



# Managing the Remote Cable MSO Links Solution

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## Introduction

This chapter describes the three monitoring mechanisms that you can use to monitor the traffic optimization on remote links solution:

- p3vlink command line utility (CLU)
- Cisco SCE command line interface (CLI)

## Virtual Link Names

Each virtual link represents a single interface on the CMTS device and the virtual link name comprises the CMTS device name and the interface name. The virtual links are named according to the following naming convention:

<Device name>\_<Interface name>

- <Device name>—This portion of the name is set when configuring the CMTS in the vlink.cfg configuration file.
- <Interface name>—This portion of the name identifies the specific CMTS interface including the direction and the interface index. This information is how the CMTS describes the interface internally and it is retrieved from the CMTS device by using SNMP.
  - The direction portion of the virtual link name indicates the virtual link direction. Values can be upstream or downstream.
  - The interface index indicates the specific interface on the CMTS of the virtual link.

This is a sample virtual link name for a CMTS device named Device-1:

```
Device-1_CMTS1/0-upstream 1
```

If a downstream virtual link contains two channels, then the virtual link names are displayed as:

<Device name>\_<Interface name>-L<index of the primary channel>

or

<Device name>\_<Interface name>-W

# Monitoring Using the p3vlink Utility

The p3vlink utility provides the ability to show virtual link configurations and metrics related to the virtual links. The command format is:

```
p3vlink OPERATION [OPTIONS]
```

Table 5-1 and Table 5-2 lists the p3vlink operations and options, respectively.

**Table 5-1** p3vlink Operations

Operation	Description	Notes
--show	Displays the current general configuration, CMTS device list, and CMTS device information.	—
--show-device	Displays general configuration of the specified CMTS device that is known to the VLM. This includes non-Cisco CMTS devices also.  To specify the CMTS device, use the <b>-d</b> option.  To show all the links related to the CMTS device, specify the <b>--detail</b> option.	—
--resync	Gets all the Cisco SCE virtual link configurations and sends it to the Cisco SCE, Cisco SCE-Sniffer DHCP LEG, and CM.  To specify the Cisco SCE, use the <b>-n SCE_NAME</b> option.  To specify a Collection Manager, use the <b>-n CM_NAME</b> option. In this case, the VLM gets all the Cisco SCE virtual links that are related to the specified Collection Manager and sends the data to the Collection Manager.	This is a nonblocking command. Query operation and synchronization operation are activated in the background.
--resync-all	Gets all the Cisco SCE virtual link configurations for each Cisco SCE and sends them to the Cisco SCE, Cisco SCE-Sniffer DHCP LEG, and Collection Manager.	This is a nonblocking command. Query operation and synchronization operation are activated in the background.
--start-query	Starts the on demand query operation (and the CMTS device synchronization operation) for one CMTS device or more separated by “,”.  To specify the CMTS device to be queried, use the <b>-d &lt;device name&gt;</b> option.	This is a nonblocking command. Query operation and synchronization operation is activated in the background.

Table 5-1 p3vlink Operations (continued)

Operation	Description	Notes
<b>--show-vlinks</b>	Shows the virtual links, virtual link indexes, and bonding group information related to the specified Cisco SCE.  To specify the Cisco SCE, use the <b>-n &lt;SCE name&gt;</b> option.  (Optional) To specify the prefix of the virtual links that you want this command to show, use the <b>--prefix=&lt;vlink prefix&gt;</b> option.	—
<b>--show-vlink-data</b>	Shows all the data related to the specified link.  To specify the vlink, use one of these options: <b>--vlink-name=&lt;name&gt;</b> <b>--vlink-id=&lt;id&gt;</b> , <b>--ne-name</b> , and <b>--direction</b>	—
<b>--show-vlink-details</b>	Shows the maximum number of upstream and downstream vlinks, the number of existing, and free vlinks in a Cisco SCE device.  Use the <b>-n SCE name</b> option to specify the Cisco SCE.	—
<b>--show-vlink-mappings</b>	Shows the upstream and downstream vlink mappings that the virtual link manager learnt from all configured CMTSSs.	—

Table 5-1 p3vlink Operations (continued)

