Subnets

Subnetting is dividing a big network into many small networks

Requirement of Subnetting

we have seen that Class A contains nearly 2^24 which is nearly 16 million and Class B has nearly 64,000 and Class C, the smallest class also contains 256 IP addresses which means 254 hosts can be configured.

In many of the cases in practical and industry what happens is we don't want very big networks, the reasons:

- maintenance will be very difficult, headache for network administrator to manage.
- we want to provide some security within the same network, and in big networks it will cause issues.

Example:

Lets say in your office, we have four departments and one department is developers and other department is testing and other department is maintenance and other is HR department so we don't want all the departments to access any common service for example if there is any code server we want to protect this code server from the other departments, so in this case we don't want to leave the network loosely so one thing is if I have a very big network maintenance is going to be very difficult and second thing is the security is going to be one more second issue. That is why even we have a big network we are going to divide it into many smaller networks this is called subnetting.

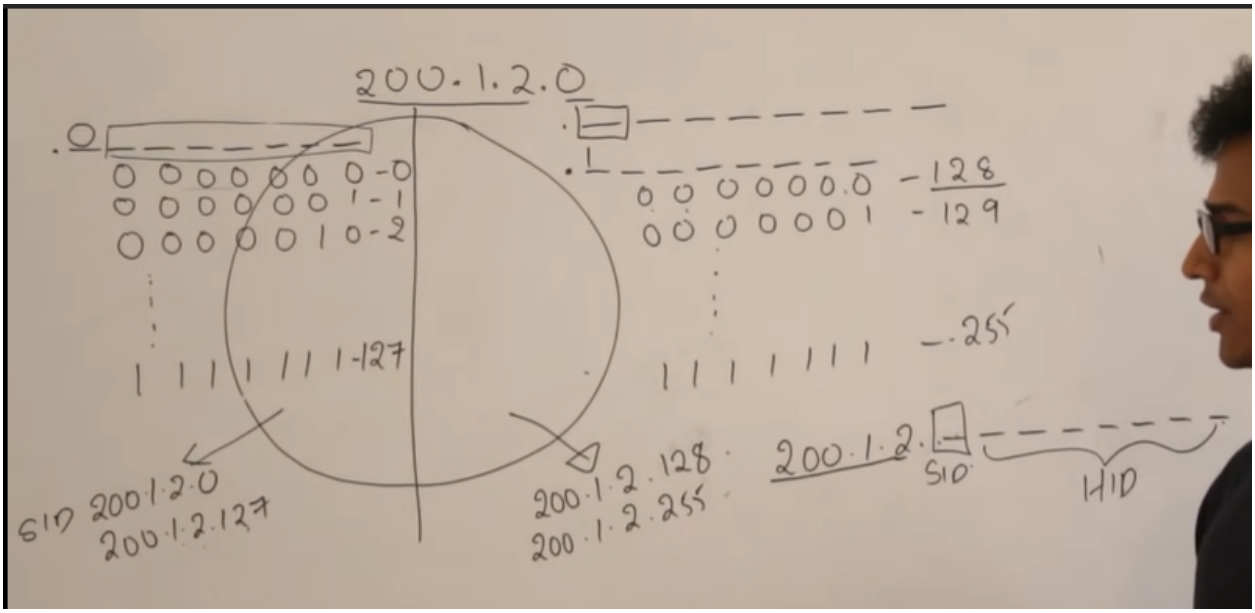
Advantages:

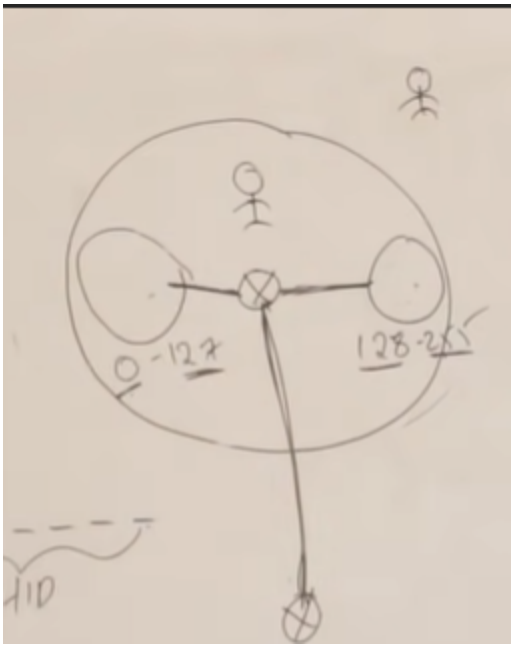
Ease of Maintenance and Security of smaller networks.

Disadvantages:

total 4 steps required in the identification process, one extra step is to reach the subnet in a network.

