IP Addressing Guide

Class A first octet range 1 – 127*   (Network 127 is reserved for loopback and internal testing)   Leading bit pattern   0
Class B first octet range 128 – 191   Leading bit pattern   10
Class C first octet range 192 – 223   Leading bit pattern   110
Class D first octet range 224 – 239   (Reserved for multicast)   Leading bit pattern   1110
Class E first octet range 240 – 255   (Reserved for experimental, used for research)   Leading bit pattern   11110

Maximum number of unique addresses in each class

Class A $2^7 - 2 = 126$ Class B $2^{14} - 2 = 16,382$ Class C $2^{21} - 2 = 2,097,150$

Formulas to determine the number of subnets or hosts created by borrowing from the host portion of the address

M = the number of bits borrowed (Masked)   **U = the number of bits remaining or not borrowed (Unmasked)**

2^M = Total # of subnets created 2^U = Total # of host on each subnets

$2^M - 2$ = Useable # of subnet created $2^U - 2$ = Useable # of host on each subnet

Class A License   N.H.H.H

# of Bits Borrowed	Subnet Mask	Total # Subnets	Useable # Subnets	Total # Hosts	Useable # Hosts
2	255.192.0.0	4	2	4,194,304	4,194,302
3	255.224.0.0	8	6	2,097,152	2,097,150
4	255.240.0.0	16	14	1,048,576	1,048,574
5	255.248.0.0	32	30	524,288	524,286
6	255.252.0.0	64	62	262,144	262,142
7	255.254.0.0	128	126	131,072	131,070
8	255.255.0.0	256	254	65,536	65,534
9	255.255.128.0	512	510	32,768	32,766
10	255.255.192.0	1,024	1,022	16,384	16,382
11	255.255.224.0	2,048	2,046	8,192	8,190
12	255.255.240.0	4,096	4,094	4,096	4,094
13	255.255.248.0	8,192	8,190	2,048	2,046
14	255.255.252.0	16,384	16,382	1,024	1,022
15	255.255.254.0	32,768	32,766	512	510
16	255.255.255.0	65,536	65,534	256	254
17	255.255.255.128	131,072	131,070	128	126
18	255.255.255.192	262,144	262,142	64	62
19	255.255.255.224	524,288	524,286	32	30
20	255.255.255.240	1,048,576	1,048,574	16	14
21	255.255.255.248	2,097,152	2,097,150	8	6
22	255.255.255.252	4,194,304	4,194,302	4	2

Class B License   N.N.H.H

# of Bits Borrowed	Subnet Mask	Total # Subnets	Useable # Subnets	Total # Hosts	Useable # Hosts
2	255.255.192.0	4	2	16,384	16,382
3	255.255.224.0	8	6	8,192	8,190
4	255.255.240.0	16	14	4,096	4,094
5	255.255.248.0	32	30	2,048	2,046
6	255.255.252.0	64	62	1,024	1,022
7	255.255.254.0	128	126	512	510
8	255.255.255.0	256	254	256	254
9	255.255.255.128	512	510	128	126
10	255.255.255.192	1,024	1,022	64	62
11	255.255.255.224	2,048	2,046	32	30
12	255.255.255.240	4,096	4,094	16	14
13	255.255.255.248	8,192	8,190	8	6
14	255.255.255.252	16,384	16,382	4	2

Class C License   N.N.N.H

# of Bits Borrowed	Subnet Mask	Total # Subnets	Useable # Subnets	Total # Hosts	Useable # Hosts
2	255.255.255.192	4	2	64	62
3	255.255.255.224	8	6	32	30
4	255.255.255.240	16	14	16	14
5	255.255.255.248	32	30	8	6
6	255.255.255.252	64	62	4	2

NOTE: You must borrow at least 2 bits and you must leave at least 2 bits.