensure that all the provisioning parameters are present in the CSV file.

**Step 4** Import

**Note** When you attempt to provision Data and Auxiliary services such as Video or OOB on two different cores, Smart PHY considers the operation as **atomic**. RPD is provisioned successfully when both Data and Auxiliary services are configured successfully. If it fails even in one of the cores, the entire operation is rolls back.

## Service Definitions

### Feature History

Feature Name	Release information	Description
Service Definition Enhancement	Cisco Smart PHY 22.2	<ul style="list-style-type: none"> <li>• <b>Service Definition Versions:</b> Service definition now provides versioning and enables you to track the Service Definition changes. This identifies the RPDs running specific versions of a Service Definition.</li> <li>• <b>Forced Config Push:</b> You can edit Service Definitions and push service impacting changes to RPD(s) using the Force Config push option. Smart PHY deletes and re-adds the RPDs automatically.</li> <li>• <b>RF Profile Overwrite:</b> You can overwrite the RF Power Adjust Profile during RPD provisioning.</li> </ul>

Feature Name	Release information	Description
Modernized and Refreshed Service Definition UI	Cisco Smart PHY 22.2	<ul style="list-style-type: none"> <li>• Support to create, edit, and clone service definitions.</li> <li>• Support to bulk delete the service definitions.</li> <li>• Filter based on with assigned and without assigned RPDs.</li> <li>• Ability to view device information, configuration, and version details in the Service definition name link. Ease to edit or clone from <b>Service Definitions Details</b> page.</li> </ul> <p>Enhanced Search option based on service definitions configured.</p> <ul style="list-style-type: none"> <li>• Export service definitions from GUI.</li> <li>• Import a maximum of 500 service definition using CSV file.</li> <li>• Enhancement in table settings to edit the table columns and table appearance, and arrange the table columns as per requirement.</li> </ul>
Apply Latest Service Definition Version	Cisco Smart PHY 22.3	You can assign the latest service definition to one or more RPDs in RPD Association page. Smart PHY handles service affecting changes smartly and reprovisions the RPDs in case service affecting changes are applicable in the latest version of the Service Definition.

Service Definitions are a logical grouping of the various configuration parameters that are needed to complete the RPD provisioning. You can manage Service Definitions on Smart PHY's **Service Definition** page.

When an RPD Association is created, or modified, the parameters that are configured in the selected Service Definition, are applied to the RPD.

**Figure 2: Service Definitions**

The screenshot shows the Cisco Operations Hub interface for Smart PHY Service Definitions. The main content area displays a table of service definitions with the following data:

Definition Name	RPD Associated	Version	MAC Domain Split	OOB	NDR/NDF	Delay	Load Balance
Cop-taipei-rphy-COX-LC2-4	0	1	Yes	No	No	No	No
abc-taipei-rphy-COX-LC2-MDEPI	6	9	Yes	No	No	No	No
taipei-rphy-COX-LC2-4	9	19	Yes	No	No	No	No
taipei-rphy-COX-LC2-2	2	2	Yes	No	No	No	No
taipei-rphy-COX-LC2	0	2	Yes	No	No	No	No
taipei-rphy-COX-LC2-3	7	1	Yes	No	No	Yes	No
taipei-rhvh-COX-LC2-2x2-2	0	1	No	No	No	No	No

The interface also shows a sidebar with navigation options: Overview, Inventory, Service Definitions (selected), RPD Associations, PROFILES (Credential Profiles, RF Power Adjust Profiles), SETTINGS (Global Configuration, GCP Redirect Configuration, Software Compatibility Rules), and ADMINISTRATION (Database Operations). The table has 9 records and a search bar is visible at the top right.

