

Chapter 1

Introduction

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Network models

Protocols and standards

Data communications

Components

Data representation

Data Flow

Networking

Internet

LANs and WANs

Distribution processing

Criteria

Structure

Data Communications

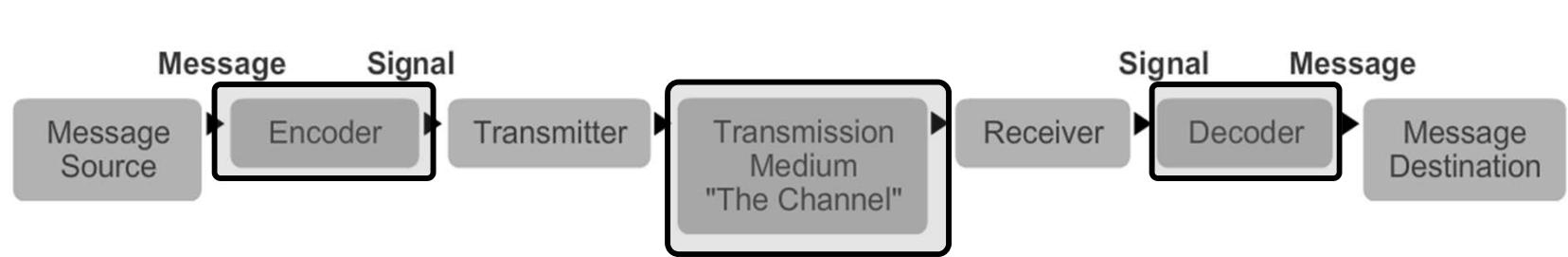
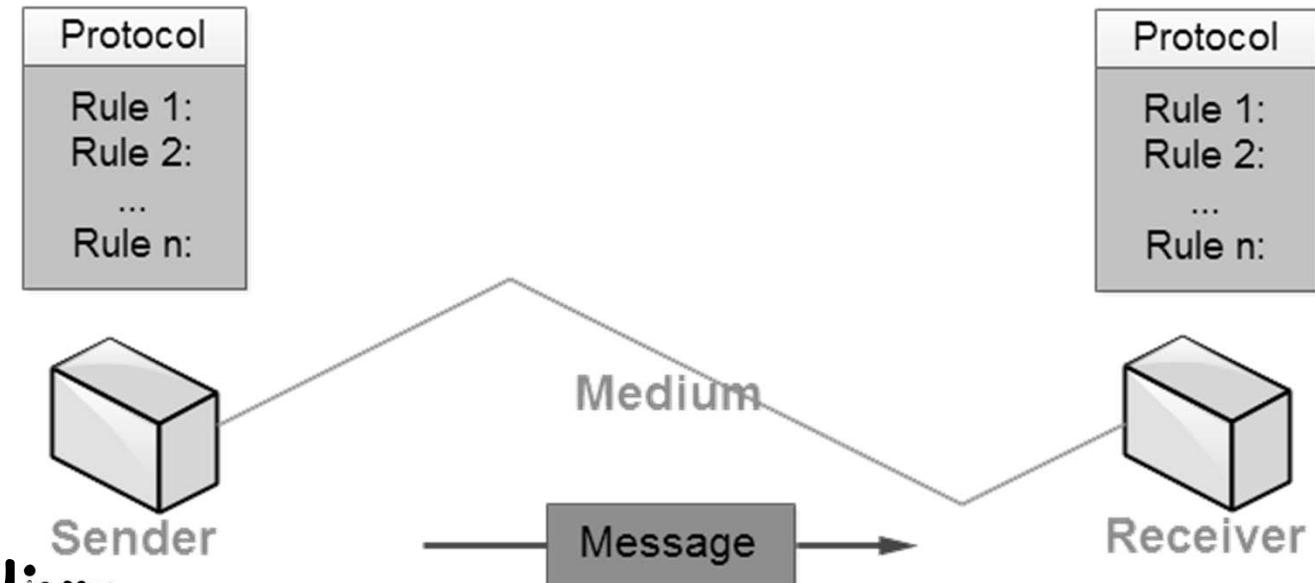
- Objective
- System Components
- Data Representation
- Data Flow

