chapter 1

Data Communications – An Introduction

CHAPTER OBJECTIVES

- Define data communications and its building blocks.
- Identify and describe three different types of data encoding.
- Describe the differences between analog and digital data.
- Describe the differences between analog transmission and digital transmission.
- Recognize the differences between parallel and serial transmission.

병렬전송 직렬전송

CHAPTER OBJECTIVES (cont'd)

- Identify and describe asynchronous and synchronous transmission.
  비동기식과 동기식 전송의 차이
- Define simplex, half-duplex, and full-duplex data transmission.
- Examine common data communications media options.
- Describe key data communications standards, standards organizations, and standards-making processes.
- Identify the layers of the OSI and TCP/IP models and describe their layered architectures.

DATA COMMUNICATIONS *DEFINED*

- It moves data from point A to point B. 가까울수도 멀 수도 있다
- It requires at least one communications medium. 전송매체
- Data must be formatted for transmission across the medium.
- High-tech hardware, software, and services are used.
- It's the transmission of encoded data and information in a medium-specific format between two or more nodes, people, businesses, or entities.

전송매체에 맞게 포멧된 데이터

두개 이상의 비지니스 사람들 노드 등 정보통신

BITS, BYTES, and DATA ENCODING

- To transfer human readable data, the data must be transmitted in a format that machines can understand. To do this, we use bits, bytes, and data encoding.

Bit – smallest unit of encoding in the binary number system.

Byte – 8 bits.

Data Encoding – the method by which data is represented in digital or binary format.

BITS, BYTES, and DATA ENCODING (cont'd)

Examples of data encoding include:

EBCDIC – the Extended Binary Coded Decimal Interchange Code. 미국애들이 만들어서 알파벳만 씀

ASCII – the American Standard Code for Information Interchange.

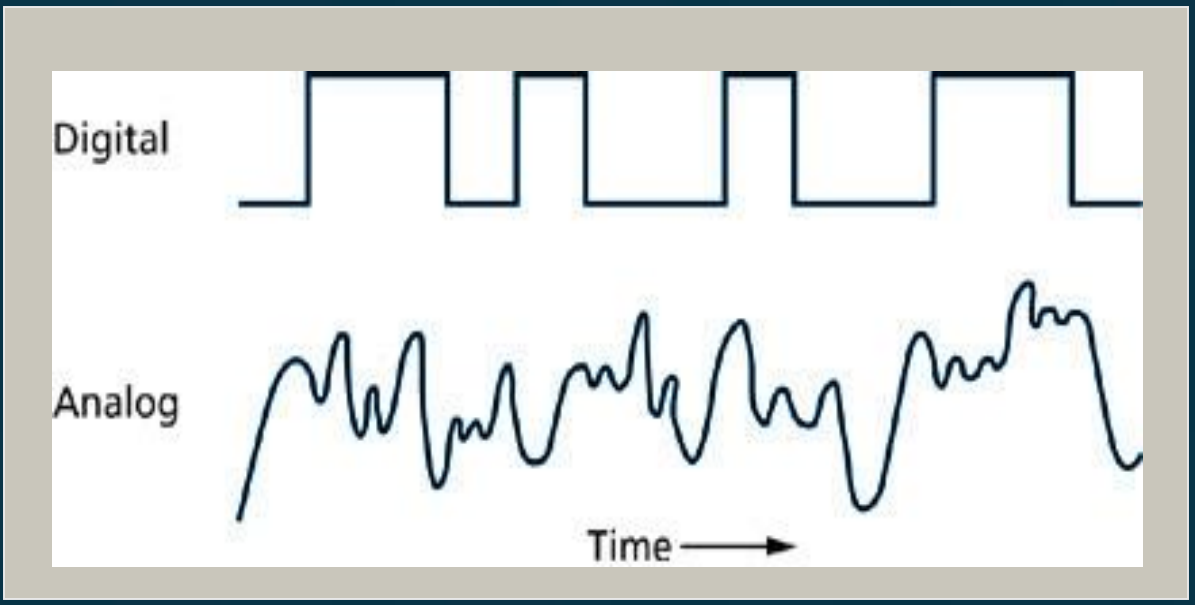
Unicode – surpasses the limitations of ASCII by employing more bits. 16bit 크기로 언어를 표시할 때 사용

DIGITAL and ANALOG DATA

- Analog data - is represented and reproduced by a continuously variable level of sound, light, electricity, or other input.

