DATA COMUNICATION

Course assessment

- Attends +quizzes 30
- Final exam 70

- Total 100

Pre-course and suffix course

- Pre-course:

  Computer introduction, programming skills
- Suffix course:

  Network

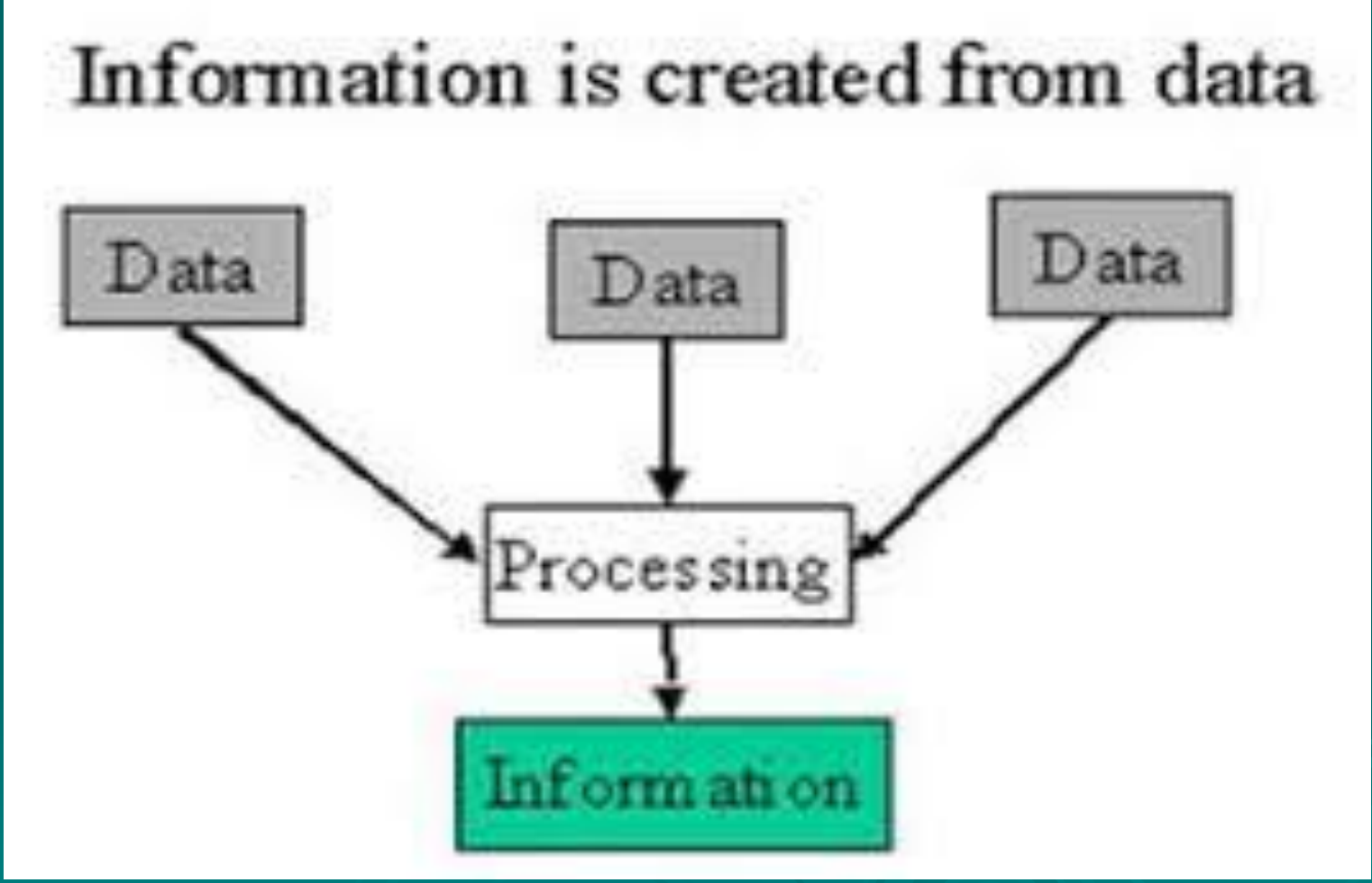
references

- data and computer communication 9 edition William stalling

Course content

- **Chapter one**
- Introduction to data & computer communication
- **Chapter two**
- OSI model
- **Chapter three**
- Analog and digital signal
- **Chapter four**
- Data flow (TCP/IP)

