





Information about Cisco Smart PHY

The Cisco Smart PHY application simplifies the installation, configuration, monitoring, and troubleshooting of Remote PHY Devices (RPD) serviced by Cisco cBR-8 routers. It enables multiple use cases, including:

- Distributed Access Architecture (DAA) deployment simplification
- RPD deployment automation
- RPD software lifecycle management
- CIN Traffic engineering
- Common DHCP policy

These are some general instructions and information for using the Cisco Smart PHY:

| Icon | Description |
|---|--|
|  | Information button. Click this button to display more information. |
|  | Context Menu button. Move the mouse over this button to display a context menu. |

- [Benefits of Cisco Smart PHY, on page 1](#)
- [Dashboard, on page 2](#)
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- [RPD Automation, on page 6](#)
- [User Management, on page 16](#)

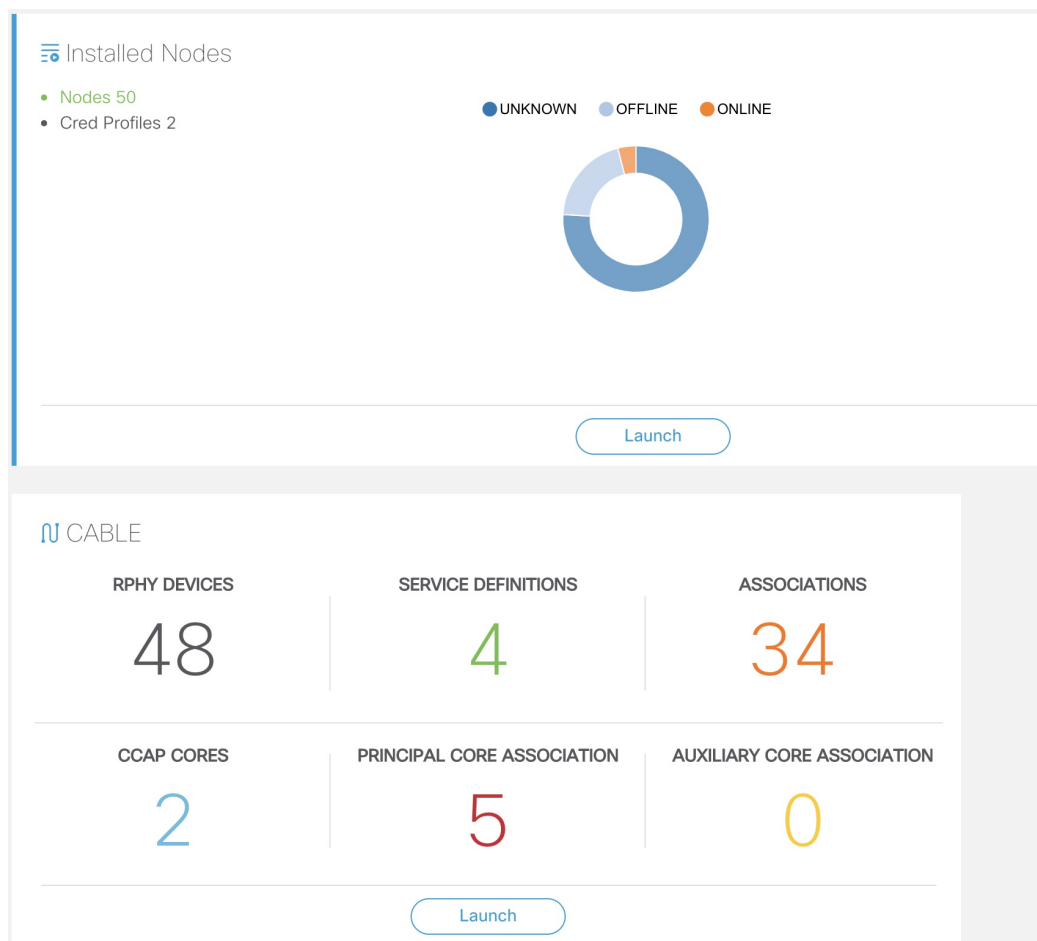
Benefits of Cisco Smart PHY

Following are some of the benefits of using the Cisco Smart PHY application:

- **Initial RPD Zero-Touch Automation:** Initial RPD installation and provisioning with Zero-touch of the Cisco CMTS.
- **Inventory:** Tracks RPD and CCAP resources, allowing operators to perform searches on several provisioning-specific criteria.

