



Frame Relay Point-Multipoint Wireless

Feature History

Release	Modification
Prior to 12.2(2)T	This feature was introduced on various platforms.
12.2(2)T	Support for this feature was added to multipoint fixed wireless.

This feature module describes Frame Relay support for multipoint fixed wireless. It includes information on the benefits of the new feature, supported platforms, related documents, and other information.

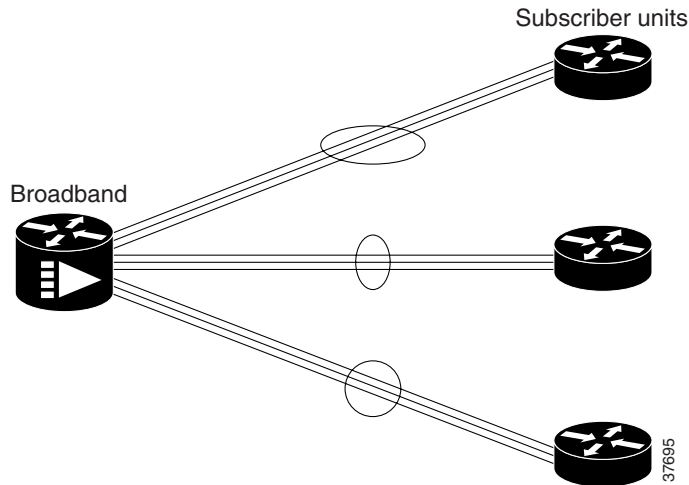
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Feature Overview

This feature provides an end-to-end Frame Relay network for customers using wireless interfaces in their Frame Relay network. Several new commands are used to establish a virtual Frame Relay interface, then link it to a specific multipoint destination MAC address. The configuration information is associated with a new interface type, virtual Frame Relay and new interface commands, **interface virtual-framerelay** and **frame-relay over radio**.

Using the new interface enables Cisco uBR7200 series, Cisco 3600 series, and Cisco 2600 series routers to provide a seamless transition from a serial interface to a multipoint Frame Relay interface. By implementing RFC 1315, Frame Relay DTE MIB, a virtual Frame Relay interface can be linked to a specific multipoint radio interface and destination MAC address. The headend router acts as a Frame Relay switch, receiving radio frequency signals from subscriber units. Once received, the multipoint link is switched to a serial link and then to an upstream router.

Figure 1 Point to Multipoint

Benefits

This feature provides a seamless extension of Frame Relay services over fixed wireless. The look and feel of the interface is consistent with existing Frame Relay services.

The existing Frame Relay infrastructure is leveraged by creating a virtual interface. No hardware upgrade is required.

Restrictions

The wireless network module must be installed and configured correctly and use the Cisco IOS Release 12.2(2)T image. The virtual Frame Relay interface is used only in conjunction with the multipoint radio interface. It cannot be used in conjunction with the cable interface.

Frame Relay over fixed wireless offers a lower payload than over a serial interface. The payload is 1488 bytes compared to 1500 bytes when Frame Relay is on a serial link.

Related Features and Technologies

The multipoint fixed wireless interface must be used to take advantage of the new functionality.

Related Documents

For detailed information about Cisco multipoint wireless support on the Cisco uBR7200 series universal broadband routers, and the Cisco 2600 series and Cisco 3600 series routers, see the following documents:

Routers

- *Router Products Command Reference*

Headend Documents

- *Cisco uBR7200 Series Multipoint Wireless Modem Card and Subsystem Installation*
- *Cisco Multipoint Headend Wireless Transverter Duplexer Replacement Instructions*
- *Cisco Multipoint Headend Power Feed Panel Replacement Instructions*
- *Cisco Multipoint Headend Wireless Transverter Replacement Instructions*
- *Multipoint Wireless Support for Cisco uBR7200 Series Universal Broadband Router*

