Networking

Intranet Technologies

Hub

- Hubs are used on networks that use twisted-pair cabling.
- Ports available on the hub provide the connection points for the devices on the network.
- Computers and other devices are attached to the hub by individual network cables.
- Hubs come in many sizes and shapes and supply different numbers of ports.

Repeaters

- Takes the signal that it receives from computers and other devices on the LAN and regenerates the signal so that the signal maintains its integrity along a longer media run than is normally possible.
- Repeaters don't have any capabilities for directing network traffic or deciding the particular route certain data should take;
- they are simple devices that just sit on the network, boosting the data signals they receive.
- The problem with repeaters is that they amplify the entire signal that they receive, including any line noise.
- So, in worst-case scenarios, they pass on data traffic that is barely discernable from the background noise on the line.

Bridge

- A bridge is an internetworking device used to help conserve the bandwidth available on the network.
- When LANs really start to grow, network data traffic can begin to overwhelm the available bandwidth on network media.
- One strategy for conserving network bandwidth is to chop the network up into smaller segments.
- These segments are connected to a bridge.
- Bridges are smarter than hubs and repeaters and actually use some software to help get the job done.

Switch

- A switch is another internetworking device used to manage the bandwidth on a large network.
- Switches are rapidly becoming one of the most used internetworking devices for connecting even smaller networks because they allow you some control over the use of the bandwidth on the network.
- A switch, which is often referred to as a "bridge on steroids," controls the flow of data by using the MAC address that is placed on each data packet (which coincides with the MAC address of a particular computer's network card).
- Switches divide networks into what are called Virtual LANs or VLANs.

Router

- A router uses a combination of hardware and software to actually "route" data from its source to its destination.
- Routers actually have a very sophisticated OS that allows you to configure their various connection ports.
- You can set up a router to route data packets from a number of different network protocol stacks, including TCP/IP, IPX/SPX, and AppleTalk.

IP in 802.1 Networks

- IEEE introduced the standards for local area networks using the 802 standards
- standards were enhanced to also include wireless LAN (WLAN) standards under the 802.11 umbrella.
- The 802.11 family continues to use the same logical link control (LLC) layer as the other wired LAN systems.
- other standards such as 802.11b and 802.11a that provide higher data throughputs

IEEE 802 Family, LAN Standards, and IP

- The 802 family of standards from the Institute of Electrical and Electronics Engineers (IEEE) defines various types of LANs.
- Of these, 802.3 (Ethernet) is the most popular LAN technology and is deployed widely throughout the world.
- Other LAN standards from IEEE include 802.4 (token bus), 802.5 (token ring), and 802.6 (FDDI).

Brief History of Wireless LAN

- This section provides a brief history of wireless LAN and its relationship with other IEEE LAN standards.
- Similar to LANs, many of the initial WLANs were proprietary.
- Prior to 1998, many of these wireless applications were characterized by low data rates, high cost, and a lack of a worldwide standard that limited widespread deployment.
- These WLANs were used in many areas, such as manufacturing, retail, and warehousing.
- It was at this juncture that IEEE stepped in and created the standards for WLANs.

IEEE 802.11 Protocol Model

- The IEEE 802.11 standards were developed with the primary goal of being very similar to the makeup of the 802 LAN family that we introduced earlier.
- This means that all the applications, protocols, and management mechanisms need to execute seamlessly in the IEEE 802.11 environment as well.
- Users accustomed to the mode of operation in a LAN environment (for example, the IEEE 802.3 LAN), should not notice any significant difference while operating in a IEEE 802.11 environment.

802.11 Family Wireless LAN Architecture

- This section examines the architecture common to the IEEE 802.11 family.
- IEEE 802.11 has defined a logical architecture that not only includes devices but other logical entities to create a robust yet flexible architecture.
- The architecture is distributed in nature and also includes key functions as power savings as part of the architecture.
- The architecture is flexible to allow transient or ad hoc networks and can also support permanent networks at home and enterprise networks.
- This section introduces the basic concepts of the architecture, including stations and access points, and then presents the two modes of the IEEE 802.11 family.

802.11 Family Physical Layer

- This section examines the various PHY layer mechanisms that have been standardized in the IEEE 802.11 family.
- The architecture described in the previous section is common to all the physical layer technologies.
- This section begins with the IEEE 802.11 standard and then discusses the IEEE 802.11b standard and the IEEE 802.11a standard.
- The other evolving standards, such as IEEE 802.11g and IEEE 802.11h, are not discussed as they are still in their formative stages.

IEEE 802.11 Medium Access Control Layer

- The IEEE 802.11 family MAC layer is common to all types of PHY layers mentioned previously and this section discusses features of the MAC layer.
- Many of the functions have been modeled after the previously introduced IEEE 802.3 LAN with modifications and additional functions needed for wireless capability.
- The goal of the IEEE 802.11 family of MAC standards is to provide equivalent or better functions as compared with the IEEE 802.3 LAN MAC layer.

Services Provided in the IEEE 802.11 Family

- Some services are required in all stations, including the access point, and a few of them are very specific to the infrastructure mode.
- There are two categories of services provided in an IEEE 802.11 system.
- The first category is called station services, and the second category is the distributed station services (DSS).

IEEE 802.11 Family Operations

- This section examines the operations of an IEEE 802.11 family device in an infrastructure BSS.
- Although very similar mechanisms exist for the independent BSS as well, this section focuses on the more ubiquitous infrastructure BSS, or just simply BSS.
- To obtain service in a WLAN environment, each station has to execute a few functions or services as noted in the IEEE 802.11 standards.

Deployment of IEEE 802.11 WLAN Systems

- Let us now explore some of the deployment scenarios with wireless LAN and some deployment considerations.
- Although the IEEE 802.11 family was seen as an extension of wired LAN, in some cases for new locations, the popularity of the IEEE 802.11 family has
- extended beyond applications such as conferences.
- WLAN systems are gaining ground at residential applications to create a wireless LAN without any cabling.
- Enterprise and industrial applications, including manufacturing, retail, warehousing, hospitality, health care, and education are some of the applications where WLAN finds its niche success.

Assignment

- List the networking connectivity device
- Explain briefly all the networking connectivity devices
- Differentiate between Bridge and switch
- List the functions of Routers, Hub
- What is IEEE 802 Family?
- Briefly describe the history of Wireless LAN
- How to set up the 802.11 Family Physical Layer?
- List Services Provided in the IEEE 802.11 Family
- What does mean Deployment of IEEE 802.11 WLAN Systems