Cisco RF Gateway 10 QAM Replication Configuration Guide

This document provides information about the QAM replication (also known as RF spanning) in the Cisco RF Gateway 10 (RFGW-10).

Contents

Operating Use Cases for RF Spanning

Following are the two operating use cases for RF spanning:

Replicated Video Carriers (Narrowcast Service-Group Mismatch Use-Case)

This use case satisfies the condition where the number of homes passed (HP) by narrowcast video services is greater than the number of HP by DOCSIS services. Typically, the ratio of HP by narrowcast video services and DOCSIS is 2:1. However, other ratios can also be used. Unique DEPI flows are configured on all ports of a Cisco DS-384 line card (without using replication), while QAM Replication Group (QRG) is configured for video carriers.

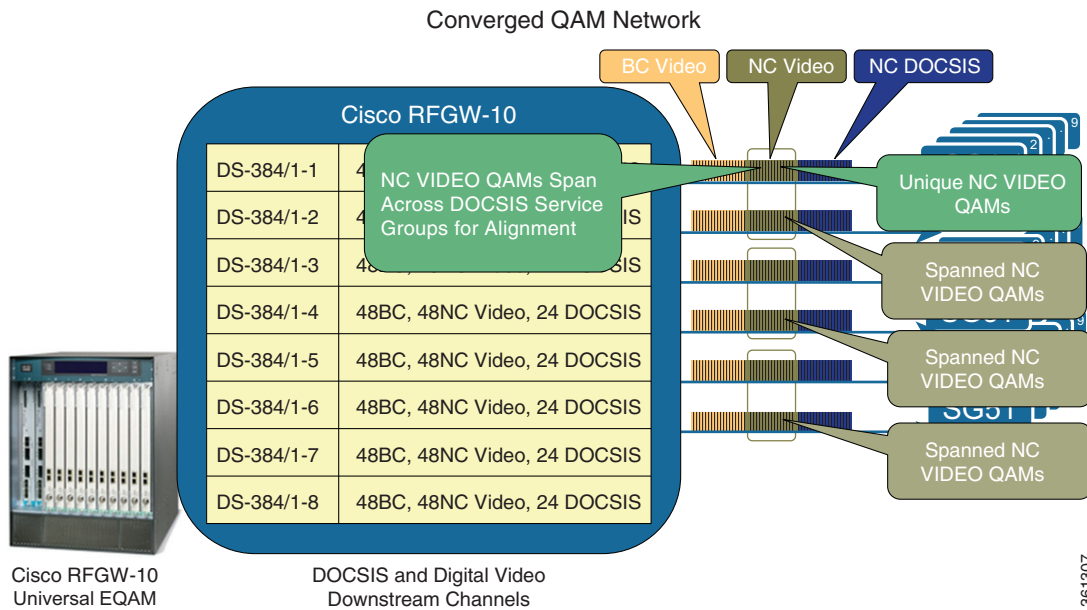When the ratio of HP by narrowcast video services and DOCSIS is 2:1:

- Pilot video channels from port 1 are replicated to port 2

- Pilot video channels from port 3 are replicated to port 4

- Pilot video channels from port 5 are replicated to port 6

- Pilot video channels from port 7 are replicated to port 8.

When the ratio of HP by narrowcast video services and DOCSIS is 4:1:

- Pilot video channels from port 1 are replicated to ports 2, 3 and 4

- Pilot video channels from port 5 are replicated to ports 6, 7 and 8

The typical carrier (QAM) usage for the 4:1scenario may be 16-24 DOCSIS channels, 16-24 Switched Digital Video (SDV) channels, and 8 Video on Demand (VoD) per service group (SG).

Figure 1   *SG Combining Using RF Spanning*

Converged QAM Network

Cisco RFGW-10 Universal EQAM

DOCSIS and Digital Video Downstream Channels

Replicated DOSCIS Carriers (VDOC Use Case)

This use case supports video over DOCSIS (VDOC) broadcast, where linear video flows are flooded to each SG. In this use case, a pilot channel-bonding group on port 1 is replicated to all other ports on the line card.