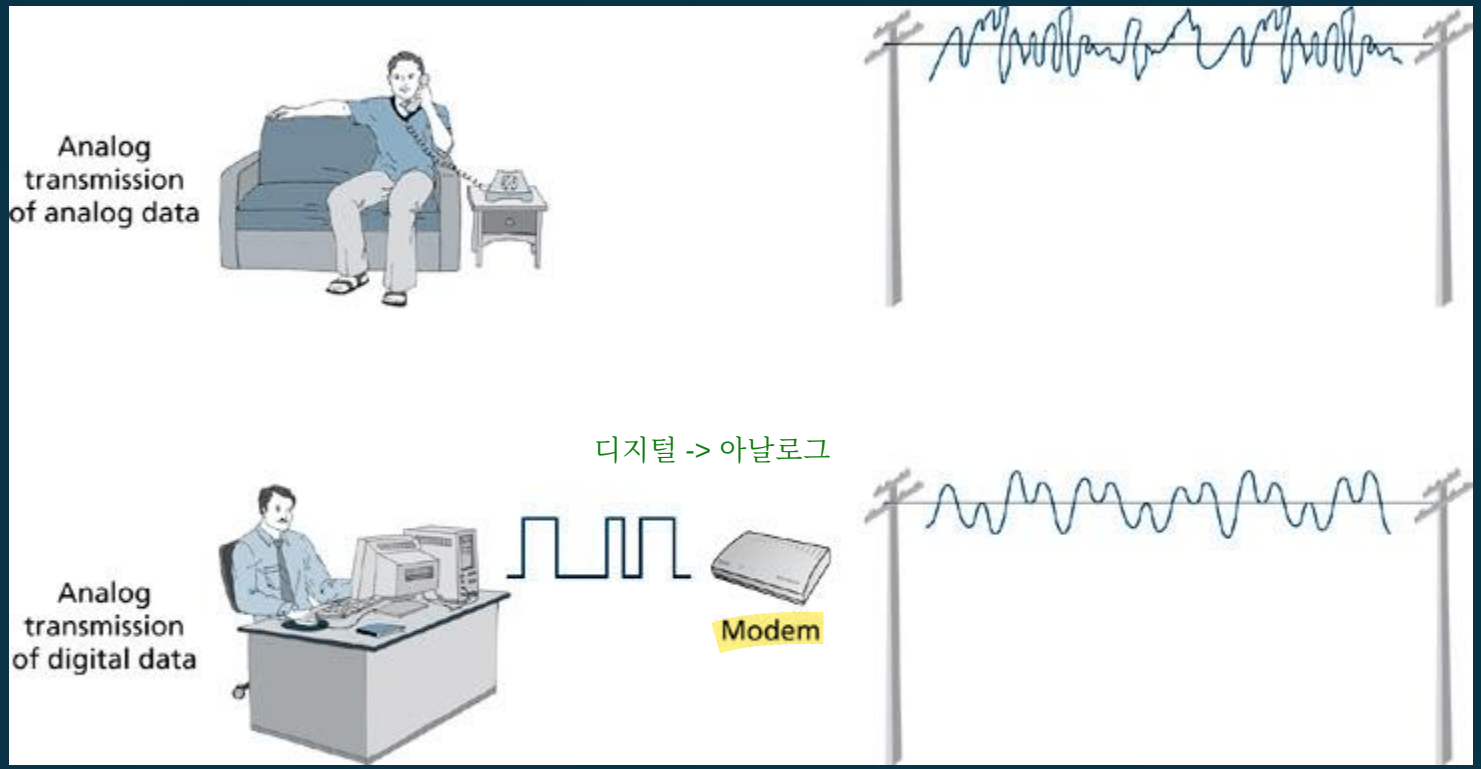
- Digital data – is represented and reproduced by discrete levels of sound, light, electricity, or other input.