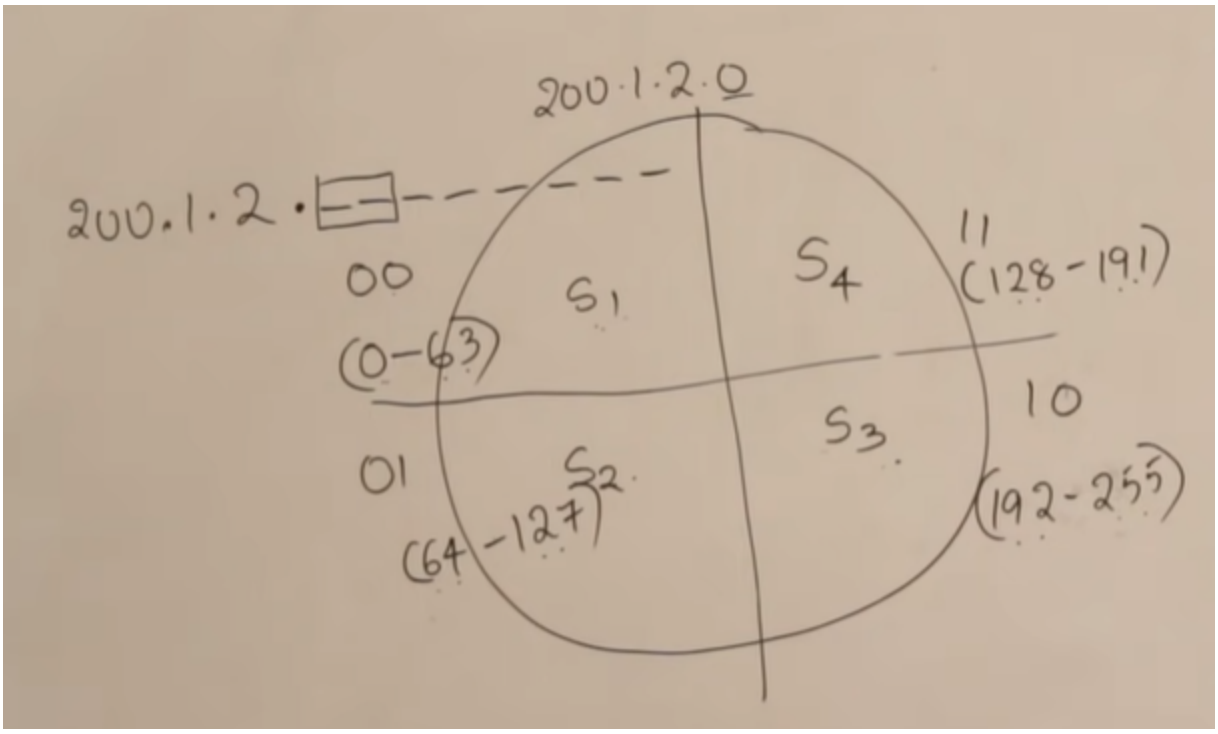
Working





256 - 2 = 254

128 - 2 = 126 x 2 = 252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S3