DATA & information



Computer Communication

Why study data communication

- Education & research
- Entertainment
- Business
- Space mission
- PC revolution
- Telecommunication

Characteristics of data communication

- Delivery
- Accuracy
- Timeliness
- jitter

Data and Computer Communications

Chapter 1 – Data Communications, Data Networks, and the Internet

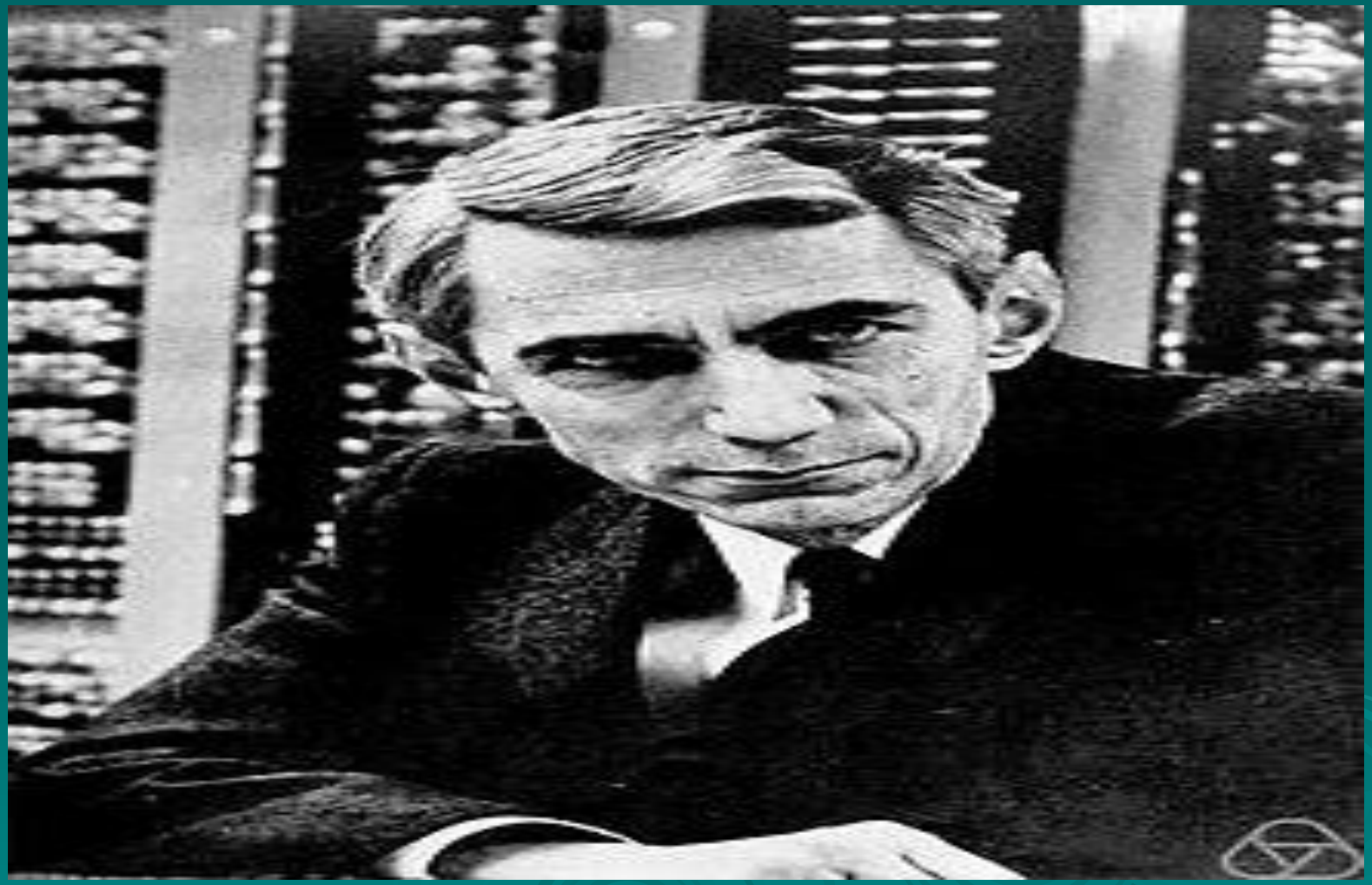
Eighth Edition

by William Stallings

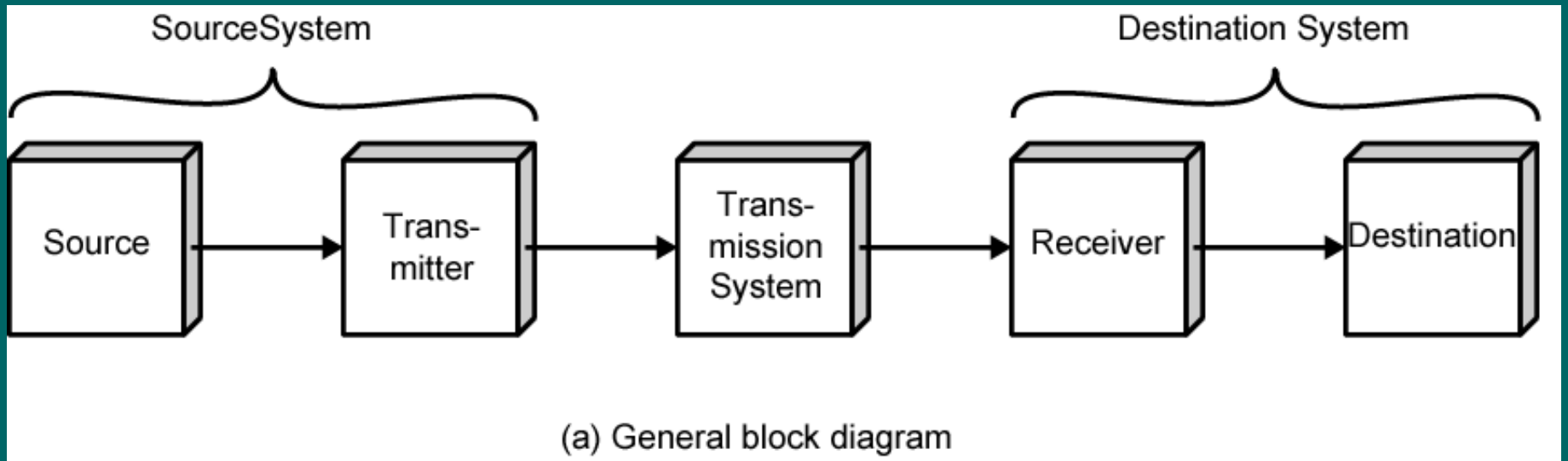
Data Communications, Data Networks, and the Internet

- **The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point - The Mathematical Theory of Communication, Claude Shannon**
- DEF. Exchange data between two devices via some forms of transmission medium.