- Configuration generation and push: Generates error free Cisco cBR-8 RPD configuration and ensures that the configuration is pushed to the appropriate DOCSIS Principal and Video CCAP Cores.
- RPD SW management: Manages RPD software.
- API centric design: Direct programmatic access for operators to various Cisco Smart PHY services and functions using open interfaces and tools.
- Deployment validation: Monitors Cisco cBR-8 routers for unauthorized out-of-band changes to RPD configurations.

Dashboard



Following are the field descriptions:

| Name | Description |
|-----------|--|
| Dashboard | Snapshot view of all devices managed and monitored by the Cisco Smart PHY application. |

| Name | Description |
|-----------------|--|
| Installed Nodes | Shows the number of nodes installed using the Cisco Smart PHY application. This panel also shows the number of Credential Profiles available in the application. The pie chart shows the offline, online, and unknown (unmanaged cores) nodes. |
| Launch | Takes you to the specific page view. |
| Cable | Shows the following details in this pane: configured and managed using the RPD Automation page. <ul style="list-style-type: none"> • RPHY Devices • Service Definitions • Associations • CCAP Cores • Principal Core Association • Auxiliary Core Association Click the number to view more details. Click the Launch link to go to the RPD Automation page. |

Inventory

Inventory has two tabs; Inventory and Credential Profiles.

The screenshot displays the 'Inventory' tab interface. At the top, there are three summary charts: 'Status' (a pie chart showing Offline, Unknown, and Online counts), 'Type' (a gauge chart showing counts for Node-Unknown, Node-Virtual, CBR-8-CCAP-Chassis, and Shelf_600-6X12), and 'Manufacturer' (a gauge chart showing the count for Cisco). Below these charts is a table with the following columns: Status, Host Name, Key Type, IP Address, MAC Address, UUID, Product Type, Credential Pr..., Latitude, Longitude, and Loc. The table contains several rows of device information, with the last row selected. The selected row has a checkmark in the Status column, 'sphy-c2.cisco.com' in Host Name, 'IP ADDRESS' in Key Type, '172.22.9.171' in IP Address, and '_DEVICE_172.22.9...' in UUID.

Inventory

The **Inventory** tab enables you to onboard and organize your managed and unmanaged CCAP Cores.















Note Add the RPDs through the Cable Pairing table in the Cisco Smart PHY application and not through the Inventory tab.

Cisco Smart PHY supports 50000 RPDs on a 3-node cluster. Because the number of RPDs provisioned by the Cisco Smart PHY scales into such huge numbers, we recommend that the Operators work on Cisco Smart PHY programmatically through its REST API.

Following are the field descriptions for Inventory:

