

COMPUTER

NETWORK

ASSIGNMENT - 3

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Network Details

• Base Network: 10.0.0.0/120

• Total IPs in/20n:

$$2^{12} = 4096 \text{ IPs}$$

Usable = 4094 (excluding network and broadcast)

Question 1: Subnet a /120 block into 8 subnets

• To divide the /120 into 8 subnets, we need:

$$2^3 = 8 \rightarrow \text{borrow bits}$$

$$\text{New Prefix: } 120 + 3 = 123$$

$$\text{Subnet mask: } 255.255.254.0$$

Each subnet will have:

• 512 IP address (2^9)

• 510 usable host (minus network + broadcast)

These subnets can be assigned to:

• Labs \rightarrow 10.0.0.0/123

• Sensors \rightarrow 10.0.2.0/123

• Classrooms \rightarrow 10.0.4.0/123

Question 2: If each subnet needs 500 hosts what prefix is required?

ANSWER:

To determine the correct subnet size for a network requiring 500 hosts per subnet, use the formula for calculating usable ip addresses in a subnet

$$\text{USABLE HOSTS} = 2^n - 2$$

Step - 1 - Step Calculation:

We check the smallest n that satisfies:

$$2^n - 2 \geq 500$$

• For $n = 9$:

$$2^9 = 512 \Rightarrow 512 - 2 = 510 \text{ Usable hosts}$$

Required Prefix:

If 9 bits are used for hosts, then:

$$\text{Prefix} = 32 - 9 = /23$$

• Subnet mask: $255.255.254.0$

• Usable hosts per subnet: 510

• Total addresses per subnet: 512

CONCLUSION:

TO SUPPORT 500 hosts per subnet, we need a subnet with /23 Prefix. This ensures sufficient IP addresses while minimizing waste.

QUESTION 3: How many total hosts are supported by a /20?

Answer:

A Subnet with a /20 prefix means:

- 20 bits are used for the network
- the remaining 12 bits are for hosts
(Since IPv4 has 32 bits total)

Step-by-step calculation:

$$\text{Total IPs} = 2^{12} = 4096$$

- Out of these, 2 addresses are reserved:
 - 1 for network address
 - 1 for broadcast address

Final Answer:

- Total IP address in /20 = 4096
- Usable IP addresses (host) = 4094

Address planning
Broadcast control
Subnetting

10-0-0-0120