Figure 2   *VDOC RF Spanning (Broadcast)*
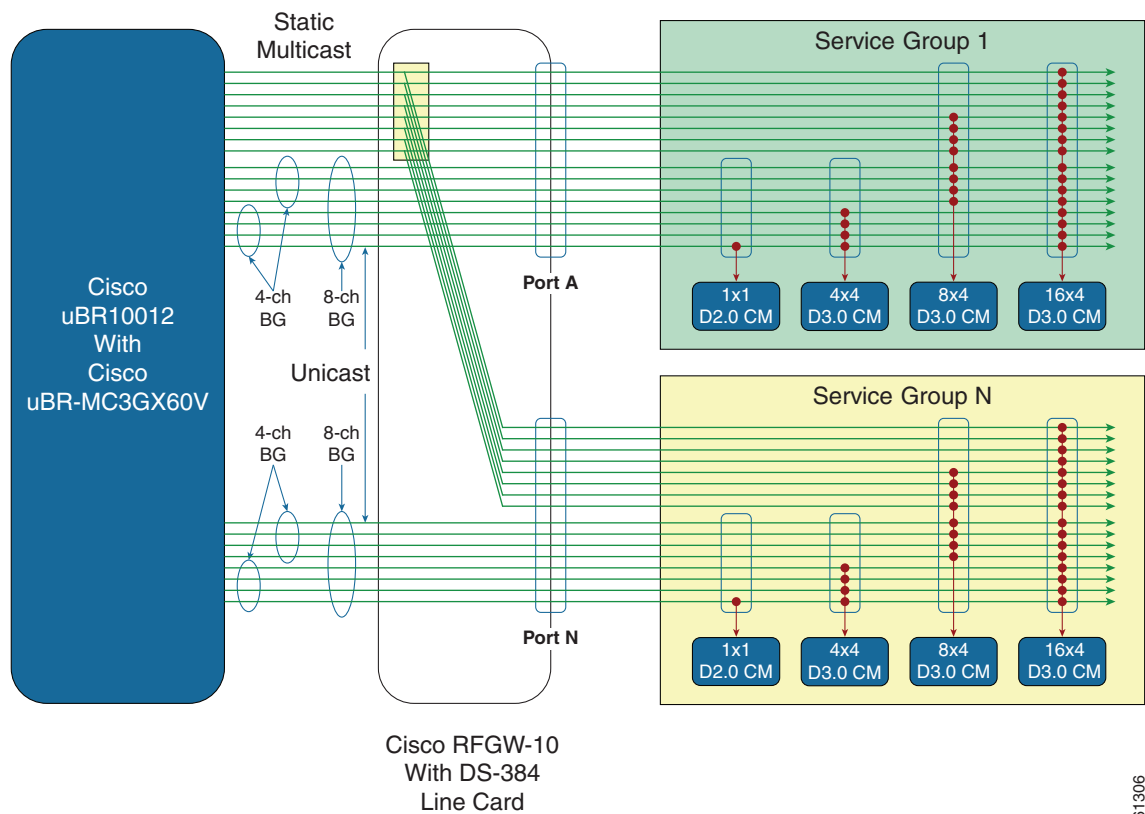
Provisioning Use Cases for RF Spanning

RF Spanning Licensing Use Cases

Adding License to a Line Card

For more information on how to obtain, download, and install permanent licenses, see the Software License Activation for Cisco RF Gateway 10 DS-384 Line Card.

If the license is not activated, complete these steps to activate it:

Step 1 Login to the line card using the following commands:

```
cable telnet slot
login:root
```

Step 2 Activate the *DS_Span_License* using the **license activate DS_Span_License** command and accept the End User License Agreement (EULA).

Step 3 Reset the line card using the **hw-module** *slot* **reset** command.

Line Card License Consumption

The RF spanning licenses are consumed by the number of QAM channels provisioned for the QRG groups.

