



1:1 and 1:N Line Card Redundancy

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The Cisco RF Gateway 10 (RFGW-10) Universal Edge Quadrature Amplitude Modulation (UEQAM) supports two types of line card redundancy. The QAM line cards are protected with 1:1 and 1:N redundancy schemes. The internal Cisco RF Switch together with the Cisco RFGW-10 UEQAM provides a fully redundant system that enables cable operators to achieve Packet Cable system availability, minimized service disruptions, and simplified operations.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the [“Feature Information for 1:1 and 1:N Line Card Redundancy”](#) section on page 104.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS, Catalyst OS, and Cisco IOS XE software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

Contents

- [Prerequisites for 1:1 and 1:N Line Card Redundancy, page 90](#)
- [Restrictions for 1:1 and 1:N Line Card Redundancy, page 91](#)
- [Information About 1:1 and 1:N Line Card Redundancy, page 91](#)
- [How to Configure 1:1 and 1:N Line Card Redundancy, page 92](#)
- [Additional References, page 103](#)
- [Command Reference, page 104](#)
- [Feature Information for 1:1 and 1:N Line Card Redundancy, page 104](#)
- [Glossary, page 105](#)

Prerequisites for 1:1 and 1:N Line Card Redundancy

- Each of the redundancy groups on the Cisco RFGW-10 must have a secondary line card providing protection for the primary line cards in the same group.
- Secondary QAM line cards are limited to using only slots 11 and 12. If slot 12 is configured as a secondary line card slot, all other slots (3 through 11) can be configured as primary line cards in a single redundancy group.
- Primary cards within a 1:N redundancy group must not overlap with primary cards in another redundancy group.
- Secondary line card in slot 11 must protect the lower-numbered slot group, and slot 12 must protect the line cards in the higher-numbered slot group. For example, slot 11 must protect slots 3 to 6 configured within line card group 1, and slot 12 must protect slots 7 to 10 configured within line card group 2.
- If slot 11 is configured as a secondary line card, it must have a QAM line card in slot 3 in its protect redundancy group.

Additional Prerequisites For Multiple Card Types on the Cisco RFGW-10

- Each line card group has a reserve card type configuration associated with the line card. In a typical line card redundancy configuration, the reserve card type is automatically generated when the primary line card is configured. To manually configure the reserve card type prior to configuring the first primary line card, use the **reserve cardtype** command.

[Table 1](#) lists the line card redundancy compatibility between the Cisco RFGW-10 line cards within the same redundancy group.

Table 1 *Line Card Redundancy Matrix*

Cisco RFGW-10 Line Cards	Primary RFGW-10 DS-384	Primary RFGW-10 DS-48-1G	Primary RFGW-10 DS-48
Secondary RFGW-10 DS-384	Yes	No	No
Secondary RFGW-10 DS-48-1G	No	Yes	Yes
Secondary RFGW-10 DS-48	No	No	Yes

- Card types in one redundancy group are not required to be compatible with card types in other redundancy groups.
- Additional redundancy line cards are configured only for card types that are compatible with reserve card types and the existing members.
- Adding software licenses affects line card protection. Secondary line cards should have a higher count of installed licenses than the primary card in the same redundancy group to permit new members joining the group.
- The primary card cannot initialize if the primary card is removed and replaced with a card with higher count of installed licenses than the secondary card. Similarly, the secondary card cannot initialize if the secondary card is replaced by a line card with a license count too low to protect one or more primary cards.

- If a line card in a redundancy group is replaced with another line card having a different number of installed licenses, the other members of the group will be re-evaluated and allowed to initialize if they now meet the license restrictions.
- A line card with encryption license can protect a line card with encryption license. Similarly, line cards without encryption license protect line cards that do not have encryption licenses.

**Note**

The QAM ports of the QAM line card are protected. Front panel Gigabit Ethernet and the 10-Gigabit Ethernet SFP ports are not protected. They remain in use for all line cards regardless of the active or standby redundancy states.

