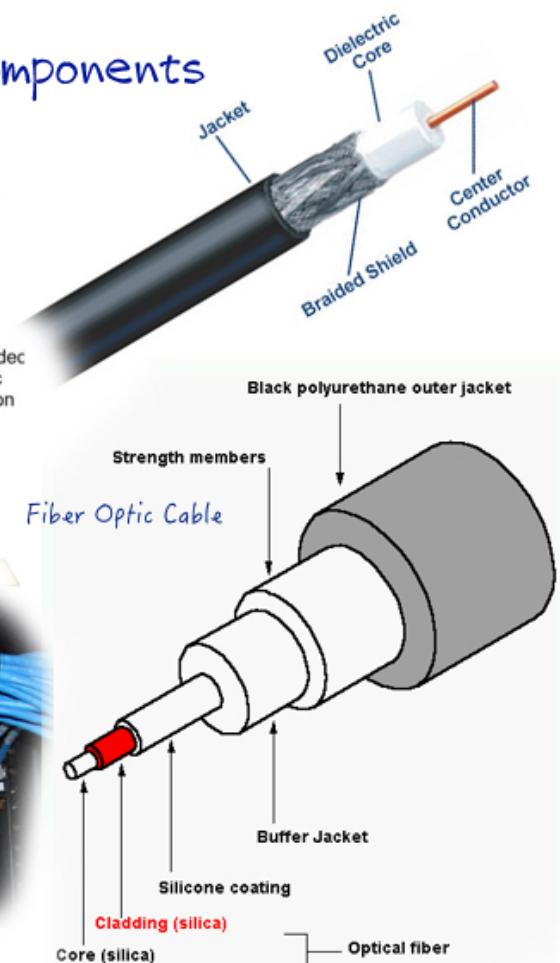
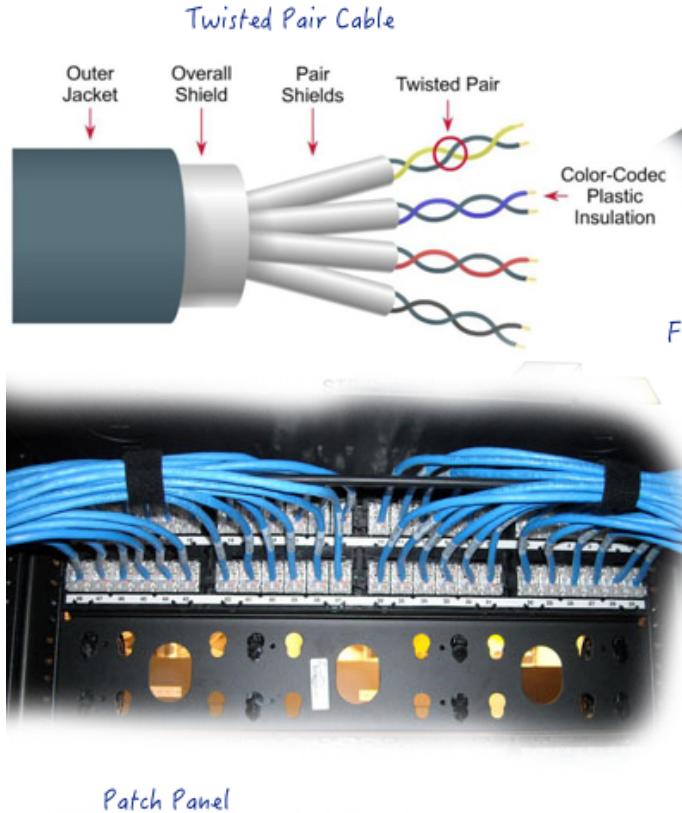


