اللهم علمنا ما ينفعنا، وانفعنا بما علمتنا، وزدنا علما "سُبْحَانَكَ لا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيم"

CIDR Block and IP Range Examples

Problem 1 Solution

Step 1: Identify all IPs in the CIDR block 100.1.2.35/28

- CIDR Block: 100.1.2.35/28
  - /28 CIDR notation means there are 32 - 28 = 4 bits left for host addresses.
  - 2^4 = 16 addresses in total for this subnet.

  - Subnet Range Calculation
  - Subnet mask: 255.255.255.240
  - Network address for 100.1.2.35/28 is 100.1.2.32 (this is the start of the range).
  - Broadcast address is 100.1.2.47 (this is the end of the range).

- List of IP Addresses:
  100.1.2.32 - Network address
  100.1.2.33
  100.1.2.34
  100.1.2.35
  100.1.2.36
  100.1.2.37
  100.1.2.38
  100.1.2.39
  100.1.2.40
  100.1.2.41
  100.1.2.42
  100.1.2.43
  100.1.2.44
  100.1.2.45
  100.1.2.46
  100.1.2.47 - Broadcast address

Step 2: Check if 100.1.2.32 to 100.1.2.47 is a valid IP block

1- Range is continuous
2- Number of Hosts = 47 – 32 = 16 (size of the block is power of 2)
3- First ip in range (100.1.2.32) is divisible by the size of the block
   00100000 ---------- > 32
   00010000 ---------- > 16

Additional Examples with Valid and Invalid Ranges

Example 1:

- Find all IPs in this CIDR Block
- Classless
- 192.168.10.5/29
- Check whether 192.168.10.0 to 192.168.10.7 is a valid IP address block or not?

CIDR Block: 192.168.10.5/29

A /29 CIDR block provides 8 IP addresses ($2^3 = 8$).

The range starts at the network address and includes up to the broadcast address.

1. Calculate the network address:
   - Starting IP: 192.168.10.0 (network address of 192.168.10.5/29)
2. Calculate the broadcast address:
   - Ending IP: 192.168.10.7 (broadcast address for 192.168.10.5/29)
3. Range of IPs:
   - 192.168.10.0 to 192.168.10.7 = 8 (size of the block)
4. Yes, the range 192.168.10.0 to 192.168.10.7 is a valid IP address block for this CIDR depend on
   - a- Range is continuous
   - b- Number of Hosts = 0 ---- > 7 = 8 (size of the block is power of 2)
   - c- First ip in range (192.168.10.0) is divisible by the size of the block

     00000000 ---------- > 0

     00001000 ---------- > 8

Example 2:

- Find all IPs in this CIDR Block
- Classless
- 172.16.20.15/27
- Check whether 172.16.20.0 to 172.16.20.31 is a valid IP address block or not?

CIDR Block: 172.16.20.15/27

A /27 CIDR block provides 32 IP addresses ($2^5 = 32$).

1. Calculate the network address:
    - Starting IP: 172.16.20.0 (network address of 172.16.20.15/27)
2. Calculate the broadcast address:
    - Ending IP: 172.16.20.31 (broadcast address for 172.16.20.15/27)
3. Range of IPs:

    - 172.16.20.0 to 172.16.20.31 = 32 (size of the block)
5. Answer: Yes, the range 172.16.20.0 to 172.16.20.31 is a valid IP address block for this CIDR depend on
    a- Range is continuous
    b- Number of Hosts = 0 ---- > 31 = 32
    (Size of the block is power of 2)
    c- First ip in range (172.16.20.0) is divisible by the size of the block
    000**00000** ---------- > 0
    001**00000** ---------- > 32