## Creating Service Definitions

- Step 1** At the main menu, select **Smart PHY > Service Definitions**.  
The **Service Definitions** page appears.
- Step 2** Click **Create**. The **Create Service Definition** page displays.
- Step 3** Fill the **Name**, **Description**, and **Tags** fields. If you have multiple Service Definitions, then enter concise, informative, and detailed descriptions for these fields.
- Step 4** Check the **Default** check box to make this the default Service Definition for Smart PHY. This is optional.
- Step 5** Enter the remaining Service Definition parameters listed in the following table. All fields that are not marked as optional, are mandatory. Cisco Smart PHY supports unique downstream (DS) and upstream (US) configurations for each port of RPD 2x2.

**Table 4: Service Definition Parameters**

Field	Description	Service Affecting Parameter
Name	Name of the Service Definition.	No
Description	A brief description about the Service Definition	No
Tags	New or previously created user-defined tags can be assigned to the Service Definition.	No
<b>General Parameters</b>		
Event Profile ID	RPD Event Profile Set.	No
Remote DOCSIS Timing Interface ID	Remote DOCSIS Timing Interface (R-DTI) Set.	No
Pilot Tone Profile ID	Pilot tone profile.	Yes
Cable DSG TGs	DSG tag IDs.	Yes
<b>Logical Pairings</b>		
Split the MAC Domain	Select this box to have Smart PHY split the MAC Domain between two fiber nodes that share the same downstream controller.	Yes
<b>First Logical DS/US Pairing</b>		
Service Group Profile	Pre-existing Cable Service Profile-Group on the Cisco cBR-8 router.	Yes
Downstream Controller Profile	Primary downstream CCAP controller profile.	Yes
RF Power Adjust Profiles	You can adjust the power for the downstream RF channels using RF Power Profiles.	No
Upstream Controller Profile	Primary upstream CCAP controller profile.	Yes
<b>Second Logical DS/US Pairing</b>		

Field	Description	Service Affecting Parameter
Switch	Use this option to enable the second logical DS/US pairing. The Cisco Smart PHY application supports different controller profiles and fiber node configurations for second logical pairing in 2x2 RPD.	Yes
Service Group Profile	Pre-existing Cable Service Profile-Group on the Cisco cBR-8 router.	Yes
Downstream Controller Profile	Secondary downstream CCAP controller profile.	Yes
RF Power Profiles	It allows you to adjust power for downstream RF channels using RF Power Profiles. For more information, see <a href="#">Managing RF Power Adjust Profiles</a> .	No
Upstream Controller Profile	Secondary upstream CCAP controller profile.	Yes
<b>Network Delay</b>		
Type:	<p>Two options are available:</p> <ul style="list-style-type: none"> <li>• <b>DEPI Latency Measurement</b>—The cBR-8 router periodically measures the network latency between itself and the RPD, and dynamically updates the cable map advance. Range is the interval that is measured in seconds. The valid range for measuring DLM is 1–420 seconds. <i>Measure only</i>—Choose to measure network latency between the CCAP core and the RPD. This option is not for updating the cable map advance. You can select this option for a service definition in use, but cannot uncheck it.</li> <li>• <b>Static</b>—The cable map advance is adjusted by a fixed amount. The valid range is 30–100,000 microseconds. This range is the Converged Interconnect Network (CIN) delay in microseconds. CIN is the network between the CCAP core and RPD.</li> </ul> <p>For more information, see <i>DEPI Latency Measurement in the Service Template</i> section in this document.</p>	No
<b>Out Of Band</b>		
<b>Out Of Band Downstream</b>		
Virtual out-of-band Modulator ID	OOB 55–1 Downstream Virtual out-of-band Modulator (VOM) identification (ID).	No
Virtual out-of-band Profile	OOB 55–1 Downstream VOM profile.	No
<b>Out Of Band Upstream</b>		
Virtual Advanced Return Path Demodulator ID	OOB 55–1 Upstream Virtual Advanced Return Path Demodulator (VARPD) ID.	No