Objective of Data Communications

- Delivery
- Timeliness
- Accuracy
- Jitter

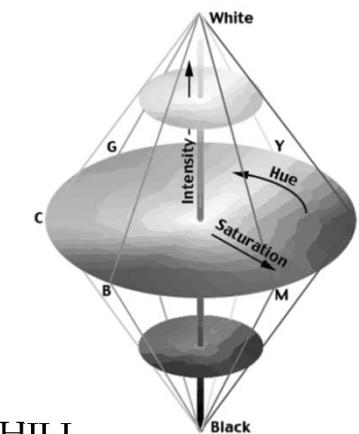
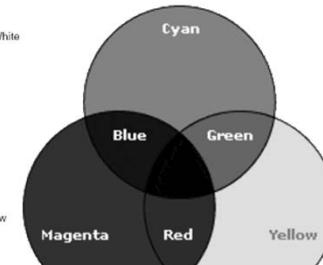
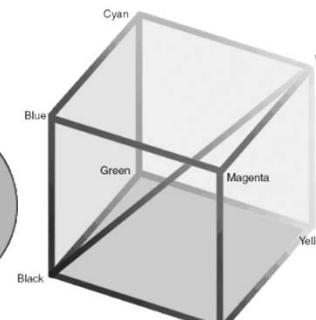
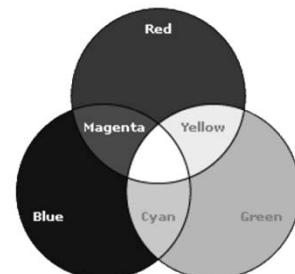
System Components

- Message
- Sender
- Receiver
- Transmission medium
- Protocol



Data Representation

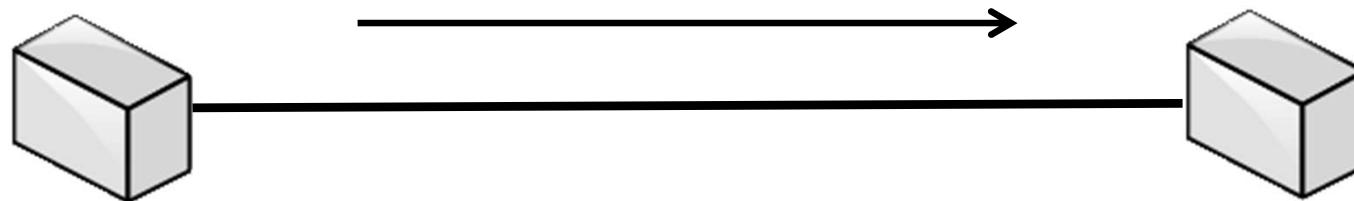
- Text
 - ASCII (The American Standard Code for Information Interchange)
 - Unicode used 32 bits represent a symbol or character used in any language in the world.
- Number : base 10 (decimal), base 2 (binary), base 8 (octal), base 16 (hexadecimal), base 256
- Images : Binary Image, Gray-level Images,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



