

Internet and Web Principal

Week 2

How network create Internet

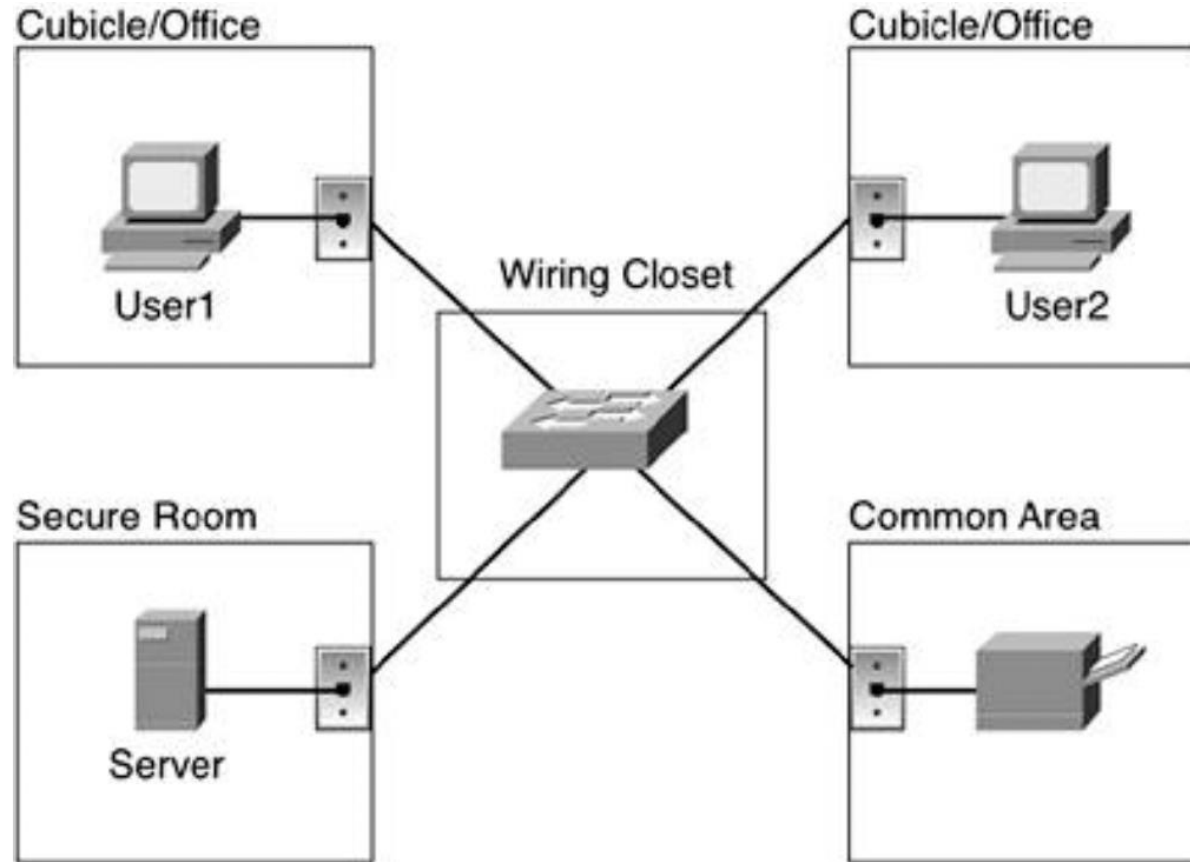
Content

1. Local Area Network
2. Wide Area Network
3. Networking Device
4. How Packet moving
5. TCP/IP

Local Area Network

- Network
 - network is a combination of hardware, software, and cabling that allows 2 or more computing devices to communicate with each other
- Local Area Network
 - LAN is a network that cover communication of computing devices locally, usually in the same location with a not too wide area

Local Area Network

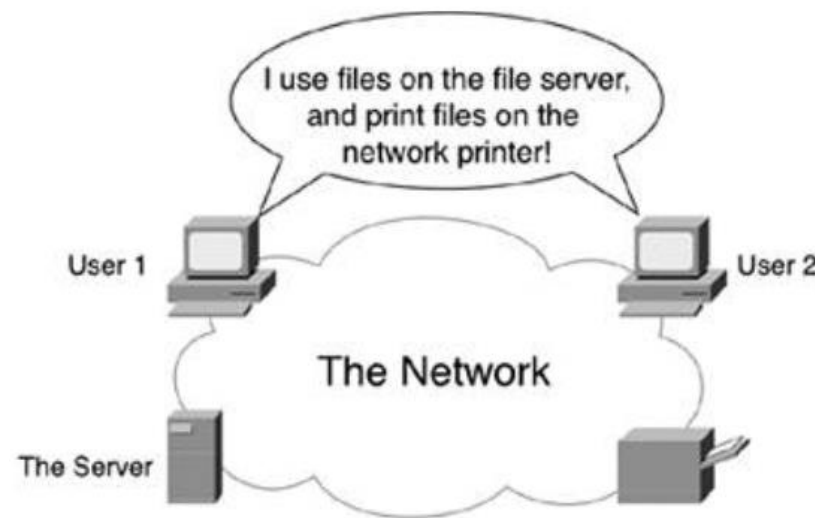


Local Area Network

the use of local area networks today is more intended to share devices that are used together, such as:

