SUBNET

***Why do we need subnet?***

* When two host computers try to communicate with each other, they check what we call subnet to understand whether they are within the same network.
* If they are in the same network (have the same network id), they can directly communicate with each other.
* If they are not in the same network, then they use routers to communicate with each other.

***How de we find network id?***

* If we have the IP address and the subnet mask address, we can find the network id.
* We convert the addresses to binary and connect them with AND logical operator.

***Here is an example:***

* IP address : 172.16.1.1
* Subnet Mask : 255.255.0.0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IP address | 172 | 16 | 1 | 1 |
| Subnet Mask | 255 | 255 | 0 | 0 |
| IP binary | 10101100 | 00010000 | 00000001 | 00000001 |
| Subnet binary | 11111111 | 11111111 | 00000000 | 00000000 |
| Network ID binary | 10101100 | 00010000 | 00000000 | 00000000 |
| Network ID | 172 | 16 | 0 | 0 |

***Here is another example:***

* IP address : 172.16.1.1
* Subnet Mask : 255.255.0.0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IP address | 192 | 168 | 1 | 10 |
| Subnet Mask | 255 | 255 | 255 | 0 |
| IP binary | 11000000 | 10101000 | 00000001 | 00001010 |
| Subnet binary | 11111111 | 11111111 | 11111111 | 00000000 |
| Network ID binary | 11000000 | 10101000 | 00000001 | 00000000 |
| Network ID | 192 | 168 | 1 | 0 |

* To make the calculation easier, just copy the octets from the IP address as they are if the subnet mask part is 255 or all 1s.
* If any octet of the subnet or the IP address is all 0s, then the network id part will be 0.

***CIDR: Classless Inter-Domain Routing***

* CIDR provides the network portion of the IP address
* IP address has a total of 32 bits (4 octets or 4 bytes). CIDR consists of all the 1s in a subnet.
* CIDR = To find the CIDR just calculate the number of 1s (Turned-on bits)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subnet Mask | 255 | 255 | 255 | 0 |
| CIDR =24 | 11111111 | 11111111 | 11111111 | 00000000 |
| Subnet Mask | 255 | 255 | 224 | 0 |
| CIDR =19 | 11111111 | 11111111 | 11100000 | 00000000 |