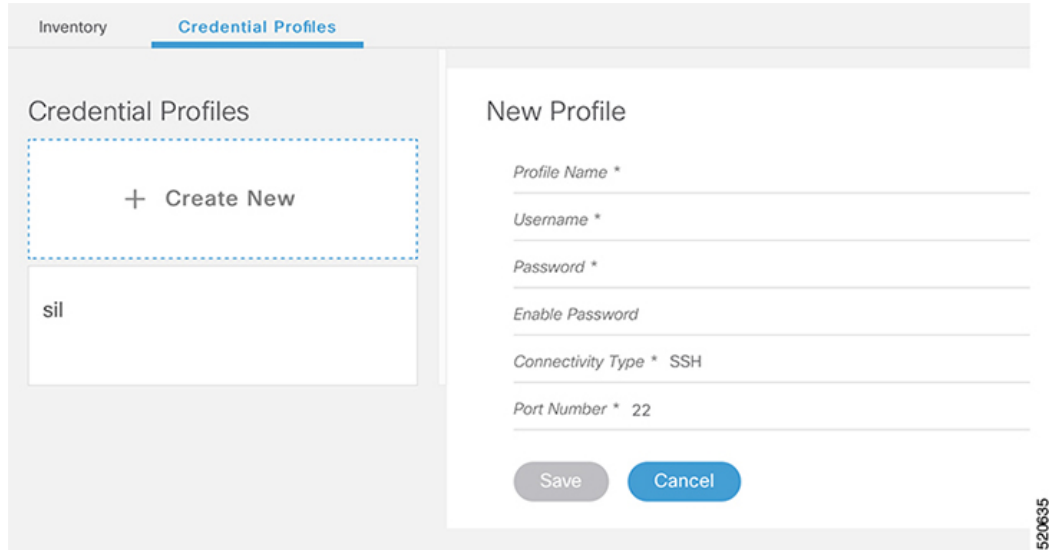
| Name | Description |
|--------------------|--|
| Status | Shows a graphical pie chart of all devices in the network, categorized by status: <ul style="list-style-type: none"> • ONLINE • OFFLINE • UNKNOWN • SSHKEYFETCH • MAINTENANCE • NORMALOPS_PROGRESS |
| Host Name | Host name of the device. |
| Key Type | Two types: <ul style="list-style-type: none"> • MAC ADDRESS • IP ADDRESS |
| IP Address | IP address of the device. |
| MAC Address | MAC address of the device. |
| UUID | Universally unique identifier of the device. |
| Product Type | Product type of the device. |
| Credential Profile | Credential profile name. |
| Latitude | Latitude of the device. |
| Longitude | Longitude of the device. |
| Location | Location of the device. |
| Description | Description of the device. |
| Software Version | Software version of the device. |
| Model Number | Model number of the device. |

| Name | Description |
|---|---|
|  | Adds a device to the existing inventory. |
|  | Edits the device information. |
|  | Deletes a device from the inventory. |
|  | Imports devices by using a CSV file. |
|  | Exports device information to a CSV file. |
|  | Synchronizes RPD states manually by fetching the latest RPD status. |
|  | Enables maintenance mode on one or more Cisco cBR-8 routers. Applicable only to Cisco cBR-8 routers. |
|  | Resumes normal operations on one or more Cisco cBR-8 routers. Applicable only to Cisco cBR-8 routers. |
|  | Fetches the SSH key on one or more Cisco cBR-8 routers. Applicable only to Cisco cBR-8 routers. Cisco Smart PHY 3.1.4 and later, supports SSH key fetch from offline and online Cisco cBR-8 routers. The SSH key fetch states are the following: <ul style="list-style-type: none"> • SSHKEYFETCH_IN_PROGRESS • SSHKEYFETCH_FAILED For more details, see the section Fetch SSH Keys from Cisco cBR-8 . |
|  | Status showing SSH key failure. |
|  | Status shows one of the following states: <ul style="list-style-type: none"> • Fetching SSH Keys • Resuming Normal Operations from the maintenance mode |
| Details | Shows the details of the devices, such as Device Summary and Device State History |
|  | Sets the columns in the device table. |
| Search | Allows you to search for and filter the network devices. |
| Devices table | Shows detailed information about each device in the network. |

Credential Profiles

Credential profiles are collections of device credentials for Telnet or SSH network devices. Using credential profiles lets you apply credential settings consistently across devices. When you add or import devices, you specify the credential profile the devices use. If you need to make a credential change, such as changing a device password, you can edit the profile to update the settings across all devices that use that profile.