Digital Transmission and Analog Transmission



디지털은 값이 0하고 1밖에 없지만 아날로그는 어떤 값이든 가질 수 있다

Analog Transmission of Analog Data versus Analog Transmission of Digital Data



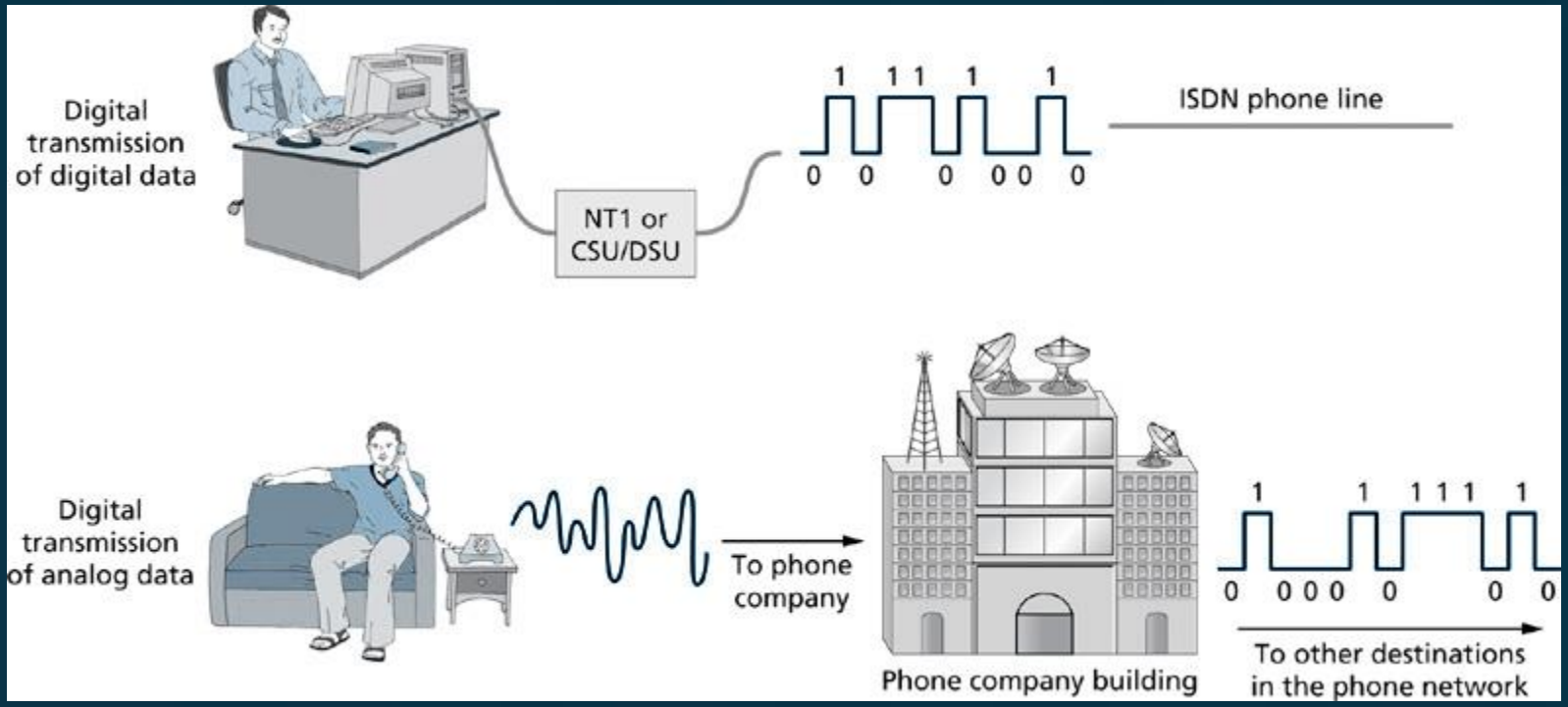
디지털 -> 아날로그

데이터를 전송할 때 손상된 데이터를 원상복구 하는 결과가 디지털이 아날로그보다 훨씬 좋다

0.8 0.2 이런식으로되면 1.0 0.0 으로 바꿔주면 복원이 아주 잘 된다