Field	Description	Service Affecting Parameter
Port 0 Virtual Advanced Return Path Demodulator Profile	OOB 55–1 Upstream VARPDP profile for first logical downstream/upstream (DS/US) pairing. The upstream VARPDP profile (upstreamVarpdProfile) and the second upstream VARPDP profile (secondUpstreamVarpdProfile) can have the same value. For more details, see <a href="#">Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2, on page 19</a> .	No
Port 1 Virtual Advanced Return Path Demodulator Profile	OOB 55–1 Upstream VARPDP profile for second logical downstream/upstream (DS/US) pairing. The upstream VARPDP profile (upstreamVarpdProfile) and the second upstream VARPDP profile (secondUpstreamVarpdProfile) can have the same value. For more information, see <a href="#">Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2, on page 19</a> .	No
<b>Narrowband Digital Forward &amp; Return</b>		
Port	Choose Port 0, or Port 1.	No
Pseudowire Name	ForwardNarrowband digital forward pseudowire name. Supports up to three pseudowire names and profile ID sets per DS port. ReturnNarrowband digital return pseudowire name. Supports up to three pseudowire names and profile ID sets per US port.	No
Profile ID	<ul style="list-style-type: none"> <li>• NDF—NDF profile ID corresponding to the above NDF pseudowire.</li> <li>• NDR—NDR profile ID corresponding to above NDF pseudowire.</li> </ul>	No
<b>Load Balancing</b>		
Text Field	Use the Cisco NSO Ntool to create a Load Balance group config-template encoded in XML. Enter the template in the text entry field.	No

**Step 6** Click **Save** to save the information to Smart PHY or click **Save & Assign** to save the information and assign this Service Definition to one or more RPDs.

**Note** Once Service Definition is created, you can see more parameters such as **Service Definition Version**, **Create**, **Update timestamp** and **Owner information** which is the user who created this Service Definition in the Service Definition page.

## Viewing and Editing Service Definitions

Once you create a Service Definition, you can view and edit it anytime. You can view the Service Definition information after a service is created and associated with the RPDs.

- You can view the Service Definition information after a service is created and associated with the RPDs. For more information, see [Viewing Service Definitions, on page 16](#).

- You can dynamically edit the parameters of a Service Definition including its name even when the RPDs are associated to service definitions. For more information, see [Editing Service Definitions, on page 16](#).

### Applying Latest Version of a Service Definition

Once a Service Definition is edited, you can apply its latest version to one or multiple RPDs from 'Assigned RPDs' tab of Service Definition Details side bar. To assign the latest version:

1. At the main menu, select **Smart PHY > Service Definitions** and click a Service Definition name. The **Service Definition Details** side bar.
2. Select **Assigned RPDs** from the **Service Definition Details** side bar.
3. Identify and select the RPDs where the latest version needs to be configured.
4. Click **Apply Latest SD Version** to apply the latest Service Definition version.

Once the operation is successful, you can see the **LATEST** tag in the version column, confirming that the RPD running the latest Service Definition version.

## Viewing Service Definitions

The procedure enables you to view service definition details in the **Service Definitions** page.

### Procedure

	Command or Action	Purpose										
<b>Step 1</b>	At the main menu, click <b>Smart PHY &gt; Service Definitions</b> .	The <b>Service Definitions</b> page appears.										
<b>Step 2</b>	Click any <b>Service Definition</b> to view the following details:	<p><b>Table 5: Service Definition Fields</b></p> <table border="1"> <thead> <tr> <th>Field Name</th> <th>Details</th> </tr> </thead> <tbody> <tr> <td>Overview</td> <td>Displays the overview of the Service Definition and contains the version, description, tags, create time, last modification details, and RPDs Assigned.</td> </tr> <tr> <td>Configurations</td> <td>Displays the details of the various configuration parameters that are used in the Service Definition.</td> </tr> <tr> <td>Assigned RPDs</td> <td>Displays the list of RPDs assigned to that Service Definition.</td> </tr> <tr> <td>Version History</td> <td>Displays the history of the changes for a Service Definition in chronological order.</td> </tr> </tbody> </table>	Field Name	Details	Overview	Displays the overview of the Service Definition and contains the version, description, tags, create time, last modification details, and RPDs Assigned.	Configurations	Displays the details of the various configuration parameters that are used in the Service Definition.	Assigned RPDs	Displays the list of RPDs assigned to that Service Definition.	Version History	Displays the history of the changes for a Service Definition in chronological order.
Field Name	Details											
Overview	Displays the overview of the Service Definition and contains the version, description, tags, create time, last modification details, and RPDs Assigned.											
Configurations	Displays the details of the various configuration parameters that are used in the Service Definition.											
Assigned RPDs	Displays the list of RPDs assigned to that Service Definition.											
Version History	Displays the history of the changes for a Service Definition in chronological order.											

