Computer Networks Lab : IS6L02

Prepare a detailed report on different devices available in various layers of computer network architecture.

OSI stands for Open Systems Interconnection. It is a 7 layer architecture where each layer have specific functionality. They are :

1. Application Layer
2. Presentation Layer
3. Session Layer
4. Transport Layer
5. Network Layer
6. Data Link Layer
7. Physical Layer

**Physical Layer:**  
The physical layer contains information in the form of bits.   
It is responsible for transmitting individual bits from one node to the next.

**Different Devices available:**

**Hub:**  
A hub is a common connection point, also known as a network hub, which is used for connection of devices in a network.   
The hub has numerous ports.   
If a packet reaches one port, it is able to be seen by all the segments of the network due to a packet being copied to the other ports.   
A network hub has no routing tables or intelligence (unlike a network switch or router), which is used to send information and broadcast all network data across each and every connection.  
There are three types of hubs: Passive Hub, Active Hub and Intelligent Hub.

**Repeater:**A repeater is a network device that retransmits a received signal with more power and to an extended geographical or topological network boundary than what would be capable with the original signal.  
Repeaters amplify the received/input signal to a higher frequency domain so that it is reusable, scalable and available.  
Repeaters are also known as signal boosters. **Modem:**Modem is a device that enables a computer to send or receive data over telephone or cable lines.   
The data stored on the computer is digital whereas a telephone line or cable wire can transmit only analog data.  
The main function of the modem is to convert digital signal into analog and vice versa. Modem is a combination of two devices − modulator and demodulator.

**Cables:**

To connect two or more computers or networking devices in a network, network cables are used.

There are three types of network cables; coaxial, twisted-pair, and optic fiber cables.

**Data Link Layer:**  
The data link layer is responsible for the node-to-node delivery of the message.   
The main function of this layer is to make sure data transfer is error-free from one node to another, over the physical layer.   
When a packet arrives in a network, it is the responsibility of DLL to transmit it to the Host using its MAC address.   
**Different Devices available:**  
**Bridges:**

A bridge is a type of computer network device that provides interconnection with other networks that use the same protocol, connecting two different networks together and providing communication between them.

**Network Interface Card:**

Network interface card is an electronic device that is mounted on the ROM of the com that connects a computer to a computer network, usually a LAN.   
It is considered a piece of computer hardware.   
Most modern computers support an internal network interface controller embedded in the motherboard directly rather than provided as an external component.  
**Layer-2 Switch:**A layer 2 switch is a type of network switch or device that works on the data link layer (OSI Layer 2) and utilizes MAC Address to determine the path through where the frames are to be forwarded.   
It uses hardware based switching techniques to connect and transmit data in a local area network (LAN).

A layer 2 switch can also be referred to as a multiport bridge. **Access points:**A Wireless Access Point (WAP) is a device that allows wireless devices to connect to a wired network using Wi-Fi, or related standards.   
The AP usually connects to a router (via a wired network) as a standalone device, but it can also be an integral component of the router itself.  
An access point cannot create a new network. It only broadcasts whatever packet it receives.

**Network Layer:**The network layer works for the transmission of data from one host to the other located in different networks.   
It also takes care of packet routing i.e. selection of the shortest path to transmit the packet, from the number of routes available.   
The sender & receiver’s IP addresses are placed in the header by the network layer. **Different Devices available:  
Routers:**

A router is a switch like device that routes/forwards data packets based on their IP addresses.   
Routers normally connect Local Area Network (LANs) and Wide Area Network (WANs) together and have a dynamically updating routing table based on which they make decisions on routing the incoming packets.

**Brouters:**

A bridge router or brouter is a network device that works as a bridge and as a router.   
The brouter routes packets for known protocols and simply forwards all other packets as a bridge would. Brouters operate at both the network layer for routable protocols (or between network with different data link layer protocol ex. one is running on ethernet (802.3) and other network is running on Token ring (802.5)) and at the data link layer for non-routable protocols (or both network are using same data link layer protocol).

**Layer-3 Switch:**A layer 3 switch combines the functionality of a switch and a router.   
It acts as a switch to connect devices that are on the same subnet or virtual LAN at lightning speeds and has IP routing intelligence built into it to double up as a router.   
It can support routing protocols, inspect incoming packets, and can even make routing decisions based on the source and destination addresses.  
**Gateways:**

In computer networking, a gateway is a component that is part of two networks, which use different protocols. The gateway is a protocol converter which will translate one protocol into the other. A router is a special case of a gateway.

**Transport Layer:**​​The Transport layer is responsible for end-to-end communication.  
**Different Devices available:**  
**Firewall:**

A firewall is a system designed to prevent unauthorized access to or from a private network, some of the functionalities of firewall are, packet filtering and as a proxy server.  
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**Session Layer:**This layer allows users on different machines to establish active communications sessions between them. It is responsible for establishing, maintaining, synchronizing, and terminating sessions between end-user applications.  **Different Devices available:  
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**Gateways:**

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**Application Layer:**  
This layer provides several ways for manipulating the data (information) which actually enables any type of user to access network with ease. This layer also makes a request to its bottom layer, which is presentation layer for receiving various types of information from it.   
**Different Devices available:**

Computers:  
A computer is a digital electronic machine that can be programmed to carry out sequences of arithmetic or logical operations (computation) automatically.