Restrictions for 1:1 and 1:N Line Card Redundancy

- Cisco RFGW-10 DS-48 and Cisco RFGW-10 DS-384 line cards have different ports, hence cannot be used in the same redundancy group.
- Redundancy cannot be configured for slots containing no line card or when the card type is not determined.
- The **class** command must be configured before adding members.
- One or more primary line cards must be configured before adding a secondary line card.
- The Cisco RFGW-10 UEQAM supports only the internal-switch redundancy type.

Information About 1:1 and 1:N Line Card Redundancy

The Cisco RFGW-10 supports up to two line card protection groups—class 1:1 or class 1:N. 1:N redundancy or 1 for N backup (warm standby) refers to a single QAM line card protecting more than one line card. Therefore, a single QAM line card can protect a maximum of nine other QAM line cards. 1:1 redundancy refers to a configuration where each line card has a dedicated backup line card in case of failure (hot standby).

**Note**

After a line card switchover, the RF output from the secondary line card in slot 11 or 12 replaces the output from the failed primary line card. Due to the difference in the RF path of the primary and secondary line cards, and the inevitable uncertainty in the measurement of the line card in the calibration processes, a switchover may result with a nominal RF power delta of up to 3 dB at the chassis output. The system will automatically attempt to minimize this power change by adjusting RF power on the secondary line card.

The RF power delta will be minimized when the primary line card is not operated at maximum RF power.

How to Configure 1:1 and 1:N Line Card Redundancy

This section describes how to configure 1:1 and 1:N line card redundancy in the Cisco RFGW-10 UEQAM:

- [Configuring Primary and Secondary Line Cards for 1:1 and 1:N Redundancy, page 92](#)
- [Displaying Line Card Redundancy Information, page 95](#)
- [Initiating a Line Card Switchover, page 96](#)
- [Deconfiguring Primary Line Cards, page 99](#)
- [Deconfiguring Secondary Line Cards, page 100](#)

Configuring Primary and Secondary Line Cards for 1:1 and 1:N Redundancy

This section describes how to configure the Primary and Secondary QAM line cards for 1:1 and 1:N redundancy schemes.

Prerequisites

- The line card must be capable of performing the redundancy class (1:1 or 1:N) defined for the group.
- The line card being added to the redundancy group must not overlap with another redundancy group.
- If multiple line cards exist on the Cisco RFGW-10 router, see the additional prerequisites (“[Prerequisites for 1:1 and 1:N Line Card Redundancy](#)” section on page 90), and the line card redundancy compatibility matrix. (See [Table 1](#))

The prerequisites for adding a secondary line card are:

- The line card must be within the correct range of a secondary line card for its specified redundancy class (1:1 or 1:N).
- The line card must be of the same type as the other primary line cards in the group.
- The mandatory primary line cards for the redundancy group must be configured for that redundancy group.
- The primary line card that should not be in a redundancy group must not be added to that redundancy group.
- The Cisco RFGW-10 DS-48-1G line card can be the standby card for the Cisco RFGW-10 DS-48 line card.



Note

The Cisco RFGW-10 DS-48 line card cannot be the standby card for the Cisco RFGW-10 DS-48-1G card.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**
4. **linecard-group *linecard-groupId* internal-switch**

5. **class** {1:1 | 1:N}
6. **member slot** *slot* **primary**
7. **reserve cardtype** *type*
8. **member slot** *slot* **secondary**
9. **exit**
10. **write memory**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	redundancy Example: Router(config)# redundancy	Enters redundancy configuration mode.
Step 4	linecard-group <i>linecard-groupId</i> internal-switch Example: Router(config-red)# linecard-group 1 internal-switch	Configures a link protection scheme for the redundancy group. The no form of the command removes the line card redundancy group, and frees the associated <i>linecard-groupId</i> for future use. The no linecard-group command succeeds only when you have not configured the slot members. If not, the system displays a message stating that the slot members have to be removed first will be displayed.
Step 5	class { 1:1 1:N } Example: Router(config-red)# class 1:N	Configures the redundancy class. Classes 1:1 and 1:N imply transmission switching from active line card to standby line card on switchover. Class 1:N with one Primary and one Secondary member is different from class 1:1 . With class 1:1 configuration, hot redundancy is supported but with class 1:N configuration, warm redundancy is supported at best. It is mandatory to configure the class before adding members to a redundancy group. When you execute the no form of this command, the default class for the line card group's link protection scheme is used instead of the class that is currently configured.
Step 6	member slot <i>slot</i> primary Example: Router(config-red)# member slot 3 primary	Configures a slot as Primary in a redundancy group.
Step 7	reserve cardtype <i>type</i> Example: Router(config-red-lc)# reserve cardtype 0x6015	(Optional) Manually configures the reserve cardtype for the primary line card. Note In typical configuration, the reserve card type is automatically generated when the primary line card is configured.