## Editing Service Definitions

You can dynamically edit the parameters of a Service Definition including its name even when the RPDs are associated to service definitions. You can then apply the changes to one or more RPDs that are already running that specific service definition. If a Service Definition is edited, then its version gets updated and is visible in the Service Definition page.



Editing a Service Definition may affect the service particularly, when you want to apply the changes to RPDs. On the Smart PHY UI, if a flag is visible next to a Service Definition parameter, it signifies that it is a service impacting field. You may get `config push error` from the Cisco cBR-8 router and may have to reprovision the RPD. However, if you don't want to reprovision the RPDs, you can use the updated service definition parameters to provision new RPDs in the network. For more details, see [Service Definitions, on page 11](#).

Also, if the Cisco cBR-8 router is in maintenance mode, you cannot propagate these changes to the RPDs. In these scenarios, configuration error messages appear in the **RPD 360** page.

This procedure edits a Service Definition.

---

**Step 1** At the main menu, click **Smart PHY > Service Definitions**.

The **Service Definitions** page appears.

**Step 2** Select the service definition which you wish to update and click **Edit**.

**Step 3** Update the required fields.

**Step 4** Click **Save** or **Save & Assign**.

- Note**
- **Save** allows you to save the changes to the Cisco Smart PHY database.
  - **Save & Assign** allows you to save the changes to the Cisco Smart PHY database and then recommends that you to apply the changes to one or more RPDs.

Once a service definition is updated, its version is incrementally updated and the changes are captured under **Version History**.

---

## Cloning Service Definitions

You can create a new Service Definition by cloning an existing Service Definition. Cloning creates a copy of selected Service Definition, which you can edit. Cloning saves time if you only intend to make minor changes to an existing Service Definition.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	At the main menu, click <b>Smart PHY &gt; Service Definitions</b> .	The <b>Service Definitions</b> page appears.
<b>Step 2</b>	Select the check boxes of the Service Definitions that you wish to clone.	
<b>Step 3</b>	Click <b>Clone</b> .	The <b>Clone Service Definition</b> sidebar displays. The name of the cloned Service Definition is prefixed with <b>Copy-</b> .
<b>Step 4</b>	Edit the parameters that you wish to change and rename the Service Definition.	
<b>Step 5</b>	Click <b>Clone</b> .	

# Provisioning an RPD for Video Support

Table 6: Feature History

Feature Name	Release Information	Description
Multi Core Atomic Provisioning	Cisco Smart PHY, Release 22.2	<ul style="list-style-type: none"> <li>• Atomic transactions when multiple cores are involved.</li> <li>• Automatic rollback on transaction failure.</li> </ul>

Cisco Smart PHY can be configured to use distinct Cisco cBR-8 routers as the DOCSIS Principal core and auxiliary video core.

The DOCSIS configuration is pushed to the Principal core and the video configuration is pushed to the specified Video Auxiliary core. You can configure the OOB core to be either the Principal core or the Video Auxiliary core. The OOB 55–1 and NDF/NDR configurations are pushed to the OOB core through the OOB core interface. You can configure only the Pilot tone, SSD, and DLM on the Principal core.



**Important** When integrating Viavi with RPD, NDF or NDR must be configured on the Principal Core. Viavi communicates with the core using SNMP MIBs that are only available on the Principal Core.

