

A212 STIJ5024 INTERNET TECHNOLOGY

Topic 4: Network and Connection Technologies

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What is network segmentation? How does this relate to LAN or VLAN?

Network Segmentation

- Network segmentation is a process that divides a network into smaller sub-networks, each being a network segment.
- Virtual local area networks or VLAN allows the network segmentation of a LAN into separate logical networks.
- A Local Area Network (LAN) is a collection of interconnected devices that share the same broadcast domain before VLANs. LANs include networks in homes, schools, and offices.

What is a router? bridge? hub? switch? How are they different from one another?

A Router is a layer-3 network connecting device, i.e., it works on the physical, data-link and network layer of the OSI model. Static Routing:the path for the data packets is manually set. It is generally used for small networks.Dynamic Routing:various routing algorithms are used to find the best and shortest path for the data packets.

Hub is a very simple network connecting device. In Star/hierarchical topology, a Repeater is called Hub. It is also known as a Multiport Repeater Device. Active Hub: is also known as Concentrator.
Passive Hub: does not need any power supply to operate.

A bridge is a layer-2 network connecting device, it works on the physical and data-link layer of the OSI model.Transparent Bridge:simply works as a transmission medium between two devices.
Routing Bridge:have their unique identity, they can be easily identified by the network devices.

A switch is a layer-2 network connecting device, i.e., it works on the physical and data-link layer of the OSI model. It interprets data in the form of data frames. A switch acts as a multiport bridge in the network.

What is a MAC address? Compare MAC address and IP address

MAC address & IP address

- MAC address or Media Access Control Address is a unique identifier or hardware identification number that is assign to NIC(Network Interface Controller/ Card). It was given to the network adapter when it is manufactured.
- Both MAC and IP address share the same definition.
- While the MAC address are used to ensure the physical address of the computer, IP address is used to uniquely identifies the connection of the network with that device takes part in a network.

What is bus topology? token ring topology? star network topology? full mesh topology? Compare them

Bus Topology In bus topology, All the computers are connected with a central bus and the data flow in a single direction.

Token Ring Topology In ring topology all the computer are connected with each other one after one forming a circular or ring pattern.

Star Topology In star topology, there is a central hub and all the computers are connected to it.

Mess Topology In mess topology all the computers are connected with each other ! and there are $n(n-2)/2$

channels to connect to n devices.

What is bluetooth? What is Wi-Fi? Compare them

Bluetooth is for connecting devices to each other. Bluetooth a standard for the short-range wireless interconnection of mobile phones, computers, and other electronic devices.

Bluetooth needs a password when pairing the devices;

Wifi is for connecting devices to the internet. Wifi a facility allowing computers, smartphones, or other devices to connect to the internet or communicate with one another wirelessly within a particular area.

What is an Access Point? How is it different than a router?

Access Point

- Access point is a stand-alone device or computer that connects and communicates with a wired computer network via wireless devices (such as laptop & PC).

- An access point is a network device that provides a Wireless Local Area Network (WLAN) allowing devices to connect from within your network, while a router acts as a gateway, creating a local area network and controlling all connected devices.

- A wireless router can function as a wireless access point, but an access point can't act as a router.

What are the differences of 4G and 5G?

5G is a new digital system for transforming bytes - data units - over air. It uses a 5G New Radio interface, along with

other new technologies, that utilises much higher radio frequencies (28 ghz compared to 700 mhz - 2500 mhz for 4G) to transfer data over the air for faster speeds, reduced congestion.

4G can support about 4,000 devices per square kilometre, whereas 5G will support around one million. This means more Netflix streaming, voice calls and You Tube carried, without interruption, over the limited air space.

5G also uses a new digital technology called Massive MIMO, 5G involves installing Massive MIMO and 5G New Radio to all mobile network base stations on top of the existing 4G infrastructure.

5G networking are expected to be revolutionary for data-driven industries, smart cities and infrastructure management because it will be possible to have many more devices working, reliably, securely and uninterrupted in the same area. Overall, due to the new technologies, spectrum and frequencies it uses, 5G has several benefits over 4G; higher speeds, less latency, capacity for a larger number of connected devices, less interference and better efficiency.

What is a VPN? How does it work?

VPN

- VPN is a virtual private network, a service that helps us to stay private and establishes a secure, encrypted connection between the computer and internet, providing a private tunnel for the data and communications while using public networks.

- VPN can hide the IP address by letting the network redirect it through a specially configured remote server run by a VPN host, adding a layer of security

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