Data Communications

Department of Computer Engineering
Faculty of Engineering
King Mongkut's Institute of Technology Ladkrabang

Instructors

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Course Description

- Basic concepts of data communication; OSI model; signal characteristics; encoding and modulating; transmission of digital data; communication interface device; communication media; data multiplexing; high speed digital access (Digital Subscriber Line (xDSL), integrated services digital network (ISDN), Cable TV, SONET/SDH,); error detection and correction; data link flow control; switching; point-to-point protocol (PPP); multiple access.

Text Book & Grading

- Text Book
  - B. A. Forouzan, Data Communications and Networking, 4th edition, McGRAW-HILL
- Grading Policy
  - Online Practice 5%
  - Assignment 15%
  - Activity 20%
  - Midterm Exam 30%
  - Final Exam 30%

Score	Grade
>=85.00	A
>=77.00	B+
>=70.00	B
>=65.00	C+
>=60.00	C
>=55.00	D+
>=50.00	D
<50.00	F

Chapter 1
Introduction

Jirasak Sittigorn
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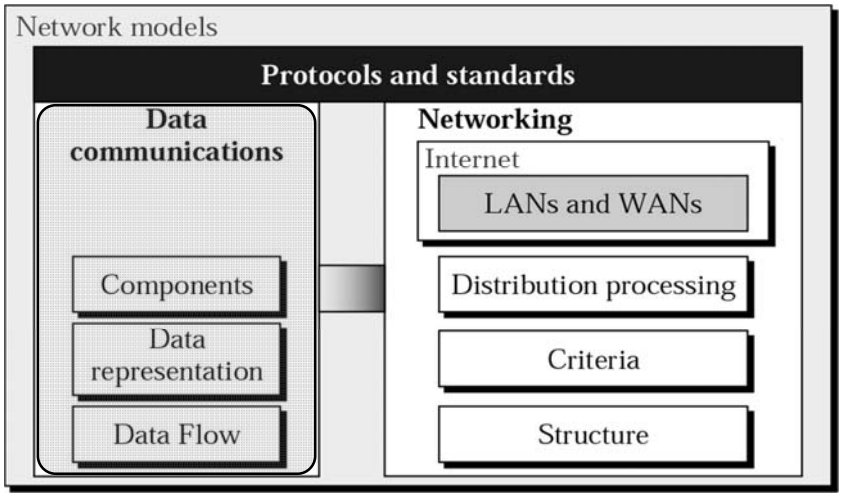


Data Communications

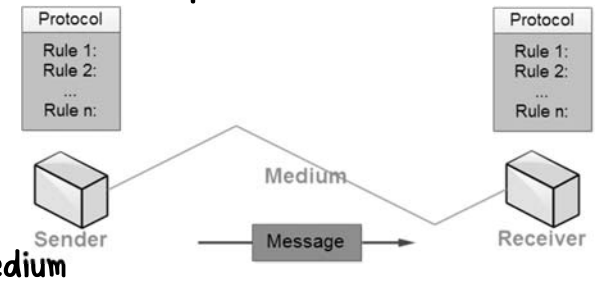
- Objective
- System Components
- Data Representation
- Data Flow

Objective of Data Communications

- Delivery
- Timeliness
- Accuracy
- Jitter

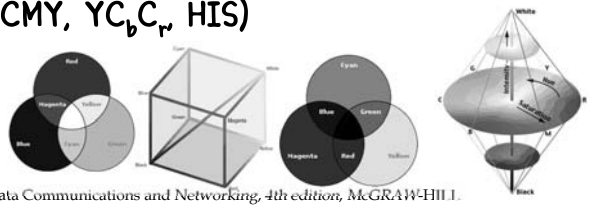
System Components

- Message
- Sender
- Receiver
- Transmission medium
- Protocol



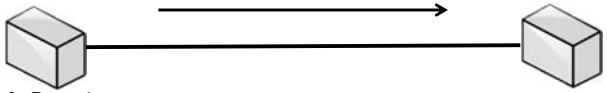
Data Representation

- Text
  - ASCII (The American Standard Code for Information Interchange)
  - Unicode used 32 bits represent a symbol or character used in any language in the world.
- Number : base 10 (decimal), base 2 (binary), base 8 (octal), base 16 (hexadecimal), base 256
- Images : Binary Image, Gray-level Images, Color Image (RGB, CMY, YC_bC_r, HIS)
- Audio
- Video

