William Stallings
Data and Computer Communications
7th Edition

Chapter 1
Data Communications and Networks Overview

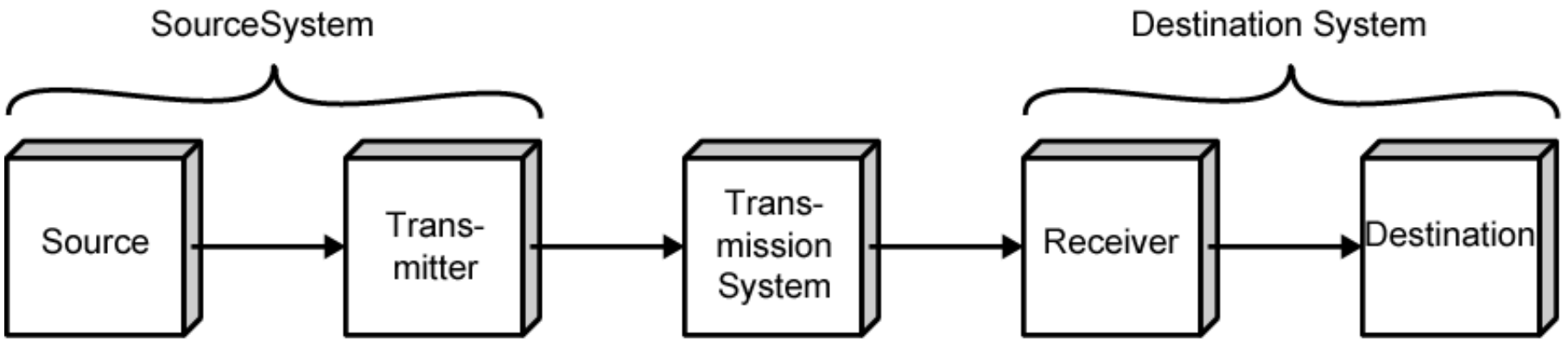
A Communications Model

- Source
  - —generates data to be transmitted
- Transmitter
  - —Converts data into transmittable signals
- Transmission System
  - —Carries data
- Receiver
  - —Converts received signal into data
- Destination
  - —Takes incoming data

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	

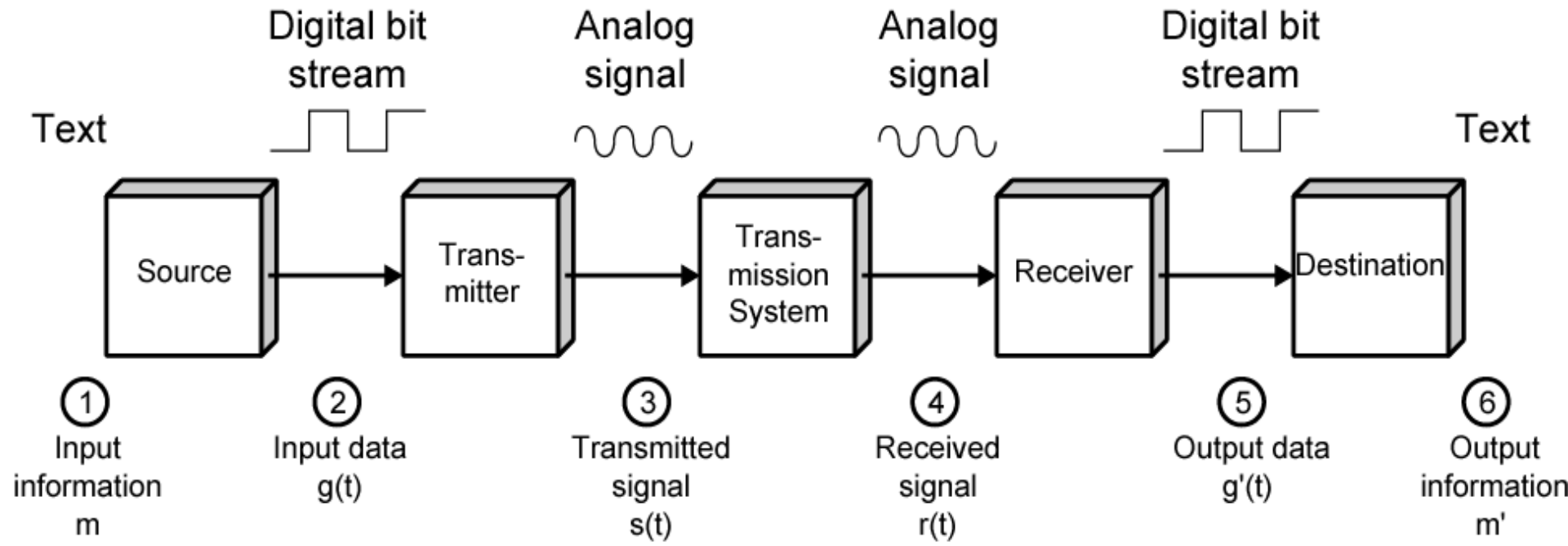
Simplified Communications Model - Diagram



(a) General block diagram

(b) Example

Simplified Data Communications Model



Networking

- Point to point communication not usually practical
  - —Devices are too far apart
  - —Large set of devices would need impractical number of connections
- Solution is a communications network
  - —Wide Area Network (WAN)
  - —Local Area Network (LAN)