	Command or Action	Purpose
Step 8	member slot slot secondary Example: Router(config-red)# member slot 11 secondary	Configures a slot as Secondary. For a given line card redundancy group, you can specify one Secondary slot. Subsequent attempts are rejected with an error message.
Step 9	exit Example: Router(config-red)# exit	Exits global and redundancy configuration modes and returns to privileged EXEC mode.
Step 10	write memory Example: Router# write memory	Saves your settings to the nonvolatile random access memory (NVRAM) to ensure that the system retains the settings after a power cycle.

Examples

The following example assigns member slots 7 and 12 as Primary and Secondary line cards respectively in the redundancy line card group 2 in the Cisco RFGW-10 UEQAM:

```
Router(config-red)# linecard-group 2 internal-switch
Router(config-red-lc)# class 1:1
Router(config-red-lc)# member slot 7 primary
Router(config-red-lc)# reserve cardtype 0x6015
Router(config-red-lc)# member slot 12 secondary
```

Displaying Line Card Redundancy Information

To display the redundancy status and other related information of a line card or a line card group, use the following command in user EXEC or privileged EXEC mode:

```
Router# show redundancy linecard {slot slot-number | all | group [linecard-groupID | all]}
```

Examples

The following is a sample output of the show running-config command displaying the redundancy for line card group 2:

```
Router# show run | beg redundancy
...
redundancy
  linecard-group 2 internal-switch
  class 1:N
  reserve cardtype 0x6011
  member slot 3 primary
  revertive 300
  mode sso
!
```

The following is sample output for redundancy of line card group 2:

```
Router# show redundancy linecard group 2
Group Identifier: 2
Group Description: "line card group 2 created."
NON-revertive
```

```

Reserved Cardtype: 0x6011 24593
Group Redundancy Type: INTERNAL SWITCH
Group Redundancy Class: 1:1
Group Redundancy Configuration Type: LINECARD GROUP
Primary: 7
Secondary: 12

```

The following is sample output for redundancy of line card in slot 3:

```
Router# show redundancy linecard slot 3
```

```

LC Group Number: 0
LC Slot: 3 (idx=3)
LC Card Type: 0x6011 , 24593
LC Name: 3
LC Mode: Primary
LC Role: Active
LC My State: Active
LC Peer State: Stdbby Warm

```

The following is sample output for redundancy of all line cards:

```
Router# show redundancy linecard all
```

Slot	Subslot	LC Group	My State	Peer State	Peer Slot	Peer Subslot	Role	Mode
3	-	0	Active	Stdbby Warm	12	-	Active	Primary
5	-	0	Active	Stdbby Warm	12	-	Active	Primary
7	-	0	Active	Stdbby Warm	12	-	Active	Primary
12	-	0	-	-	Multiple	None	Standby	Secondary

At any given point in time, a 1:N Secondary Standby does not have a unique My State value. It has N values of My State with each value corresponding to one of the N primaries that it is protecting. Because all N My State values cannot be displayed simultaneously on the console for a 1:N Secondary Standby line card, a hyphen (-) is displayed instead. The My state for the 1:N Secondary Standby corresponding to a specific Primary it protects is indicated by that Primary line card's Peer State.