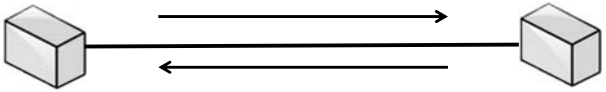


Data Flow

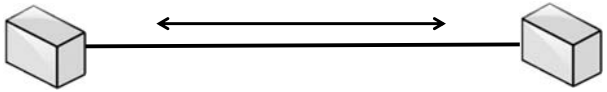
- Simplex

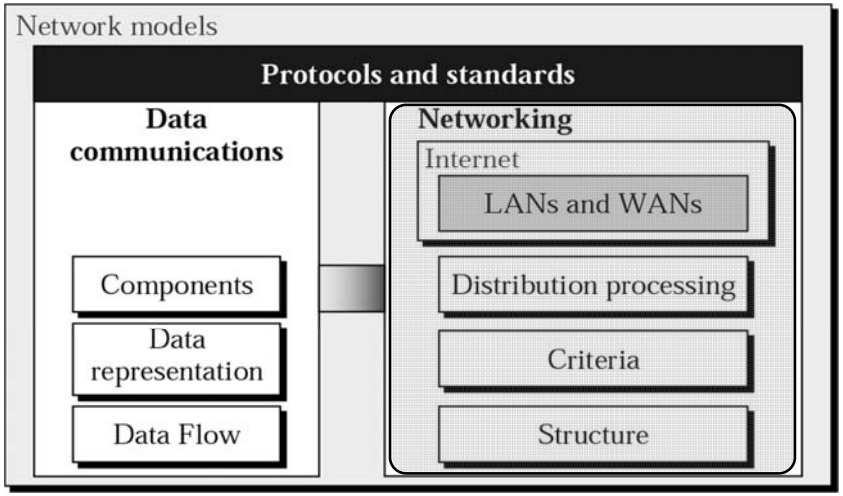


- Half-Duplex



- Full-Duplex





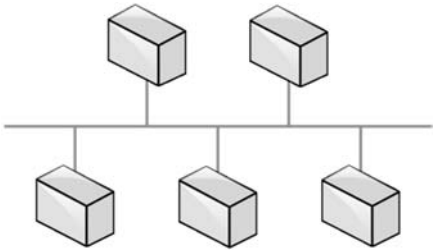
Networks

- Distributed Processing
- Physical Structures
- Categories of Networks

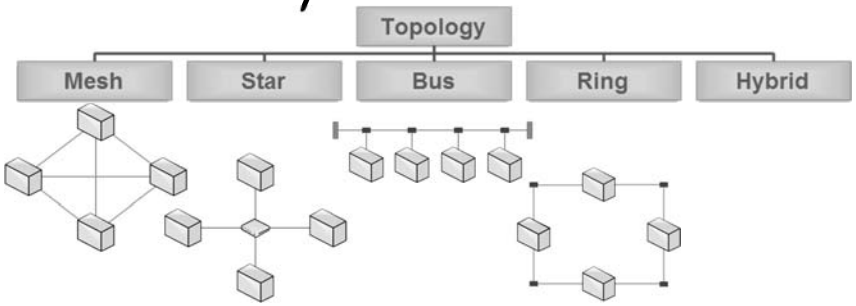
Distributed Processing

- Point-to-Point

- Multipoint



Physical Structures



- Transmission speed
- Reliable (damage link)
- Privacy, Security
- Fault Detection
- Cost (Installation and Maintenance)
- Expansion and Modification

Physical Structures

Transmission speed (High -> Low)	
Reliable (damage link) (High -> Low)	
Privacy, Security (High -> Low)	
Fault Detection (Easy -> Hard)	
Cost (Installation and Maintenance) (Low -> High)	
Expansion and Modification (Easy -> Hard)	

Categories of Networks

- Local Area Network
- Metropolitan Area Networks
- Wide Area Network
- Interconnection of Networks: Internetwork
- *Personal Area Network*
- *Wireless Local Area Network*

The Internet

- A Brief History
- The Internet Today (ISPs)

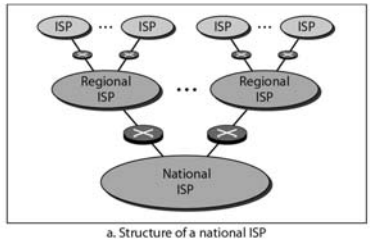
A Brief History

- In the mid-1960s
  - Mainframe computers
    - Research organizations
    - Standalone devices
  - Advanced Research Projects Agency (ARPA) in Department of Defense (DoD)
    - Connect computers
- 1967
  - Association for Computing Machinery (ACM) meeting
    - ARPA presented its ideas for ARPANET
    - Host attached to specialized computer called IMP (Interface Message Processor)