아날로그는 값을 모두 가지고 있어서 어렵다

Digital Transmission of Digital Data versus Digital Transmission of Analog Data

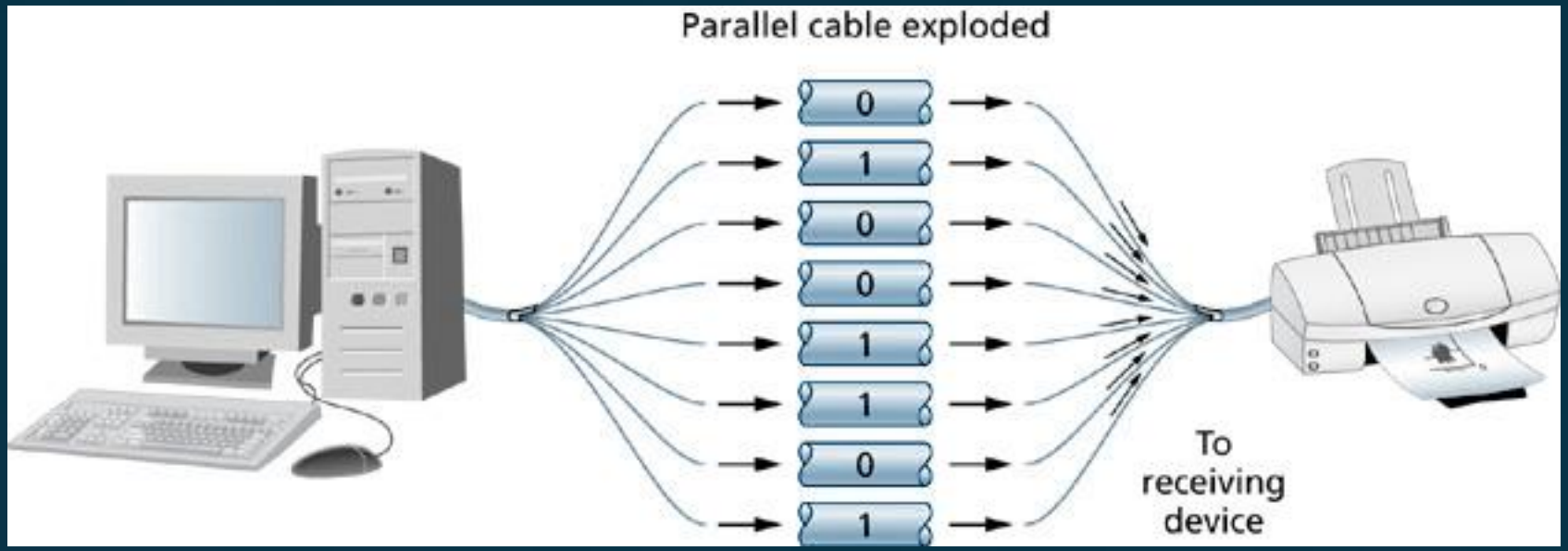


전화 -> 기지국 -> 전화받는 사람 근처 기지국 -> 전화받는 사람

Parallel Transmission

병렬 전송

1바이트 데이터를 한 번에 밀어준다



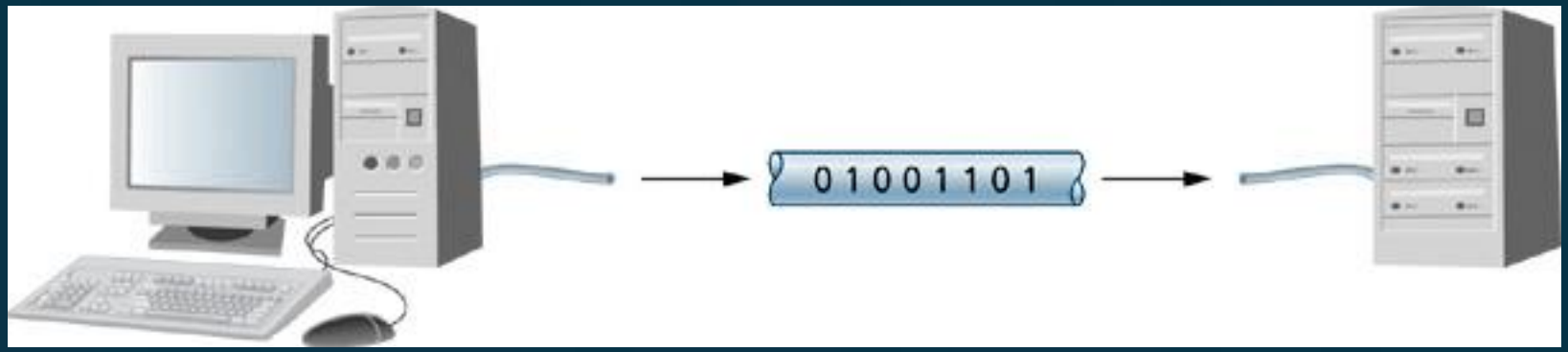
통상적으로 병렬이 직렬보다 빨랐었다 (케이블로 많이 썼다) 요즘은 usb로 쓴다