Operation	Description	Notes
--show-subs	<p>This command has four uses:</p> <ul style="list-style-type: none"> <li>• Shows all subscribers connected to a specific CMTS device. <ul style="list-style-type: none"> <li>– To specify the CMTS device, use the <b>-d &lt;device name&gt;</b> option.</li> <li>– (Optional) To specify the virtual link ID, use the <b>--vlink-id=&lt;id&gt;</b> option.</li> <li>– (Optional) To specify the virtual link direction, use the <b>--direction=&lt;up/down&gt;</b> option.</li> <li>– (Optional) To specify the prefix of the virtual links that you want this command to show, use the <b>--prefix=&lt;vlink prefix&gt;</b> option.</li> </ul> </li> <li>• Shows all subscribers connected to a specific CMTS device interface, or related to a specific CMTS device. <ul style="list-style-type: none"> <li>– To show all subscribers related to the vlink, use <b>--vlink-name=&lt;name&gt;</b>.</li> </ul> <p>Because each vlink represents one CMTS device interface, this command enables you to see all subscribers traveling from a specific CMTS device interface.</p> </li> <li>• Shows the bonding group if the cable modems are DOCSIS 3.0 modems.</li> <li>• Shows the channelID, all subscribers who are associated to this channelID, and the direction of the channel, when the DOCSIS 2.0 modem is assigned to a single primary channel. <ul style="list-style-type: none"> <li>– To show the channel ID and the direction of the channel, use <b>--channel-name=&lt;channel name&gt;</b>.</li> </ul> </li> </ul>	<p>This command retrieves subscribers whose giaddr attribute is one of the CMTS devices giaddr attributes.</p> <p>The result can be filtered by using:</p> <ul style="list-style-type: none"> <li>• Prefix (first use only)</li> <li>• Vlink-id (first use only)</li> <li>• Direction</li> </ul>
--remove-device	<p>Removes a dynamic device from the VLM.</p> <p>To specify the CMTS device, use the <b>-d &lt;device name&gt;</b> option.</p>	<p>After the device is removed, VLM deletes all virtual links related to the device from the Cisco SCE. The subscribers of the affected device are logged in with default vlink mappings.</p>

Table 5-1 p3vlink Operations (continued)

Operation	Description	Notes
<b>--enable-logging -d &lt;device name&gt;</b>	Enables login on a specific device. To specify the CMTS device, use the <b>-d &lt;device name&gt;</b> option.	This command sets the log_all flag related to the device to true. During load-config and the Cisco Subscriber Manager restart operations, the value of log_all is reset to the value defined in the configuration file.
<b>--disable-logging -d &lt;device name&gt;</b>	Disables login on a specific device. To specify the CMTS device, use the <b>-d &lt;device name&gt;</b> option.	This command sets the log_all flag related to the device to false. During load-config and the Cisco Subscriber Manager restart operations, the value of log_all is reset to the value defined in the configuration file.
<b>--import-cmts-details --file-name=&lt;Complete path of the file&gt;</b>	Imports the CMTS credentials from a file.	This command imports the device credentials to VLM. The device credentials are imported from the file mentioned in the --file-name. After importing, creates a CSV file in encrypted format.
<b>--import-queue &lt;file name&gt;</b>	Imports the subscribers from a given file to the SNMP BG primary queue.	
<b>--import-subs-into-db -d &lt;device name&gt;</b>	Queries the CMReg table and imports the subscribers into the database with GIADDR.	Supported CMTS type: Cisco and ARRIS. If GIADDR exists in the database, it is updated with that of the device.
<b>--import-subs-into-db -d &lt;device name&gt; -o &lt;file name&gt;</b>	Queries the CMReg table and exports the subscriber details to an output file.	Supported CMTS type: Cisco and ARRIS.
<b>--snmp-bg-query -d &lt;device-name&gt; -m &lt;mode&gt;</b>	Queries the subscribers in various modes from the database and adds these subscribers to the primary queue of the SNMP bonding group process. Cisco Service Control Subscriber Manager queries the CMTS on a need basis for bringing together all the subscribers with proper Up and Down VLink IDs.	Supported CMTS Type: Cisco and ARRIS. Valid modes are: <ul style="list-style-type: none"> <li>• Partial—Retrieves subscribers with partial or no Vlink mappings.</li> <li>• Full—Retrieves only subscribers with upvlink and downvlink associations.</li> <li>• All—retrieves all subscribers belonging to a device.</li> </ul>
<b>--show-subs-partial-vlink -d &lt;device name&gt;</b>	Queries the database for subscribers with partial, no, and 0 vlink mappings, and displays the details on the console.	Supported CMTS Type: Cisco and ARRIS. If the subscribers_for_snmp_bg parameter in the vlink.cfg file is configured as introduced, the command queries only for the active subscribers in Cisco SCE.
<b>--query-subs-partial-vlink -d &lt;device name&gt;</b>	Queries the database for subscribers with partial, no, and 0 vlink mappings, and adds them to the SNMP BG queue to retrieve the Vlink associations.	Supported CMTS Type: Cisco and ARRIS. If the subscribers_for_snmp_bg parameter in the vlink.cfg file is configured as introduced, the command queries only for the active subscribers in Cisco SCE.

