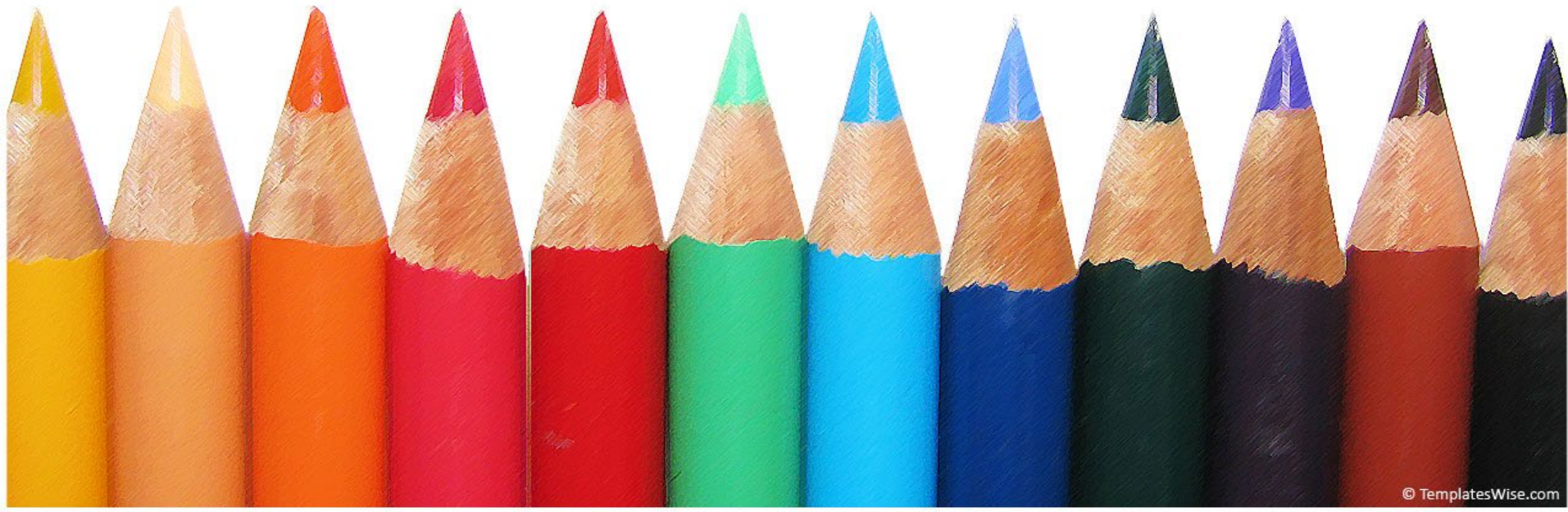


CHAPTER 1

INTRODUCTION



LESSON OUTCOMES

- Student can differentiate each data flow, physical structures of networks, physical topologies and categories of networks.
- Student can draw different types of data flow and physical topologies of networks.

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1. Data Communications

- a. Fundamental Characteristics
- b. Components
- c. Data Representation
- d. Data Flow

2. Networks

- a. Network Criteria
- b. Physical Structures
- c. Network Models
- d. Categories Of Networks

3. The Internet

4. Protocols & Standards

- a. Standards
- b. Organizations
- c. Internet Standards

5. Exercise

6. References

1. DATA COMMUNICATIONS

- Exchange of data between two devices via transmission medium
- To occur, communicating devices **MUST** be part of communication system
 - Combination of hardware (physical equipment) and software (programs)



