

**Name : Khushi Nitinkumar Patel**

**PRN : 2020TECS00037**

**Batch : S3**

**Q. 1 Study the OSI model and write the layer by layer working of it.**

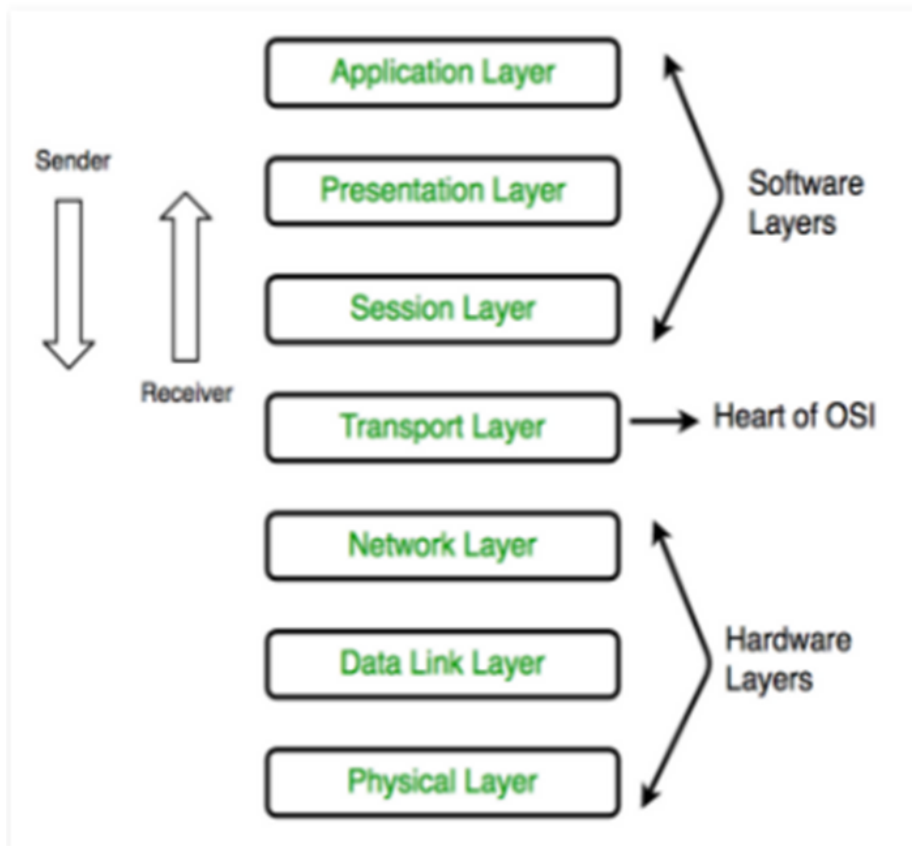
-Purpose of OSI model is to show how to facilitate communication between different systems without requiring changes to the logic of the underlying hardware and software.

-The OSI model is not a protocol; it is a model for understanding and designing a network architecture that is flexible, robust and interoperable.

-It is a layered framework for the design of network system that allows communication between all types of computer system.

## Layers of OSI model.

Each layer is a package of protocol.



## **1.Physical layer**

- Lowest layer of OSI model.
- Responsible for the actual physical connection between the devices.
- This layer contains information in the form of bits and is responsible for transmitting individual bits from one node to the next.
- When the data is received in this layer, the layer will get the signal received and convert it into 0s and 1s and further send it to the Data link layer.
- Hub, Repeater, Modem, cables are physical layer devices.
- Physical layer defines the characteristics of the interface between the device and the transmission medium.
- It also defines the type of transmission medium.

The physical layer defines the characteristics of the interface between the devices and the transmission medium. It also defines the type of transmission medium.

- Representation of bits.
- Data rate.
- Synchronization of bits.
- Line configuration
- Physical topology.
- Transmission mode.

**-> Functions of Physical layer.**

1. Bit synchronization
2. Bit rate control
3. Physical topologies
4. Transmission mode

## **2.Data Link layer (DLL)**

- Responsible for node to node delivery of the message.
- Main function is to check that data transferred from one node to other over the physical layer.
- It is divided into two sublayers
  - 1)Logical Link Control
  - 2)Media Access Control
- It makes the physical layer appear error-free to the upper layer (network layer).
- Framing. The data link layer divides the stream of bits received from the network layer into manageable data units called frames.  
and is responsible for moving frames from one hop to the next.

Other responsibilities of the data link layer include the following:

- Physical addressing.
- Flow control.
- Error control.
- Access control.

### **3.Network layer**

- Transport layer passes data segment to the network layer.
- This layer works for the transmission of the received data segments from one computer to another located in different networks.
- Data units in this layer are called packets. It is the layer where routers reside.
- Functions of Network layer are:
  - 1.logical addressing
  - 2.Path determination
  - 3.Routing

#### **4.Transport layer**

-This is the layer below the session layer.