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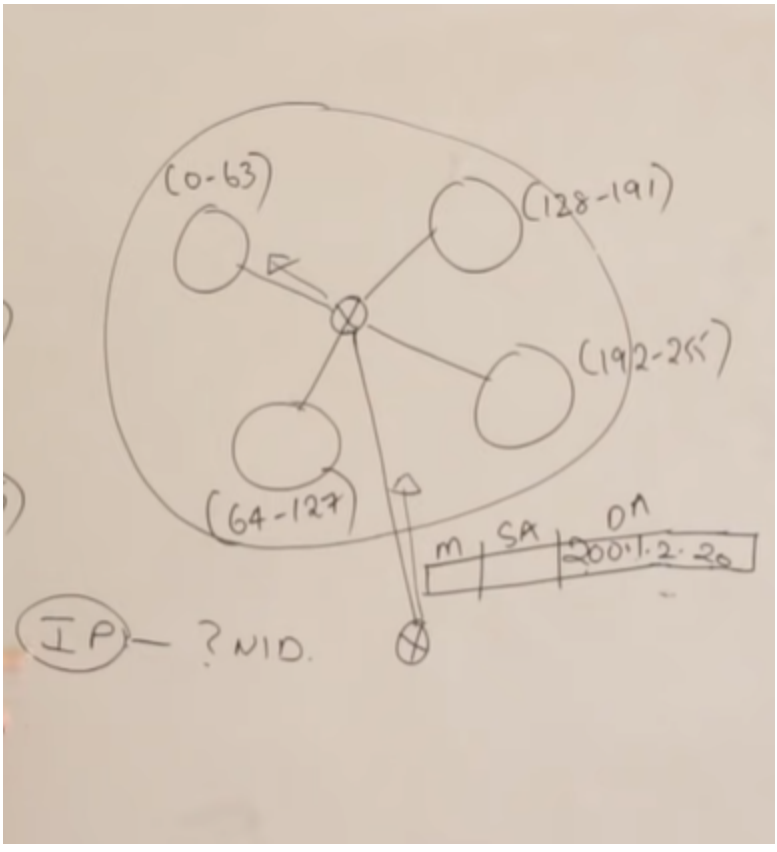
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