**Hands-On Project 6-3: Working with CIDR Notation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Network/prefix** | **Subnet mask** | **Host bits** | **Number of hosts** |
| 172.16.1.0/24 | 255.255.255.0 | 8 | 254 |
| 10.1.100.128/26 | 255.255.255.192 | 6 | 62 |
| 10.1.96.0/19 | 255.255.224 | 13 | 8190 |
| 192.168.1.0/24 | 255.255.255.0 | 8 | 254 |
| 172.31.0.0/16 | 255.255.0.0 | 16 | 65534 |
| 10.255.255.252/30 | 255.255.255.252 | 2 | 2 |
| 172.28.240.0/20 | 255.255.240.0 | 12 | 4094 |
| 10.44.108.0/22 | 255.255.252.0 | 10 | 1022 |
| 192.168.100.24/21 | 255.255.248.0 | 11 | 2046 |
| 172.23.64.0/18 | 255.255.192.0 | 14 | 16382 |
| 192.168.5.128/25 | 255.255.255.128 | 7 | 126 |

**Subnet mask:**

1. For converting the subnet mask, consider the prefix. From the table, 172.16.1.0/24. Consider 24 and convert 24 into four octets of 1’s and 0’s.

2. For 24 it would be 11111111.11111111.11111111.00000000 which means it has 24 1’s and 8 0’s.

3. when the above-mentioned octets are converted into decimal number then it would be **255.255.255.0**

4. Seeing another one from the table, 192.168.5.128/25, consider the prefix 25 which should be converted into four octets of 1’s and 0’s.

5. For 25 it would be 11111111.11111111.11111111.10000000 which means it has 25 1’s and 7 0’s.

6. When the above-mentioned octets are converted into decimal number then it would be **255.255.255.128.** Likewise, the same calculation is done for the rest of the subnet masks in the table.

**Host bits:**

1. For converting the host bits, for ipv4 address it is considered as 32 bits. For host bits we need to subtract the prefix from 32.

2. Here for, 10.1.100.128/26, it will be 32-26 which is 6. Therefore, 6 is the number of host bits required for the given value.

3. Seeing another one from the table, 172.23.64.0/18, it will be 32-18 which is 14. Therefore, 14 is the number of host bits required for the given value. Likewise, the same calculation is done for the rest of host bits in the table.

**Number of hosts:**

1. For number of hosts it is calculated by a formula which is 2n-2 where n is host bits. From the table, 172.28.240.0/20 for which host bits are 12. So, for this number of hosts would be 212-2 which is 4094(4096-2).

2. Seeing another one from the table, 10.255.255.252/30 for which host bits is 2. Therefore, for the number of hosts would be 22-2 which is 2. Likewise, the same calculation is done for the rest of number of hosts in the table.

**Hands-On project 6-4: Determining the Correct Prefix:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Network ID** | **Required hosts** | **Host bits needed** | **Network ID/prefix** |
| 172.16.1.0 | 254 | 8 | 172.16.1.0/24 |
| 10.1.100.128 | 62 | 6 | 10.1.100.128/26 |
| 10.1.96.0 | 8190 | 13 | 10.1.96.0/19 |
| 192.168.1.0 | 200 | 8 | 192.168.1.0/24 |
| 172.31.0.0 | 65,000 | 16 | 172.31.0.0/16 |
| 10.255.255.252 | 2 | 1 | 10.255.255.252/31 |
| 172.28.240.0 | 4000 | 12 | 172.28.240.0/20 |
| 10.44.108.0 | 900 | 10 | 10.44.108.0/22 |
| 192.168.240.0 | 2200 | 11 | 192.168.240.0/21 |
| 172.23.64.0 | 16,000 | 14 | 172.23.64.0/18 |
| 192.168.5.128 | 110 | 7 | 192.168.5.128/25 |

**Host bits needed:**

1. For host bits needed, this can be calculated the nearest number of 2n of required hosts and n is the host bits neededi.e., from the table consider 254 which is near to 256 i.e., 28. Therefore, 8 is host bits needed.

2. Seeing another one from the table, 65,000 which is near to the 65,536 i.e., 216. Therefore, 16 is host bits needed. Likewise, for the rest of hosts bits needed is calculated.

**Network ID/prefix:**

1. For calculating the prefix, host bits are subtracted from 32. From the table, for 192.168.5.128, the host bits are 7 and for prefix 7 is subtracted from 32 which would be 25. Therefore, the network ID/prefix for the given value be 192.168.5.128/25.

2. Seeing another value from the table, 10.255.255.252 for which host bits is 1 and for prefix 1 is subtracted from 32 which would be 32. So, the network ID/prefix for the given value would be 10.255.255.252/31. Likewise, the rest of calculations are done.