병렬보다 빠르게 만들어 준게 USB Serial Bus

Serial Transmission

직렬 전송

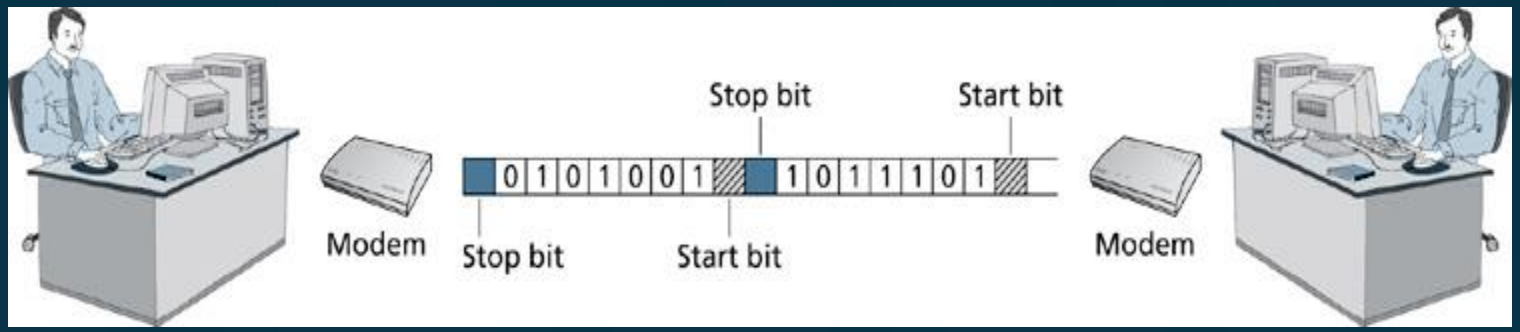
1바이트 데이터를 1비트씩 순서대로 전송한다



요즘에는 직렬을 많이 씀

Asynchronous Transmission

비동기 전송



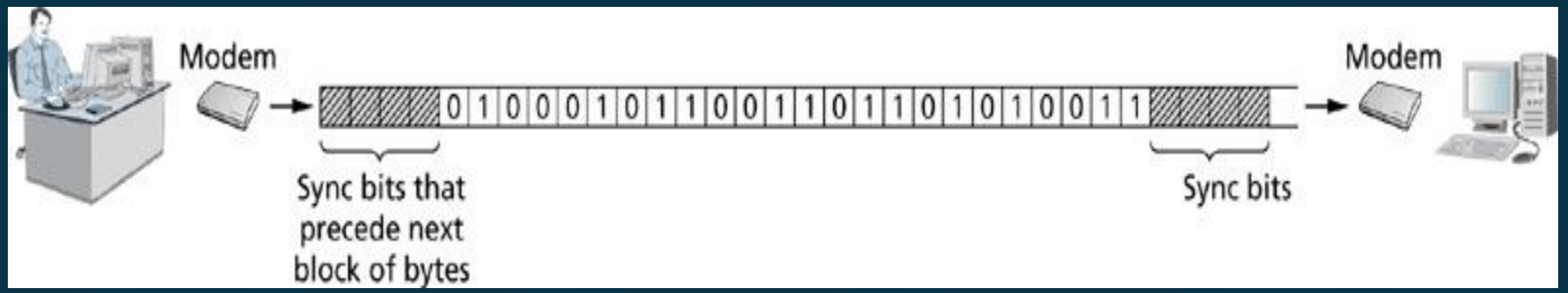
문자 메세지 보내는 거 지금 당장 볼 수도 있지만 나중에 볼 수 있다

.

