

**List of acronyms**

<b>ARP</b> Address Resolution Protocol	<b>MPLS</b> Multi-Protocol Label Switching
<b>AS</b> Autonomous System	<b>MSS</b> Maximum Segment Size
<b>ASN</b> Autonomous System Number	<b>MST</b> Minimum Spanning Tree
<b>ATM</b> Asynchronous Transfer Mode	<b>MWST</b> Minimum Weight Spanning Tree
<b>BCC</b> Blocked Calls Cleared	<b>NAP</b> Network Access Point
<b>BGP</b> Border Gateway Protocol	<b>NCC</b> Network Control Center
<b>BPDU</b> Bridge Protocol Data Unit	<b>NFS</b> Network File System
<b>CAN</b> Campus Area Network	<b>NIC</b> Network Interface Card
<b>CIDR</b> Classless Inter-Domain Routing	<b>NNTP</b> Network News Transfer Protocol
<b>CSMA</b> Carrier Sense Multiple Access	<b>NOC</b> Network Operations Center
<b>CSMA/CA</b> CSMA with Collision Avoidance	<b>NTP</b> Network Time Protocol
<b>CSMA/CD</b> CSMA with Collision Detection	<b>OSI</b> Open Systems Intergration
<b>DHCP</b> Dynamic Host Configuration Protocol	<b>OSPF</b> Open Shortest Path First
<b>DDoS</b> Distributed Denial of Service	<b>PDN</b> Public Data Network
<b>DoS</b> Denial of Service	<b>POP</b> Post Office Protocol
<b>DTE</b> Data Terminal Equipment (or Computer)	<b>POS</b> Packet Over SONET
<b>ECN</b> Explicit Congestion Notification	<b>PPP</b> Point to Point Protocol
<b>EGP</b> Exterior Gateway Protocol	<b>PSTN</b> Public Switched Telecommunications Network
<b>EIGRP</b> Enhanced Interior Gateway Routing Protocol	<b>PVC</b> Permanent Virtual Circuit
<b>EMULab</b> Ericsson Melbourne University Laboratory	<b>QoS</b> Quality of Service
<b>FAK</b> Forward ACKnowledgement	<b>RED</b> Random Early Detection
<b>FDDI</b> Fiber Distributed Data Interface	<b>RFC</b> Request For Comment
<b>FDM</b> Frequency Division Multiplexing	<b>RIB</b> Routing Information (data)Base
<b>FDMA</b> Frequency Division Multiple Access	<b>RIP</b> Routing Information Protocol
<b>FIB</b> Forwarding Information (data)Base	<b>RSVP</b> Resource ReSerVation Protocol
<b>FTP</b> File Transfer Protocol	<b>RTO</b> Retransmission TimeOut
<b>FTTC</b> Fiber to the Curb	<b>RTP</b> Real-time Transport Protocol
<b>FTTN</b> Fiber to the Node	<b>RTT</b> Round Trip Times
<b>FTTP</b> Fiber to the Premises	<b>SACK</b> Selective ACKnowledgement
<b>GoS</b> Grade of Service	<b>SDH</b> Synchronous Digital Hierarchy
<b>HTML</b> Hyper Text Markup Language	<b>SMB</b> Server Message Block
<b>HTTP</b> Hyper Text Transfer Protocol	<b>SMTP</b> Simple Mail Transfer Protocol
<b>IAB</b> Internet Architecture Board	<b>SNMP</b> Simple Network Management Protocol
<b>IANA</b> Internet Assigned Numbers Authority	<b>SONET</b> Synchronous Optical Networking
<b>ICANN</b> Internet Corp. for Assigned Names and Numbers	<b>SPF</b> Shortest Path First
<b>ICMP</b> Internet Control Message Protocol	<b>SSH</b> Secure SHell
<b>IDC</b> Infinitely Divisible Cascade	<b>SSL</b> Secure Sockets Layer
<b>IEEE</b> Inst. of Electrical and Electronic Engineers	<b>STP</b> Spanning Tree Protocol
<b>IETF</b> Internet Engineering Task Force	<b>TCP</b> Transmission Controls Protocol
<b>IESG</b> Internet Engineering Steering Group	<b>TCP/IP</b> Transmission Controls Protocol/Internet Protocol
<b>IGP</b> Interior Gateway Protocol	<b>TDM</b> Time Division Multiplexing
<b>IGRP</b> (Cisco's) Interior Gateway Routing Protocol	<b>TDMA</b> Time Division Multiple Access
<b>IMAP</b> Internet Message Access Protocol	<b>TLA</b> Three Letter Acronym
<b>IP</b> Internet Protocol	<b>TSP</b> Travelling Salesman Problem
<b>IPv4</b> Internet Protocol version 4	<b>UDP</b> User Datagram Protocol
<b>IPv6</b> Internet Protocol version 6	<b>UNI</b> User-to-Network Interface
<b>IRSG</b> Internet Research Steering Group	<b>URL</b> Uniform Resource Locator
<b>IRTF</b> Internet Research Task Force	<b>VC</b> Virtual Circuit
<b>ISDN</b> Integrated Services Digital Network	<b>W3C</b> World Wide Web consortium
<b>ISOC</b> Internet Society	<b>WAN</b> Wide Area Network
<b>ISP</b> Internet Service Provider	<b>WDM</b> Wavelength Division Multiplexing
<b>ITU</b> International Telecommunications Union	<b>WDMA</b> Wavelength Division Multiple Access
<b>IS-IS</b> Intermediate System to Intermediate System	<b>WWW</b> World Wide Web
<b>IXP</b> Internet eXchange Point	
<b>LAN</b> Local Area Network	
<b>LRD</b> Long Range Dependence	
<b>LSA</b> Link State Announcement	
<b>MAC</b> Medium Access Control (protocol)	
<b>MAN</b> Metropolitan Area Network	
<b>MED</b> Multi-Exit Discriminator	
<b>MF</b> MultiFractal	

