Subnet Calculation

1. Default Class B subnet mask: 255.255.0.0, After adding 5 subnet bits -> **Subnet Mask:** 255.255.248.0
2. Default Class A subnet mask: 255.0.0.0, After adding 15 subnet bits to the default subnet mask -> **Subnet Mask:** 255.255.254.0

Subnets and Hosts Calculation

1. Each added subnet bit halves the number of available host addresses, for a subnet mask with n bits, the number of hosts is 232−n−2 (subnet ID and Broadcast).
2. To create 5 subnets, we need at least 3 bits (since 23=8 while 22=4 which is insufficient).
3. To create 11 subnets, we need at least 4 bits (since 24=16 which is the first power of 2 greater than 11).

Subnets and Hosts Available

1. This is a /20 prefix “the first 20 bits are fixed (subnet portion), leaving 12 bits for host addresses”, The subnet mask allows for **2^12 = 4096** subnets, within each subnet, we have 12 bits available for host addresses, This gives us **2^12 - 2 = 4094** usable host addresses per subnet.

Class Address and Subnet Requirements

1. **Subnet Mask:** 255.255.255.240
2. Class A Address.

Next Higher Subnet Calculation

1. **Next Higher Subnet Address:** 135.100.12.0.

Subnet Mask Identification

1. Converting these subnets to binary: **153.93.4.0**: 10011001.01011101.00000100.00000000 && **153.93.8.0**: 10011001.01011101.00001000.00000000 && **153.93.12.0**: 10011001.01011101.00001100.00000000 &&**153.93.16.0**: 10011001.01011101.00010000.00000000. So we can deduce that the subnet mask is: **10011001.01011101.000xxxxx.xxxxxxxx.** Making the subnet mask “**255.255.224.0**”

Practical Subnetting Exercise

1. **Subnet Mask:** 255.255.255.224
2. **Number of Hosts per Subnet:** 30 (2^5 - 2)
3. **Subnet 1**: 192.168.15.0 - 192.168.15.31 “where the first number is the subnet ID and the second number is the Broadcast”, **Subnet 2**: 192.168.15.32 - 192.168.15.63, **Subnet 3**: 192.168.15.64 - 192.168.15.95, **Subnet 4**: 192.168.15.96 - 192.168.15.127, **Subnet 5**: 192.168.15.128 - 192.168.15.159, **Subnet 6**: 192.168.15.160 - 192.168.15.191
4. **Subnet #4** Broadcast Address: 192.168.15.127
5. The IP **192.168.15.77** is in **Subnet 3** which includes the range: 192.168.15.64 - 192.168.15.95