Table 5-2 p3vlink Options

SM Option	Abbreviation	Description
<b>--channel-name=</b> <i>NAME</i>	—	Specifies the channel name. To list the subscribers on a specific channel, use this option with the <b>--show-subs</b> operation.
<b>--direction=</b> <i>up/down</i>	—	Specifies the direction of the virtual link.
<b>--detail</b>	—	(Optional) To display additional information, use this option with the <b>--show-device</b> operation.
<b>--device=</b> <i>DEVICE</i>	<b>-d</b> <i>DEVICE</i>	Specifies the logical name of the CMTS device.
<b>--file-name=</b> <Complete path of the file>	<b>-o</b> <i>FILE NAME</i>	Specifies the complete path of the file to import or export the device credentials, Used with <b>--import-cmts-details</b> and <b>--import-subs-into-db -d</b> operations.
<b>--m</b> <i>MODE</i>	<b>-m</b> <i>MODE</i>	Specifies the mode of the subscriber.
<b>--ne-name=</b> <i>NAME</i>	<b>-n</b> <i>NAME</i>	Specifies the logical name of the Cisco SCE platform or CM.
<b>--prefix=</b> <i>vlink prefix</i>	—	Specifies the virtual link prefix.
<b>--vlink-name=</b> <i>vlink name</i>	—	Specifies the virtual link name.
<b>--vlink-id</b>	—	Specifies the index of the virtual link.

## p3vlink Utility Examples

To show the CMTS device general configuration, CMTS device list, and CMTS device information:

```
p3vlink --show
General data:
-----
Version : 4.1.0 Build 123
Start : Yes
Monitor Every : 5 minutes
BW Up Factor : 95
BW Down Factor : 95
Next query operation : Tue Dec 17 14:17:24 IST 2013
Next ip removal operation : Tue Dec 31 14:12:24 IST 2013
Enable Device Learning : true
Enable Dynamic Giaddr Learning : true
Upstream Global Controllers : None
Downstream Global Controllers : None
Ignore Duplicate IP : false
periodic SNMP BG query interval : 3 Minutes
Global SNMP BG query mode : all
SNMP BG subscriber mode : all
Import subscriber in to DB from device : false
Subscribers list for SNMP BG query : all

Device list
-----
1) Name: ArrisNOVACMTS, Host Name: ArrisNOVACMTS, Type: Static, Query state: Failure, Last
successful query:
```

```
Command terminated successfully
>
```