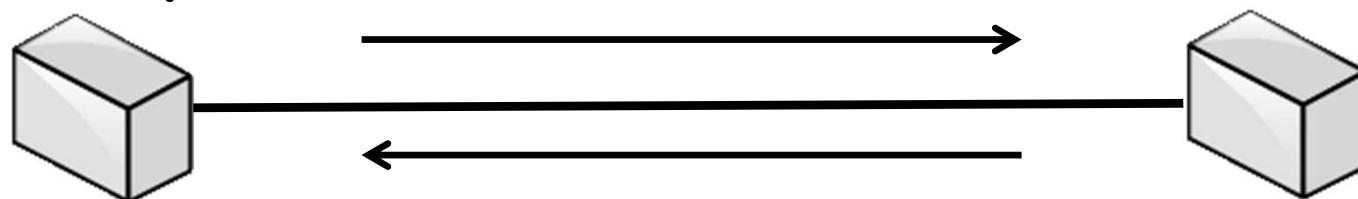
Data Flow



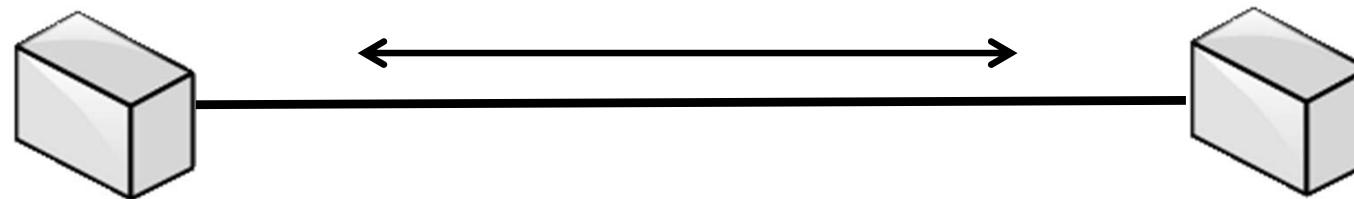
- **Simplex**



- **Half-Duplex**



- **Full-Duplex**



Network models

Protocols and standards

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Networks

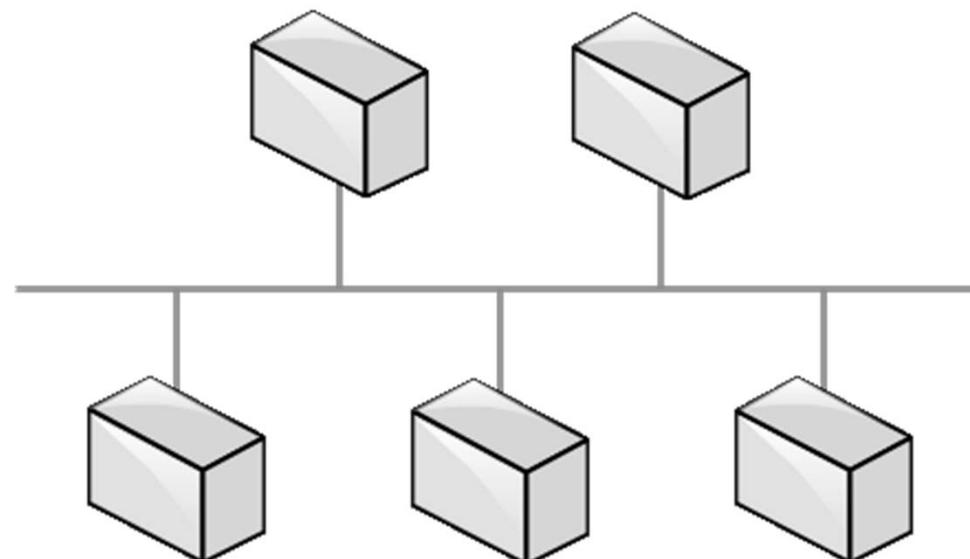
- Distributed Processing
- Physical Structures
- Categories of Networks