a) Fundamental Characteristics

Delivery

Accuracy

Timeliness

Jitter

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b) Components

Message

Sender

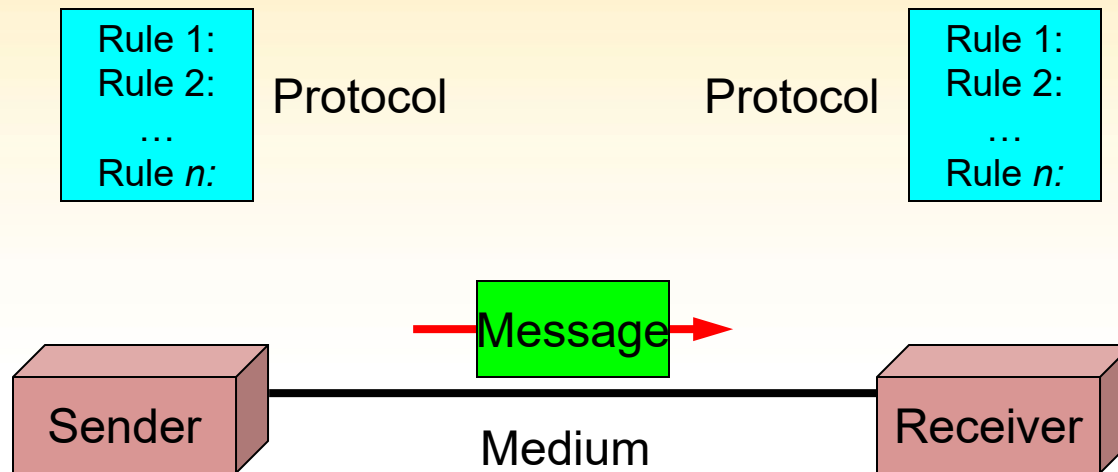
Receiver

Transmission
Medium

Protocol



Fig 1.1 Data Communication System



c) Data Representation

Text

Numbers

Images

Audio

Video

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d) Data Flow

Simplex

- One way street
- Only one device can transmit
- Monitor

Half-Duplex

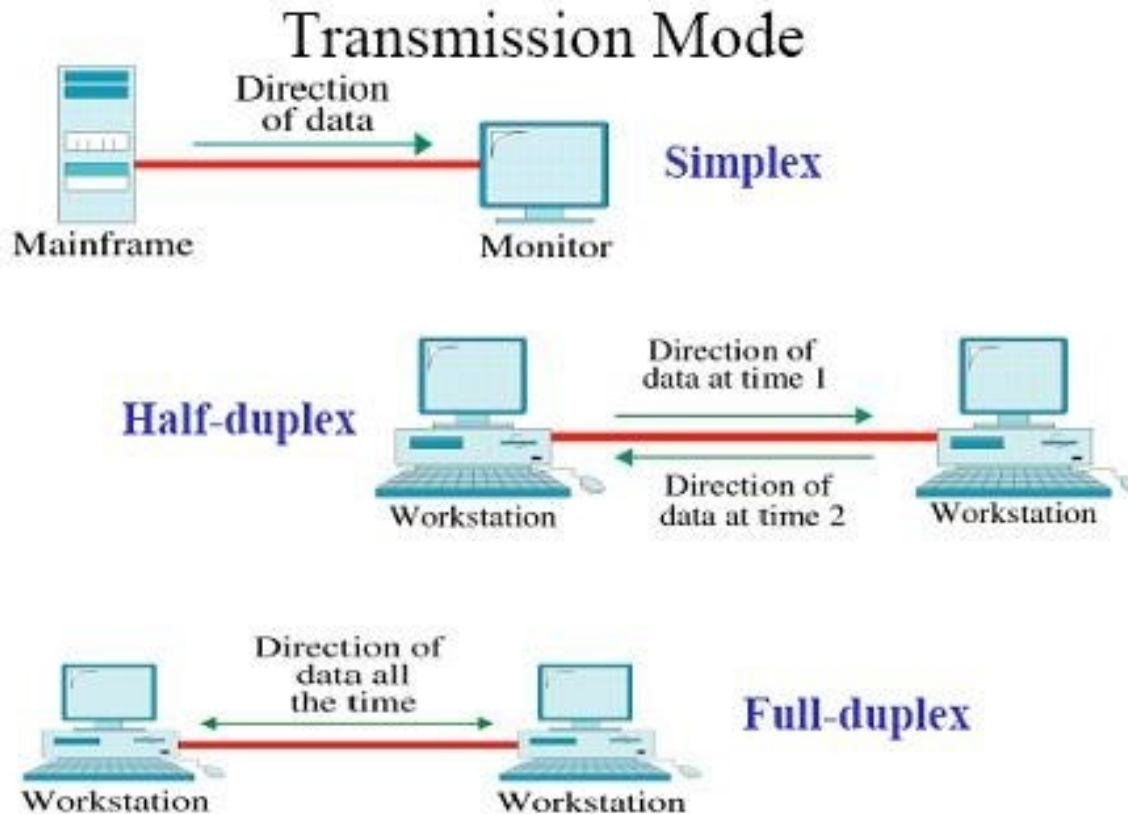
- Each station can transmit and receive but not at the same time
- Walkie-talkies

Full-Duplex

- Also called duplex
- Two way street flowing both direction at the same time
- Telephone network

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d) Data Flow (Cont.)



2. NETWORKS

- A set of devices (nodes) connected by communication links
- Distributed Processing
 - Task divided among multiple computers.



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a) Network Criteria



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b) Physical Structures

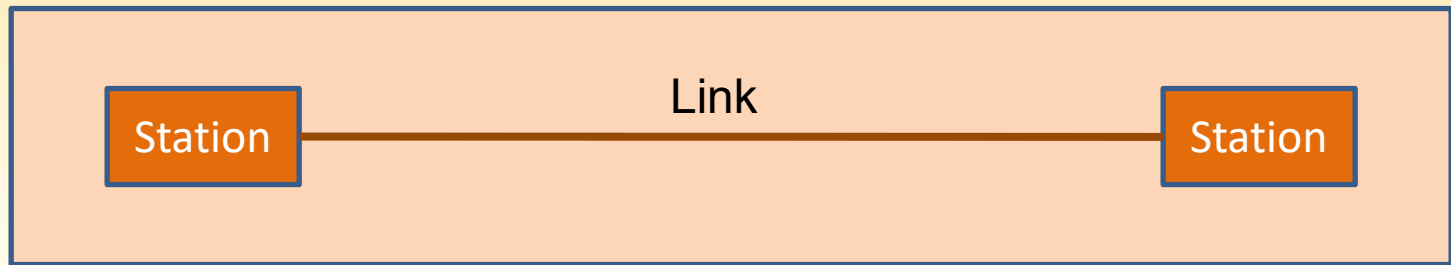
- Types of Connection
 - Point-to-Point
 - Multipoint
- Physical Topology
 - Mesh
 - Star
 - Bus
 - Ring