Note 384 downstream licenses and 640 RF spanning licenses can be installed on a line card. However, a maximum of 384 combined licenses (the sum of downstream licenses for primary channels and RF spanning licenses for secondary or replicate channels) can be consumed in initial video release.

Increase Total Licenses on a Live Line Card

You can increase (upgrade) the number of RF spanning licenses to a maximum of 640 per line card, if needed. For more information on upgrading, see the Software License Activation for Cisco RF Gateway 10 DS-384 Line Card.

Rehost and RMA Licenses

You can transfer the existing RF spanning licenses from one line card to another line card in the system. For more information, see the Software License Activation for Cisco RF Gateway 10 DS-384 Line Card.

Notes for Expired Licenses

For the demo, evaluation, and built-in licenses, de-provision the QRG before the license expires. Do not support expired licenses with the QRG provisioned.

Initial Configuration

Complete the following steps in the specified order for error-free operation:

Configure the Pilot Channel

Provision these parameters for the port and channel that are configured as a pilot, if they are not already provisioned:

- RF parameters (profile, frequency, level, tsid, and so on)
- Cable mode
- LQAM group
- Video or DEPI sessions

Special Notes for Remote Learn DEPI with QRG

- New configuration—Configure the Cisco CMTS and then remotely learn the pilot and QRG on the Cisco RFGW-10.
- Change the Cisco CMTS parameters (for example, frequency, QAM, and so on)—De-provision QRG on the Cisco RFGW10, change the Cisco CMTS, and then re-provision the QRG.

Pilot QAM port:

```
interface Qam3/1
 cable downstream max-carriers 48
 cable downstream freq-profile annex-b-low
```

Pilot QAM:

```
interface Qam3/1.1
 cable carrier-id 1
 cable mode video local
 cable downstream lqam-group 1
 cable downstream tsid 3101
 cable downstream rf-profile 256B
 cable downstream rf-power 41.0
 cable downstream frequency 423000000
 no cable downstream rf-shutdown
 cable video ip 2.2.1.2 udp 1 multicast ssmsd1 program 2
 cable video ip 2.2.1.2 udp 1 multicast ssmsd2 program 3
 cable video ip 2.2.1.2 udp 1 multicast ssmhd2 program 42
 cable video ip 2.2.1.2 udp 1 multicast ssmhd1 program 41
 !
```

Install the RF Spanning License

Install or upgrade the RF spanning license on the line cards (for both primary and secondary line cards if line card high availability (LCHA)).

Check the downstream RF spanning licenses using the **show cable licenses** command. The following example shows the RF spanning licenses for slot 3:

```
# show cable licenses 3
Slot 3 : License Capability : DS384_384_PKEY_N_DVB
---------------------------------------------------
Feature: Downstream Licenses
Installed: 384 Consumed: 1   Available: 384 Forced-Shut: 0

Feature: Downstream Span Licenses
Installed: 640 Consumed: 0   Available: 640 Forced-Shut: 0

Feature: PowerKEY License
Installed: YES Enforced: YES  Channels with PKEY ON: 0

Feature: DVB License
Installed: YES Enforced: NO  Channels with DVB ON: 0
```

If the license accounts for the total number of replicates that are needed, further licensing is not needed.

If there is no license or the license does not account for the total number of replicates that are needed, install new or upgrade license. For more information, see the RF Spanning Licensing Use Cases, page 3.

Configure Line Card High Availability

Provision the line card redundancy as necessary. The following example shows how to make the line card in slot 11 the secondary line card for the line cards in slots 3 and 4.

```
(config)# redundancy
(config-red)# linecard-group 0 internal-switch
(config-red)# class 1:N
(config-red-lc)# member slot 3 primary
(config-red-lc)# member slot 4 primary
(config-red-lc)# member slot 11 secondary
```

Increase Max-Carriers on Replicate Port

Increase the max-carriers on the port, where the replicate port is configured, to cover the addition of the replicate, if necessary.

✎
Note The frequency-profiles, start frequency of the pilot, and replicate QAM ports must be the same.

