**How to Calculate Subnets**

Subnets and Hosts

**Borrow 2 bits**

| **S** | **S** | **H** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 22 = 4**

**Subnet mask** = 2 bits = 128 + 64 = **192 Range of hosts = 26 = 64**

TT

**Range Useable Range**

Network ID 0 – 63

64 – 127 **65 - 126** 128 – 191 **129 - 190**

Broadcast 192 – 255

Address

**Borrow 3 bits**

| **S** | **S** | **S** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 23 = 8**

**Subnet mask** = 3 bits = 128 + 64 + 32 = **224 Range of hosts = 25 = 32**

**Range Useable Range**

Network ID 0 – 31

32 – 63 **33 - 62** 64 – 95 **65 - 94** 96 – 127 **97 -126** 128 – 159 **129 -158**

160 – 191 **161 -190**

192 – 223 **193 -222**

Broadcast 224 – 255

Address

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**How to Calculate Subnets**

**Decimal/Binary Subnet Ranges**

**Borrow 2 bits**

| **S** | **S** | **H** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 22 = 4 = 00000100**

**Subnet mask** = 2 bits = 128 + 64 = **192 = 11000000**

**Range of hosts = 26 = 64 = 01000000**

**[Range ……………………………] [Useable Range …………………...] Network ID 0 – 63 00 000000 – 00 111111**

**64 – 127 01 000000 – 01 111111 65 - 126 01 000001 – 01 111110 128 – 191 10 000000 – 10 111111 129 – 190 10 000001 – 10 111110 Broadcast 192 – 255 11 000000 – 11 111111**

**Address**

**Borrow 3 bits**

| **S** | **S** | **S** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 23 = 8**

**Subnet mask** = 3 bits = 128 + 64 + 32 = **224 = 11100000**

**Range of hosts = 25 = 32 = 00100000**

**[Range ……………………………] [Useable Range …………………...] Network ID 0 – 31 000 00000 – 000 11111**

**32 – 63 001 00000 – 001 11111 33 – 62 001 00001 – 001 11110 64 – 95 010 00000 – 010 11111 65 – 94 010 00001 – 010 11110 96 – 127 011 00000 – 011 11111 97 – 126 011 00001 – 011 11110 128 – 159 100 00000 – 100 11111 129 – 158 100 00001 – 100 11110 160 – 191 101 00000 – 101 11111 161 – 190 101 00001 – 101 11110 192 – 223 110 00000 – 110 11111 193 – 222 110 00001 – 110 11110 Broadcast 224 – 255 111 00000 – 111 11111**

**Address**

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**How to Calculate Subnets**

**Binary Subnet Ranges**

**Borrow 2 bits**

| **S** | **S** | **H** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 22 = 4 = 00000100**

**Subnet mask** = 2 bits = 128 + 64 = **192 = 11000000**

**Range of hosts = 26 = 64 = 01000000**

**[Net] [Useable] [Broadcast] [Network] [Useable Range …….] [Broadcast] [ID] [Range] [ID]**

**0 63 00 000000 00 111111 64 65 – 126 127 01 000000 01 000001 – 01 111110 01 111111 128 129 – 190 191 10 000000 10 000001 – 10 111110 10 111111 192 255 11 000000 11 111111**

**Borrow 3 bits**

| **S** | **S** | **S** | **H** | **H** | **H** | **H** | **H** |
| --- | --- | --- | --- | --- | --- | --- | --- |

**# of subnets = 23 = 8**

**Subnet mask** = 3 bits = 128 + 64 + 32 = **224 = 11100000**

**Range of hosts = 25 = 32 = 00100000**

**[Net] [Useable] [Broadcast] [Network] [Useable Range …….] [Broadcast] [ID] [Range] [ID]**

**0 31 000 00000 000 11111 32 33 – 62 63 001 00000 001 00001 – 001 11110 001 11111 64 65 – 94 95 010 00000 010 00001 – 010 11110 010 11111 96 97 – 126 127 011 00000 011 00001 – 011 11110 011 11111 128 129 – 158 159 100 00000 100 00001 – 100 11110 100 11111 160 161 – 190 191 101 00000 101 00001 – 101 11110 101 11111 192 193 – 222 223 110 00000 110 00001 – 110 11110 110 11111 224 255 111 00000 111 11111**

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How to subnet in your head.

Subnet Patterns

Step One left to right

Count 1 2 3 4 5 6 7 8

Step two Right to left

Document

Binary Place

Value 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

128 64 32 16 8 4 2 1

Step Three left to right

ADD 128 "+64" "+32" "+16" "+8" "+4" "+2" "+1"

Equals 128 192 224 240 248 252 254 255

Step Four Close your eyes and Repeat steps 1-3

Bits Borrowed 1 2 3 4 5 6 7 8

Range of

Hosts 128 64 32 16 8 4 2 1

Subnet Mask 128 192 224 240 248 252 254 255

Written by Daniel Foss

http://ohiocatc.treca.org Subnet Patterns Page 1

How to subnet in your head.

1 Bit Borrowed 1 2 3 4 5 6 7 8

| 32 | 16 | 8 | 4 | 2 |
| --- | --- | --- | --- | --- |

Range of Hosts 128 64 1 Subnet Mask 128 192 224 240 248 252 254 255

2 Bits Borrowed 1 2 3 4 5 6 7 8

| 16 | 8 | 4 | 2 |
| --- | --- | --- | --- |

Range of Hosts 128 64 32 1 Subnet Mask 128 192 224 240 248 252 254 255

3 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 |
| --- |

| 8 | 4 | 2 |
| --- | --- | --- |

Range of Hosts 64 32 16 1 Subnet Mask 128 192 224 240 248 252 254 255

4 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 | 64 |
| --- | --- |

| 4 | 2 |
| --- | --- |

Range of Hosts 32 16 8 1 Subnet Mask 128 192 224 240 248 252 254 255

5 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 | 64 | 32 |
| --- | --- | --- |

| 2 |
| --- |

Range of Hosts 16 8 4 1 Subnet Mask 128 192 224 240 248 252 254 255

6 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 | 64 | 32 | 16 |
| --- | --- | --- | --- |

Range of Hosts 8 4 2 1 Subnet Mask 128 192 224 240 248 252 254 255

7 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 | 64 | 32 | 16 | 8 |
| --- | --- | --- | --- | --- |

Range of Hosts 4 2 1 Subnet Mask 128 192 224 240 248 252 254 255

8 Bits Borrowed 1 2 3 4 5 6 7 8

| 128 | 64 | 32 | 16 | 8 | 4 |
| --- | --- | --- | --- | --- | --- |

Range of Hosts 2 1 Subnet Mask 128 192 224 240 248 252 254 255

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