- Printer Sharing
- Scanner Sharing
- Screen Cast
- IP PABX
- etc

Figure 1-1. Simple Single Site Network

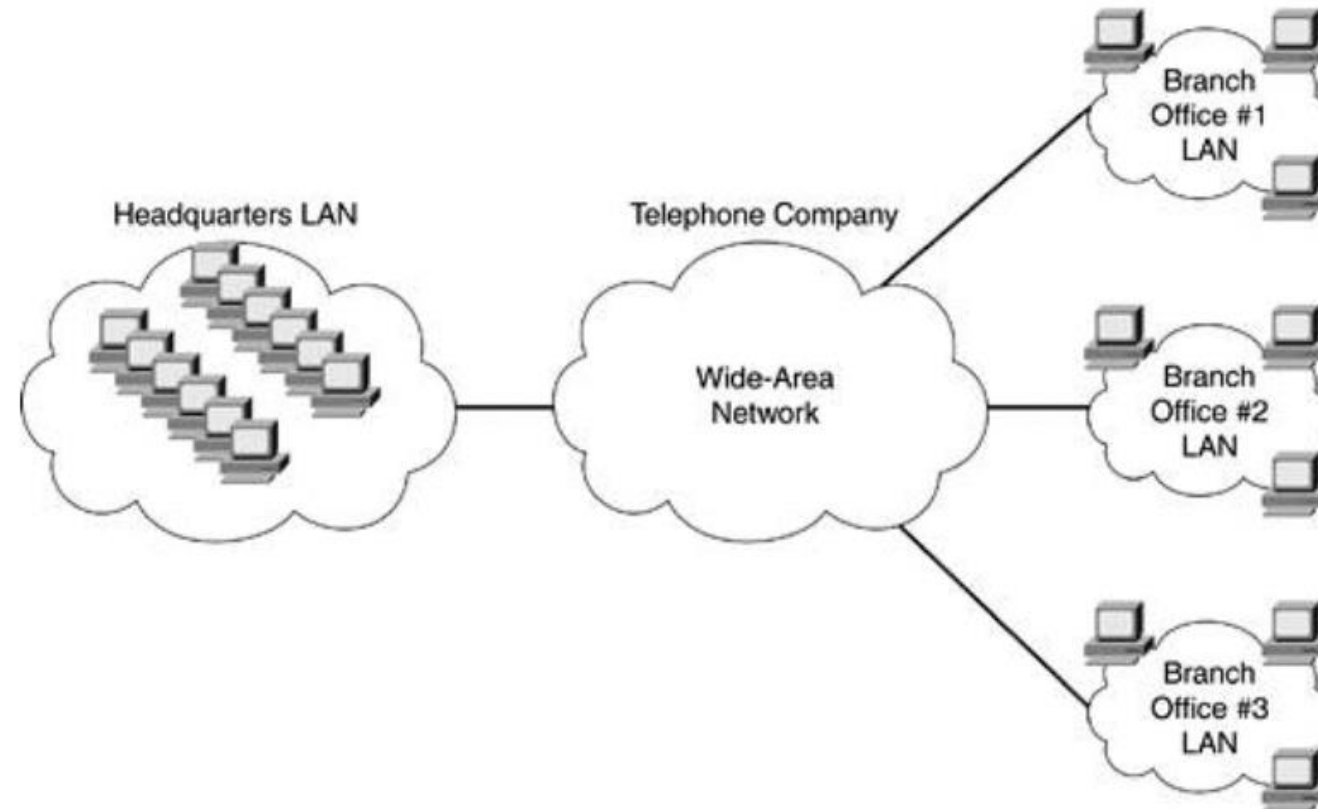


Wide Area Network

- Wide Area Network
 - WAN is a network that includes communication between LANs over a very wide area, located from anywhere and connected to each other
 - WAN is often use to call internet on computer networking term to easily separate from the local side network (LAN)
 - If you are connected to WAN, it's mean that you connected to the internet / joining the internet network / joining the WAN