Distributed Processing

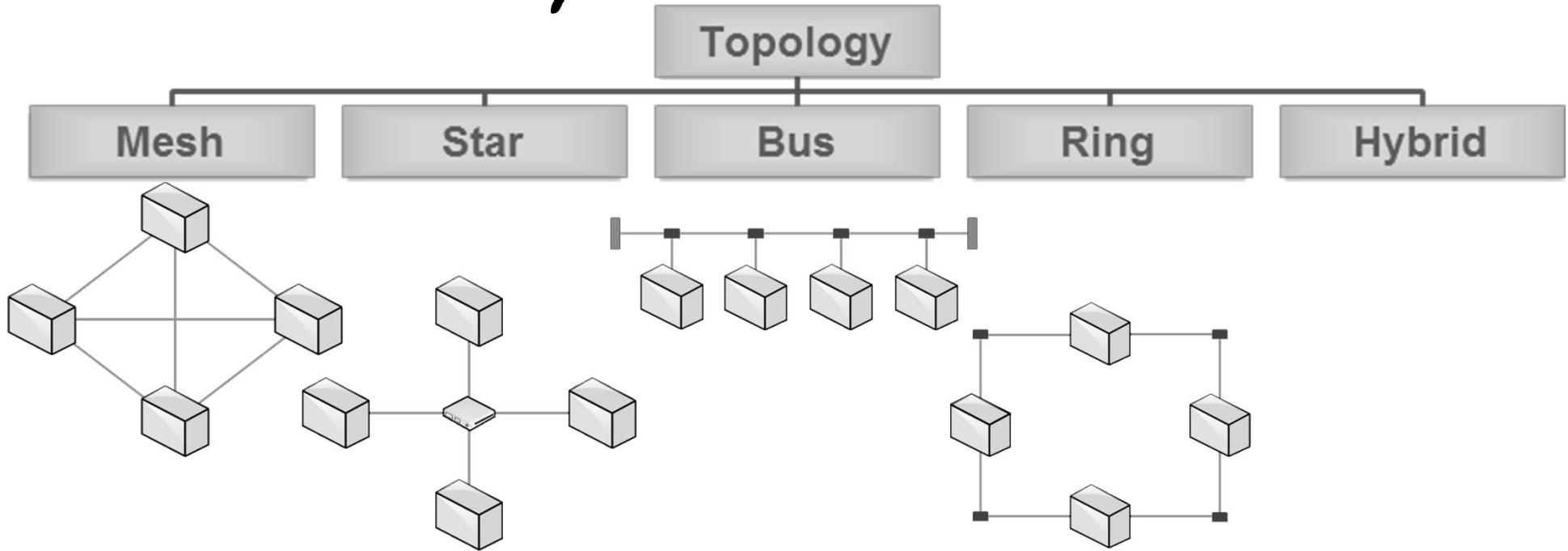
- Point-to-Point



- 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)

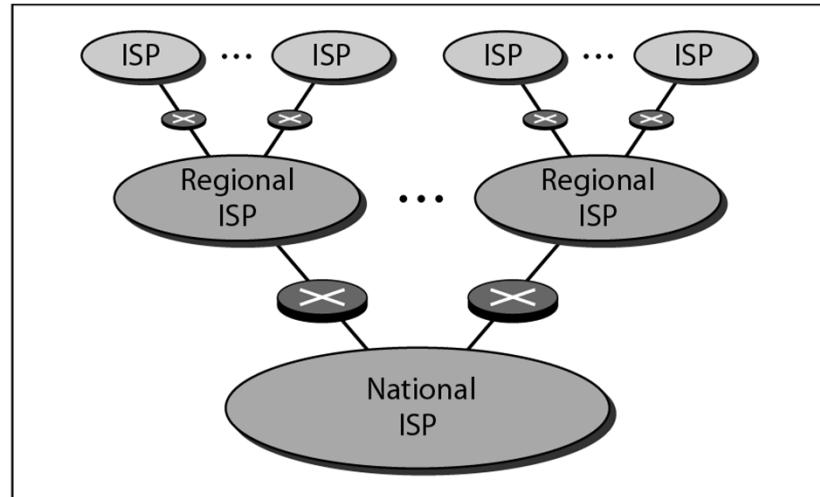
A Brief History

- 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)