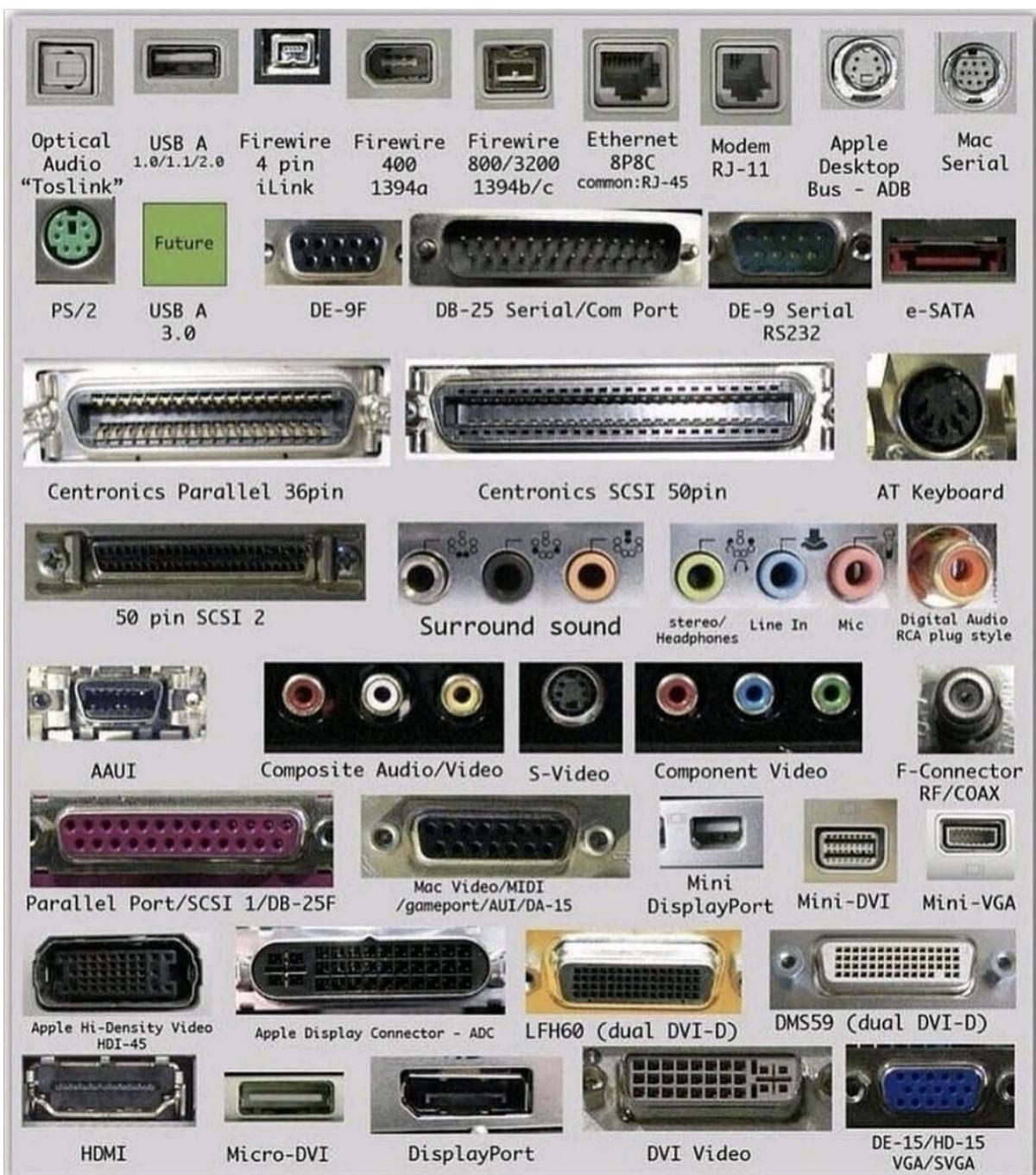
Network Components



Passive Network Components Active Network Components

Cable
Junction box
Connector
Patch Panel
Network Cabinet / Patch cabinet

Network card
Repeater
Hub
Switch
Router
Gateway
Server
Proxy
Print Server
NAS (Storage)
Firewall
Load Balancer



