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Roll No: 20P-0750

Lab-task: subnetting

Task 1: Determine Network Address of the following IP Address

IP address: 10.128.240.50/30. Also, determine broadcast and range of host addresses.

Class | Subnet mask
A | 255.0.0.0 /8
B | 255.255.0.0 /16
C | 255.255.255.0 /24

/25
/30
/27

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Task-01

32 bits subnet mask
← 25 bits on
7 bits off

IP: 11000000.10101000.00000101.01010101
Sub: 11111111.11111111.11111111.10000000 1st

AND
11000000.10101000.00000101.00000000 2nd

↳ ab host part k bits ko 0 karenge.
Ya broadcast add ayegi.

ip
Sub given /24
/25

3rd 1st 32-bit subnet
= (8)
↳ broadcast addr.

ip: 10.128.240.53/30

00001010.10000000.11110000.00110101
11111111.11111111.11111111.11111100

AND:

Network
32-30
(2)

00001010.10000000.11110000.00110011
broadcast address

Network: 10.128.240.48
Broadcast add: 10.128.240.51
range of host addresses: (49 - 50) ⇒ 2 hosts

formula:
192.168.240.10/28

32 - 28 = 4 no of host bits

2^4 - 2
= Total no of hosts.

How many networks ??
3 bits borrow karenge
2^3 bit = 8 subnet networks
256/8 ⇒ 32
add 32 to get the add of next

Task 2 : Determine the network and broadcast addresses and number of hosts bits and hosts for the given IPv4 addresses and prefixes in the following table.

IPv4 Address/Prefix	Network Address	Broadcast Address	Total Number of Host Bits	Total Number of Hosts
192.168.100.25/28	192.168.100.16	192.168.100.31	4	14
172.30.10.130/30	172.30.10.128	172.30.10.131	2	2
10.1.113.75/19	10.1.96.0	10.1.127.255	13	8190
198.133.219.250/24	192.133.219.0	198.133.219.255	8	254

Task: 2

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1) 192.168.100.25/28

32 - 28 = 4
Host bits
$2^4 - 2 = 14$
Total no of hosts.

ip: 11000000.10101000.01100100.00011001

Sub mask: 11111111.11111111.11111111.11110000

And: 11000000.10101000.01100100.00010000
network

1111
broadcast addr

Network addr in decimal: 192.168.100.16

broadcast: 192.168.100.31

2) 172.30.10.130/30

host bits
=) 32 - 30 = 2

total no of hosts
$2^2 - 2 = 2$

ip: 10111000.00011110.00001010.10000010

Subnet: 11111111.11111111.11111111.11111100

AND: 10111000.00011110.00001010.10000000
11
broad cast

Network address: 172.30.10.128

broadcast address: 172.30.10.131

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Task # 02

3) 10.1.113.75/19

32 − 19 = 13 host bits

$2^{13} - 2 = 8190$ total no of hosts.

00001010.00000001.01110001.01001011
11111111.11111111.11100000.00000000

AND: 00001010.00000001.01100000.00000000
00001010.00000001.01111111.11111111

Network add. 10.1.96.0

broadcast add. 10.1.127.255 Ans.

4) 198.133.219.250/24

32 − 24 = 8 host bits

$2^8 - 2 = 254$ total no of hosts

~~11000110.10000101.11011011.11111010~~
~~11000110.10000101.11011011.00000001~~
11000110.10000101.11011011.11111010
11111111.11111111.11111111.00000000