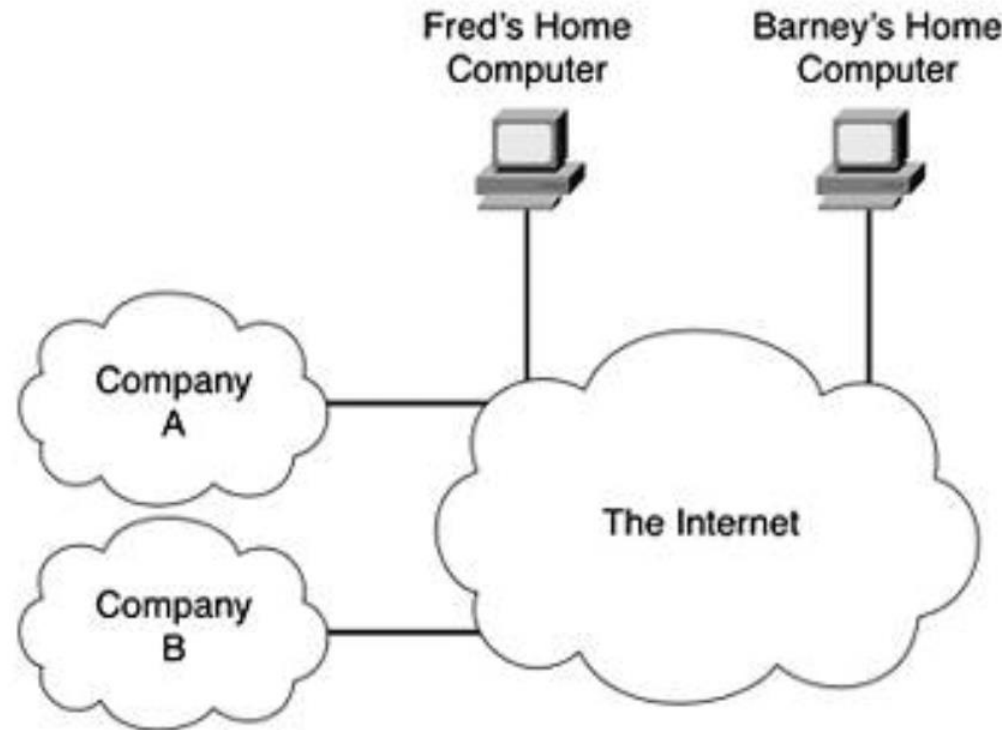
Wide Area Network

Figure 1-6. A Larger Network: An Enterprise WAN



Wide Area Network

Figure 1-7. The Internet, with Enterprises and Individuals Connected to It



Other type of network

- Personal Area Network
- Metropolitan Area Network
- Global Area network

7 OSI Layer

Application

- End User
- HTTP, HTTPS, FTP, FTPS, SSH, DNS, IRC

Presentation

- Syntax Layer / Data Type Layer
- MPEG, JPEG, MP4, MP3

Session

- Sync and Send to Port
- API, Winsock, Socket

Transport

- End to End Connection
- TCP, UDP

Network

- Packet
- IP, ICMP, IPsec, IGMP | Router

Data Link

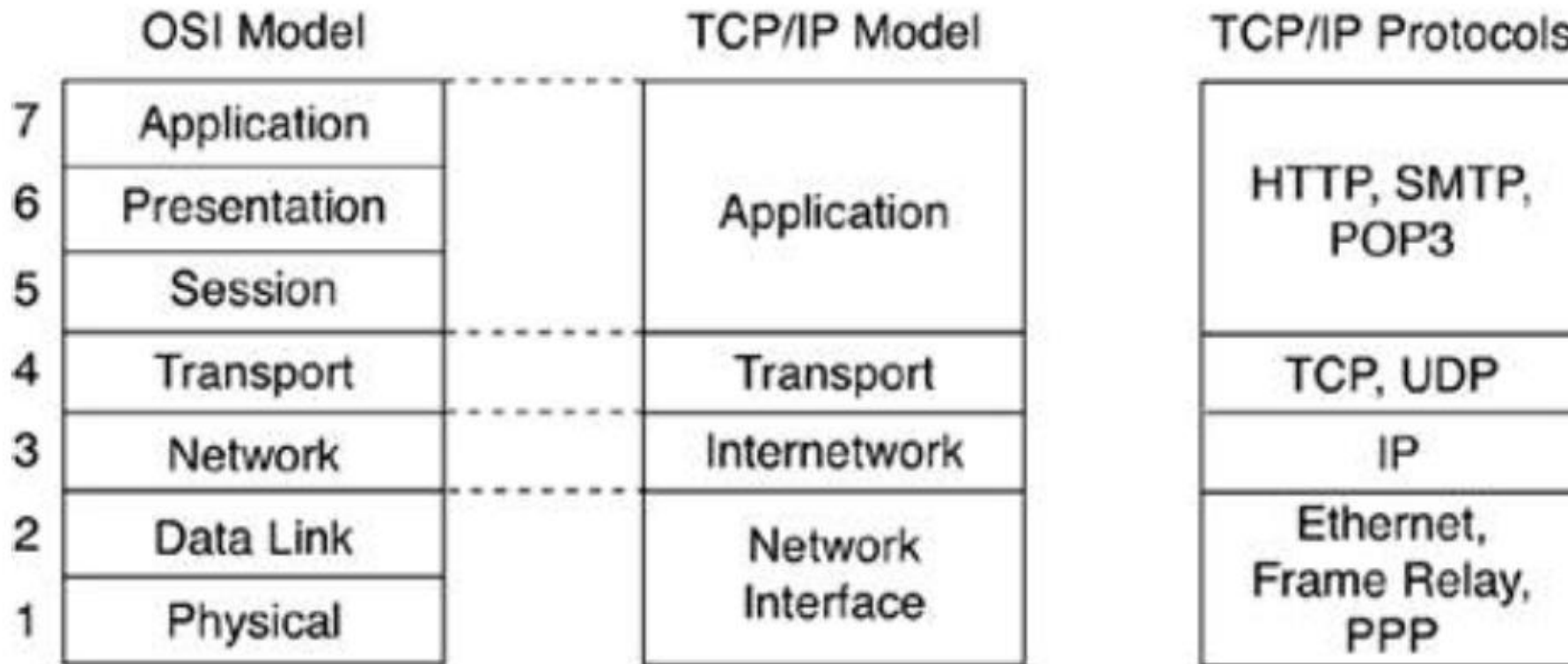
- Frames
- Ethernet, Switch, Bridge

Physical

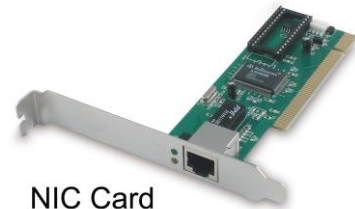
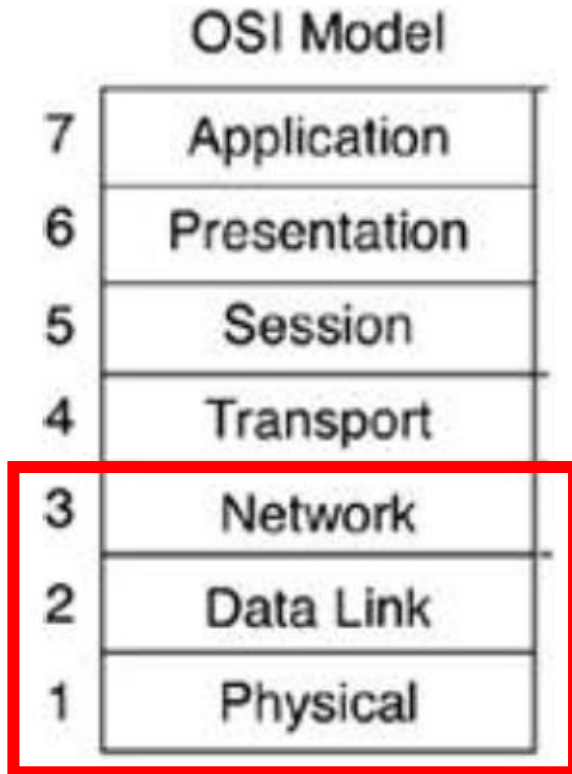
- Physical Structure
- Coax, UTP, STP, Fiber, Wireless, Repeater

7 OSI Layer

Figure 3-10. OSI Model Versus TCP/IP Model (a.k.a. T-Rex Versus the Elephant)



Networking Device



NIC Card



<https://www.teorikomputer.com/2012/11/network-card.html>

https://www.edimax.com/edimax/merchandise/merchandise_detail/data/edimax/global/home_legacy_wireless_adapters/ew-7727in/

Networking Device

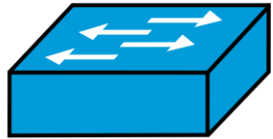
Router

A router is a device that analyzes the contents of data packets transmitted within a network or to another network. Routers determine whether the source and destination are on the same network or whether data must be transferred from one network type to another, which requires encapsulating the data packet with routing protocol header information for the new network type.