Cisco Smart PHY can also provision an RPD for supporting video using a standalone Cisco cBR-8 router or some other Core that is not managed by Cisco Smart PHY, as the Principal core.

If the principal core is not managed by Cisco Smart PHY and you do not have OOB 55–1 configuration on the auxiliary video core, the RPD Assignment does not require Service Definition configuration.



- Note**
- When you provision data and video services on two different cores simultaneously, Smart PHY considers it as an **atomic transaction**. In other words, an RPD is provisioned successfully when both data and video services are configured successfully. If the configuration of either core fails, then the entire operation is rolled back.
  - When you provision data and video services on different cores at different point of time, each provisioning operation is considered as an independent transaction.
    - If RPD is online with both Principal Core and separate Video Auxiliary Core, and you remove the Video Core configuration, the RPD reboots and becomes online with only the Principal Core.
    - If the RPD is online with only the Principal Core, and later if you configure a separate Video Auxiliary Core, the RPD does not reboot automatically. You must manually reboot the RPD to get it to redirect to the new Video Core. After the RPD reboots, it becomes online with both cores.



**Caution** When you use the REST API to provision an RPD with separate video cores, you must use only version 2 (V2) RPD-pairing REST API. If you use V1 RPD-pairing API to provision an RPD with separate video cores, it may lead to data corruption. Also, version 1 (V1) of the RPD-pairing REST API does not support features such as 1x2 node segmentation, 2x2 node segmentation, OOB override, DLM, or separate video cores.

### Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2

The Cisco cBR-8 router supports configuring the same profile to both upstream physical RF ports in an RPD. Service providers can expand the OOB 55-1 service group on to the second US port without the need for extra hardware.

This feature is available only in the following versions of Cisco cBR-8 series routers:

- Cisco IOS XE Fuji 16.8.1 and earlier
- Cisco IOS XE Amsterdam 17.3.1x and later



**Note** When you provision data and OOB services on two different cores, Smart PHY considers it as an **atomic transaction**.

### Example

```

cable rpd SAME_OOB_US_PROFILE
identifier 2222.5555.2323
core-interface Te6/1/2
principal
rpd-ds 0 downstream-cable 6/0/1 profile 1
rpd-us 0 upstream-cable 6/0/1 profile 1
rpd-us 1 upstream-cable 6/0/2 profile 1
core-interface Te6/1/2
rpd-ds 0 downstream-oob-vom 1 profile 100
rpd-us 0 upstream-oob-varpd 1 profile 101
rpd-us 1 upstream-oob-varpd 1 profile 101
r-dti 1
rpd-event profile 0
cable fiber-node 2
downstream Downstream-Cable 6/0/1
downstream sg-channel 0 23 downstream-Cable 6/0/1 rf-channel 0 23
upstream Upstream-Cable 6/0/1
upstream sg-channel 0 1 upstream-Cable 6/0/1 us-channel 0 1
upstream sg-channel 2 3 peer-node-us
service-group managed md 0 Cable 6/0/1
service-group profile ram_SG1
cable fiber-node 3
downstream Downstream-Cable 6/0/1
downstream sg-channel 0 23 downstream-Cable 6/0/1 rf-channel 0 23
upstream Upstream-Cable 6/0/2
upstream sg-channel 2 3 upstream-Cable 6/0/2 us-channel 0 1
upstream sg-channel 0 1 peer-node-us
service-group managed md 0 Cable 6/0/1
service-group profile ram_SG1

```

In REST API, the following restrictions are applicable:

- OOB is enabled only if the following four parameters are configured within the specified range:
  - downstreamVomId
  - downstreamVomProfile
  - upstreamVarpdId
  - upstreamVarpdProfile
- The NDF configuration is independent of the OOB downstream and upstream configurations.
- NDR configuration is independent of OOB downstream and upstream configurations.

