

Chapter 3

Introduction of Individual Technology to Constitute the Current Internet

INDIVIDUAL TECHNOLOGY AS THE COMPONENT OF THE INTERNET

TCP/IP

The Internet system is constructed as one big network in the form of small networks connecting mutually. Consequently, the big network is formed by putting small subnetworks together. In this way, the Internet system becomes a hierarchical structure. The network which is built by LANs being connected to each other is usually called wide area network (WAN). The biggest range of the WAN is the Internet. On the Internet, the various computers perform mutual data communication. As a rule for communication, the TCP/IP is used. The TCP/IP is a standard protocol used on the Internet. The explanation is explained on page 17 in detail. The rule for data communication is generally called communication protocol, and the TCP/IP is an example. Since the TCP/IP is adopted with various computers, communication is enabled regardless of the kind of the computer and network line. The Internet originated from the ARPANET. The ARPANET is the WAN which was built by connecting the plural physical networks. ARPANET, too, used TCP/IP communications.

In the following, a communication protocol is explained simply. A communication protocol is the constant rule about the exchanges of data on a network. In the communications between computers, the communication protocol is used by all means. The TCP/IP plays a key role. The network is built by inserting communication protocols collected in the TCP/IP. In a

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computer network, these devices are connected on the network line. Through the network line, data are transmitted and received. To prevent an error during this process, the connection method and the delivery method of the data are decided beforehand as a promise. This promise is the communication protocol. When an early network was created, each computer company developed the original communication protocol and realized the communication with the computer. There was not the idea of standardizing a communication protocol in each computer company. For example, the system network architecture (SNA) was announced in 1974 by IBM. In addition, an original communication protocol was announced by other companies. However, it was impossible to connect networks using those different communication protocols and perform data communications. Therefore, the TCP/IP was developed as the standard protocol. As a result, it became possible to perform data communication freely, even if the different networks were connected to each other. Beyond the TCP/IP, a great deal of communication protocols are available. These protocols are determined as request for comment (RFC) documents; some examples are AppleTalk, SNA, NetBEUI, and NetWare (IPX/SPX).

In the following, the contents of the TCP/IP are illustrated. The TCP/IP is the communication protocol which is realized by putting the Transmission Control Protocol (TCP) and the Internet Protocol (IP) together. In other words, the TCP/IP is not a single protocol, but an aggregate of plural communication protocols. The TCP/IP is used in various networks, such as the Internet system, the WAN, and the LAN. This TCP/IP is often explained by the open systems interconnection (OSI) reference model. The OSI reference model consists of seven hierarchies: (1) physical layer, (2) data link layer, (3) network layer, (4) transport layer, (5) session layer, (6) presentation layer, and (7) application layer, as they are displayed. When the software for the network sends the data to the network software on the guard side, the process is characterized as follows. The network software, which is located in the application layer, hands data to the presentation layer, that is a low-ranking layer. Subsequently, the data are carried to the lower layer in turn. The data are sent from the physical layer of the bottom layer to the network line. The data which reached the computer of the counterpart are sent from the network line to the physical layer of the bottom layer. Then, the data are carried to the upper layer in turn. The data are handed to the application layer of the top layer and are finally handed to the network software. In this way, the data communication in the network is carried out through each layer. In addition to the OSI reference model, there is the TCP/IP model. The TCP/IP model is often used to explain the content of the network communication. The TCP/IP model consists of four layers:

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