The following example shows how to set the max-carriers:

✎
Note Repeat this for all the replicate ports.

```
interface Qam-red3/2
cable downstream max-carriers 48
cable downstream freq-profile annex-b-low
!
```

Configure QRG

Create a QRG, add the pilot, and then add the replicates. Acknowledgement for the entire QRG is provided after each carrier is added.

Restrictions

- Exiting the config-qrg level, before adding a pilot and at least one replicate, causes the QRG to be removed from the configuration.

- A QRG can support 1 to 7 replicate channels.

- Pilot and replicate channels must be from different ports.

- Each replicate channel must be from a different port.

Step 1 Create a QRG. The following example shows how to create a QRG:

```
(config)# cable qam-replication-group 1
New qrg - group number 1
```

Step 2 Add pilot channel. The following example shows how to add a pilot channel:

```
(config-qrg)# pilot-qam Qam-red3/1.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
```

Step 3 Add replicate channels. The following example shows how to add replicate channels:

```
(config-qrg)# replicate-qam Qam-red3/2.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1

(config-qrg)# replicate-qam Qam-red3/3.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1
    repl-qam - slot 3, port 3, chan 1

(config-qrg)# replicate-qam Qam-red3/4.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1
    repl-qam - slot 3, port 3, chan 1
    repl-qam - slot 3, port 4, chan 1

(config-qrg)# replicate-qam Qam-red3/5.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1
    repl-qam - slot 3, port 3, chan 1
    repl-qam - slot 3, port 4, chan 1
    repl-qam - slot 3, port 5, chan 1

(config-qrg)# replicate-qam Qam-red3/6.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1
    repl-qam - slot 3, port 3, chan 1
    repl-qam - slot 3, port 4, chan 1
    repl-qam - slot 3, port 5, chan 1
    repl-qam - slot 3, port 6, chan 1
```

```
(config-qrg)# end
```

Verify the Configuration

Verify that the configuration is correctly assigned within the configuration file.

Step 1 Verify the configuration for the QRG. The following example shows how to verify the configuration:

```
# show cable qam-replication-group 1

QRG     Pilot Qam     Replicate Qams
----    ----------    ---------------
1       3/1.1         3/2.1, 3/3.1, 3/4.1, 3/5.1, 3/6.1


#show run
```

- then check the end of the running configuration output

```
cable qam-replication-group 1
pilot-qam Qam-red3/1.1
replicate-qam Qam-red3/2.1
replicate-qam Qam-red3/3.1
replicate-qam Qam-red3/4.1
replicate-qam Qam-red3/5.1
replicate-qam Qam-red3/6.1
!
```

Step 2 Verify the configuration for the pilot channel. The following example shows how to verify this configuration:

```
# show running interface qam-red3/1.1

interface Qam-red3/1.1
 cable carrier-id 1
 cable mode video local
 cable downstream lqam-group 1
 cable downstream tsid 3101
 cable downstream rf-profile 256B
 cable downstream rf-power 41.0
 cable downstream frequency 423000000
 no cable downstream rf-shutdown
 cable qam-replication-group 1 pilot
 cable video ip 2.2.1.2 udp 1 multicast ssmhd1 program 41
 cable video ip 2.2.1.2 udp 1 multicast ssmsd2 program 3
 cable video ip 2.2.1.2 udp 1 multicast ssmhd2 program 42
 cable video ip 2.2.1.2 udp 1 multicast ssmsd1 program 2
!
```

Step 3 Verify the configuration for the replicate channels. The following example shows how to verify tis configuration:

> **Note** This example show only the first replicate channel.

```
# show running interface qam-red3/2.1

interface Qam-red3/2.1
```

```
cable carrier-id 49
cable downstream rf-power 41.0
cable qam-replication-group 1 replicate
!
```

Verify the Controllers

Verify that the controllers for the replicate channels indicate the correct pilot as established in the QRG.

Note RF parameters except the rf-power value (which can be provisioned separately with different values) in controller output of the replicate channel follow the parameters of the pilot channel.

