

Computer Networks

X.25 Protocol

- X.25 is a protocol suite defined by **ITU** for **packet switched communications** over **WAN (Wide Area Network)**.
- It was originally designed for use in the 1970s and became very popular in 1980s.
- Presently, it is used for networks for **ATMs** and **credit card** verification.
- It allows multiple logical channels to use the same physical line.
- It also permits data exchange between terminals with **different communication speeds**.

X.25 Protocol

X.25 network devices fall into three general categories:

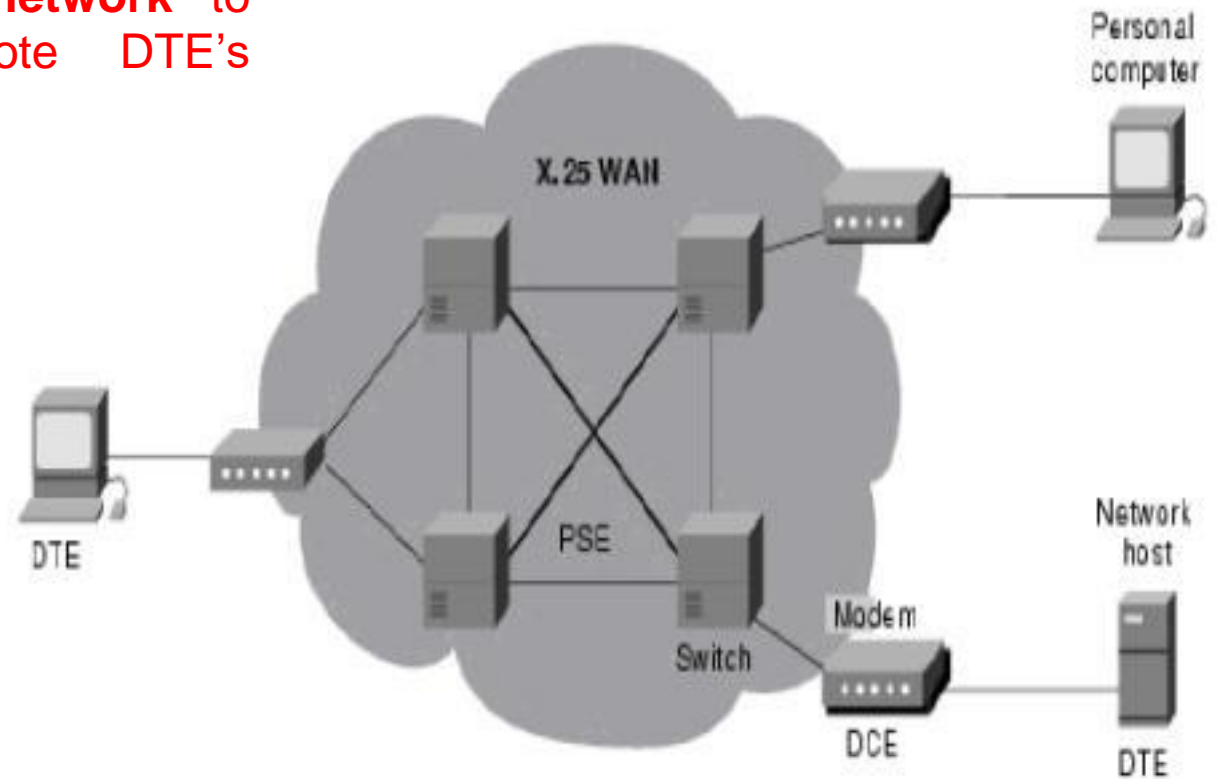
1. Data Terminal Equipment (DTE),
2. Data Circuit-terminating Equipment (DCE),
3. Packet-switching Exchange (PSE)

- **Data Terminal Equipment (DTE)** devices are end systems that communicate across the X.25 network. They are usually terminals, **personal computers**, or network hosts.
- **DCEs** are communications devices, such as **modems** and **packet switches**, that provide the interface between DTE devices and a PSE, and are generally located in the carrier's facilities.
- **PSEs** are switches that compose the bulk of the carrier's network. They transfer data from **one DTE device to another through the X.25**.

DTEs, DCEs, and PSEs Make Up an X.25 Network

X.25 permits a DTE user on an **X.25 network** to communicate with a number of remote DTE's simultaneously.

X.25 routes packets across the network from DTE to DTE.



