### Subnetting

1. **IP Adressing**

Una dirección IP puede escribirse de tres formas distintas:

|  |  |
| --- | --- |
| Notación decimal | 200.1.25.7 |
| Binaria | 11001000 00000001 00011001 00000111 |
| Hexadecimal | C8 1 19 7 |

|  |  |  |  |
| --- | --- | --- | --- |
| Primer octeto | **Segundo**  **octeto** | **Tercer**  **octeto** | **Cuarto**  **octeto** |

**Clase A**

|  |  |  |  |
| --- | --- | --- | --- |
| Network | **Host** | **Host** | **Host** |

|  |  |  |  |
| --- | --- | --- | --- |
| Network | **Network** | **Host** | **Host** |

**Clase B**

|  |  |  |  |
| --- | --- | --- | --- |
| Network | **Network** | **Network** | **Host** |

**Clase C**

1. **IP Address Bit Patterns**

|  |  |  |  |
| --- | --- | --- | --- |
| Primer octeto | **Segundo**  **octeto** | **Tercer**  **octeto** | **Cuarto**  **octeto** |

***#bits* 1 7 24**

**Clase A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | Network | **Host** | **Host** | **Host** |

***#bits* 1 1 14 16**

**Clase B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 0 | Network | **Network** | **Host** | **Host** |

***#bits* 1 1 1 21 8**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 0 | Network | **Network** | **Network** | **Host** |

**Clase C**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Clase** | **Rango primer octeto** | Número de redes | | Número de hosts | | **Dirección de muestra** |
| A | 1-126 | 2**7** – 1**\*** | 127 | 2**24** - 2 | 16,777,214 | 10.15.121.5  **0**0001010 00001111 01111001 00000101 |
| **B** | 128 - 191 | 2**14** | 16,384 | 2**16** - 2 | 65,534 | 130.13.44.52  **10**000010 00001101 00101100 00110100 |
| **C** | 192 - 223 | 2**21** | 2,097,152 | 2**8** - 2 | 254 | 200.15.23.8  **110**01000 00001111 00010111 00001000 |

**\* La red 127 no se usa está reservada**

1. **Subnetting**

**IP Address**

La longitud de los campos varia dependiendo de la clase de la dirección IP.

|  |  |
| --- | --- |
| Net Id | **Host Id** |

**IP Address with subnetting**

Algunos bits son prestados del campo Host Id.

|  |  |  |
| --- | --- | --- |
| Net Id | Subnet Id | **Host Id** |

|  |  |  |
| --- | --- | --- |
| Net Id |  | **Host Id** |

***Subnet Id***

***Subnet Id***

|  |  |  |
| --- | --- | --- |
| Net Id |  | **Host Id** |

El número máximo de bits que pueden ser prestados es la longitud del Host Id –2

***Host Id***

***Subnet Id***

|  |  |  |
| --- | --- | --- |
| Net Id |  |  |

|  |  |  |
| --- | --- | --- |
| **Bits prestados** | **Decimal** | **Binario** |
| 1 | 128 | 1000 0000 |
| 2 | 192 | 1100 0000 |
| 3 | 224 | 1110 0000 |
| 4 | 240 | 1111 0000 |
| 5 | 248 | 1111 1000 |
| 6 | 252 | 1111 1100 |
| 7 | 254 | 1111 1110 |

|  |  |
| --- | --- |
| 20 | 1 |
| 21 | 2 |
| 22 | 4 |
| 23 | 8 |
| 24 | 16 |
| 25 | 32 |
| 26 | 64 |
| 27 | 128 |

1. **Ejemplo Subnetting**

* La organización tiene una licencia clase C
* Network Id = 197.15.22.0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net Id |  |  |  | **Host Id** |

* Subnet mask = 255.255.255.224

***Subnet Id***

* Se prestan los 3 bits mas significativos del campo host Id.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net Id |  |  |  | **Host Id** |

***Subnet Id***

|  |
| --- |
| **0 0 0 Subnet 1**  **0 0 1 Subnet 2**  **0 1 0 Subnet 3**  **0 1 1 Subnet 4**  **1 0 0 Subnet 5**  **1 0 1 Subnet 6**  **1 1 0 Subnet 7**  **1 1 1 Subnet 8** |