Hybrid

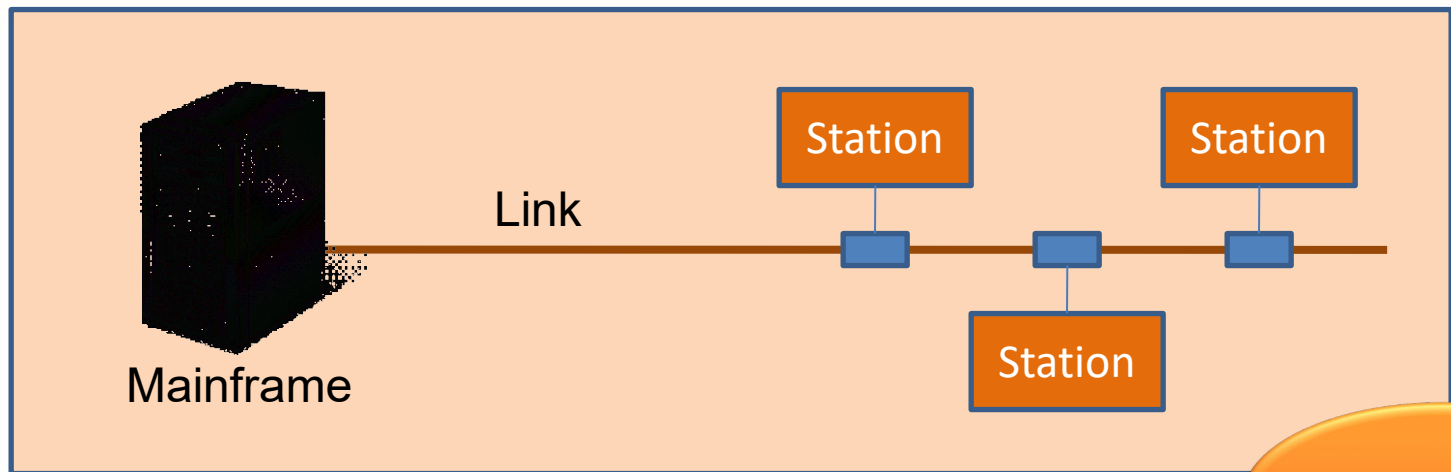
COMPARISON



Fig. 1.2 Types of Connections



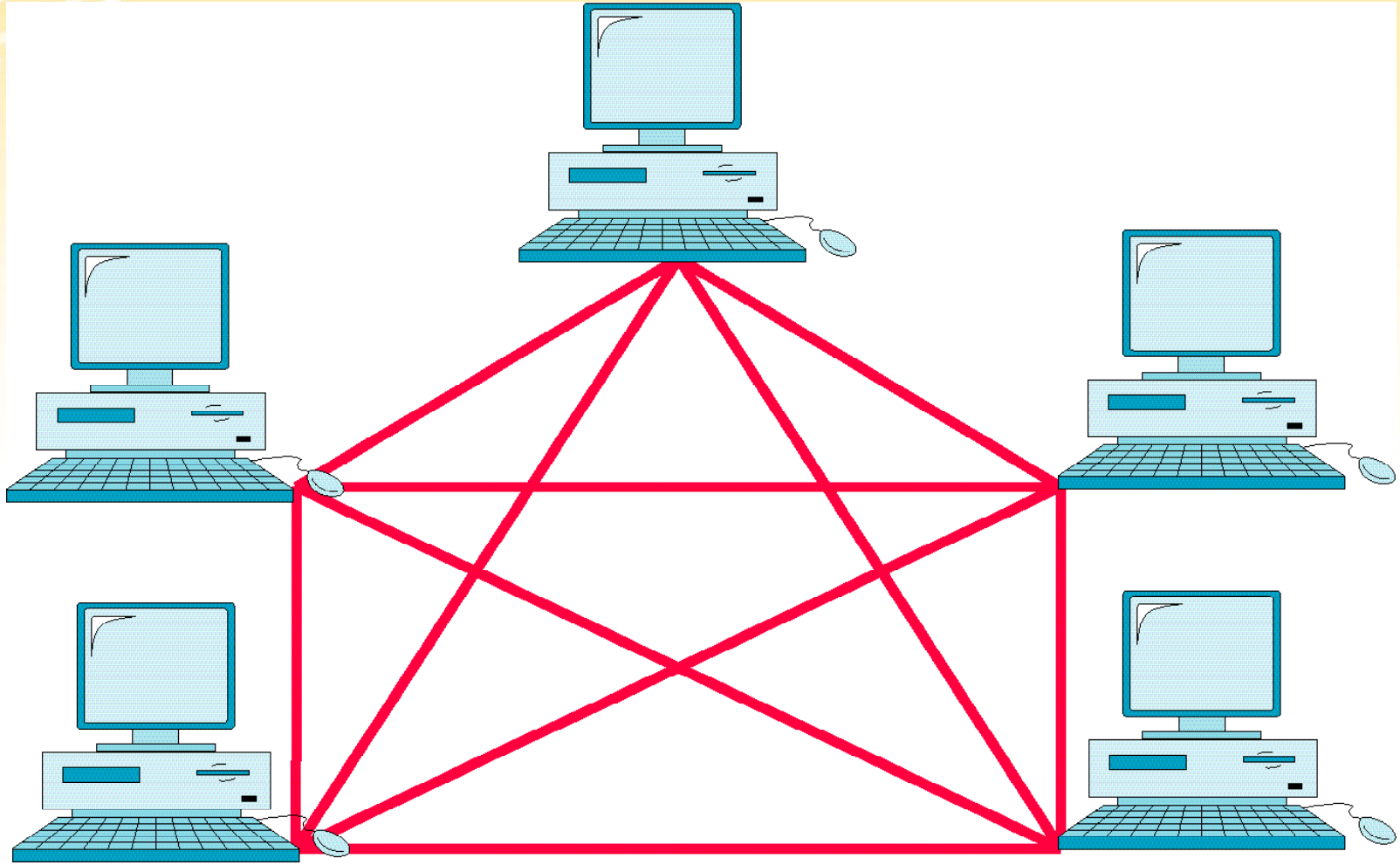
Point-to-Point



Multipoint

