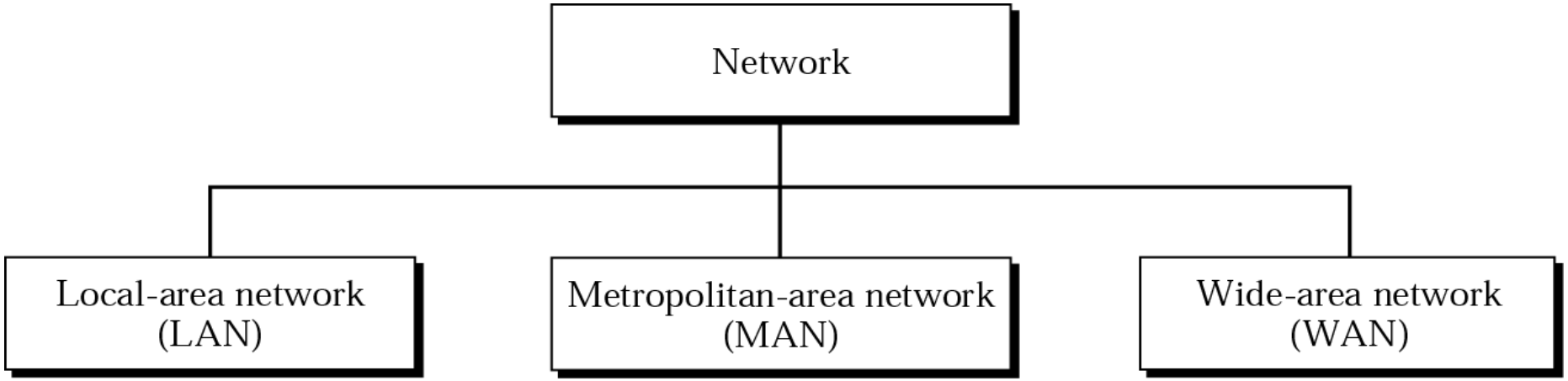
جامعة الحمدانية
كلية التربية
قسم علوم الحاسوب

Categories of Networks

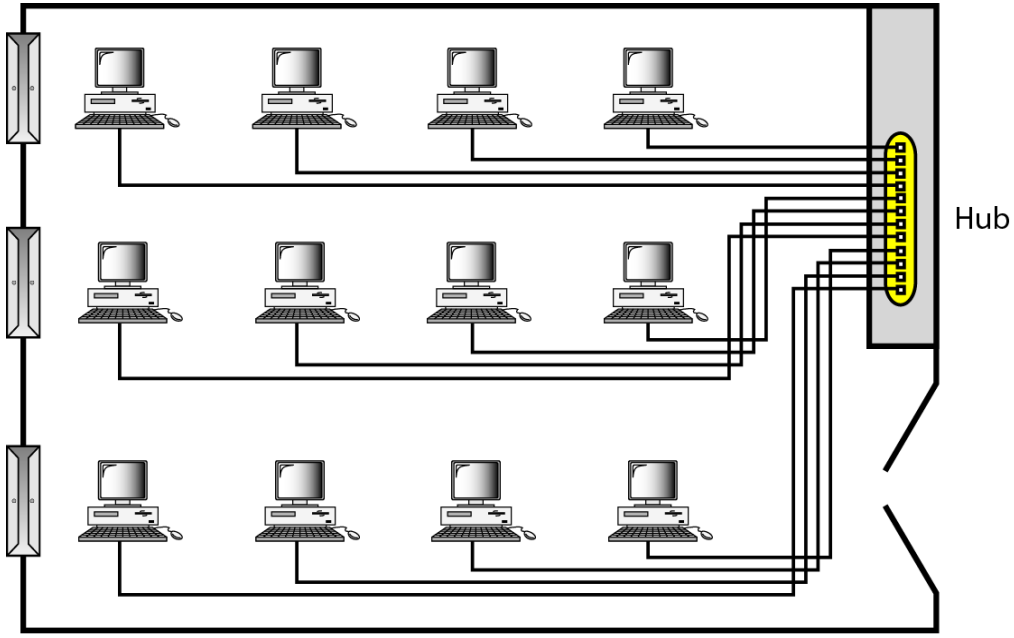
المرحلة الرابعة
ا.م.د نورس يونس السليم
المحاضرة الثالثة

Categories of Networks



Local Area Network (LAN)

A local area network (LAN) is usually privately owned and links the devices in a single office, building, or campus as shown below.



An isolated LAN connecting 12 computers to a hub in a closet

LAN can be as simple as two PCs and a printer in someone's home office; or it can extend throughout a company.

LAN size is limited to a few kilometers.

