

Password

Password: "cisco"

Secret Password: "class"

Calculating Subnet Mask Prefix and Hosts

Class C Subnet mask - 255.255.255.0

Class C Subnet mask in Octets 1111.1111.1111.0

Network prefix is the total number of bits in the subnet mask. Host bits are bits in the end of the subnet mask.

Number of Usable IPs = $2^{(\text{Host Bits})} - 2$ **OR** decimal conversion of 0s excluding last bit which is reserved for subnet ID and broadcast address.

Network Prefix	128	64	32	16	8	4	2	1	Sum	Host Bits	Usable IPs
/24	0	0	0	0	0	0	0	0	0	8	254
/25	1	0	0	0	0	0	0	0	128	7	126
/26	1	1	0	0	0	0	0	0	192	6	62
/27	1	1	1	0	0	0	0	0	224	5	30
/28	1	1	1	1	0	0	0	0	240	4	14
/29	1	1	1	1	1	0	0	0	248	3	6
/30	1	1	1	1	1	1	0	0	252	2	2
/31	1	1	1	1	1	1	1	0	254	1	0
/32	1	1	1	1	1	1	1	1	255	0	0

Assigning hosts bit per location

Host bits = $\text{Log}_2(\text{Number-of-hosts}+2)$

Example:

28 (Sales) devices

$\text{Log}_2(28+2) = 4.90689059561$

Round up to host bit

$4.90689059561 = 5$

Find corresponding prefix

$5 = /27$

Number of hosts for each location:

Location A - 28 sales staff, 7 finance staff, 4 technical support, 3 management, 5 administration staff

Location B - 9 finance staff, 6 technical support, 10 design and planning staff, 10 management, 15 administration staff

Location C - 26 sales staff, 4 technical support, 3 management, 5 administration staff (Note was less than 55 total devices, therefore more hosts than needed were added in to each department in Location C)

Location D - 15 sales staff, 7 finance staff, 4 technical support, 8 design and planning staff, 3 management, 5 administration staff

Table of corresponding prefixes

	Sales	Finance	Technical	Design and Planning	Administration	Management
Location A	/27	/28	/29	/29	/29	/29
Location B	-	/28	/28	/28	/27	/28
Location C	/27	-	/29	-	/28	/28
Location D	/27	/28	/29	/28	/29	/29

Performing VLSM on networks

Example: Location C - Using IP 192.168.4.1

First arrange in prefix order, highest usable IPs to lowest. First and Last IP are taken by Subnet ID and Broadcast Address. Usable IP determines range

	Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
Sales	/27	30	192.168.4.0	192.168.4-30	192.168.4.31
Management	/28	14	192.168.4.32	192.168.33-46	192.168.4.47
Administration	/28	14	192.168.4.48	192.168.4.49-62	192.168.4.63
Technical	/29	6	192.168.4.64	192.168.4.65-70	192.168.4.71

Location A - VLSM

	Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
Sales	/27	30	192.168.2.0	192.168.2.1-30	192.168.2.31
Management	/28	14	192.168.2.32	192.168.2.33-46	192.168.2.47
Administration	/29	6	192.168.2.48	192.168.2.49-54	192.168.2.55
Technical	/29	6	192.168.2.56	192.168.2.57-62	192.168.2.63
Administration	/29	6	192.168.2.64	192.168.2.65-70	192.168.2.71

Location B - VLSM

	Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
Administration	/27	30	192.168.3.0	192.168.3.1-30	192.168.3.31
Finance	/28	14	192.168.3.32	192.168.3.33-46	192.168.3.47
Technical	/28	14	192.168.3.48	192.168.3.49-62	192.168.3.63
Design and Planning	/28	6	192.168.3.64	192.168.3.65-78	192.168.3.79
Management	/28	6	192.168.3.80	192.168.3.81-94	192.168.3.95

Location C - VLSM

	Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
Sales	/27	30	192.168.4.0	192.168.4-30	192.168.4.31
Management	/28	14	192.168.4.32	192.168.33-46	192.168.4.47
Administration	/28	14	192.168.4.48	192.168.4.49-62	192.168.4.63
Technical	/29	6	192.168.4.64	192.168.4.65-70	192.168.4.71