SVCs vs PVCs

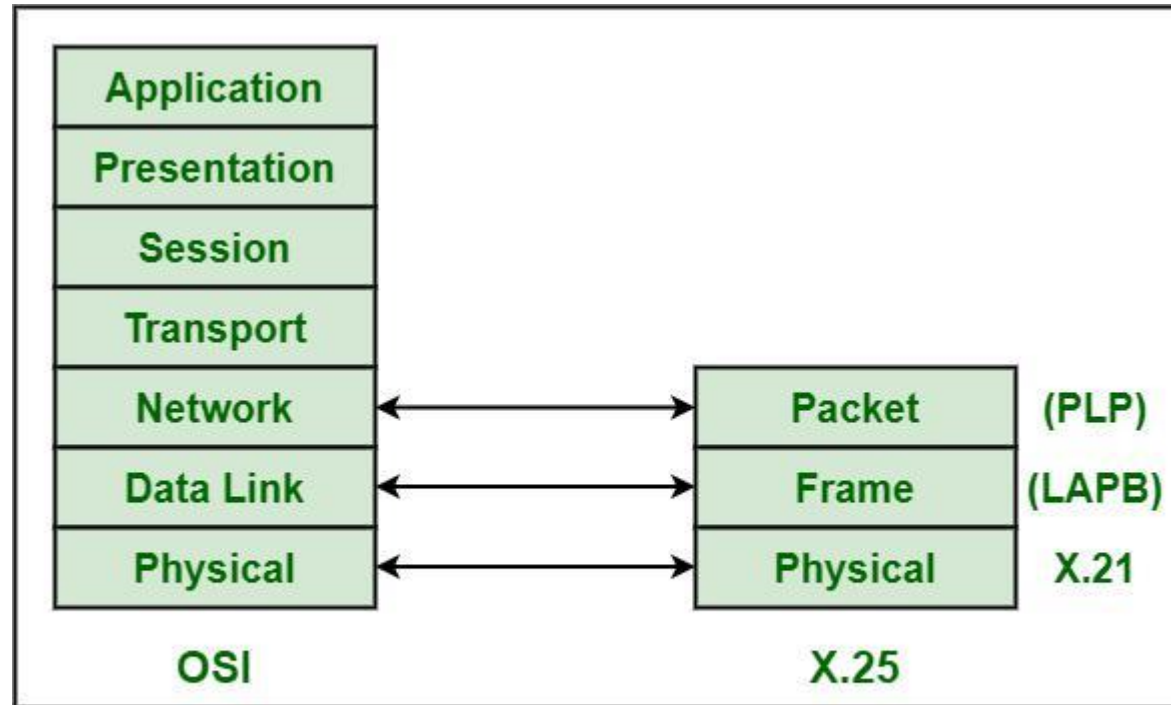
Two types of X.25 **virtual circuits** exist: **switched and permanent**.

- **Switched virtual circuits (SVCs)** are **temporary connections** used for irregular data transfers. They require that two DTE devices establish, maintain, and terminate a session each time the devices need to communicate.
- **Permanent virtual circuits (PVCs)** are **permanently established connections** used for frequent and consistent data transfers. PVCs do not require that sessions be established and terminated. Therefore, DTEs can begin transferring data whenever necessary because the session is always active.

X.25 protocol layers

X.25 has three protocol layers

LAPB: Link Access Procedure, Balanced



P= PEACE
F= FOR
P= PEOPLE

X.25 Layer Mapping with OSI Model

X.25 protocol layers

X.25 has three protocol layers

Physical Layer: This layer is basically concerned with electrical or signaling. This layer provides various communication lines that transmit or transfer some electrical signals. X.21 physical implementer is commonly used for the linking.

X.25 protocol layers

Data Link Layer: Data link layer is also known as Frame Layer. This layer is an implementation or development of ISO High-Level Data Link Layer (HDLC) standard which is known as **LAPB (Link Access Procedure Balanced)**.

- It provides an **error free link** between any two physically connected nodes.
- LAPB also allows DTE (Data Terminal Equipment) or DCE (Data Circuit-Terminating Equipment) simply to **start or end a communication session or start data transmission**. This layer is one of the most important and essential parts of X.25 Protocol.
- The Data Link Layer is responsible for error-free communication between any two nodes. Thus errors are checked and corrected for each hop all the way across the network. It is this feature that makes X.25 so robust, and so suitable for noisy, error-prone links.
- This layer also provides a mechanism for checking in each hop during the transmission. This service also ensures a bit-oriented, error-free, and also sequenced and ordered delivery of data frames or packets.

X.25 protocol layers

Packet Layer: Packet layer is also known as Network Layer protocol of X.25. This layer generally **governs the end-to-end communications among various DTE devices**.

- It also defines how to address and deliver X.25 **packets** among end nodes and switches on a network with the help of PVCs (Permanent Virtual Circuits) or SVCs (Switched Virtual Circuits).
- Layer 3 is concerned with connection set-up and teardown and flow control between the DTE devices, as well as network routing functions and the multiplexing of simultaneous logical connections over a single physical connection.
- This layer also defines and explains the format of data packets and also the procedures for control and transmission of data frames. This layer is also responsible for establishing a connection, transmitting data frames or packets, ending or terminating a connection, error and flow control, transmitting data packets over external virtual circuits.

Comparison between X.25 and Frame Relay

- <https://www.geeksforgeeks.org/comparison-between-x-25-and-frame-relay/>