**Provided network: 190.11.40.0/23**

Before Subnetting:

* Network Addresses (range)
  + 190.11.40.0 🡪 190.11.41.255
* Broadcast Address
  + 190.11.41.255
* Netmask
  + 255.255.11111110.0 (decimal in cyan, binary in yellow)
  + 255.255.254.0
* Maximum number of hosts
  + There are a **total of 9 host bits**
  + This means there can be a total of 512 hosts before subnetting (given the statement that we are **able** to use all 0s and 1s)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subnet Number** | **Subnet ID Binary Value** | **Network bits 3rd octet** | **3rd octet decimal value** | **Host bits binary range (4th octet)** | **4th octet binary range** | **4th octet decimal value** | **IP Range (From)** | **IP Range (To)** |
| 0 | 0 00 | 0010100 0 | 40 | 000000 - 111111 | 00 000000 - 00 111111 | 0 - 63 | 190.11.40.0 | 190.11.40.63 |
| 1 | 0 01 | 0010100 0 | 40 | 000000 - 111111 | 01 000000 - 01 111111 | 64 - 127 | 190.11.40.64 | 190.11.40.127 |
| 2 | 0 10 | 0010100 0 | 40 | 000000 - 111111 | 10 000000 - 10 111111 | 128 - 191 | 190.11.40.128 | 190.11.40.191 |
| 3 | 0 11 | 0010100 0 | 40 | 000000 - 111111 | 11 000000 - 11 111111 | 192 - 255 | 190.11.40.192 | 190.11.40.255 |
| 4 | 1 00 | 0010100 1 | 41 | 000000 - 111111 | 00 000000 - 00 111111 | 0 - 63 | 190.11.41.0 | 190.11.41.63 |
| 5 | 1 01 | 0010100 1 | 41 | 000000 - 111111 | 01 000000 - 01 111111 | 64 - 127 | 190.11.41.64 | 190.11.41.127 |
| 6 | 1 10 | 0010100 1 | 41 | 000000 - 111111 | 10 000000 - 10 111111 | 128 - 191 | 190.11.41.128 | 190.11.41.191 |
| 7 | 1 11 | 0010100 1 | 41 | 000000 - 111111 | 11 000000 - 11 111111 | 192 - 255 | 190.11.41.192 | 190.11.41.255 |

After Subnetting:

* Netmask
  + We will use a total of **3 bits to create the subnets**
  + We can create a total of 8 subnets (given the statement that we are **able** to use all 0s and 1s)
  + New netmask will be /26 (23 + 3)
  + 255.255.255.11000000 (decimal in cyan, binary in yellow)
  + 255.255.255.192
* Maximum number of hosts per subnet
  + **6 host bits** are needed to achieve a minimum of 50 hosts per subnet
  + This means that we have a maximum number of 64 hosts per subnet (given the statement that we are **able** all 0s and 1s)