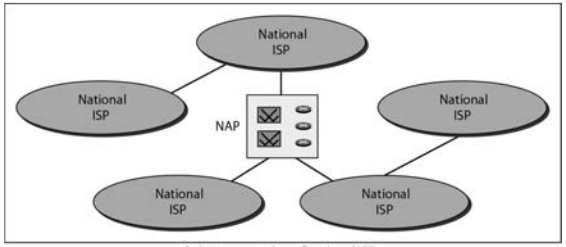
A Brief History

- 1969
  - ARPANET : Network Control Protocol (NCP)
    - Communication between the hosts (4 nodes)
      - the University of California at Los Angeles (UCLA)
      - the University of California at Santa Barbara (UCSB)
      - Stanford Research Institute (SRI)
      - the University of Utah
- Vint Cerf and Bob Kahn
  - 1972 : Internetting Project
  - 1973 : Transmission Control Protocol (TCP)
    - the protocols to achieve end-to-end delivery of packets
  - Shortly thereafter : split TCP into two protocols
    - Transmission Control Protocol (TCP)
    - Internetworking Protocol (IP)

The Internet Today



a. Structure of a national ISP



b. Interconnection of national ISPs

Protocols and Standards

- Protocols
- Standards
- Standards Organizations
- Internet Standards

Protocols

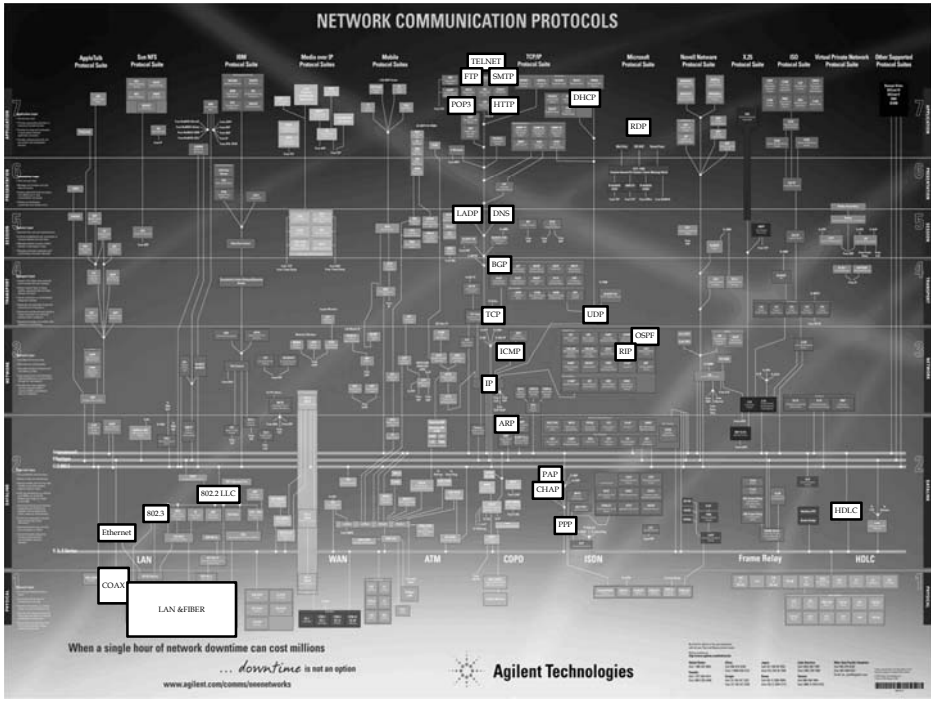
- Basically set of rules

Humans	Computer Network
Can learn protocols	Normally, Can't Learn Protocols
Example : Conversation Protocols , Driving Protocols	Example : Communication Protocols
Sometimes break down	Break down => Network crash

- The key elements of a protocol
  - Syntax
  - Semantics
  - Timing

Internet Protocols

- A protocol is a set of rules. Internet protocols govern communication within and between computers on a network.
- Many protocols consist of a suite (or group) of protocols stacked in layers.
  - Devices and computers connected to the Internet use a protocol suite called TCP/IP to communicate with each other.
- The main functions of protocols:
  - Identifying errors
  - Compressing data
  - Deciding how data is to be sent
  - Addressing data
  - Deciding how to announce sent and received data
- The information is transmitted most often via two protocols, TCP and UDP.