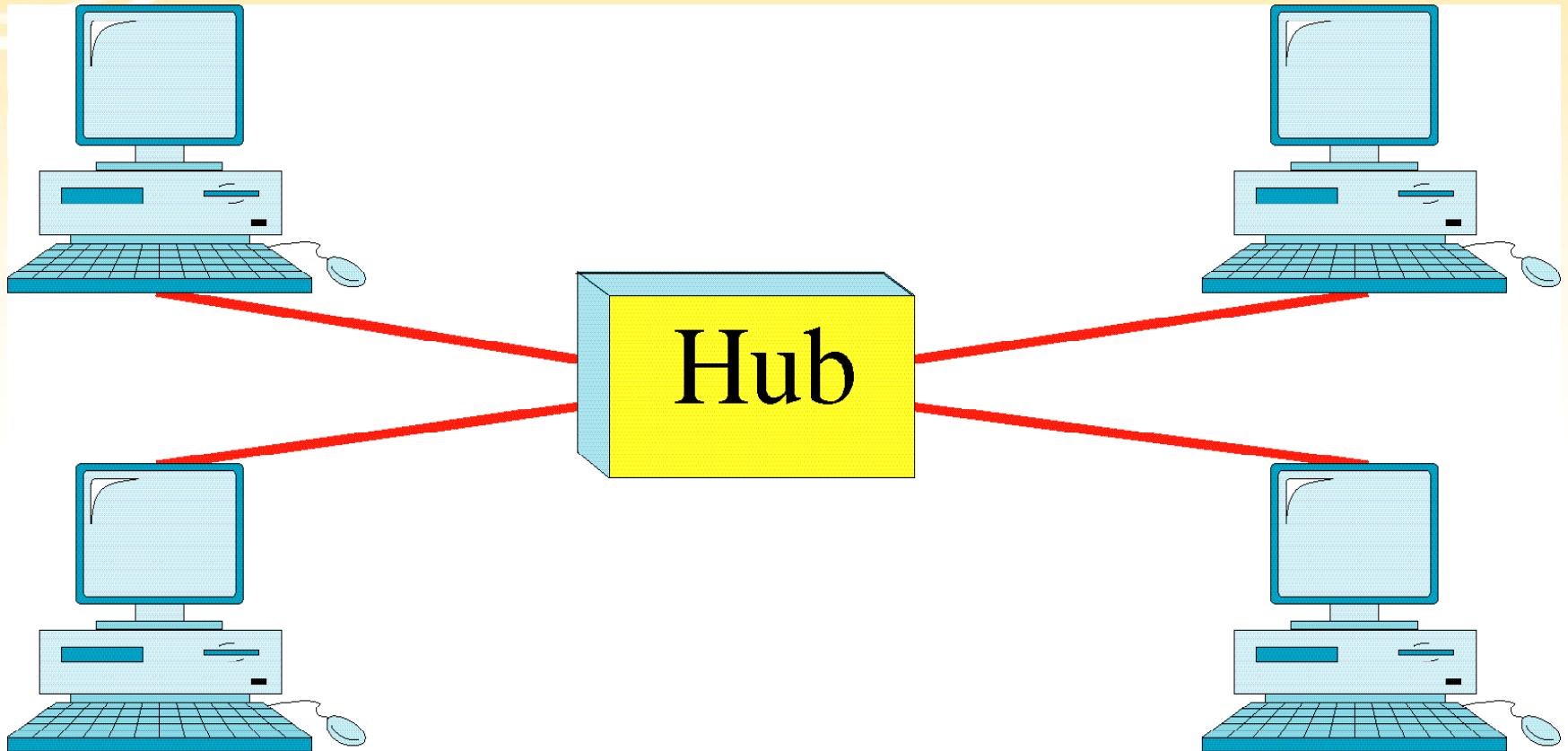
BACK

Fig 1.3 Mesh Topology



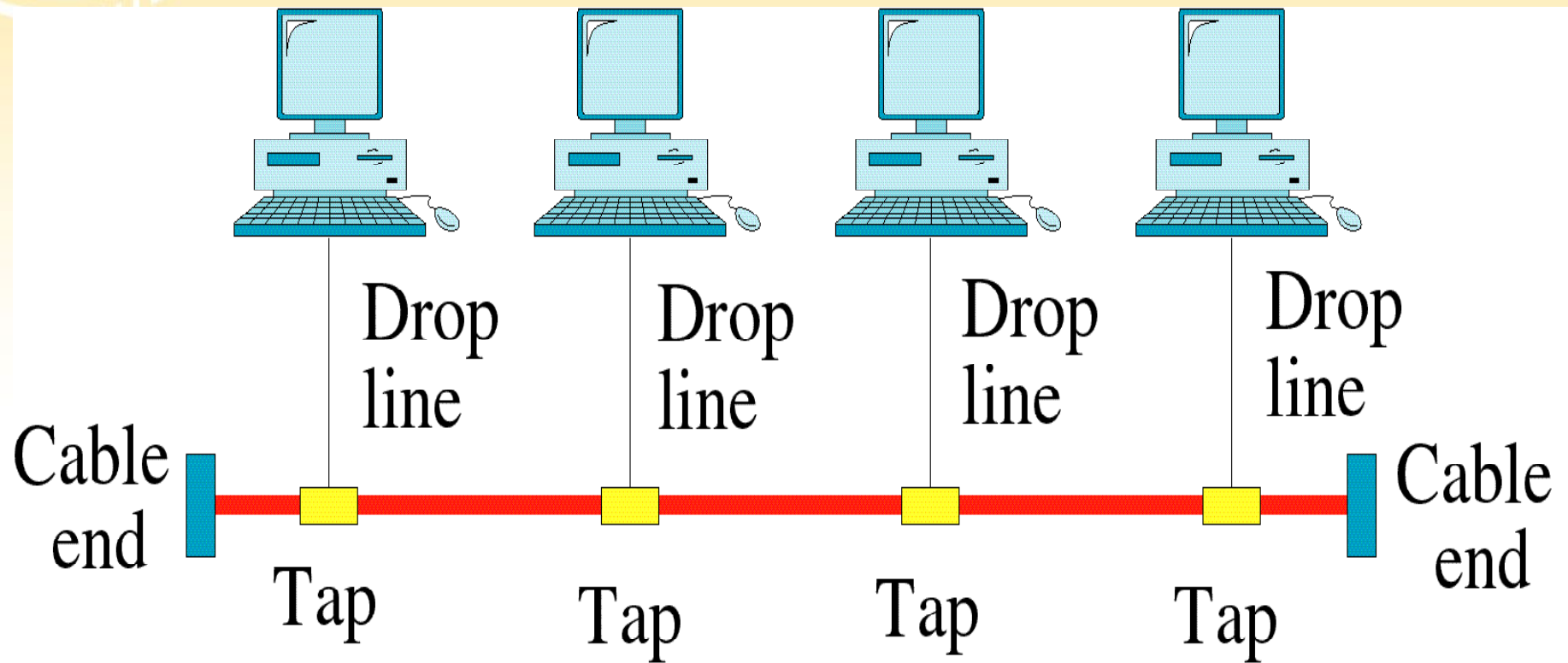
Physical Topology

Fig 1.4 Star Topology



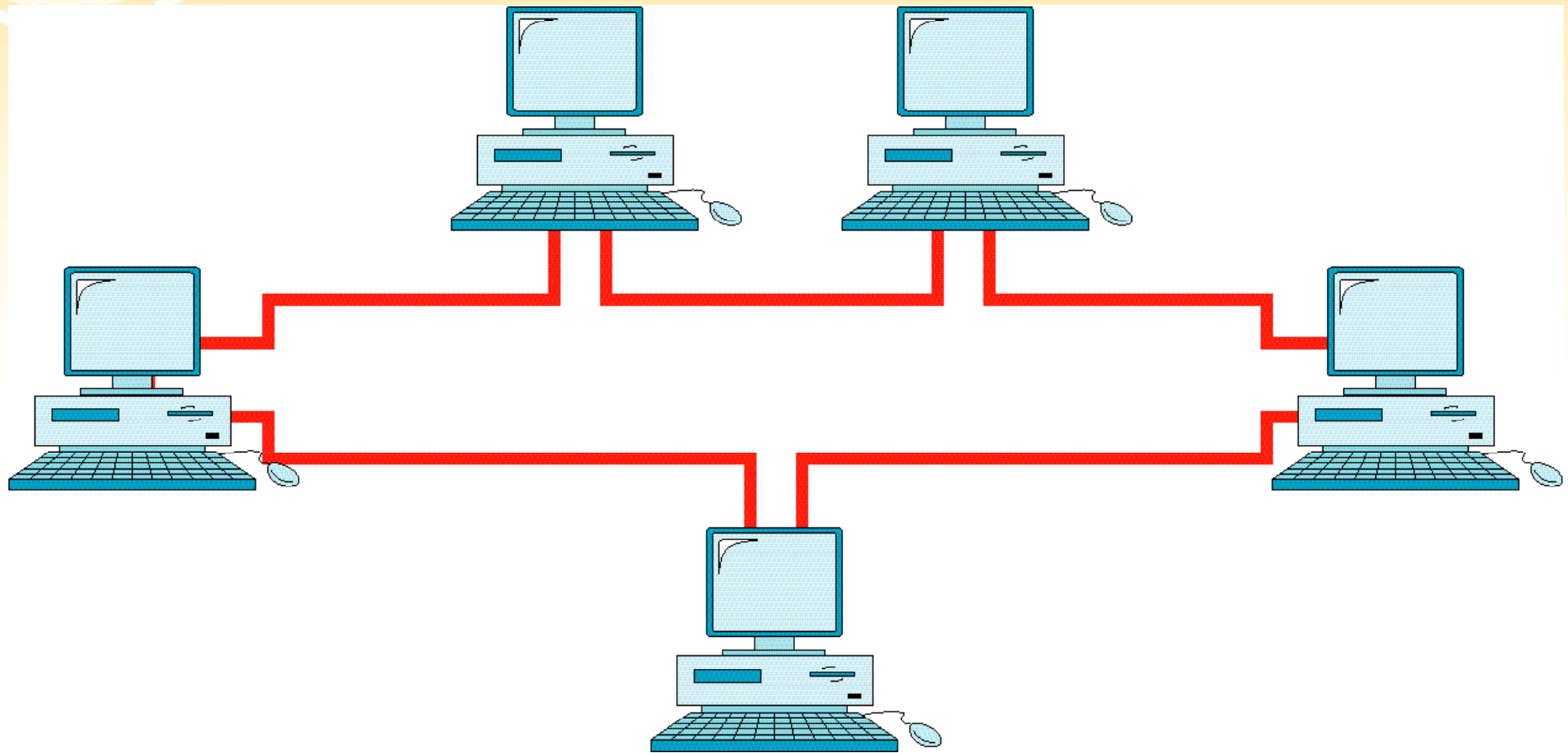