CIDR Notation	Subnet Mask	Total Number of Networks	Formula Used for Usable Hosts	Wildcard Mask
/0	0.0.0.0	0	$2^0(32-0) - 2 = 2^{32} - 2 = 4,294,967,294$	255.255.255.255
/1	128.0.0.0	1	$2^1(32-1) - 2 = 2^{31} - 2 = 1,474,833,646$	127.255.255.255
/2	192.0.0.0	2	$2^2(32-2) - 2 = 2^{30} - 2 = 1,073,741,822$	63.255.255.255
/3	224.0.0.0	3	$2^3(32-3) - 2 = 2^{29} - 2 = 536,870,910$	31.255.255.255
/4	240.0.0.0	4	$2^4(32-4) - 2 = 2^{28} - 2 = 268,435,454$	15.255.255.255
/5	248.0.0.0	5	$2^5(32-5) - 2 = 2^{27} - 2 = 134,217,727$	7.255.255.255
/6	252.0.0.0	6	$2^6(32-6) - 2 = 2^{26} - 2 = 67,108,862$	3.255.255.255
/7	254.0.0.0	7	$2^7(32-7) - 2 = 2^{25} - 2 = 33,554,430$	1.255.255.255
/8	255.0.0.0	8	$2^8(32-8) - 2 = 2^{24} - 2 = 16,777,214$	0.255.255.255
/9	255.128.0.0	9	$2^9(32-9) - 2 = 2^{23} - 2 = 8,386,006$	0.127.255.255
/10	255.192.0.0	10	$2^{10}(32-10) - 2 = 2^{22} - 2 = 4,194,302$	0.63.255.255
/11	255.224.0.0	11	$2^{11}(32-11) - 2 = 2^{21} - 2 = 2,097,150$	0.31.255.255
/12	255.240.0.0	12	$2^{12}(32-12) - 2 = 2^{20} - 2 = 1,048,574$	0.15.255.255
/13	255.248.0.0	13	$2^{13}(32-13) - 2 = 2^{19} - 2 = 524,286$	0.7.255.255
/14	255.252.0.0	14	$2^{14}(32-14) - 2 = 2^{18} - 2 = 262,142$	0.3.255.255
/15	255.254.0.0	15	$2^{15}(32-15) - 2 = 2^{17} - 2 = 131,070$	0.1.255.255
/16	255.255.0.0	16	$2^{16}(32-16) - 2 = 2^{16} - 2 = 65,534$	0.0.255.255
/17	255.255.128.0	17	$2^{17}(32-17) - 2 = 2^{15} - 2 = 32,766$	0.0.127.255
/18	255.255.192.0	18	$2^{18}(32-18) - 2 = 2^{14} - 2 = 16,382$	0.0.63.255
/19	255.255.224.0	19	$2^{19}(32-19) - 2 = 2^{13} - 2 = 8,190$	0.0.31.255
/20	255.255.240.0	20	$2^{20}(32-20) - 2 = 2^{12} - 2 = 4,094$	0.0.15.255
/21	255.255.248.0	21	$2^{21}(32-21) - 2 = 2^{11} - 2 = 2,046$	0.0.07.255
/22	255.255.252.0	22	$2^{22}(32-22) - 2 = 2^{10} - 2 = 1,022$	0.0.03.255
/23	255.255.254.0	23	$2^{23}(32-23) - 2 = 2^9 - 2 = 510$	0.0.1.255
/24	255.255.255.0	24	$2^{24}(32-24) - 2 = 2^8 - 2 = 254$	0.0.0.255
/25	255.255.255.128	25	$2^{25}(32-25) - 2 = 2^7 - 2 = 126$	0.0.0.0127
/26	255.255.255.192	26	$2^{26}(32-26) - 2 = 2^6 - 2 = 62$	0.0.0.063
/27	255.255.255.224	27	$2^{27}(32-27) - 2 = 2^5 - 2 = 30$	0.0.0.031
/28	255.255.255.240	28	$2^{28}(32-28) - 2 = 2^4 - 2 = 14$	0.0.0.015
/29	255.255.255.248	29	$2^{29}(32-29) - 2 = 2^3 - 2 = 6$	0.0.0.007
/30	255.255.255.252	30	$2^{30}(32-30) - 2 = 2^2 - 2 = 2$	0.0.0.003
/31	255.255.255.254	31	Total number of Hosts = 2	0.0.0.01
/32	255.255.255.255	32	Total number of Hosts = 1	0.0.0.00

IP SUBNETTING CHEAT SHEET INFOGRAPHIC

Class	Leading bits Start	End	Default Subnet Mask	CIDR	Network ID and Host ID and total Number of Host & Network Support
Class A	1	1.0.0.0	126.255.255.255	255.0.0.0	Uses (0-127) 8 bit of Network ID portion giving 127 networks
Class B	10000000	128.0.0.0	191.255.255.255	255.255.0.0	Uses (128-191) 16 bits of Network ID portion giving 16,000 networks.
Class C	110000000	224.0.0.0	239.255.255.255	255.255.255.0	Uses (192-223) 24 bits of Network ID portion giving 2 million networks.
Class D	1110000000	240.0.0.0	255.255.255.255	255.255.255.255	Reserved for multicast groups.
Class E					Reserved for future usage or R&D.

