

Computer Science E-1



Understanding Computers and the Internet

Lecture 5: The Internet, Continued

Wednesday, 18 October 2006

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Agenda



- Network Topologies
- The Internet
 - backbones
 - TCP/IP
 - DHCP
 - DNS
- NAT
- Ethernet
 - NICs
 - Cabling
 - Switches
 - Routers
 - Access Points
- Wireless
 - IR
 - RF
 - Bluetooth
 - WiFi
- ISPs
- Modems
 - Dialup
 - Cable
 - DSL

Network Topologies

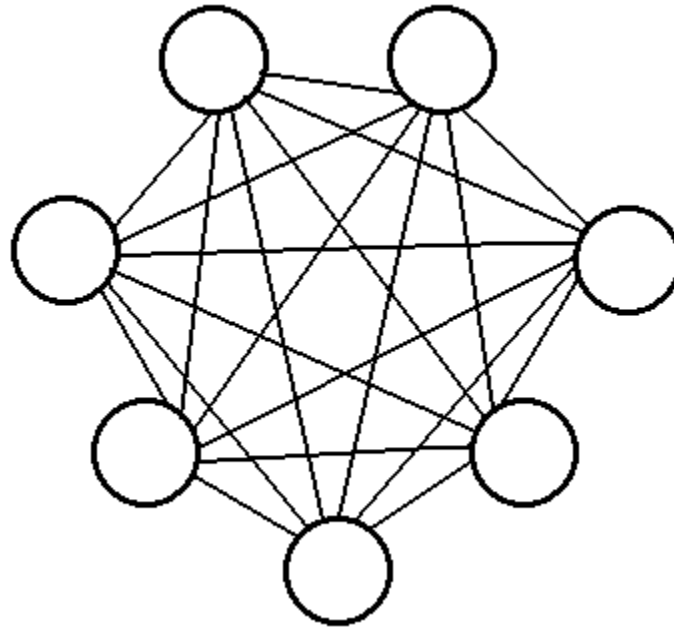


Image from <http://www.indiesoft.com/scnp/topology.html>.

Network Topologies



Bus

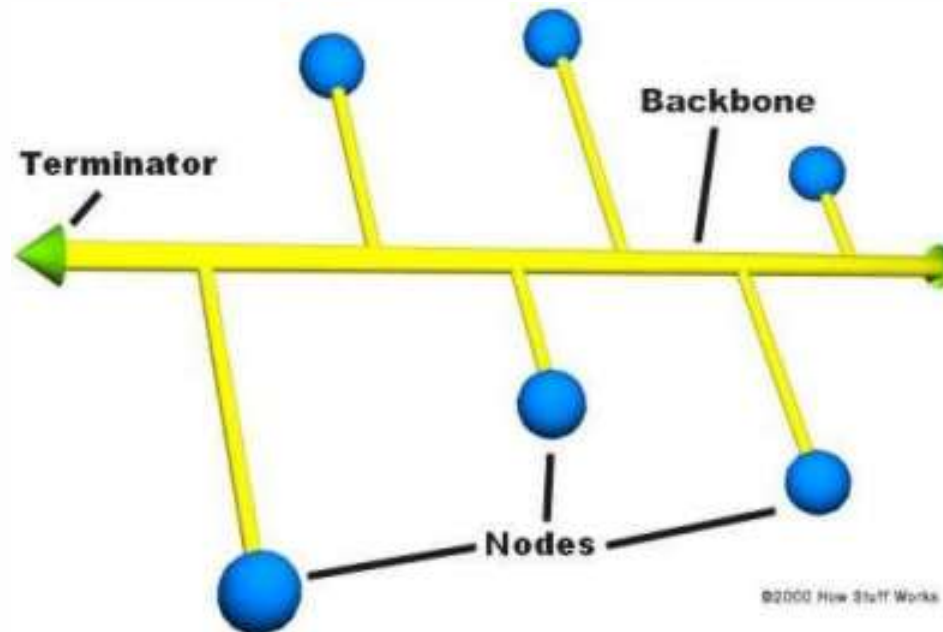


Image from <http://www.howstuffworks.com/lan-switch1.htm>.

