

Terminology

A local area network (LAN) is a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, or an airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic range, and lack of a need for leased telecommunication lines.

Ethernet over unshielded twisted pair cabling, and Wi-Fi are the two most common technologies currently, but ARCNET, Token Ring and many others have been used in the past.

Wide Area Network (WAN) is a computer network that covers a broad area (i.e., any network whose communications links cross metropolitan, regional, or national boundaries). Less formally, a WAN is a network that uses routers and public communications links. The largest and most well-known example of a WAN is the Internet.

WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations. Many WANs are built for one particular organization and are private. Others, built by Internet service providers, provide connections from an organization's LAN to the Internet. WANs are often built using leased lines. At each end of the leased line, a router connects to the LAN on one side and a hub within the WAN on the other. Leased lines can be very expensive. Instead of using leased lines, WANs can also be built using less costly circuit switching or packet switching methods. Network protocols including TCP/IP deliver transport and addressing functions.

Internet Addressing System

An Internet Protocol (IP) address is a numerical identification (logical address) that is assigned to devices participating in a computer network utilizing the Internet Protocol for communication between its nodes. Although IP addresses are stored as binary numbers, they are usually displayed in human-readable notations, such as 192.168.100.1 (for IPv4), and 2001:db8:0:1234:0:567:1:1 (for IPv6). The role of the IP address has been characterized as follows: "A name indicates what we seek. An address indicates where it is. A route indicates how to get there."

The original designers of TCP/IP defined an IP address as a 32-bit number and this system, now named Internet Protocol Version 4 (IPv4), is still in use today. However, due to the enormous growth of the Internet and the resulting depletion of the address space, a new addressing system (IPv6), using 128 bits for the address, was developed.

The Internet Protocol also has the task of routing data packets between networks, and IP addresses specify the locations of the source and destination nodes in the topology of the routing system. For this purpose, some of the bits in an IP address are used to designate a subnetwork. (In CIDR notation, the number of bits used for the subnet follows the IP address. E.g. 192.168.100.1/16) An IP address can be private, for use on a LAN, or public, for use on the Internet or other WAN.

Early specifications intended IP addresses to each be uniquely assigned to a particular computer or device. However, it was found that this was not always necessary as private networks developed and address space needed to be conserved (IPv4 address exhaustion). RFC 1918 specifies private address spaces (also known as non-routable addresses) that may be reused by anyone; today, such private networks typically connect to the Internet through Network Address Translation (NAT). In addition, technologies such as anycast addressing have been developed to allow multiple hosts at the same IP address but in different portions of the Internet to service requests by network clients.

The Internet Assigned Numbers Authority (IANA) manages the global IP address space. IANA works in cooperation with five Regional Internet Registries (RIRs) to allocate IP address blocks to Local Internet Registries (Internet service providers) and other entities.

A gateway is a network point that acts as an entrance to another network. Gateways that connect two IP-based networks, have two IP addresses, one on each network. A gateway address like 192.168.1.1 is a Private address, and is the address to which traffic is sent from the LAN. The other IP address is the Wide Area Network address, this is the address to which traffic is sent coming from the WAN. When this is the Internet, that address is usually assigned by an ISP. When talking about the gateway IP address, commonly the LAN-address of the gateway is meant. If private addressing is used then the addresses of computers connected to the LAN are hidden behind the WAN gateway. That is, remote computers located "out there" on the WAN can only communicate with LAN stations via the gateway's WAN IP address. To regulate traffic between the WAN and the LAN, the gateway commonly performs Network Address Translation (NAT), presenting all of the LAN traffic to the WAN as coming from the gateway's WAN IP address and doing packet sorting and distribution of return WAN traffic to the local network.

Dynamic Host Configuration Protocol (DHCP)

Dynamic Host Configuration Protocol (DHCP) is a protocol used by networked devices (clients) to obtain the parameters necessary for operation in an Internet Protocol network. This protocol reduces system administration workload, allowing devices to be added to the network with little or no manual configuration. Dynamic Host Configuration Protocol is a way to manage network parameter assignment from a single DHCP server, or a group of DHCP servers arranged in a fault-tolerant manner. Even in small networks, Dynamic Host Configuration Protocol is useful because it can make it easy to add new machines to the local network.

Command Prompt Commands

ipconfig	displays all current TCP/IP network configuration values
ipconfig /all	displays the full TCP/IP configuration for all adapters
Ping <ip address> or ping <hostname>	Ping is a computer network tool used to test whether a particular host is reachable across an IP network
tracert <ip address> or tracert <hostname>	tracert is a computer network tool used to determine the route taken by packets across an IP network
netstat	netstat (network statistics) is a command-line tool that displays network connections (both incoming and outgoing), routing tables, and a number of network interface statistics.