Step 1 View the pilot and the replicate controllers. The following example shows how to view the controllers:

```
# show controllers qam-red 3/1.1 downstream

Qam-red 3/1.1 Downstream is up
        RF Profile Name: 256B
        LQAM Group: 1 Id: 0
        Annex B, Power: 41.0 dBmV
        Frequency: 423000000 Hz, lane: 2, block: 3
        Modulation: 256QAM, TSID: 3101, QAM IDB_State: UP
        Bandwidth Reserved for Video:   35220000 bps
        Bandwidth Used:                 35078202 bps
        Bandwidth Total:                38810700 bps
        Transport Mode: QAM_MODE_VIDEO Qam Owner: LOCAL
        Qam License: Exists
        Interleave Level: 2, FEC I: 32 FEC J: 4
        SNMP LINK TRAP: Disabled
        Bandwidth Reserved for Video Shell Sessions: 0        bps
        Bandwidth Used by Video Shell Sessions:      0        bps

# show controllers qam-red 3/2.1 downstream

Qam-red 3/2.1 Downstream is up
        Replicate of Pilot Qam-red 3/1.1
        RF Profile Name: 256B
        LQAM Group: 1 Id: 0
        Annex B, Power: 41.0 dBmV
        Frequency: 423000000 Hz, lane: 2, block: 3
        Modulation: 256QAM, TSID: 3101, QAM IDB_State: UP
        Bandwidth Reserved for Video:   35220000 bps
        Bandwidth Used:                 35076645 bps
        Bandwidth Total:                38810700 bps
        Transport Mode: QAM_MODE_VIDEO Qam Owner: LOCAL
        Qam License: Exists
        Interleave Level: 2, FEC I: 32 FEC J: 4
        SNMP LINK TRAP: Disabled
        Bandwidth Reserved for Video Shell Sessions: 0        bps
        Bandwidth Used by Video Shell Sessions:      0        bps
```

Step 2 Verify the downstream RF spanning licenses consumed. The following example show how to verify the licenses:

```
# show cable licenses 3

Slot 3 : License Capability : DS384_384_PKEY_N_DVB
```

```
--------------------------------------------------
Feature: Downstream Licenses
Installed: 384 Consumed: 1 Available: 383 Forced-Shut: 0

Feature: Downstream Span Licenses
Installed: 640 Consumed: 5 Available: 635 Forced-Shut: 0

Feature: PowerKEY License
Installed: YES Enforced: YES  Channels with PKEY ON: 0

Feature: DVB License
Installed: YES Enforced: NO  Channels with DVB ON: 0
```

Provision External System for Usage of the QRG Channels

Step 1 Configure the Cisco CMTS for external interface for DOCSIS.

Step 2 Configure Digital Network Control System (DNCS) and Universal Session and Resource Manager (USRM) for remote sessions for external interface for video. For more information about configuring DNCS, see the Provisioning the DNCS to Support SDV Services User Guide. For more information about configuring USRM, see the Provisioning the USRM for SDV on the DNCS.

Step 3 After provisioning the external servers, provision the QRG channels. For more information, see the Configure QRG, page 7.

Expectations After the Provisioning

- The RF spanning license count must be accurate. License count corresponds to the number of replicates configured as shown in the following example:

```
# show cable license 3

Slot 3: License Capability: DS384_384_PKEY
--------------------------------------------------
Feature: Downstream Licenses
Installed: 384 Consumed: 1   Available: 383 Forced-Shut: 0

Feature: Downstream Span Licenses
Installed: 640 Consumed: 2   Available: 638 Forced-Shut: 0

Feature: PowerKEY License
Installed: YES Enforced: NO Channels with PKEY ON: 0
        Note: Encryption license not enforced! Please check the encryption cli
Feature: DVB License
Installed: NO Enforced: NO Channels with DVB ON: 0
```

- The provisioned replicates must be displayed as shown in the following example:

```
# show cable qam-replication-group 1

QRG     Pilot Qam     Replicate Qams
----    ----------    --------------
1       3/1.1         3/2.1, 3/3.1, 3/4.1, 3/5.1, 3/6.1
```

- The running configuration must reflect the correct pilot and replicate configurations.