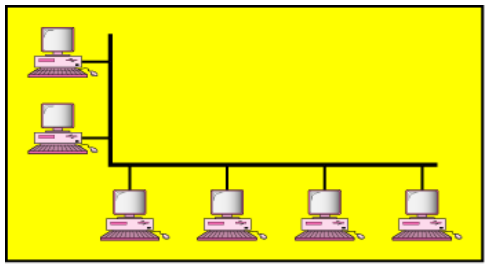
Main Goal: LANs are designed to allow resources to be shared between personal computers or workstations. The resources to be shared can include hardware (e.g., a printer), software (e.g., an application program), or data.

One of the computers may be given a large capacity disk drive and may become a server to clients. Software can be stored on this central server and used as needed by the whole group.

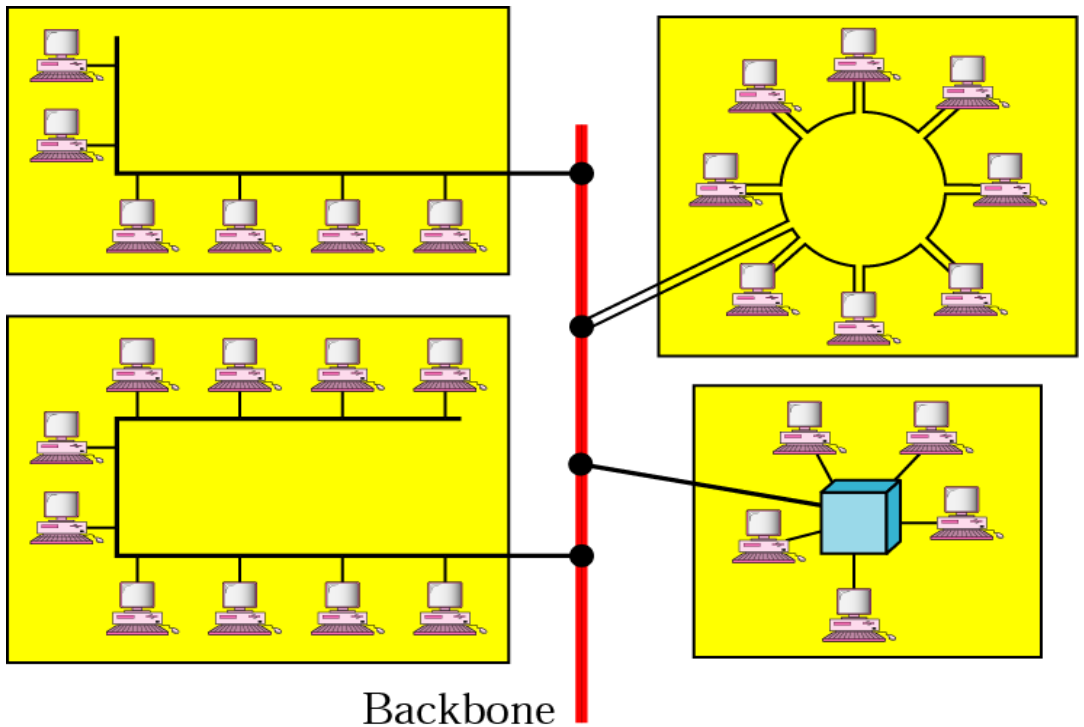
The most common LAN topologies are bus, ring, and star.

LANs had data rates are: 4 -16 Mbps,100 Mbps and 1Gigabps

Wireless LANs are the newest evolution in LAN technology.