To show the general configuration of a specified CMTS device:

```
p3vlink --show-device -d CMTS1 --detail
```

```
Device Name: cmts1
Host Name: cmts1
IP: 10.78.242.201
Type: Static
SCE Related: sce
Upstream factor: 95
Downstream factor: 95
Ignore Periodic Device Query: false
Last success Query: Tue Dec 17 14:53:34 IST 2013
Last Query Attempt: Tue Dec 17 14:53:34 IST 2013
Last Query Status: Completed
Sync state with SCE: Not-done
Sync state with CM: N/A
Giaddr List: 10.78.242.201;
Upstream Global Controllers: None
Downstream Global Controllers: None
isLogAll: false
Num of up interfaces: 100
Num of down interfaces: 17

VLink Information:
1) Name: cmts1_Cable5/1/0-upstream0, Vlink Id: 244, Direction: UP, PIR: 5120 kbps
2) Name: cmts1_Cable5/1/0-upstream1, Vlink Id: 239, Direction: UP, PIR: 2560 kbps
3) Name: cmts1_Cable5/1/0-upstream2, Vlink Id: 233, Direction: UP, PIR: 5120 kbps
4) Name: cmts1_Cable5/1/0-upstream3, Vlink Id: 278, Direction: UP, PIR: 2560 kbps
5) Name: cmts1_Cable5/1/1-upstream0, Vlink Id: 226, Direction: UP, PIR: 2560 kbps
6) Name: cmts1_Cable5/1/1-upstream1, Vlink Id: 222, Direction: UP, PIR: 2560 kbps
7) Name: cmts1_Cable5/1/1-upstream2, Vlink Id: 247, Direction: UP, PIR: 2560 kbps
8) Name: cmts1_Cable5/1/1-upstream3, Vlink Id: 229, Direction: UP, PIR: 2560 kbps
9) Name: cmts1_Cable5/1/2-upstream0, Vlink Id: 273, Direction: UP, PIR: 2560 kbps
10) Name: cmts1_Cable5/1/2-upstream1, Vlink Id: 228, Direction: UP, PIR: 2560 kbps
11) Name: cmts1_Cable5/1/2-upstream2, Vlink Id: 211, Direction: UP, PIR: 2560 kbps
12) Name: cmts1_Cable5/1/2-upstream3, Vlink Id: 221, Direction: UP, PIR: 2560 kbps
13) Name: cmts1_Cable5/1/3-upstream0, Vlink Id: 195, Direction: UP, PIR: 2560 kbps
14) Name: cmts1_Cable5/1/3-upstream1, Vlink Id: 277, Direction: UP, PIR: 2560 kbps
15) Name: cmts1_Cable5/1/3-upstream2, Vlink Id: 192, Direction: UP, PIR: 2560 kbps
16) Name: cmts1_Cable5/1/3-upstream3, Vlink Id: 202, Direction: UP, PIR: 2560 kbps
17) Name: cmts1_Cable5/1/4-upstream0, Vlink Id: 193, Direction: UP, PIR: 2560 kbps
18) Name: cmts1_Cable5/1/4-upstream1, Vlink Id: 259, Direction: UP, PIR: 2560 kbps
19) Name: cmts1_Cable5/1/4-upstream2, Vlink Id: 256, Direction: UP, PIR: 2560 kbps
20) Name: cmts1_Cable5/1/4-upstream3, Vlink Id: 210, Direction: UP, PIR: 2560 kbps
21) Name: cmts1_Cable6/0/0-downstream, Vlink Id: 355, Direction: DOWN, PIR: 42885 kbps
22) Name: cmts1_Cable6/0/0-downstream:WB-340, Vlink Id: 340, Direction: DOWN, PIR: 200000
    kbps
Channel Name: cmts1_Modular-Cable1/0/0:0-L24, index: 340, PIR: 50000 kbps, CIR: 40000 kbps
Channel Name: cmts1_Modular-Cable1/0/0:1-L25, index: 341, PIR: 50000 kbps, CIR: 40000 kbps
Channel Name: cmts1_Modular-Cable1/0/0:2-L26, index: 342, PIR: 50000 kbps, CIR: 40000 kbps
Channel Name: cmts1_Modular-Cable1/0/0:3-L27, index: 343, PIR: 50000 kbps, CIR: 40000 kbps
Channel Name: cmts1_Wideband-Cable1/0/0:0-OLBG-W1, index: 344, PIR: 200000 kbps, CIR:
20000 kbps
23) Name: cmts1_Cable6/0/0-upstream0, Vlink Id: 249, Direction: UP, PIR: 5120 kbps
24) Name: cmts1_Cable6/0/0-upstream1, Vlink Id: 260, Direction: UP, PIR: 2560 kbps
25) Name: cmts1_Cable6/0/0-upstream2, Vlink Id: 263, Direction: UP, PIR: 2560 kbps
26) Name: cmts1_Cable6/0/0-upstream3, Vlink Id: 214, Direction: UP, PIR: 2560 kbps
27) Name: cmts1_Cable6/0/1-downstream, Vlink Id: 338, Direction: DOWN, PIR: 30342 kbps
28) Name: cmts1_Cable6/0/1-upstream0, Vlink Id: 181, Direction: UP, PIR: 2560 kbps
```

```

29) Name: cmts1_Cable6/0/1-upstream1, Vlink Id: 236, Direction: UP, PIR: 2560 kbps
30) Name: cmts1_Cable6/0/1-upstream2, Vlink Id: 200, Direction: UP, PIR: 2560 kbps
31) Name: cmts1_Cable6/0/1-upstream3, Vlink Id: 184, Direction: UP, PIR: 2560 kbps
32) Name: cmts1_Cable6/0/2-downstream, Vlink Id: 356, Direction: DOWN, PIR: 30342 kbps
33) Name: cmts1_Cable6/0/2-upstream0, Vlink Id: 187, Direction: UP, PIR: 2560 kbps
34) Name: cmts1_Cable6/0/2-upstream1, Vlink Id: 185, Direction: UP, PIR: 2560 kbps
35) Name: cmts1_Cable6/0/2-upstream2, Vlink Id: 209, Direction: UP, PIR: 2560 kbps
36) Name: cmts1_Cable6/0/2-upstream3, Vlink Id: 191, Direction: UP, PIR: 2560 kbps
37) Name: cmts1_Cable6/0/3-downstream, Vlink Id: 348, Direction: DOWN, PIR: 30342 kbps
38) Name: cmts1_Cable6/0/3-upstream0, Vlink Id: 217, Direction: UP, PIR: 2560 kbps
39) Name: cmts1_Cable6/0/3-upstream1, Vlink Id: 189, Direction: UP, PIR: 2560 kbps
40) Name: cmts1_Cable6/0/3-upstream2, Vlink Id: 250, Direction: UP, PIR: 2560 kbps

```

Command terminated successfully

>

The output of this command includes these four information elements:

- Num of up interfaces—Summarizes the total number of upstream virtual links related to this CMTS device. *Unknown* indicates that the VLM was not able to communicate with the CMTS device.
- Num of down interfaces—Summarizes the total number of downstream virtual links related to this CMTS device. *Unknown* indicates that the VLM was not able to communicate with the CMTS device.
- Sync state with Cisco SCE:
  - Done—The Cisco SCE is fully synchronized with CMTS device information.
  - Not-done—The Cisco SCE is not synchronized with all CMTS device data. Use the **p3vlink --resync -n <sce which manages the device>** command to perform the synchronization operation.
  - Sync-in-process—When VLM detects configuration changes, the change needs to be sent to the Cisco SCE. During the update process, the VLM changes the sync state to Sync-in-process. For successful updates, the Cisco SCE sync state is set to Done, else the value is set to Not-Done.
- Sync state with Collection Manager:
  - Done—The Collection Manager is fully synchronized with CMTS device information.
  - Not-done—The CM is not synchronized with all CMTS device data. Use the **p3vlink --resync -n <sce which manages the device>** command to perform the synchronization operation.
  - N/A—The Cisco SCE to which the CMTS device belongs, is not connected to any Collection Manager.
  - Sync-in-process – When VLM detects configuration changes, the change needs to be sent to the Collection Manager. During the update process, the VLM changes the sync state to Sync-in-process. For successful updates, Cisco SCE sync state is set to Done, else the value is set to Not-Done.
- Last Query Status:
  - Not started—Query operation for the device was not started since the last Cisco Subscriber Manager boot.
  - Completed—Last query was completed successfully.
  - Failure—Last query failed to complete.
  - Waiting for query—Query operation is in queue waiting for resources.