Network Topologies



Ring

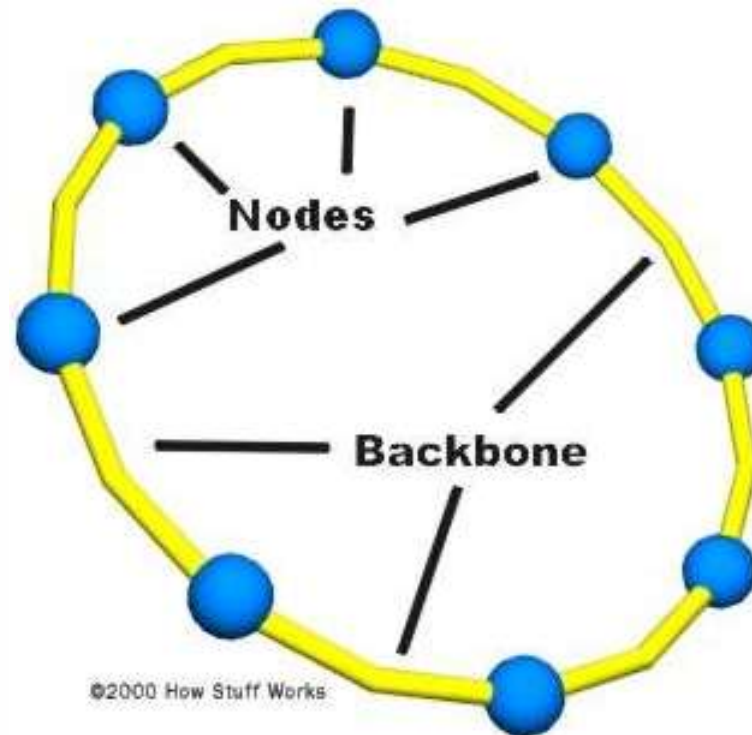


Image from <http://www.howstuffworks.com/lan-switch1.htm>.

Network Topologies



Star

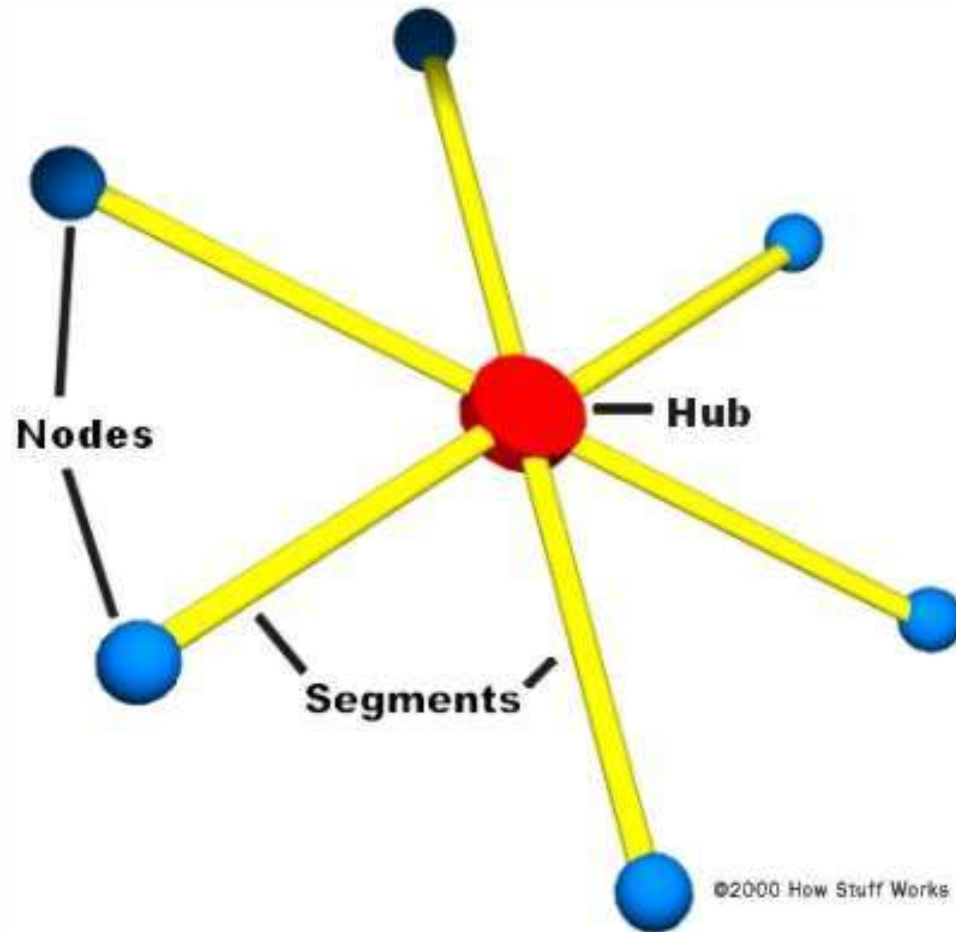
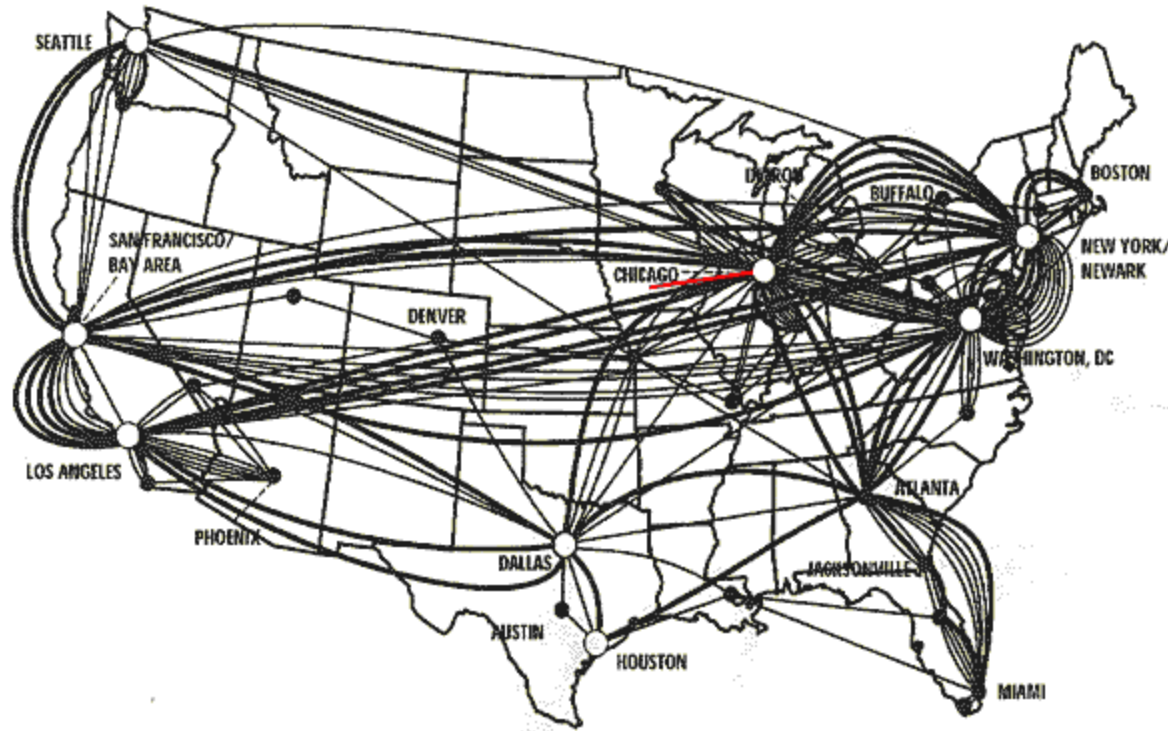