In the example, line card 12 (the 1:N Secondary Standby) is in Standby Warm state for all the three Primary line cards it protects. This is the steady state of this 1:N LCRED configuration. Before it reaches steady-state, the CLI display for the above command resembles the following sample output:

Slot	Subslot	LC Group	My State	Peer State	Peer Slot	Peer Subslot	Role	Mode
3	-	0	Active	Stdbby Warm	12	-	Active	Primary
5	-	0	Active	Init	12	-	Active	Primary
7	-	0	Active	Stdbby Cold	12	-	Active	Primary
12	-	0	-	-	Multiple	None	Standby	Secondary

In the previous sample output, the state of the Secondary Standby line card 12 is Standby Warm for Primary line card 3, Init for Primary line card 5, and Standby Cold for Primary line card 7.

These are legal transient states for a 1:N Secondary Standby line card.

Initiating a Line Card Switchover

To initiate a line card switchover, use the following command in privileged EXEC mode:

```
Router# redundancy linecard-group switchover from slot slot
```


If the standby line card is ready to switchover, then this command will cause a switch over from the active line card specified in the command to the current standby line card.

As this is a user-initiated switchover, the revertive timer is not triggered.

Revertive Switchover

On the Cisco RFGW-10 UEQAM, a Secondary line card is hosted only in specific slots. In a 1:N redundancy group, if a Primary active line card fails, the Secondary standby line card in that slot becomes active. After the failed Primary line card is repaired and becomes Standby Hot, a revertive timer is started. When a timeout occurs, the Primary line card becomes active and the Secondary line card reverts to standby to protect the N Primary line cards. The revertive switchover occurs even during the online insertion and removal (OIR) of the Primary line card.

For 1:N redundancy, until revertive switchover occurs, the Secondary line card protects only the affected Primary line card and the other Primary line cards are not protected.

The Revertive Switchover is enabled by default for a redundancy group having class 1:N.

It is important to distinguish between the revertive feature being enabled for a group and the revertive timer being turned on. The revertive timer can be off even when the revertive feature is enabled.

```
Router# show redundancy linecard group 0
Group Identifier: 0
Revertive, Revert Timer: OFF (300 sec)
Reserved Cardtype: 0x6011 24593
Group Redundancy Type: INTERNAL SWITCH
Group Redundancy Class: 1:N
Group Redundancy Configuration Type: LINECARD GROUP
Primary: Slot 5
Primary: Slot 7
Secondary: Slot 12
```

When the repaired or re-inserted Primary line card transitions to the Standby Hot state, the revertive timer is started. When the revertive timer times out, the Primary line card is active and the Secondary card is reset so that it becomes the standby to protect the N Primary line cards in the redundancy group.

```
Router# show redundancy linecard group 0
Group Identifier: 0
Revertive, Revert Timer: ON (300 sec) Remaining Time: 26 sec
Reserved Cardtype: 0x6011 24593
Group Redundancy Type: INTERNAL SWITCH
Group Redundancy Class: 1:N
Group Redundancy Configuration Type: LINECARD GROUP
Primary: Slot 5
Primary: Slot 7
Secondary: Slot 12
```

The revertive timer for a redundancy group is not triggered when the switchover is user-initiated using the **redundancy linecard-group switchover from slot slot** command. The revertive feature gets disabled when a user initiates a switchover.

```
Router# show redundancy linecard group 0
Group Identifier: 0
Revertive, Revert Timer: OFF (300 sec)
Revertive feature is disabled due to user switchover request
Reserved Cardtype: 0x6011 24593
Group Redundancy Type: INTERNAL SWITCH
Group Redundancy Class: 1:N
Group Redundancy Configuration Type: LINECARD GROUP
```

```
Primary: Slot 5
Primary: Slot 7
Secondary: Slot 12
```

The default value of the Revertive Timer is 300 seconds, but you can specify the value using the following command:

```
Router(config-red-lc)# revertive [timeout in seconds]
```

In addition to this, if the revertive feature for a redundancy group has been disabled previously by the **no revertive** command, the above command will automatically enable the revertive feature for this redundancy group. The revertive feature is disabled by default for a redundancy group having class 1:1.

Handling Multiple Line Card Failures With the Revertive Feature

You can use the revertive feature for multiple Primary line card failures in a 1:N redundancy group. When the repaired or re-inserted Primary is Standby Hot, the revertive timer is triggered. When another Primary line card in that redundancy group fails, the timer is turned off to cause an immediate switchover so that the Secondary line card can take over for the other failed Primary line card.