Physical Topology

Fig 1.5 Bus Topology



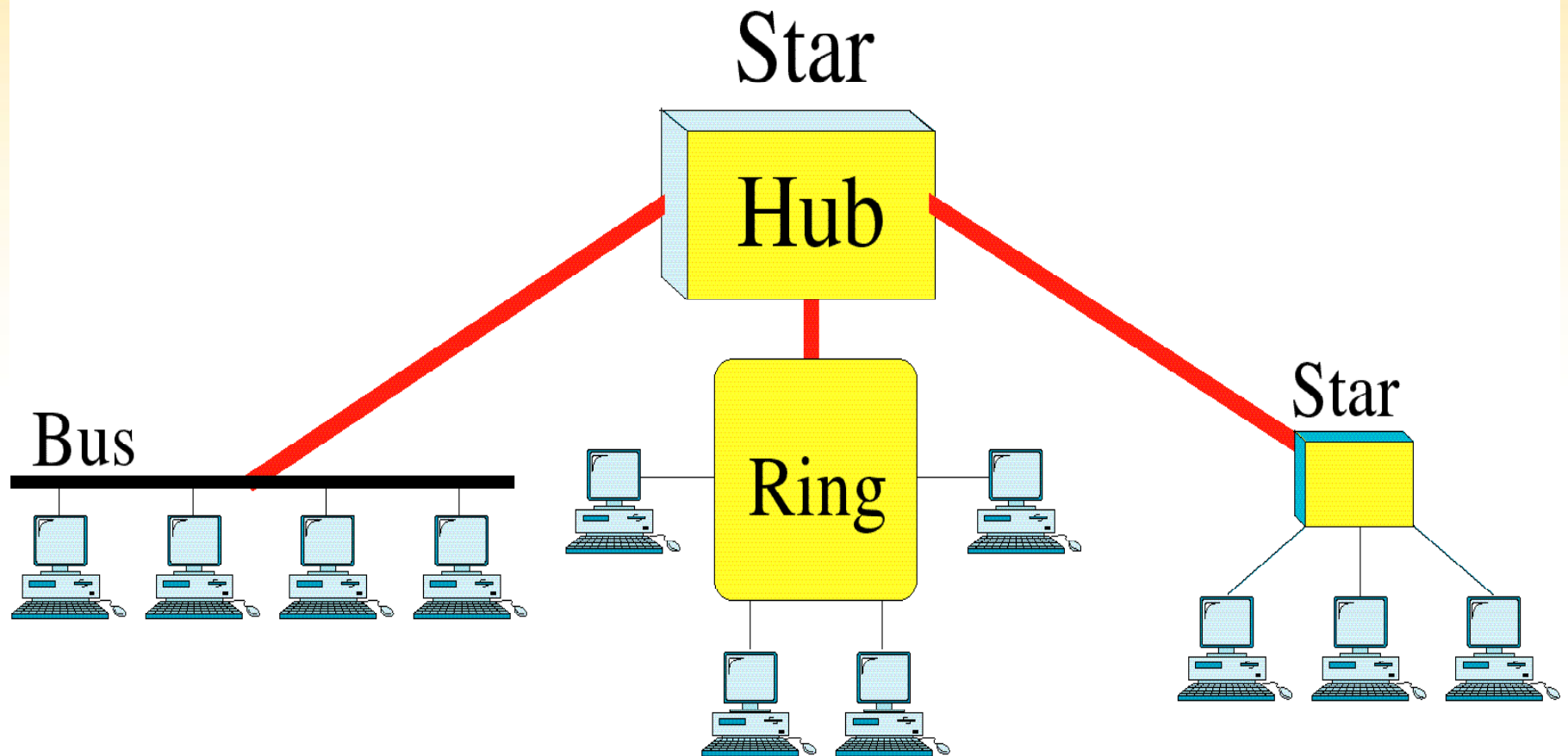
Physical Topology

Fig 1.6 Ring Topology



Physical Topology

Fig 1.7 Hybrid Topology



Physical Topology

Comparison Between Topologies

Mesh

- Eliminating traffic problems
- Robust
- Privacy & Security High
- Fault identification & isolation easy
- Expensive
 - More cable
 - More I/O