-It controls reliability of communication through segmentation,flow control and error control.

Segmentation :

-Data received from session layer is divided into small data units called segments.

-Each segment contains a source's and destination port number and a sequence number.

Flow control

-In flow control, transport layer controls the amount of data being transmitted.

Error control

-It helps in error control ,it uses automatic repeat request scheme to retransmit the lost or computed data.

-Protocols of transport layer are TCP ,UDP

## **5.Session layer**

- Helps in setting up and managing connections,enabling,sending and receiving of data followed by termination of connection.
- It has its own APIs NET BIOS
- Just before,a connection is established with the server performs a function called authentication, it is a process of verifying who you are?
- This layer keeps a track of the files that are being downloaded.
- This layer keeps a track of which data packet belongs to which file and tracks where the received data packet go.It helps in session management.

## **6.Presentation layer**

- It receives data from application layer
- This data is in the form of characters and numbers,the presentation layer convert this data into machine understandable language.
- Before data is transmitted, presentation layer reduces the number of bits that are used to represent the original data and this process is called as data compression,it reduces the amount of space used to store the original file.
- To maintain integrity of data, before transmission data is encrypted.



## **7.Application layer**

- At this layer, both the end user and the application layer interact directly with the software application.
- It doesn't reside in the layer but uses application layer protocols like HTTP,HTTPS.
- Used by network applications.

**Q.2. Study and prepare document on various networking Devices used for networking communication. Write its information, working and include images of it.**

Common network device list:

### **1. Hub.**

-A hub is a common connection point which is used for connection of devices in a network.

Working

-Hubs work as a central connection between all network equipment and handle a data type, which is called frames. If a frame is received, it is transmitted to the port of the destination computer after amplifying it. A frame is passed to each of its ports in the hub, whether it is destined only for one port.

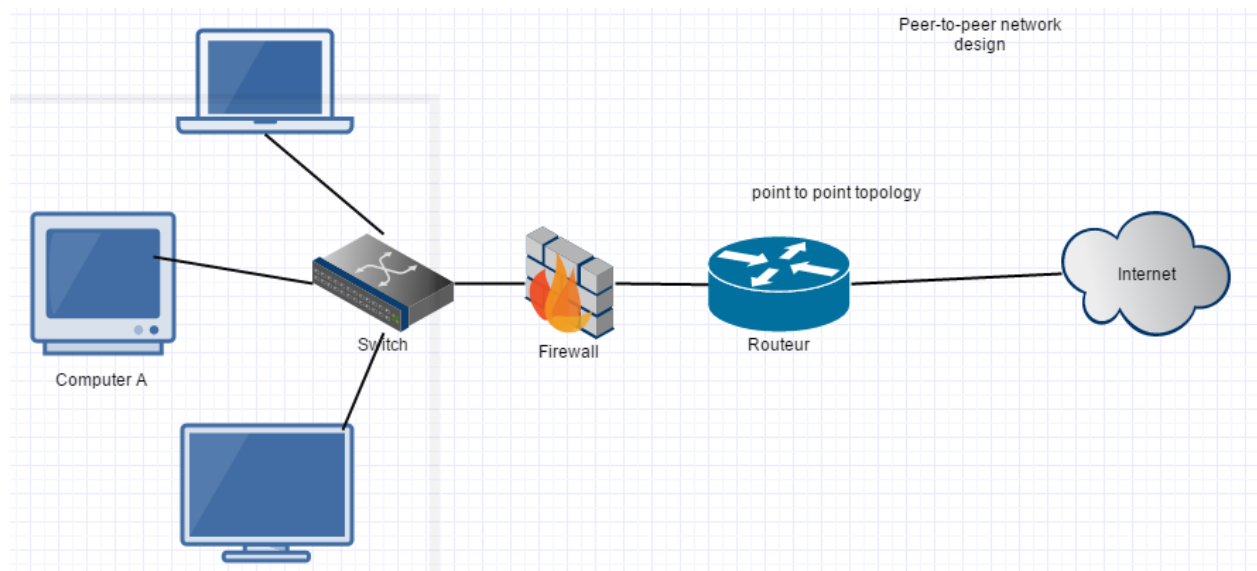


## 2. Switch.

- A switch is a multiport device that improves network efficiency.
- The switch maintains limited routing information about nodes in the internal network, and it allows connections to systems like hubs or routers.
- Strands of LANs are usually connected using switches. Generally, switches can read the hardware addresses of incoming packets to transmit them to the appropriate destination.
- Using switches improves network efficiency over hubs or routers because of the virtual circuit capability.