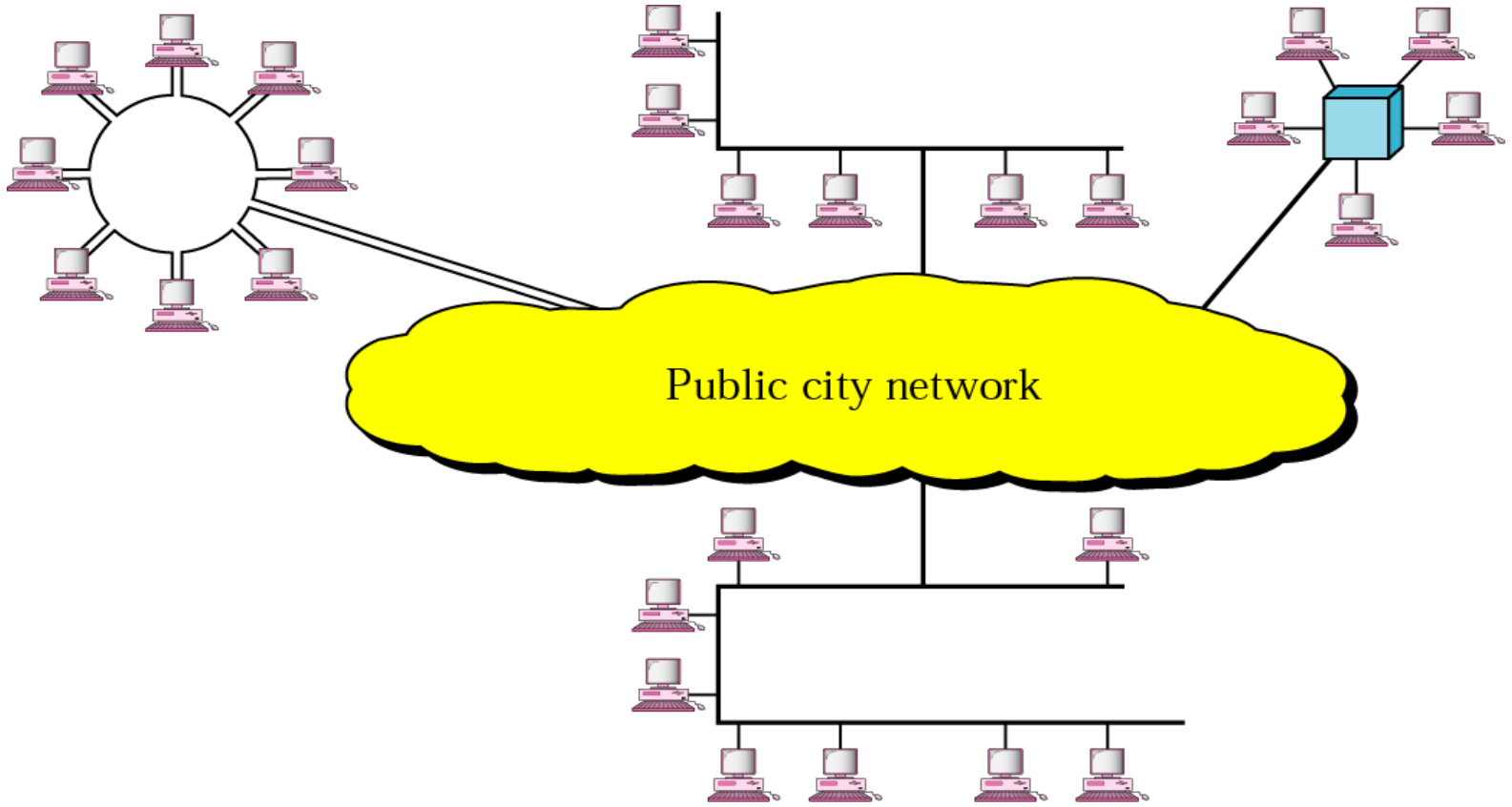
a. Single-building LAN



b. Multiple-building LAN

Metropolitan Area Network (MAN)

It normally covers the area inside a town or a city.