(<https://www.techopedia.com/definition/2277/router>)



Networking Device



Switch

A switch is a multiport bridge with a buffer and a design that can boost its efficiency (a large number of ports imply less traffic) and performance. A switch is a data link layer device. The switch can perform error checking before forwarding data, which makes it very efficient as it does not forward packets that have errors and forward good packets selectively to the correct port only. In other words, the switch divides the collision domain of hosts, but broadcast domain remains the same. (<https://www.geeksforgeeks.org/network-devices-hub-repeater-bridge-switch-router-gateways/>)

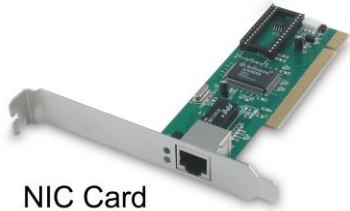


Hub - A hub is basically a multiport repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects different stations. Hubs cannot filter data, so data packets are sent to all connected devices. In other words, the collision domain of all hosts connected through Hub remains one. Also, they do not have the intelligence to find out the best path for data packets which leads to inefficiencies and wastage. (<https://www.geeksforgeeks.org/network-devices-hub-repeater-bridge-switch-router-gateways/>)



Bridge – A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device. (<https://www.geeksforgeeks.org/network-devices-hub-repeater-bridge-switch-router-gateways/>)

Networking Device



NIC Card

<https://www.teorikomputer.com/2012/11/network-card.html>



https://www.edimax.com/edimax/merchandise/merchandise_detail/data/edimax/global/home_legacy_wireless_adapters/ew-7727in/

A NIC (network interface controller) card, also known as a network adaptor or network interface card, is a circuit board that is installed on a computer to connect to the network.

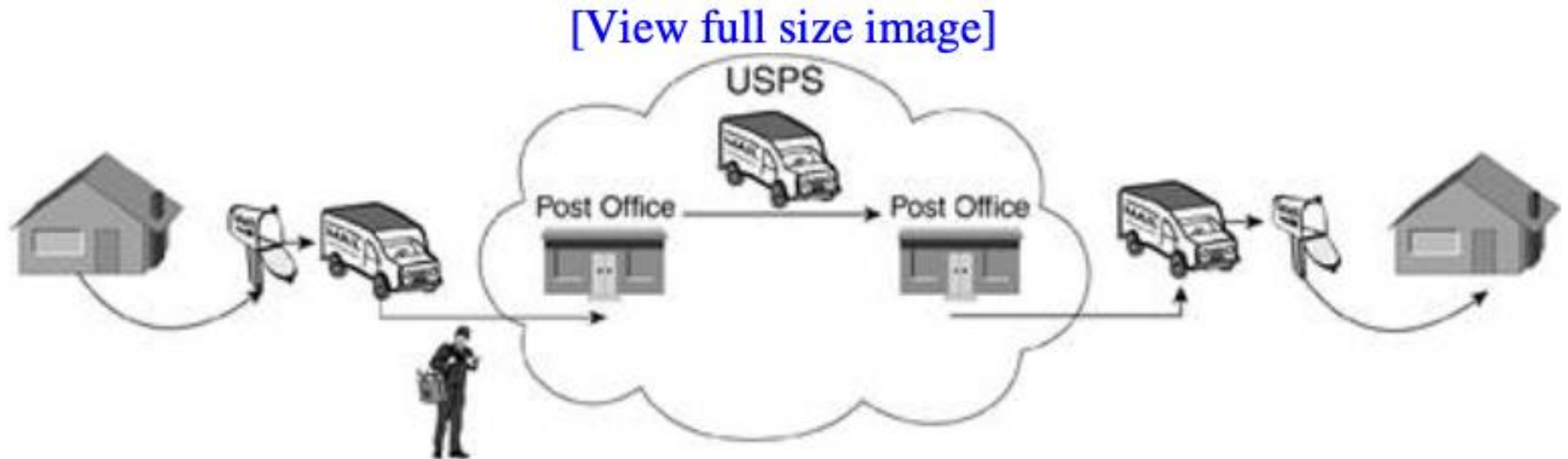
A NIC card works as an indispensable component for the network connection of computers, helping to better communication between data communication equipment (DCE).

NIC cards are commonly found in most computers and some network servers. They contain electrical circuitry in line with data link and physical layer standards, including a port to connect to the local area network's (LAN) medium.

