

PROJECT

KOMUNIKASI DATA (WEEK 2)

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DATE

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CLIENT

JURUSAN SISTEM KOMPUTER (S1)

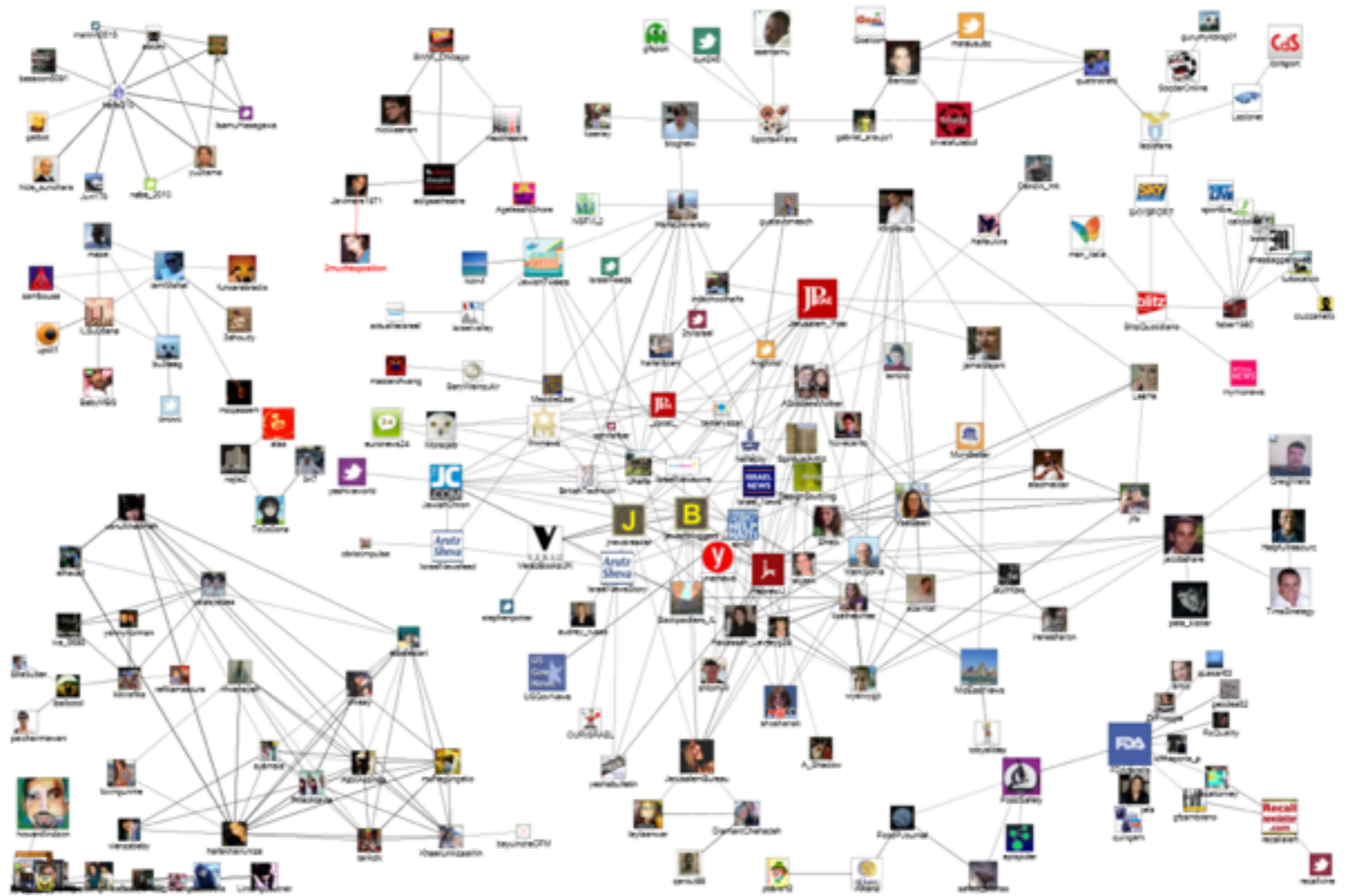
Chapter 1

Introduction

- ✿ DISTRIBUTED PROCESSING
- ✿ NETWORK CRITERIA
- ✿ PHYSICAL STRUCTURES
- ✿ NETWORK MODELS
- ✿ CATEGORIES OF NETWORKS

Networks

- A network is a set of devices (often referred to as nodes) connected by communication links.
- A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.



Distributed Processing

- Most networks use distributed processing, in which a task is divided among multiple computers.
- Instead of one single large machine being responsible for all aspects of a process, separate computers (usually a personal computer or workstation) handle a subset.

Network Criteria

A network must be able to meet a certain number of criteria.

The most important of these are :

- ❖ **Performance**
- ❖ **Reliability**
- ❖ **Security**

Performance

Performance can be measured in many ways, including transit time and response time

- Transit time is the amount of time required for a message to travel from one device to another.
- Response time is the elapsed time between an inquiry and a response

The performance of network depends on a number of factors, including the number of users, the type of transmission medium, the capabilities of the connected hardware and the efficiency of the software.

Performance is often evaluated by two networking metrics: **throughput** and **delay**

- we often need more throughput and less delay --> However, these two criteria are often contradictory
 - ❖ if we try to send more data to the network, we may increase throughput, but we increase the delay because the traffic congestion in the network.

