

CCNA4 WAN Technologies

Module 2, Review

2.1.1 WAN Technology

- A copper or fiber cable connects the CPE to the service provider's nearest exchange or central office (CO). This cabling is often called the local loop, or "last-mile".
- A router is a commonly used piece of Data Terminal Equipment.

2.1.4 WAN encapsulation

- Most framing is based on the HDLC standard.

2.1.5 Packet and circuit switching

- Each switch must evaluate the address to determine where to send the packet and each packet carries an identifier.
- The switch determines the onward route by looking up the identifier in tables held in memory.

2.1.5 Packet and circuit switching

- Because of the switching operation used to establish the circuit, the telephone system is called a circuit-switched network.
- The internal path taken by the circuit between exchanges is shared by a number of conversations. Time division multiplexing (TDM) is used to give each conversation a share of the connection in turn.

2.1.6 WAN Link Options

■ Disadvantages:

- Many WAN users do not make efficient use of the fixed bandwidth that is available with dedicated, switched, or permanent circuits, because the data flow fluctuates.
- Because the internal links between the switches are shared between many users, the costs of packet switching are lower than those of circuit switching.

2.2.1 Analog dialup

- The physical characteristics of the local loop and its connection to the PSTN limit the rate of the signal.
- The upper limit is around 33 kbps.
- The rate can be increased to around 56 kbps if the signal is coming directly through a digital connection.

2.2.2 ISDN

- A common application of ISDN is to provide additional capacity as needed on a leased line connection.
- The leased line is sized to carry average traffic loads while ISDN is added during peak demand periods.
- ISDN is also used as a backup in the case of a failure of the leased line.

2.2.2 ISDN

- Basic Rate Interface (BRI) ISDN is intended for the home and small enterprise and provides two 64 kbps B channels and a 16 kbps D channel.
- PRI delivers twenty-three 64 kbps B channels and one 64 kbps D channel in North America, for a total bit rate of up to 1.544 Mbps. In North America PRI corresponds to a T1 connection.

2.2.2 ISDN

- Terminal adapters are necessary for equipment that does not have an ISDN interface

2.2.4 X.25

- X.25 can be very cost effective because tariffs are based on the amount of data delivered rather than connection time or distance.
- Typical X.25 applications are point-of-sale card readers. These readers use X.25 in dialup mode to validate transactions on a central computer.

2.2.6 ATM

- ATM has data rates beyond 155 Mbps.
- ATM is a technology that is capable of transferring voice, video, and data through private and public networks.
 - Small, fixed-length cells are well suited for carrying voice and video traffic because this traffic is intolerant of delay.
 - Video and voice traffic do not have to wait for a larger data packet to be transmitted.

2.2.7 DSL

- DSL technology connects the local loop line to a digital subscriber line access.
- The different varieties of DSL provide different bandwidths, with capabilities exceeding those of a T1 or E1 leased line.
- The transfer rates are dependent on the actual length of the local loop and the type and condition of its cabling. For satisfactory service, the loop must be less than 5.5 kilometers.

2.3.1 WAN communication

- Because the WAN is merely a set of interconnections between LAN based routers, there are no services on the WAN. WAN technologies function at the lower three layers of the OSI reference model.

2.3.2 Steps in WAN design

- In designing the WAN, it is necessary to know what data traffic must be carried, its origin, and its destination.
- WANs carry a variety of traffic types with varying requirements for bandwidth, latency, and jitter.

2.3.2 Steps in WAN design

- For each pair of end points and for each traffic type, information is needed on the various traffic characteristics.
- Knowing the various end points allows the selection of a topology or layout for the WAN.

2.3.3 How to identify and select networking capabilities

- Adding more network devices to the data path will increase latency and decrease reliability.

2.3.4 Three-layer design model

- A hierarchical solution with three layers offers many advantages.
- A group of LANs in an area are interconnected, several areas are interconnected to form a region, and the various regions are interconnected to form the core of the WAN.