- In-query—Device is in the process of a query operation.
- Waiting for deletion—During the last query, if no giaddr was found, the system queues up the device for deletion. This is applicable only to dynamic devices.

To show all the virtual links for a specific network element (Cisco SCE):

```
p3vlink --show-vlinks -n sc0
```

```
device0_0_Cmts0/1-downstream1, vlink id=15, direction=DOWN
device0_0_Cmts0/1-upstream1, vlink id=8, direction=UP
device0_0_Cmts0/1-upstream2, vlink id=16, direction=DOWN
device0_1_Cmts1/1-downstream1, vlink id=11, direction=DOWN
device0_1_Cmts1/1-upstream1, vlink id=6, direction=UP
device0_1_Cmts1/1-upstream2, vlink id=12, direction=DOWN
device0_2_Cmts2/1-downstream1, vlink id=25, direction=DOWN
device0_2_Cmts2/1-upstream1, vlink id=13, direction=UP
device0_2_Cmts2/1-upstream2, vlink id=26, direction=DOWN
device0_3_Cmts3/1-downstream1, vlink id=13, direction=DOWN
device0_3_Cmts3/1-upstream1, vlink id=7, direction=UP
device0_3_Cmts3/1-upstream2, vlink id=14, direction=DOWN
device0_4_Cmts4/1-downstream1, vlink id=21, direction=DOWN
device0_4_Cmts4/1-upstream1, vlink id=11, direction=UP
device0_4_Cmts4/1-upstream2, vlink id=22, direction=DOWN
device0_5_Cmts5/1-downstream1, vlink id=1, direction=DOWN
device0_5_Cmts5/1-upstream1, vlink id=1, direction=UP
device0_5_Cmts5/1-upstream2, vlink id=2, direction=DOWN
device0_6_Cmts6/1-downstream1, vlink id=9, direction=DOWN
device0_6_Cmts6/1-upstream1, vlink id=5, direction=UP
device0_6_Cmts6/1-upstream2, vlink id=10, direction=DOWN
device1_0_Cmts7/1-downstream1, vlink id=3, direction=DOWN
device1_0_Cmts7/1-upstream1, vlink id=2, direction=UP
device1_0_Cmts7/1-upstream2, vlink id=4, direction=DOWN
device1_1_Cmts8/1-downstream1, vlink id=7, direction=DOWN
device1_1_Cmts8/1-upstream1, vlink id=4, direction=UP
device1_1_Cmts8/1-upstream2, vlink id=8, direction=DOWN
device1_2_Cmts9/1-downstream1, vlink id=27, direction=DOWN
device1_2_Cmts9/1-upstream1, vlink id=14, direction=UP
device1_2_Cmts9/1-upstream2, vlink id=28, direction=DOWN
device1_3_Cmts10/1-downstream1, vlink id=23, direction=DOWN
device1_3_Cmts10/1-upstream1, vlink id=12, direction=UP
device1_3_Cmts10/1-upstream2, vlink id=24, direction=DOWN
device1_4_Cmts11/1-downstream1, vlink id=19, direction=DOWN
device1_4_Cmts11/1-upstream1, vlink id=10, direction=UP
device1_4_Cmts11/1-upstream2, vlink id=20, direction=DOWN
device1_5_Cmts12/1-downstream1, vlink id=5, direction=DOWN
device1_5_Cmts12/1-upstream1, vlink id=3, direction=UP
device1_5_Cmts12/1-upstream2, vlink id=6, direction=DOWN
device1_6_Cmts13/1-downstream1, vlink id=17, direction=DOWN
device1_6_Cmts13/1-upstream1, vlink id=9, direction=UP
device1_6_Cmts13/1-upstream2, vlink id=18, direction=DOWN
Command terminated successfully
```

To show the vlink data of a specific link:

```
p3vlink --show-vlink-data --vlink-name=device_Cmts0/0-downstream1
```

```
VLink Name: device_Cmts0/0-downstream1
VLink Id:    1
Direction:  downstream
SCE Name:   sce0
Device Name: device
PIR:       200000000
```

```
Channels related to VLink
<name>-L, index <index>, PIR <value>, CIR <value>
<name>-W, index <index>, PIR <value>, CIR <value>
```

Related upstream virtual links –Lists all upstream interface related to the same MAC layer as the selected downstream interface.

```
device_Cmts0/0-upstream0
device_Cmts0/0-upstream1
device_Cmts0/0-upstream2
device_Cmts0/0-upstream3
```

**Note**


---

If more than one vlink has the same name, this command displays the information for all the vlinks.