동기가 안맞는 거 : 싱크가 안맞는다

Synchronous Transmission

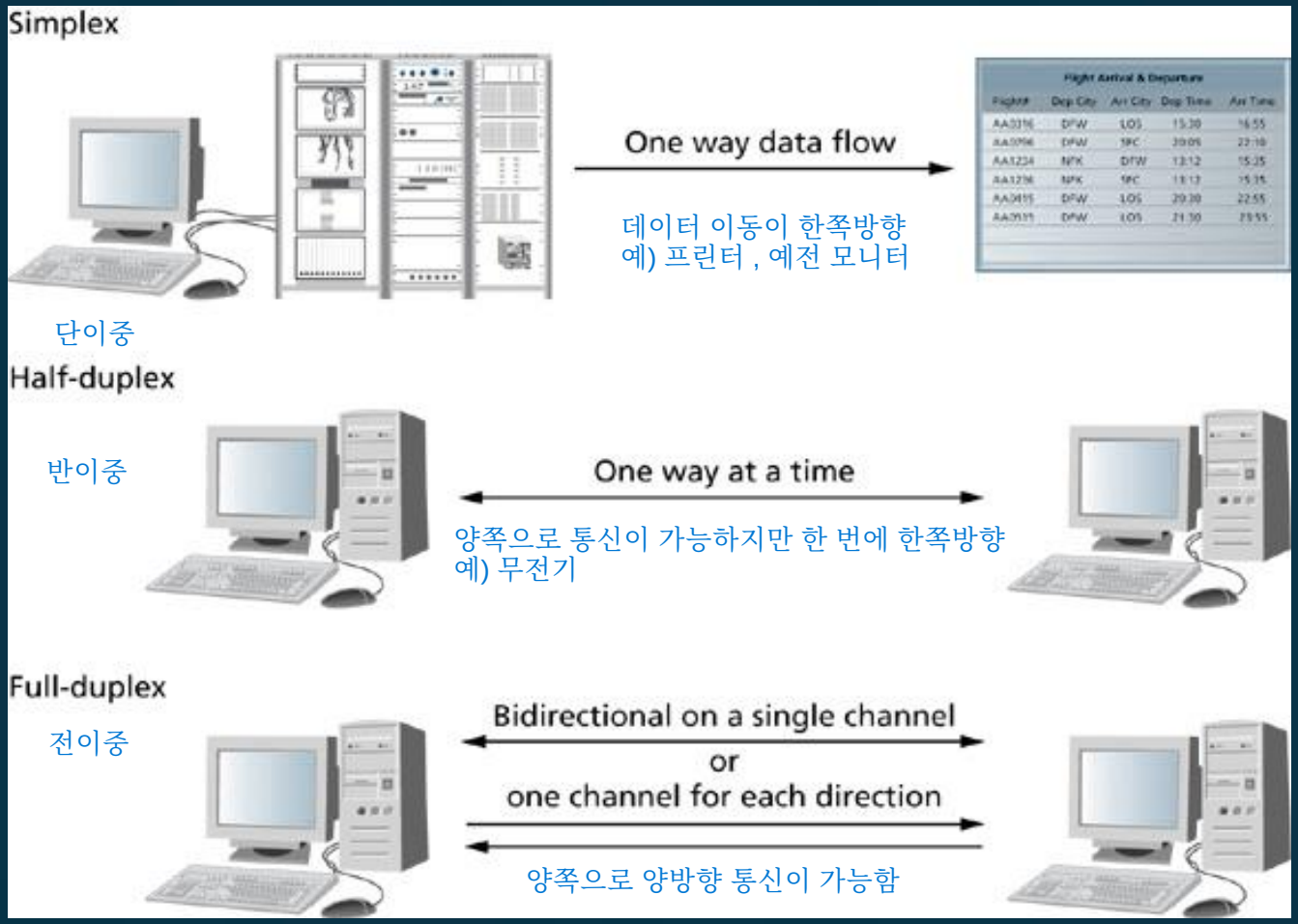
동기 전송



전화를 받는거
동기전송 전에는 연결설정을 해야한다.
연결설정이 되면 데이터를 쭉 보낸다

둘이 데이터를 씀으로 시작과 끝을 구분할 필요가 없다.

Simplex, Half-Duplex, and Full-Duplex Transmission



굳이 왜 이런 거를 나누어 놨을까???

네트워크 초창기에는 이런 거 해석하는데 돈이 많이 들었다, 돈을 아끼기 위해 이렇게 나누어 놓은 거임

고속도로를 10차선으로 안 해 놓은 것과 같음

DATA COMMUNICATIONS STANDARDS

- A standard is an accepted model or pattern.
- Standards are used extensively in data communications and networks.
- Standards provide a basic level of compatibility and interoperability among devices.
- Morse code and the Bell telephone are historical examples of standards.

공식 표준과 업계 표준이 있다.

표준 기구에서 표준을 정하고, 의견이 있는 사람들에 의견을 받고 조정받고 정해진 표준이 공식표준

업계 표준은 A 라는 회사는 제품을 만들었는데 성능이 좋고 장점이 많아서 시장에 이회사 제품이 대부분 사용되면 업계표준

DATA COMMUNICATIONS STANDARDS (cont'd)

- Many standards organizations develop and publish data communications standards.

ANSI – represents member companies in the pursuit of national standards. 아스키 코드

IEEE – fosters the development and publication of electrical, computer, and control standards. I 트리플 E라고 부름 전기전자공학 엔지니어들의 회부

DATA COMMUNICATIONS STANDARDS (cont'd)

ITU – assists in the standardization of numerous data communications standards.

통신회사, 통신 연구소들의 모임

ISO – develops and publishes standards for data communications technologies as well as standards for non-technical products and services.

DATA COMMUNICATIONS MODELS

계층 구조

- Layered architectures and protocols provide the framework for two important data communications models.

app
O/S
Device Drive
HardWare

각자 개발하면 됨

이렇게 계층구조를 만들어 놓는 이유는 컴퓨터가 발전해 나가는 데 있어서 ,가장 적합하다고 생각하는 부분을 나눔

- These models are the OSI model and the TCP/IP model.