AND: 11000110.10000101.11011011.00000000
11111111

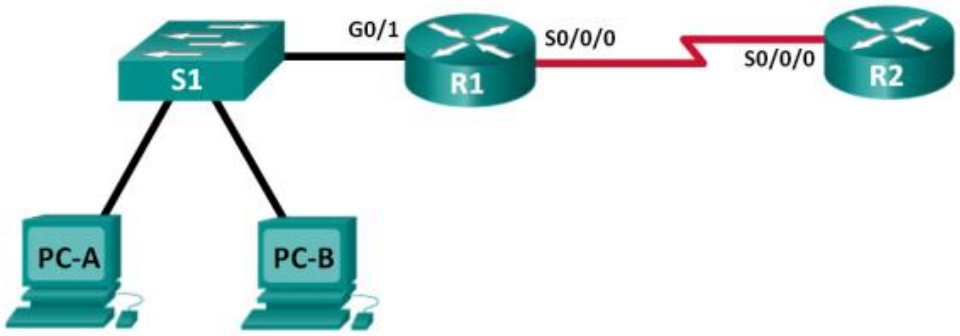
Nk 198.133.219.0

broadcast 198.133.219.255

broadcast add

Task 3: Network Topology A

In Part 1, you have been given the 192.168.10.0/24 network address to subnet, with the following topology. Determine the number of networks needed and then design an appropriate addressing Scheme.



Step 1: Determine the number of subnets in Network Topology A.

a. How many subnets are there? 2

b. How many bits should you borrow to create the required number of subnets? 1

c. How many usable host addresses per subnet are in this addressing scheme? 126

d. What is the new subnet mask in dotted decimal format? 255.255.255.128

e. How many subnets are available for future use? 0

Step 2: Record the subnet information.

Fill in the following table with the subnet information:

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	192.168.10.0	192.168.10.1	192.168.10.126	192.168.10.127
1	192.168.10.128	192.168.10.129	192.168.10.254	192.168.10.255
2				

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Task #03

a) 2 subnets in given Topology.

b) ~~one~~ 1 bits needs to borrow to create two subnets

$2^{\text{Bbits}} = 2^1 = 2$ subnets.

c) 126 usable host addresses per subnet.

because $256 / 2 = 128$

∴ 128 − 2 as first & last address are reserved so 126 will be usable

d) new subnet mask = 255.255.255.128

As we borrow 1 so there will be 25 bits reserved for network.

11111111.11111111.11111111.10000000

= 255.255.255.128

e) Zero subnets for future use.

$2^1 = 2$ subnets and we are using both subnets so no subnet left.

129 128
128
256
254

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Step 2

ip. 192.168.10.0

256/2 = 128 addresses

128 - 2 = 126 for 1st subnet.

one for network and one for broadcast address

for 2nd subnet.
10.0 + 128 =
192.168.10.128

saving 126 will be usable between hosts from 192.168.10.1 to 192.168.10.126

for 2nd :.

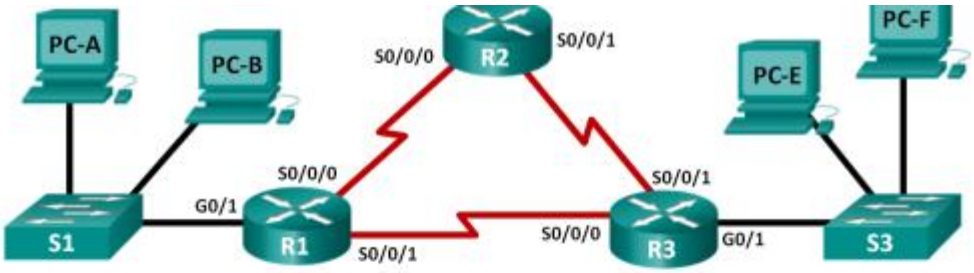
192.168.10.129 → 192.168.10.254

128 for network

255 for broadcast.

Task 4: Network Topology B

The topology has changed again with a new LAN added to R2 and a redundant link between R1 and R3. Use the 192.168.10.0/24 network address to provide addresses to the network devices. Also provide an IPaddress scheme that will accommodate these additional devices. For this topology, assign a subnet to each network.



Step 1: Determine the number of subnets in Network Topology B.

a. How many subnets are there? 6

b. How many bits should you borrow to create the required number of subnets? 3

c. How many usable host addresses per subnet are in this addressing scheme? 30

d. What is the new subnet mask in dotted decimal format? 224

e. How many subnets are available for future use? 2

Step 2: Record the subnet information.