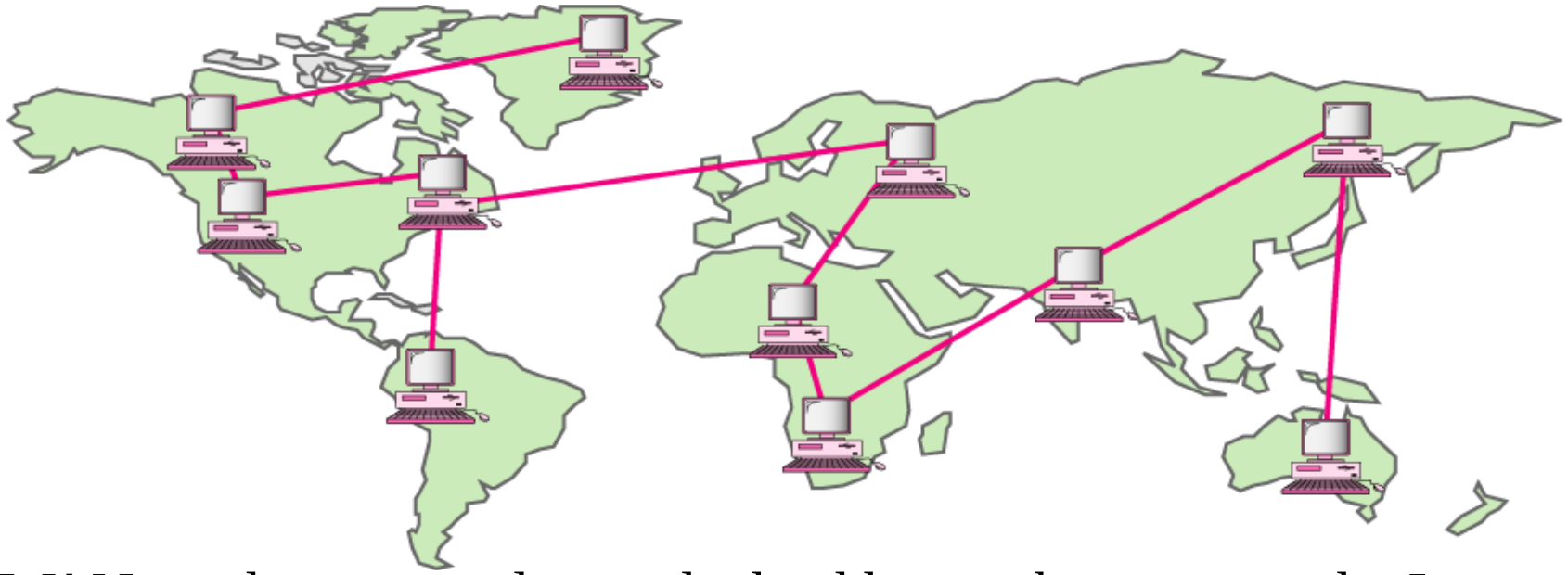


It is designed for customers who need a high-speed connectivity.

A good example of a MAN is the part of the telephone company network that can provide a high-speed DSL line to the customer. Another example is the cable TV network that originally was designed for cable TV.

Wide Area Network (WAN)

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.

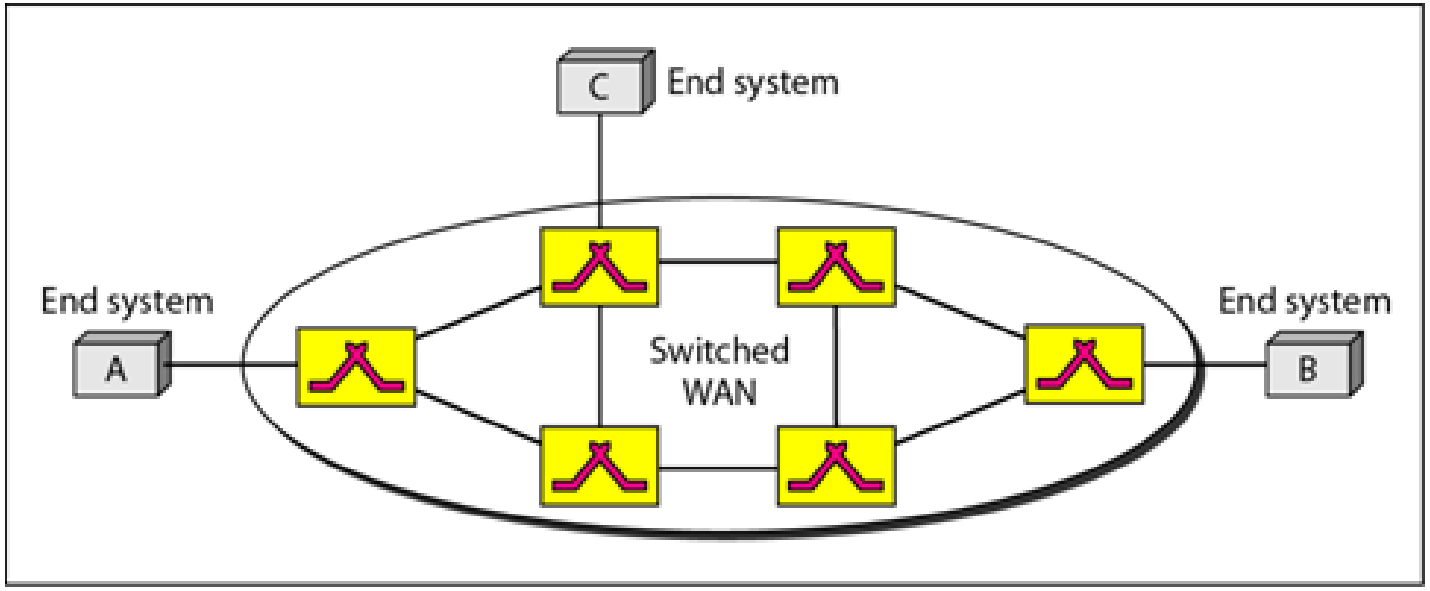


A WAN can be as complex as the backbones that connect the Internet.

A WAN can be as complex as the backbones that connect the Internet or simple as a dial-up line that connects a home computer to the Internet. We normally refer to the first as a switched WAN and to the second as a point-to-point WAN.