표준 모델

업계 표준

- These models provide frameworks by which vendors can develop products that have compatibility and interoperability.

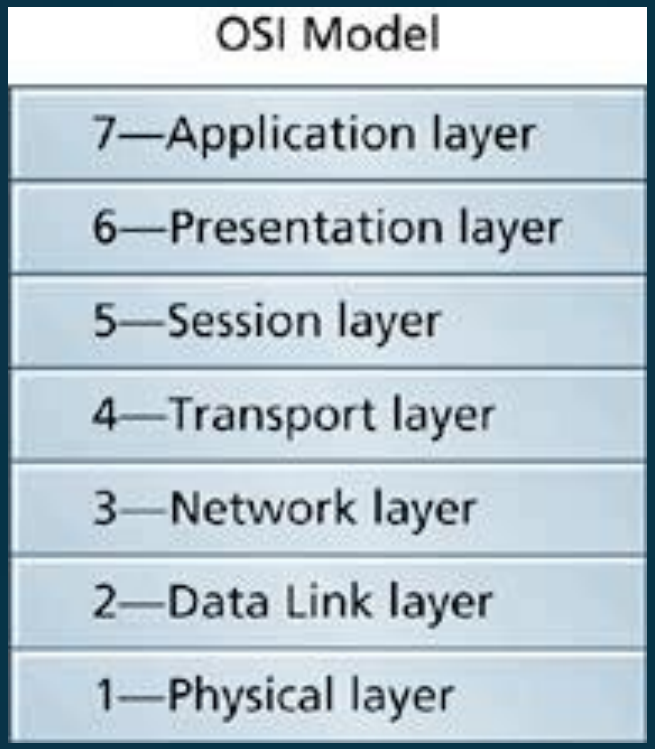
DATA COMMUNICATIONS MODELS (cont'd)

OSI Model – dates back to the late 1970s.

- It uses a 7-layer framework to define communications functions that assure compatible communications among devices or systems.
- Its layered architecture provides modularity to systems developers.
- Each layer provides a set of rules or protocols.

The OSI Reference Model

7개의 계층



응용 계층

표현 계층

LAYERS OF THE OSI MODEL

Physical Layer

랜선, 와이파이 어뎁터

- It's also known as layer 1 of the OSI model.
- Defines the protocols that govern the physical connection and transmission of bits between devices. 디바이스가 비트의 전송을 담당해준다
- Defines the signaling method such as digital or analog. 디지털을 쓸지 아날로그를 쓸지 결정
- Specifies transmission characteristics such as asynchronous, synchronous, simplex, half-duplex, or full-duplex. 전송특성도 어떤 전송매체를 깔았느냐에 따라 달라진다
- Defines the data rate such as 10 Mbps, 100 Mbps, 1000 Mbps, etc. 전송속도를 결정함 , 아무리 빠른속도를 지원받고 싶어도 계층 1에서 지원을 안하면 안된다.

LAYERS OF THE OSI MODEL (cont'd)

Data Link Layer

- Prepares data for the physical layer and provides services to the network layer that's above it.
- Organizes data bits into frames.
- Defines node addresses.
- Also defines how data bits access the transmission medium.
- Includes error detection and correction protocols.

LAYERS OF THE OSI MODEL (cont'd)

Network Layer

- Defines logical network and node addressing.
- Specifies creation of packets and sequencing of the packets.
- Prepares data for the data link layer and provides support services for the transport layer.
- Provides route discovery and determination of best route between separate networks.

목적지까지 찾아가는 최적의 경로를 알려주는 역할을 함

LAYERS OF THE OSI MODEL (cont'd)

Transport Layer

- Receives messages from upper layers and segments those messages into smaller chunks.
- Provides connection-oriented data services.
- Provides end-to-end flow control.
- Identifies service addresses, or port numbers.

전송계층에서 중요한 거

LAYERS OF THE OSI MODEL (cont'd)

Session Layer

- Is responsible for establishing, maintaining, synchronizing, and terminating communications between two devices.

파일을 보내다가 중간에 끊어질 때 세션계층에서 잘해주면 이어 받을 수 있다

LAYERS OF THE OSI MODEL (cont'd)

Presentation Layer

- Provides data transformation services, such as encoding – ASCII, EBCDIC, or Unicode.
- Can provide end-to-end encryption services within data transmissions.

encoding 과 encryption 역할을 한다.

