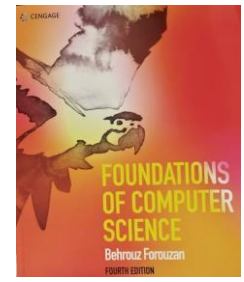
Chapter 6



Computer Networks and Internet

電腦網路與網際網路

6.1

Objectives 學習目標

After studying this chapter, students should be able to:

- ❑ **Describe local and wide area networks (LANs and WANs)區域網路與寬域網路.**
- ❑ **Distinguish an Internet from the Internet.**
- ❑ **Describe the TCP/IP protocolsuite as the network model in the Internet. 網際網路TCP/IP協定**
- ❑ **Define the layers in the TCP/IP protocol suite and their relationship. TCP/IP協定的各層**
- ❑ **Describe the applications in the Internet. 網際網路的應用**
- ❑ **Describe the different transmission medias used in computer networking. 電腦網路不同的傳輸媒體**

6.2

Networks

A network is defined as the interconnection of a set of devices capable of communication網路的定義為連接一組裝置之通訊的能力. A device can be a **host** 一個裝置可為主機(or an end system) such as a large computer, desktop, laptop, workstation, cellular phone, or security system. A device can also be a connecting device一個裝置可為被連接的裝置，如(such as a **router** 繞線器 which connects the network to other networks, a **switch** 轉接器 which connects devices together, a **modem**數據機 that changes the form of data, and so on. These devices in a network are connected using **wired or wireless** transmission media such as **cable or air**.

6.3

The Internet

An Internet網際網路**is two or more networks that can communicate with each other and is composed of thousands of interconnected networks**.

The Internet is as several **backbones**骨幹, **provider networks**, and **customer networks**. *Backbones* at top level are large networks owned by some communication companies. *Provider networks* at second level use the services of the backbones for a fee. C*ustomer networks* are networks at the edge of the Internet that actually use the services provided by the Internet. They pay fees to provider networks for receiving services.

Backbones and provider networks are also called **Internet Service Providers(ISPs)**網際網路服務供應者. The backbones are often referred to as international ISPs.

6.4

TCP/IP Protocol Suite協定組

The **TCP/IP (Transmission Control Protocol / Internet Protocol)** is a protocol suite (a set of protocols organized in different layers), **Application layer, Transport layer, Network layer, Data link layer and Physical layer**, **used in the Internet today**. It is a **hierarchical protocol**階層式協定 made up of interactive modules, each of which provides a specific functionality.

6.5

Application-Layer Paradigms應用層的範例

Using the Internet, we need two application programs to interact with each other: one running on a computer and the other running on another. Should both application programs be able to **request services** and/or **provide services**?

Two paradigms have been developed during the lifetime of the Internet to answer this question: the ***client-server paradigm***使用者端-伺服器端範例 and the ***peer-to-peer paradigm***同儕對同儕範例.

6.6

ADSL Point-to-Point Network

Digital subscriber line (DSL) 數位訂戶線 supports high-speed communication over the existing telephone. The **asymmetric**不對稱 **DSL (ADSL)** provides higher speed (*bit rate*) in the **downstream** direction (from the Internet to the resident) than in the **upstream** direction (from the resident to the Internet).

6.7

Long-Term Evolution：長期演進 LTE

- **LTE is a standard of wireless data communication technology**.
- **It provides 4G or above types** of services to connect the main station to fixed station or to mobile stations such as cellular phones.
- **Not compatible with 2G or 3G**.
- **Start business on May 2014**.

6.8

傳輸媒介

Electrical signals created at the physical layer need transmission media to go from point to another. Transmission media are actually located below the physical layer and are directly controlled by the physical layer. We could say that transmission media belong to layer zero.

Review Questions

- What are the differences between **LAN** and **WAN**?
- What is the **protocol**?
- Define the layers in the **TCP/IP** protocol suite.
- Explain the following terminologies: **ISP**, **WiFi**, **LTE**, **Ethernet**, **Bluetooth**, **Modem**, **ADSL**, and **IPv4**.
- What are the differences between **client-server** and **peer-to-peer** processes.