**IP Addressing**

|  |  |
| --- | --- |
| IP1 | 223.172.16.2/24 Default Subnet 255.255.255.0  11011111.10101100.00010000.00000010  11111111.11111111.11111111.00000000  11011111.10101100.00010000.00000000 (after Masking)  **223.172.16.0 (Network ID)** |
| IP2 | 223.172.16.128/24 Default Subnet 255.255.255.0  11011111.10101100.00010000.10000000  11111111.11111111.11111111.00000000  11011111.10101100.00010000.00000000 (after Masking)  **223.172.16.0 (Network ID)** |
| IP3 | 223.172.17.254/24 Default Subnet 255.255.255.0  11011111.10101100.00010001.11111110  11111111.11111111.11111111.00000000  11011111.10101100.00010001.00000000 (after Masking)  **223.172.17.0 (Network ID)** |

**Subnet**

**Class C** Sub netting

Net ID: 192.168.1.0

Minimum Host Required: 50

Minimum Subnet Required: 4

|  |  |
| --- | --- |
| Custom Subnet Mask | 255.255.255.0 (Default Subnet)  11111111.11111111.11111111.00000000  (50+1)= 51 🡪 110011 (6 bits)  nnnnnnnn.nnnnnnn.nnnnnnnn.nnhhhhhh  11111111.11111111.1111111.11000000  255.255.255.192 🡪 new custom subnet mask |
| Max Hosts per Subnet | 2^6🡪 64 possible hosts but we cant use host address with all 1’s and all 0’s  Actual hosts is 64-2 🡪 62 |
| Max Subnets | 2^2🡪 4 |
| Subnet IDs  Increment by 64 | 192.168.1.0 🡪 192.168.1.00000000  192.168.1.64 🡪192.168.1.01000000  192.168.1.128 🡪192.168.1.10000000  192.168.1.192 🡪192.168.1.11000000 |
| Host ID Ranges | 192.168.1.nnhhhhhh  ~~192.168.1.0~~ 🡪 192.168.1.nn000000 (we can’t use that coz it’s net ID)  ~~192.168.1.63~~ 🡪 192.168.1.nn111111(we can’t use that coz it’s broadcast IP)  **Note: We can’t use all 0’s and all 1’s in h bits**  Valid Ranges   |  |  |  |  | | --- | --- | --- | --- | | **From** |  | **To** | **For Network#** | | 192.168.1.1 | 🡪 | 192.168.1.62 | (for subnet 192.168.1.0) | | 192.168.1.65 | 🡪 | 192.168.1.126 | (for subnet 192.168.1.64) | | 192.168.1.129 | 🡪 | 192.168.1.190 | (for subnet 192.168.1.128) | | 192.168.1.193 | 🡪 | 192.168.1.254 | (for subnet 192.168.1.192) | |