Cluade E. shannon



A Communications Model



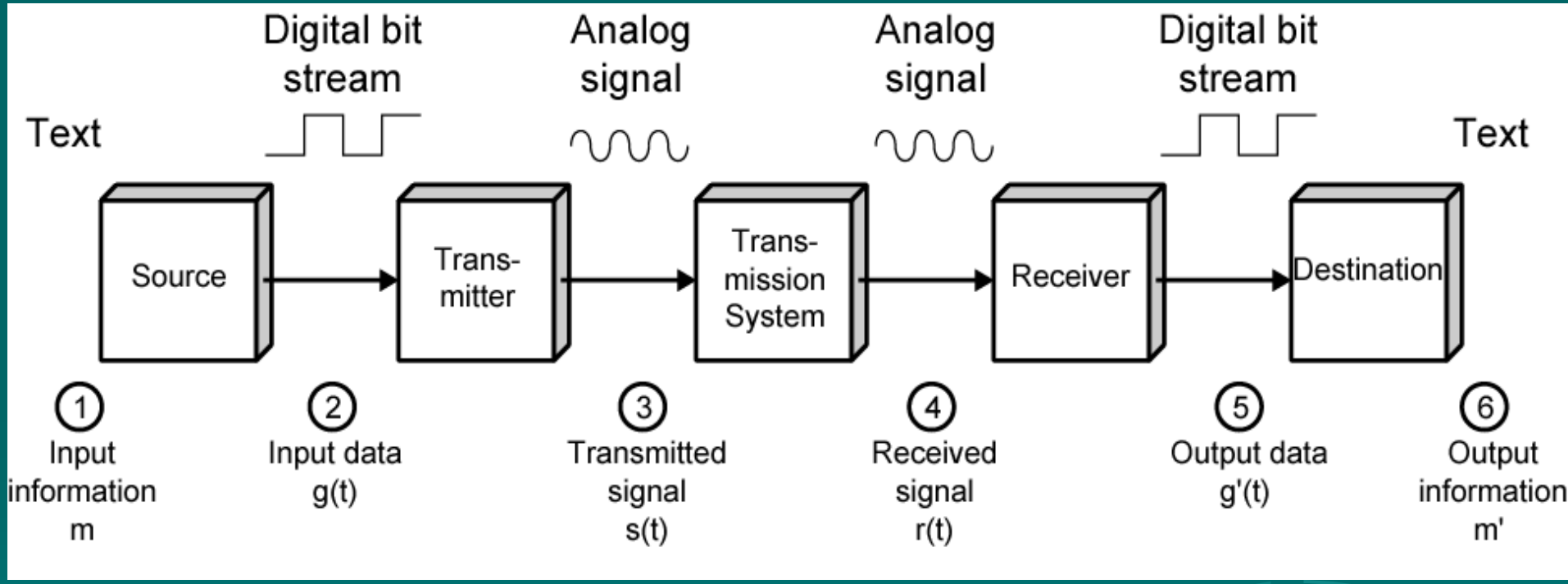
(a) General block diagram

(b) Example

Communications Tasks

Transmission system utilization	Addressing
Interfacing	Routing
Signal generation	Recovery
Synchronization	Message formatting
Exchange management	Security
Error detection and correction	Network management
Flow control	

Data Communications Model



Transmission Medium

- selection is a basic choice
  - internal use entirely up to business
  - long-distance links made by carrier
- rapid technology advances change mix
  - fiber optic
  - wireless
- transmission costs still high
- hence interest in efficiency improvements

Networking

- growth of number & power of computers is driving need for interconnection
- also seeing rapid integration of voice, data, image & video technologies
- two broad categories of communications networks:
  - Local Area Network (LAN)
  - Wide Area Network (WAN)

Wide Area Networks

- span a large geographical area
- cross public rights of way
- rely in part on common carrier circuits
- alternative technologies used include:
  - circuit switching
  - packet switching
  - frame relay
  - Asynchronous Transfer Mode (ATM)

Circuit Switching

- uses a dedicated communications path established for duration of conversation
- comprising a sequence of physical links
- with a dedicated logical channel
- eg. telephone network
- Wasted bandwidth
- High cost

Packet Switching

- data sent out of sequence
- small chunks (packets) of data at a time
- packets passed from node to node between source and destination
- used for terminal to computer and computer to computer communications

Frame Relay

- packet switching systems have large overheads to compensate for errors
- modern systems are more reliable
- errors can be caught in end system
- Frame Relay provides higher speeds
- with most error control overhead removed