Reliability

- In addition to accuracy of delivery, network reliability is measured by the frequency of failure, the time it takes a link to recover from failure, and the networks's robustness in a catastrophe

Security

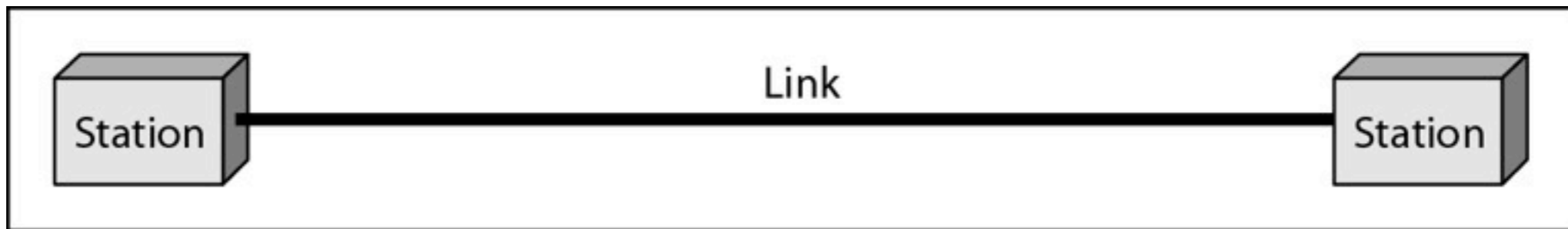
- Network security issues include protecting data from unauthorized access, protecting data from damage and development, and implementing policies and procedures for recovery from breaches and data losses

Physical Structures

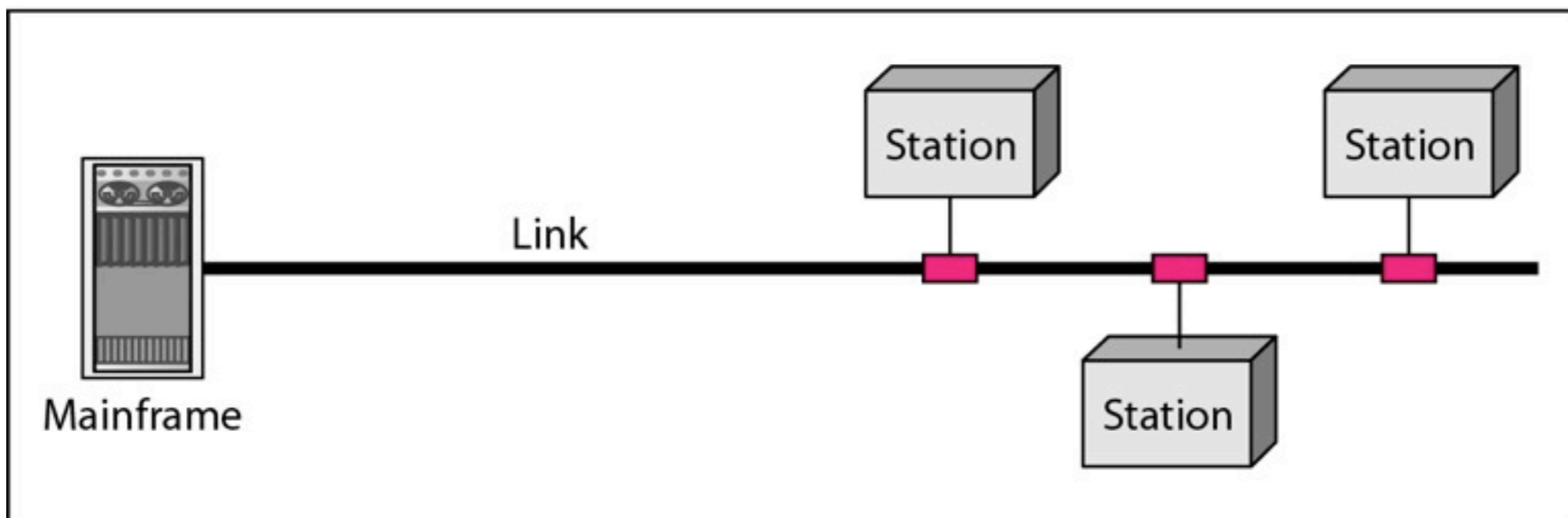
- Before we discussing networks, we need to define some network attributes
 - Types of Connection
 - Physical Topology

Types of Connection

- Types of connection: point to point and multipoint



a. Point-to-point



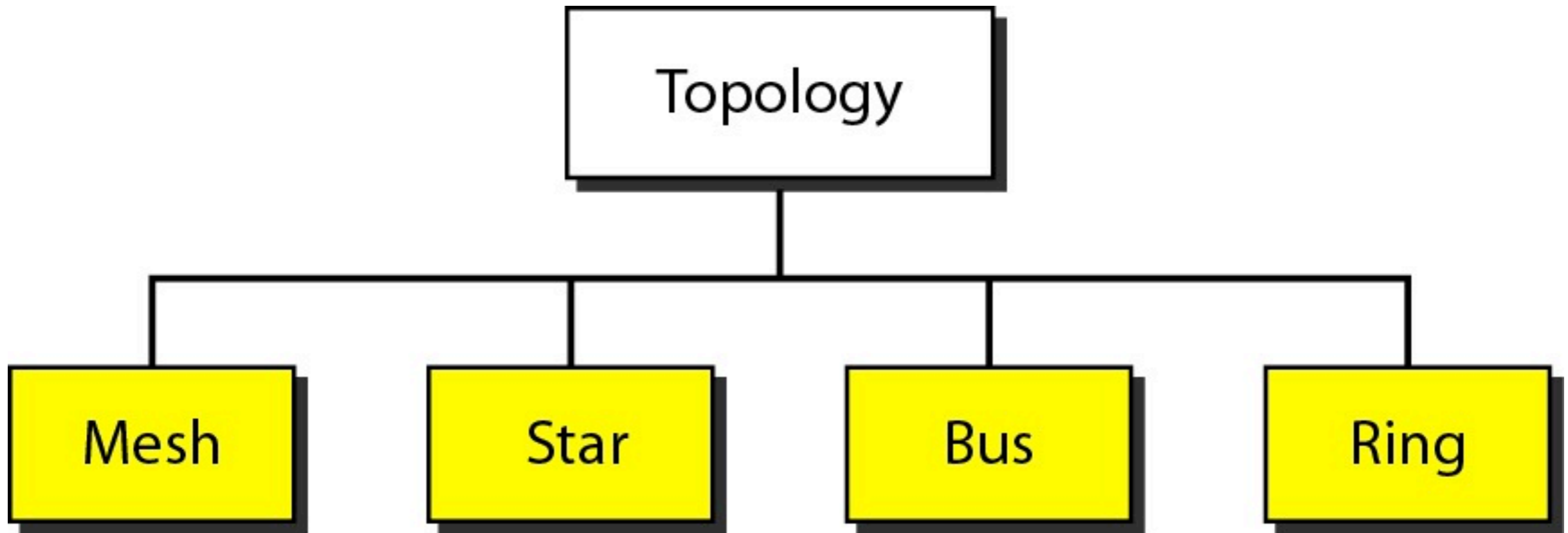
b. Multipoint

- Point to point connections provides a dedicated link between two devices. The entire capacity of the link is reserved for transmission between those two devices. Most point to point connections use an actual length of wire or cable to connect the two ends, but other options, such as microwave or satellite links, are also possible.
- Multipoint (also called multidrop) connection is one in which more than two specific devices share a single link. In multipoint environment, the capacity of the channel is shared, either spatially or temporally. If several devices can use the link simultaneously, it is a spatially shared connection. If users must take turns, it is a timeshared connection.