Location D - VLSM

	Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
Sales	/27	30	192.168.5.0	192.168.5.1-30	192.168.5.31
Finance	/28	14	192.168.5.32	192.168.5.33-46	192.168.5.47
Design and Planning	/28	14	192.168.5.48	192.168.5.49-62	192.168.5.63
Technical	/29	6	192.168.5.64	192.168.5.65-70	192.168.5.71
Administration	/29	6	192.168.5.72	192.168.5.73-78	192.168.5.79
Management	/29	6	192.168.5.80	192.168.5.81-86	192.168.5.87

Subnetting other networks

Router Network

Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
/30	2	192.168.1.0	192.168.1.1-2	192.168.1.3
/30	2	192.168.1.4	192.168.1.5-6	192.168.1.7
/30	2	192.168.1.8	192.168.1.9-10	192.168.1.11
/30	2	192.168.1.12	192.168.1.13-14	192.168.1.15
/30	2	192.168.1.16	192.168.1.17-18	192.168.1.19
/30	2	192.168.1.20	192.168.1.21-22	192.168.1.23
/30	2	192.168.1.24	192.168.1.25-26	192.168.1.27
/30	2	192.168.1.28	192.168.1.29-30	192.168.1.31
/30	2	192.168.1.32	192.168.1.33-34	192.168.1.35
/30	2	192.168.1.36	192.168.1.37-38	192.168.1.39

DMZ Network

Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
29	6	192.168.6.0	192.168.1-6	192.168.1.7

Internet Network

Prefix	Usable IPs	Subnet ID	Range	Broadcast Address
/30	2	192.168.0.0	192.168.0.1-2	192.168.0.3

IP Address Table

Device	Interface	IP Address	Subnet Mask	Wildcard Mask	Default Gateway
Router(A)	Se0/2/0	192.168.1.1	255.255.255.252	0.0.0.3	
	Se0/2/1	192.168.1.17	255.255.255.252	0.0.0.3	
	Se0/3/0	192.168.1.14	255.255.255.252	0.0.0.3	
	G0/0.10	192.168.2.1	255.255.255.224	0.0.0.31	
	G0/0.20	192.168.2.33	255.255.255.240	0.0.0.15	
	G0/0.30	192.168.2.49	255.255.255.248	0.0.0.7	
	G0/0.40	192.168.2.57	255.255.255.248	0.0.0.7	
	G0/0.99	192.168.2.65	255.255.255.248	0.0.0.7	
Router(B)	Se0/2/0	192.168.1.10	255.255.255.252	0.0.0.3	
	Se0/2/1	192.168.1.21	255.255.255.252	0.0.0.3	
	Se0/3/0	192.168.1.13	255.255.255.252	0.0.0.3	
	G0/0.10	192.168.3.65	255.255.255.240	0.0.0.15	
	G0/0.20	192.168.3.33	255.255.255.240	0.0.0.15	
	G0/0.30	192.168.3.49	255.255.255.240	0.0.0.15	
	G0/0.40	192.168.3.1	255.255.255.224	0.0.0.31	
	G0/0.99	192.168.3.81	255.255.255.240	0.0.0.15	
	G0/1	192.168.1.25	255.255.255.252	0.0.0.3	
Router(C)	Se0/2/0	192.168.1.9	255.255.255.252	0.0.0.3	
	Se0/2/1	192.168.1.18	255.255.255.252	0.0.0.3	
	Se0/3/0	192.168.1.6	255.255.255.252	0.0.0.3	
	G0/0.10	192.168.4.1	255.255.255.224	0.0.0.31	
	G0/0.20	192.168.4.65	255.255.255.248	0.0.0.7	
	G0/0.30	192.168.4.49	255.255.255.240	0.0.0.15	
	G0/0.99	192.168.4.33	255.255.255.240	0.0.0.15	

