Networking Essay, Research Paper

networking

Ever since the days of the Pony Express, people have looked to getting

information, whether personal or business, to its intended receiver as soon as

possible. The computer has evolved as a communications super-tool, enabling

people to do just that. Networking has given individuals the power to transfer

ideas, reports, and files quickly and efficiently. Networks also grant the power

to business professionals and families to conference with voice and video from

their individual offices or homes. These abilities have made networking

invaluable to many people in many different areas; however, networking can be

limited to a small geographic region or even a single building and still have

tremendous benefits. A Local Area Network (LAN) is a network of interconnected

workstations sharing the resources of a single processor or server within a

relatively small geographic area. LANs can be found in offices, schools,

throughout whole buildings, and even dispersed throughout several buildings.

Throughout these local networks, people are able to share files of information,

communicate, and connect different departments to maximize efficiency. A LAN is

comprised of several pieces of hardware that enable connectivity of the network;

these include network interface cards, servers, bridges, repeaters, and hubs. A

LAN can be comprised of all of these parts and more, but can also be constructed

of less hardware. The hardware components of a specific network depend on the

needs of the network. A network interface card physically connects a computer to

a transmission medium used on a network and controls the flow of information

from the computer to the network. A network interface card has its own unique

hardware address that is embedded upon its manufacturing. The hardware address

is used to identify each NIC when information is being sent or received over a

network. These cards are installed directly into the expansions slots of a

computer and in the case of portable computers require a specialized device

called a network adapter. Network interface cards have ports that are used to

connect the card to the transmission medium used throughout the network.

Different types of cards are designed to accept a certain type of transmission

medium or network cable, which in turn determines the amount of information and

the speed at which that information can be sent. The NIC also contains a

transceiver, which converts the computer output signal into a signal that can be

transmitted over cable. In some instances a network interface card may also

contain a boot chip, which enables a drive-less computer to access a network.

Different cards are designed for different purposes, one type of card can be

used by a client workstation solely to connect that computer to a network, while

others are used by network servers that are specifically designed to transfer

large amounts of information. A hub is a device used to concentrate and organize

network wiring. There are two basic types of hubs, active and passive. A passive

hub is simply a device that allows wiring connections in an orderly way. It

requires no power, and does no processing or regeneration of the traffic coming

through it. Another type of hub is an active hub, which contains circuitry that

can filter, amplify and control the traffic going through it. Hubs may also

contain additional utilities, such as bridging, manageability, and repeaters.

Active hubs are based on an extension of the network repeater. It does this by

accepting network traffic on its input side, and then amplifying the signal on

its output, allowing it to travel farther. A hub is a multi-port repeater.

Physically, it appears as a box with one input port and a number of output ports

that are typically wired to end-user workstation connections, although servers

and other devices can be attached as well. Signals on any port are transmitted

to all the other ports. Although a basic hub provides a way to organize cable

wiring, it does not segment or organize network traffic in any way. Hubs are

used in the design and implementation of a coherent and easily managed network

cabling system. In a typical design, a company may run cabling from a wall plate

in each user’s cubicle to a central wiring closet on each floor of the building.

These cables, known as station drops are each connected to a port on the wiring

hub. The hubs on each floor are then connected to the network backbone, which

runs from floor to floor in each wiring closet. This divides the network into

logical and physical groupings that simplifies troubleshooting and network

growth. Because of the signal boosting performed by the hub, it can also extend

the physical scope of the network. A recent innovation is the concept of the

switching hub. A switching hub basically bridges the output as well as the input

ports on the hub. With this arrangement, traffic from a port will not pass to

the hub unless it needs to access a different port than it came in on. If it

needs to pass across the hub to reach its destination, it only passes between

the two ports it needs, and is isolated from the rest of the ports. This cuts

down unnecessary traffic on all network segments attached to the hub, improving

the capacity and speed of the network. A bridge is used to interconnect two or

more similar LANs or to divide a large network into smaller more manageable

ones. Splitting of a large network with a bridge increases the efficiency of the

network and reduces the chances of an overload. A bridge is able to increase

effectiveness of two connected networks because it only passes information is

bound for the "far side" of the bridge if necessary. There are two

types of bridges, simple and learning. A simple bridge receives packets of

information and retransmits them to all ports until that packet reaches the

correct one. A learning bridge reads, stores, and learns the addresses of each

computer on the network. The learning bridge then constructs a table to

efficiently route packets to the correct port, without wasting resources sending

each packet to every port. If a packet comes through the bridge intended for a

destination not recorded on the bridging table, the bridge sends the packet out

to all ports and records the accepting destination. A repeater is a device that

extends the length of transmission media over which network information is

passed. A repeater accepts network input, amplifies the signal, and retransmits

the information. Repeaters are especially useful when a network is cabled

throughout a large building, over several floors. They are also able to filter

out interference or distortion before retransmission, but are unable to operate

efficiently when attempting to transfer huge amounts of information. A repeater

is a simple device contained in a stand alone box or within a hub

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