

IP Address and Subnetting Guide



NETWORK ADDRESS RANGES BY CLASS		
IP network addresses are issued as follows:		
CLASS	RANGE	DEFAULT MASK
Class A	1-127	255.0.0.0
Class B	128-191	255.255.0.0
Class C	192-223	255.255.255.0

MAXIMUM NUMBER OF HOSTS BY CLASS				
The maximum number of hosts is achieved by using the default subnet mask for each class (i.e. by having only one subnet).				
CLASS	NO. OF ADDRESSES			
Class A	2^{24} 16,777,216			
Class B	2^{16} 65,536			
Class C	2^8 256			

BINARY CALCULATIONS		
DECIMAL	BINARY	
2^0	1	00000001
2^1	2	00000010
2^2	4	00000100
2^3	8	00001000
2^4	16	00010000
2^5	32	00100000
2^6	64	01000000
2^7	128	10000000

SUBNET MASKS - BINARY REPRESENTATIONS		
DECIMAL	HEX	BINARY
.128	80	10000000
.192	C0	11000000
.224	E0	11100000
.240	F0	11110000
.248	F8	11111000
.252	FC	11111100
.254	FE	11111110
.255	FF	11111111

NO. OF BITS	SUBNET MASK	NO. OF SUBNETS	NO. OF HOSTS PER SUBNET
CLASS B			
1	255.255.128.0	2	32766
2	255.255.192.0	4	16382
3	255.255.224.0	8	8190
4	255.255.240.0	16	4094
5	255.255.248.0	32	2046
6	255.255.252.0	64	1022
7	255.255.254.0	128	510
8	255.255.255.0	256	254
9	255.255.255.128	512	126
10	255.255.255.192	1024	62
11	255.255.255.224	2048	30
12	255.255.255.240	4096	14
13	255.255.255.248	8192	6
14	255.255.255.252	16384	2
CLASS C			
1	255.255.255.128	2	126
2	255.255.255.192	4	62
3	255.255.255.224	8	30
4	255.255.255.240	16	14
5	255.255.255.248	32	6
6	255.255.255.252	64	2

IP ADDRESS RANGES FOR CLASS C SUBNETS									
SUBNET MASK	SUBNET NO.	SUBNET ADDRESS	ADDRESS RANGE	B'CAST	SUBNET MASK	SUBNET NO.	SUBNET ADDRESS	ADDRESS RANGE	B'CAST
Number of bits for Class C networks — 24 bit mask = 255.255.255.0, 32 bit mask = 255.255.255.255.									
USABLE SUBNETS AND ADDRESSES									
The top and bottom host numbers of any subnet may not be used. The bottom number is the subnet address and the top number is the broadcast address for the subnet.									
128 (25 bits)	0	0	1-126	127	252 (30 bits)	0	0	1-2	3
	1	128	129-254	255		1	4	5-6	7
192 (26 bits)	0	0	1-62	63		2	8	9-10	11
	1	64	65-126	127		3	12	13-14	15
	2	128	129-190	191		4	16	17-18	19
	3	192	193-254	255		5	20	21-22	23
224 (27 bits)	0	0	1-30	31		6	24	25-26	27
	1	32	33-62	63		7	28	29-30	31
	2	64	65-94	95		8	32	33-34	35
	3	96	97-126	127		9	36	37-38	39
	4	128	129-158	159		10	40	41-42	43
	5	160	161-190	191		11	44	45-46	47
	6	192	193-222	223		12	48	49-50	51
	7	224	225-254	255		13	52	53-54	55
240 (28 bits)	0	0	1-14	15		14	56	57-58	59
	1	16	17-30	31		15	60	61-62	63
	2	32	33-46	47		16	64	65-66	67
	3	48	49-62	63		17	68	69-70	71
	4	64	65-78	79		18	72	73-74	75
	5	80	81-94	95		19	76	77-78	79
	6	96	97-110	111		20	80	81-82	83
	7	112	113-126	127		21	84	85-86	87
	8	128	129-142	143		22	88	89-90	91
	9	144	145-158	159		23	92	93-94	95
	10	160	161-174	175		24	96	97-98	99
	11	176	177-190	191		25	100	101-102	103
	12	192	193-206	207		26	104	105-106	107
	13	208	209-222	223		27	108	109-110	111
	14	224	225-238	239		28	112	113-114	115
	15	240	241-254	255		29	116	117-118	119
248 (29 bits)	0	0	1-6	7		30	120	121-122	123
	1	8	9-14	15		31	124	125-126	127
	2	16	17-22	23		32	128	129-130	131
	3	24	25-30	31		33	132	133-134	135
	4	32	33-38	39		34	136	137-138	139
	5	40	41-46	47		35	140	141-142	143
	6	48	49-54	55		36	144	145-146	147
	7	56	57-62	63		37	148	149-150	151
	8	64	65-70	71		38	152	153-154	155
	9	72	73-78	79		39	156	157-158	159
	10	80	81-86	87		40	160	161-162	163
	11	88	89-94						