- The cable modem and set top box (STB) outputs must display the replicated service.

- Provisioning must be error-free. High availability, reloads or reboots, and so on must work fine after provisioning.

De-provisioning Use Case for QRG

Replicated QAMs can be removed from service individually or on a group-basis.

Remove Replicates

- To remove all the replicates from a group, remove the group itself or remove the pilot and exit the config-qrg level. The following example shows how to remove the replicates

```
(config)# no cable qam-replication-group 1
```

OR

```
(config)# cable qam-replication-group 1
Edit qrg - group number 1
 QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam  - slot 3, port 2, chan 1
    repl-qam  - slot 3, port 3, chan 1
    repl-qam  - slot 3, port 4, chan 1
    repl-qam  - slot 3, port 5, chan 1
    repl-qam  - slot 3, port 6, chan 1

(config-qrg)# no pilot-qam Qam-red3/1.1
Removing replicate from the linecard.
Removing replicate from the linecard.
Removing replicate from the linecard.
Removing replicate from the linecard.
Removing replicate from the linecard.
```

- The following example shows how to remove an individual replicate:

```
(config)# cable qam-replication-group 1
Edit qrg - group number 1
 QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam  - slot 3, port 2, chan 1
    repl-qam  - slot 3, port 3, chan 1
    repl-qam  - slot 3, port 4, chan 1
    repl-qam  - slot 3, port 5, chan 1
    repl-qam  - slot 3, port 6, chan 1

(config-qrg)# no replicate-qam Qam-red 3/4.1
Removing replicate from the group.
 QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam  - slot 3, port 2, chan 1
    repl-qam  - slot 3, port 3, chan 1
    repl-qam  - slot 3, port 5, chan 1
    repl-qam  - slot 3, port 6, chan 1
```

Cisco RF Gateway 10 QAM Replication Configuration Guide

Expectations After the De-provisioning

- The RF spanning license count must be accurate. License count drops to 0 after all the QRGs are removed as shown in the following example:

```
# show cable licenses 3

Slot 3: License Capability: DS384_384_PKEY
----------------------------------------------------
Feature: Downstream Licenses
Installed: 384 Consumed: 0   Available: 384 Forced-Shut: 0

Feature: Downstream Span Licenses
Installed: 640 Consumed: 0   Available: 640 Forced-Shut: 0

Feature: PowerKEY License
Installed: YES Enforced: NO Channels with PKEY ON: 0
        Note: Encryption license not enforced! Please check the encryption cli
Feature: DVB License
Installed: NO Enforced: NO Channels with DVB ON: 0
```

- No changes are observed in the downstream licenses.

- Running configuration of the QAM interface must not have the pilot or replicate configurations as shown in the following example:

```
interface Qam3/1.1
 cable carrier-id 1
 cable mode video local
 cable downstream lqam-group 1
 cable downstream tsid 3101
 cable downstream rf-profile 256B
 cable downstream rf-power 41.0
 cable downstream frequency 423000000
 no cable downstream rf-shutdown
 cable video ip 2.2.1.2 udp 1 multicast ssmsd1 program 2
 cable video ip 2.2.1.2 udp 1 multicast ssmsd2 program 3
 cable video ip 2.2.1.2 udp 1 multicast ssmhd2 program 42
 cable video ip 2.2.1.2 udp 1 multicast ssmhd1 program 41
```

- The **show cable qam-replication-group all** command must not display the de-provisioned QRGs as shown in the following example:

```
# show cable qam-replication-group all
QRG     Pilot Qam     Replicate Qams
----    ----------    ---------------
```

- A channel that was previously assigned to a QRG must be available for reuse without reload or reboot.

- De-provisioning must be error-free. High availability, reloads or reboots, and so on must work fine after the de-provisioning.