Figure 1: Credential Profiles



Following are the field descriptions for Credential Profiles:

| Name | Description |
|--------------|--|
| + Create New | Allows you to add or edit a credential profile. Note Mandatory fields are marked with an asterisk. |
| New Profile | You can create a new profile by entering the required details and saving the profile. |

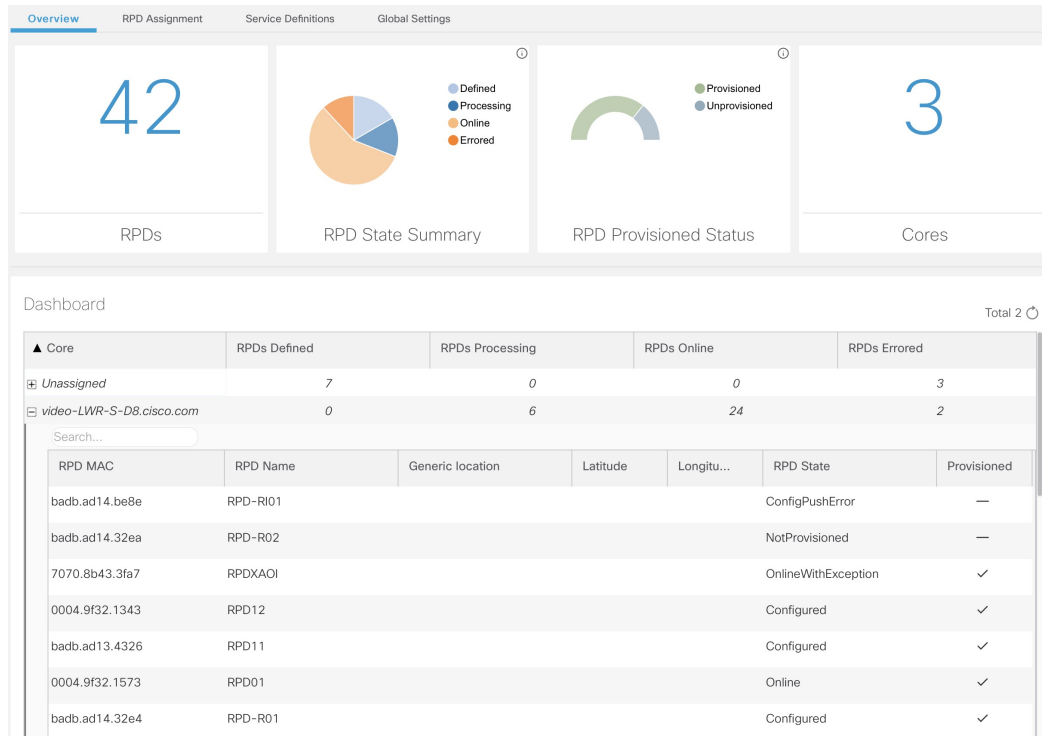
RPD Automation

The **RPD Automation** page enables you to add, organize, and update information about CMTS and RPD devices in the network. The information available in the view is focused on CCAP Cores and Remote PHY Devices.

The **RPD Automation** page has four tabs; Overview, RPD Assignment, Service Definitions, and Global Settings.

Overview

Provides a view of the number of RPDs, their status, and the number of Cores. Also, it provides a dashboard view of the Core and the RPDs in different states.




You can view the following RPD State Summary table by clicking the  icon in the RPD State Summary dashlet.

