



# Video Virtual Carrier Group and Virtual Edge Input

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A Virtual Carrier Group (VCG) is a collection of virtual QAM carriers (RF channels) provisioned on a Logical Edge Device (LED). A Virtual Edge Input (VEI) is a customer assigned IP address that is used, from the Head End, as a destination IP address for unicast video IP packets.

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## Information about Virtual Carrier Group and Virtual Edge Input

### Virtual Carrier Group

A Virtual Carrier Group (VCG) is a collection of virtual QAM carriers (RF channels) provisioned on a Logical Edge Device (LED).

Each VCG must have a unique name and ID, since it also assigns attributes such as TSID and output port number to the virtual QAM carriers. The output port number only needs to be unique per LED. However, TSID/ONID pair must be unique for the chassis.

Duplicate TSIDs can be assigned to multiple QAM carriers by overriding the default TSID. Overriding the default TSID does not affect the unique TSID/ONID pair on the cBR router. The duplicate TSID overrides the unique TSID on the PAT header.

For more information, see [Overriding the Default TSID](#) section.

The service type must be designated in each VCG and the `encrypt` command must be entered if the carriers are to be encrypted. Enabling the VCG to use encryption and service type designates that each QAM carrier listed in the VCG will consume a QAM encryption license and video service type license. The actual number of licenses consumed will be done at VCG binding operation and is also dependent on the QAM replication requirements.

For more information on how the licenses are consumed, see [Cisco Smart Licensing for Video](#).

## Virtual Edge Input

A Virtual Edge Input (VEI) is a customer assigned IP address that is used, from the Head End, as a destination IP address for unicast video IP packets. Each VEI will need to be configured with a routable IP address from within the customer's network.

A VEI is assigned within a Logical Edge Device. Each Virtual Carrier Group (VCG) is associated with one or more IP addresses that represent VEIs.

For GQI protocol, VEI must be configured under the LED, since GQI expects VEI to be able to reach any Virtual QAM carrier listed in the same LED. Again, for GQI protocol, there is a limit of five VEIs per LED.

For the table based protocol, VEI may be configured under the LED or under a VCG. If the VEI is configured under a VCG, it can only reach the virtual QAM carriers associated with that particular VCG.

During the VCG binding operation, each VEI IP address will be bound to a single Video IP interface.

You can isolate the video traffic from other network traffic using MPLS (Multiprotocol Label Switching) and VRF (Virtual Routing and Forwarding), by configuring the VRF name parameter in video-edge-input command.



### Note

Do not use the same VEI IP address in multiple VRFs, as Head End video session management servers are not MPLS or VRF aware.

## How to Configure Virtual Carrier Group and Virtual Edge Input

### Configuring Virtual Carrier Group

#### Before you begin

Since each VEI needs to be configured with a routable IP address from within the customer's network, choose the IP addresses to use prior to configuring the VEIs.

Error messages for problems with the VCG configuration will become evident during the bind operation. Errors include overlapping rf-channels.

In virtual-edge-input-ip command line configuration, vrf is an optional parameter and can be used for MPLS routing or to make VEI private from other parts of the network.

To configure virtual carrier group, follow the steps below:

```
enable
configure terminal
cable video
virtual-carrier-group name [id number]
virtual-edge-input-ip ip-address [vrf vrf-name] input-port-number port-number
encrypt
service-type narrowcast
rf-channel start_channel-end_channel tsid start_tsid-end_tsid output-port-number
start_number-end_number
```

## Overriding the Default TSID

To assign duplicate TSIDs to multiple QAM carriers, you can override the default TSID by using the **override-tsid** command as shown in the example below.

```
enable
configure terminal
cable video
virtual-carrier-group name [id number]
override-tsid TSID
```

## Verifying Virtual Carrier Group Configuration

To verify the virtual carrier group configuration, use the **show cable video virtual-carrier-group** command as shown in the example below.

```
Router# show cable video virtual-carrier-group all
Number of Virtual Carrier Groups: 1
```

ID Name	Service	Logical	ServiceType	Encrypted	Low Latency	Override TSID	Total VEI	Total RF-Channel
	-Distribution	-Edge						
	-Group Name	-Device Name						
1	vcg1 sdg1	led1	narrowcast	N	N	-	0	1

## Configuring Virtual Edge Input under Logical Edge Device

### Before you begin

Since each VEI will need to be configured with a routable IP address from within the customer's network, choose the IP addresses to use prior to configuring the VEIs.

