



Ethernet Switches Tutorial

■ What is an Ethernet Switch?

An Ethernet switch is a device used to connect multiple PCs, servers, laptops or other Ethernet IP enabled devices such as IP cameras to a Local Area Network (LAN). Most switches feature 10/100 Mega bit per second RJ45 ports although many newer switch designs now offer 10/100/1000 triple speed ports that provide up to 1 Gigabit per second access. The switch uses a MAC address table to keep track of where PCs, servers or other connected devices are located. Each device has a unique MAC (Media Access Control) address “burned”

into the hardware. For example; if a PC on port one needs to “talk” to a file server, the switch will look at its MAC address table and determine which port the file server is located on and send the PCs data to that port. This relieves network congestion. The older hub technology used a shared communication method where all requests were sent to all ports of the hub causing latency.

■ How is an Ethernet Switch used?

Ethernet switches typically utilize RJ45 ports for UTP or STP connectivity to PCs, servers, routers etc. Many switches also feature high

speed uplink ports where modules can be purchased to connect fiber optic or UTP cabling supporting speeds of 1 Gigabit per second or more. Cables are used to plug into the ports on the switch and then into the Ethernet device (PC, router etc.) on the other end.

■ Where are Ethernet Switches used?

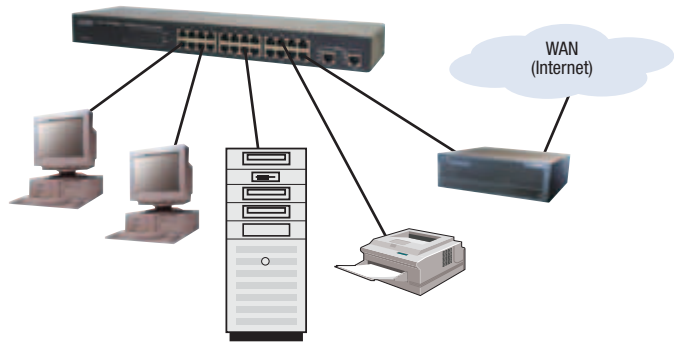
Ethernet switches are utilized everywhere from Small Office/Home Office (SOHO) environments to major ISPs (Internet Service Providers) to military installations. Ethernet switches are used for both industrial and commercial applications.

What is Ethernet?

In the early 1980s, Digital Equipment Corporation, Intel, and Xerox developed the Ethernet Local Area Networking format. This technology was soon accepted by the IEEE Committee, creating the 802.3 standard. This standard dictates the use of CSMA/CD (Carrier Sense Multiple Access with Collision Detection) as its accessing scheme. Local Area Networks (LANs) use a variety of NICs (Network Interface Cards), hubs, transceivers, converters, repeaters & switches, as well as different types of transmission media (copper and fiber) for carrying signals.

Accessing Scheme:	CSMA/CD - Carrier sense multiple access with Collision Detection.
Speed:	10 Mbps/100 Mbps/1000 Mbps (1 Gbps).
Network Architecture:	Bus, Star, Ring, Hybrid

The diagram below shows a typical Ethernet Switch application



In the diagram above you can see that Ethernet switches are used for sharing resources such as printers, networked file servers and router connection to the Internet or Wide Area Network (WAN).

Managed and Unmanaged

Unmanaged Ethernet switches, typically referred to as “plug and play”, are easy to install but do not provide port level statics, management and control that is often required in larger networks where many switches are installed. Managed switches typically feature an SNMP agent that allows port level control and statistics such as collisions, packets in, packet out etc. Some Managed switches also feature filters where only certain devices, PCs etc. are allowed to communicate on a certain port of the switch. By using managed switches a network administrator can see if a port may be malfunctioning and sending bad packets onto the network and shut that port off so the whole network does not go down.

Industrial Ethernet Switches

There is a class of Ethernet Switches referred to as Industrial Ethernet switches which are designed to work in harsh environments where extreme temperatures, vibration, dust and moisture are present. These Industrial rated switches generally have no moving parts such as fans and utilize components that are designed for extreme temperatures etc. In very moist environments or areas where condensation is present a conformal coating is sometimes used to cover the entire PCB to protect the components. Typical installations for Industrial Ethernet switches include manufacturing facilities, mining, oil production, power plants, waste water treatment plants and any other application where environmental extremes exist.

Connectors Commonly Used in Ethernet Environments