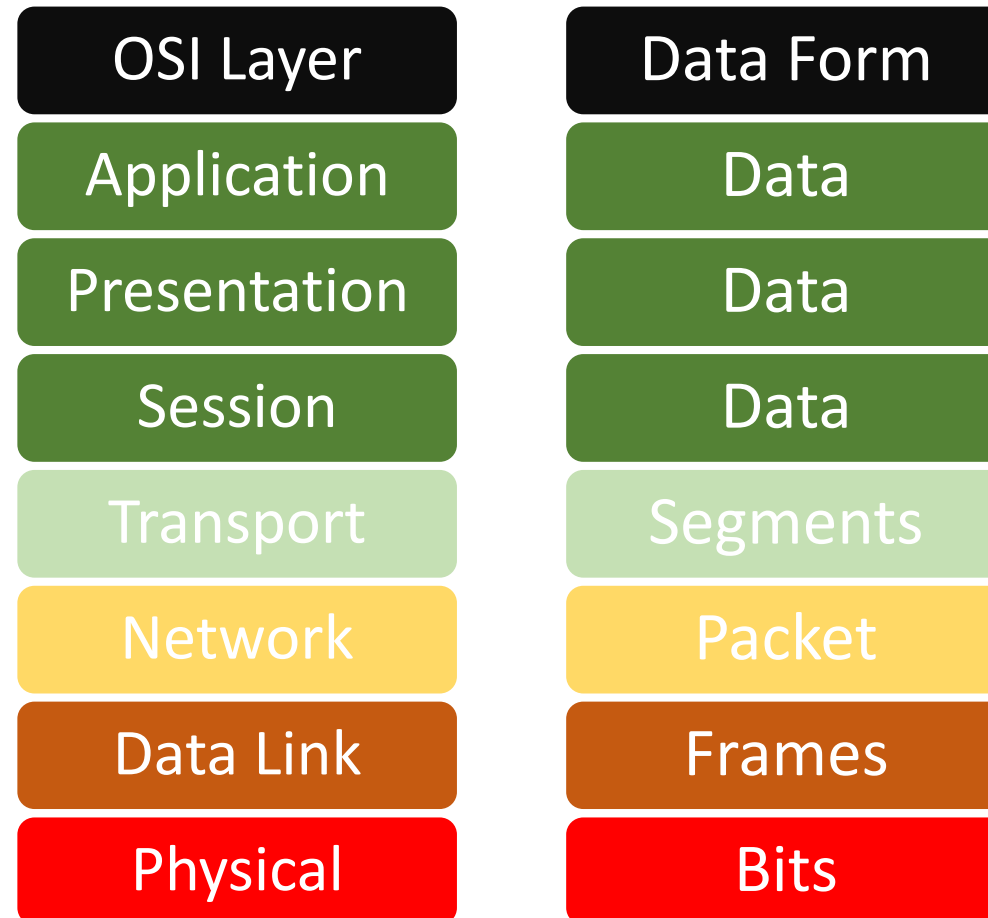
(<https://www.trentonsystems.com/blog/nic-card>)

How Package moving

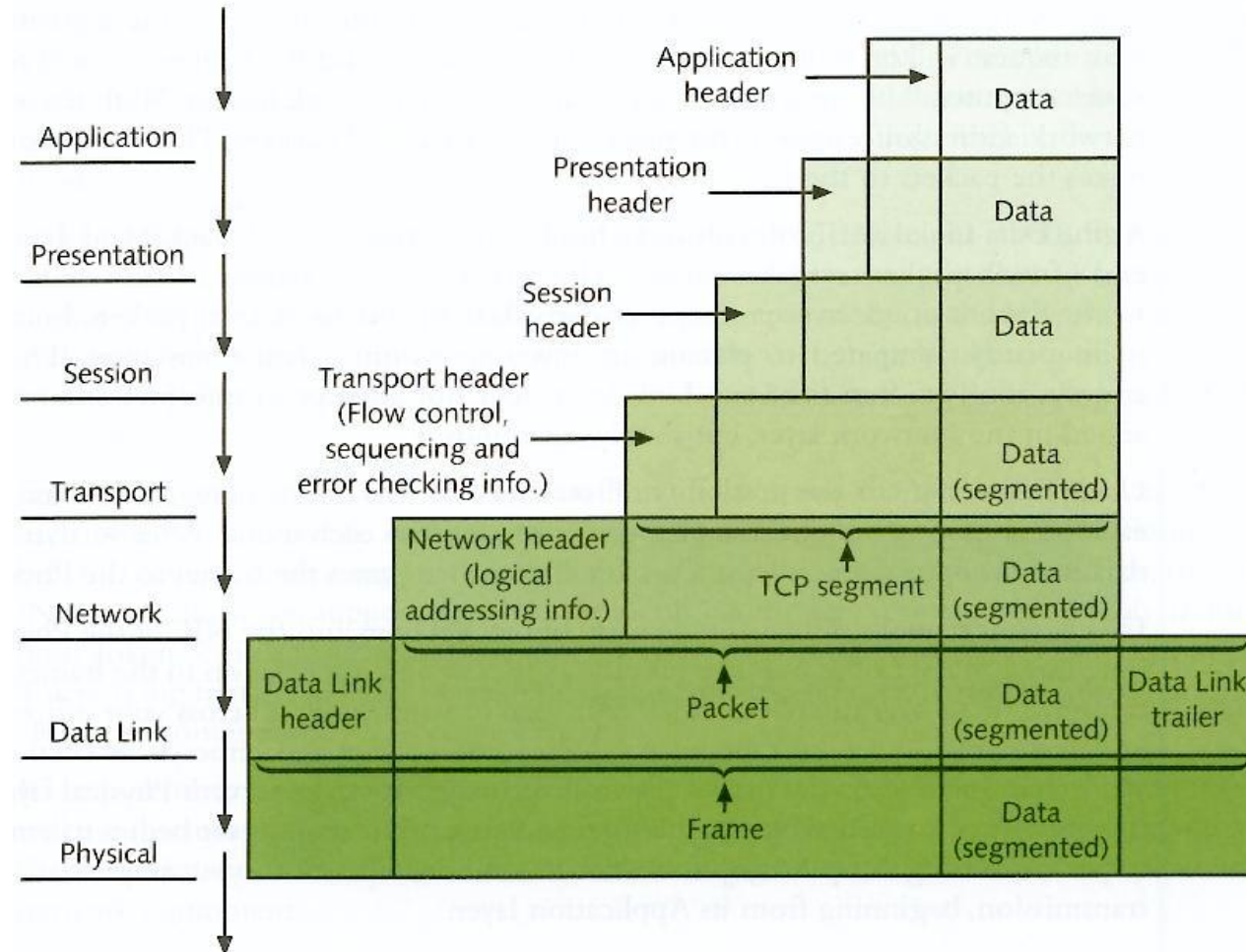
Figure 8-1. Postal Worker Picking Up and Dropping Off the Mail



