

Chapter Seven, Backbone Networks

1. Compare and contrast switches, routers, and gateways.

The similarities is that all 3 operate at the physical layer

The difference is that while routers and gateway can operate at network layer, switches operate at data link layer.

2. What circumstances require the use of a router?

Routers may be special purpose devices or special network modules in other devices e.g., wireless access points for home use often include a built-in router). In general, they more processing on each message than switches and therefore operate more slowly. One major feature of a router is that it can choose the “best” route between networks there are several possible routes between them. Because a router knows its own location, as well as the packet’s final destination, it looks in a routing table to identify the best route or path.

3. List and explain the three backbone architecture layers .

Routed backbones, switched backbones and virtual LANs.

4. Explain how single-switch VLANs work.

Which means that the VLAN operates only inside one switch.

5. Explain how multi-switch VLANs work.

Several switches are used to build the VLANs

6. What are the advantages and disadvantages of VLANs?

Advantages consist of their ability to manage the flow of traffic on the LAN and backbone very precisely and prioritize traffic.

Disadvantages consist of their cost and management complexity.

Chapter 8, Wide Area Networks

1. What are common carriers, local exchange carriers, and interexchange carriers?

Common carriers are organization in the business of providing regulated telephone, telegraph, telex, and data communications services

Local exchange carriers provides local telephone services

Interexchange carriers are provides long-distance services

2. How does Multiprotocol Label Switching (MPLS) work?

MPLS is designed to work with a variety of commonly used layer-2 protocols. It is sometimes called a layer-2.5 technology because it inserts 4-byte header that contains its own information between the layer-2 frame and the layer-3 IP packet.

3. Compare and contrast circuit-switched services, dedicated-circuit services, and packet-switched services.

The similarities for these 3 is that they enable the customer to more precisely design and manage the WAN and offer more reliable services, so these services are most commonly chosen by large organizations that view the WAN as an important part of their business operations.

The difference is that circuit switched uses a cloud architecture, dedicated-circuit uses a private network, and packet-switched uses enable multiple connections to exist simultaneously between computers over the same physical circuit, just like LANs and BNs.

4. Compare and contrast ring, star, and mesh WAN architectures.

The similarities for these 3 is that they each connect to a computer

The differences is that their effects for doing so are different. A star architecture is connects all computers to one central computer that routes messages to the appropriate computer. A ring architecture connects all computers in a closed loop with each computer linked to the next. Mesh has two types: partial and full. A partial mesh in which many, but not all, computers are connected, is far more common, and most WANs are this concept. A full mesh every computer is connected to every other computer.

5. What are the most commonly used T carrier services? What data rates do they provide?

A T1 circuit (also called a DS1 circuit) provides a data rate of 1.544 Mbps. A T3 circuit allows transmission at a rate of 44.736 Mbps although most articles refer to this rate as 45 megabits per second. Fractional T1, sometimes called FT1, offers portions of a 1.544-Mbps T1 circuit for a fraction of its full cost.

6. What is SONET?

American standard (ANSI) for high-speed dedicated-circuit services.

7. How do datagram services differ from virtual circuit services?

Datagram is a connectionless service in packet-switched networks. Each packet has a destination and sequence number and may follow a different route through the network. Different routes may deliver packets at different speeds, so data packets often arrive out of sequence. The sequence number tells the network how to reassemble the packets into a continuous message.

Virtual circuit is a temporary transmission circuit in which sequential data packets are routed between two. It is created by the software in such a way that users think they have a dedicated point-to-point leased circuit.

8. How do VPN services differ from common carrier services?

A new type of VAN, called a virtual private network (VPN) has recently emerged. VPNs provide circuit that run over the Internet but appear to the user to be private networks. Internet access is inexpensive compared to the cost of leasing dedicated circuits, circuit switched services, or packet switched services from a common carrier. Different VPNs provide different services, but most offer packets switching hardware that will communicate via the Internet, or VPN services which you lease from the VPN in much the same way as leasing a service from a common carrier. These VPN hardware (or services) take your data, encrypt it, and send it through the Internet through a series of "tunnels", a virtual circuit through the Internet which constrains the source and destination to only those within the VPN.

9. Explain how VPNs work.

With a VPN, you first lease an Internet connection at whatever access rate and access technology you choose for each location you want to connect. For example, you might lease a T1 circuit from a common carrier that runs from your office to your Internet Service Provider (ISP). You pay the common carrier for the circuit and the ISP for Internet access. Then you connect a VPN gateway (a specially designed router or switch) to each Internet access circuit to provide access from your networks to the VPN. The VPN gateways enable you to create PVCs through the Internet that are called tunnels. The VPN gateway at the sender takes the outgoing packet and encapsulates it with a protocol that is used to move it through the tunnel to the VPN.

gateway on the other side. The VPN gateway at the receiver strips off the VPN packet and delivers the packet to the destination network. The VPN is transparent to the users; it appears as though a traditional packet-switched network PVC is in use. The VPN is also transparent to the ISP and the Internet as a whole; there is simply a stream of Internet packets moving across the Internet. VPN software is commonly used on home computers or laptops to provide the same secure tunnels to people working from offsite.

Chapter Nine, The Internet

1. What is the basic structure of the Internet?

There are 10 Network Access Points (NAPs) around the country. Also known as gigapops because they operate at speed exceeding 10Gbps. These NAPs provide multi-level access to the Internet for regional and local networks in their part of the country. The fundamental structure of the Internet takes the form of a massive fully meshed network.

2. Explain how the Internet is a network of networks.

The internet consists of many other networks connecting via various NAPs and ISPs around the world. Some is having a limited number of hops to connect while others have as many as 15-17 hops.

3. Compare and contrast a Network Access Point (NAP) and a Metropolitan Area Exchange (MAE).

NAPs emerged on the scene as the former NSFnet began to dissolve and lose its funding and the commercial sector continued to build in to the internet. Initially there were 4 NAPs around the country and this number has grown to 10. As the number of ISPs grew, a new form of network access point called a metropolitan area exchange (MAE) emerged. MAEs are smaller versions of NAPs and typically link a set of regional ISPs whose networks come together in major cities. Today there are about 50 MAEs in the United States.

4. What is WiMax? How does WiMax work?

WiMAX (short for Worldwide Interoperability for Microwave Access) is the commercial name for a set of standards developed by the IEEE 802.16 standards group. WiMax is family of technologies that is much like the 802.11 Wi-Fi family. It reuses many of the Wi-Fi components and was designed to connect easily into Ethernet LANs. WiMax can be used as a fixed wireless technology to connect a house or an office into the Internet, but its future lies in its ability to connect mobile laptops and smart phones into the Internet.

5. What are the principal organizations responsible for Internet governance, and what do they do?

ISOC is an open-membership professional society with more than 175 organizational and 8,000 individual members in over 100 countries, including corporations, government agencies, and foundations that have created the Internet and its technologies.

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7. What is ICANN?

ICANN or Internet Corporation for Assigned Names and Numbers was formed to assume responsibility for the IP address space and domain name system management.

8. What is an RFP?

RFP or Request for Proposal used to solicit bids from vendors for new network hardware, software, and services. RFPs specify what equipment, software, and services are desired and ask vendors to provide their best prices.