Subscriber Unit Documents

- *Multipoint Wireless Support for the Cisco 2600 and Cisco 3600 Series Routers*
- *Cisco 2600 Series Hardware Installation Guide*
- *Software Configuration Guide (for Cisco 3600 series and Cisco 2600 series routers)*
- *Cisco Network Modules Hardware Installation Guide (for Cisco 3600 series and Cisco 2600 series routers)*

Supported Platforms

The Frame Relay Point-Multipoint Wireless feature is supported on following platforms:

- Cisco 2610
- Cisco 2611
- Cisco 2620
- Cisco 2621
- Cisco 2650
- Cisco 2651
- Cisco 3620
- Cisco 3640
- Cisco 3661
- Cisco 3662
- Cisco uBR7223
- Cisco uBR7246
- Cisco uBR7246 VXR

Supported Standards, MIBs, and RFCs

Standards

DOCSIS 1.0 and 1.0+. The DOCSIS 1.0+ implementation is DOCSIS 1.0 with quality-of-service (QoS) support.

MIBs

This feature is supported by:

- Cisco uBR7200 series MIBs and DOCSIS MIBs
- Frame Relay DTE MIB (RFC 1315)

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on cisco.com at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

RFCs

- RFC 1315, *Management Information Base for Frame Relay DTEs*

Prerequisites

The routers and wireless links must be functioning properly to use this feature.

Configuration Tasks

See the following sections for configuration tasks for the Frame Relay Point-Multipoint Wireless feature. Each task in the list indicates if the task is optional or required.

- Creating the virtual Frame Relay interface.

Creating the Virtual Frame Relay Interface

To create a virtual Frame Relay interface, enter these commands beginning in the global configuration mode:

	Command	Purpose
Step 1	Router(config)# interface virtual-framerelay <i>number</i>	Creates the virtual Frame Relay interface and assigns a number to the interface.
Step 2	Router(config-if)# frame-relay over radio <i>interface destination</i>	Identifies the slot and port numbers of the interface.

Verifying Virtual Frame Relay

To verify that the interface is present, enter the **show interface virtual-framerelay** command.

Troubleshooting Tips

Verify that the multipoint wireless link is up and is working properly, then follow standard Frame Relay troubleshooting procedures.

Configuration Examples

This section provides the following configuration examples:

- Headend Example
- Subscriber Unit Example

Headend Example

The example shows the virtual Frame Relay interface being created. The number assigned at the end of the **interface virtual-framerelay** command is the number assigned to the virtual interface. The **frame-relay over radio** command is used to link the interface to a specific MAC address after the interface has been created.

```
!
interface virtual-framerelay1
 ip address 10.6.24.20 255.255.0.0
 frame-relay map ip 11.6.24.21 16
 frame-relay intf-type dce
 frame-relay route 100 interface Hssi1/0 100
 frame-relay route 200 interface Hssi1/0 300
 frame-relay over Radio3/0 0002.b905.fc30
!
interface virtual-framerelay2
 ip address 10.30.36.12 255.255.255.0
 frame-relay map ip 11.30.36.12 16
 frame-relay intf-type dce
 frame-relay route 100 interface Hssi1/0 200
 frame-relay route 200 interface Hssi1/0 400
 frame-relay over Radio3/0 0002.fd50.bf90
interface Hssi1/0
 no ip address
 encapsulation frame-relay
 no ip mroute-cache
 hssi internal-clock
 frame-relay lmi-type cisco
 frame-relay intf-type dce
 frame-relay route 100 interface Virtual-FrameRelay1 100
 frame-relay route 200 interface Virtual-FrameRelay2 100
 frame-relay route 300 interface Virtual-FrameRelay1 200
 frame-relay route 400 interface Virtual-FrameRelay2 200
!
interface radio3/0 point-to-multipoint
 ip address 10.30.38.0 255.255.255.0
 no ip mroute-cache
 no keepalive
 radio cable-loss 1 4 1
 radio transmit-power 31
 radio upstream frequency 2156000 width 6.0
 radio upstream 0 subchannel 3 modulation-profile 8
 radio upstream 0 target-receive-power -72
```

```

no radio upstream 0 shutdown
radio upstream 1 target-receive-power -72
radio upstream 1 shutdown
radio upstream 2 target-receive-power -72
radio upstream 2 shutdown
radio upstream 3 target-receive-power -72
radio upstream 3 shutdown
radio downstream frequency 2530000 width 6.0
radio downstream subchannel 2 modulation-profile 1
radio su-onoff-trap interval 600