---

To Show the maximum number of upstream and downstream vlinks, the number of existing, and free vlinks in a Cisco SCE device:

```
p3vlink --show-vlink-details -n sce1
```

```
Maximum number of upstream Channels supported      : 1023
Maximum number of downstream Channels supported   : 1023
Free upstream Channels available                   : 596
Free downstream Channels available                 : 754
Number of upstream channels created                : 427
Number of downstream channels created              : 269
Command terminated successfully
```

To show the upstream and downstream vlink mappings that the virtual link manager learnt from all configured CMTSs:

```
p3vlink --show-vlink-mappings
```

```
IPDR Vlink Mapping Tables:
```

```
=====
```

```
Upstream Table:
```

```
{10.52.206.2_1054_1=191, 10.52.206.2_1109_2=88,
10.52.206.2_1077_4=196, 10.52.206.2_1031_1=99,
10.52.206.2_1019_4=43, 10.52.206.2_1047_1=9,
10.52.206.2_1093_4=97, 10.52.206.2_1018_2=158,
10.52.206.2_1080_2=73, 10.52.206.2_1042_4=126}
```

```
Downstream Table:
```

```
{10.52.206.2_1110_185=9, 10.52.206.2_1106_169=3,
10.52.206.2_1093_153=7, 10.52.206.2_1095_161=5,
10.52.206.2_1092_149=1, 10.52.206.2_1108_177=6,
10.52.206.2_1107_173=2, 10.52.206.2_1094_157=8,
10.52.206.2_1109_181=4}
```

```
Command terminated successfully
```

To show the subscribers using virtual links:

- Use the **p3subsdb** command to list all the subscribers:

```
p3subsdb --show-all
```

```
0005ca679c20
0005ca67f530
0005ca6ece30
0005ca7086e0
0005caddbec0
0005cae99cf0
```

```

00189b4938c9
00189b64fa64
001b2f8dfaat
001dcf1e48cc
001dcf1e48f4
0024b2106af4
00252e11d22e
00252ed453ca
00252ed454ee
00252ed455d8
00252ed455dc
00252ed4585a
00252ed4589e
00252ed45934
00252ed459d6
00252ed459d8
00252ed459fe
00252ed45a06
00252ed45a2a
00252ed45a42
00265b2c5200
00265b585e60
00265b588d50
0026f2132b12
Command terminated successfully

```

- Use the **p3subs** command to show the virtual links of a particular subscriber:

```

p3subs --show -s 0005ca679c20
Name:          0005ca679c20
Domain:        subscribers
Mappings:
  IP: 10.10.0.10/32
Properties:
  downVlinkId=11  Name=cmts1_Cable7/1/4-downstream
  upVlinkId=10    Name=cmts1_Cable7/0/3-upstream3
Custom Properties:
  giaddr=10.78.242.201
Command terminated successfully

```

- Use the **p3vlink** command to show the subscribers that are associated with a particular CMTS device:

```

p3vlink --show-subs -d device1_1

Subscribers related to device: device1_1 vlink-id: 4, giaddr: 1.1.1.1, direction UP
lynn_jones
Subscribers related to device: device1_1 vlink-id: 7, giaddr: 1.1.1.1, direction DOWN
lynn_jones
Command terminated successfully

```

- Use the **p3vlink** command to show the subscribers that are associated with a specific CMTS device:

```

p3vlink --show-subs -d Test0 --direction=Down --vlink-id=23

Subscribers related to device: Test0 vlink-id: 23, giaddr: 24.191.128.17, direction
DOWN010101010106010101010107
Command terminated successfully

```

- Use the **p3vlink** command to show the subscribers that are associated with a specific vlink:

```

p3vlink --show-subs --vlink-name test1_Cmts0/0-upstream2

Subscribers related to device: test1 vlink-id: 5, giaddr: 10.78.233.149, direction UP

```

```
010101010101
1 subscriber was found
Command terminated successfully
```

- Use the **p3vlink** command to show the subscribers that are associated to a channel name:

```
p3subs --show -s sub1
```

```
Name:          sub1
Domain:        subscribers
Properties:
  downVlinkId=11  Name=local_Modular-Cable1/0/0:1-L194
  upVlinkId=11   Name=local_Cable7/0/2-upstream2
Custom Properties:
  giaddr=10.78.233.233
Command terminated successfully
```

```
p3vlink --show-subs --channel-name=local_Cable7/0/2-upstream2
```

```
Subscribers related to device: local vlink-id: 11, giaddr: 10.78.233.233, direction UP
sub1
1 subscriber was found
Command terminated successfully
```

```
p3vlink --show-subs --channel-name=local_Modular-Cable1/0/0:1-L194
```

```
Subscribers related to device: local vlink-id: 11, giaddr: 10.78.233.233, direction
DOWN
sub1
1 subscriber was found
Command terminated successfully
```

To view the subscribers with partial, no, and 0 vlink mappings for a given device:

```
p3vlink --show-subs-partial-vlink -d cisco
```

```
Subscribers with partial and default vlinks in Device cisco :
=====
000101010d10,000101010e10
```