***Con 3 bits prestados, podemos crear 8 subnets***

***Host Id***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Net Id | Subnet |  |  |  |  |  |

***(No usables)***

|  |
| --- |
| **0 0 0 0 0 Host 1**  **0 0 0 0 1 Host 2**  **0 0 0 1 0 Host 3**  **0 0 0 1 1 Host 4**  **0 0 1 0 0 Host 5**  **. . .**  **. . .**  **. . .**  **1 1 1 1 1 Host 32**  **0 0 0 0 0 Host 7**  **0 0 0 0 1 Host 8** |

***Con los 5 bits restantes, podemos tener 32 hosts por cada subnet***

***(No usables)***

|  |
| --- |
| **0 0 0 0 0 Host 1**  **0 0 0 0 1 Host 2**  **0 0 0 1 0 Host 3**  **0 0 0 1 1 Host 4**  **0 0 1 0 0 Host 5**  **. . .**  **. . .**  **. . .**  **1 1 1 1 1 Host 32**  **0 0 0 0 0 Host 7**  **0 0 0 0 1 Host 8** |

|  |
| --- |
| **0 0 0 Subnet 0**  **0 0 1 Subnet 1**  **0 1 0 Subnet 2**  **0 1 1 Subnet 3**  **1 0 0 Subnet 4**  **1 0 1 Subnet 5**  **1 1 0 Subnet 6**  **1 1 1 Subnet 7** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Net Id | Subnet |  |  |  |  |  |

***(No usables)***

|  |
| --- |
| **0 0 0 0 0 Host 1**  **0 0 0 0 1 Host 2**  **0 0 0 1 0 Host 3**  **0 0 0 1 1 Host 4**  **0 0 1 0 0 Host 5**  **. . .**  **. . .**  **. . .**  **1 1 1 1 1 Host 32**  **0 0 0 0 0 Host 7**  **0 0 0 0 1 Host 8** |

|  |
| --- |
| **0 0 0 Subnet 0**  **0 0 1 Subnet 1**  **0 1 0 Subnet 2**  **0 1 1 Subnet 3**  **1 0 0 Subnet 4**  **1 0 1 Subnet 5**  **1 1 0 Subnet 6**  **1 1 1 Subnet 7** |

***(No usables)***

|  |
| --- |
| **0 0 0 0 0 Host 1**  **0 0 0 0 1 Host 2**  **0 0 0 1 0 Host 3**  **0 0 0 1 1 Host 4**  **0 0 1 0 0 Host 5**  **. . .**  **. . .**  **. . .**  **1 1 1 1 1 Host 32**  **0 0 0 0 0 Host 7**  **0 0 0 0 1 Host 8** |

|  |
| --- |
| **0 0 0 Subnet 0**  **0 0 1 Subnet 1**  **0 1 0 Subnet 2**  **0 1 1 Subnet 3**  **1 0 0 Subnet 4**  **1 0 1 Subnet 5**  **1 1 0 Subnet 6**  **1 1 1 Subnet 7** |

**.**

**.**

**.**

* Escribe el rango de direcciones IP dentro de cada subnet.

|  |  |  |  |
| --- | --- | --- | --- |
| **Subred**  **(Subnetwork#)** | **Dirección de subred**  **(Subnetwork IP)** | **Broadcast de subred**  **(Broadcast ID)** | **Rango de direcciones válidas**  **(Host range)** |
| **0** | **197.15.22.0** | **197.15.22.31** | **197.15.22.1 - 197.15.22.30** |
| **1** | **197.15.22.32** | **197.15.22.63** | **197.15.22.33 - 197.15.22.62** |
| **2** | **197.15.22.64** | **197.15.22.95** | **197.15.22.65 - 197.15.22.94** |
| **3** | **197.15.22.96** | **197.15.22.127** | **197.15.22.97 - 197.15.22.126** |
| **4** | **197.15.22.128** | **197.15.22.159** | **197.15.22.129 - 197.15.22.158** |
| **5** | **197.15.22.160** | **197.15.22.191** | **197.15.22.161 - 197.15.22.190** |
| **6** | **197.15.22.192** | **197.15.22.223** | **197.15.22.193 - 197.15.22.222** |
| **7** | **197.15.22.224** | **197.15.22.255** | **197.15.22.225 - 197.15.22.254** |