LAYERS OF THE OSI MODEL (cont'd)

Application Layer

- Provides services such as file, print, and email services that support user applications.
- Remote access services exist in this layer.
- Collaborative computing services and service advertising mechanisms exist here.

만들어진 프로토콜을 기반으로 앱을 만드는 게 아니라 기획한 게임에 적합한 통신 프로토콜을 선택해서 구현하는 게 우리가 해야 할 작업이다

DATA ENCAPSULATION IN A LAYERED ARCHITECTURE

- Data encapsulation is a process that adds an additional set of protocol information known as a header to a set of data bits for each layer in a layered architecture.

  인캡슐레이션

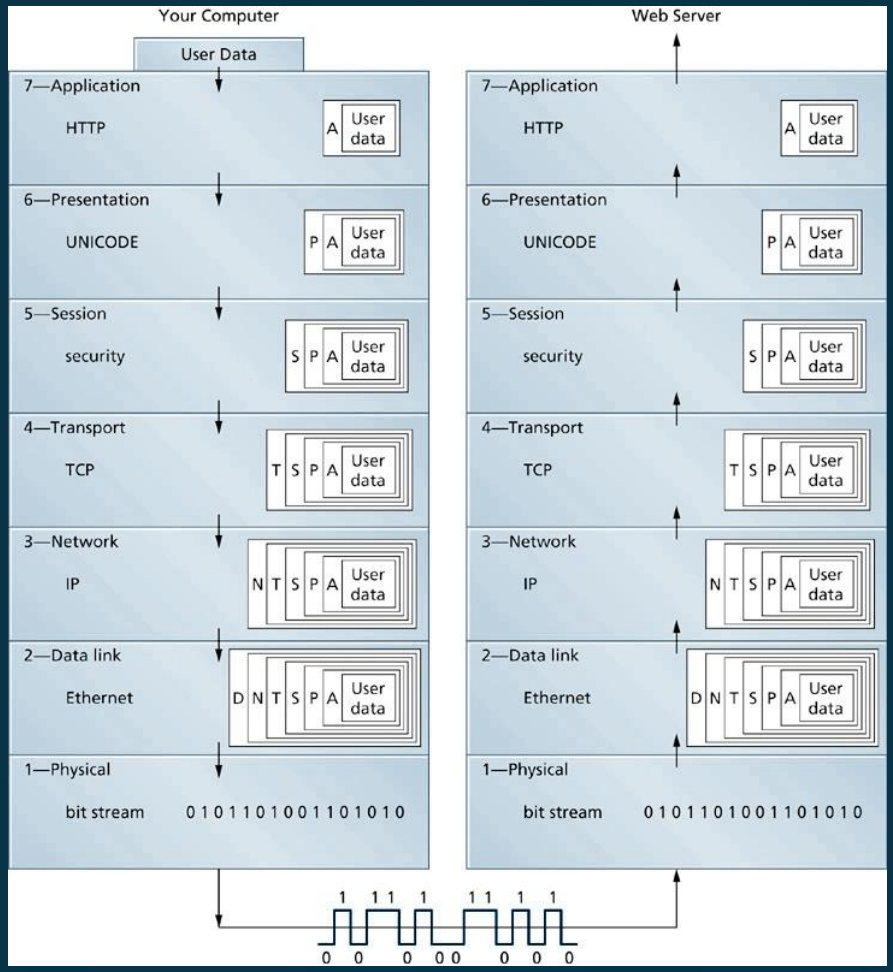
- Protocols at each layer provide a framework that describes how data communications should take place between similar processes, services, or functions running on two or more devices that are exchanging data.

- Protocols that function according to the rules that describe each layer facilitate the exchange of data between communicating devices.

Layered Approach to Data Encapsulation

반송될 경우를 생각해서
보낸 사람의 정보를 적음

마찬가지로 IP주소를 적는다



데이터 정보에 부가정보가 더해진 한 덩어리를 패킷이라 부름

THE TCP/IP MODEL

- Dates back to the early 1970s.
- Uses a layered architecture for defining communications functions between devices.
- It's not a formal standard. 업계 표준이다.
- Can be represented as either a 4-layer or 5-layer model.

The TCP/IP Model and the OSI Reference Model Compared

OSI Model	TCP/IP Model
7—Application layer	4—Process/Application layer
6—Presentation layer	
5—Session layer	
4—Transport layer	3—Host-to-Host layer
3—Network layer	2—Internet layer
2—Data Link layer	1—Network Access layer
1—Physical layer	