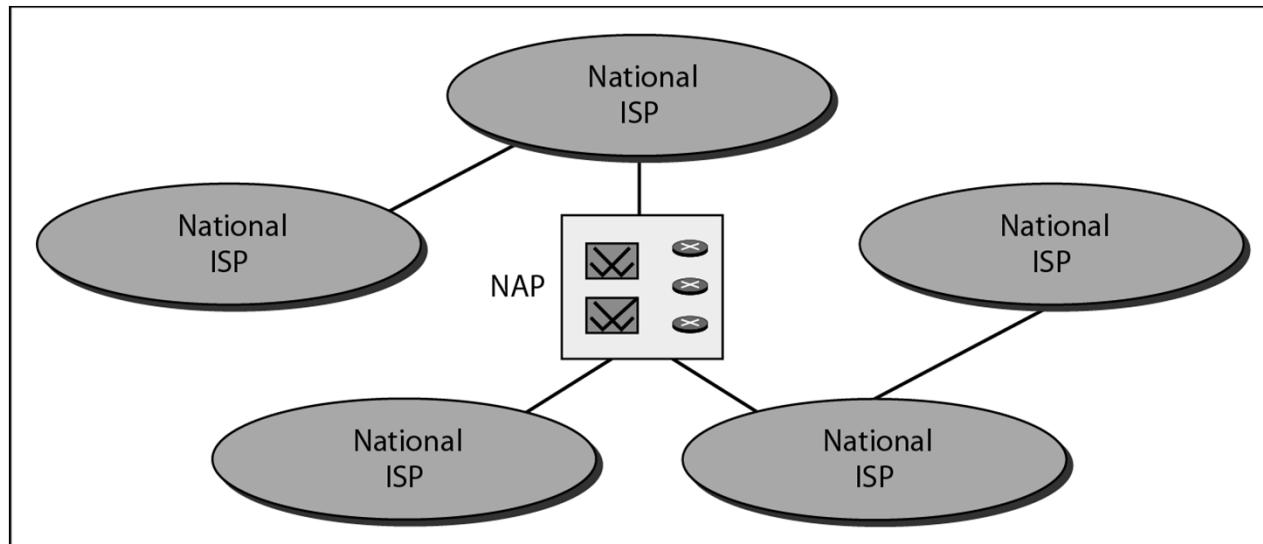
A Brief History

- 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

Can learn protocols

Example : Conversation Protocols , Driving Protocols

Sometimes break down

Computer Network

Normally, Can't Learn Protocols

Example : Communication Protocols

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

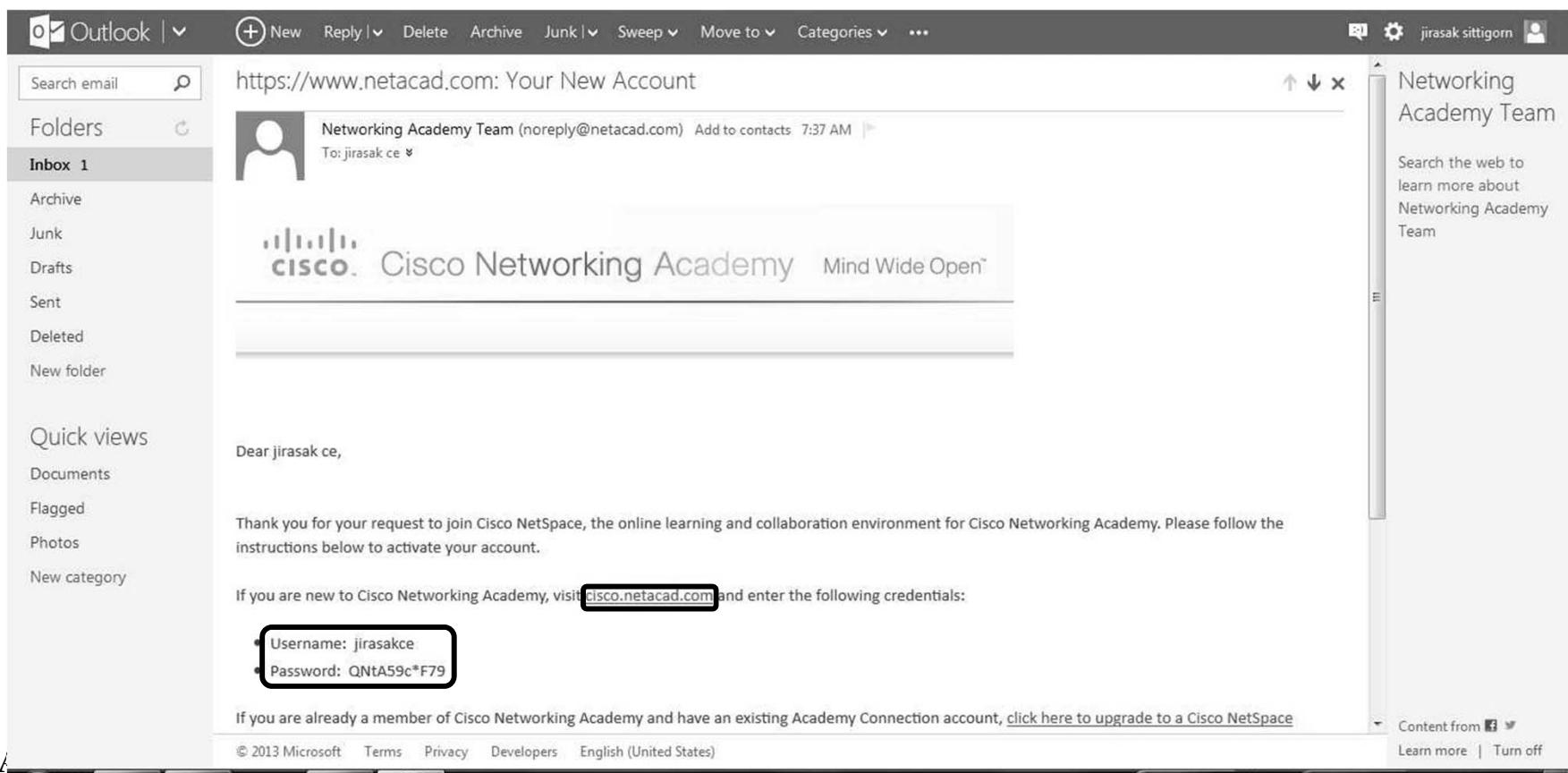
Standards Organizations

- 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

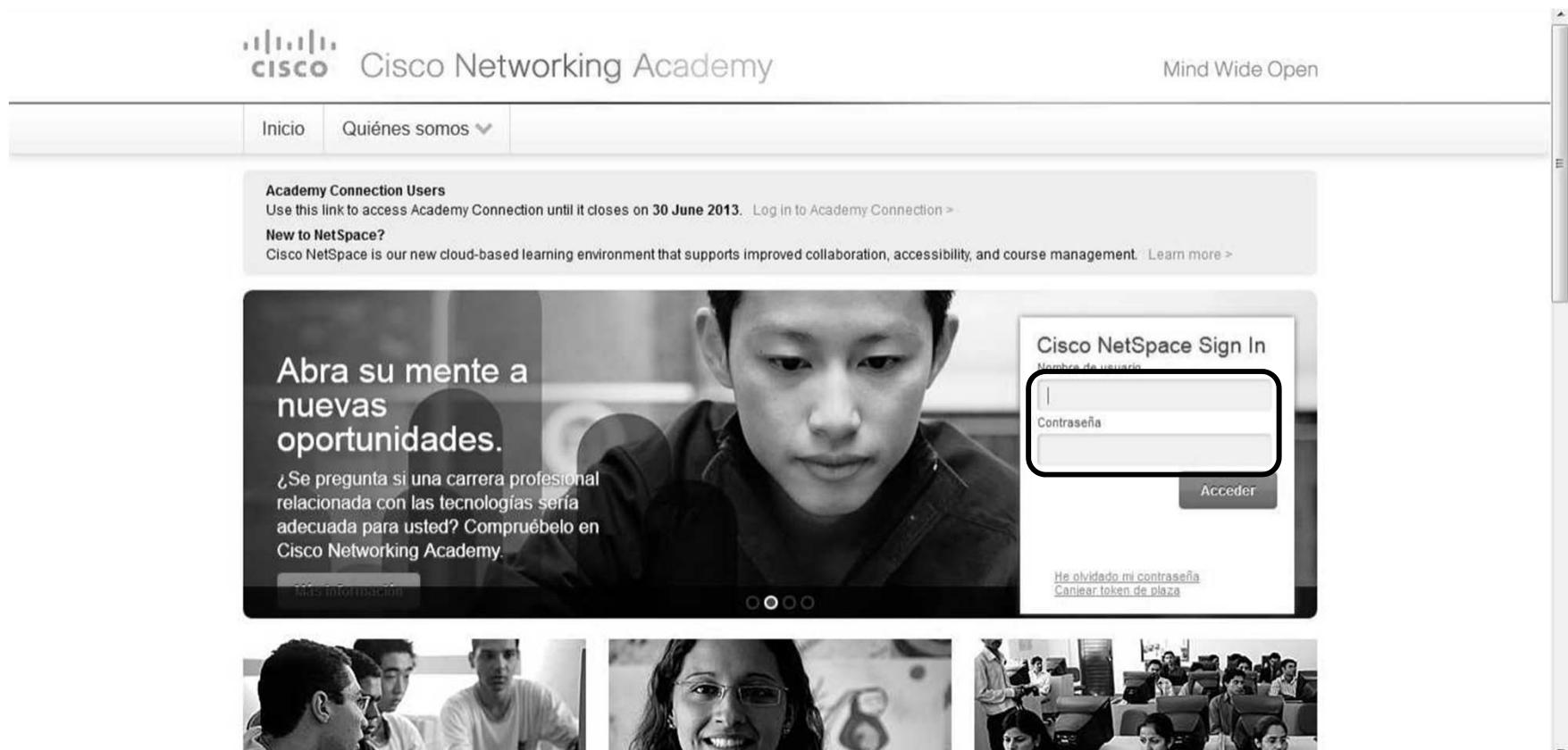
ลงทะเบียนสำหรับทำแบบฝึกหัด

- 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

— ประเทศไทย Thailand

— เดือน-วัน-ปีกิต (ปี พ.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 เกิ่ม
 - ห้ามมีส่วนของ Screen Name (Username) ที่จะตั้งใหม่ (ห้ามต่อนต่อไป)

Password Rules:

- Passwords must include a lowercase (e.g. abc), an uppercase(e.g. ABC), and a number (e.g. 123)
- Passwords must be at least eight (8) characters
- Previous passwords may not be used

Password

Enter Again

ลงทะเบียนสำหรับทำแบบฝึกหัด

- ป้อนข้อมูลส่วนตัวต่างๆ : Screen Name เป็น Username ในการ Login

Networking Academy User Profile
