

Part O: ANDing Process

- When a source host attempts to communicate with a destination host, the source host uses its subnet mask to determine whether the destination host is on the local network or a remote network
- AND operation is very simple - two binary digits are compared, and the based on their combination, a resultant value is formed.

AND function has the following properties

If the two compared values are both 1, the result is 1.
If one of the values is 0 and the other is 1, the result is 0.
If both of the compared values are 0, the result is 0.

$$0 \text{ AND } 0 = 0$$

$$0 \text{ AND } 1 = 0$$

$$1 \text{ AND } 1 = 1$$

Steps

1. Host takes its own IP address and ANDs it with its own subnet mask, producing a result.
2. Host then takes the destination IP address and ANDs it with its own subnet mask, producing another result.
3. Host compares the two results. In cases where the ANDing results are identical, it means that the hosts reside on the same subnet. In cases where the results are different, it means that the destination host is remote.

Example

- Computer A has an IP address of 192.168.62.14 with a subnet mask of 255.255.248.0.
- It wishes to communicate with host 192.168.65.1.
- In order to determine whether this destination is local or remote, it will go through the ANDing process

Source IP	11000000	10101000	00111110	00001110	
Source Subnet Mask	11111111	11111111	11111000	00000000	
AND Result	11000000	10101000	00111000	00000000	= 192.168.56.0

Destination IP	11000000	10101000	01000001	00000001	
Source Subnet Mask	11111111	11111111	11111000	00000000	
AND Result	11000000	10101000	01000000	00000000	= 192.168.64.0

- Computer A is on subnet 192.168.56.0, while the destination host is on subnet 192.168.64.0, which means that Computer A will next be sending the data to a router.

ANDING Process continued

Answer the following

Question 1

- Host A (with IP address 172.16.2.4) wants to communicate with Host B (with IP address 172.16.3.5).
- If the subnet mask for Host A is 255.255.0.0, will the hosts communicate using local transmissions or will they send information to the default gateway?
- Show the workings for the ANDing process below.

Source IP	
Source Subnet Mask	
AND Result	_____ =
Destination IP	
Source Subnet Mask	
AND Result	_____ =

Will the host communicate

Question 2

- Host A (with IP address 192.168.0.10) wants to communicate with Host B (with IP address 192.168.20.2).
- If the subnet mask for Host A is 255.255.255.0, will the hosts communicate using local transmissions or will they send information to the default gateway?
- Show the workings for the ANDing process below.

Source IP	
Source Subnet Mask	
AND Result	_____ =
Destination IP	
Source Subnet Mask	
AND Result	_____ =

Will the host communicate