Table 1: RPD States Summary

| RPD Summary | RPD State | Description |
|-------------|--------------------|---|
| DEFINED | Defined | RPD pairing is defined. However, MAC address is not yet assigned. |
| DEFINED | Installed | Installed RPD. RPD name, MAC address, and the GPS location are available. |
| DEFINED | Inventory | Added RPD MAC address to the inventory without the GPS details. |
| 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 get the existing CCAP core configuration. |
| ERRORED | ConfigurationError | Assigned incorrect RPD in the Cisco Smart PHY application. |

| RPD Summary | RPD State | Description |
|-------------|---------------------------------|---|
| 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 | ResourceAllocationError | Unable to allocate resources to an RPD for the assigned CCAP core or interface. |
| ONLINE | Online | RPD is online on the CCAP core. |
| ONLINE | OnlineWithException | RPD is online, but NDF or NDR fails. |
| ONLINE | PartialOnline | Partial services are available if the RPD is not online on all cores. |
| PROCESSING | Configured | CCAP core is configured. RPD configuration is pushed to the CCAP core. |
| PROCESSING | DeletePending | RPD pairing deletion is pending. |
| PROCESSING | GcpRedirected | Received an ACK from the RPD for the CCAP core redirect message. This redirect message captures the result of the redirect request, initiated by the Cisco Smart PHY application, along with the hostname, the IP address, and the interface of the redirected core. |
| PROCESSING | GcpRedirectStartedWithException | RPD configuration is pushed to the CCAP core and redirecting the RPD to that core has started. However, one of the following errors occurred: <ul style="list-style-type: none"> • RouterVersionIncompatible • StaticRouteNotConfigured |
| PROCESSING | GcpRedirectStarted | RPD configuration is pushed to the CCAP core and the RPD is redirected to that core. |
| PROCESSING | 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"> • RouterVersionIncompatible • StaticRouteNotConfigured |






| RPD Summary | RPD State | Description |
|-------------|---------------------------|--|
| PROCESSING | GcpUp | Received GCP message from the RPD. |
| WARNING | RouterVersionIncompatible | RPD software version is incompatible with the CCAP core version. |
| WARNING | StaticRouteNotConfigured | Static route is not configured. |

RPD Assignment

Allows you to add, edit, import, or export the details of RPD assignments. Search allows you to search for or filter the RPD information.

Following are the menu options available on the RPD Assignment window:

| Options | Description |
|---------|--|
| | To assign an RPD for a specific RPD name or to add an RPD MAC address to the RPD Inventory. You can assign additional RPD information only after specifying a name for the RPD MAC address. |
| | To edit an existing RPD assignment. You can edit the name, the MAC address information, and so on. |

| Options | Description |
|---|--|
|  | <p>To delete an RPD name and its RPD assignment information.</p> <p>When you delete the RPD Assignment details, the RPD MAC address that is assigned to the RPD name is moved back to the Inventory and is retained in the system.</p> <p>To delete the RPD MAC address, delete it from the main Inventory page.</p> <p>Similarly, deleting an RPD MAC address from the Inventory does not delete the RPD name and its assignment information in the RPD Assignment table. This deletion removes only the RPD MAC address from the RPD Assignment table.</p> |
|  | <p>Imports the details of RPD assignments using a CSV file.</p> <p>Sample of the CSV file is available when you click this icon.</p> |
|  | Exports the details of RPD assignments to a CSV file. |
|  | Synchronizes RPD states manually by fetching the latest RPD status. |
| Assign | To assign the chosen Service Definition to all the selected RPDs. |
| Clear | To clear the core and the service template assignment for a specific RPD name. This option does not clear the mapping between an RPD name and the MAC address. |
| Details | To get the details of the RPD, such as RPD Summary, RPD State History, and RPD CLI. |
| Search | Use any filtering option. |
|  | Sets the required columns in the device table. |

Following are the field descriptions in the Associate RPDs table:

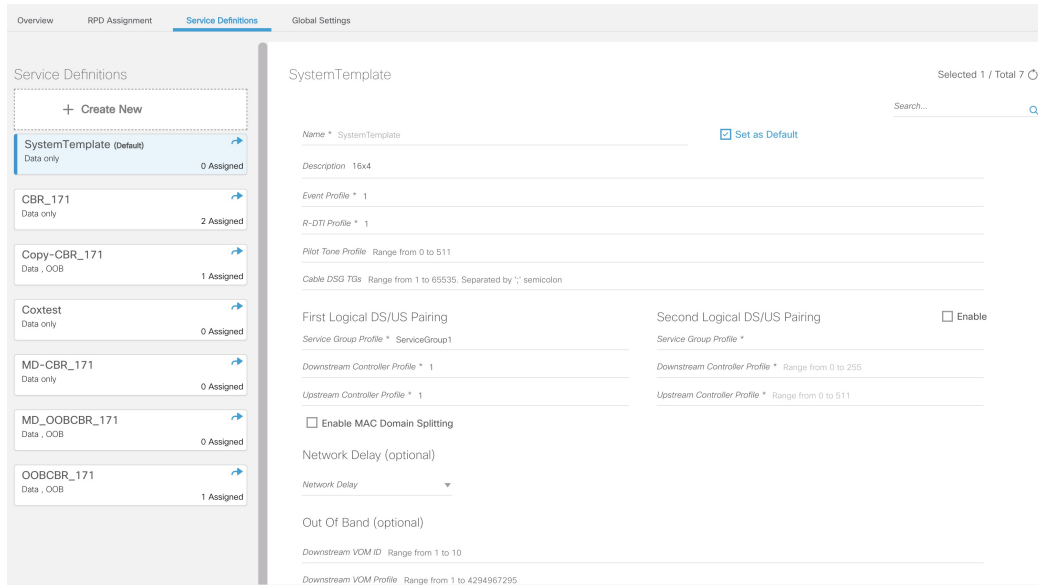
| Field Name | Description |
|--------------|---|
| Status | Shows the status of the RPDs. |
| Provisioned | Shows whether the RPD is provisioned or not. |
| RPD Name | <p>Name for the RPD.</p> <p>This RPD name is also used in the <code>cable rpd</code> CLI command.</p> |
| MAC | MAC address of the RPD. |
| Segmentation | Node segmentation of the RPD: 1x1, 1x2, or 2x2. |

| Field Name | Description |
|--------------------------|---|
| Service Definition | Service Definition as created in the Service Definitions tab. If Cisco Smart PHY does not manage the principal CCAP core and if the Principal Core field is empty, then this Service Definition field is optional. |
| Principal Core | The name of the managed Cisco cBR-8 router or the unmanaged Core, which is the Principal Converged Cable Access Platform (CCAP) Core for the RPD. |
| SSD Profile | Secure Software Download (SSD) profile details for image storage. |
| Disable Network Delay | The default is value is No . <ul style="list-style-type: none"> • No: Apply the network-delay from service definition to RPD. • Yes: Do not apply the network-delay from service definition to RPD. <p>Changing this value to <code>yes</code> is service impacting, if the RPD's assigned Service Definition/Template has network-delay configured.</p> |
| Principal Core Interface | If the Principal Core is a managed Cisco cBR-8 router, the name of the TenGigabitEthernet DPIC interface is listed in this field. If the Principal Core is an unmanaged Core, the field is empty. |
| Video Core | Name of the Cisco cBR-8 router, which is the auxiliary CCAP core for the RPD that provides video services. |
| Video Core Interfaces | List of complete names of the TenGigabitEthernet DPIC interfaces to be used for Video Services. |
| OOB Core | 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. |
| OOB Core Interface | Complete name of the TenGigabitEthernet DPIC interface to be used for out-of-band 55-1 and NDF/NDR service. |
| Downstream VOM ID | OOB 55-1 Downstream Virtual out-of-band Modulator (VOM) Identification (ID). If present, this value overrides the value from the Service Definition. |
| Downstream VOM Profile | OOB 55-1 Downstream VOM profile. If present, this value overrides the value from the Service Definition. |
| Upstream VARP ID | OOB 55-1 Upstream Virtual Advanced Return Path Demodulator (VARPD) ID. If present, this value overrides the value from the Service Definition. |
| Upstream VARP Profile | OOB 55-1 Upstream VARP profile for first logical Downstream/Upstream (DS/US) pairing. If present, this value overrides the value from the Service Definition. The Upstream VARP Profile (<code>upstreamVarpdProfile</code>) and the Second Upstream VARP Profile (<code>secondUpstreamVarpdProfile</code>) can have the same value. For more details, see Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2 . |