Fill in the following table with the subnet information:

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	192.168.10.0	192.168.10.1	192.168.10.30	192.168.10.31
1	192.168.10.32	192.168.10.33	192.168.10.62	192.168.10.63
2	192.168.10.64	192.168.10.65	192.168.10.94	192.168.10.95
3	192.168.10.96	192.168.10.97	192.168.10.128	192.168.10.129
4	192.168.10.130	192.168.10.131	192.168.10.162	192.168.10.163
5	192.168.10.164	192.168.10.165	192.168.10.194	192.168.10.195
6	192.168.10.196	192.168.10.197	192.168.10.226	192.168.10.227
7	192.168.10.228	192.168.10.229	192.168.10.258	192.168.10.259
8				

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Task #04

DATE:

Step 1

a) 6

b) 3

c) 30

d) 192.168.10.224

e) 2

ip: 192.168.10.0/24

SubMask: 255.255.255.0

$2^3 = 8$ subnets

256/8 = 32

32 − 2 = 30 Usable host addresses

→ As we take 3 bits borrow the new subnet mask will be:

11111111.11111111.11111111.11100000

= 255.255.255.224

f) As there are 6 subnets in give topology and we have 8 subnets so 2 subnets are available for future.

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Step 5)

Subnet addel	First usable Host	Last usable host	Broadcast addel
192.168.10.0	192.168.10.1	192.168.10.30	192.168.10.31
192.168.10.32	192.168.10.33	192.168.10.62	192.168.10.63
192.168.10.64	192.168.10.65	192.168.10.94	192.168.10.95

Logic:

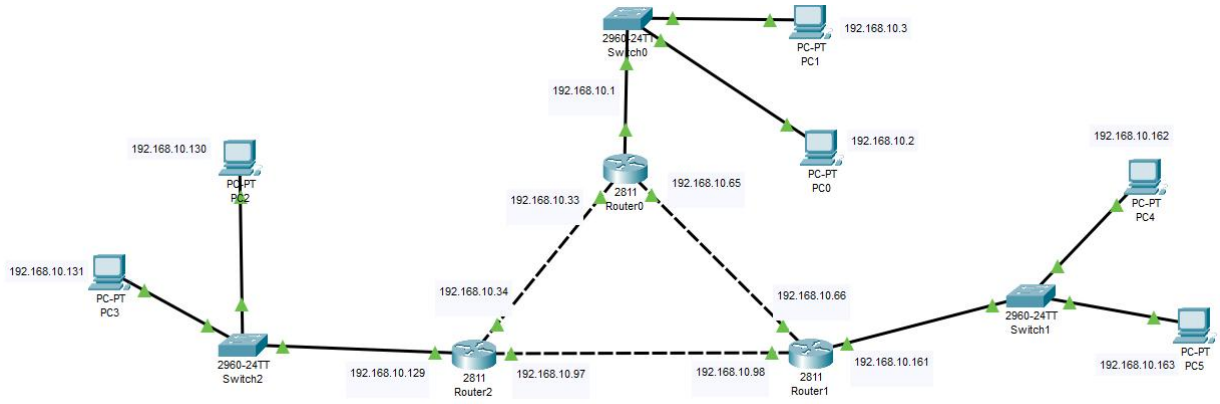
256/8 = 32

↓ So in first Subnet

Subnet 0 host add → 1 — 31

So in each subnet we have 30 usable host addresses

because first and last are reserved for network and broadcast address so it's applicable for every subnet.



Step 3: Assign addresses to network devices in the subnets.

a. Fill in the following table with IP addresses and subnet masks for the router interfaces:

Device	Interface	IP Address	Subnet Mask
R1	GigabitEthernet 0/1	192.168.10.1	255.255.255.224
	Serial 0/0/0	192.168.10.33	255.255.255.224
	Serial 0/0/1	192.168.10.65	255.255.255.224
R2	GigabitEthernet 0/1	192.168.10.66	255.255.255.224
	Serial 0/0/0	192.168.10.98	255.255.255.224
	Serial 0/0/1	192.168.10.161	255.255.255.224
R3	GigabitEthernet 0/1	192.168.10.34	255.255.255.224
	Serial 0/0/0	192.168.10.97	255.255.255.224
	Serial 0/0/1	192.168.10.129	255.255.255.224