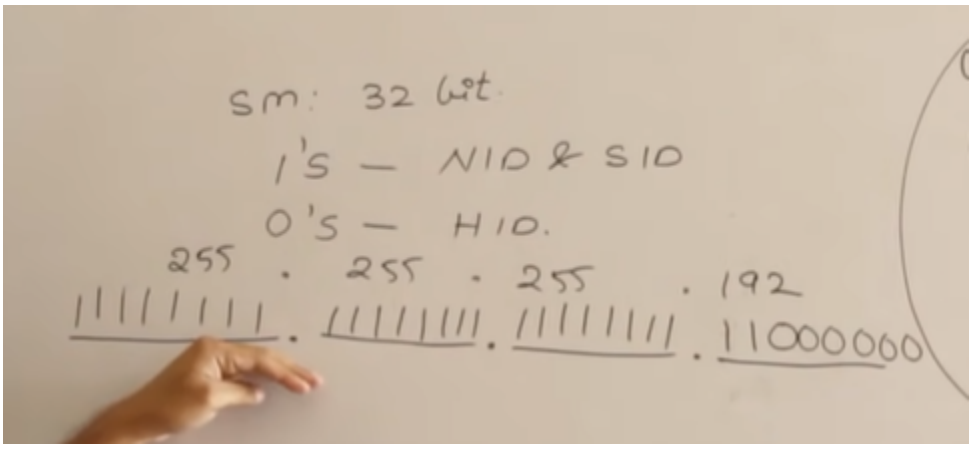
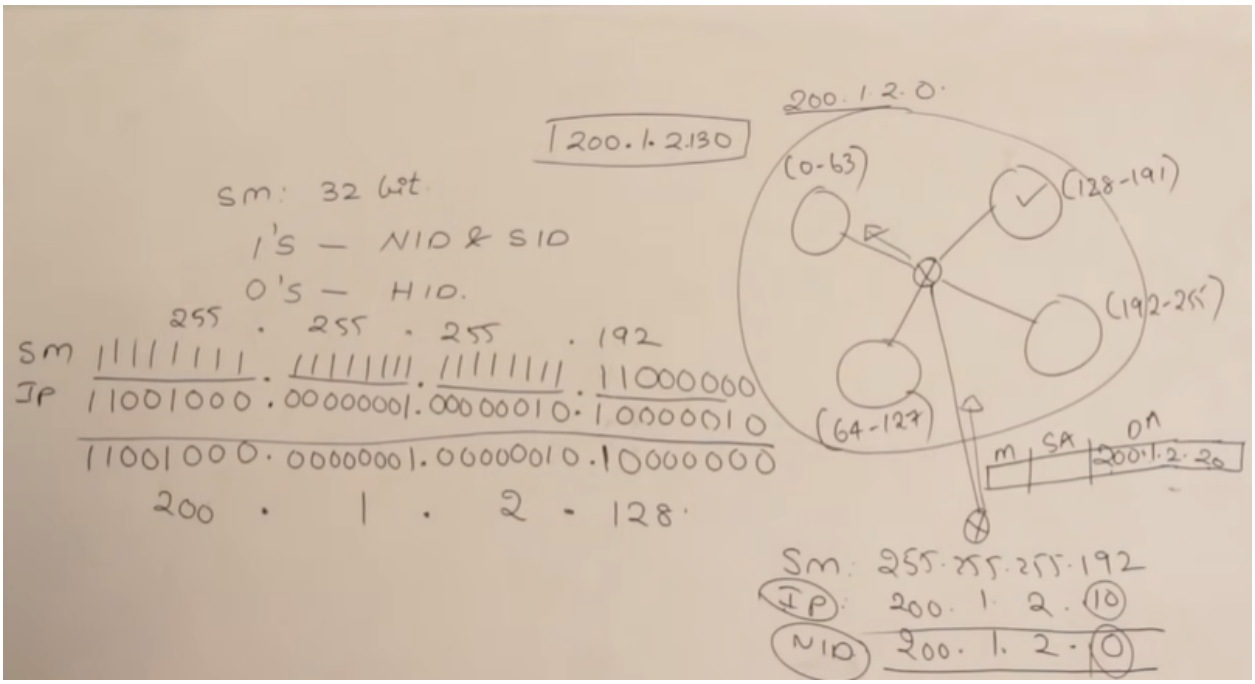
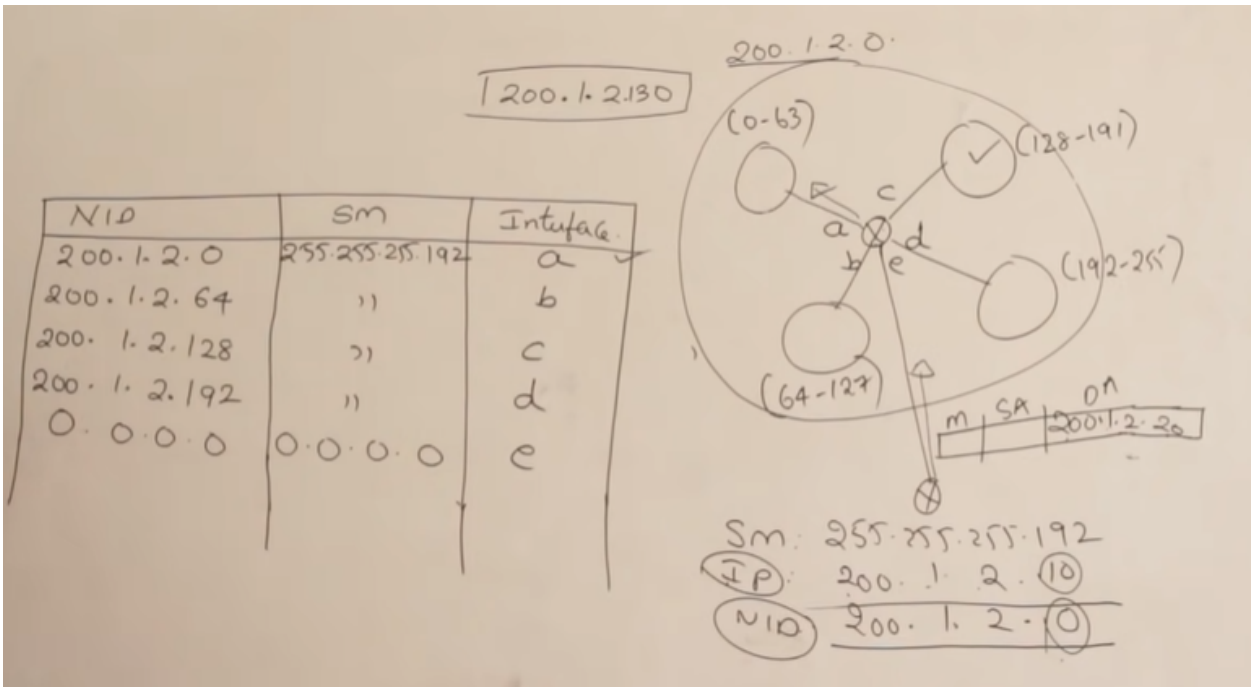
Subnet Mask