Let's put it All together

Let's take an example of the network configuration of your computer.

Wireless LAN adapter WiFi:

Connection-specific DNS Suffix . :
Link-local IPv6 Address : 192.168.2.15
Subnet Mask : 255.255.255.0
Default Gateway : 192.168.2.1

Let's understand the main things here.

- IPv4 Address of this computer is 192.168.2.15
- Subnet Mask or subnet size or prefix length is 255.255.255.0
- 192.168.2.15 is from the Private IP address range.
- You can also write the above IP address and subnet mask in CIDR notation as 192.168.2.15/24
- Default Gateway is 192.168.2.1
- Let's line up the IP address and Subnet Mask portion and convert Decimal numbers to Binary.
- 11000000.10101000.00000010.00001110 — IP address (192.168.2.15)
11111111.11111111.11111111.00000000 — Subnet mask (255.255.255.0)
- As you can see above, there are the first three octets (24 bits) that make up the network address and the last octet (8 bits) that make up the host address. This gives you these things:
 - 11000000.10101000.00000010.00001110 — Network address (192.168.2.0)
 - 00000000.00000000.00000000.00000015 — Host address (000.000.0015)
- The network address is 192.168.2.0 and the host address is 0.0.0.15. When a packet with a destination address of 192.168.2.15 will arrive on the 192.168.2.0 subnet, your computer will receive and process it.

Example - Convert Binary 11011011 to Decimal							
Binary	1	1	0	1	1	0	1
Power of 2	2^7	2^6	2^5	2^4	2^3	2^2	2^1
Decimal Number	128	64	32	16	8	4	1
Total = $128 + 64 + 0 + 16 + 8 + 0 + 2 + 1 = 219$							

Private IP Address		
With Subnet Mask	Total IP Range	Denoted in CIDR
10.0.0.0 255.0.0.0	10.0.0.0 to 10.255.255.255	10.0.0/8
172.16.0.0 255.240.0.0	172.16.0.0 to 172.31.255.255	172.16.0/12
192.168.0.0 255.255.0.0	192.168.0.0 to 192.168.255.255	192.168.0/16

IP address
 ↓
 192.168.2.15
 ↓
 11000000.10101000.00000010.00001111
 ↓
 Network Address (24 Bits) Host Address (8 Bits)
 ↓
 IPv4 Address 32 Bits (4 Bytes)

AfrozAhmad

Subnetting

Cheat Sheet Series comparitech

Prefix Length Slash Notation (CIDR)	Addresses (Total IPs)	Max Available Hosts (Usable IPs)	Subnet Length	Subnet Mask
/32	1	1	0	255.255.255.255
/31	2	0	1	255.255.255.254
/30	4	2	2	255.255.255.252
/29	8	6	3	255.255.255.248
/28	16	14	4	255.255.255.240
/27	32	30	5	255.255.255.224
/26	64	62	6	255.255.255.192
/25	128	126	7	255.255.255.128
/24	256	254	8	255.255.255.0
/23	512	510	9	255.255.254.0
/22	1024	1022	10	255.255.252.0
/21	2048	2046	11	255.255.248.0
/20	4096	4094	12	255.255.240.0
/19	8192	8190	13	255.255.224.0
/18	16384	16382	14	255.255.192.0
/17	32768	32766	15	255.255.128.0
/16	65536	65534	16	255.255.0.0
/15	131072	131070	17	255.254.0.0
/14	262144	262142	18	255.252.0.0
/13	524288	524286	19	255.248.0.0
/12	1048576	1048574	20	255.240.0.0
/11	2097152	2097150	21	255.224.0.0
/10	4194304	4194302	22	255.192.0.0
/9	8388608	8388606	23	255.128.0.0
/8	16777216	16777214	24	255.0.0.0
/7	33554432	33554430	25	254.0.0.0
/6	67108864	67108862	26	252.0.0.0
/5	134217728	134217726	27	248.0.0.0
/4	268435456	268435454	28	240.0.0.0
/3	536870912	536870910	29	224.0.0.0
/2	1073741824	1073741822	30	192.0.0.0
/1	2147483648	2147483646	31	128.0.0.0
/0	4294967296	4294967294	32	0.0.0.0

Creating a subnet by dividing the host identifier			
Before Subnetting	Network Identifier	Host Identifier	
After Subnetting	Network Identifier	Subnet Identifier	Host Identifier