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Sec: 22

1) I) 3.12.64.0/19

II) R2 LAN 3.12.64.0/22

SW LAN 3.12.68.0/23

R4 LAN 3.12.70.0/24

WAN Links 3.12.71.0/30

III) Allocated size = 22.2^{10} = 1024 addresses

∴ Wasted = 1024 − 1003

= 21

2) I) ~~The routing table~~

From the figure, the devices and routers that are directly connected to the respective routers are direct connections.

II) ip route 0.0.0.0 0.0.0.0 192.10.11.1

III) ip route 0.0.0.0 0.0.0.0 s0/0/1 10

↳ AD

iv) 40: The AD represents the trustworthiness of the route.

0: Metric, representing cost

v) A directly attached route is better because it avoids the recursive lookup process.

3) I) Total data = 4534 - 42 = 4542 bytes

Let Data per fragment = x - 42

8D + 362 = 4542

⇒ D = 522.5

if D = 520

2) 8 × 520 = 4160

∴ 4542 - 4160 = 382

if 4th segment is 362 bytes 3D + 362 must be ≤ Total data

∴ x = 562

II) Offset = (4 × 520)/8 = 260

III) $\frac{4542}{2520}$

2.73

$\therefore$ 9 packets

4) I) Link state algorithms converge once LSPs are flooded. Here, it takes 3 iterations

R4 → R1 → R2 → R3

II) R1 will detect the loss if it stops receiving 'Hello' packets from R4 within the dead interval or if the physical layer reports a carrier loss on the interface.

5) I) Longest form: 2001:0db8:12af:0001:0003

Type: Global unicast, used for generic internet communication.

II) Longest form: 0000:0000:0000:0000:0000:0000:0000:0000

Type: Unspecified address, used by a host as a source address before unique address assigned.

8) The client broadcasts the DHCP Request to inform all other DHCP servers that it has accepted an offer from a specific server, allowing those other servers to release the IP addresses they were holding for that client. When renewing, the packet is Unicast directly to the server that granted the lease, rather than broadcast.

9) I) The likely cause is NAT.

II) Rajib should implement Port forwarding.

10) I) Destination MAC for host X:

⇒ Because Host Y is on a different subnet (10.0.1.x vs 10.0.2.x), Host X sents this frame to its Default gateway (R1).

⇒ Destination MAC: MAC of R1's interface F9

⇒ Host X uses ARP to find MAC address.

II) Switches are 'self-learning' because they build a MAC address table by 'inspecting the source MAC address of incoming frames on each port. In this scenario, when Host X sends a frame S1 records that MAC 11-11-11-11-11-11 is on port F1.