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TCP / IP is an abbreviation of the term Transmission Control Protocol / Internet Protocol. In computer network terminology, a protocol is a pre-agreed standard that allows two computers to exchange data. In fact, TCP / IP is not one protocol, but several. That is why you often hear how it is called a set, or a set of protocols, among which TCP and IP are the two main ones.

The software for TCP / IP on your computer is a platform-specific implementation of TCP, IP and other members of the TCP / IP family. Usually, it also has such high-level applications as FTP (File Transfer Protocol, File Transfer Protocol), which make it possible to control file exchange over the network via the command line.

TCP / IP - originated as a result of research funded by the US Government Advanced Research Project Agency (ARPA) in the 1970s. This protocol was developed so that the computing networks of research centers around the world can be combined in the form of a virtual "network of networks" (internetwork). The original Internet was created by converting an existing conglomerate of computer networks called ARPAnet using TCP / IP.

The reason TCP / IP is so important today is because it allows independent networks to connect to the Internet or to join together to create private intranets. The computing networks that make up the intranet are physically connected through devices called routers or IP routers. A router is a computer that transmits data packets from one network to another. In a TCP / IP-based intranet, information is transmitted in the form of discrete blocks called IP packets or IP datagrams. Thanks to the TCP / IP software, all computers connected to the computer network become "close relatives". Essentially, it hides the routers and the underlying network architecture and makes it all look like one big network. Just as Ethernet connections are recognized by 48-bit Ethernet identifiers, intranet connections are identified by 32-bit IP addresses, which we express as decimal numbers separated by periods (for example, 128.10.2.3). By taking the IP address of a remote computer, a computer on the intranet or on the Internet can send data to it as if it were part of the same physical network.

TCP / IP provides a solution to the problem of data between two computers that are connected to the same intranet but belong to different physical networks. The solution consists of several parts, with each member of the TCP / IP protocol family contributing to the common cause. IP - the most fundamental protocol from the TCP / IP suite - transmits

IP datagrams over the intranet and performs an important function called routing, in fact it is the choice of the route that the datagram will follow from point A to point B, and the use of routers for "jumping "between networks.

TCP is a higher-level protocol that allows applications running on various network hosts to exchange data streams. TCP divides data streams into chains, called TCP segments, and transmits them using IP. In most cases, each TCP segment is forwarded in one IP datagram. However, if necessary, TCP will split the segments into several IP datagrams that fit into the physical data frames that are used to transfer information between computers on the network. Since IP does not guarantee that datagrams will be received in the same sequence in which they were sent, TCP reassembles the TCP segments at the other end of the route to form a continuous stream of data. FTP and telnet are two examples of popular TCP / IP applications that rely on TCP.

Another important member of the TCP / IP suite is the User Datagram Protocol (UDP, which is similar to TCP but more primitive. TCP is a "reliable" protocol because it provides error checking and confirmation messages to ensure that data reaches its destination without distortion. UDP is an "unreliable" protocol because it does not guarantee that datagrams will arrive in the order in which they were sent, or even that they will arrive at all. If reliability is a desirable condition, software will be required to implement it. But UDP still takes its place in the world of TCP / IP, and is used in many programs. The SNMP (Simple Network Management Protocol) application, implemented in many TCP / IP implementations, is one example of UDP programs.

Other TCP / IP protocols play less noticeable, but in equal

Brief Description of the TCP / IP Protocol Family Abbreviations

ARP (Address Resolution Protocol): Converts 32-bit IP addresses to physical network addresses, such as 48-bit Ethernet addresses.

FTP (File Transfer Protocol): allows you to transfer files from one computer to another using TCP connections. In a related but less common file transfer protocol - Trivial File Transfer Protocol (TFTP) - UDP is used to transfer files, not TCP.

ICMP (Internet Control Message Protocol): allows IP routers to send error messages and control information to other IP routers and host computers on the network. ICMP messages travel in the form of IP datagram data fields and must be implemented in all IP variants.

IGMP (Internet Group Management Protocol): allows IP datagrams to be distributed in a circular mode (multicast) among computers that belong to the corresponding groups.

IP (Internet Protocol): A low-level protocol that routes data packets over separate networks connected together using routers to form the Internet or intranet. Data travels in the form of packets called IP datagrams.

RARP (Reverse Address Resolution Protocol): Converts physical network addresses to IP addresses.

SMTP (Simple Mail Transfer Protocol): defines the message format that an SMTP client running on one computer can use to forward email to an SMTP server running on another computer.

TCP (Transmission Control Protocol): The protocol is oriented to work with connections and transmits data in the form of byte streams. Data is sent in packets - TCP segments - which consist of TCP headers and data. TCP is a "reliable" protocol because it uses checksums to verify data integrity and send acknowledgments to ensure that the transmitted data is received without distortion.

UDP (User Datagram Protocol): A connection-independent protocol that transmits data in packets called UDP datagrams. UDP is an "unreliable" protocol because the sender does not receive information indicating whether the datagram was actually received.

TCP / IP Architecture

TCP/IP Protocol Stack