Standards

- de facto (meaning "by fact" or "by convention")
  - Standard not been approved by organization body
  - Widespread
- de jure (meaning "by law" or "by regulation")
  - Standard been approved by organization body

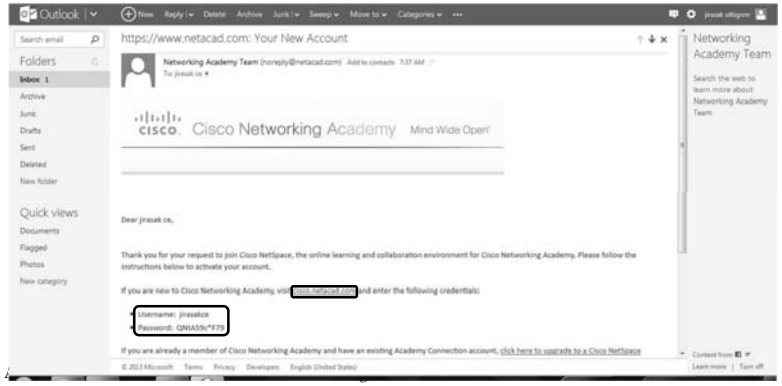
Standards Organizations

- Standards Creation Committees

	Name	Type	Standards	Established
ITU-T	ITU Telecommunication Standardization Sector (formerly CCITT)	one of the three Sectors of the International Telecommunication Union	Standards covering all fields of telecommunications	Became ITU-T in 1992
IEEE	Institute of Electrical and Electronics Engineers	A non-profit, technical professional association	Standards for the computer and electronics industry	1884
ISO	International Organization for Standardization	A network of the national standards institutes of 157 countries	Promote the development of international standards agreements	1947
IAB	Internet Architecture Board	A committee; an advisory body	Oversees the technical and engineering development of the Internet	1979; first named ICCB
IEC	International Electrotechnical Commission	Global organization	Standards for all electrical, electronic, and related technologies	1906
ANSI	American National Standards Institute	Private, non-profit organization	Seeks to establish consensus among groups	1918
TIA/EIA	Telecommunications Industry Association / Electronic Industries Alliance	Trade associations	Standards for voice and data wiring for LANs	After the deregulation of the U.S. telephone industry in 1984

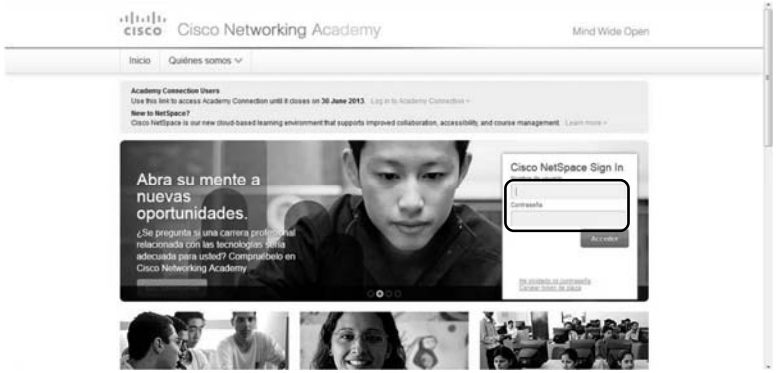
ลงทะเบียนสำหรับทำแบบฝึกหัด

- ลงทะเบียนข้อมูลส่วนตัว
  https://goo.gl/forms/xybgsS8WrWCeZoGu1
- เช็ค email เข้าระบบลงทะเบียนทำแบบฝึกหัด Online



ลงทะเบียนสำหรับทำแบบฝึกหัด

- ใช้ Username และ Password ที่ส่งมาใน email ในการลงทะเบียน : https://www.netacad.com/



ลงทะเบียนสำหรับทำแบบฝึกหัด

- อ่านข้อกำหนด

- เลือก
  - ประเทศ Thailand
  - เดือน-วัน-ปีเกิด (เป็น ค.ศ. เท่านั้น)
  - เลือก I have read and agreed to the terms of use
  - เลือก Submit

ลงทะเบียนสำหรับทำแบบฝึกหัด

- กำหนด Password ใหม่เอง โดยมีเงื่อนไข
  - ประกอบด้วย อักษรตัวเล็ก อักษรตัวใหญ่ และตัวเลข
  - อย่างน้อย 8 ตัว
  - ห้ามซ้ำกับ Password เดิม
  - ห้ามมีส่วนของ Screen Name (Username) ที่จะตั้งใหม่ (ขั้นตอนต่อไป)

ลงทะเบียนสำหรับทำแบบฝึกหัด

- ป้อนข้อมูลส่วนตัวต่างๆ : Screen Name เป็น Username ในการ Login