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Assignment 02

Course : 421

Q1 (i) Given,

root network: 3.255.192.0/19

Network Bit = 19

Host Bit = 32 - 19 = 11

~~Host IP address~~ =

Maximum subnets $= 2^{11} = 2048$

Subnetworks — hosts

(ii) R1 LAN $\longrightarrow$ 1000 + 2 = 1002

R2 LAN $\rightarrow$ 512 + 2 = 514

R3 LAN $\rightarrow$ 255 + 2 = 257

R6 - R4 $\Rightarrow$ WAN $\rightarrow$ 2 + 2 = 4

R6 - R5 $\Rightarrow$ WAN $\rightarrow$ 2 + 2 = 4

R2 - R3 (via S3) $\rightarrow$ 2 + 2 = 4

~~R1 - R2~~

S1 - S2 - R4 $\rightarrow$ 3 + 2 = 5

address	2^x	num of host bit	Subnet generator
1002	$2^{10} = 1024$	$\log_2(1024) = 10$	100.00000000 = 3rd Octant = 4
514	$2^{10} = 1024$	10	4
257	$2^9 = 512$	9	10.00000000 = 2 ⇒ 3rd Octet
5	$2^3 = 8$	3	1000 = 8 ⇒ 4th
4	$2^2 = 4$	2	100 = 4 = 4th
4	$2^2 = 4$	2	4 = 4th
54	$2^2 = 4$	2	4 = 4th

192+4 = 196 + 4 = 200

Network Address:

3.225.110.00000.00000000

R1 → 3.225.192.0/22 32-10 = 22

R2 → 3.225.196.0/22

R3 → 3.225.200.0/23

R4-R6 → 3.225.202.0 /29

R5-R6 → 3.255.202.8 /30

R2-R3 → 3.255.202.12/30

R4 → 3.255.202.16/30

3.255.192.0/19

- 3.225.192.0/22
- 3.225.196.0/22
- 3.225.200.0/23
- 3.225.202.0/29
- 3.255.202.8/30
- 3.255.202.12/30
- 3.255.202.16/

Q 2) (i) R2 LANS in binary,

Network		3rd Octet
198.44.128.0	=	10000000
198.44.144.0	=	10010000
198.44.160.0	=	10100000
198.44.176.0	=	10110000

2bit

Common bit, (16+2) = 18

Summarized network = 198.44.128.0 /18

Subnet Mask = 255.255.192.0

Static route on R1 :-

R1 (config) #. ip route 198.44.128.0 255.255.192.0 20.2.1.2

(ii) R3 config # ip route 0.0.0.0 0.0.0.0 20.2.2.1 5

Q31

i) Data = 4080 bytes

MTU = 540 bytes

Header = 20 bytes

only Data = (540 - 20) = 520

num of fragments = $\frac{4080}{520} = 7.85$

Total fragments 8.

ii) $3 \times 520 = 1560$ bytes

$1560 \div 8 = 195$ [8 → fragment offset measured]

iii) MF bit of 4^{th} fragment is 1.

exit ~~ex~~ interface S0

Q4:) B. Table:

Message	Source MAC	Destination MAC	Purpose
DHCP offer	Wifi router MAC	Client MAC or broadcast	Offers IP configuration
DHCP Req	Client MAC	FF:FF:FF:FF:FF:FF	Accepts offer

The wifi router sends a DHCP offer containing IP configuration details, and the mobile replies with a DHCP request accepting the offered IP address.

Q5:) Using NAT with Port Address Translation (PAT) R2 uses NAT (specifically PAT/NAPT) to map a private server IP and port to a public IP and port.

R2 maps the servers private IP and port (192.168.1.2:80) to its public IP and Port (201.113.13.221:8080)

Req sent to the public IP and port are translated by R2 and forward to the private server and replies are translated back.

~~Q8~~

[Q6] In a link state routing protocol, a router send LSPs only on its active interfaces where it has discovered neighbours.

R3 uses hello packets to discover directly connected neighbours on its interfaces. From this neighbour discovery, R3 learns only S1 and S0 have adjacent routers, while other interfaces have no routing neighbours. So it only flood packets to S0 and S1.

Q8 PC2 sends two frames PC4 and PC6.

PC2 → S1 → S2 → S3 → PC4

S3 ↓

S4 → P6

As switch is a self learning device so it will learn automatically when PC2 send Packets to S1 via F1 it learns PC2 is in F1 port then it flood to F0 and F2 then it goes to S2 and S2 learns that PC2 is in F0 so it floods

floods to F1 and F2 then it goes to S3 via F0 and S3 learns PC2 is in F0 so it floods to other ports F1, F2, F3 but as PC4 do not reply back so it can't deliver the packet because it do not have destination MAC address. Now when it send packet to ~~P6~~ PC6 it ~~will~~ wont flood to any other port because now they know where PC2 is so simply from PC2 it come to S3 thoroughly and from S3 it goes to S4 from F0 and sends via F1 to PC6.

Switch	Device	Interface
S3	PC6	F3
S4	PC6	F1

Q9) Link State protocols maintain a complete and accurate network topology and calculate routers using cost based algorithms (SPF), resulting in faster convergence and more reliable routers than RIP, which uses hop count and converges slowly. Hence, LSP has a lower AD.

Q10) ARP entries have a TTL to remove stale IP MAC mappings when device change or leave it reduce pressure on RAM. ARP request are broadcast Layer-2 messages and it is limited to LANs and do not forward broadcast, so ARP limited to local network only.

Q11) IPV6 uses Extention Headers to carry extra information instead of options in the main header.

The IPV6 base header size remains 40bytes, but the Payload length field changes to include the extention headers.

Q121 (i) The first octet of the MAC address is AF.

In ~~the~~ binary, AF = 10101111.

The second least significant bit (U/L) is 1 which indicates locally administered MAC address.

(ii) MAC is portable because it is independent of the network location. The same MAC address remains valid even when the device moves to a different network.

Q131 Traceroute shows each hop IP address, RTT to each hop. So it helps where delays, packet loss or failures occur along the path, aiding troubleshooting.