Image from <http://www.howstuffworks.com/lan-switch1.htm>.

The Internet

Backbones



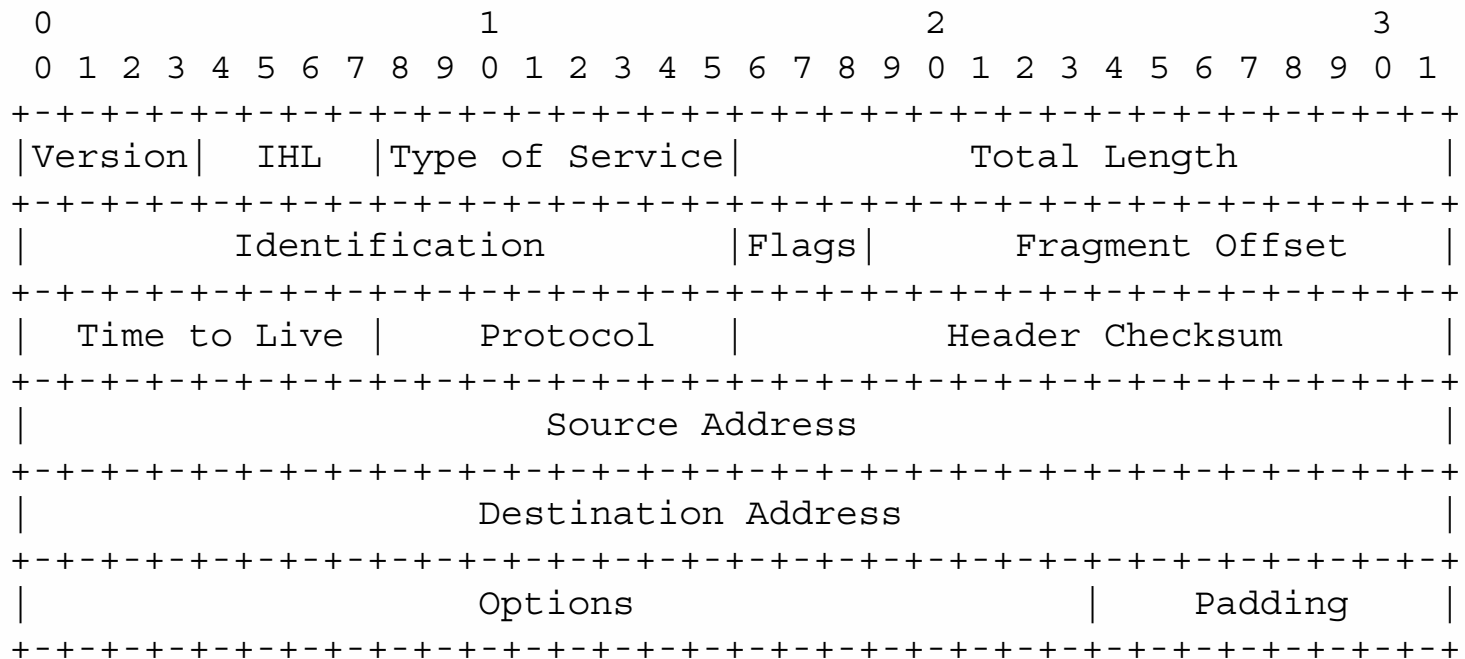
Images from <http://www.webfusion.co.uk/images/uunet-logo.gif> and <http://www.captainjack.com/uunet.html>.

The Internet



TCP/IP

Internet Header Format



Example Internet Datagram Header

Figure from <http://www.ietf.org/rfc/rfc0791.txt?number=791>.