7 OSI Layer | Data Form



How Package moving



How Package moving

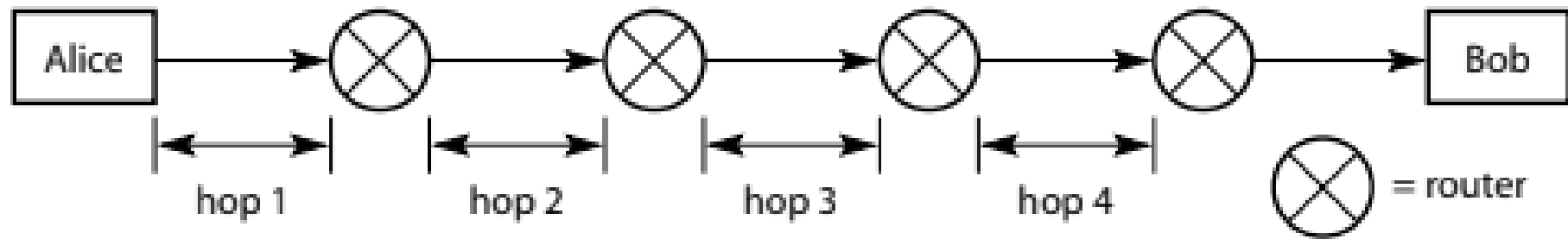








Figure 2.2 Packets travel hop by hop from router to router

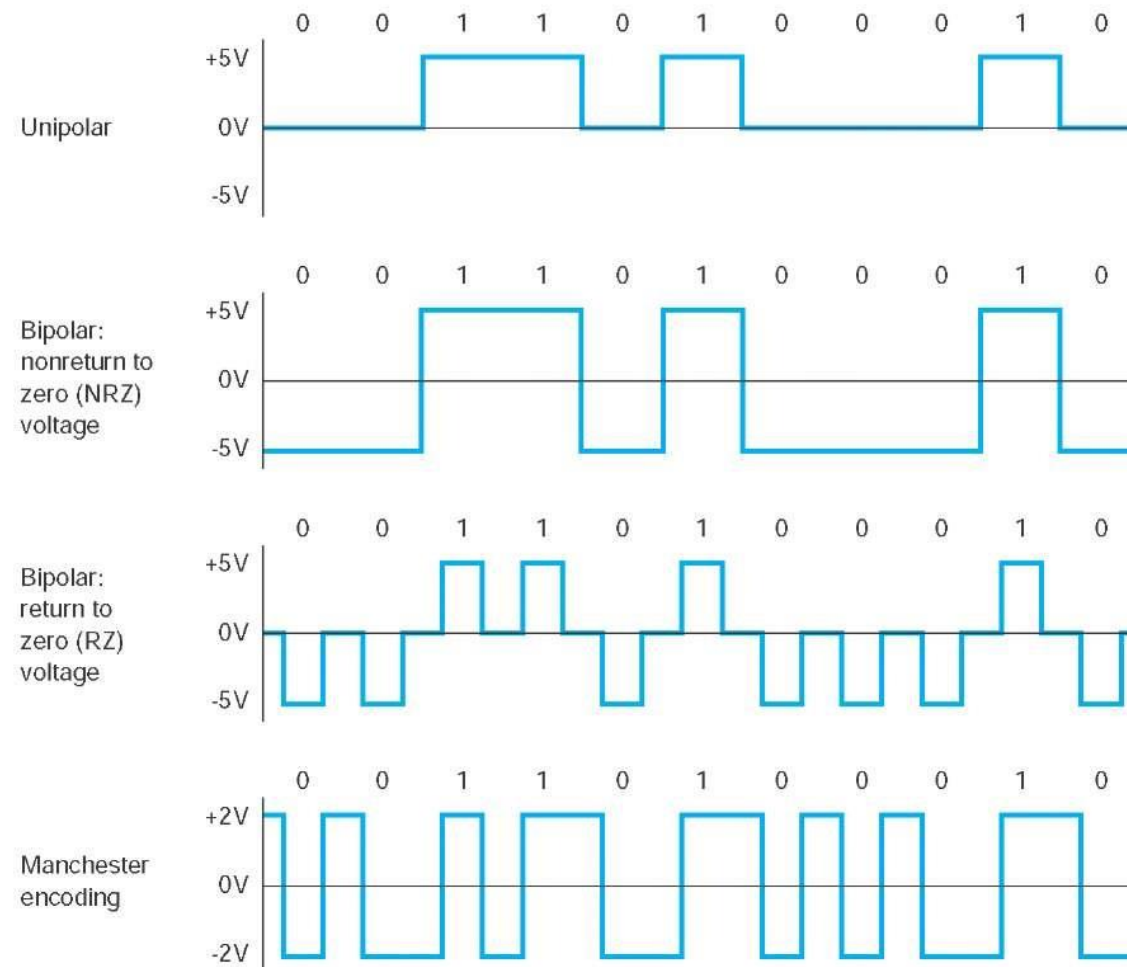
Transmission Media

TYPES OF NETWORK CABLES

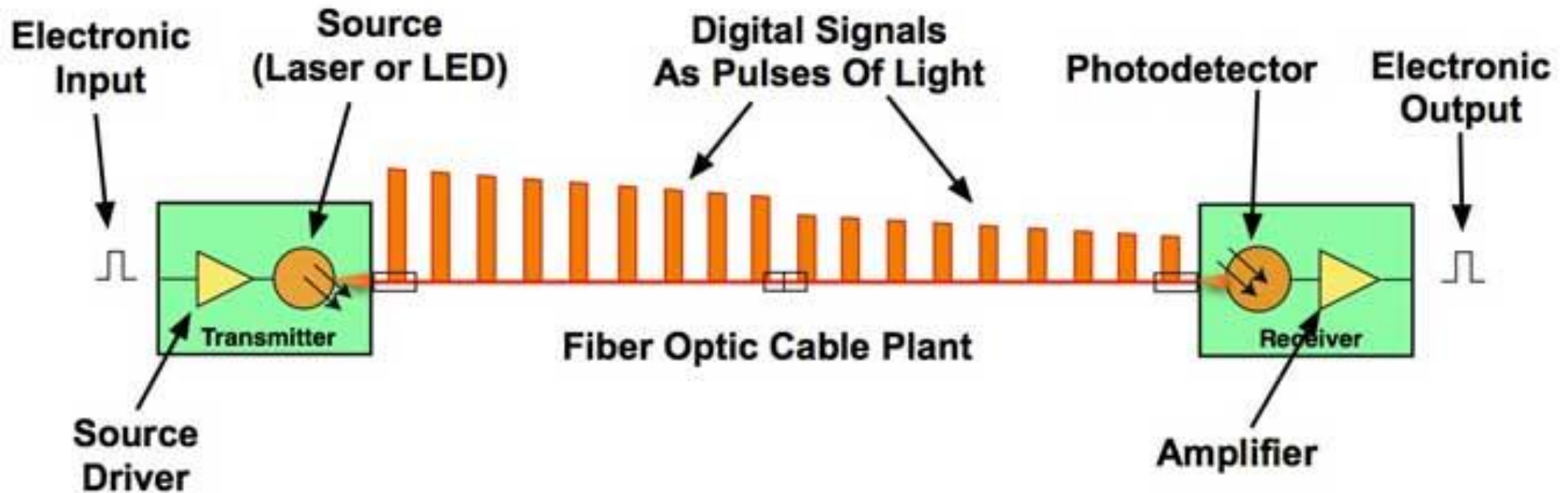
<h3>COAXIAL CABLE CONSTRUCTION</h3> 	<h3>UTP</h3> 	<h3>STP</h3> 
<h3>SINGLE-MODE FIBER</h3> 	<h3>FIBER OPTIC CABLE</h3> 	<h3>MULTI-MODE FIBER</h3> 

networkinterview.com
(An Initiative By ipwithease.com)