Star

- Less expensive
- Easy installation & reconfigure
- Robust
- Fault identification & isolation easy
- Dependency

Bus

- Easy installation
- Eliminated redundancy
- Difficult reconnection & fault isolation
- Dependency

Ring

- Easy Installation & reconfiguration
- Simplify fault isolation
- Dependency
- Less cabling

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c) Network Models

- Discuss in CHAPTER 2 (Network Models)



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d) Categories of Networks

Local Area Network (LAN)

- Privately owned
- Single office, building @ campus

Wide Area Network (WAN)

- Long-distance transmission
- The Internet is the largest WAN

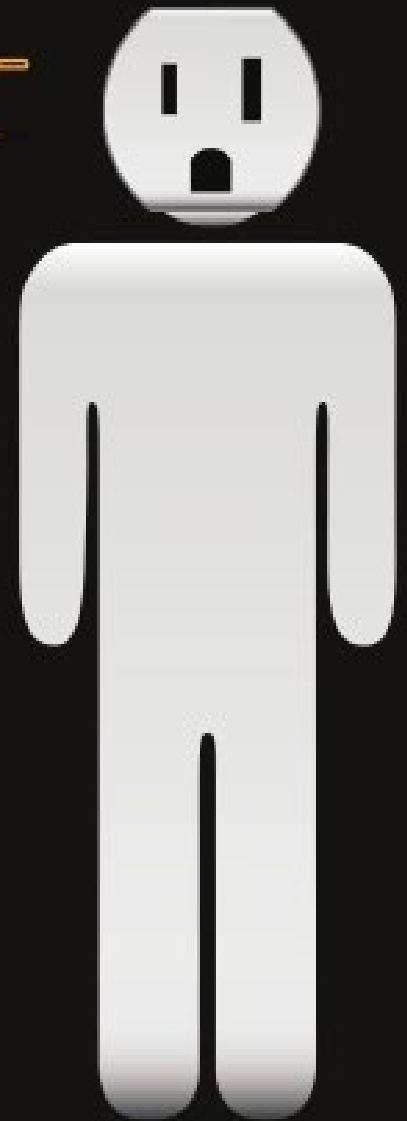
Metropolitan Area Network (MAN)

- Covers area town @ city
- High-speed connectivity
- Cable TV network, telephone company network

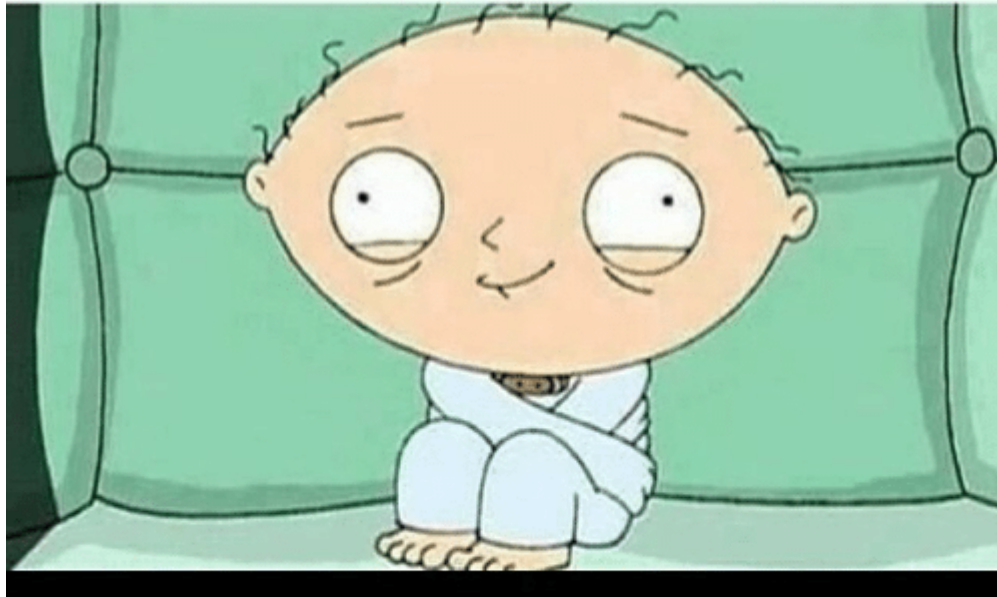
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**Imagine
Your Life
Without
the Internet**