```

interface virtual-frameRelay1

```

Virtual-FrameRelay1 is up, line protocol is up
Hardware is Virtual Frame Relay interface
MTU 1488 bytes, BW 100000 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation FRAME-RELAY, loopback not set
Keepalive set (10 sec)
LMI enq sent 0, LMI stat recvd 0, LMI upd recvd 0
LMI enq recvd 1175, LMI stat sent 1175, LMI upd sent 0, DCE LMI up
LMI DLCI 1023 LMI type is CISCO frame relay DCE
Broadcast queue 0/64, broadcasts sent/dropped 0/0, interface broadcasts 0
Last input 00:00:07, output never, output hang never
Last clearing of "show interface" counters 4d03h
Queueing strategy:fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 9000 bits/sec, 2 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
2094 packets input, 229655 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
1175 packets output, 66954 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions

```

Subscriber Unit Example

The example shows the **interface virtual-framerelay** command being used on the subscriber unit to create the virtual Frame Relay interface. The **frame-relay over radio** command is used to link the interface to a specific MAC address, after the interface has been created.

```

interface virtual-framerelay1
ip address 11.6.24.21 255.255.0.0
frame-relay over Radio1/0 0030.80ac.a054
!
interface virtual-framerelay1.1 point-to-point
ip address 192.168.0.0 255.255.255.0
no cdp enable
frame-relay interface-dlci 100
!
interface virtual-framerelay1.2 multipoint
ip address 192.168.1.1 255.255.255.0
frame-relay map ip 192.168.1.0 200
!
interface radio1/0 point-to-multipoint
ip address docsis
no ip route-cache
no ip dvmrp auto-summary
no ip mroute-cache
docsis boot admin 2

```

```
docsis boot oper 5
docsis upstream channel 1 only
docsis mac-timer t2 180000
no docsis compliant bridge
radio cable-loss 1 2 1
no cdp enable
```

show interface virtual-frameRelay1

```
Virtual-FrameRelay1 is up, line protocol is up
  Hardware is Virtual Frame Relay interface
  MTU 1488 bytes, BW 100000 Kbit, DLY 100000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation FRAME-RELAY, loopback not set
  Keepalive set (10 sec)
  LMI enq sent 1579, LMI stat recvd 1224, LMI upd recvd 0, DTE LMI up
  LMI enq recvd 0, LMI stat sent 0, LMI upd sent 0
  LMI DLCI 1023 LMI type is CISCO frame relay DTE
  Broadcast queue 0/64, broadcasts sent/dropped 0/0, interface broadcasts 0
  Last input 00:00:08, output never, output hang never
  Last clearing of "show interface" counters 4d03h
  Queueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  3 minutes, 30 seconds input rate 0 bits/sec, 0 packets/sec
  3 minutes, 30 seconds output rate 0 bits/sec, 0 packets/sec
  1984 packets input, 395391 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  2474 packets output, 875444 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
```

Command Reference

This section documents new commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

New Commands

- **debug frame-relay virtual**
- **frame-relay over radio**
- **interface virtual-framerelay**

debug frame-relay virtual

To display debug messages for the virtual Frame Relay interface, use the **debug frame-relay virtual** command. The **debug frame-relay virtual** command produces output only when problems occur.

debug frame-relay virtual *destination interface*

Syntax Description	<i>destination interface</i> Enables the debugging messages for that specific interface.
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Defaults	Disabled
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Command History	Release	Modification
	12.2(2)T	This command was introduced.