| Field Name | Description |
|--------------------------------|--|
| Second Upstream VARPDP Profile | OOB 55-1 Upstream VARPDP profile for second logical Downstream/Upstream (DS/US) pairing. If present, this value overrides the value from the Service Definition. The upstream VARPDP profile (upstreamVarpdpProfile) and the second upstream VARPDP profile (secondUpstreamVarpdpProfile) can have the same value. For more details, see Common OOB 55-1 US Profile for Cisco RPD 1x2/2x2 . |
| Cable DSG TGs | Semicolon separated list of DOCSIS Set-Top Gateway (DSG) Tunnel Group (TG) identifications. If present, this list overrides the list from the Service Definition. |
| Additional Cores | Semicolon separated list of additional cores to which the RPD must connect. |
| Latitude | Latitude of the RPD (GPS coordinates) |
| Longitude | Longitude of the RPD (GPS coordinates) |
| RPD Description | Description for the RPD |

Service Definitions

Allows you to add, edit, delete, or assign service templates. Fields that are not marked as optional are mandatory.



Following are the menu options descriptions:

| Name | Description |
|--|---|
| + Create New | Click this option to create a new service template. |
| <i>Name of the existing service definition</i> | Click the name of the existing service definition to edit the template. |

| Name | Description |
|------------------------|--|
| New Service Definition | Enter the details in each field and click the Save button to create a new service template. |
| Search | Use this Search text field in upper right-hand corner to filter service definition names. |

Global Settings

You can perform the following configurations from the Global Settings window.

- Database Backup
- Global Configuration
- Software Compatibility

Database Backup

You can back up the database to a local server or a remote server.

Overview RPD Assignment Service Definitions Global Settings

v Database Backup

Server * ⓘ hostname.domain.com

Username * admin

Password *

Directory * /users/name/folder/

Filename (Import Only) * ⓘ smartphy_InstanceName_backup_timestamp.tar.gz

Export
Import
Reset

Database Backup Status

| Operation | Start Time | End Time | Message |
|-----------|------------|----------|---------|
| | | | |

The database backup file is a TAR.GZ file with the following naming convention:

filename_YYYYMMDD_HHMMSS.tar.gz. For example, aio_backup_20210318_121354.tar.gz. Enter the following details in the **Database Backup** window to back up the database.

| Field | Description |
|------------------------|---|
| Server | <p>The location where you want to save the DB.</p> <ul style="list-style-type: none"> Local backup—Enter localhost. Local backup files are saved to the <code>/var/smartphy/backup</code> directory on the local filesystem. Remote backup—Enter the IP address or the principal coreFQDN of the remote host. For remote backup, the Cisco Smart PHY application uses SFTP to transfer files from Cisco Smart PHY instances. |
| Username | <ul style="list-style-type: none"> Local backup—Leave the field empty. Remote backup—Enter the username for the remote server access. |
| Password | <ul style="list-style-type: none"> Local backup—Leave the field empty. Remote backup—Enter the password for the remote server access. |
| Directory | <ul style="list-style-type: none"> Local backup—Leave the field empty. Remote backup—Enter the file path of the directory in the remote server. |
| Filename (Import Only) | <p>Used exclusively for importing a database. Imported file must be in the following format: <code>smartphy_InstanceName_backup_timestamp.tar.gz</code></p> <ul style="list-style-type: none"> Local backup: Enter only the filename of the backup file available in the default directory: <code>/data/smartphy/backup</code> Remote backup: Enter the file path (absolute path) of the remote server. |
| Export | Click the Export button to perform local and remote backup. |
| Import | Click the Import button to import a DB. |

Global Configuration

The **Global Configuration** section under the **Global Settings** menu provides the following options for you to configure on RPDs. Choose the following functions according to your requirement.