A. Switched WAN

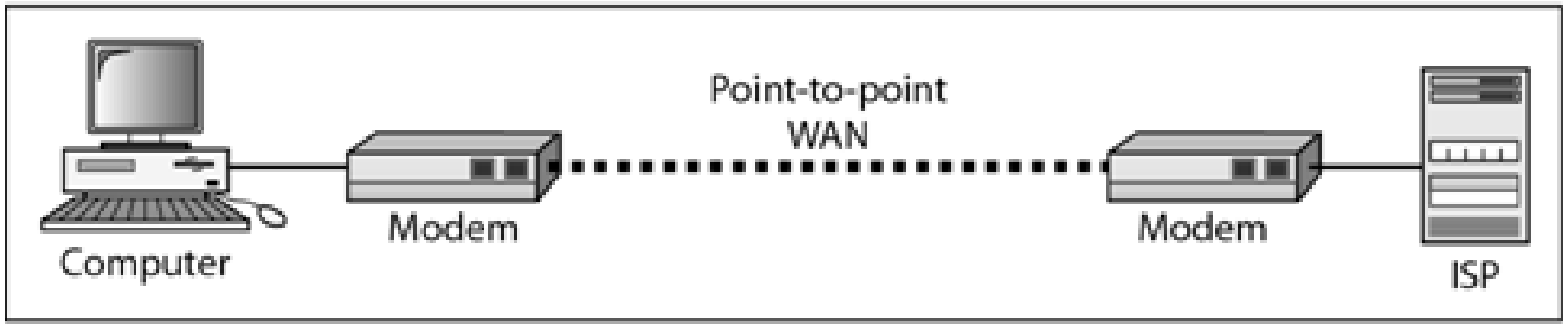
The switched WAN connects the end systems, which usually comprise a router (internetworking connecting device) that connects to another LAN or WAN.



a. Switched WAN

B. point-to-point WAN

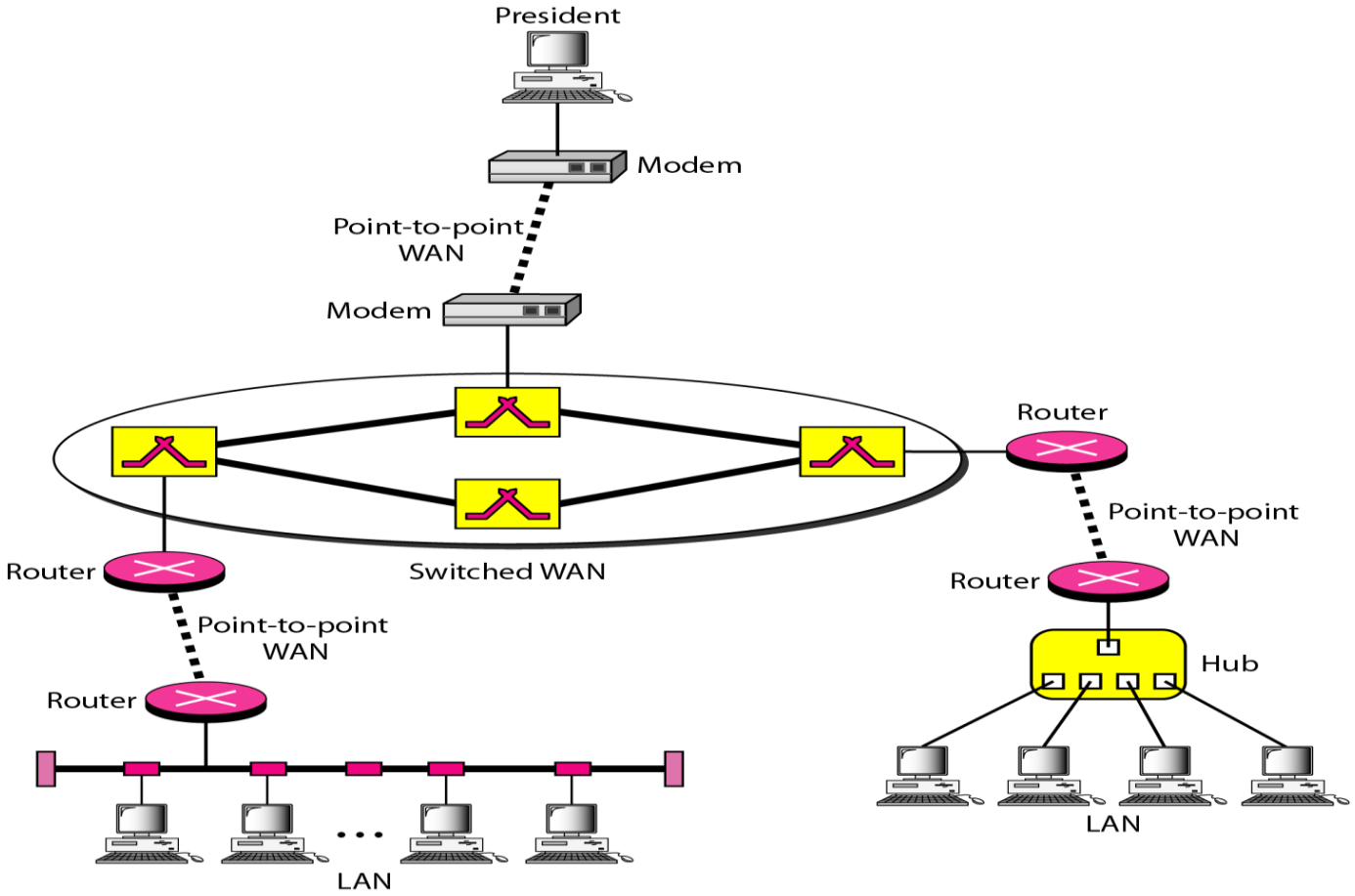
The point-to-point WAN is normally a line leased from a telephone or cable TV provider that connects a home computer or a small LAN to an Internet service provider (lSP). (Modem or Router)