Re-provisioning Use Case

To modify the parameters of a pilot QAM, de-provision the QRG. After modifying the pilot QAM, re-provision the QRG.

Step 1 De-provision the QRG and remove all carriers from the QRG. The following example shows how to de-provision the QRG:

```
(config)# no cable qam-replication-group 1
```

Step 2   Change the parameters of pilot QAM. The following example shows how to change the parameters:

```
(config)# interface Qam-red3/1.1
(config-subif)# cable downstream tsid 2002
```

Step 3   Re-provision the QRG by recreating the QRG for the necessary carriers. This allows the new pilot parameters to be used at the replicate. The following example shows adding the pilot and the first replicate:

```
(config)# cable qam-replication-group 1
New qrg - group number 1

(config-qrg)# pilot-qam Qam-red3/1.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1

(config-qrg)# replicate-qam Qam-red3/2.1
QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam - slot 3, port 2, chan 1
```

Step 4   Verify that the configuration changes are maintained with the recreation of the QRG for the carriers. The following examples show how to verify the configuration:

```
# show running interface qam-red3/1.1

interface Qam-red3/1.1
 cable carrier-id 1
 cable mode video local
 cable downstream lqam-group 1
 cable downstream tsid 2002
 cable downstream rf-profile 256B
 cable downstream rf-power 41.0
 cable downstream frequency 423000000
 no cable downstream rf-shutdown
 cable qam-replication-group 1 pilot
 cable video ip 2.2.1.2 udp 1 multicast ssmhd1 program 41
 cable video ip 2.2.1.2 udp 1 multicast ssmsd2 program 3
 cable video ip 2.2.1.2 udp 1 multicast ssmhd2 program 42
 cable video ip 2.2.1.2 udp 1 multicast ssmsd1 program 2
!

# show running interface qam-red3/2.1

interface Qam-red3/2.1
 cable carrier-id 49
 cable downstream rf-power 41.0
 cable qam-replication-group 1 replicate!
```

Expectations After the Re-provisioning

- The RF spanning license count must be accurate. License count corresponds to the number of replicates configured as shown in the following example:

```
# show cable licenses 3

Slot 3: License Capability: DS384_384_PKEY
```

```
-------------------------------------------------
Feature: Downstream Licenses
Installed: 384 Consumed: 1   Available: 383 Forced-Shut: 0

Feature: Downstream Span Licenses
Installed: 640 Consumed: 2   Available: 638 Forced-Shut: 0

Feature: PowerKEY License
Installed: YES Enforced: NO Channels with PKEY ON: 0
        Note: Encryption license not enforced! Please check the encryption cli
Feature: DVB License
Installed: NO Enforced: NO Channels with DVB ON: 0
```

- The re-provisioned replicates must be displayed in the as shown in the following example:

    # **show cable qam-replication-group 1**

    ```
    QRG     Pilot Qam     Replicate Qams
    ----    ---------     --------------
    1       3/1.1         3/2.1, 3/3.1, 3/4.1, 3/5.1, 3/6.1
    ```

- The running configuration must show the correct pilot and replicate configurations.

- The cable modem and STB outputs must display the replicated service.

- Re-provisioning must be error-free. High availability, reloads or reboots, and so on must work fine after the re-provisioning.

Maintenance Window

Complete the following steps in the specified order for error-free operations:

Change Power Level

Change the power level of the replicate or pilot carrier as necessary.

- If the power level is not configured on the replicate carrier, it inherits the power level of the pilot when it is added to the QRG. If max-carriers on replicate port are higher than pilot, and power budget does not allow for the pilot level, the highest available replicate power is used for the max-carrier setting.

- A pilot or replicate must be removed from the QRG before making a change. If different power level is needed for a replicate, configure the replicate with the desired power level before it is added into the QRG as a replicate. You can also configure different power levels on the replicates before adding them to the QRG.