The Internet



TCP/IP

IP Address, Canonical Form
#.#.#.#

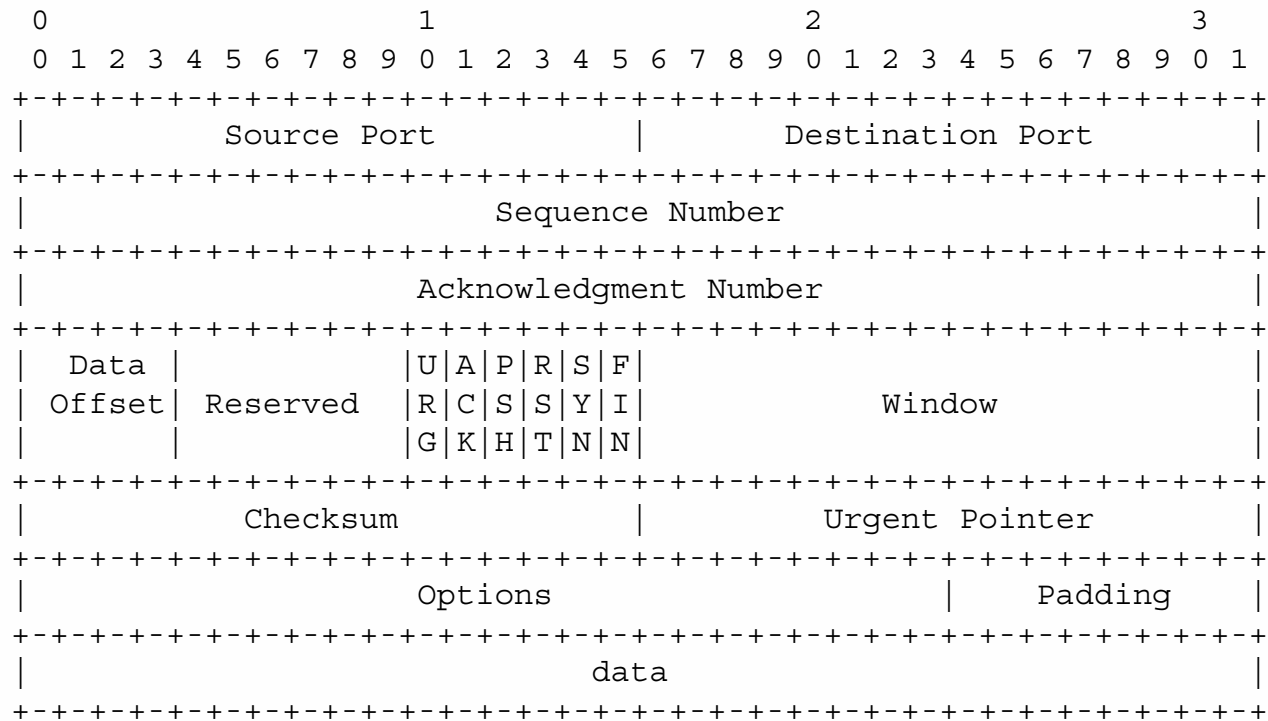
where each # denotes an integer, 0 through 255, inclusive

The Internet



TCP/IP

TCP Header Format



TCP Header Format

Figure from <http://www.ietf.org/rfc/rfc0793.txt?number=793>.