Asynchronous Transfer Mode

- ATM
- evolution of frame relay
- fixed packet (called cell) length
- with little overhead for error control
- anything from 10Mbps to Gbps
- constant data rate using packet switching technique with multiple virtual circuits

Local Area Networks

- smaller scope
  - Building or small campus
- usually owned by same organization as attached devices
- data rates much higher
- switched LANs, eg Ethernet
- wireless LANs

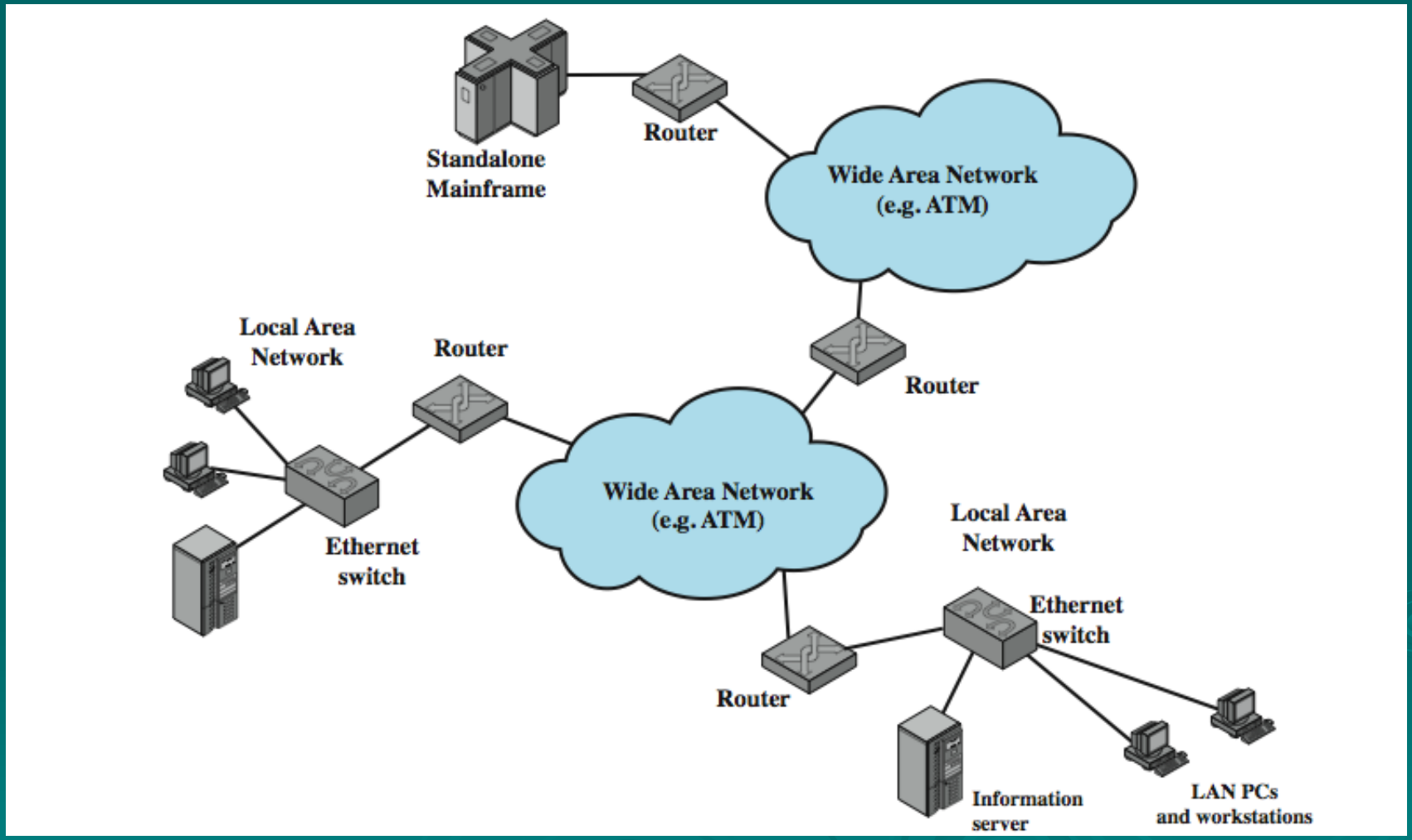
Metropolitan Area Networks

- MAN
- middle ground between LAN and WAN
- private or public network
- high speed
- large area

