

- Local Management Interface (LMI) signaling is used by Frame Relay switches to manage connections and maintain status between the devices. The supported LMI types are cisco, ansi, and q933a.

Configuring Frame Relay

The three commands used to configure basic Frame Relay on a router select the Frame Relay encapsulation type, establish the LMI connection, and enable Inverse ARP:

```
encapsulation frame-relay [cisco | ietf]
frame-relay lmi-type {ansi | cisco | q933i}
frame-relay inverse-arp [protocol] [dlci]
```

Here's the procedure for configuring basic Frame Relay:

```
RouterA>enable
RouterA#config term
RouterA(config)#int ser 1
RouterA(config-if)#address 10.16.0.1 255.255.255.255
RouterA(config-if)#encapsulation frame-relay cisco
RouterA(config-if)#frame-relay lmi-type cisco
RouterA(config-if)#bandwidth 64
RouterA(config-if)#frame-relay inverse-arp ip 16
RouterA(config-if)#exit
RouterA(config)#exit
RouterA#
```

Verifying Frame Relay Operations

The following commands verify and display Frame Relay information:

- **show interface**—Displays Layer 1 and Layer 2 status, DLCI information, and the LMI DLCIs used for the local management interface.
- **show frame-relay lmi**—Displays LMI traffic statistics (LMI type, status messages sent, and invalid LMI messages).
- **show frame-relay pvc**—Displays the status of all configured connections, traffic statistics, and BECN FECN packets received by the router.
- **show frame-relay map**—Displays the current map entries for static and dynamic routes. The **frame-relay-inarp** command clears all dynamic entries.

Static Frame Relay Map Configuration

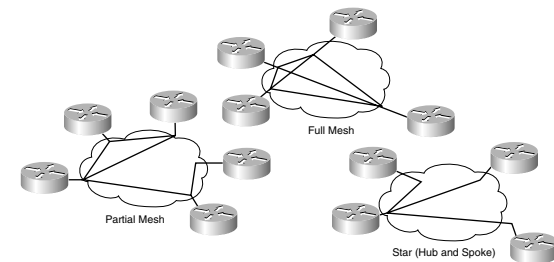
A router's address-to-DLCI table can be defined statically when inverse ARP is not supported. These static maps can also be used to control broadcasts. To statically configure the map table, use the following command:

```
frame-relay map protocol protocol-address dlci [broadcast]
[ietf | cisco] payload-compression packet-by-packet]
```

protocol specifies bridging or logical link control, *protocol-address* is the network layer and address of the destination device, *dlci* is the local dlci, *broadcast* is an optional parameter used to control broadcasts and multicasts over the VC, and *payload compression* is an optional Cisco proprietary compression method.

Frame Relay Topology

Frame Relay is a nonbroadcast multi-access (NBMA) connection scheme. This means that although Frame Relay interfaces support multipoint connections by default, broadcast routing updates are not forwarded to remote sites. Frame



Relay networks can be designed using star, full-mesh, and partial-mesh topologies.

A *star topology*, also known as a hub-and-spoke configuration, is the common network topology. Remote sites are connected to a central site, which usually provides a service. Star topologies require the fewest PVCs, making them relatively inexpensive. The hub router provides a multipoint connection using a single interface to interconnect multiple PVCs.

In a *full-mesh topology*, all routers have virtual circuits to all other destinations. Although it is expensive, this method provides redundancy, because all sites are connected to all other sites. Full-mesh networks become very expensive as the number of nodes increases. The number of links required in a full-mesh topology with n nodes is $(n - (n - 1)) / 2$.