Hexadecimal Numbers

Single Digit Translation

Hex	Value
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

From Hex to Dec

Notation

To avoid confusion with decimal numbers in a text, hexadecimal numbers are prefixed with 0x or appended with the basis 16:

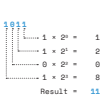
$0x11 == 11_{16} == 17$

Binary Numbers

Single Digit Translation

Bin	Value
0	0
1	1

From Bin to Dec



Notation

To avoid confusion with decimal numbers in a text, binary numbers are appended with the basis 2:

$11_{2} == 3$

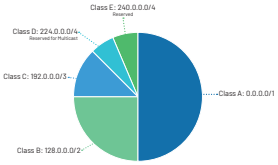
IPv4 Addresses

Subnetting

CIDR	Mask	Num Hosts
/32	255.255.255.255	0 or the host itself
/31	255.255.255.254	0
/30	255.255.255.252	2
/29	255.255.255.248	6
/28	255.255.255.240	14
/27	255.255.255.224	30
/26	255.255.255.192	62
/25	255.255.255.128	126
/24	255.255.255.0	254
/23	255.255.254.0	510
/22	255.255.252.0	1 022
/21	255.255.248.0	2 046
/20	255.255.240.0	4 094
/19	255.255.224.0	8 190
/18	255.255.192.0	16 384
/17	255.255.128.0	32 766
/16	255.255.0.0	65 534
/15	255.254.0.0	131 070
/14	255.252.0.0	262 142
/13	255.248.0.0	524 286
/12	255.240.0.0	1 048 574
/11	255.224.0.0	2 097 150
/10	255.192.0.0	4 194 302
/9	255.128.0.0	8 388 606
/8	255.0.0.0	16 777 214

Special IPv4 Addresses

0.0.0.0/0	Default Gateway
10.0.0.0/8	Private Network
127.0.0.0/8	Link Local
169.254.0.0/16	APIPA
172.16.0.0/12	Private Network
192.168.0.0/16	Private Network
224.0.0.0/4	Multicast
224.0.0.5	OSPF All Routers
224.0.0.6	OSPF All DRs and BDRs
224.0.0.9	RIPv2
224.0.0.10	EIGRP
240.0.0.0/4	Reserved
255.255.255.255/32	Limited Broadcast



IPv6 Addresses

Special IPv6 Addresses

::/0	Default Gateway	FF01::1	All Nodes Interface Local
::1/128	Loopback Address	FF01::2	All Routers Interface Local
::/128	Unspecified Address	FF02::1	All Nodes Link Local
2001::/23	IETF Protocol Assignments	FF02::2	All Routers Link Local
2001:DB8::/32	Documentation	FF02::5	OSPFv3 All Routers
FC00::/7	Unique Local	FF02::6	OSPFv3 All Designated Routers
FE80::/10	Link Local Unicast	FF02::9	RIPng
		FF02::A	EIGRP
		FF05::2	All Routers Site Local

Well-Known Ports

TCP UDP Unofficial Encrypted

7	Echo Protocol	143	Internet Message Access Protocol
9	Wake-on-LAN	161 162	Simple Network Management Protocol
13	Daytime Protocol	179	Border Gateway Protocol
20 21	File Transfer Protocol	194	Internet Relay Chat
22	Secure Shell, SCP, SFTP	389	Border Gateway Multicast Protocol
23	Telnet	443	HTTP over TLS
25	SMTP on servers	443	Quick UDP Internet Connection
43	WHOIS	465	Authenticated SMTP over TLS
49	TACACS, TACACS+ is TCP only	514	syslog
53	Domain Name System	520 521	RIP and RIPng
67	DHCP and BOOTP server	546 547	DHCPv6 client and server
68	DHCP and BOOTP client	587	SMTP on clients
69	Trivial File Transfer Protocol	631	Common Unix Printing System
80	Hypertext Transfer Protocol	636	LDAP over TLS
80	Quick UDP Internet Connection	646	Label Distribution Protocol
88	Kerberos authentication system	853	DNS over TLS
110	Post Office Protocol 3 (POP3)	873	rsync
123	Network Time Protocol	989 990	FTP over TLS
137 138	NetBIOS Name and Datagram Service	993	IMAP over TLS
139	NetBIOS Session Service	995	POP3 over TLS

Internet Protocol Suite / TCP/IP — Open Systems Interconnection (OSI) Model

Application

7 Application Layer

This layer directly interacts with data from the user. Software applications like web browsers and chat apps rely on the application layer to initiate communications.

6 Presentation Layer

Also called the syntax layer, layer 6 aligns application data. This enables applications to exchange data in a common manner. Data encryption occurs on this layer, too.

5 Session Layer

Establishment, management and termination of connections between local and remote applications are done by the session layer. It is usually implemented in applications that use remote procedure calls (RPC).

Transport

4 Transport Layer

In order to address hosts as well as applications running on them, the transport layer is needed. This layer allows an operating system to deliver a segment to the correct application. The transport layer may implement additional functionality to address the network layers' flaws: Communication can be reliable, errors get reported and congestion can be avoided.

Internet

3 Network Layer

To transfer packets from host to host in a different network, layer 3 functionality is needed. Message delivery may not be reliable or error-free.

Network Access

2 Data Link Layer

The data link layer can be divided into two sublayers, the Medium access control (MAC) layer and the Logical link control (LLC) layer. The MAC layer controls how devices within a network gain access to a medium and permission to transmit data. Identifying and encapsulating network layer protocols, error checking and frame synchronisation is done by the LLC layer. All in all, the data link layer provides node-to-node data transfer.

1 Physical Layer

At the physical layer, digital bits get converted into electrical, radio, or optical signals. This layer is responsible for the transmission and reception of raw data between a device and a physical transmission medium such as a copper cable.