Data Communications Laboratory
Subnetting

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Documentation Task 1.

AND the following IP addresses to determine whether the destination IP address belongs to a host on a local network or a remote network.

Source IP address:

10011001 10101010 00100101 10100011

Mask:

11111111 11111111 00000000 00000000

Destination IP address:

11011001 10101010 10101100 11101001

Source IP Address (AND): **10011001:10101010:0000000:0000000**

Destination *IP Address (AND):* **11011001:10101010:0000000:0000000**

As these AND address based on the Mask do not match, these must be a remote network.

Documentation Task 2. (Get your demonstrator to check your answers)

Determine the number of bits that need to be borrowed from the host portion of the network address and the number of bits that will be left for host addresses.

Fill in the table on the following page of this document for *all* the subnets that your subnetting of the network creates. This may be more than actually needed to satisfy the above requirement.

Subnet Number	**Subnet ID binary value**	**Host bits binary range**	**Last octet binary range**	**Last octet decimal range**	**IP range**	**Usable**
Examle #0	*00…*	*…0000-…1111*	*00000000-00..1111*	*0-2^n-1*	*197.15.22.0-197.15.22.2^n-1*	***Y/N?***
0	000	00000-11111	00000000-00011111	0-31	197.15.22.0 - 197.15.22.31	No
1	001	00000-11111	00100000-00111111	32-63	197.15.22.32 - 197.15.22.63	Yes
2	010	00000-11111	01000000-01011111	64-95	197.15.22.64 - 197.15.22.95	Yes
3	011	00000-11111	01100000-01111111	96-127	197.15.22.96 - 197.15.22.127	Yes
4	100	00000-11111	10000000-10011111	128-159	197.15.22.128 - 197.15.22.159	Yes
5	101	00000-11111	10100000-10111111	160-191	197.15.22.160 - 197.15.22.191	Yes
6	110	00000-11111	11000000-11011111	192-223	197.15.22.192 - 197.15.22.223	Yes
7	111	00000-11111	11100000-11111111	224-255	197.15.22.224 - 197.15.22.255	No

Use the table just developed to help answer the following questions:

1. Which octet(s) represent the network portion of a Class C IP address?

197.15.22.0

These make up the first 3 octets of IP address to make up a Class C IP address.

2. Which octet(s) represent the host portion of a Class C IP address?

197.15.22.***

The host portion of a Class C IP Address is the last octet.

3. For the subnets you defined how many bits in total represent the network portion of the IP address?

24 bits are used for the Network portion and an additional 3 bits are used from the Host to create the Subnet.

Therefore, for the subnets we defined, there is a total of 27 bits used for the Network portion.

4. For the subnets you defined how many bits are left in the fourth octet for host IDs?

As we created a total of 8 Subnets (6 usable) we consumed 3 of the bits from the fourth octet, we have a total of 5 bits to use for the host IDs.

5. What subnet mask must be used for the subnets you defined? Give the subnet mask in both decimal and binary.

We must use subnet mask Class C as we are only using the last octet to define our subnets and host IDs.

6. What is the maximum number of subnets that can be created with this subnet mask (in answering this question ignore the consideration of whether a particular subnet is usable or not)

256

7. What is the maximum number of useable subnets that can be created with this mask?

254

8. How many hosts per subnet can be in the subnets you have created? Assume the lowest and highest host ID in each subnet cannot be used.

30

9. Why can't the lowest and highest address in each subnet be used?

Highest address is used to broadcasting messages.

Lowest address is used for another special purpose.

10. What is the maximum number of hosts that can be defined for all subnets with this scenario if the all 0's and all 1's subnets cannot be used but all others can be? Assume the lowest and highest host ID in each subnet cannot be used.

180 (30*6)

There are 30 usable host IDs per subnet, and there are 6 usable subnets from what we have created.

11. Answer the previous question again, but now assume the all 0's and all 1's subnets can be used

256 (32*8)

Given no constraints, there is a total of 32 host IDs per subnet and a total of 8 subnets.

12. Is 197.15.22.63 a valid host IP address with this scenario? Why or why not?

That is NOT a valid IP address because 63 is not a valid host ID as it will include all 1s for the host ID. This is the broadcasting address and cannot be used.

13. Is 197.15.22.160 a valid host IP address with this scenario? Why or why not?

That is NOT a valid IP address because 160 is not a valid host ID as it will include all 0s for the host ID. This address is used for a special function and cannot be used as a host address.

14. Host A has an IP address of 197.15.22.126. Host B has an IP address of 197.15.22.129. Are these hosts on the same subnet? Why?

These are not apart of the same subnet. 126 is included in the range of subnet 3 and 129 is included in the range of subnet 4. Therefore, these are not apart of the same subnet.