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CTEC 415

How to Internet/Network Guide

The internet is the world’s largest network. It connects various local area network (LAN), or networks within a limited geographical region such as a building, and wide area networks(WAN), or networks within a large geographical region such as a city, and allows communication and the sharing of resources between them.

Internet

WAN

WAN

LAN

LAN

LAN

LAN

LAN

In general, a network consists of hosts, routers, and switches. Hosts can be broken down to clients and servers. Servers are computers or devices on a network that provide resources while clients are computers or devices on a network that access resources. Routers and switches provide the connection and delivery of data on a network between hosts.

Client

Client

Client

Client

Server

Server

Switch

Switch

Router

The transmission of data across networks is controlled by various factors. The physical medium and protocols are the two main factors that affect data transmission. The various types of physical mediums include digital subscriber lines (DSL), cable internet, and fiber optics or fiber to the home. DSL is an older technology that was used to transmit data over telephone lines. Cable internet uses the same infrastructure as cable television to provide internet access. Fiber to the home utilizes fiber optics wired from a central point to individual buildings to provide internet access. Wireless networks operate by using a wireless access point, usually combined with a router, to connect wireless devices to the physical network through radio frequencies.

Protocols are standardized rules that control certain aspects of computation. The most widely used networking protocol is the Transmission Control Protocol/Internet Protocol (TCP/IP). This protocol lists the rules for establishing a connection between two hosts and how the data should be transmitted. Data is transmitted over networks as packets, broken down pieces of a whole message. TCP then determines what information needs to be added to those packets to properly deliver them to their destination. The IP portion of the protocol determines the “address” of the sender and destination. Once the packets have been received, TCP also controls how those packets are reassembled to form the complete message.

Another function of routers lies within the directing of packets across a network. Routers determine the best route or path, the various stops that a packet will travel to reach its destination, for a packet. A packet will travel router to router until it reaches the destination and is reassembled into the whole message. The routers that packets travel across are typically edge routers, routers that exist at the edge of a network and connect the network to the internet.

Packet path

LAN

Edge Router

Edge Router

LAN

LAN

LAN

Edge Router

Edge Router

Edge Router

LAN

On a network, bandwidth is the maximum amount of data that can be transmitted at once. The bit rate of a network is how much data is transmitted over that bandwidth in a measured amount of time. The latency of the network is the delay between a user sending data and the time it takes to respond.

10ms latency

5ms to deliver packets

5ms to deliver packets

Device

Device

600 Megabits sent over 1 minute = 10 Megabits per second (Mbps) bit rate

Bandwidth

Actually Sent Data

Actually Sent Data