### Working

- Once a device is connected to a switch, the switch notes its media access control (MAC) address, a code that's baked into the device's network-interface card (NIC) that attaches to an ethernet cable that attaches to the switch.
- The switch uses the MAC address to identify which attached device outgoing packets are being sent from and where to deliver incoming packets.

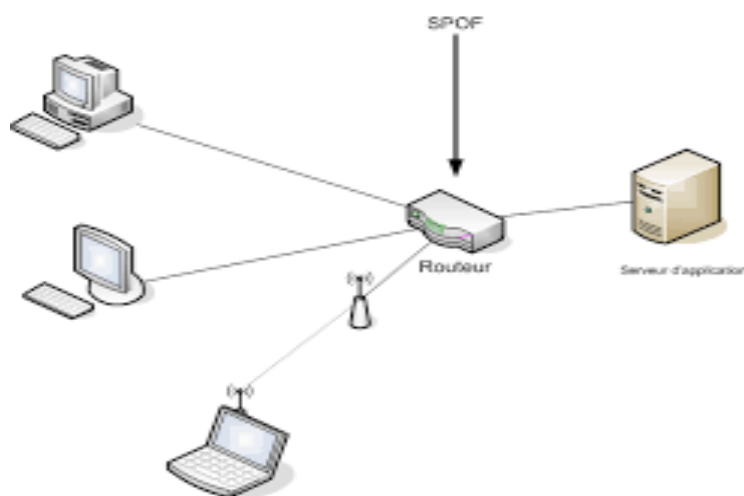


### 3. Router.

- Routers are intelligent devices, and they store information about the networks they're connected to.
- Most routers can be configured to operate as packet-filtering firewalls and use access control lists (ACLs).
- Routers, in conjunction with a channel service unit/data service unit (CSU/DSU), are also used to translate from LAN framing to WAN framing.

#### Working

- a router connects devices within a network by forwarding data packets between them.
- This data can be sent between devices, or from devices to the internet. The router does this by assigning a local IP address to each of the devices on the network.
- This ensures that the data packets end up in the right place, rather than getting lost within the network.



#### 4. Bridge.

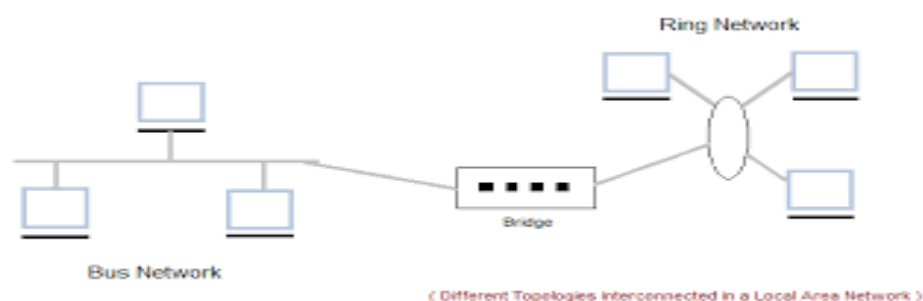
-Bridges are used to connect two or more hosts or network segments together. The basic role of bridges in network architecture is storing and forwarding frames between the different segments that the bridge connects.

-They use hardware Media Access Control (MAC) addresses for transferring frames. By looking at the MAC address of the devices connected to each segment, bridges can forward the data or block it from crossing. Bridges can also be used to connect two physical LANs into a larger logical LAN.

-Bridges work only at the Physical and Data Link layers of the OSI model. Bridges are used to divide larger networks into smaller sections by sitting between two physical network segments and managing the flow of data between the two.

-Bridges are like hubs in many respects, including the fact that they connect LAN components with identical protocols. However, bridges filter incoming data packets, known as frames, for addresses before they are forwarded.

-As it filters the data packets, the bridge makes no modifications to the format or content of the incoming data. The bridge filters and forwards frames on the network with the help of a dynamic bridge table.