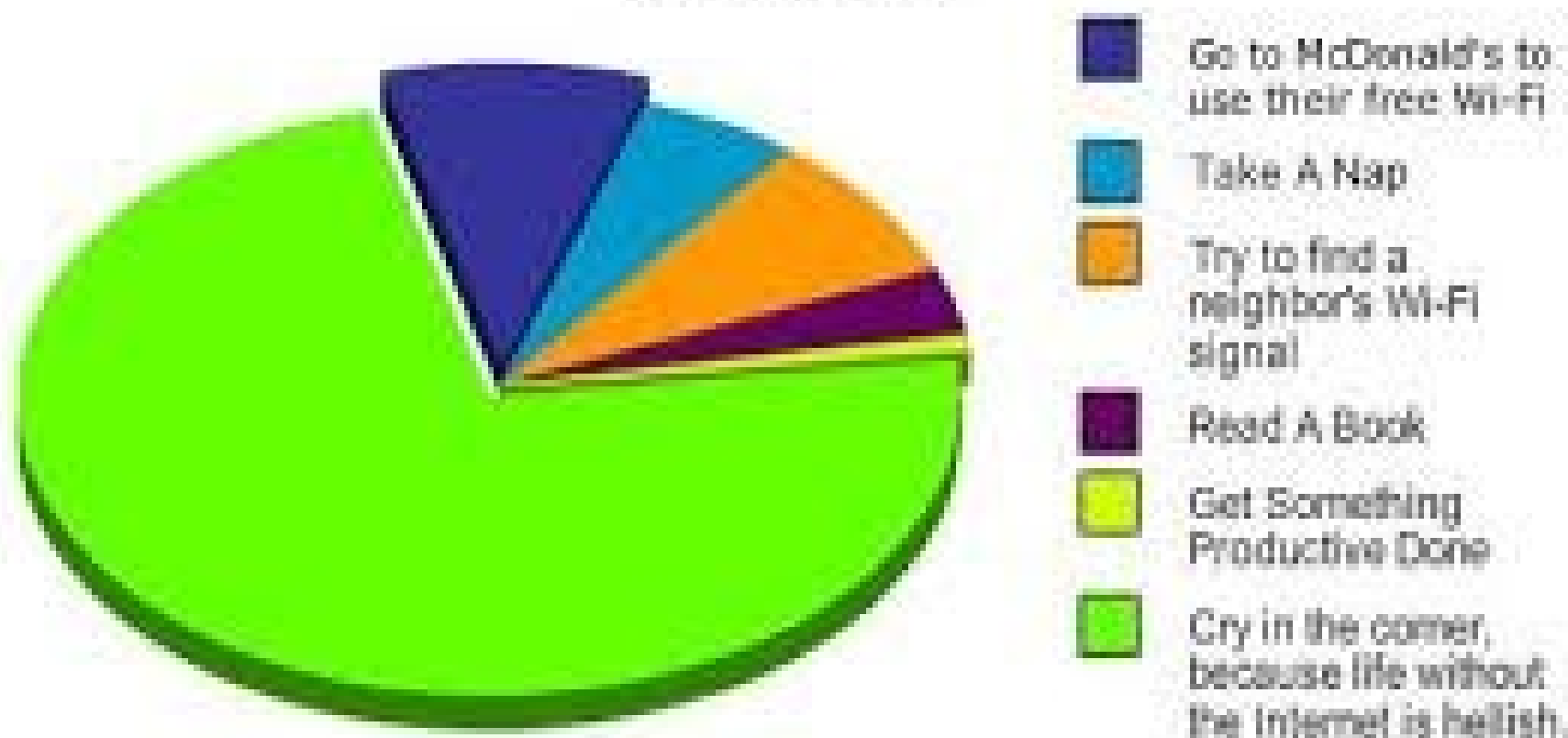


LIFE WITHOUT INTERNET



There is no life.....

Things to Do Without Access To The Internet



3. The Internet

- A group of connected communicating devices such as computers and printers.
- Developed by ARPA – Advanced Research Projects Agency (mid 1960s)
- Objective – finding way to connect computers to share findings, reducing costs, eliminating duplication



3. The Internet (cont.)

- Include 4 nodes (1969)
 - University of California, LA (UCLA)
 - University of California, SB (UCSB)
 - Stanford Research Institute (SRI)
 - University of Utah
- Vint Cerf & Bob Kahn came up with TCP (1972)
- Then TCP split into two (2) protocols
 - Transmission Control Protocol
 - Internetworking Protocol



3. The Internet (cont.)

- International Internet Service Provider
 - National Internet Service Providers
 - Regional Internet Service Providers
 - Local Internet Service Providers



4. Protocols and Standards

PROTOCOLS

Syntax

- Structure @ format of the data

Semantics

- The meaning of each section of bits

Timing

- Two characteristics
 - When to send
 - How fast sending data

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a) Standards

De Facto

- Standard has not been approved by organized body but widespread use

De Jure

- Standards legislated by official recognized body

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b) Standards Organizations

International Organization for Standardization (ISO)

- Developing cooperation between standards creation committees

International Telecommunication Union – Telecommunication Standards Sector (ITU-T)

- Devoted to research and establishment of standards for telecommunications

American National Standards Institute (ANSI)

Institute of Electrical & Electronics Engineers (IEEE)

- Oversees the development and adoption of international standards for computing and communications

Electronic Industries Association (EIA)

- Devoted to promotion of electronics manufacturing concerns

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c) Internet Standards

- Thoroughly tested specification that is useful to and adhered to by those who work with the Internet
- Formulized regulation must followed
- Internet draft – working document with no official status & a 6-months lifetime.
- Request for Comment (RFC) published upon recommendation from Internet authorities.



5. EXERCISE

1. Draw a hybrid topology with a star and backbone and three ring networks.
2. Draw a hybrid topology with a ring backbone and two bus networks.



ANSWER



REFERENCE

ITT300's Textbook:

Behrouz. A Forouzan. (2007). *Data communications and Networking*. Fourth Edition. McGraw-Hill. New York.