### REST set-service-template

```

{
  "autoAccept": false,
  "defaultFlag": false,
  "dlmMeasureOnly": false,
  "dsgTunnelGroupIDs": "1",
  "elementsList": [
    {
      "description": "Service profile with 1.5Gbps Data Service. 16x4 DS/US SG channels",
      "downstreamControllerProfile": 0,
      "downstreamVomId": 1,
      "downstreamVomProfile": 1,
      "eventProfile": 0,
      "mdSplitting": false,
      "rdtiConfig": 0,
      "serviceGroupName": "SGProfile",
      "serviceType": "Data",
      "svcNdfProfiles": [
        {
          "portNum": 0,
          "profileId": 100,
          "pwName": "name1"
        }
      ],
      "svcNdrProfiles": [
        {
          "portNum": 0,
          "profileId": 100,
          "pwName": "name1"
        }
      ],
      "upstreamControllerProfile": 0,
      "upstreamVarpdId": 1,
      "upstreamVarpdProfile": 1
    }
  ],
  "loadBalanceXml": "XML String",
  "name": "Gold",
  "networkDelayDlm": 10,
  "networkDelayStatic": "null",
  "pilotToneProfile": 0,
  "secondUpstreamVarpdProfile": 1
}
REST get-service-template Response Content Type

{
  "autoAccept": false,
  "defaultFlag": false,

```

```

"dlmMeasureOnly": false,
"dsgTunnelGroupIDs": "1",
"elementsList": [
  {
    "description": "Service profile with 1.5Gbps Data Service. 16x4 DS/US SG channels",
    "downstreamControllerProfile": 0,
    "downstreamVomId": 1,
    "downstreamVomProfile": 1,
    "eventProfile": 0,
    "mdSplitting": false,
    "rdtiConfig": 0,
    "serviceGroupName": "SGProfile",
    "serviceType": "Data",
    "svcNdfProfiles": [
      {
        "portNum": 0,
        "profileId": 100,
        "pwName": "name1"
      }
    ],
    "svcNdrProfiles": [
      {
        "portNum": 0,
        "profileId": 100,
        "pwName": "name1"
      }
    ],
    "upstreamControllerProfile": 0,
    "upstreamVarpdId": 1,
    "upstreamVarpdProfile": 1
  }
],
"error": {
  "errorCode": "RecordNotFound",
  "errorMessage": "Record not found : <Record type> <identifier>",
  "errorTag": "Record not found",
  "errorType": "User"
},
"loadBalanceXml": "XML String",
"name": "Gold",
"networkDelayDlm": 10,
"networkDelayStatic": "null",
"pilotToneProfile": 0,
"rpdsAssigned": 0,
"rpdsProvisioned": false,
"secondUpstreamVarpdProfile": 1,
"status": "Success or Failure. If Failure check Error field for error details."
}

```

## Configuring Video Services

You can configure video service in a Cisco cBR-8 router using Cisco Smart PHY by wiring the video interfaces and video service groups (VSG).

Cisco Smart PHY provides a clear mapping between VSG and video interfaces. RPD node segmentation determines the number of VSGs that you can choose for a video interface.

### Prerequisites

Create video service groups (VSG) in the Cisco cBR-8 router, before you configure a video service for each RPD. There are two ways to create VSGs:

- Manual method(Recommended): Provide a logical name for the VSG. Example: `cable virtual-service-group 18528 downstream-video 1/0/8 profile 101`
- Automatic method: When you assign a controller to a Cisco cBR-8 router profile that has video services, Cisco cBR-8 creates a VSG with a random name.

For more information, see [Cisco cBR Converged Broadband Routers Video Configuration Guide for Cisco IOS XE Cupertino 17.9](#).

### Adding a New Video Interface

Use the following task to add a new video interface.

1. Click the main menu at the top-left of the home page, and select > **Smart PHY** > **RPD Associations**. The **Remote PHY Device Associations** page displays.
2. Click the **Create** button. The **Create Remote PHY Device Association** page displays.
3. Add single or multiple entries in the **Video Core Interface** and **Video Service Group** fields.
4. Click the **Save** button.

