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NEWTON'S TELECOM DICTIONARY

The Official Dictionary of
Telecommunications & the Internet

15th Updated, Expanded and Much Improved Edition

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NEWTON's TELECOM DICTIONARY

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TCP/IP According to Microsoft: Transmission Control Protocol/Internet Protocol (TCP/IP) is a networking protocol that provides communication across interconnected networks, between computers with diverse hardware architectures and various operating systems. TCP (Transmission Control Protocol) and IP (Internet Protocol) are only two protocols in the family of Internet protocols. Over time, however, "TCP/IP" has been used in industry to denote the family of common Internet protocols. The Internet protocols are a result of a Defense Advanced Research Projects Agency (DARPA) research project on network interconnection in the late 1970s. It was mandated on all United States defense long-haul networks in 1983 but was not widely accepted until the integration with 4.2 BSD (Berkeley Software Distribution) UNIX. The popularity of TCP/IP (Harry's note: it's the Internet's networking protocol) is based on:

- Robust client-server framework. TCP/IP is an excellent client-server application platform, especially in wide-area network (WAN) environments.
- Information sharing. Thousands of academic, defense, scientific, and commercial organizations share data, electronic mail and services on the connected Internet using TCP/IP.
- General availability. Implementations of TCP/IP are available on nearly every popular computer operating system. Source code is widely available for many implementations. Additionally, bridge, router and network analyzer vendors all offer support for the TCP/IP protocol family within their products.

TCP/IP is the most complete and accepted networking protocol available. Virtually all modern operating systems offer TCP/IP support, and most large networks rely on TCP/IP for all their network traffic. Microsoft TCP/IP provides cross-platform connectivity and a client-server development framework that many software vendors and corporate developers are using to develop distributed and client-server applications in heterogeneous enterprise networks over TCP/IP.

How TCP Works: TCP is a reliable, connection-oriented protocol. Connection-oriented implies that TCP first establishes a connection between the two systems that intend to exchange data. Since most networks are built on shared media (for example, several systems sharing the same cabling), it is necessary to break chunks of data into manageable pieces so that no two communicating computers monopolize the network. These pieces are called packets. When an application sends a message to TCP for transmission, TCP breaks the message into packets, sized appropriately for the network, and sends them over the network.

Because a single message is often broken into many packets, TCP marks these packets with sequence numbers before sending them. The sequence numbers allow the receiving system to properly reassemble the packets into the original message. Being able to reassemble the original message is not enough, the accuracy of the data must also be verified. TCP does this by computing a checksum. A checksum is a simple mathematical computation applied, by the sender, to the data contained in the TCP packet. The recipient then does the same calculation on the received data and compares the result with the checksum that the sender computed. If the results match, the recipient sends an acknowledgment (ACK). If the results do

header is at the beginning of the packet
other "control" information for TCP.

How IP Works: IP is the messenger protoc
protocol, much simpler than TCP, basic
sends packets. IP relies on three pieces of
you provide, to receive and deliver pack
address, subnet mask, and default gatewa
The IP address identifies your system on t
IP addresses are 32-bit addresses that are
a network. They are generally represented
notation, which separates the four bytes
periods. An IP address looks like this: 102
Although an IP address is a single value, it
pieces of information: (a.) Your system's n
Your system's host (or system) ID.
The subnet mask, also represented in dot
tion, is used to extract these two values fro
The value of the subnet mask is determined
work ID bits of the IP address to ones and
zeros. The result allows TCP/IP to determin
work IDs of the local workstation. Here's how
IP address. For example:
When the IP address is 102.54.94.97 (spec
And the subnet mask is 255.255.0.0 (specif
The network ID is 102.54 (IP address and su
And the host ID is 94.97 (IP address and su
OK, the above was Microsoft's definition. He
which covers some areas Microsoft doesn't.
protocols developed by the Department of De
similar computers across many kinds of net
unreliable ones and ones connected to
TCP/IP is the protocol used on the Internet.
the glue that binds the Internet. Developed in
U.S. Department of Defense's Advanced Re
Agency (DARPA) as a military standard pro
ance of multi vendor connectivity has made i
commercial users as well, who have a
Consequently, TCP/IP now is supported by
turers of minicomputers, personal compute
technical workstations and data communicati
It is also the protocol commonly used over
LANs (as well as X.25) networks. It has been i
everything from PC LANs to minis and mainfr
TCP/IP currently divides networking functio
four layers:
A Network Interface Layer that corresponds to t
and Data Link Layers. This layer manages the e
between a device and the network to which it
routes data between devices on the same netw
An Internet Layer which corresponds to the OS
The Internet Protocol (IP) subset of the TCP/I
this layer. IP provides the addressing needed t
to forward packets across a multiple LAN int
IEEE terms, it provides connectionless data
which means it attempts to deliver every pack
provision for retransmitting lost or damage
leaves such error correction, if required, to hig
tocols, such as TCP.
IP addresses are 32 bits in length and have t