b. Point-to-point WAN

Interconnection of Networks: Internetwork

When two or more networks are connected, they become an internetwork, or internet.



The Internet

A Brief History

An internet (note the lowercase letter i) is two or more networks that can communicate with each other. The most notable internet is called the Internet (uppercase letter I), a collaboration of more than hundreds of thousands of interconnected networks.

The Internet Today

Today most end users who want Internet connection use the services of Internet service providers (ISP). There are :

International Service Providers

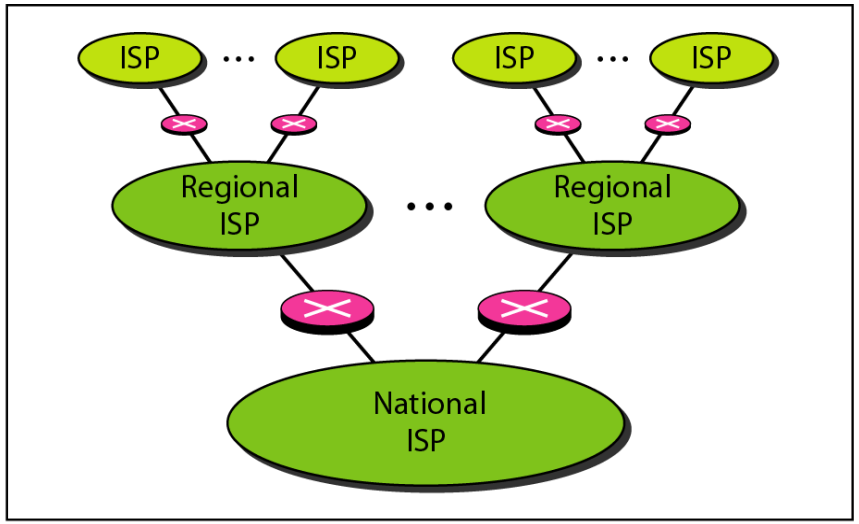
National Service Providers

Regional Service Providers

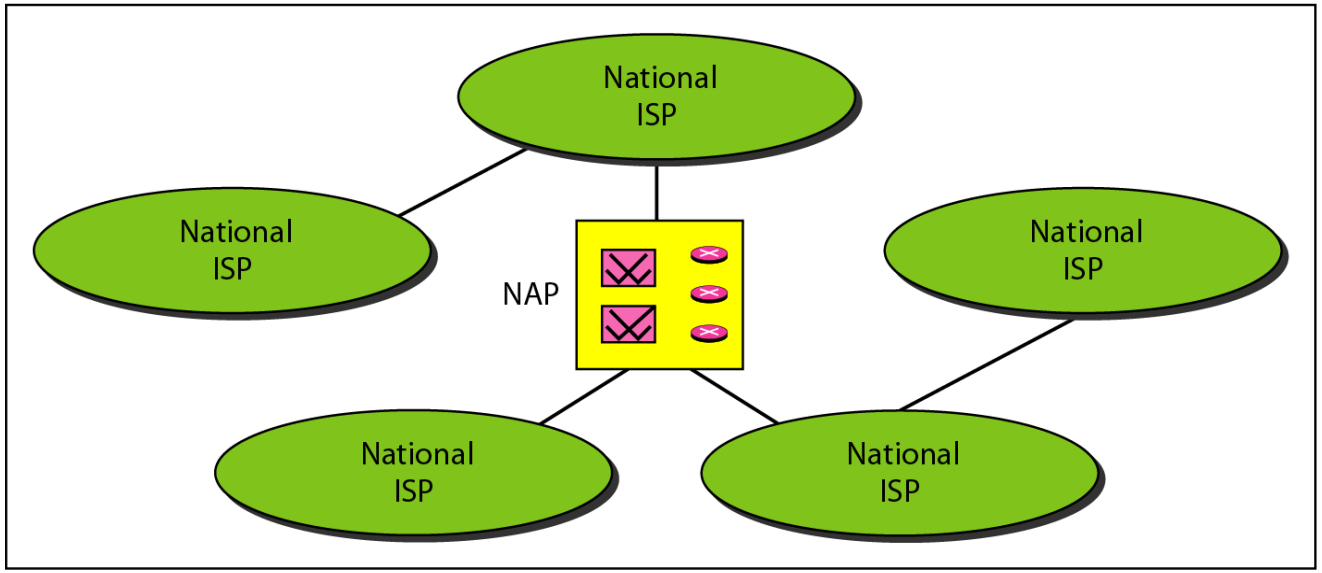
Local Service Providers

The Internet today is run by private companies, not the government.

Hierarchical organization of the Internet



a. Structure of a national ISP



b. Interconnection of national ISPs

International Internet Service Providers

At the top of the hierarchy are the international service providers that connect nations together.

National Internet Service Providers

To provide connectivity between the end users, these backbone networks are connected by complex switching stations (normally run by a third party) called network access points (NAP: for connecting two countries).