Physical Topology

- The term physical topology refers to the way in which a network is laid out physically.
- The topology of a network is the geometric representation of the relationship of all links and linking devices (usually called nodes) to one another.

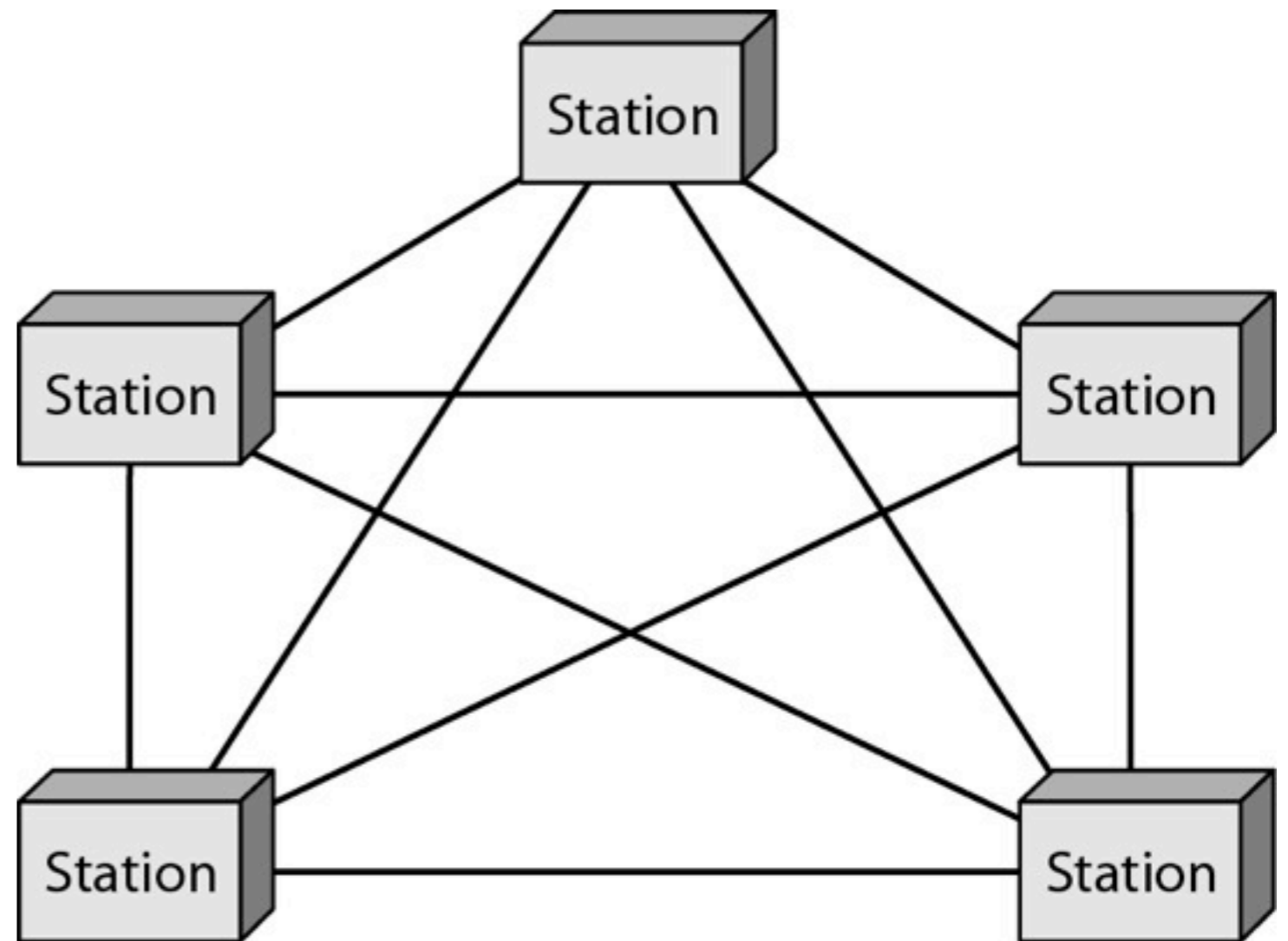
these are four basic topologies possible



Mesh Topology

- In mesh topology, every device has a dedicated point to point link to every other device
- the term dedicated means that the link carries traffic only between the two devices it connects
- In mesh topology, we need:

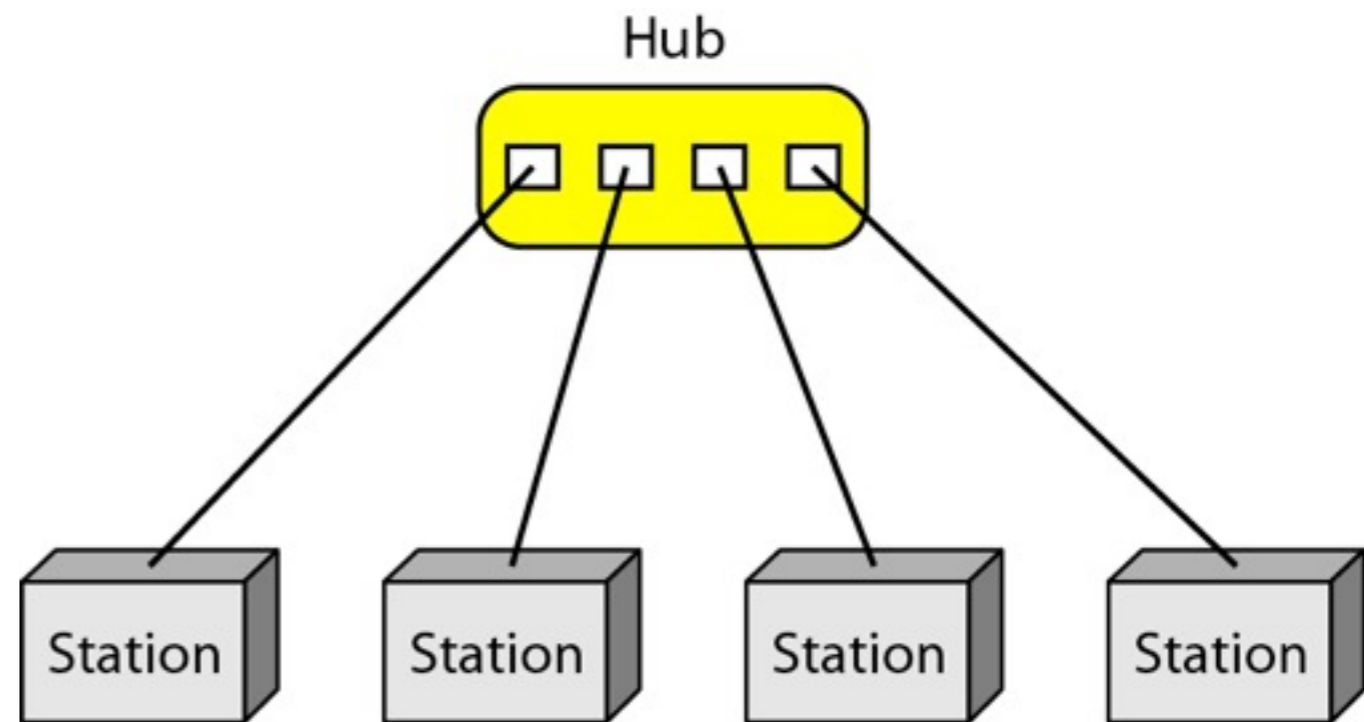
$$n(n-1)/2$$



- ❖ Dengan bentuk hubungan seperti itu, topologi mesh memiliki beberapa kelebihan, yaitu:
 - ❖ Hubungan dedicated links menjamin data langsung dikirimkan ke komputer tujuan tanpa harus melalui komputer lainnya sehingga dapat lebih cepat karena satu link digunakan khusus untuk berkomunikasi dengan komputer yang dituju saja (tidak digunakan secara beramai-ramai/sharing).
 - ❖ Memiliki sifat Robust, yaitu Apabila terjadi gangguan pada koneksi komputer A dengan komputer B karena rusaknya kabel koneksi (links) antara A dan B, maka gangguan tersebut tidak akan memengaruhi koneksi komputer A dengan komputer lainnya.
 - ❖ Privacy dan security pada topologi mesh lebih terjamin, karena komunikasi yang terjadi antara dua komputer tidak akan dapat diakses oleh komputer lainnya.
 - ❖ Memudahkan proses identifikasi permasalahan pada saat terjadi kerusakan koneksi antar komputer.
- ❖ Meskipun demikian, topologi mesh bukannya tanpa kekurangan. Beberapa kekurangan yang dapat dicatat yaitu:
 - ❖ Membutuhkan banyak kabel dan Port I/O. semakin banyak komputer di dalam topologi mesh maka diperlukan semakin banyak kabel links dan port I/O (lihat rumus penghitungan kebutuhan kabel dan Port).
 - ❖ Hal tersebut sekaligus juga mengindikasikan bahwa topologi jenis ini * Karena setiap komputer harus terkoneksi secara langsung dengan komputer lainnya maka instalasi dan konfigurasi menjadi lebih sulit.
 - ❖ Banyaknya kabel yang digunakan juga mengisyaratkan perlunya space yang memungkinkan di dalam ruangan tempat komputer-komputer tersebut berada.
- ❖ Berdasarkan kelebihan dan kekurangannya, topologi mesh biasanya diimplementasikan pada komputer-komputer utama dimana masing-masing komputer utama tersebut membentuk jaringan tersendiri dengan topologi yang berbeda (hybrid network).

Star Topology

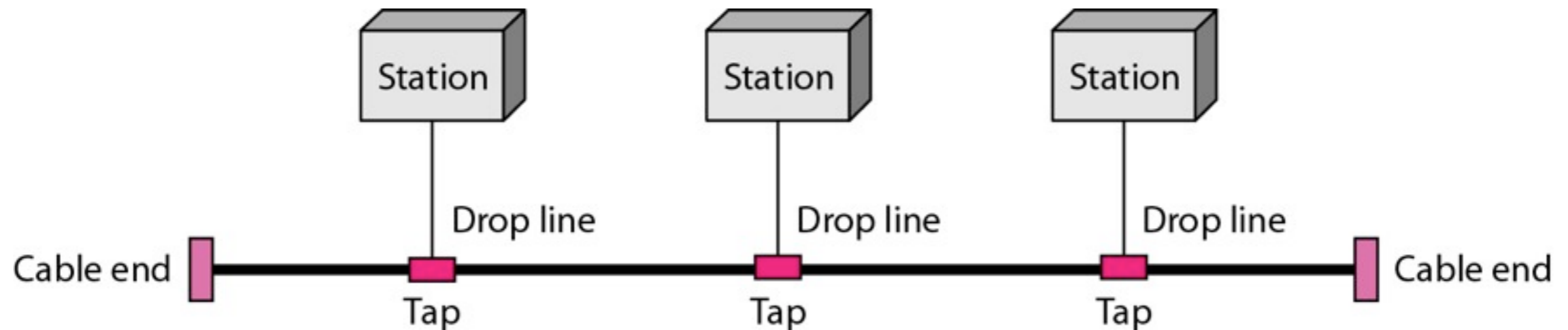
- In star topology, each device has a dedicated point to point link only to a central controller, usually called hub.
- the devices are not directly linked to one another
- unlike a mesh topology, a star topology does not allow direct traffic between devices. the controller acts as an exchange. If one device wants to send data to another, it sends the data to the controller