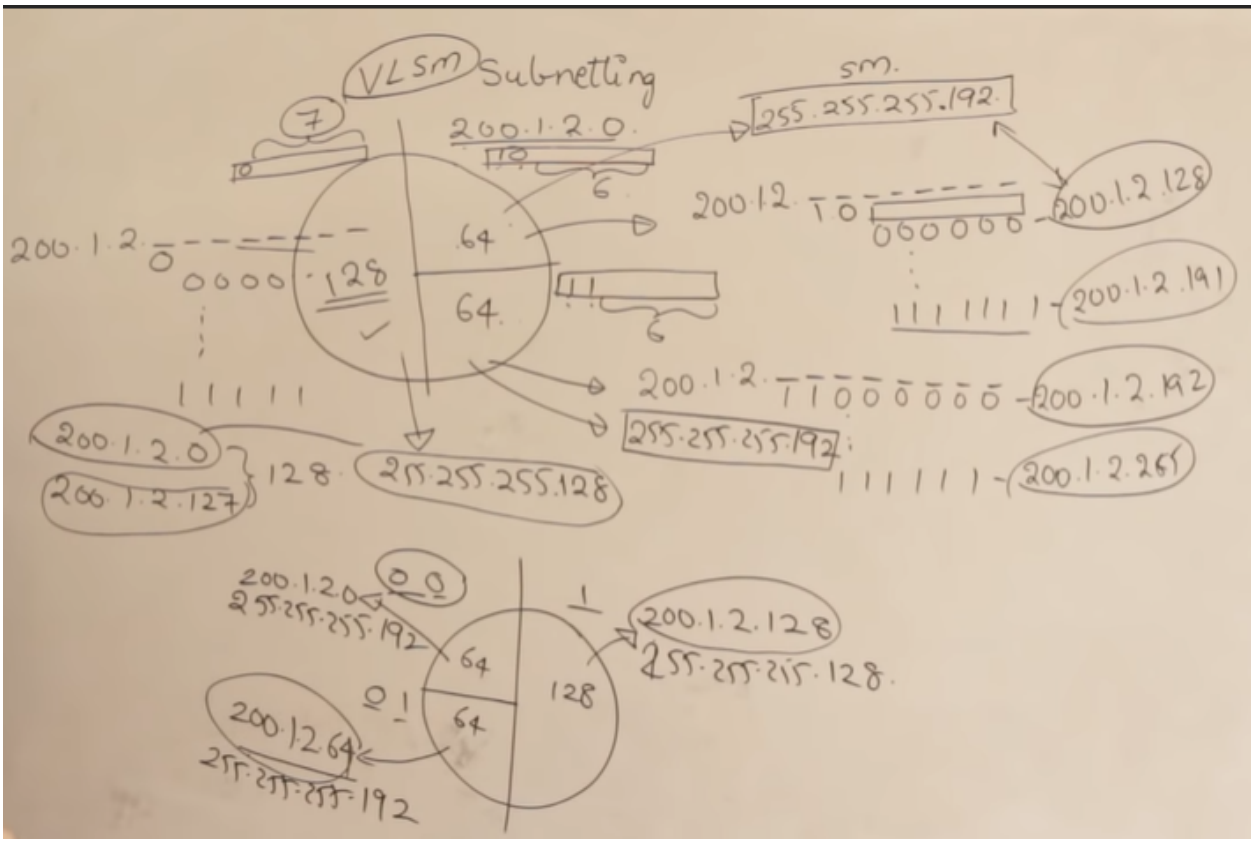


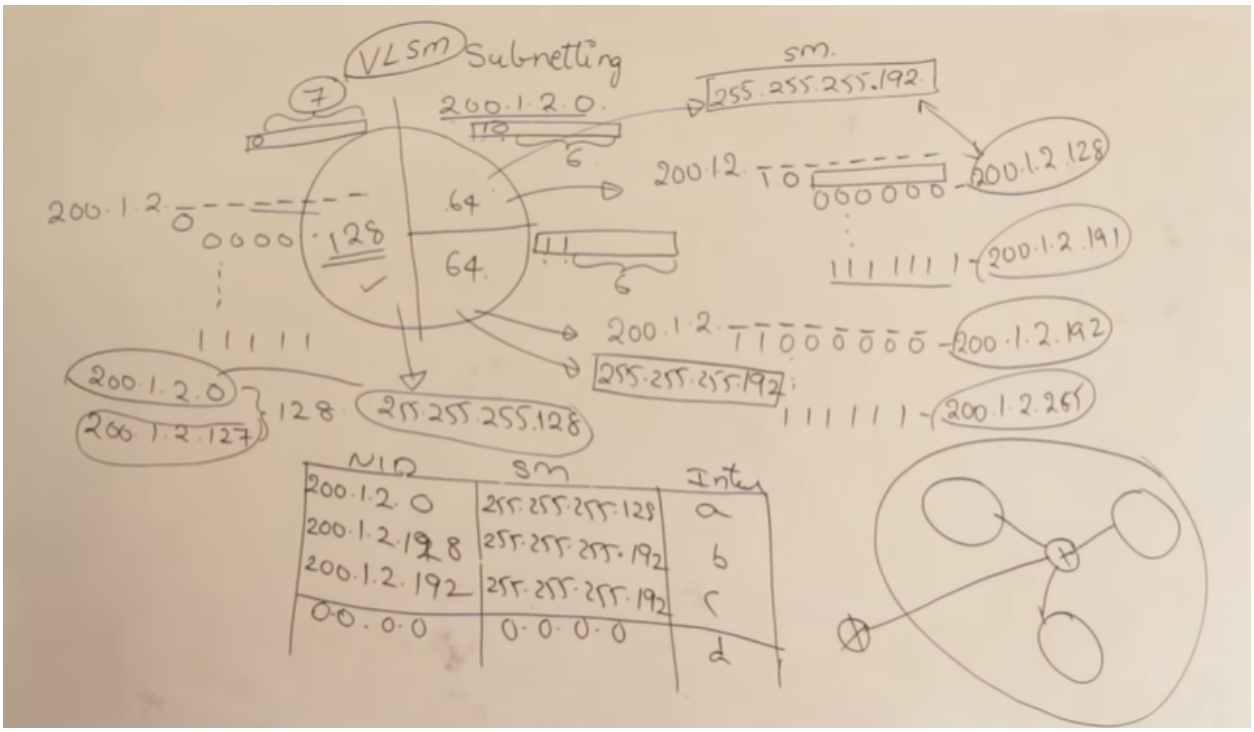
Router uses Subnet mask to AND it with IP address to determine to which subnet the packet goes to. For this, router uses the Routing Table.