Router(D)	Se0/2/0	192.168.1.2	255.255.255.252	0.0.0.3	
	Se0/2/1	192.168.1.22	255.255.255.252	0.0.0.3	
	Se0/3/0	192.168.1.5	255.255.255.252	0.0.0.3	
	G0/0.10	192.168.5.1	255.255.255.224	0.0.0.31	
	G0/0.20	192.168.5.33	255.255.255.240	0.0.0.15	
	G0/0.30	192.168.5.65	255.255.255.248	0.0.0.7	
	G0/0.40	192.168.5.49	255.255.255.240	0.0.0.15	
	G0/0.50	192.168.5.73	255.255.255.248	0.0.0.7	
	G0/0.99	192.168.5.81	255.255.255.248	0.0.0.7	
RouterDMZInternal	G7/0	192.168.1.29	255.255.255.252	0.0.0.3	
	G8/0	192.168.1.33	255.255.255.252	0.0.0.3	
	G9/0	192.168.1.26	255.255.255.252	0.0.0.3	
RouterDMZExternal	G7/0	192.168.1.30	255.255.255.252	0.0.0.3	
	G8/0	192.168.1.37	255.255.255.252	0.0.0.3	
	G9/0	192.168.0.2	255.255.255.252	0.0.0.3	
RouterDMZServer	G7/0	192.168.1.38	255.255.255.252	0.0.0.3	
	G8/0	192.168.1.34	255.255.255.252	0.0.0.3	
	G9/0	192.168.6.1	255.255.255.248	0.0.0.7	
ISP	G0/0	192.168.0.1	255.255.255.252	0.0.0.3	
PCA1	NIC	192.168.2.2	255.255.255.224		192.168.2.1
PCA2	NIC	192.168.2.34	255.255.255.240		192.168.2.33
PCA3	NIC	192.168.2.50	255.255.255.248		192.168.2.49
PCA4	NIC	192.168.2.58	255.255.255.248		192.168.2.57
PCA5	NIC	192.168.2.66	255.255.255.248		192.168.2.65
PCA6	NIC	192.168.2.51	255.255.255.248		192.168.2.49
PCA7	NIC	192.168.2.59	255.255.255.248		192.168.2.57
PCA8	NIC	192.168.2.67	255.255.255.248		192.168.2.65

LaptopA1	NIC	192.168.2.3	255.255.255.224		192.168.2.1
LaptopA2	NIC	192.168.2.4	255.255.255.224		192.168.2.1
LaptopA3	NIC	192.168.2.36	255.255.255.240		192.168.2.33
PrinterA1	NIC	192.168.2.35	255.255.255.240		192.168.2.33
PCB1	NIC	192.168.3.66	255.255.255.240		192.168.3.65
PCB2	NIC	192.168.3.34	255.255.255.240		192.168.3.33
PCB3	NIC	192.168.3.50	255.255.255.240		192.168.3.49
PCB4	NIC	192.168.3.2	255.255.255.224		192.168.3.1
PCB5	NIC	192.168.3.82	255.255.255.240		192.168.3.81
LaptopB1	NIC	192.168.3.4	255.255.255.224		192.168.3.1
LaptopB2	NIC	192.168.3.68	255.255.255.240		192.168.3.65
PrinterB1	NIC	192.168.3.3	255.255.255.224		192.168.3.1
PrinterB2	NIC	192.168.3.67	255.255.255.240		192.168.3.65
PrinterB3	NIC	192.168.3.69	255.255.255.240		192.168.3.65
PCC1	NIC	192.168.4.2	255.255.255.224		192.168.4.1
PCC2	NIC	192.168.4.3	255.255.255.224		192.168.4.1
PCC3	NIC	192.168.4.4	255.255.255.224		192.168.4.1
PCC4	NIC	192.168.4.5	255.255.255.224		192.168.4.1
PCC5	NIC	192.168.4.66	255.255.255.248		192.168.4.65
PCC6	NIC	192.168.4.50	255.255.255.240		192.168.4.49
PCC7	NIC	192.168.4.67	255.255.255.248		192.168.4.65
PCC8	NIC	192.168.4.51	255.255.255.240		192.168.4.49
PCC9	NIC	192.168.4.34	255.255.255.240		192.168.4.33
PCD1	NIC	192.168.5.50	255.255.255.240		192.168.5.49
PCD2	NIC	192.168.5.74	255.255.255.248		192.168.5.73
PCD3	NIC	192.168.5.82	255.255.255.248		192.168.5.81
PCD4	NIC	192.168.5.34	255.255.255.240		192.168.5.33

PCD5	NIC	192.168.5.66	255.255.255.248		192.168.5.65
PCD6	NIC	192.168.5.35	255.255.255.240		192.168.5.33
PCD7	NIC	192.168.5.36	255.255.255.240		192.168.5.33
ServerFTP	NIC	192.168.6.2	255.255.255.248		192.168.6.1
ServerHTTP	NIC	192.168.6.3	255.255.255.248		192.168.6.1