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Sub: Computer Networking and
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Group - B

Ans to the Q.No-8

The rapid growth of the Internet resulted in a shortage of available IPv4 addresses. In response, a specific subset of the IPv4 address space was designated as private, to temporarily alleviate this problem.

Public address: A public address can be routed on the Internet. Thus, hosts that must be Internet-accessible must be configured with public addresses. Allocation of public addresses is governed by the Internet Assigned Numbers Authority (IANA).

Private address: A private address is intended for internal use within a home or organization, and can be freely used by anyone. However,

private addresses can never be routed on the Internet. In fact, Internet routers are ~~are~~ configured to immediately drop traffic with private addresses. Three private address ranges were defined in RFC 1918, one for each IPv4 class.

- Class A - 10.x.x.x /8

- Class B - 172.16.x.x /12

- Class C - 192.168.x.x /24

Ans. to the Q. No - 5

Subnetting: Subnetting is the process of creating new networks by stealing bits from the host portion of subnet mask. There is one caveat: Stealing bits from hosts creates more networks but fewer host per network.

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The $2^n - 2$ for subnetted networks: To avoid confusion, it was historically unacceptable to use the first and last new networks created when subnetting, as it is possible for a classful network to have the same subnet and broadcast address as its subnetted networks. This required the $2^n - 2$ formula to also be used when calculating the number of new networks created while subnetting.

However, this is no longer a restriction for modern equipment and routing protocols. Specifically, on Cisco IOS devices, the following command is now enabled by default:

```
Router#conf t  
Router(config)#ip subnet-zero
```

The ip subnet-zero command allows for the use of networks with all 0 or all 1 bits.

in the subnet network portion of the address. Thus the formula for calculating the number of new networks created is simply 2^n .

The formula for calculating usable hosts is always $2^n - 2$.

Ques. 2. Answer the following questions.

Ans. to the Q.No-1

- a) Computer networking and security consists of measures taken by business or some organizations to monitor and prevent unauthorized access from the outside attackers. Different approaches to computer network security management have different requirements depending on the size of the computer network.

Network security is broad term that covers a multitude of technologies derived and processes. Computer network security is need for home networks as well as in the business world. Most homes with speed internet connection have one or more wireless routers, which could be easily exploited if not properly secure. A solid network security system helps reduce the risk of data loss.

b) Classification of network topology:

The term topology refers that way in which the end points or stations, attached to the network are interconnected or it is the arrangements of systems in computer network. It can be either physical or logical.

The network topology can be categorized into:

- i Bus topology iv Tree topology
- ii Ring topology v Mesh topology
- iii Star topology vi Hybrid topology

Hybrid topology:

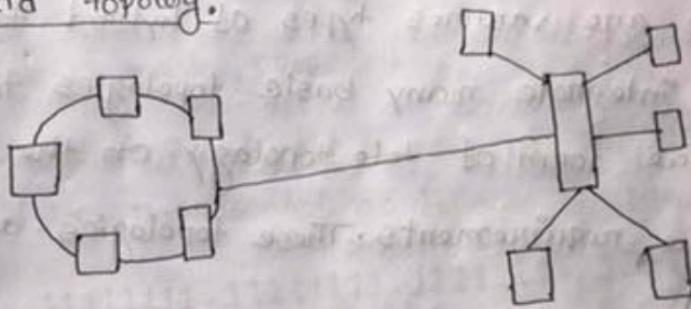


Fig: Hybrid topology

A combination of two or more topology is known as hybrid topology. For example a combination of star and mesh topology is known as hybrid topology. These topologies can include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology.

It's usage and choice are dependent on its deployments and requirements like the performance of desired network and the number of computers, their location.

There are various types of hybrid topologies that integrate many basic topologies to make a new form of topology on the basis of the requirements. These topologies are -

- ① Hierarchical network topology.
- ② Star with Ring network topology.
- ③ Star-wired bus topology.