Virtual Interfaces

The Virtual Interface model for 1:N redundancy establishes the relationship between the physical interfaces (both primary and secondary) and the virtual interfaces. In a 1:N redundancy group, every Primary physical interface has only one virtual interface corresponding to it, whereas a Secondary physical interface corresponds to N virtual interfaces.

For line cards configured as part of a redundancy group, all the configurations are associated with the virtual interface rather than with the physical interface.

The virtual interface has the same slot, port, and channel as the corresponding Primary physical interface. The name of the virtual interface is derived by adding a “-red” suffix to the name of the corresponding Primary physical interface.

For example, if the Primary physical interface is named “Qam5/1,” the corresponding virtual interface is named “Qam-red5/1.”

For two line cards (in slots 3 and 11) that are not part of a redundancy group, the output of the **show running-config** command will display the physical interfaces of both the line cards as:

```
interface Qam3/1
interface Qam3/1.1
interface Qam3/1.2
interface Qam3/1.3
interface Qam3/1.4
...
...
interface Qam11/1
interface Qam11/1.1
interface Qam11/1.2
interface Qam11/1.3
interface Qam11/1.4
...
...
```

When the line card in slot 3 is added as a Primary member and the line card in slot 11 is added as a Secondary member of a redundancy group, the output of the **show running-config** command will display the virtual interfaces (with a “-red” suffix) for this redundancy group as:

```
interface Qam-red3/1
interface Qam-red3/1.1
interface Qam-red3/1.2
interface Qam-red3/1.3
interface Qam-red3/1.4
....
....
```

**Note**

The Primary and Secondary physical interfaces (Qam3/1, Qam11/1, and their subinterfaces) will not be shown in the redundancy configuration.

Even after a switchover from slot 3 to slot 11, the same virtual interfaces (having the slot, port, and channel as the Primary physical interface) are displayed by the **show running-config** command. Subsequently, if a revertive switchover occurs and slot 3 becomes active again, the same virtual interfaces will be displayed for this group. Hence, all the configurations are associated with the virtual interface.

The physical and virtual interface-related information can also be obtained from the output of the **show ip interface brief** command.

Deconfiguring Primary Line Cards

This section describes how to deconfigure Primary QAM line cards.

Restrictions

- A mandatory Primary line card cannot be removed from the redundancy group.
- You cannot delete the last Primary member without deleting the Secondary member. Hence, if there are four Primary members in a group, you can delete three out of four with the Secondary present. But to delete the last Primary member, you have to delete the Secondary member first. For example, if the Secondary is slot 11, then slot 3 will be the last member to be deleted and it can be deleted only after the Secondary slot 11 is deleted.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**
4. **linecard-group** *linecard-groupId* **internal-switch**
5. **no member slot** *slot* **primary**
6. **exit**
7. **write memory**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	redundancy Example: Router(config)# redundancy	Enters redundancy configuration mode.
Step 4	linecard-group <i>linecard-groupId</i> internal-switch Example: Router(config-red)# linecard-group 1 internal-switch	Configures a link protection scheme for the redundancy group. To remove the line card redundancy group and free the associated <i>linecard-groupId</i> for future use, use the no form of the command. The no linecard-group command succeeds only when there are no slot members configured. If not, the system displays a message that the slot members have to be removed first.
Step 5	no member slot <i>slot</i> primary Example: Router(config-red)# no member slot 3 primary	Deconfigures the Primary line card from the redundancy group.
Step 6	exit Example: Router(config-red)# exit	Exits global and redundancy configuration modes and returns to privileged EXEC mode.
Step 7	write memory Example: Router# write memory	Saves your settings to the nonvolatile random access memory (NVRAM) to ensure that the system retains the settings after a power cycle.

Deconfiguring Secondary Line Cards

This section describes how to deconfigure Secondary QAM line cards.

