

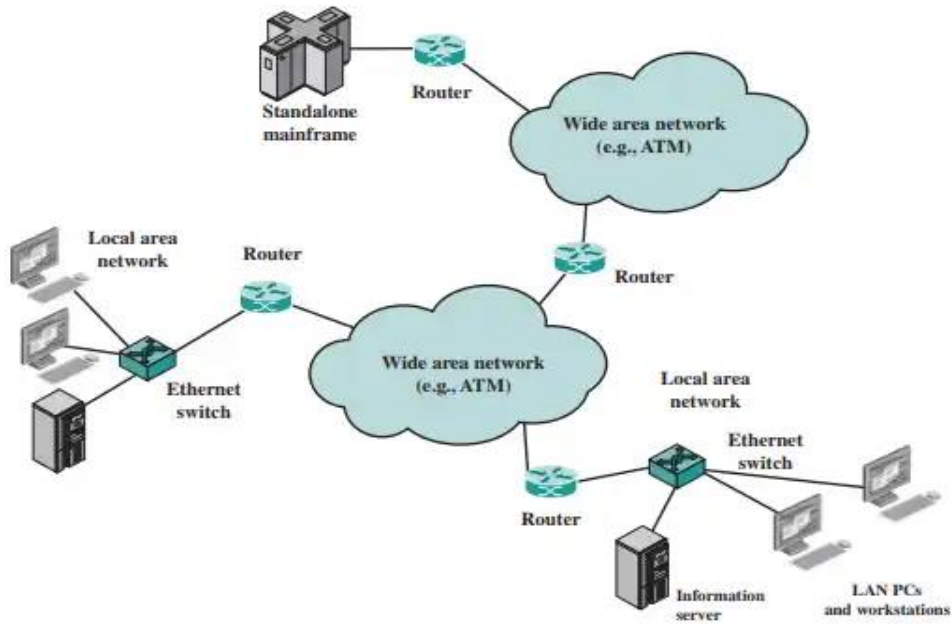
The Internet

Origins of the Internet

The Internet evolved from the ARPANET, which was developed in 1969 by the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense. It was the first operational packet-switching network. ARPANET began operations in four locations. Today the number of hosts is in the hundreds of millions, the number of users in the billions, and the number of countries participating nearing 200. The number of connections to the Internet continues to grow exponentially. The network was so successful that ARPA applied the same packet-switching technology to tactical radio communication (packet radio) and to satellite communication (SATNET). Because the three networks operated in very different communication environments, the appropriate values for certain parameters, such as maximum packet size, were different in each case. Faced with the dilemma of integrating these networks, Vint Cerf and Bob Kahn of ARPA developed methods and protocols for internetworking—that is, communicating across arbitrary, multiple, packet-switched networks. They published a very influential paper in May 1974 [CERF74] outlining their approach to a Transmission Control Protocol. The proposal was refined and details filled in by the ARPANET community, with major contributions from participants from European networks eventually leading to the TCP (Transmission Control Protocol) and IP (Internet Protocol) protocols, which, in turn, formed the basis for what eventually became the TCP/IP protocol suite. This provided the foundation for the Internet.

Key Elements

The purpose of the Internet, of course, is to interconnect end systems, called hosts; these include PCs, workstations, servers, mainframes, and so on. Most hosts that use the Internet are connected to a network, such as a local area network or a wide area network (WAN). These networks are in turn connected by routers. Each router attaches to two or more networks. Some hosts, such as mainframes or servers, connect directly to a router rather than through a network. In essence, the Internet operates as follows. A host may send data to another host anywhere on the Internet. The source host breaks the data to be sent into a sequence of packets, called IP datagrams or IP packets. Each packet includes a unique numeric address of the destination host. This address is referred to as an IP address, because the address is carried in an IP packet. Based on this destination address, each packet travels through a series of routers and networks from source to destination. Each router, as it receives a packet, makes a routing decision and forwards the packet along its way to the destination.



Internet Architecture

The Internet today is made up of thousands of overlapping hierarchical networks. Because of this, it is not practical to attempt a detailed description of the exact architecture or topology of the Internet. Today, computers come in many forms, including mobile phones and even cars. All of these forms can be hosts on the Internet. Hosts are sometimes grouped together in a LAN. This is the typical configuration in a corporate environment. Individual hosts and LANs are connected to an Internet service provider (ISP) through a point of presence (POP). The connection is made in a series of steps starting with the customer premises equipment (CPE). The CPE is the communications equipment located onsite with the host.