Ans. to the Q. No - 9

Classless Inter-Domain Routing (CIDR) is a simplified method of representing a subnet mask. CIDR identifies the number of binary bits set to a 1 in a subnet mask, preceded by a slash.

For example, a subnet mask of 255.255.255.240 would be represented as follows in binary.

11111111.11111111.11111111.11110000

The first 28 bits of the above subnet mask are set to 1. The CIDR notation for this subnet mask would thus be 6 /28.

The CIDR mask is often appended to the IP address. For example, an IP address of 192.168.1.1 and a subnet mask of 255.255.255.0 would be represented as follows in using CIDR notation.

192.168.1.1 /24

Ans. to the Q. No - 2

Hardware addressing: A hardware address is used to uniquely identify a host. Addressing is a function of Data-link layer of the OSI model. Hardware addresses help identify devices attached to a wired or wireless network. Both wired and wireless network adapters have a hardware address.

The hardware address is sometimes referred to as a physical address, Ethernet address, or media access control (MAC) address.

The standard format for printing hardware address is six groups of two hexadecimal digits, separated by hyphens (-) or colons (:).

Only the letters a-f are used, as well as the numbers 0-9.

Example: 01-23-45-67-89-ab or 01:23:45:67:89:ab

Internet protocol: IP stands for "Internet Protocol" which is the set of rules governing the format of data sent via the internet or local network. An IP address is a unique address that identifies a device on the internet or a local network. There are several commonly used network protocols that run on top of IP, including -

- ① TCP: Transmission Control protocol enables the flow of data across IP address connections.
- ② UDP: User datagram protocol provides a way to transfer low-latency process communication that is widely used on the internet for DNS lookup and voice over internet protocol.
- ③ FTP: File transfer protocol is a specification that is purpose-built for accessing, managing, loading, copying and deleting files across connected

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IP hosts

④ HTTP: HyperText Transfer Protocol is the specification that enables the modern web. It typically runs over port 80.

⑤ HTTPS: HyperText Transfer Protocol Secure is HTTP that runs with encryption via secure sockets layer or transport layer security. It typically is served over port 443.

Subnet mask: A subnet mask is a 32-bit number created by setting host bits to all 0s and setting network bits to all 1s. In this way, the subnet mask separates the IP address into the network and host addresses. When organizations need additional subnetworking, subnetting divides the host

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element of the IP address further into a subnet.

The goal of subnet masks are simply to enable the subnetting process. The phrase "mask" is applied because the subnet mask essentially uses its own 32-bit numbers to mask the IP address.

XXXXX 0011
XXXXX 0011
XXXXX 1111

XXXXX 0011
XXXXX 1111

XXXXX 1111

XXXXX 1111

Ans. to the Q. No - 6

Determining the Range of Subnetted Networks :

Given IP : 192.168.254.0/29

Given IP was subnetted using a 255.255.255.

240 mask

010 000 000 000 000 000 000 000

192.168.254.0 ; 11000000.10101000.1111110.00000000

255.255.255.240; 1111111.1111111.1111111.11110000

1 01 00000

Calculating the five stolen bits -

00000
1110000

Binary	Decimal
.000XXXXX	.0
.001XXXXX	.32
.010XXXXX	.64
.011XXXXX	.96
.101XXXXX	.160
.110XXXXX	.192
.100XXXXX	.128
.111XXXXX	.224

This equates to exactly 8 new networks. The decimal value represents ^{the} first address of each newly created network.

Binary	Decimal
.000000000	.0
.000000001	.1
.000000010	.2
.000000011	.3
.000000100	.4
.000000101	.5
.000000110	.6
.000000111	.7

The binary value has been split to emphasize the separation of the stolen networks bits. The first address has all 0 bits in the last portion (000)^{and} the address for this network. The last address all the 1 bit in the last portion.

: There are exactly 6 ~~as~~ usable address to assign to hosts.