World wide web

The World Wide Web (commonly shortened to the Web) is a system of interlinked hypertext documents accessed via the Internet. With a Web browser, one can view Web pages that may contain text, images, videos, and other multimedia and navigate between them using hyperlinks. The World Wide Web was created in 1989 by British scientist Tim Berners-Lee, working at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, and released in 1992. Since then, Berners-Lee has played an active role in guiding the development of Web standards (such as the markup languages in which Web pages are composed), and in recent years has advocated his vision of a Semantic Web.

How it works

Viewing a Web page on the World Wide Web normally begins either by typing the URL of the page into a Web browser, or by following a hyperlink to that page or resource. The Web browser then initiates a series of communication messages, behind the scenes, in order to fetch and display it.

First, the server-name portion of the URL is resolved into an IP address using the global, distributed Internet database known as the domain name system, or DNS. This IP address is necessary to contact and send data packets to the Web server.

The browser then requests the resource by sending an HTTP request to the Web server at that particular address. In the case of a typical Web page, the HTML text of the page is requested first and parsed immediately by the Web browser, which will then make additional requests for images and any other files that form a part of the page. Statistics measuring a website's popularity are usually based on the number of 'page views' or associated server 'hits', or file requests, which take place.

Having received the required files from the Web server, the browser then renders the page onto the screen as specified by its HTML, CSS, and other Web languages. Any images and other resources are incorporated to produce the on-screen Web page that the user sees.

Most Web pages will themselves contain hyperlinks to other related pages and perhaps to downloads, source documents, definitions and other Web resources. Such a collection of useful, related resources, interconnected via hypertext links, is what was dubbed a "web" of information.

Internet Protocols

Internet Protocols (set of instructions) are used to transfer files or data from one machine to the other. All computers on the Internet communicate with each other using the Transmission Control Protocol / Internet Protocol (TCP/IP). Thus, data is sent from the server to the client (and vice-versa) using TCP/IP.

Typically, the client is your browser and the server is a program running on a different computer. You use the browser on your computer (called the client machine in Internet lingo) to access the information on another computer (called the server machine). This server machine can be located thousands of miles from your workplace.

The File Transfer Protocol (FTP)

The File Transfer Protocol is an excellent method to transfer (download and send) files from one computer to the other on the Internet. Though you can transfer files using email, it is not a good choice especially when the file size is large or when you need to transfer several files.

The HTTP - HyperText Transfer Protocol

The HTTP provides a set of instructions for accurate information exchange. The communication between the client (your browser) and the server (a software located on a remote computer) involves requests sent by the client and responses from the server.

Detailed article on the HTTP Protocol

The email Protocol

Email is the most used application on the Internet. Emails allow users to communicate with each other almost instantly. Each email message consists of a header and a body. The header contains the following information:

Recipient email address

Senders email address

Email address of the people to whom a carbon copy (Cc) and blind carbon copy (Bcc) has been sent.

The subject line

The main text message resides in the email body.

Incoming Mail Server Protocols

In computing, local e-mail clients use the Post Office Protocol version 3 (POP3), an application-layer Internet standard protocol, to retrieve e-mail from a remote server over a TCP/IP connection. POP3 and IMAP4 (Internet Message Access Protocol) are the two most prevalent Internet standard protocols for e-mail retrieval. Virtually all modern e-mail clients and servers support both.

Outgoing Mail Server Protocol

Simple Mail Transfer Protocol (SMTP) is a de facto standard for electronic mail (e-mail) transmissions across the Internet.

E-mail address

An e-mail address identifies a location to which e-mail messages can be delivered. An e-mail address on the modern Internet looks like, for example, `jsmith@example.com` and is usually read as "jsmith at example dot com".

E-mail addresses, such as `jsmith@example.com`, have two parts. The part before the @ sign is the local-part of the address, often the username of the recipient, and the part after the @ sign is the domain which is a hostname where the e-mail will be sent.

Uniform Resource Locator

In computing, a Uniform Resource Locator (URL) is a Uniform Resource Identifier (URI) which also specifies where the identified resource is available and the protocol for retrieving it. In popular usage and in many technical documents it is often confused as a synonym for uniform resource identifier.

Every URL begins with the scheme name that defines its namespace, purpose, and the syntax of the remaining part of the URL. Most Web-enabled programs will try to dereference a URL according to the semantics of its scheme and a context-vbn. For example, a Web browser will usually dereference the URL `http://example.org/` by performing an HTTP request to the host `example.org`, at the default HTTP port (port 80). Dereferencing the URL `mailto:bob@example.com` will usually start an e-mail composer with the address `bob@example.com` in the To field.

`example.com` is a domain name; an IP address or other network address might be used instead. In addition, URLs that specify `https` as a scheme (such as `https://example.com/`) normally denote a secure website.

The hostname portion of a URL, if present, is case insensitive (since the DNS is specified to ignore case); other parts are not required to be, but may be treated as case insensitive by some clients and servers.