## List of units

In contrast to normal computing units for memory, we do things in powers of ten (as in standard scientific notation).

**kbps** kilobits per second ( $10^3$  bits per second)

**Mbps** Megabits per second ( $10^6$  bits per second)

**Gbps** Gigabits per second ( $10^9$  bits per second)

**Tbps** Gigabits per second ( $10^{12}$  bits per second)

**B** bytes (1 byte = 8 bits)

**octet** 1 octet = 1 byte = 8 bits

**kB** kilobytes ( $10^3$  bytes)

**MB** Megabytes ( $10^6$  bytes)

**GB** Gigabytes ( $10^9$  bytes)

**TB** Terabytes ( $10^{12}$  bytes)

**PB** Petabytes ( $10^{15}$  bytes)

## Some terminology

Some frequently used terminology (see notes for details)

- a **router** = a layer-3 device that forwards packets based on their destination address. Another sometimes synonymous term is gateway, but this usage is obsolete terminology, and we use the term **gateway router** to mean a router connecting two ASes, while a **gateway** itself often means a device that translates between higher level protocols (e.g. IP to IPX).
- a **switch** = a (nominally) layer-2 device that switches data along a virtual circuit (also sometimes called a **cross-connect**).
- a **hub** = a multiport **repeater** = a layer-1 device that repeats a signal to extend its domain.

Typically, though, these days the term "switch" is applied to an Ethernet device (also called a multi-port **bridge**), which really has some characteristics of a layer-2 and some characteristics of a layer-3 device. It forwards packets to Ethernet segments based on their destination address, but this is a layer-2 MAC address, and IP addresses are not used. VLANs complicate things, but I won't talk about them in CND.

You need to understand both definitions of a switch, but when I talk about switches I will typically mean the former, unless the context is Ethernet, or I explicitly say Ethernet switch.

## Link speeds

Common link speeds.

**dial-up modem** up to 56 kbps

**T1** 1.544Mbps

**E1** 2.048Mbps

**T3** 44.736Mbps (=28xT1)

**DS3** 44.736Mbps

**OC3/STM1** 155.52 Mbps (=100 T1)

**OC12/STM4** 622.08 Mbps (=4xOC3)

**OC48/STM16** 2.488 Gbps (=4xOC12)

**OC192/STM64** 9.953 Gbps (=4xOC48)

**OC768/STM256** 39.813 Gbps (=4xOC192)

**Ethernet (10BaseT)** 10 Mbps

**Fast-Ethernet** 100 Mbps

**Gig-E** 1 Gbps

**10Gig-E** 10 Gbps

**FDDI** 100 Mbps

**IEEE 802.11b (Wi-Fi)** <11 Mbps

**IEEE 802.11g (Wi-Fi)** <54 Mbps

We call the link speed the **link capacity** or the **link bandwidth**. The actual bandwidth available for applications depends on overheads in physical and link layers, and the MAC layer protocol.