- Berikut Keuntungan Memakai Star Topology (Topologi Bintang) :
 - ❖ Lebih Mudah Dalam Pengelolaan Jaringan Karena Kontrol terpusat pada server
 - ❖ Pengembangan jaringan lebih Fleksibel
 - ❖ Deteksi masalah Jaringan lebih Mudah
 - ❖ Pemasangan atau Perubahan Struktur Jaringan Lebih Mudah
- Meskipun Begitu pada Jaringan ini juga Terdapat Kekurangannya Berikut Kekurangan Penggunaan Topologi Bintang :
 - ❖ Biaya Pembuatan Jaringan Relatif mahal karena Kabel digunakan cenderung lebih banyak
 - ❖ Sangat Rawan pada hubungan karena kerusakan Hubungan akan Mempengaruhi Sistem Secara Keseluruhan

Bus Topology

- A bus topology, is multipoint
- One long cable acts as a backbone to link all the devices in a network
- Nodes are connected to the bus cable by drop lines and taps

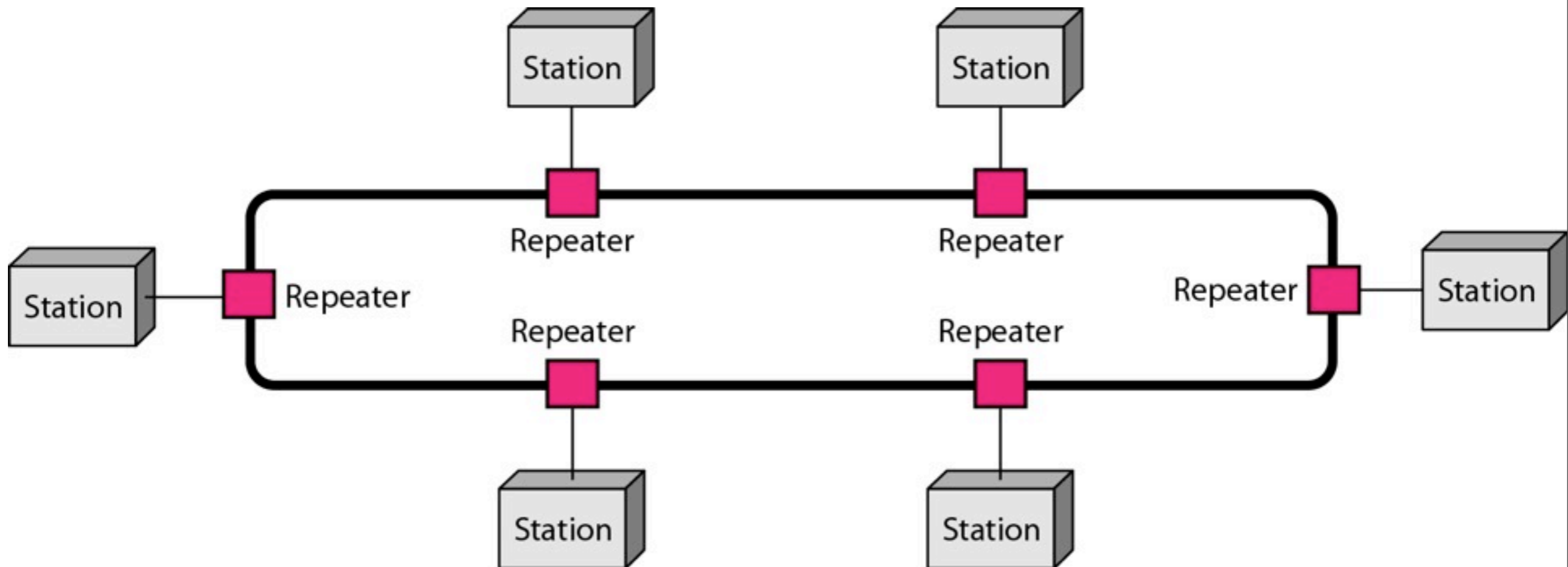


- Keuntungan topologi bus
 - ❖ Hemat kabel, karena pada topologi bus hanya menggunakan kabel tunggal dan terpusat sebagai media transmisi sehingga tidak membutuhkan banyak kabel.
 - ❖ Layout kabel sederhana, pada pemasangan topologi bus rancangan dan skema kabel yang digunakan sangat sederhana sehingga mudah dalam pemasangannya.
 - ❖ Pengembangan jaringan komputer atau penambahan komputer baru baik sebagai server maupun client dapat dilakukan dengan mudah tanpa mengganggu komputer atau workstation yang lain.

- Kerugian topologi bus
 - ❖ Deteksi dan isolasi kesalahan sangat kecil sehingga jika jaringan mengalami gangguan, maka akan lebih sulit untuk mengidentifikasi kesalahan yang ada.
 - ❖ Kepadatan lalu lintas pada jalur utama, karena topologi bus menggunakan kabel terpusat sebagai media transmisi maka lalu lintas data akan sangat padat pada kabel utama.
 - ❖ Jika kabel utama mengalami gangguan maka seluruh jaringan akan mengalami gangguan pula.
 - ❖ Diperlukan repeater sebagai penguat sinyal jika akan menambahkan workstation dengan lokasi yang jauh.