The following example shows how to change the power level of an existing replicate carrier:

```
(config)# cable qam-replication-group 1
Edit qrg - group number 1
 QRG - group number 1
    pilot-qam - slot 3, port 1, chan 1
    repl-qam  - slot 3, port 2, chan 1
    repl-qam  - slot 3, port 3, chan 1
    repl-qam  - slot 3, port 4, chan 1
    repl-qam  - slot 3, port 5, chan 1
```

```
                       repl-qam  - slot 3, port 6, chan 1
                  (config-qrg)# no replicate-qam Qam-red3/2.1
                  Removing replicate from the group.
                   QRG - group number 1
                       pilot-qam - slot 3, port 1, chan 1
                       repl-qam  - slot 3, port 3, chan 1
                       repl-qam  - slot 3, port 4, chan 1
                       repl-qam  - slot 3, port 5, chan 1
                       repl-qam  - slot 3, port 6, chan 1
                  (config-qrg)# exit
                  (config)# interface Qam-red3/2.1
                  (config-subif)# cable downstream rf-power 31.0
                  (config-subif)# exit
                  (config)# cable qam-replication-group 1
                  Edit qrg - group number 1
                   QRG - group number 1
                       pilot-qam - slot 3, port 1, chan 1
                       repl-qam  - slot 3, port 2, chan 1
                       repl-qam  - slot 3, port 3, chan 1
                       repl-qam  - slot 3, port 4, chan 1
                       repl-qam  - slot 3, port 5, chan 1
                       repl-qam  - slot 3, port 6, chan 1
                  (config-qrg)# replicate-qam Qam-red3/2.1
                   QRG - group number 1
                       pilot-qam - slot 3, port 1, chan 1
                       repl-qam  - slot 3, port 2, chan 1
                       repl-qam  - slot 3, port 3, chan 1
                       repl-qam  - slot 3, port 4, chan 1
                       repl-qam  - slot 3, port 5, chan 1
                       repl-qam  - slot 3, port 6, chan 1
                  (config-qrg)# end
```

Mute and Unmute a QAM

Muting (shut down) and unmuting (no shut down) a pilot carrier performs the same operation on all its corresponding replicates.

The following example shows how to mute and unmute a pilot:

```
(config)# interface Qam-red3/1.1
(config-subif)# cable downstream rf-shutdown
   (config-subif)# no cable downstream rf-shutdown
```

The following example shows how to mute and unmute an individual replicate carrier. This administratively shuts down the QAM.

✎

Note   The **rf-shutdown** command cannot be used on a replicate QAM.

```
(config)# interface Qam-red3/2.1
(config-subif)# shutdown
   (config-subif)# no shutdown
```

Mute and Unmute a Port

We recommend that you do not mute (shut down) a port that contains QAMs that are part of QRG. If the pilot QAM port is muted, all its corresponding replicate QAMs on other ports are muted.

The following example shows how to administratively shut down or no shut down the port.

✎
Note The **rf-shutdown** command cannot be used on a replicate QAM.

```
(config)# interface Qam-red3/1
(config-int)# shutdown
(config-int)# no shutdown
```

Not Recommended

ASI Monitor Configuration on a Replicate Port

We recommend that you do not configure Asynchronous Serial Interface (ASI) monitor on a replicate port. If it is configured, a warning message is displayed and unexpected system behaviors may be observed.

Default Configuration on a Pilot/Replicate Carrier or Port

We recommend that you do not to use the **default** configuration command on a pilot or replicate carrier if it is for remote learn DEPI. If the **default** command is used, you cannot reconfigure the QRG after the default configuration of the pilot or replicate channel.

Additional References

These topics provide references related to the Software License Activation feature and the CMTS routers.

Related Documents

Document Title	URL
Cisco RF Gateway 10 Command Reference	http://www.cisco.com/en/US/docs/cable/rf_gateway/command/reference/RFGW-10_Book.html
Cisco RF Gateway 10 Software Configuration Guide	http://www.cisco.com/en/US/docs/cable/rf_gateway/feature/guide/rfgw_scg.html

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco IOS-XE releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.