Fixed Length Subnets

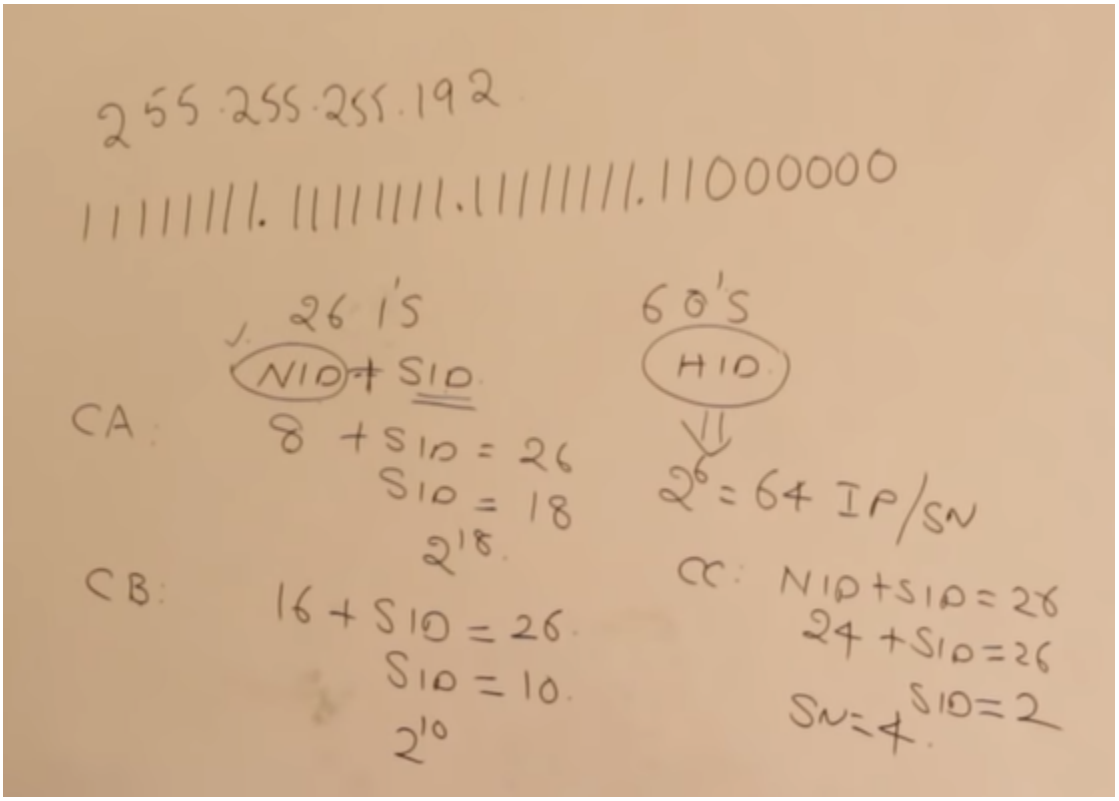


Variable Length Subnets

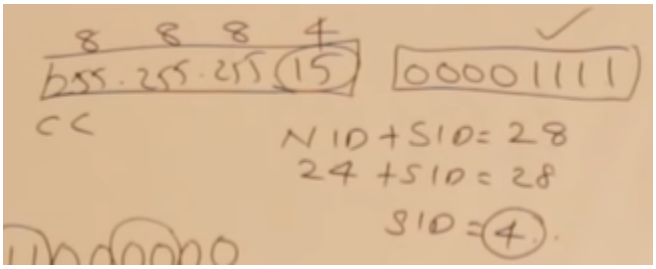




In the routing table, if there are no matches, go for the default entry 0.0.0.0 and if there are multiple matches, go for the longest subnet mask.