You can also import CSV files from the previous versions of the Cisco Smart PHY application which have video configurations. You can also import a database that is exported from a previous version of the Cisco Smart PHY application.

### Configuring VSG Using API

You can configure VSG using the Cisco Smart PHY API `setrpdpairinglist`.

This API is backward compatible. It has an extra `videointerfaces` field under `port-config`. The existing video service group mapping with the video interfaces, remains without any changes.

#### Example: Sample RPD Pairing API

```
{
  "setrpdpairinglist": [
    {
      "name": "rpd03",
      "previousname": "rpd03",
      "macaddress": "00049f320825",
      "description": null,
      "approvalstate": "approved",
      "servicetemplate": "d8-sg-split-rdt11",
      "gpslocation": {
        "genericlocation": "",
        "latitude": "",
        "longitude": ""
      },
      "ssdprofileid": 1,
      "disablenetworkdelay": false,
      "preconfigure": true,
      "nodesegmentation": "rpd_1x1",
      "additionalcores": [
        "2004:172:30:0:2eab:a4ff:feff:f36c"
      ],
      "assignedcores": [
        {
          "servicetype": "data",
          "mgmtcore": "video-lwr-s-d8.cisco.com",
          "rpdconnectioninterface": "tengigabitethernet9/1/0",

```

```
    },
    {
      "servicetype": "video",
      "mgmtcore": "video-lwr-s-d8.cisco.com",
      "rpdconnectioninterface": "tengigabitethernet9/1/0",
    },
    {
      "servicetype": "video",
      "mgmtcore": "video-lwr-s-d8.cisco.com",
      "rpdconnectioninterface": "tengigabitethernet9/1/6",
    },
    {
      "servicetype": "oob",
      "mgmtcore": "video-lwr-s-d8.cisco.com",
      "rpdconnectioninterface": "tengigabitethernet9/1/0",
    }
  ],
  "portconfigs": [
    {
      "dsport": 0,
      "usport": 0,
      "dsservicegroup": "sg-9-0-0",
      "usservicegroup": "sg-upstream-9-0-0",
      "videoservicegroups": [
        "vsg1", // Index 0 is read along with video interface index 0
        "vsg2", // Index 1 is read along with video interface index 1
        "vsg3" // Index 2 is read along with video interface index 2
      ],
      "videointerfaces": [
        "tengigabitethernet9/1/0", // Index 0 is read along with vsg index 0
        "tengigabitethernet9/1/6", // Index 1 is read along with vsg index 1
        "tengigabitethernet9/1/6" // Index 2 is read along with vsg index 2
      ]
    }
  ]
}
}
```

### Limitations

- If you use the `setrpdpairinglist` API without the `videoInterfaces` attribute under `port-configs`, Cisco SmartPHY performs an ambiguity resolution. This process does not provide a clear one-to-one mapping.
- If two or more VSGs are configured under the same interface, the `videointerfaces` must repeat to match the one-to-one mapping.
- If you do not add the video interfaces under `port-config` and the assigned-cores, then the application shows an error.
- The size of the list of video interfaces and the VSGs must be the same.
- You can only map a VSG to a single interface. However, you can map the VSG to the same interface in a different port.
- If you configure a video interface without mapping to a VSG, then the application ignores the video interface.

# cBR-8 Configuration Reconciliation

## Feature History

Feature Name	Release information	Description
cBR-8 Configuration Reconciliation	Cisco Smart PHY 22.2	You can now detect the configuration mismatches between the cBR-8 router and Smart PHY cluster. This helps in reconciling the configuration between both the entities so that the configuration set are in sync with each other and eliminates the need of reprovisioning of RPDs effectively and saves time.