- Configure Static Routes—If you enable this option, for interfaces with /31 (IPv4 networks) or /127 (IPv6 networks) configured on the DPIC, the Cisco Smart PHY application adds a static route configuration on the Cisco cBR-8 router per RPD.
- Validate Software Compatibility—If you enable this option, the Cisco Smart PHY application checks the compatibility between the RPD version and the Cisco cBR-8 router version that is specified in the table.

- **Persist Running Configuration**—If you enable this option, when the Cisco Smart PHY makes a change to the Cisco cBR-8 configuration, the Cisco Smart PHY makes the configuration persistent. This option allows you to make the changes persistent on the Cisco cBR-8 router at a specific interval.

Global Configuration

- Configure Static Routes
- Validate Software Compatibility
- Persist Running Configuration

Config Save Interval 60 ⓘ

Set Reset

Software Compatibility Selected 1 / Total 1 ⌵ ⚙

Search... 🔍

| <input checked="" type="checkbox"/> | RPD Vendor | RPD Software Version | Router Product Type | Router Software Version |
|-------------------------------------|------------|----------------------|---------------------|-------------------------|
| <input checked="" type="checkbox"/> | Arq | v8.6 | CBR-8-CCAP-CHASS | 17.2.1 |

Static Route

To route traffic and for communication between an RPD and a Cisco cBR-8 router, static routes to the Cisco cBR-8 router are created when you configure the RPDs.

Smart PHY automatically creates a static route for the RPD if the DPIC interface is configured with a /31 (IPv4 networks) or /127 (IPv6 networks) subnet. The static route is determined by calculating the gateway IP address and routing traffic through the gateway for the RPD.



Note

- The DPIC must be a /31 or /127 subnet.
- Wait for the RPD to push the static route configuration.

Sample of a Cisco Smart PHY-Generated Configuration

```

cable rpd <the name assigned to the RPD>
  identifier a0f8.496f.6506
  type shelf
  rpd-ds 0 base-power 25
  rpd-ds 1 base-power 25
  core-interface Te9/1/6
  principal
  rpd-ds 0 downstream-cable 9/0/16 profile 100
  rpd-us 0 upstream-cable 9/0/1 profile 4
  r-dti 2
  rpd-event profile 0
  rpd-55d1-us-event profile 0

cable fiber-node <next available fiber-node>
  downstream Downstream-Cable 9/0/16
  upstream Upstream-Cable 9/0/1
  downstream sg-channel 0 23 downstream-Cable 9/0/16 rf-channel 0 23
  upstream sg-channel 0 3 Upstream-Cable 9/0/1 us-channel 0 3
  service-group managed md 0 Cable 9/0/1
  service-group profile SG1
  
```

Software Compatibility

Allows you to add, edit, or delete the software compatibility matrix. Fields that are not marked as optional are mandatory.

Software Compatibility—This window displays a compatibility matrix for the RPD software versions and the Cisco cBR-8 software versions. The Smart PHY application detects the software incompatibility between an RPD and a Cisco cBR-8 router, and alerts you about the incompatibility. After the alert appears, either manually upgrade the RPD software or associate the RPD with an SSD profile through the Cisco Smart PHY application, which notifies the Cisco cBR-8 for the software upgrade.

Table 2: Field Description for Software Compatibility Matrix

| Name | Description |
|-------------------------|--|
| RPD Vendor | Name of the RPD vendor. |
| RPD Software Version | Software version running on the RPD. |
| Router Product Type | Product type of the router from the Inventory. Example: CBR-8-CCAP-CHASS |
| Router Software Version | Software version of the router. |

User Management

Administrators can manage users in the Cisco Smart PHY application by using the **Systems > Users & Roles** menu option. For more details, see [Manage Users](#).



Note Only Administrators can access the **User & Roles** option.