Class C

Net ID: 223.1.1.0

Minimum Host Required: 29

Minimum Subnet Required: 6

|  |  |
| --- | --- |
| Custom Subnet Mask | 255.255.255.0 (Default Subnet for class C)  11111111.11111111.11111111.00000000  (29+1)= 30 🡪 1 1110 (5 bits)  nnnnnnnn.nnnnnnn.nnnnnnnn.nnnhhhhh  11111111.11111111.1111111.11100000  255.255.255.224 🡪 new custom subnet mask |
| Max Hosts per Subnet | 2^5🡪 32 possible hosts but we cant use host address with all 1’s and all 0’s  Actual hosts is 32-2 🡪 30 |
| Max Subnets | 2^3🡪 8 |
| Subnet IDs  Increment by 32 | 223.1.1.0 🡪 223.1.1.00000000  223.1.1.32 🡪 223.1.1.00100000  223.1.1.64 🡪 223.1.1.01000000  223.1.1.96 🡪 223.1.1.01100000  223.1.1.128 🡪 223.1.1.10000000  223.1.1.160 🡪 223.1.1.10100000  223.1.1.192 🡪 223.1.1.11000000  223.1.1.224 🡪 223.1.1.11100000 |
| Host ID Ranges | 223.1.1.nnnhhhhh  **Note: We can’t use all 0’s and all 1’s in h bits**  Valid Ranges   |  |  |  |  | | --- | --- | --- | --- | | **From** |  | **To** | **For Network#** | | 223.1.1.1 | 🡪 | 223.1.1.30 | (for subnet 223.1.1.0) | | 223.1.1.33 | 🡪 | 223.1.1.62 | (for subnet 223.1.1.32) | | 223.1.1.65 | 🡪 | 223.1.1.94 | (for subnet 223.1.1.64) | | 223.1.1.97 | 🡪 | 223.1.1.126 | (for subnet 223.1.1.96) | | 223.1.1.129 | 🡪 | 223.1.1.158 | (for subnet 223.1.1.128) | | 223.1.1.161 | 🡪 | 223.1.1.190 | (for subnet 223.1.1.160) | | 223.1.1.193 | 🡪 | 223.1.1.222 | (for subnet 223.1.1.192) | | 223.1.1.223 | 🡪 | 223.1.1.254 | (for subnet 223.1.1.224) | |

**Exercise**

Class C

Net ID: 223.1.2.0

Minimum Host Required: 2

Minimum Subnet Required: 61

**Exercise**

Class B

Net ID: 172.16.0.0

Minimum Host Required: 500

Minimum Subnet Required: 14

**Exercise**

Class A

Net ID: 10.0.0.0

Minimum Host Required: 220

Minimum Subnet Required: 118

**Exercise**

Class A

Net ID: 10.0.0.0

Minimum Host Required: 478

Minimum Subnet Required: 1200

**VLSM (Variable Length Subnet Masks)**

Net ID: 131.109.40.0 /22

Subnet Mask: 255.255.252.0

11111111.11111111.1111110.00000000

|  |  |
| --- | --- |
| Subnet A 510 Hosts | Custom Mask  (510+1) 🡪 111111111 (9 bits)  255.255.11111110.00000000  255.255.254.0/23 |
| Number of hosts | 2^9=512-2=510 |
| Number of subnets | 128 |
| Network ID | 131.109.40.0  131.109.42.0 |
| Network Range | 131.109.40.1🡪 131.109.41.254 (510 hosts) |
|  |  |
| Subnet B 252 Hosts | Custom Mask  (252+1)=253🡪111111101 (8 bits)  255.255.11111111.hhhhhhhh  255.255.255.0 /24 |
| Network ID | ~~131.109.40.0~~  ~~131.109.41.0~~  131.109.42.0  131.109.43.0 |
| Network Range | 131.109.42.1🡪131.109.42.254 |
|  |  |
| Subnet C 126 Hosts | Custom Mask  (126+1)=127=1111111 (7 bits)  nnnnnnnn.nnnnnnnn.nnnnnnnn.nhhhhhhh  255.255.11111111.10000000  255.255.255.128/25 |
| Network ID | ~~131.109.40.0~~  ~~131.109.40.128~~  ~~131.109.41.0~~  ~~131.109.41.128~~  ~~131.109.42.0~~  ~~131.109.42.128~~  131.109.43.0  131.109.43.128 |
| Network Range | 131.109.43.1🡪 131.109.43.126 |
|  |  |
| Subnet D 30 Hosts | Custom Subnet Mask  (30 +1)=31 🡪 11111 (5 bits)  255.255.11111111.11100000  255.255.255.224/27 |
| Network ID | ~~131.109.40.0~~  ~~131.109.40.32~~  ~~131.109.40.64~~  ~~131.109.40.0~~  ~~131.109.40.0~~  ~~---~~  ~~131.109.43.0~~  ~~131.109.43.32~~  ~~131.109.43.64~~  ~~----~~  ~~131.109.43.96~~  131.109.43.128  131.109.43.160 |
| Network Range | 131.109.43.129🡪 131.109.43.158 |