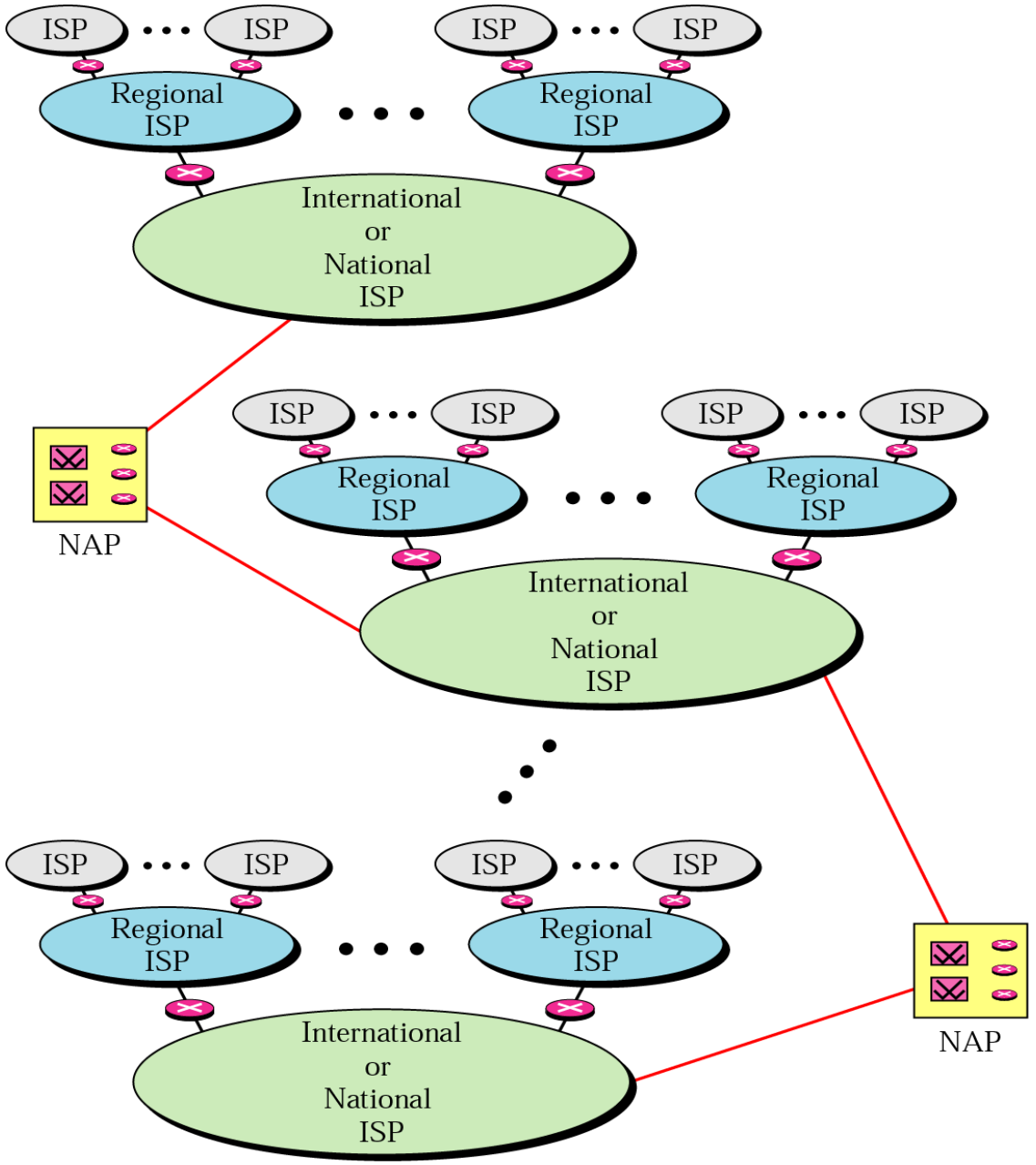
Regional Internet Service Providers

Regional internet service providers or regional ISPs are smaller ISPs that are connected to one or more national ISPs. They are at the third level of the hierarchy with a smaller data rate.

Local Internet Service Providers

Local Internet service providers provide direct service to the end users. The local ISPs can be connected to regional ISPs or directly to national ISPs. Most end users are connected to the local ISPs. A local ISP can be a company that just provides Internet services.

Internet today



PROTOCOLS AND STANDARDS

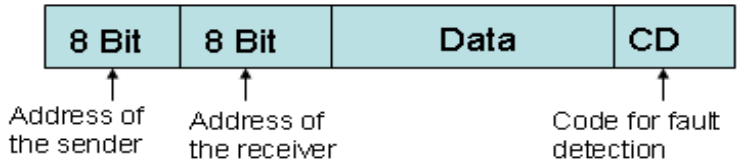
In this section, we define two widely used terms: protocols and standards. First, we define *protocol*, which is synonymous with *rule*. Then we discuss *standards*, which are agreed-upon rules.

Protocols

A protocol is a set of rules that lead data communications. An entity is anything capable of sending or receiving information.

The key elements of a protocol are:

Syntax: refers to the structure or format of the data, meaning the order in which they are presented. Example:



Semantics: refers to the meaning of each section of bits.

Timing: refers to two characteristics: when data should be sent and how fast they can be sent.

Standards

Standards provide guidelines to manufacturers, vendors, government agencies and other service providers to ensure the kind of interconnectivity necessary in today's market place and in international communications.

Data communication standards fall into two categories: *de facto* (meaning "by fact" or "by convention") and *de jure* (meaning "by law" or "by regulation").

De facto: Standards that have not been approved by an organized body but have been adopted as standards through widespread use are de facto standards.

De jure: Those standards that have been legislated by an officially recognized body are de jure standards.

Standards Organizations

1.International Organization for Standardization (ISO):The ISO is a multinational body whose membership is drawn mainly from the standards creation committees of various governments throughout the world.

