

Switch

In a telecommunications network, a switch is a device that channels incoming data from any of multiple input ports to the specific output port that will take the data toward its intended destination. In the traditional circuit-switched telephone network, one or more switches are used to set up a dedicated though temporary connection or circuit for an exchange between two or more parties. On an Ethernet local area network (LAN), a switch determines from the physical device (Media Access Control or MAC) address in each incoming message frame which output port to forward it to and out of. In a wide area packet-switched network such as the Internet, a switch determines from the IP address in each packet which output port to use for the next part of its trip to the intended destination. In the Open Systems Interconnection (OSI) communications model, a switch performs the Layer 2 or Data-link layer function. That is, it simply looks at each packet or data unit and determines from a physical address (the "MAC address") which device a data unit is intended for and switches it out toward that device. However, in wide area networks such as the Internet, the destination address requires a look-up in a routing table by a device known as a router. Some newer switches also perform routing functions (Layer 3 or the Network layer functions in OSI) and are sometimes called IP switches. On larger networks, the trip from one switch point to another in the network is called a hop. The time a switch takes to figure out where to forward a data unit is called its latency. The price paid for having the flexibility that switches provide in a network is this latency. Switches are found at the backbone and gateway levels of a network where one network connects with another and at the subnetwork level where data is being forwarded close to its destination or origin. The former are often known as core switches and the latter as desktop switches. In the simplest networks, a switch is not required for messages that are sent and received within the network. For example, a local area network may be organized in a token ring or bus arrangement in which each possible destination inspects each message and reads any message with its address.

Circuit-Switching version Packet-Switching A network's paths can be used exclusively for a certain duration by two or more parties and then switched for use to another set of parties.

This type of “switching” is known as circuit-switching and is really a dedicated and continuously connected path for its duration. Today, an ordinary voice phone call generally uses circuit-switching. Most data today is sent, using digital signals, over networks that use packet-switching. Using packet-switching, all network users can share the same paths at the same time and the particular route a data unit travels can be varied as conditions change. In packet-switching, a message is divided into packets, which are units of a certain number of bytes. The network addresses of the sender and of the destination are added to the packet. Each network point looks at the packet to see where to send it next. Packets in the same message may travel different routes and may not arrive in the same order that they were sent. At the destination, the packets in a message are collected and reassembled into the original message.



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