ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Data Communications and Networks

ITS323: Introduction to Data Communications

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Contents

Motivation

A Communications Model

Data Communications

Networks

The Internet

Examples

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

What Is Data Communications?

- ▶ When we communicate we are sharing information
  - ▶ Local sharing, e.g. face-to-face
  - ▶ Remote sharing, e.g. over some distance
- ▶ Data: information being shared, e.g. text, numbers, images, audio, video
- ▶ Data Communications: exchange of data between two (or more) devices via some transmission medium

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Effective Data Communications

Delivery: the data must be delivered to the correct destination

Accuracy: the data received must be accurate representation of the data sent

Timeliness: the data should be delivered within a reasonable time

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Contents

ITS323

Data Comms &
Networks

Motivation

Model
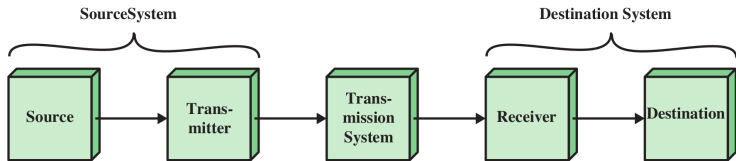
Data Comms

Networks

The Internet

Examples

Simplified Communications Model

Source: Device that generates data to be transmitted

Transmitter: Converts data from source into transmittable
signals

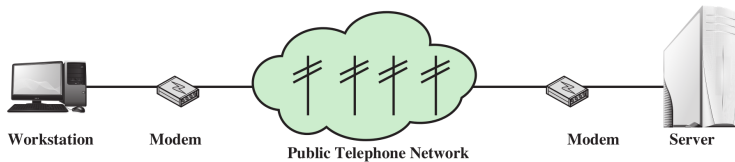Transmission system: Carries data from source to destination

Receiver: Converts received signal into data

Destination: Takes and uses incoming data

Simplified Communications Model

An Example

Workstation　　**Modem**　　**Public Telephone Network**　　**Modem**　　**Server**

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Communications Tasks

Simplified communications model makes it look easy . . . but there are many tasks to be performed in a data communications system

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

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Categorizing Communication Technologies

Data Communications: transmitting signals in reliable and
efficient manner; focusses on individual links

Networks: communications across set of links; Wide Area
Networks, Local Are Networks, The Internet

ITS323

Data Comms &
Networks

Motivation
Model
Data Comms
Networks
The Internet
Examples

Contents

Motivation

A Communications Model

Data Communications

Networks

The Internet

Examples

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

A Data Communications Model

ITS323

Data Comms &
Networks

Motivation
Model
Data Comms
Networks
The Internet
Examples
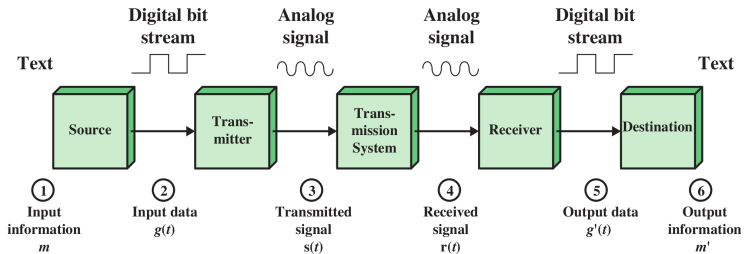
Transmission Line

- Transmission line (or system) is key part of communications system
- "Link" between transmitter and receiver
- Needs to provide required capacity, with acceptable reliability at minimum cost

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Data Comms &
Networks

Motivation
Model
Data Comms
Networks
The Internet
Examples

The Transmission of Information

Transmission and Transmission Media

- ▶ How to convert information into transmittable electromagnetic signal?
- ▶ What transmission media to use?

Communication Techniques

- ▶ How to encode information into a signal?
- ▶ How to deal with errors?

Transmission Efficiency

- ▶ How to efficiently utilize/share communications system?

ITS323

Data Comms &
Networks

Motivation
Model
Data Comms
Networks
The Internet
Examples

Contents

Motivation

A Communications Model

Data Communications

Networks

The Internet

Examples

Networks

- Demand for any user to communicate with any other machine/user
- Require:
  - Communication software (see The Internet)
  - Communication network technologies: WANs and LANs

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Wide Area Networks

- ▶ Span a large geographical area
- ▶ Require crossing of public right-of-ways
- ▶ Rely on links of common carriers (telecommunication companies)
- ▶ Carries data of multiple organisations
- ▶ How to find path across a network?
- ▶ How to deliver data across the network?
- ▶ Example technologies: ATM, Frame Relay, SDH

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Local Area Networks

- ▶ Small coverage area, e.g. building, campus
- ▶ Owned and operated by organisation owning end-devices
- ▶ Higher internal (per user) data rates compared to WANs
- ▶ How to arrange nodes in a LAN?
- ▶ How to share LAN amongst multiple users?
- ▶ Example technologies: Ethernet, Wireless LAN