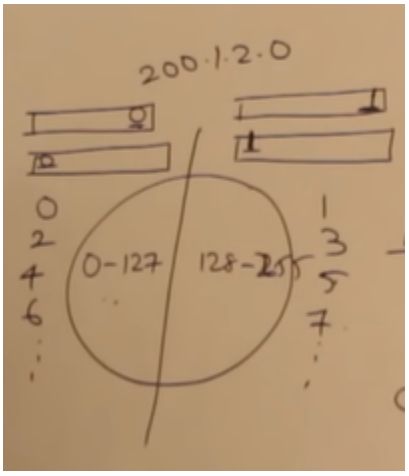


Theoretically used Subnet mask might be like:

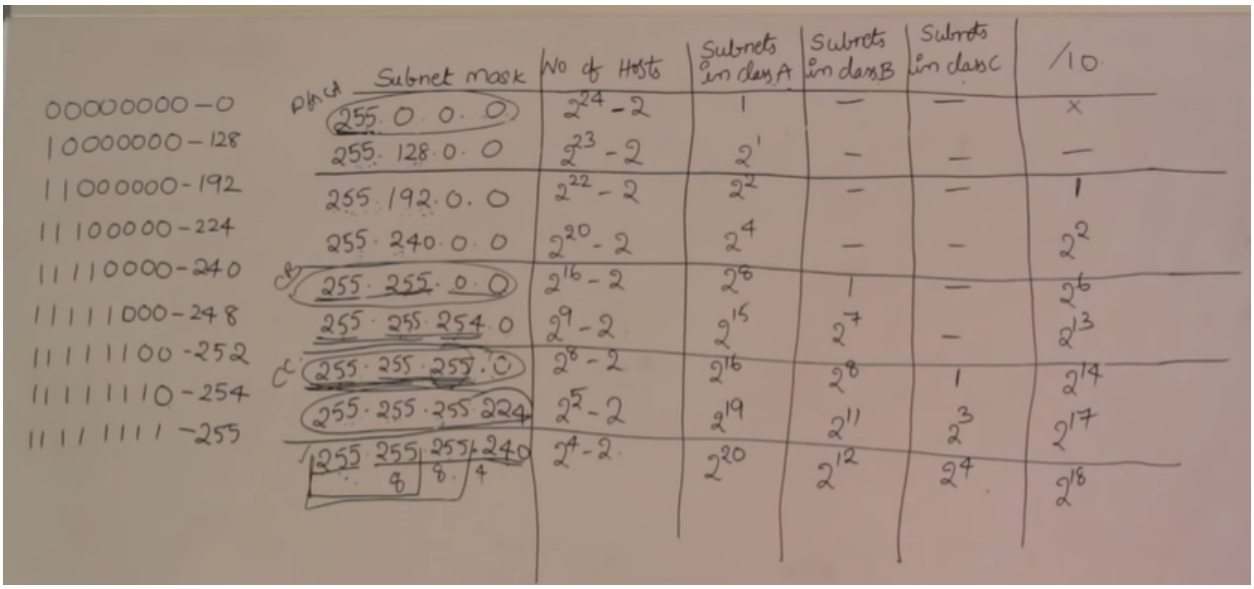


So, according to this, 2^4 = 16 subnet masks are possible. But this is not done practically.

Practically, we should not take the bits from LSB because then we would not be able to divide the network into ranges.



Subnet Mask Question



Given an IP address and Subnet Mask, determine the number of subnets