The Internet



DNS

DNS Root Servers

1 Feb 98

Designation, Responsibility, and Locations

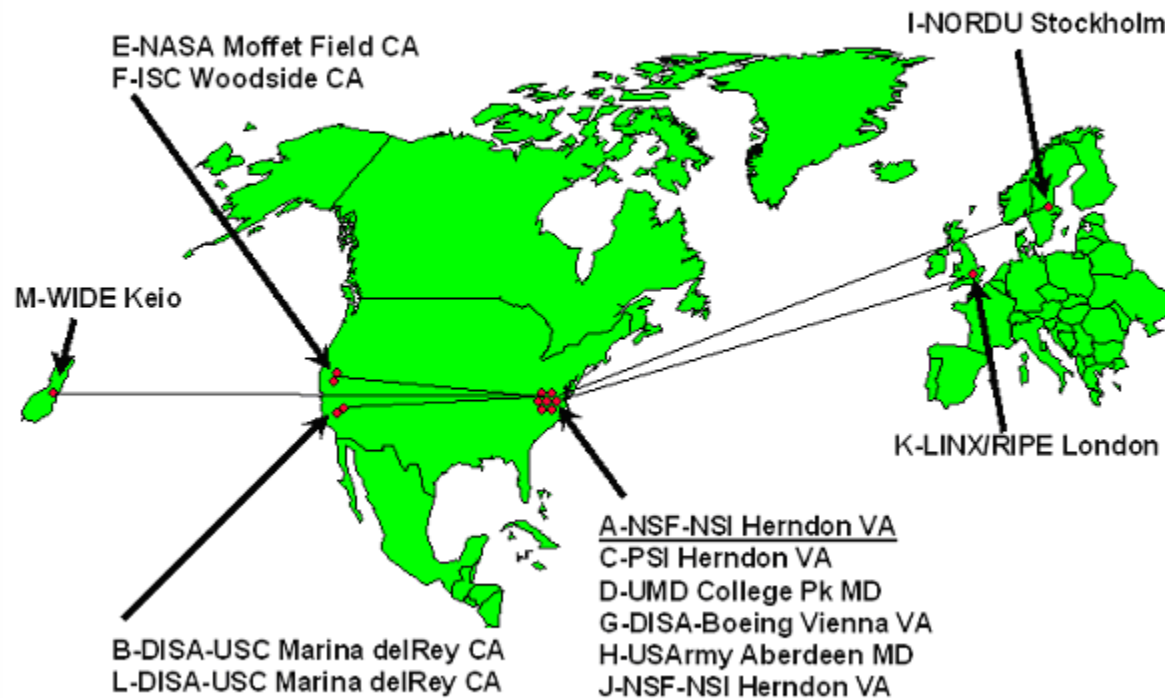


Image from <http://www.wia.org/pub/rootserv.html>.

The Internet



NAT

Mac or PC computer that was originally connected to the cable or DSL modem

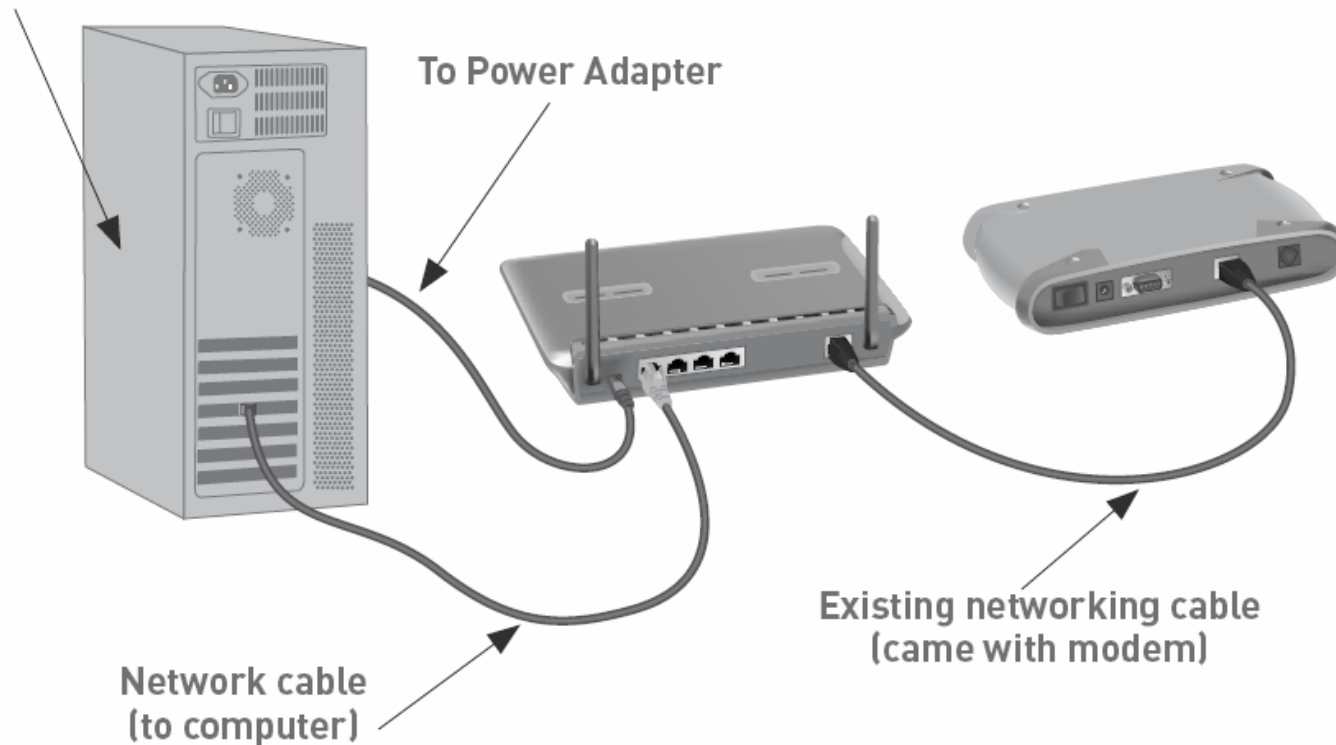


Image from <http://www.belkin.com/support/download/files/F5D7231-4.pdf>.