Examples The following example shows the output if one of the routers has not been configured. This output occurs when the other end is trying to send the receiving box Frame Relay packets.

```
VFR: Radio1/0 has no VFR for 00:00:C068:6F:AA
```

Related Commands	Command	Description
	interface virtual-framerelay	Defines the virtual interface and then associates the interface with a specific wireless connection.
	frame-relay over radio	Links the virtual Frame Relay interface to the specified radio interface and destination MAC address.
	show virtual-framerelay	Shows the output of the interface virtual-frame relay command.

frame-relay over radio

To link a virtual Frame Relay interface with a specific multipoint radio interface and destination MAC address, use the **frame-relay over radio** interface destination MAC address command in interface configuration mode. To disable this functionality, use the **no** form of this command.

The MAC address being linked is the MAC address of the remote end point. When configuring the headend, the MAC address being linked is the MAC address of the subscriber unit. When configuring the subscriber unit, the MAC address being linked is the MAC address of the headend.

frame-relay over radio *interface destination mac address*

no frame-relay over radio *interface destination mac address*

Syntax Description		
<i>interface</i>		Slot number of the wireless modem card.
<i>destination mac address</i>		Port number, on the wireless modem card on the remote endpoint, that has the destination MAC address

Defaults Disabled

Command Modes Configuration mode

Command History	Release	Modification
	12.2(2)T	This command was introduced.

Usage Guidelines Enable the virtual Frame Relay interface. Use the **no** form of the command to change the MAC address the interface is associated with. Use the **frame-relay over radio** command to associate the interface with the new MAC address.

Examples The following example shows how to link the virtual Frame Relay interface to the specified radio interface and destination MAC address:

```
interface virtual-framerelay1
 ip address 10.6.24.21 255.255.0.0
 frame-relay over radio1/0 0030.80ac.a054
```

Related Commands	Command	Description
	interface virtual-framerelay	Creates the virtual Frame Relay interface to apply the Frame Relay configuration.
	show frame-relay over radio	Shows the output of the frame-relay over radio command.
	frame-relay intf-type	Use the frame-relay intf-type interface configuration command to configure a Frame Relay switch type.

Command	Description
frame-relay lmi-type	To select the Local Management Interface (LMI) type, use the frame-relay lmi-type interface configuration command.
frame-relay map	To define the mapping between a destination protocol address and the DLCI used to connect to the destination address, use the frame-relay map interface configuration command.
frame-relay route	Use the frame-relay route interface configuration command to specify the static route for PVC switching.

interface virtual-framerelay

To create the virtual Frame Relay interface, use the **interface virtual-framerelay** command. To disable the virtual Frame Relay interface, use the **no** form of this command.

interface virtual-framerelay *number*

no interface virtual-framerelay *number*

Syntax Description	<i>number</i>	Defines the virtual interface and then associates the interface number with a specific wireless connection.
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Defaults	Disabled
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Command Modes	Configuration mode
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Command History	Release	Modification
	12.2(2)T	This command was introduced.

Usage Guidelines	Create the virtual-framerelay interface that the Frame Relay configuration will be applied to and then use the frame-relay over radio command to associate the MAC address.
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Examples	The following example shows how to define a virtual interface on a headend unit and then associate it with a specific IP address:
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```
interface virtual-framerelay1
ip address 10.6.24.20 255.255.0.0
 frame-relay map ip 11.6.24.21 16
 frame-relay intf-type dce
 frame-relay route 100 interface Hssi1/0 100
 frame-relay route 200 interface Hssi1/0 300
 frame-relay over Radio3/0 0002.b905.fc30
```

Related Commands	Command	Description
	frame-relay over radio	Links the virtual Frame Relay interface to the specified radio interface and destination MAC address.
	show virtual-framerelay	Shows the output of the interface virtual-framerelay command.