2.International Telecommunication Union Telecommunication Standards Sector (ITU-T):By the early 1970s, a number of countries were defining national standards for telecommunications, but there was still little international compatibility. The United Nations responded by forming, as part of its International Telecommunication Union (ITU), a committee, the Consultative Committee for International Telegraphy and Telephony (CCITT).

Standards Organizations

3.American National Standards Institute (ANSI):Despite its name, the American National Standards Institute is a completely private, nonprofit corporation not affiliated with the U.S. federal government. However, all ANSI activities are undertaken with the welfare of the United States and its citizens occupying primary importance.

4.Institute of Electrical and Electronics Engineers (IEEE):The Institute of Electrical and Electronics Engineers is the largest professional engineering society in the world. International in scope, it aims to advance theory, creativity, and product quality in the fields of electrical engineering, electronics, and radio as well as in all related branches of engineering

5.Electronic Industries Association (EIA):Aligned with ANSI, the Electronic Industries Association is a nonprofit organization devoted to the promotion of electronics manufacturing concerns.

SUMMARY

1. A LAN is a data communication system within a building, plant, or campus, or between nearby buildings.
2.A WAN is a data communication system spanning states, countries, or the whole world.
3.An internet is a network of networks.
4.The Internet is a collection of many separate networks.
5. There are local, regional, national, and international Internet service providers.
6.A protocol is a set of rules that govern data communication; the key elements of a protocol are syntax, semantics, and timing. Standards are necessary to ensure that products from different manufacturers can work together as expected.
7.Standards are necessary to ensure that products from different manufacturers can work together as expected.
8.The ISO, ITD-T, ANSI, IEEE, and EIA are some of the organizations involved in standards creation.