Contents

Motivation

A Communications Model

Data Communications

Networks

The Internet

Examples

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

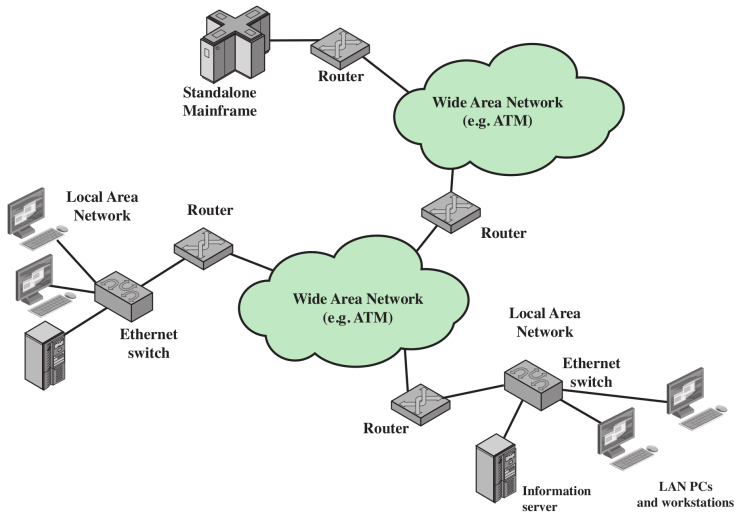The Internet

Examples

The Internet

Origins

- ▶ Evolved from US Department of Defence research network, ARPANET (developed in 1969)
- ▶ Used packet switching technology (whereas telephone networks used circuit switching)
- ▶ Development and standardization of the Internet suite of protocols: TCP/IP
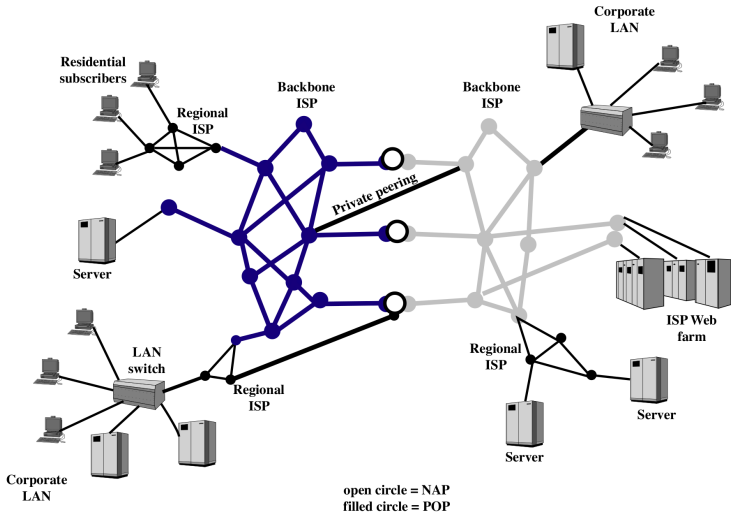
What is The Internet?

- ▶ Collection of networks connected together using common software: Internet Protocol (IP)
- ▶ Although network technologies differ, any computer can communicate with any other computer (providing they are using IP)

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Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Key Elements of the Internet

Hosts, routers and (sub-)networks

Simplified View of Portion of Internet

ITS323

Data Comms &
Networks

Motivation
Model
Data Comms
Networks
The Internet
Examples

Contents

Motivation

A Communications Model

Data Communications

Networks

The Internet

Examples

Example: SIIT

ITS323

Data Comms &
Networks

Motivation

Model

Data Comms

Networks

The Internet

Examples

Example: SIIT

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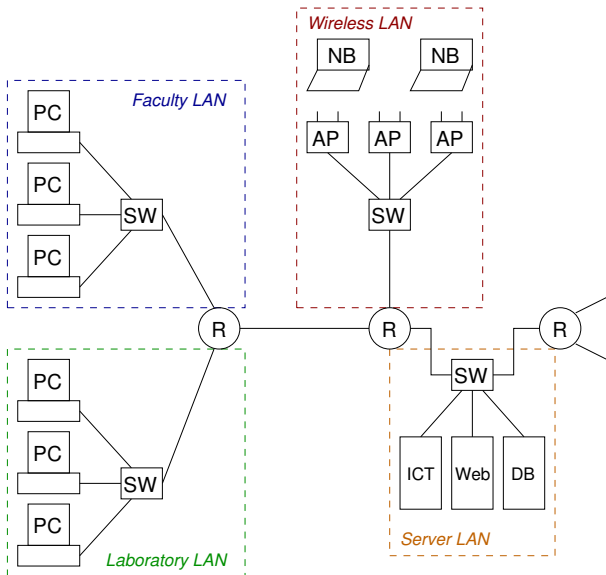
Data Comms &
Networks
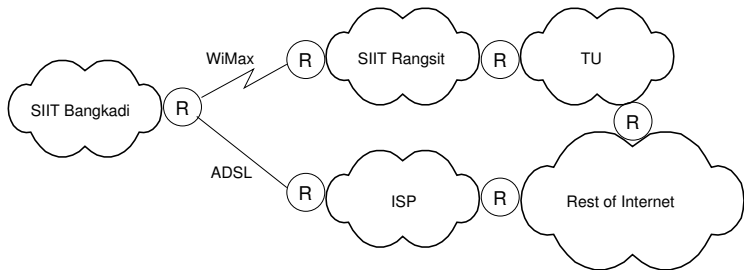
Motivation

Model

Data Comms

Networks

The Internet

Examples

Example: Thailand Internet

See http://internet.nectec.or.th/