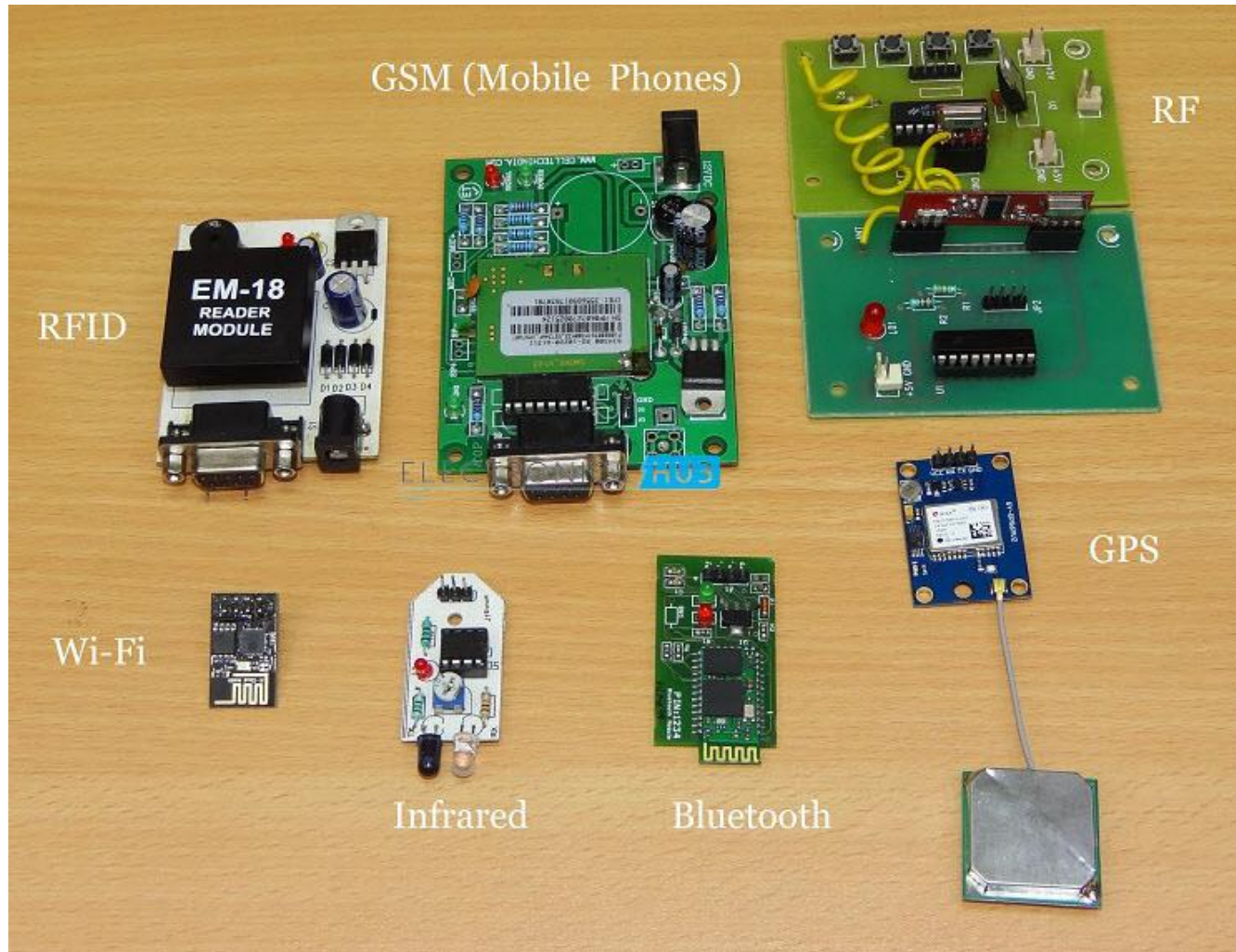
Transmission Media



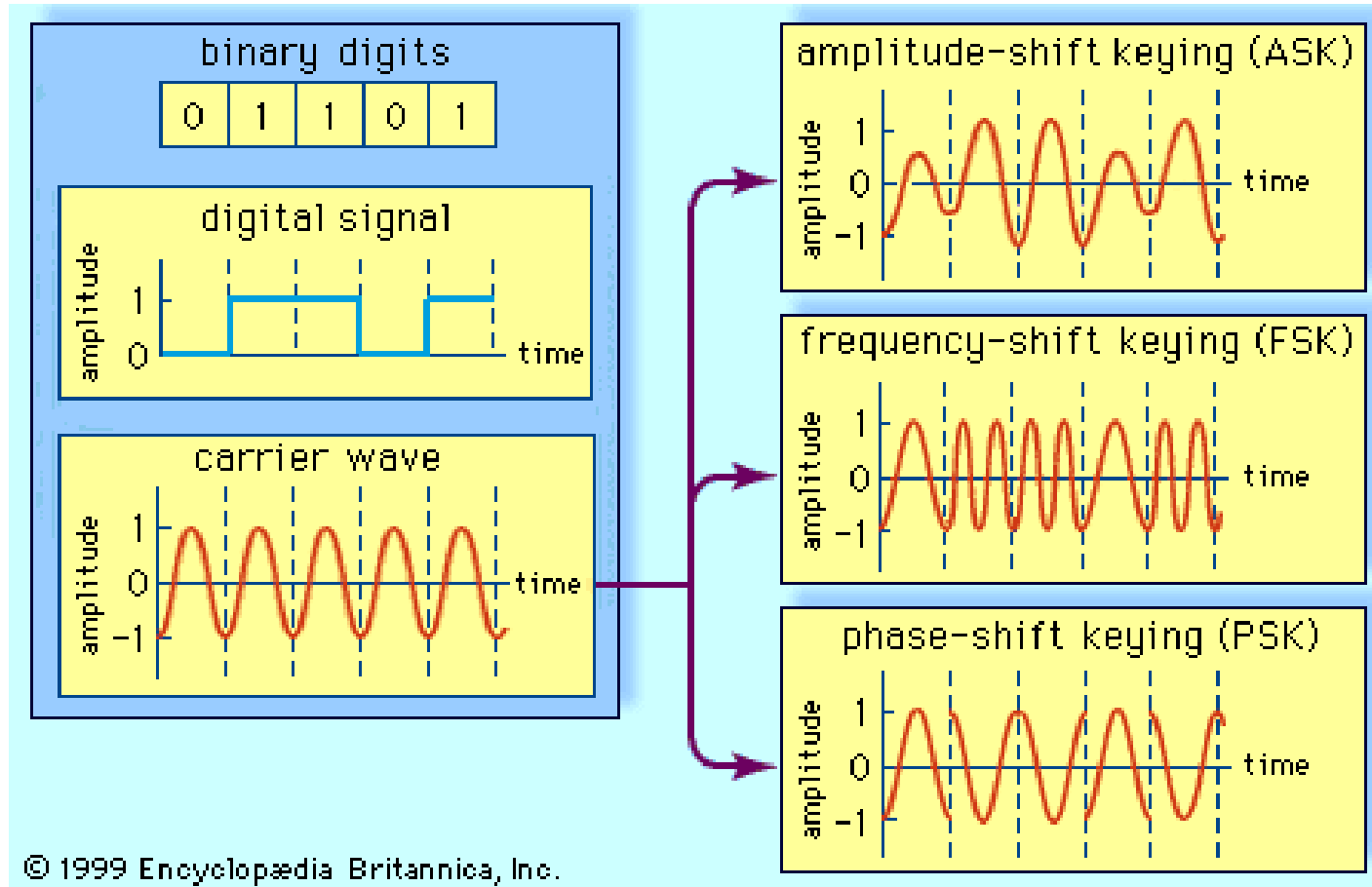
Transmission Media



Transmission Media



Transmission Media



TCP/IP

What is TCP?

Transmission Control Protocol (TCP) is a communications standard that enables application programs and computing devices to exchange messages over a network. TCP creates a connection between a source and destination before transmitting data, and it makes sure that connection is active until data transmission starts. Then, it divides enormous volumes of data into smaller packets while preserving data integrity all along the way.

TCP/IP

What is UDP?

The User Datagram Protocol (UDP) is used to establish low-latency connections between applications and decrease transmissions time. UDP does not provide error connection or packet sequencing nor does it signal a destination before it delivers data. As such, it is a good option for time-sensitive situations, such as Domain Name System (DNS) lookup, Voice over Internet Protocol (VoIP), and streaming media.

TCP/IP

What is IP?

Data transmission via the internet between devices is done using the Internet Protocol (IP). IP is in charge of defining how programs and devices exchange data packets with one another. It is the main protocol for communications that determines the formats and guidelines for transferring data and messages between computers on a single network or across several networks connected to the internet.

TCP/IP

How Does TCP/IP Work?

The TCP/IP model divides data into packets to prevent the requirement to resend the entire message in the event of a transmission error. When packages arrive at their destination, they are immediately put back together. Depending on whether the primary route selected becomes overloaded or unavailable, each packet may follow a different path between the source and the destination computer.

TCP/IP

How Does TCP/IP Work?

TCP establishes and maintains a connection between applications or hardware units until the data transfer is complete. It decides how the original message should be divided into packets, numbers and reassembles the packets, and then transmits them through switches, routers, security gateways, and other network devices before sending them to their final destination. Additionally, TCP sends and receives packets from the network layer, manages flow control, handles the transmission of any missed packets, and makes sure all packets arrive at their intended locations.

TCP/IP

How Does TCP/IP Work?

An email sent from an email server using SMTP is a good demonstration of how this works in practice. To begin, the server's TCP layer breaks the message into packets, numbers them, and sends them to the IP layer, which delivers each packet to the destination email server. When packets arrive, they are returned to the TCP layer and reassembled into the original message format before being sent to the email server, which delivers the message to the user's email inbox.

TCP/IP

How Does TCP/IP Work?

TCP/IP establishes a connection between a device and a server using a three-way handshake, allowing numerous TCP socket connections to be sent in both directions at the same time. Before communication can occur, both the device and the server must synchronize and acknowledge packets. They can then negotiate, separate, and transfer TCP socket connections.

Thank You

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Reference

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- <https://www.trentonsystems.com/blog/nic-card>