NPS

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H.A-2

Q2. Explain the needs for IPv6 address & write differences b/w IPv4 & IPv6.

Ans.

Feature	IPv4	IPv6
Address Space	32-bit	128-bit
Address Notation	Dotted decimal	Hexa decimal
Total Addresses	2^{32}	2^{128}
Header Size	20 bytes	40 bytes
Security	Optional IPSec	Mandatory IPSec
fragmentation	Routers & Hosts	Only Hosts
NAT Required?	Yes, Often Required	No, due to vast Address Space
BroadCast support.	Yes	No (uses Multicast & Any Cast)

Q1. Explain the Addressing methods for IPv6 Addresses.

Ans. IPv6 Supports several types of addressing method, which determine how IPv6 packets are routed:

i. UniCast: A Single source sends packets to a single destination address.

ii. Multi Cast: One packet is sent to multi devices. The pkt is delivered to all interfaces identified by multicast Address.

iii. Any Cast: Packet is delivered to nearest node identified by anycast address. This is useful for load balancing or locating nearest service node.

iv. Global UniCast: Publicly routable addresses similar to IPv4 Addresses.

v. Unique-Local: These are private addresses, similar to private IPv4 address. They aren't routable on public.

Q3. One of the address in a block is 17.63.110.114/24. Find the no. of addresses, first address & last address in the block.

Ans:- No. of Available bits (N) = 32-24 = 8

No. of Addresses = 2^8 = 256 Addresses.

First Address = 17.63.110.0

Last Address = 17.63.110.255

Q4. While doing Subnetting for Class-A address subnet mask given as 255.255.240.0/20. From info given find out:

(a) No. of subnets can be Formed.
(b) No. of valid subnets can be Formed.
(c) No. of Hosts can be Formed.
(d) No. of valid Hosts can be Formed.
(e) Also design subnets can be formed.

Ans:- (a) No. of subnets:-

The defaut Subnet mask for class A is 8.

Bits used for subnetting 20-12 = 4096 subnets.

(b) No. of valid subnets:-

The valid subnets exclude all 0's & all 1's Subnet, so there are 4096-2 = 4094 valid subnets

(c) No. of Hosts:-

The ~~So~~ Host bits (N) = 32-20 = 12 bits.

→ No. of Hosts = 2^{12} = 4096 Hosts.

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d. No. of Valid Hosts :

No. of valid Hosts = 4096 - 2 = 4094.

e. Designing Subnet:

The first subnet has range 16.0.0.0 to 16.0.15.255/20

Simply subsequent subnets are : 16.0.0.0/20 (subnet 1)
16.0.16.0/20 (subnet 2)
:
upto 4096 Subnets.

Q5. In Classless Addressing, we know first address & no. of addresses in block. Can we find prefix length? If answer is yes, show process & give an example.

Ans:- Yes, you can find prefix length if you know no. of address in a block. The process is:

(a) prefix length is no. of fixed Network bits in Address.

(b) Total No. of Addresses is $2^{(32-\text{prefix length})}$

for Ex, if the block contains 1024 Address, then.

$$2^{(32-\text{prefix})} = 1024$$

$$32 - \text{prefix length} = 10$$

$$\text{prefix length} = 22.$$

Q6.

Ans:- i) First group (200 business, 128 addresses each): Each business needs a /25 block (128 address), so we need 200 blocks of size /25.

First block = 150.80.00/25.

Second block = 150.8.0.0.128/25

... upto 200 blocks

ii) Second group (400 business, 16 addresses each): Each business needs a /28 block (16 addresses), so we need 400 blocks of size /28.

First block : 150.80.64.0/28

... upto 400 blocks.

iii) Third group (2000 household, 4 addresses each): Each household needs a /30 block (4 addresses). So we need 2000 blocks of size /30.

. first address : 150.80.80.0/30

... upto 2000 blocks.

* Remaining Addresses: After allocation, the remaining address space will be calculated based on unused address ranges.

Q7. An ISP is granted a block of addresses starting with 120.60.4.0/20. The ISP wants to distribute these blocks to 100 Organisations with each organization receiving 8 addresses only. Design subblocks & give slash notation for each subblock. Find out how many addresses are still available after these allocations.

Ans:- Each Organization receives 8 addresses, which require a /29 block (8 addresses). We need 100 blocks of /29 size.

. First block : 120.60.4.0/29.

Second block : 120.60.8.0/29

... upto 100 blocks.

Q8. An Organization is granted block 211.17.180.0/24. The Administrator wants to create 32 subnets.

(a) Find Subnet mask.
(b) Find no. of address in each subnet.
(c) Find first & last address in first subnet.
(d) Find first & last Address in Last Subnet (sub 32).

Ans: (a) Subnet Mask: To Create 32 subnets; we need 5 bits for subnetting ($2^5 = 32$). So the new subnet Mask is /29 => (24+5 = 29).

(b) No. of addresses per Subnet: $2^{(32-29)}$ = 8 addresses per Subnet.

(c) First & Last address in First Subnet:
-> First Address: 211.17.180.0
Last Address: 211.17.180.7

(d) First & Last Address in Last Subnet:
-> First Address: 211.17.180.248.
Last Address: 211.17.180.255.

Q9. An Organization is granted block 16.0.0.0/8. The Administrator wants to create 500 fixed-length subnets.

a. Find subnet mask.
b. Find no. of addresses in each subnet
c. Find first & last address in first subnet.
d. Find first & last address in last subnet.

Ans: (a) Subnet Mask: We need 9 bits to create 500 subnets ($2^9 = 512$); so new subnet mask is /17. (8+9 = 17).

(b) No. of Addresses per Subnet:

$2^{(32-17)}$ = 131072 addresses per subnet.

(c) First & Last Address in first Subnet:

First Address : 16.0.0.0

Last Address: 16.1.255.255.

(d) First & Last Address in Last Subnet:

First Address: 16.195.0.0

Last Address: 16.196.255.255.