Ethernet



NICs



Typical ethernet card showing the three common types of connectors

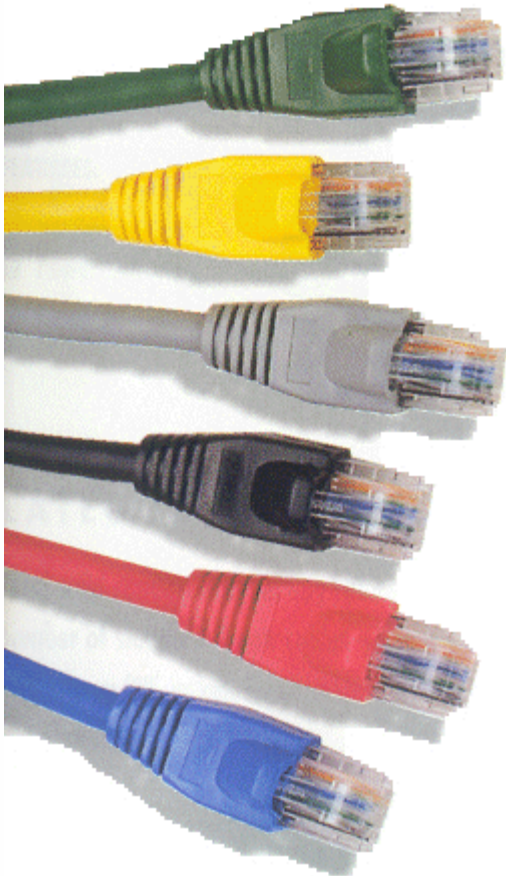


Images from http://lat.3com.com/lat/products/pc_cards/16bit_lan.html, http://lat.3com.com/lat/products/wireless/11_mbps_lan.html, and http://www.3com.com/products/en_US/detail.jsp?tab=features&pathtype=purchase&sku=3C905CX-TX-NM, copyright © 3Com Corporation; and <http://www.mackido.com/Hardware/Networking102.html>, copyright © David K. Every.

Ethernet



Cabling



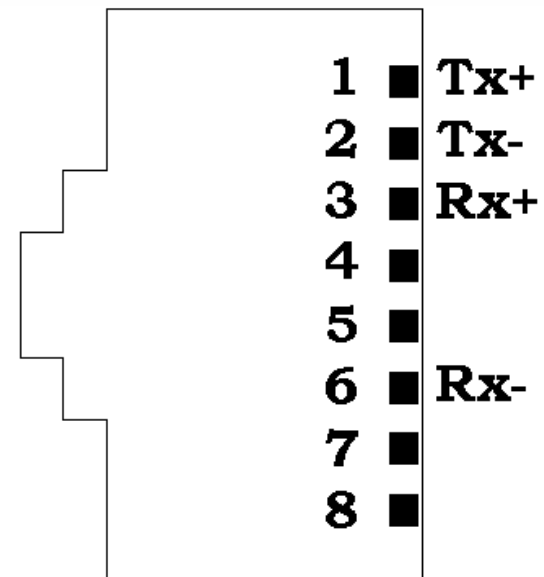
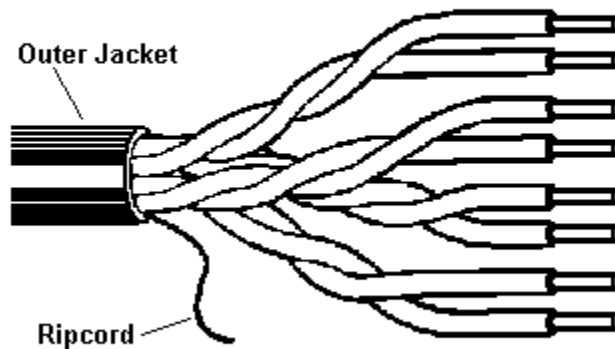
Images from <http://www.mssolutions.co.uk/cabling1.html>; <http://www.redcorp.com/products/06003129.asp>, copyright © RedCorp; and http://www.neticamall.com/C_94.htm.

Ethernet



Cabling

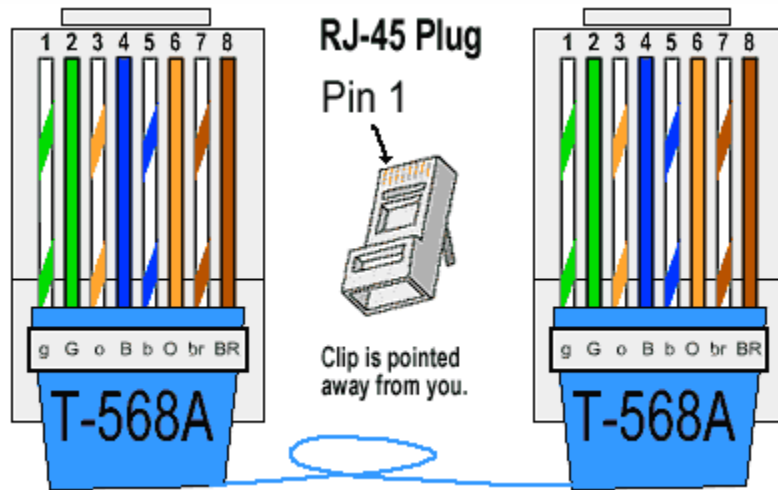
UTP Cable (4-pair)