Ring Topology

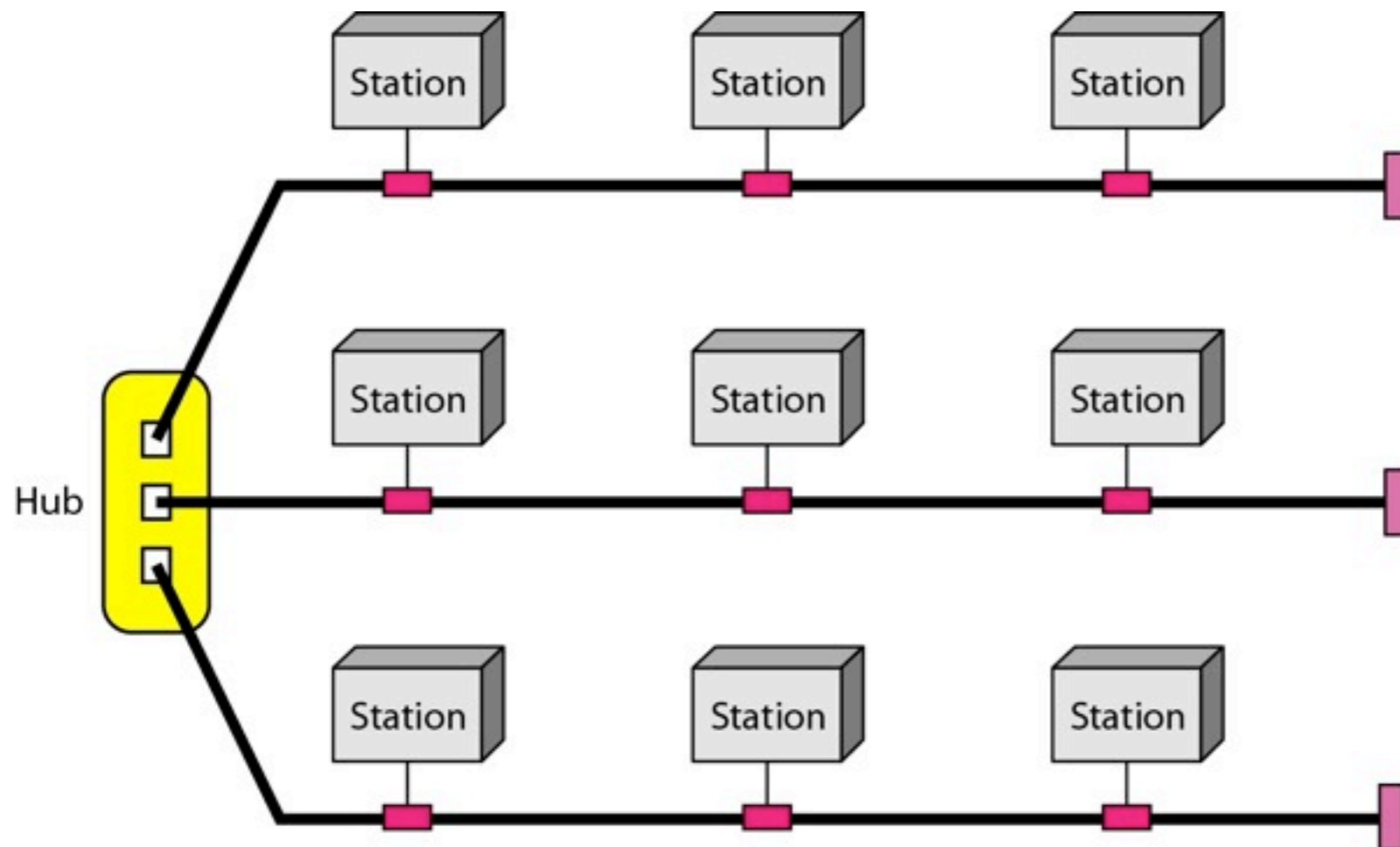
- In a ring topology, each device has a dedicated point to point connectivity with only the two devices on either side of it



- Keuntungan dari penggunaan Topologi Ring:
 - ❖ Tidak ada komputer yang memonopoli jaringan, karena setiap komputer mempunyai hak akses yang sama terhadap token.
 - ❖ Data mengalir dalam satu arah sehingga terjadinya collision dapat dihindarkan.
- Kekurangan dari topologi ring sebagai berikut:
 - ❖ Apabila ada satu komputer dalam ring yang gagal berfungsi, maka akan mempengaruhi keseluruhan jaringan.
 - ❖ Sulit untuk mengatasi kerusakan di jaringan yang menggunakan topologi ring.
 - ❖ Menambah atau mengurangi komputer akan mengacaukan jaringan.
 - ❖ Sulit untuk melakukan konfigurasi ulang.

Hybrid Topology

- A network can be hybrid.
- for example, we can have a main star topology, with each branch connecting several stations in a bus topology



Network Models

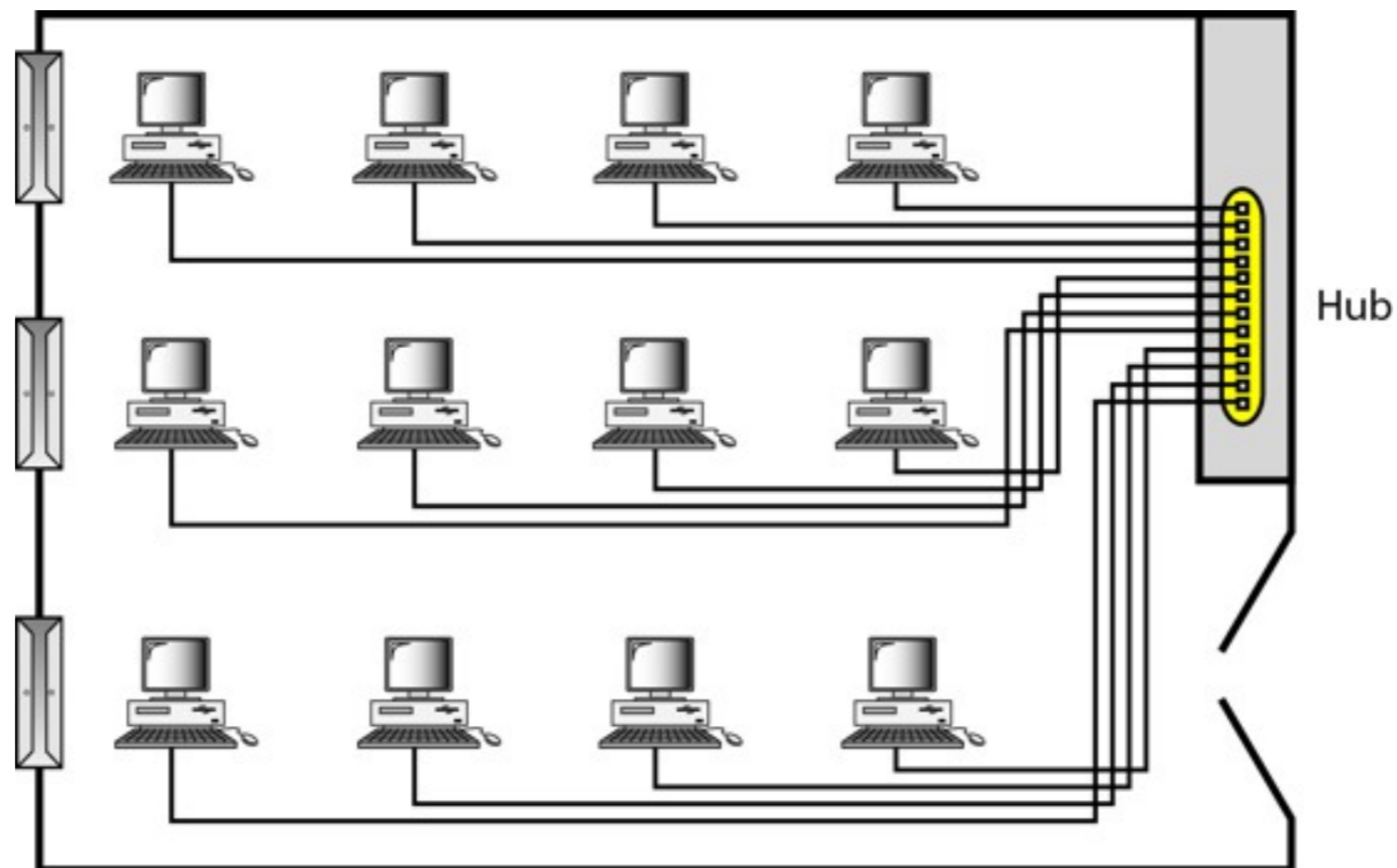
- Computer networks are created by different entities
- Standards are needed so that these heterogeneous networks can communicate with one another
- The best two known standards are the OSI Model and the Internet Model (we discuss in the next chapter)

