Q1.

i) Maximum Number of subnets

The given root network is 1.2.128.0/17.

Number of host bits = 32 - 17 = 15 bits

If all host bits are borrowed for subnetting:

ii) Network address calculation and Hierarchial Tree

The address range of 1.2.128.0/17 is:

- Start: 1.2.128.0
- End : 1.2.255.22255

The network can be hierachically

Subnetted as follows:

• 1.2.128.0/18

• 1.2.192.0/18

Each/18 can further be divided into smaller subnets (e.g., /19, /120) depending on the requirements shown in the figure.

This hierarchical subnetting ensures efficient address utilization and scalability

Q2.

i) Summarized Network of R3 ~~LA~~ LANS

All LAN networks connected to router R3 are contiguous.

By analyzing their common binary prefix, the summarized network becomes:

192.168.4.0/22

static summary route configured in R1:

ip route 192.168.4.0 255.255.252.0 <Next-hop-Address>

ii) Floating static Route

To configure a floating static route to LAN2 of R3 via routers R2 with an Administrative Distance of 50:

ip route 192.168.5.0 255.255.0 serial 0/0/1 50

This route will be used only if the primarcy route fails.

Q3.

Given

- Total packet size = 4560 bytes.
- Header size = 20 bytes.
- payload size = 4540 bytes
- MTU = 380 bytes

Payload perc fragment:

380 - 20 = 360 bytes

i) Ne Numberc of fragments

$$\frac{4540}{360} = 12.61 = 13 \text{ fragments.}$$

ii) Fragment offset of the 4th Fragment

Payload before the 4th fragment:

$3 \times 360 = 1080$

Fragment offset:

$$\frac{1080}{8} = 135$$

iii) MF Bit of 5th Fragment

Since the 5th fragment is not the last Fragment the more fragment (MF) bit = 1.

Q4.

The DHCP servers is located in a different network from Dipu's devices.

DHCP uses broadcast messages, and routers do not forward broadcasts by default.

Solution

Configure DHCP Relay (Ip Helper Address) on Dipu's router.

ip helper-address <DHCP-server-IP>

This allows DHCP requests to reach the remote DHCP server.

Q5.

The statement is FALSE.

Using Network Address Translation (NAT) or Port Address Translation (PAT), multiple

internal devices can access the Internet using a single public IP address.

~~SECTION B~~

Q

Q6.

Router R2 will send routing updates through all active interfaces, except the interface from which the route was learned, due to the split Horizon rule.

Distance Vector protocols (e.g., RIP) send periodic updates every 30 seconds to neighboring routers.

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Q7.

IPv6 address:

FE80:0:0:B0B:980:FF:FE00::

i) MAC Address

From the interface ID, removing FF:FE gives the MAC Address:

\boxed{B0:0B:09:80:00:00}

ii) IPv6 Address Type

Addresses starting with FE80::/10 are Link-Local IPv6 Addresses.

Q8.

- PC4 → PC3

Since PC3's MAC Address is already known, Switch S3 forwards the frame using unicast

- PC4 - PC2

PC2 MAC address is unknown, so switch S3 floods the frame to all ports except the incoming port.

MAC Address Tables (After Transmission)

Switch S3

- PC3 → known interface.
- PC4 → Incoming interface

Switch S2

- PC5 → known interface
- PC4 → Interface toward S3

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Q9.

Attack Type

ICMP Flood (Ping Flood) Denial-of-service Attack

Explanation

A large number of ICMP Echo Requests are sent to a sereverc, consuming bandwidth and CPU resources. As a result, the sercverc becomes unable to respond to legitimate HTTP requests.

Q10.

- ARP request is broadcast and flooded by switches S1, S2, and S3.
- PC5 replies with an ARP reply (unicast)

After receiving the reply, PC1 :.

1. Updates its ARP cache.
2. sends unicast frames to PC5

Q11.

IPv6 packets are encapsulated inside IPv4 Packets to allow communication across IPv4-only networks.

This process called Tunneling.

Q12.

MAC address:

98:CC:12:23:90:BB

i) Address Type

The frist byte indicates a unicast adress.

ii) Flat Address Explanation

MAC addresses are flat because they do not contain ~~fo~~ network hierarchy and are assigned by manufacturers, unlike IP addresses.

Q 13.

When a topology change occurs:

1. Routers detects link failurce.
2. Route metric set of infinity
3. Triggerced updates sent
4. Loop prevention mechanisms applied (split horizon, route posi poisoning)
5. Network converges gradually.

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