



Introduction to Frame Relay

Frame Relay is a high-speed communications technology providing high throughput and reliability up to T1/E1 rates. Functioning at the data link layer (OSI layer 2), frame relay was developed in the late 1980s as a simpler and faster alternative to CCITT X.25 (packet switching).

Frame Relay sends information over a wide area network (WAN) by dividing a message into smaller segments, each enclosed a small data unit, called a frame. At the message source, a Frame Relay device assigns a destination address to each frame. The address is called a Data Link Connection Identifier (DLCI). The Frame relay network comprises a set of network links connected by switches. As a frame traverses the network, Frame Relay switches examine the DLCI and use it to route the frame to its destination.

Frame Relay allows multiple logical connections over a single physical connection. A Frame Relay link can be configured for rates a low as 64k and up to full T1 or E1 rates.

Glossary

PVC – Permanent Virtual Circuit. A logical network connection between two specified end-points. A PVC is configured as a static, fixed path through the Frame Relay network. As permanent routes, PVCs are not demand assigned or available on a call-by-call basis. The actual physical path through the network may vary. In the case of a failed line or switch, for example, the Frame relay network may automatically reroute the circuit around the failure. The configured source and destination of the circuit, however, will not change, but remain as they were initially configured.

DLCI – Data Link Circuit Identifier. A numeric link layer identifier assigned to each frame. The DLCI identifies a logical connection by specifying the destination side of the PVC.

LMI – Local Management Interface. A pre-defined PVC used to exchange management information (the status of a PVC, for example) between Frame Relay devices.

LMI Details

To promote interoperation between vendors, the Frame Relay specification comprises several component specifications. There are currently three versions of the LMI specification:



RAS: Configuring Frame Relay

Protocol	Specification
LMI	Frame Relay Forum Implementation Agreement (IA) FRF.1 superseded by FRF.1.1
Annex D	ANSI T1.617
Annex A	ITU Q.933 referenced in FRF.1.1

Note: While LMI was used colloquially for the FRF.1 IA, it may also be used as a generic term to refer to any and all of the protocols. The revised Frame Relay Forum IA FRF.1.1 calls for the mandatory implementation of Annex A of ITU Q.933.

Each version of LMI includes a slightly different use of the management protocol. Virtually all equipment vendors support LMI and most support Annex D, while fewer vendors support Annex A. To ensure interoperability when your network consists of equipment from different vendors, the same version of management protocol must be operating at each end of the frame relay link. Patton's remote access server supports all LMI specifications.

The principal frame relay standards, which Patton supports, are shown in the following table:

Description	ANSI Standard	Status	ITU Standard	Layer
Service Description	T1.606	Standard	I.233	Physical
Core Aspects	T1.618 (previously known as T1.6ca)	Standard	Q.922 Annex A	Data Link
Access Signaling	T1.617 (previously known as T1.6fr)	Standard	Q.933	Network

Patton supports RFC 1490 Multi-protocol encapsulation (also known as *IP-in-Frame Relay*) for carrying traffic over the Frame Relay link. Because the remote access server has a built-in router, the access server can route IP traffic to multiple locations over multiple virtual channels. The remote access server can function as either a network-to-network interface (NNI) switch or as a User-to-Network Interface (UNI).



Typically the Patton RAS is configured as a UNI and connected to a provider's Frame Relay switch via a T1/E1 line. In this application, the access server will establish a point-to-point link via one or more DLCIs or virtual channels. Each DLCI is a pipe with an associated far-end IP address. The remote access server only supports un-numbered interfaces therefore; the remote end must also support unnumbered interfaces.

Configuring Frame Relay

A frame relay link may be provided in one of two ways: 1) the Telco company may provide a separate whole or partial T1/E1 or 2) the Telco company may take a channel or two from the inbound dial-in T1/E1. The same basic configuration will work no matter how it is provided.

Step 1: Configure the T1/E1 Line Interface and Signaling Setting.

This first step is no different from configuring your T1 for dial-in. The Telco company will provide you with the configuration for the physical layer.

Step 2: Channel Assignment

For each channel the Telco company has assigned to the frame relay circuit, you must set that channel to `frameRelay (3)`. The remote access server's Frame Relay channel assignments must match the Frame Relay channel assignments done by the Telco company.

Once Step 1 and 2 are done, the physical layer is configured and the frame relay link can be plugged in for testing. As with the dial-in lines, the Frame link should be solid green with no red error light. Volatile memory will say WAN x is Available when the line has completed synching up.

Step 3: Configuring the DLCI

Most frame relay links are configured for LMI type T617 Annex D, so the defaults for the frame relay data link and network layer should be correct. If the Telco company has indicated they are providing frame relay based on a different specification, you will need to modify the frame configuration.



Step 3: Configuring the DLCI *(continued...)*

To configure the DLCI, go to Frame Relay then select DLCI. If the DLCIs are connected and active, they will automatically appear in the DLCI list. DLCI 0 (or 1023) is the LMI and needs no configuration. For each activated DLCI, enter the IP address of the remote end. This will be the Ethernet address of the machine at the remote end as there is no IP address associated with an unnumbered interface.

Step 4: Setting Up the Routing

As soon as the remote IP address is entered and the DLCI is up, a point-to-point route will automatically be added to the routing table. At this point, the remote end of the frame relay link is reachable but nothing beyond it can be reached.

If this frame relay link is your connection to the Internet, then it needs to be set up as the default gateway. Using the first Add Route entry, enter the IP address used for the DLCI in the Gateway field then choose Add Route.

Add a Route

Destination	Mask	Gateway	
<input type="text" value="0.0.0.0"/>		<input type="text" value="192.10.10.10"/>	<input type="button" value="Add Route"/>

If this is a link to another network, but not your default gateway then you will need to add the appropriate route to access hosts on the remote network.