To import the subscribers from a given file to the SNMP BG primary queue:

```
p3vlink --import-queue --file-name=file.csv
```

```
The following imported subscribers are added into primary queue:
=====
00252ed45a06,00252ed459fe,00252ed459d8,001b2f8dfaad,
00252ed45934,00252ed4589e,00252ed4585a,00252ed455dc,
00252ed455d8,00252ed454ee,00252ed453ca,00252e11d22e,
0024b2106af4,001dcf1e48f4,001dcf1e48cc,00252ed459d6

Command terminated successfully
```

## Monitoring Virtual Links Using the Cisco SCE CLI

The Cisco SCE provides CLI commands to monitor the virtual links in the solution.

[Table 5-3](#) lists the virtual links CLI commands.

Table 5-3 Virtual Links Commands

Commands	Description
Show Commands	
<b>show interface LineCard 0 virtual-links [all   changed   different-from-template]</b>	Displays: <ul style="list-style-type: none"> <li>All the defined virtual links, when you use the <b>all</b> option.</li> <li>Virtual links whose configurations have changed from the template, when you use the <b>changed</b> option.</li> <li>Virtual links configurations that differ from the template, when you use the <b>different-from-template</b> option.</li> </ul>
<b>show interface LineCard 0 virtual-links [status   mapping]</b>	Displays the status of virtual links and updates the log with virtual links mapping. To display the status of the virtual link, use the <b>status</b> option. To update the log with virtual link mapping, use the <b>mapping</b> option. This is a debug command.
<b>show interface LineCard 0 virtual-links template [direction [upstream   downstream]]</b>	Displays the virtual link template of both upstream and downstream (Optional) To show only one direction, use the <b>[direction [upstream   downstream]]</b> option.
<b>show interface LineCard 0 virtual-links default direction [upstream   downstream] [counter   agc-mapping]</b>	Displays the default virtual link. (Optional) To specify the agc-mapping between virtual link and the actual agc indexes, use the <b>agc-mapping</b> option. (Optional) To specify the counter along with agc-mapping, enforce rate and actual rate, use the <b>counter</b> option.
<b>show interface LineCard 0 virtual-links [name &lt;name&gt;   index &lt;index&gt;] direction [upstream   downstream] [counter   agc-mapping]</b>	Displays the virtual link by name or index. To display the name or index of the virtual link, use the <b>[name &lt;name&gt;   index &lt;index&gt;]</b> option. (Optional) To specify the agc-mapping between virtual link and the actual agc indexes, use the <b>agc-mapping</b> option. (Optional) To specify the counter along with agc-mapping, enforce rate and actual rate, use the <b>counter</b> option.
Add Commands	
<b>virtual-links index &lt;index&gt; direction [upstream   downstream]</b>	Adds a virtual link index. (Optional) To specify a direction, use the <b>[direction [upstream   downstream]]</b> option.
<b>virtual-links index &lt;index&gt; name &lt;name&gt; direction [upstream   downstream]</b>	Adds a virtual link index and specifies a name. To specify a name for the channel, use the <b>name</b> option. (Optional) To specify a direction, use the <b>[direction [upstream   downstream]]</b> option.
Remove Commands	

Table 5-3 Virtual Links Commands (continued)

Commands	Description
<b>no Virtual-links index &lt;index&gt; direction [upstream   downstream]</b>	Removes a virtual link associated with the specified index and direction.  To specify the index, use the <b>&lt;index&gt;</b> option.  To specify the direction, use the <b>direction</b> option.
<b>no Virtual-links all direction [upstream   downstream]</b>	Removes all the virtual links.
Set Commands	
<b>virtual-links index &lt;index&gt; direction [upstream   downstream] gc &lt;offset&gt; set-PIR value &lt;value&gt;</b>	Sets the virtual link index PIR values by gc-offset and direction.
Reset Commands	
<b>virtual-links index &lt;index&gt; direction [upstream   downstream] gc &lt;offset&gt; reset-PIR</b>	Resets the virtual link index PIR value by gc template offset and direction to template values.