Restrictions

- The Secondary line card member should be deleted before the last Primary member is deleted from the redundancy group.
- You cannot delete an Active Secondary member unless the Primary member it is protecting is fully

Standby and ready to take over.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**
4. **linecard-group** *linecard-groupId* **internal-switch**
5. **no member slot** *slot* **secondary**
6. **exit**
7. **write memory**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	redundancy Example: Router(config)# redundancy	Enters redundancy configuration mode.
Step 4	linecard-group <i>linecard-groupId</i> internal-switch Example: Router(config-red)# linecard-group 1 internal-switch	Configures a link protection scheme for the redundancy group. To remove the line card redundancy group and free the associated <i>linecard-groupId</i> for future use, use the no form of the command. The no linecard-group command succeeds only when there are no slot members configured. If not, the system displays a message that the slot members have to be removed first.
Step 5	no member slot <i>slot</i> secondary Example: Router(config-red)# no member slot 11 secondary	Deconfigures the Secondary line card from the redundancy group.

	Command or Action	Purpose
Step 6	exit Example: Router(config-red)# exit	Exits global and redundancy configuration modes and returns to privileged EXEC mode.
Step 7	write memory Example: Router# write memory	Saves your settings to the nonvolatile random access memory (NVRAM) to ensure that the system retains the settings after a power cycle.

Additional References

The following sections provide references related to the 1:1 and 1:N Line Card Redundancy feature.

Related Documents

Related Topic	Document Title
Cisco RFGW-10 commands	Cisco RF Gateway 10 Command Reference http://www.cisco.com/en/US/docs/cable/rf_gateway/command/reference/RFGW-10_Book.html
New Software Features in Cisco IOS Release 12.2SQ	Cisco RF Gateway 10 Software Feature and Configuration Guide http://www.cisco.com/en/US/docs/cable/rf_gateway/feature/guide/rfgw_scg.html

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
DOCS-IF-MCMTS-MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

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/techsupport

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco RF Gateway 10 Command Reference* at http://www.cisco.com/en/US/docs/cable/rf_gateway/command/reference/RFGW-10_Book.html. For information about all Cisco IOS commands, use the Command Lookup Tool at <http://tools.cisco.com/Support/CLILookup> or the *Cisco IOS Master Command List, All Releases*, at http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html.

- **redundancy**
- **linecard-group** *linecard-groupId* **internal-switch**
- **class** {1:1 | 1:N}
- **[no] member slot** *slot* **primary**
- **[no] member slot** *slot* **secondary**
- **show redundancy linecard** {*slot slot-number* | **all** | **group** [*linecard-groupID* | **all**]}
- **redundancy linecard-group** **switchover from slot** *slot*
- **revertive** [*timeout in seconds*]

Feature Information for 1:1 and 1:N Line Card Redundancy

Table 2 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS, Catalyst OS, and Cisco IOS XE software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

**Note**

Table 2 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 2 Feature Information for 1:1 and 1:N Line Card Redundancy

Feature Name	Releases	Feature Information
1:1 and 1:N Line Card Redundancy	Cisco IOS Release 12.2(44)SQ	This feature was introduced in the Cisco IOS Release 12.2(44)SQ to support the Cisco RF Gateway 10. The following commands were introduced or modified: • redundancy • linecard-group <i>linecard-groupId</i> internal-switch • class { 1:1 1:N } • [no] member slot <i>slot</i> primary • [no] member slot <i>slot</i> secondary • show redundancy linecard { slot <i>slot-number</i> all group [<i>linecard-groupID</i> all] } • redundancy linecard-group switchover from slot <i>slot</i> • revertive [<i>timeout in seconds</i>]
Line card redundancy when multiple line cards exist on the Cisco RFGW-10	Cisco IOS-XE Release 3.2.0SQ	Additional prerequisites to configure line card redundancy when multiple card types exist on the Cisco RFGW-10. The following commands were introduced: • reserve cardtype

Glossary

LCRED—Line Card Redundancy

NVRAM—Nonvolatile Random Access Memory

OIR—Online Insertion and Removal

UEQAM—Universal Edge Quadrature Amplitude Modulation. A network element, which receives MPEG-TS frames over a network interface such as Ethernet, and modulates them onto QAM carriers for use on an HFC plant.

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