How to Calculate Subnets

Subnets and Hosts

Borrow 2 bits

S	S	H	H	H	H	H	H

# of subnets = 2^2 = 4

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

Range of hosts = 2^6 = 64

	Range	**Useable Range**
Network ID	0 – 63	
	64 – 127	**65 - 126**
	128 – 191	**129 - 190**
Broadcast Address	192 – 255	

Borrow 3 bits

S	S	S	H	H	H	H	H

# of subnets = 2^3 = 8

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

Range of hosts = 2^5 = 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 Address	224 – 255	

How to Calculate Subnets

Decimal/Binary Subnet Ranges

Borrow 2 bits

S	S	H	H	H	H	H	H

# of subnets = 2^2 = 4 = 00000100

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

Range of hosts = 2^6 = 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 Address	**192 – 255**	**11 000000 – 11 111111**		

Borrow 3 bits

S	S	S	H	H	H	H	H

# of subnets = 2^3 = 8

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

Range of hosts = 2^5 = 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 Address	**224 – 255**	**111 00000 – 111 11111**		

How to Calculate Subnets

Binary Subnet Ranges

Borrow 2 bits

S	S	H	H	H	H	H	H

# of subnets = 2^2 = 4 = 00000100

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

Range of hosts = 2^6 = 64 = 01000000

[Net ID]	[Useable Range]	[Broadcast]	[Network ID]	[Useable Range …….]	[Broadcast]
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 = 2^3 = 8

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

Range of hosts = 2^5 = 32 = 00100000

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

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

How to subnet in your head.

1	Bit 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
2	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
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
4	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
5	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
6	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
7	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
8	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