## virtual-links Command Examples

These examples show the output from the CLI virtual links commands:

```
SCE2000#> show interface Linecard 0 virtual-links template
```

```
Virtual Link enabled
Global Virtual link Global Controller, upstream:
  name = globalGC - pir: 8000000 - cir: 0 - al: 5
  name = globalGC1 - pir: 8000000 - cir: 0 - al: 5
Virtual link Global Controller, upstream Template hierarchic:
Total bandwidth limit in Virtual-Link:
  name = Virtual-Link Global Controller - pir: 8000000,8000000,8000000,8000000 - cir: 0
  - al: 5
  name = appGC - pir: 8000000,8000000,8000000,8000000 - cir: 0 - al: 5
Global Virtual link Global Controller, downstream:
  name = globalGC1 - pir: 8000000 - cir: 0 - al: 5
Virtual link Global Controller, downstream Template hierarchic:
Total bandwidth limit in Virtual-Link:
  name = Virtual-Link Global Controller - pir: 8000000,8000000,8000000,8000000 - cir: 0
  - al: 5
  name = appGC - pir: 8000000,8000000,8000000,8000000 - cir: 0 - al: 5
  name = appGC1 - pir: 8000000,8000000,8000000,8000000 - cir: 0 - al: 5
  name = appGC2 - pir: 8000000,8000000,8000000,8000000 - cir: 0 - al: 5
```

```
SCE2000#> show interface LineCard 0 virtual-links all
```

```
Virtual Link enabled
upstream Virtual-Link:
index=1, name=virtual link 1
index=2, name=virtual link 2
index=3, name=virtual link 3
downstream Virtual-Link:
index=1, name=virtual link 1
index=2, name=virtual link 2
index=3, name=virtual link 3
```

```
SCE2000#> show interface LineCard 0 virtual-links different-from-template
```

```

Virtual Link enabled
upstream Virtual-Link:
  virtual index=1, name=virtual link 1
    channel index=1, name=virtual channel 1, pir=99999, cir=99, al=9, agc index=3
    application index=1, name=appGC-1, pir=8000000, cir=0, al=5, agc index=2
  virtual index=2, name=virtual link 2
    channel index=2, name=virtual channel 2, pir=99999, cir=99, al=9, agc index=7
    application index=1, name=appGC-2, pir=8000000, cir=0, al=5, agc index=6
downstream Virtual-Link:
  virtual index=3, name=virtual link 3
    channel index=3, name=virtual channel 3, pir=99999, cir=99, al=9, agc index=15
    application index=1, name=appGC-3, pir=8000000, cir=0, al=5, agc index=12
    application index=2, name=appGC1-3, pir=8000000, cir=0, al=5, agc index=13
    application index=3, name=appGC2-3, pir=8000000, cir=0, al=5, agc index=14

SCE8000#> show interface LineCard 0 virtual-links index 1 direction upstream agc-mapping

Virtual Link enabled
upstream Virtual-Link:
  virtual index=1, name=virtual link 1
    channel index=1, name=virtual channel 1, pir=99999, cir=99, al=9, agc index=3
    application index=1, name=appGC-1, pir=8000000, cir=0, al=5, agc index=2

SCE8000#> show interface LineCard 0 virtual-links index 1 direction upstream counter

Virtual Link enabled
upstream Virtual-Link:
  virtual index=1, name=virtual link 1
    channel index=1, name=virtual channel 1, pir=99999, cir=99, al=9, agc index=3,
    enforce rate=99999, actual rate=0
    application index=1, name=appGC-1, pir=8000000, cir=0, al=5, agc index=2, enforce
    rate=8000000, actual rate=0

```

## Monitoring Virtual Links Using the Reporter

The Cisco SCA BB includes a Reporter tool that allows you to produce reports based on the traffic analysis performed by the Cisco SCE platform. The information is sent from the Cisco SCE platform and is stored in a database. The Reporter can query and retrieve information from the database and present the results in a comprehensive range of reports.

The Reporter includes the Virtual Links Monitoring group of report templates that allow you to view statistics of bandwidth or volume of traffic used by a virtual link. The reports are provided per service usage counter for the total volume used by the virtual link. The volume consumption can be displayed per service for the virtual link. The reports are provided per channel.

Each report can be filtered to focus on a virtual link ID, a virtual link name, a virtual link direction, or a combination of the virtual link identifiers.

The Virtual Links Monitoring group includes these report templates:

- **VLink Bandwidth per Service**—Shows the distribution of bandwidth among the different service usage counters defined in the system for all subscribers.
- **VLink Aggregated Usage Volume per Service**—Shows the total volume of traffic (upstream and downstream) for each service usage counter.
- **VLink Bandwidth per Package**—Shows the distribution of bandwidth among the different packages defined in the system for selected vlinks.

- VLink Hourly Usage Volume per Service—Shows the distribution of volume among the different service usage counters defined in the system, grouped by hour.
- VLink Daily Usage Volume per Service—Shows the distribution of volume among the different service usage counters defined in the system, grouped by day.
- Daily Peak BW for all VLinks—Shows the daily value of the maximum bandwidth (1-hour or 2-hour average) for all virtual links.
- Total Active Subscribers per VLink—Shows the number of active subscribers for a selected vlink.
- VLink Bandwidth per Channel—Shows the distribution of bandwidth among the different channels for selected vlinks.
- Top Subscribers per VLink—Shows a list of the top subscriber volume consumption in a specific hour or day for a selected vlink.
- Average Bandwidth per Subscribers per VLink—Shows the average bandwidth for a specific subscriber for a selected vlink.
- Accumulated Bandwidth Distribution per VLink—Shows the accumulated bandwidth distribution for a selected vlink.

## Creating a New Report Instance Using Cisco Insight

For details on creating a new report instance using Cisco Insight, see the *Cisco Insight Reporter User Guide*.

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