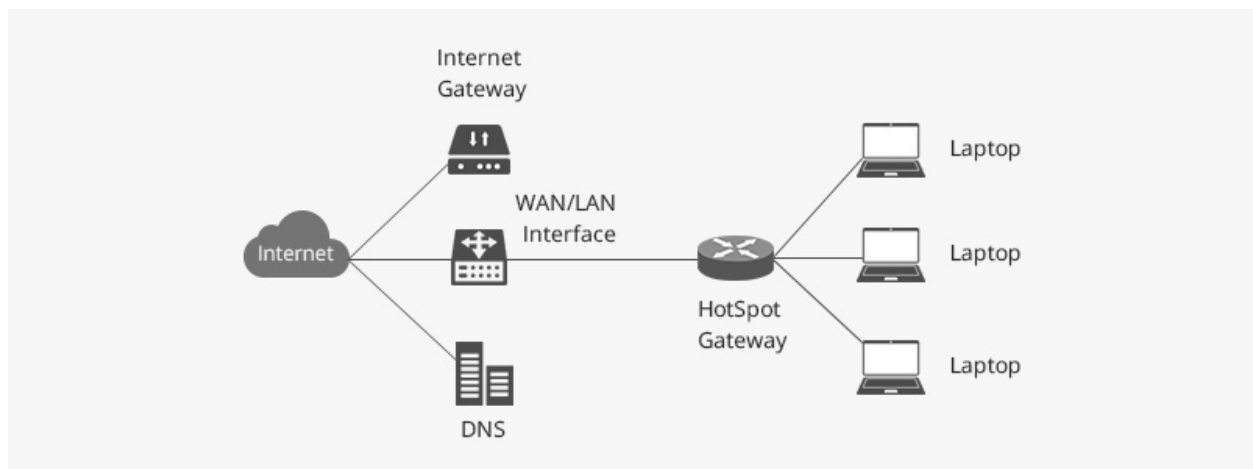


## 5. Gateway.

-Gateways normally work at the Transport and Session layers of the OSI model. At the Transport layer and above, there are numerous protocols and standards from different vendors; gateways are used to deal with them.

-Gateways provide translation between networking technologies such as Open System Interconnection (OSI) and Transmission Control Protocol/Internet Protocol (TCP/IP).

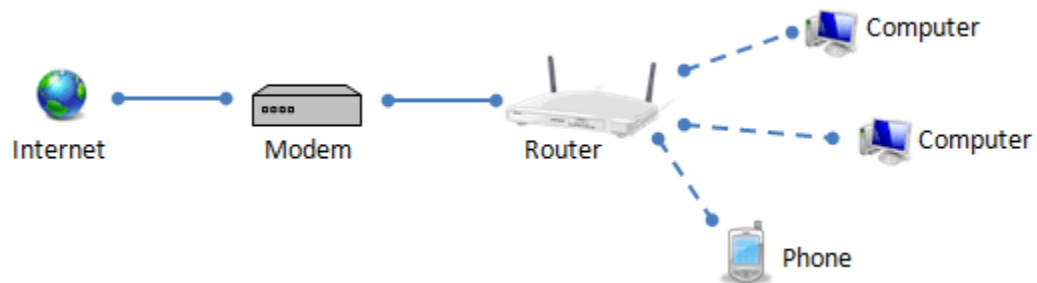
-Because of this, gateways connect two or more autonomous networks, each with its own routing algorithms, protocols, topology, domain name service, and network administration procedures and policies. Gateways perform all of the functions of routers and more.



## 6. Modem.

-Modems (modulators-demodulators) are used to transmit digital signals over analog telephone lines. Thus, digital signals are converted by the modem into analog signals of different frequencies and transmitted to a modem at the receiving location.

- The receiving modem performs the reverse transformation and provides a digital output to a device connected to a modem, usually a computer.



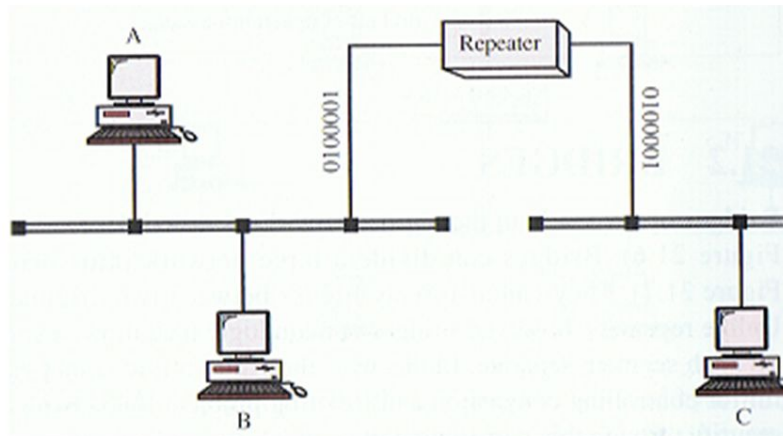
## 7. Repeater.

-A repeater is an electronic device that amplifies the signal it receives. You can think of repeater as a device which receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances, more than 100 meters for standard LAN cables. Repeaters work on the Physical layer.

### Working

-A repeater receives the radio signal on one frequency and simultaneously transmits the same signal on another frequency. Typically, a repeater is placed in a location where it can have a virtual line of sight to all radios in the system.

## Repeater





## 8. Access Point.

-An access point is a device that creates a wireless local area network, or WLAN, usually in an office or large building. An access point connects to a wired router, switch, or hub via an Ethernet cable, and projects a Wi-Fi signal to a designated area.

Working

-Access points work by connecting direct to your broadband router or network switch with a Ethernet or data cable. This provides the AP with the internet connection and bandwidth required. It then transmits and receives a wireless signal in either the 2.4Ghz or 5Ghz frequency range (WIFI).