Categories of Networks

- Today, when we speak of Networks, we are generally referring to two primary categories: Local Area Networks (LAN) and Wide Area Networks (WAN).
- LAN normally covers an area less than 2 miles; a WAN can be worldwide

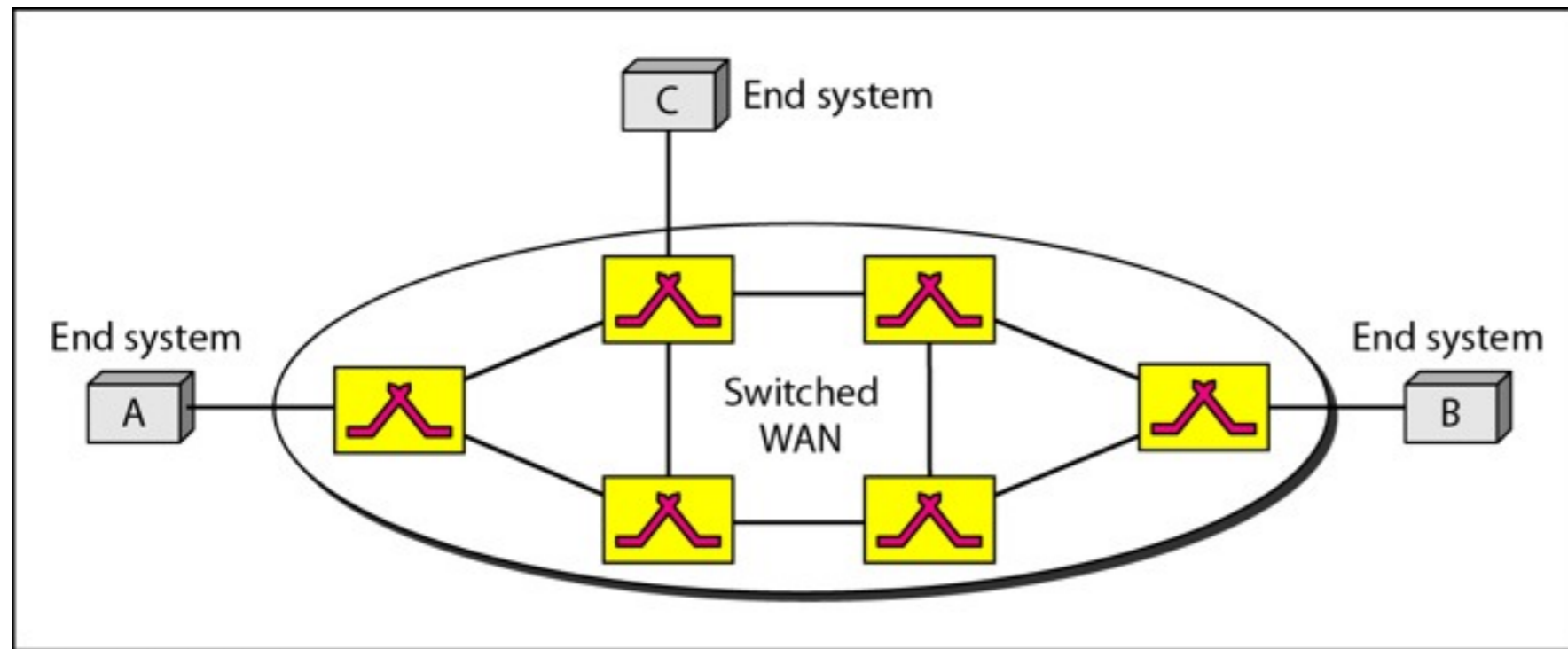
Local Area Networks

- A local area network (LAN) is usually privately owned and links the devices in a single office, building, or campus
- a given LAN will use only one type of transmission medium
- the most common LAN topologies are star, bus, and ring