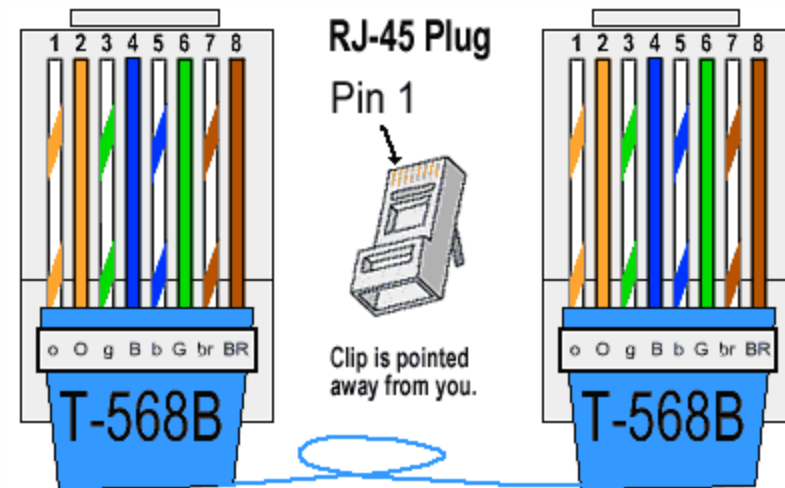
Images from <http://www.techfest.com/networking/lan/ethernet5.htm>, copyright © TechFest.com;
and http://www.it-cabling-solutions.co.uk/html/structured_cabling/systems/ethernet/ethernet.htm.

Ethernet

Cabling



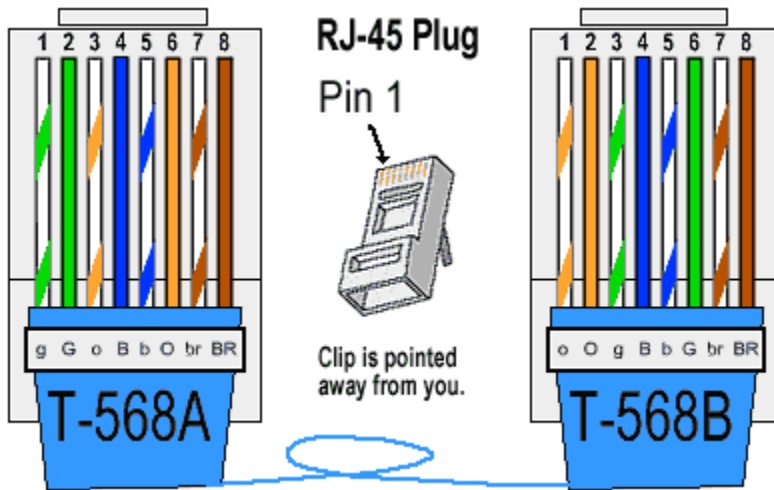
Straight-Through "Patch" Cables



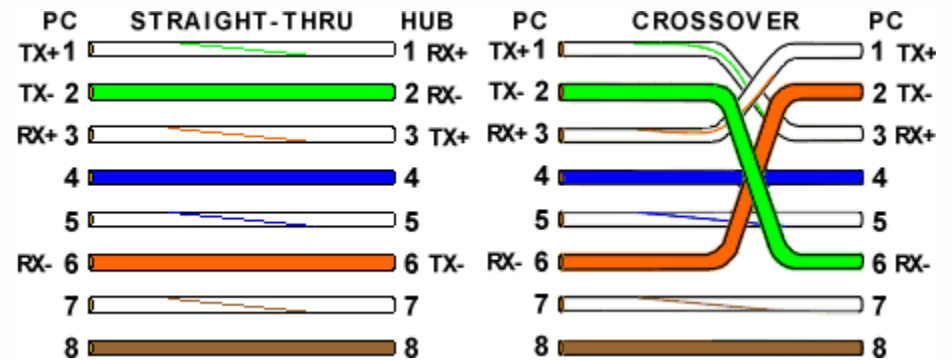
Images from <http://www.incentre.net/incentre/frame/ethernet.html>, copyright © The Internet Centre.

Ethernet

Cabling



Crossover Cables



Images from <http://www.incentre.net/incentre/frame/ethernet.html>, copyright © The Internet Centre.

Ethernet



Cabling

Fiber-Optic Cables

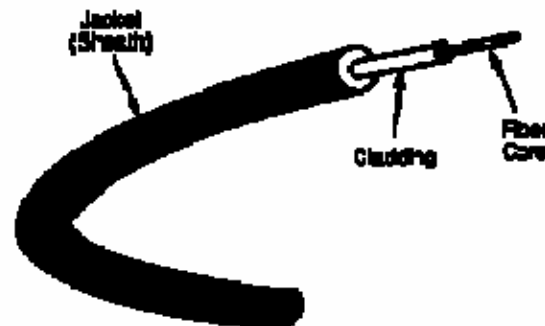


Image from <http://www.delmar.edu/Courses/ITNW2313/ethernet.htm>.