Wide Area Networks

- Large geographical area
- Crossing public rights of way
- Rely in part on common carrier circuits
- Alternative technologies
  - Circuit switching
  - Packet switching
  - Frame relay
  - Asynchronous Transfer Mode (ATM)

Circuit Switching

- Dedicated communications path established for the duration of the conversation
- e.g. telephone network

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
- Most overhead for error control is stripped out

Asynchronous Transfer Mode

- ATM
- Evolution of frame relay
- Little overhead for error control
- Fixed packet (called cell) length
- Anything from 10Mbps to Gbps
- Constant data rate using packet switching technique

Local Area Networks

- Smaller scope
  - —Building or small campus
- Usually owned by same organization as attached devices
- Data rates much higher
- Usually broadcast systems
- Now some switched systems and ATM are being introduced

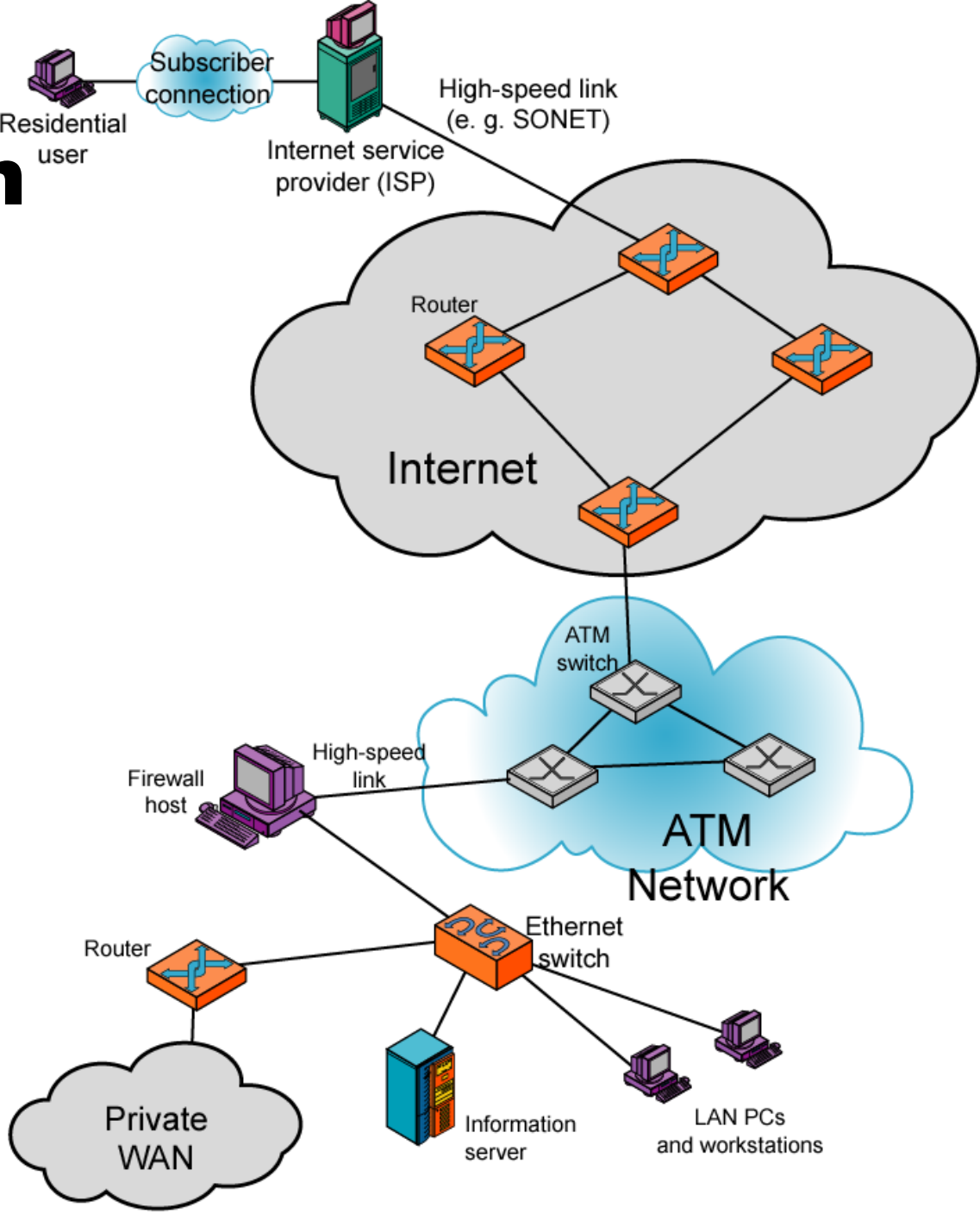
LAN Configurations

- Switched
  - —Switched Ethernet
    - May be single or multiple switches
  - —ATM LAN
  - —Fibre Channel
- Wireless
  - —Mobility
  - —Ease of installation

Metropolitan Area Networks

- MAN
- Middle ground between LAN and WAN
- Private or public network
- High speed
- Large area

Networking Configuration



Further Reading

- Stallings, W. [2003] Data and Computer Communications (7th edition), Prentice Hall, Upper Saddle River NJ, chapter 1
- Web site for Stallings book
  - http://williamstallings.com/DCC7e.html