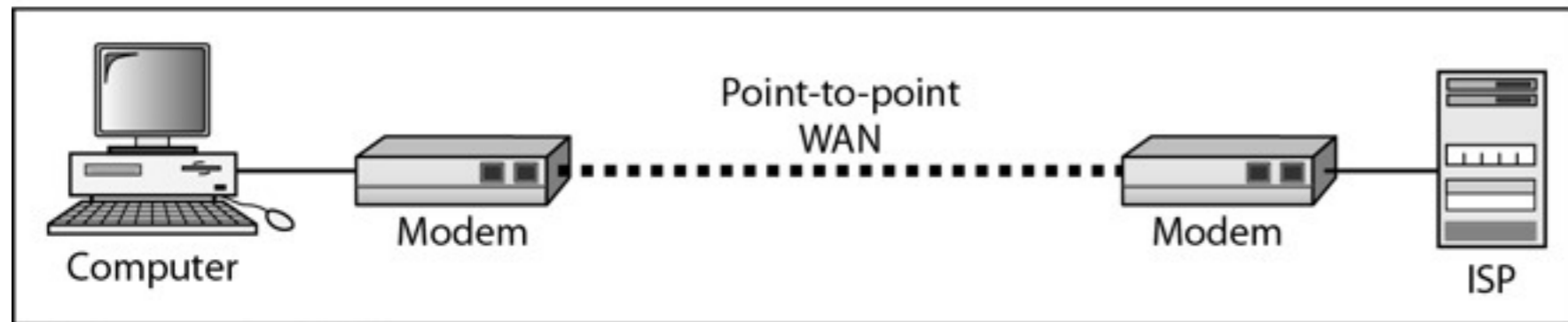


Wide Area Network

- A wide area network (WAN) provides long-distance transmission of data, image, audio, and video information over large geographic areas that may comprise a country, a continent, or even the whole world.
- A WAN can be as complex as the backbones that connect the internet or as simple as dial-up line that connects a home computer to the internet.



a. Switched WAN



b. Point-to-point WAN

An early example of a switched WAN is X.25, a network designed to provide connectivity between end users.

X.25 is gradually replaced by a high speed, more efficient network called Frame Relay.

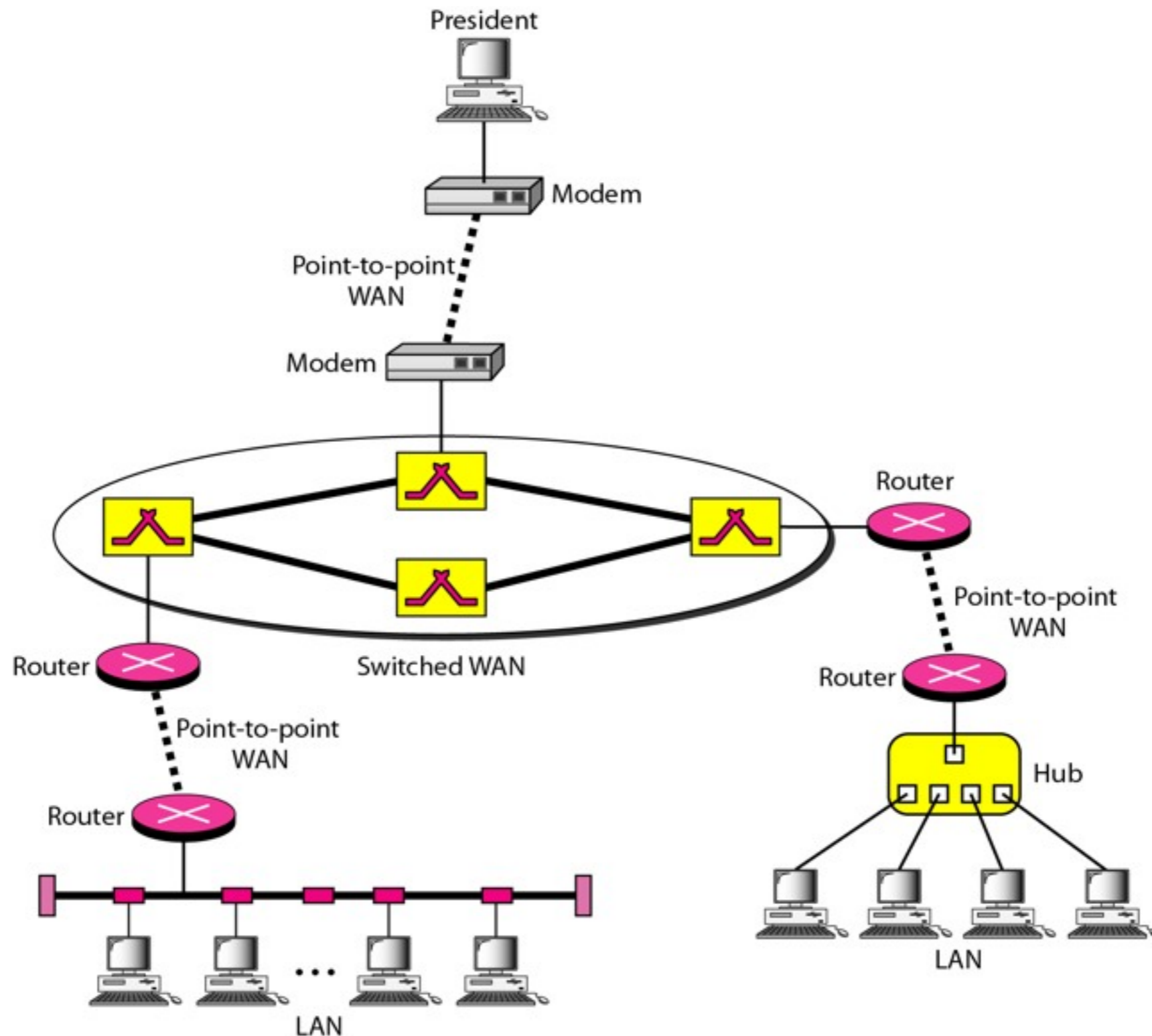
A good example of a switched WAN is the asynchronous transfer mode (ATM) network, which is a network with fixed size data unit packet called cells (we discuss in another chapter)

- a. The switched WAN connects the end systems, which usually comprise a router (internet working device) that connects to another LAN or WAN
- b. the point to point WAN is normally a line leased from a telephone or cable TV provider that connects a home computer or a small LAN to an Internet Service Provider (ISP)

Metropolitan Area Networks

- a metropolitan area networks (MAN) is a network with a size between LAN and a WAN
- It normally covers the area inside a town or a city
- It is designed for customers who need a high speed connectivity, normally to the internet
- A good example of MAN is the part of the telephone company network that can provide a high speed DSL line to the customer

A heterogenous network made of four WANs and two LANs



See you next week...