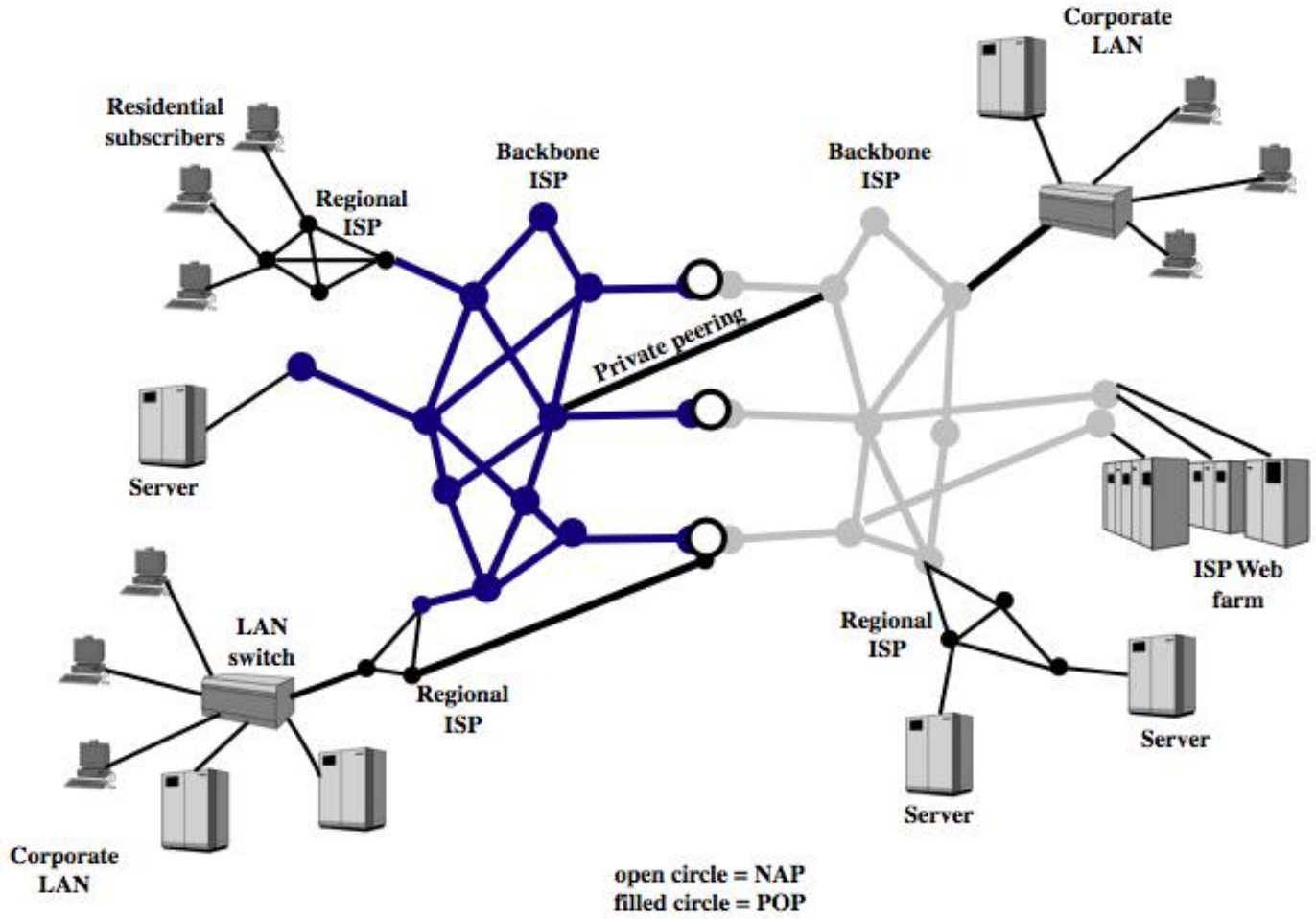
The Internet

- Internet evolved from ARPANET
  - first operational packet network
  - applied to tactical radio & satellite nets also
  - had a need for interoperability
  - led to standardized TCP/IP protocols