This is your User Profile. You can return here anytime to change your preferences by clicking on your name in the help corner at the top of the page. Please make sure all required fields (identified with *) are completed before proceeding.

User ID: 009175660
Academy Connection ID: 26435889

Change

Pref:

First Name *: jirasak

Last Name *: ce

Title:

Email Address *: ong_kmit@hotmail.com

Update my notification preferences email address in the classroom

Screen Name: **jirasakce**

Country/Region: Thailand

Closest State *: Select One

Closest City *: Select One

Language: English

Time Zone: (UTC) Coordinated Universal Time

Birthday: January 19 1980

First Name (Native Language):

Last Name (Native Language):

Region/State/Province (Native Language):

City Name (Native Language):

Phone Number:

Country/Region Code:

Gender *: Select One

Notification Preferences

Change Classroom Notifications

Subscribe to NetAcad Program emails

Participate in Recognition Program

Subscribe to partner emails

Ask me to provide program feedback

Do you want to be able to receive communication from other users?

Allow other users to search for me

The Cisco Networking Academy Program is interested in better understanding students' goals for taking courses. Please choose the one option below that best describes your goal or motivation for taking Cisco Networking Academy courses.
 Please choose an option

The Cisco Networking Academy Program would like to understand how much experience students have in IT or networking fields before taking Cisco Networking Academy courses. Please indicate how much practical experience you have in the IT or networking field, gained either from working or engaging in other activities.
 Please choose an option

Change Password

Change Password

Link To Your Academy Connection Account

If you have an existing Academy Connection account, please click below to link this account to it. This will ensure a smooth continuation of your data. This process will only take a few minutes.

Link to existing Academy Connection Account

Certificates And Letters

This area displays all your classes. When you meet the associated eligibility criteria, you will be able to open these files.

Certificates of Completion (1)

Letters of Merit (1)

Certification Exam Discounts and Vouchers

Certifications and Discounts FAQs

Pending (0)

Available (0)

Expired or Cancelled (0)

Save