Ethernet



Switches

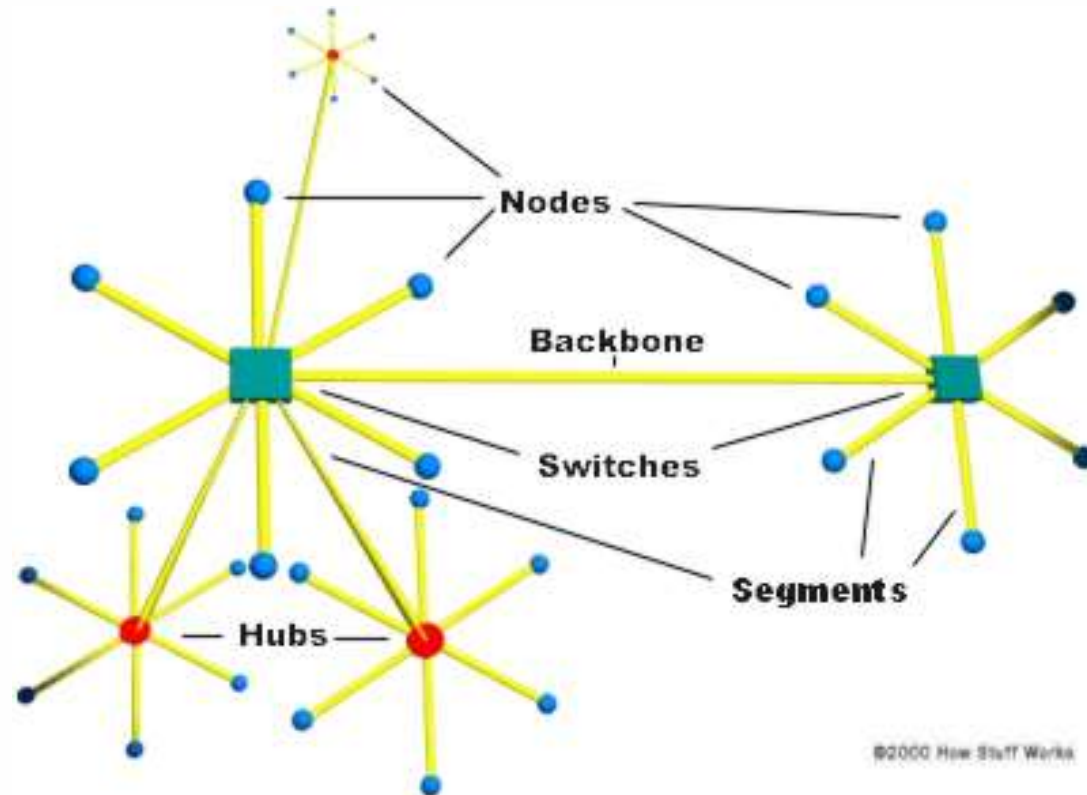


Image from <http://www.howstuffworks.com/lan-switch2.htm>; copyright © How Stuff Works.

Ethernet



Switches

Ethernet Address, Canonical Forms
??-??-??-??-??-??
?:?:?:?:?:?:?:?

where each ? denotes 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, or f

Wireless

IR and RF



Images from <http://www.micro.rrc.ru/palmOS35.asp> and <http://www.almax.com.tw/>.

Wireless

Bluetooth



Images from <http://www.cdw.com>, <http://www.usatoday.com/life/cyber/ccarch/2001-07-11-baig.htm>, and http://darkstar-sifi.co.uk/figures_spawn_22.htm.

Wireless



WiFi



Image from http://www.oreillynet.com/pub/a/wireless/2003/03/21/home_wifi.html.

ISPs



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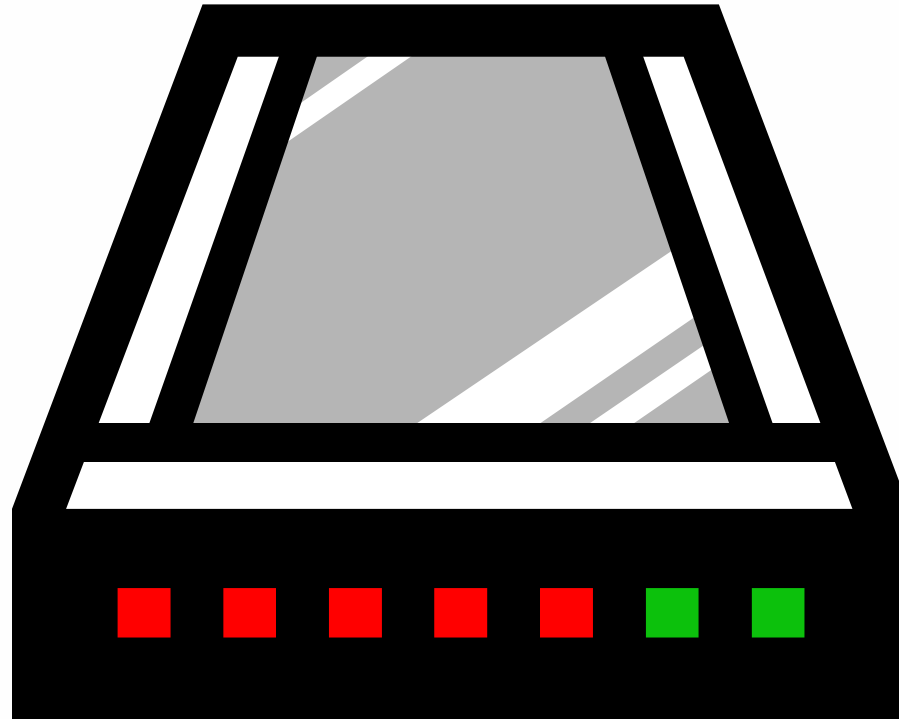
AOL 7.0

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Modems



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