Course Name: A Level (2nd Sem) Subject: DCN

Topic: X.25 and Frame Relay Date: 11-06-20

X.25:

Prior to Frame Relay, some organizations were using a virtual-circuit switching network called X.25 that performed switching at the network layer. (For example, the Internet, which needs wide-area networks to carry its packets from one place to another, used X.25. And X.25 is still being used by the Internet), but it is being replaced by other WANs due to following drawbacks:

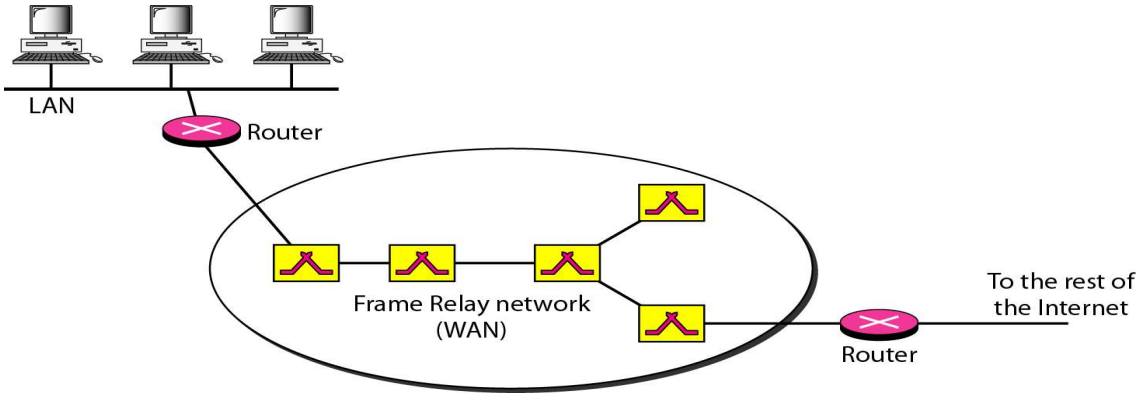
- X.25 has a low 64-kbps data rate. (By the 1990s, there was a need for higher data-rate WANs.)
- X.25 has extensive flow and error control at both the data link layer and the network layer. (This was so because X.25 was designed in the 1970s, when the available transmission media were more prone to errors.) That creates large overhead and slow down transmissions.
- (X.25 requires acknowledgments for both data link layer frames and network layer packets that are sent between nodes and between source and destination.)
- Originally X.25 was designed for private use, not for the Internet. X.25 has its own network layer. This means that the user's data are encapsulated in the network layer packets of X.25. The Internet, however, has its own network layer, which means if the Internet wants to use X.25, the Internet must deliver its network layer packet, called a datagram, to X.25 for encapsulation in the X.25 packet. This doubles the overhead.
- In response to drawbacks, Frame Relay was designed.

Frame Relay:

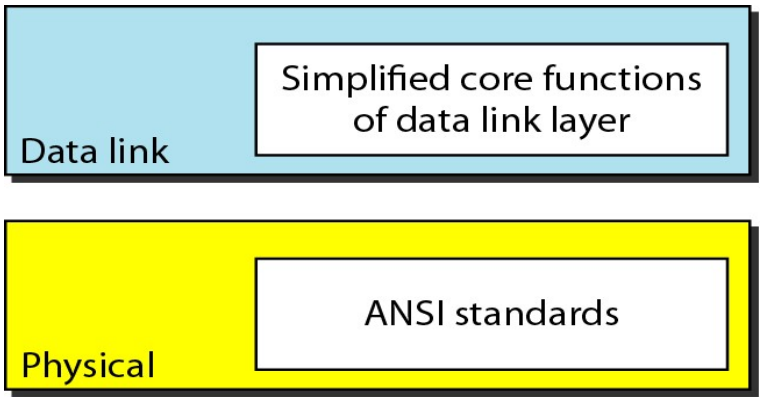
- Frame Relay is a virtual-circuit wide-area network that was designed in response to demands for a new type of WAN in the late 1980s and early 1990s.
- Frame Relay network has the following features:
- Frame Relay operates at a higher speed (1.544 Mbps and recently 44.376 Mbps). This means that it can easily be used instead of a mesh of T-I or T-3 lines.
- Frame Relay operates in just the physical and data link layers. This means it can easily be used as a backbone network to provide services to protocols that already have a network layer protocol, such as the Internet.
- Frame Relay allows bursty data and frame size of 9000 bytes, which can accommodate all local area network frame sizes.
- Frame Relay is less expensive than other traditional WANs.
- Frame Relay has error detection at the data link layer only. There is no flow control or error control. (There is not even a retransmission policy if a frame is damaged; it is silently_dropped.) In this way it provides fast transmission capability (for more reliable media and for those protocols that have flow and error control at the higher layers.)

Architecture:

- Frame Relay provides permanent virtual circuits and switched virtual circuits.
- A source and a destination may choose to have a **Permanent Virtual Circuit (PVC)**. In this case, the corresponding table entry is recorded for all switches by the administrator (remotely or electronically). An outgoing DLCI is given to the source, and an incoming DLCI is given to the destination.
- PVC connections have two drawbacks. First, they are costly because two parties pay for the connection all the time even when it is not in use.
- Second, a connection is created from one source to one single destination. If a source needs connections with several destinations, it needs a PVC for each connection. An alternate approach is the **Switched Virtual Circuit (SVC)**.
- The SVC creates a temporary, short connection that exists only when data are being transferred between source and destination. An SVC requires establishing and terminating phases.



- Frame Relay is a **virtual circuit network**. A virtual circuit in Frame Relay is identified by a number called a data link connection identifier (DLCI). Thus, VCIs in Frame Relay are called DLCIs.



- Frame Relay supports any of the protocols recognized by ANSI.
- Frame Relay uses a simple protocol that does not support flow or error control. It only has an error detection mechanism.

Exercises:

A. **What are the main drawbacks of X.25? Compare X.25 and Frame Relay.**

B. **Compare an SVC with a PVC.**