To configure virtual edge input, follow the steps below:

```
enable
configure terminal
cable video
virtual-carrier-group name [id] number
virtual-edge-input-ip ip-address [vrf vrf-name] input-port-number port-number
vcg vcg-name
active
```

To configure virtual edge input under logical edge device, follow the steps below:

```
enable
configure terminal
cable video
logical-edge-device name [id] number
protocol table-based
virtual-edge-input-ip ip-address [vrf vrf-name] input-port-number port-number
vcg vcg-name
active
```

## Verifying Virtual Edge Input Configuration

To verify the virtual edge input configuration, use the **show cable video logical-edge-device** command as shown in the example below.

```
Router# show cable video logical-edge-device id 1
Logical Edge Device: led
Id: 1
Protocol: GQI
Service State: Active
Discovery State: Disable
Management IP: 1.33.2.10
MAC Address: c414.3c17.6000
Number of Servers: 2
  Server 1: 1.200.1.193
  Server 2: 1.200.1.183
Reset Interval: 5
Keepalive Interval: 5
Retry Count:3
Number of Virtual Carrier Groups: 2
Number of Share Virtual Edge Input: 1
Number of Physical Qams: 94
Number of Sessions: 240
No Reserve PID Range

Virtual Edge Input:
Input Port   VEI           Slot/Bay Bundle Gateway
ID           IP            ID           ID    IP
-----
1           174.102.1.1  7/0         -     -  --

Virtual Carrier Group:
ID Name      Total Total      Service-Distribution-Group Service-Distribution-Groupup
      VEI    RF-channel  Name                               ID
-----
1  vcg      0     28         sdg                               1
2  vcg-2    0     19         sdg                               1

Integrated Physical Admin Operational TSID ONID Output VCG SDG Encryption
Cable      QAM ID   State State         ID  ONID  Port  ID  ID  Capable
-----
7/0/0:1    1       ON   UP           29  1000  30   2   1  powerkey
7/0/0:2    2       ON   UP           30  1000  30   2   1  powerkey
7/0/0:3    3       ON   UP           31  1000  30   2   1  powerkey
7/0/0:4    4       ON   UP           32  1000  30   2   1  powerkey
7/0/0:5    5       ON   UP           33  1000  30   2   1  powerkey
7/0/0:6    6       ON   UP           34  1000  30   2   1  powerkey
7/0/0:7    7       ON   UP           35  1000  30   2   1  powerkey
7/0/0:8    8       ON   UP           36  1000  30   2   1  powerkey
7/0/0:9    9       ON   UP           37  1000  30   2   1  powerkey
```

To verify the VEI configuration with MPLS-VPN VRF, use the **show ip arp vrf** command as shown in the example below:

```
Router# show ip arp vrf Video-VOD-Vrf
Protocol  Address           Age (min)  Hardware Addr  Type  Interface
Internet  174.102.1.1      -          12ab.0007.ce01 ARPA  Video7/0/0
```

# Configuration Examples for Virtual Carrier Group and Virtual Edge Input

This section provides configuration examples for the Virtual Carrier Group and Virtual Edge Input:

## Example: Configuring Virtual Carrier Group

The following example shows how to configure virtual carrier group:

```
enable
configure terminal
cable video
virtual-carrier-group vcg-0 id 1
virtual-edge-input-ip 174.101.1.1 input-port-number 1
virtual-edge-input-ip 174.102.1.1 vrf Video-VOD-Vrf input-port-number 2
encrypt
service-type narrowcast
rf-channel 0-10 tsid 1-11 output-port-number 1-11
```

## Example: Configuring Virtual Edge Input

The following example shows how to configure virtual edge input:

```
enable
configure terminal
cable video
logical-edge-device led_bc1 id 1
protocol table-based
virtual-edge-input-ip 174.102.1.1 input-port-number 1
vcg vcg_bc1
active
```

You can also configure VEI to be associated with a MPLS-VPN VRF:

```
enable
configure terminal
cable video
virtual-carrier-group vcg1 id 1
virtual-edge-input-ip 174.102.1.1 vrf Video-VOD-Vrf input-port-number 1
vcg vcg-name
active
```

Under logical edge device, follow the steps below:

```
enable
configure terminal
cable video
logical-edge-device led_bc1 id 1
protocol table-based
virtual-edge-input-ip 174.102.1.1 vrf Video-VOD-Vrf input-port-number 1
```

## Example: Overriding the Default TSID

```
vcg vcg_bc1
active
```

## Example: Overriding the Default TSID

The following example shows how to override the default TSID:

```
enable
configure terminal
cable video
virtual-carrier-group vcg1 id 1
override-tsid 100
%%Configuring this will regenerate the PAT with overridden TSID value for all QAM channels
  under this VCG.
Do you want to continue? [Yes/No][confirm]y
```

# Feature Information for Virtual Carrier Group and Virtual Edge Input

*Table 1: Feature Information for Virtual Carrier Group and Virtual Edge Input*

Feature Name	Releases	Feature Information
Virtual Carrier Group and Virtual Edge Input	Cisco IOS XE Everest 16.6.1	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.
Using VRF for Video Session Traffic	Cisco IOS XE Everest 16.6.1	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.