Post upgrading the software on CBR-8 router, the CBR-8 software automatically converts its earlier CLI configuration syntax into a new form on the CBR-CCAP-LC-G2-R line card. Ambiguity and differences may be seen between the actual configuration in the cBR-8 router and the corresponding configuration that is stored in the Smart PHY cluster.

The Smart PHY reconciliation feature intelligently detects such configuration mismatches and updates its internal configuration. This reconciliation helps in maintaining the cBR-8 and Smart PHY configuration to be in sync and avoids reprovisioning of RPDs. During such reconciliation process, which can be triggered when cBR-8 transitions from maintenance to normal mode, Smart PHY takes care of the following aspects:

1. Detects the configuration differences and prepares a report of the configuration difference between cBR-8 and Smart PHY.
2. Updates the Resource Allocation information and CLI details in Smart PHY when there is any discrepancy.
3. Ensures that existing RPDs are not reprovisioned and the new RPDs use the correct set of resources.




---

**Note** In Smart PHY, the reconciliation feature assumes that the RPDs are configured with the same name in both Smart PHY and the cBR-8 router.

---

## Performing Smart PHY Reconciliation Operation

To perform reconciliation operation from the UI, perform the following steps:

1. At the main menu, click **Smart PHY > Inventory**. The **Remote PHY Devices & CCAP Cores** page displays.
2. Select the check boxes of one or more cBR-8 routers that are in the maintenance mode.
3. From the **Managed CCAP Actions** drop-down list, click **Resume Maintenance Mode**.
4. Review the Warning message, select the **Reconcile cBR-8 configuration** check box. The reconciliation operation takes place. The CCAP core is moved out of the maintenance state and reconciliation is performed.
5. Click **Resume Normal Operation**.



## Viewing RPD History

- 
- Step 1** Click the main menu at the top-left of the home page, and select **Smart PHY > RPD Associations**. The **Remote PHY Device Associations** page displays.
- Step 2** Click the desired **RPD Name** to view the RPD information.
- Step 3** Click **Status History** and **RPD Config History** to view the historical information.
- 

## Managing RF Power Adjust Profiles

### Feature History

Feature Name	Release information	Description
RF Power Adjust Profile Enhancement	Cisco Smart PHY, Release 22.2	You can overwrite the RF Power Adjust Profile during RPD provisioning.

Smart PHY allows you to adjust the power levels for a single or a group of downstream RF channels using an RF Power Adjust Profile. An RF Power Adjust Profile consists of a profile name, an RF channel identifier (or identifiers), and a power adjust value. You can manage RF Power Adjust Profiles from Smart PHY's RF Power Adjust Profiles page.

RF channel power adjustment does not affect the service of the RPDs.

### Limitations for RF Power Adjust Profile

- You cannot delete an RF Power Adjust Profile that is already used in a Service Definition.
- If you modify an RF Profile, the updated configuration is not applied to the RPDs that have already been provisioned. You can access the appropriate **Service Definition** page, select **Save & Assign**, select the specific RPD, and click **Assign** to apply the modified RF Power Adjust Profile parameters.

### Creating an RF Power Adjust Profile

This procedure creates an RF power adjust profile.

- 
- Step 1** At the main menu, select **Smart PHY > Profile > RF Power Adjust Profiles**. The **RF Power Adjust Profiles** page displays.
- Step 2** Click **Create**. The **RF Power Adjust Profiles** page appears.
- Step 3** Enter values for the following fields in the **RF Power Adjust Profiles** page.

Table 7: RF Power Adjust Profiles

Field	Value
Profile Name	Profile name can be up to 21 alphanumeric characters
Power Adjust (dBmV)	The Power Adjust range is from -10 to 10 dBmV
RF Channel	The RF Channel ID can be: <ul style="list-style-type: none"><li>• A single RF channel (for example: 6)</li><li>• Multiple RF channels (for example: 6, 12, or 14)</li><li>• Multiple consecutive RF channels (for example: 15–20)</li><li>• A combination of the previous items (for example: 6.12, or 15–20)</li></ul>

**Step 4** Click **Create**.

---