There are plenty of these netmask references out there, but I prefer my own: hence this Tech Tip. We've never seen anybody use a network larger than a /4 (256M hosts), so we've truncated the table at that point.

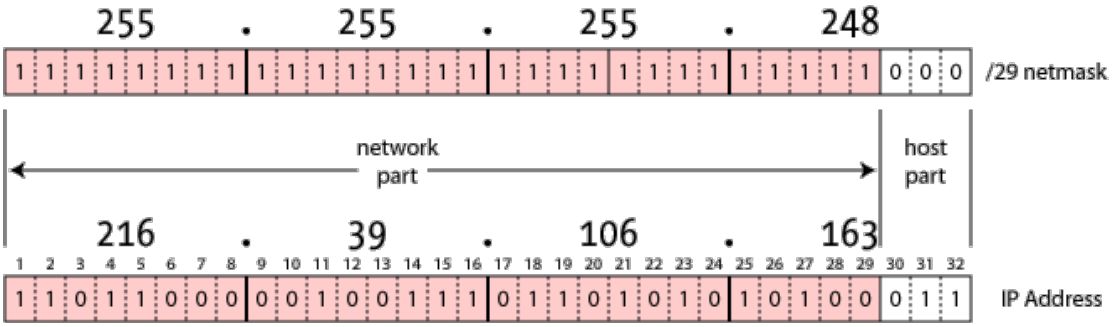
Netmask Quick Reference

# bits	# hosts	Usable hosts	netmask		Cisco mask
/4	268435456	268435454	240.0.0.0		15.255.255.255
/5	134217728	134217726	248.0.0.0		7.255.255.255
/6	67108864	67108862	252.0.0.0		3.255.255.255
/7	33554432	33554430	254.0.0.0		1.255.255.255
/8	16777216	16777214	255.0.0.0	*class A network*	0.255.255.255
/9	8388608	8388606	255.128.0.0		0.127.255.255
/10	4194304	4194302	255.192.0.0		0.63.255.255
/11	2097152	2097150	255.224.0.0		0.31.255.255
/12	1048576	1048574	255.240.0.0		0.15.255.255
/13	524288	524286	255.248.0.0		0.7.255.255
/14	262144	262142	255.252.0.0		0.3.255.255
/15	131072	131070	255.254.0.0		0.1.255.255
/16	65536	65534	255.255.0.0	*class B network*	0.0.255.255
/17	32768	32766	255.255.128.0		0.0.127.255
/18	16384	16382	255.255.192.0		0.0.63.255
/19	8192	8190	255.255.224.0		0.0.31.255
/20	4096	4094	255.255.240.0		0.0.15.255
/21	2048	2046	255.255.248.0		0.0.7.255
/22	1024	1022	255.255.252.0		0.0.3.255
/23	512	510	255.255.254.0		0.0.1.255
/24	256	254	255.255.255.0	*class C network*	0.0.0.255
/25	128	126	255.255.255.128		0.0.0.127
/26	64	62	255.255.255.192		0.0.0.63
/27	32	30	255.255.255.224		0.0.0.31
/28	16	14	255.255.255.240		0.0.0.15
/29	8	6	255.255.255.248		0.0.0.7
/30	4	2	255.255.255.252		0.0.0.3
/31	*point to point links only*				
/32	1	1	255.255.255.255	*single IP address*	*use* ***host*** *notation*

What's a netmask?

All devices on a local network have a unique IP address, but each address is inherently divided into two parts, a shared network part, and a unique host part, and this information is used by the TCP/IP stack for routing. When sending traffic to a machine with a different network part, it must be sent through a router for final delivery.

The dividing line between the network and host parts is determined by the *subnet mask*, and it's often seen in **255.255.255.0** notation. It looks like an IP address, and it uses a "1" bit to select, or "mask" the network part.



In this case, the netmask of **255.255.255.248** represents 29 bits of network and 3 bits of host (totalling 32 bits, of course), and this give 8 possible IP addresses in this range. The first and last of the range are reserved addresses, giving 6 usable addresses that may be

assigned to a device.

216.39.106.160	*zero broadcast*
216.39.106.161	available
216.39.106.162	available
216.39.106.163	available
216.39.106.164	available
216.39.106.165	available
216.39.106.166	available
216.39.106.167	*ones broadcast*

What's that Cisco notation?

When creating ACLs for Cisco routers, one specifies networks using a base IP address and what looks like an inverted netmask: rather than set a one bit for each part of the address that's a *network*, they set a one bit for each part that's a *host*.

Many consider this quite annoying, as it's one more thing to have to remember.

First published: 2005/07/17

Home | Stephen J. Friedl | Software Consultant | Orange County, CA USA | steve@unixwiz.net |