**Chapter 7**

* Simplex: simple, one-way transmission. TV station to your TV
* Half-Duplex: Can transmit to each other but not at the same time, police radio
* Full-Duplex: Data is transmitted in both directions at the same time, telephone calls etc.
* PAN (Personal area network): devices connected to single user, with Bluetooth
* MAN (Metropolitan area network): a network that spans across a large campus or city
* WAN (Wide area network): connects multiple networks in different separated locations (the internet itself is a WAN)
* Peer-to-peer, network in which devices are connected and can share files etc., no dedicated server or hierarchy
* TCP (Transmission Control Protocol): responsible for reliable delivery
* The form that a piece of data takes at any layer is called a protocol data unit (PDU).
* As application data is passed down through the layers, protocol information is added at each level. This is known as the encapsulation process.
* CSMA/CD
  + Carrier: wire used to transmit data
  + Sense: each device listens to the wire to determine if it is clear to send data
  + Multiple Access: there can be many devices accessing the network at the same time
  + Collision Detection: a collision causes a doubling of voltage in the wire, which is detected by the devices’ NICs.
* In CSMA/CD, all devices listen to the network wire for clearance to send data. Each device will only send data if another device isn’t sending any, this way collision is prevented. When a collision is detected a jam signal is transmitted to tell all devices to stop sending.
  + Most devices are now full duplex, and can transmit and receive at the same time without trouble.
* Wireless networks use Carrier Sense Multiple Access with **Collision Avoidance**. Collision isn’t detected, but avoided, by transmitting a signal to all other devices when a device is transmitting saying how long it will be transmitting. This way other devices know when it’s their turn to transmit. This is ‘half duplex’. The more devices are attached to an AP, the more the transmission efficiency is reduced.
* Hub: a hub receives data on one port and then sends it out to all other ports. A hub extends the reach of a network. Switches are more effective because they don’t flood all devices with data, saving more bandwidth.
* Bridge: bridges segment LAN networks, filtering traffic between each segment, preventing data from being flooded to devices outside the required segment. However, each device in a segment will receive the data.
* Switch: microsegment LANs, making sure only the intended device receives transmitted data. Because of cheap switches, bridges and hubs are considered legacy devices. Switches operate in full duplex. The switch identifies which port to send data through by recording the MAC address of the source of the data.
* Modem: converts a computer’s digital data into a format that can be transmitted on the ISP’s network.
* Coaxial and twisted-pair cables use electrical signals over copper to transmit data.
* Fiber-optic cables use light signals.
* On a network scheme, always choose one of two wiring schemes. If working on an existing network, use the same wiring scheme that is present on the existing network.
* Two directly connected devices, using different pins for transmitting data are called ‘unlike devices’. They require a straight-through cable to exchange data. For example, when connecting a computer with a switch you need to use a straight-through cable.
* Devices that are directly connected and use the same pins for transmit are called ‘like devices’. They require a crossover cable to connect to each other. For example, connecting a PC to a PC requires a crossover cable.
* There’s two types of fiber-optic cables. Single mode and multi-mode.
* Two cables are needed with fiber connections because light can only travel in one direction.
* IPv6 developed because it was feared we would run out of IPv4 addresses. Now it’s slowly replacing IPv4. Different format and 128 bits instead of 32.

**Chapter 8**

* DSL: Digital Subscriber Line. Uses existing copper telephone lines.
* ADSL: Asymmetric Digital Subscriber Line
* DNS: Translating web address to IP address through DNS server