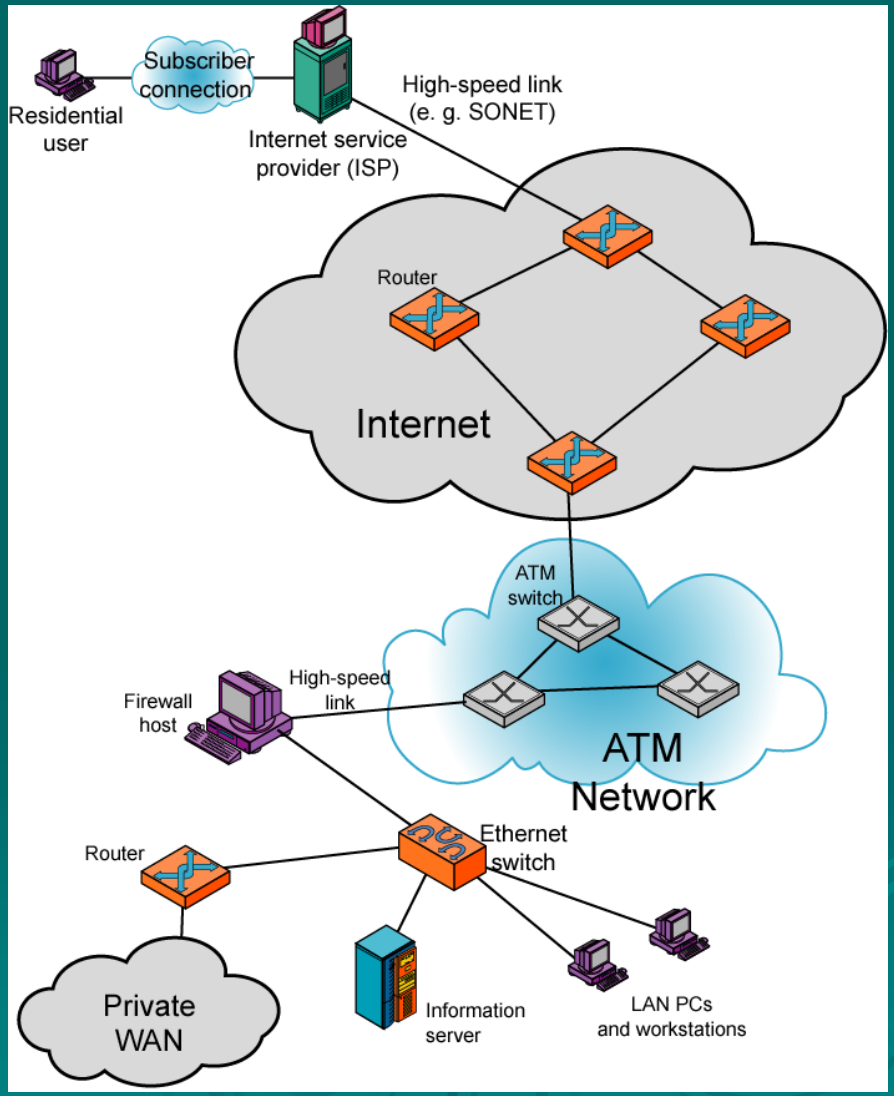
Internet Elements



Internet Architecture



Example Configuration



Questions

- What is the data communication motivation?
- What is the characteristic of DC?
- What is the tasks of DC?
- Shanon?
- Error detection and correction?
- WAN technologies?
- Deference netween fame relay and ATM?

Summary

- introduced data communications needs
- communications model
- defined data communications
- overview of networks
- introduce Internet