



School of Computer Science

Winter Term 2000

CS 308-435

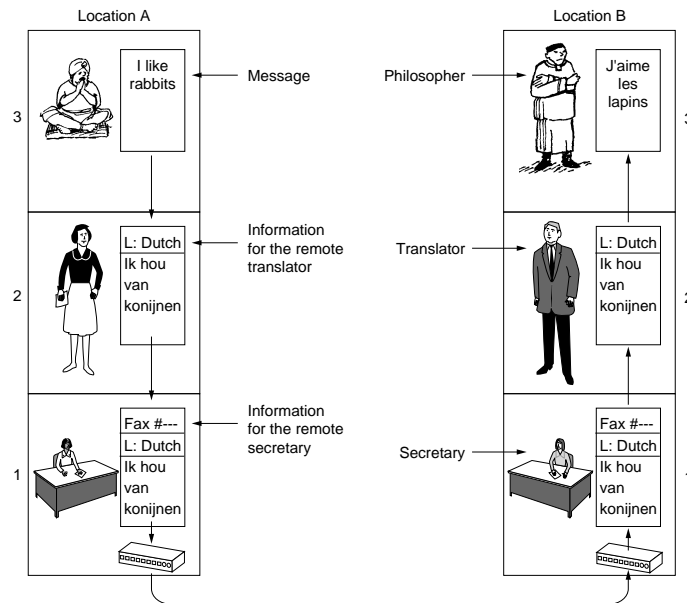
Basics of Computer Networks

Hans Vangheluwe

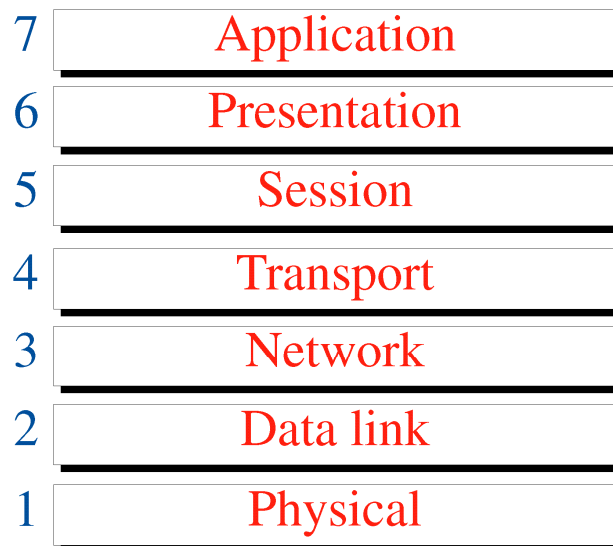
The OSI *model*

- Layered Architecture (service, interface, protocol)
- Peer-to-peer communication (horizontal)
- Interfaces (vertical)

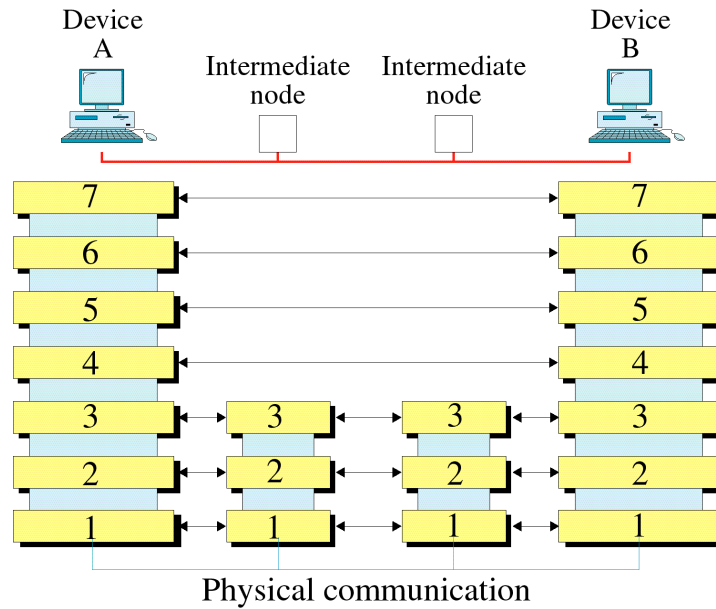
Layers, Interfaces, Protocols



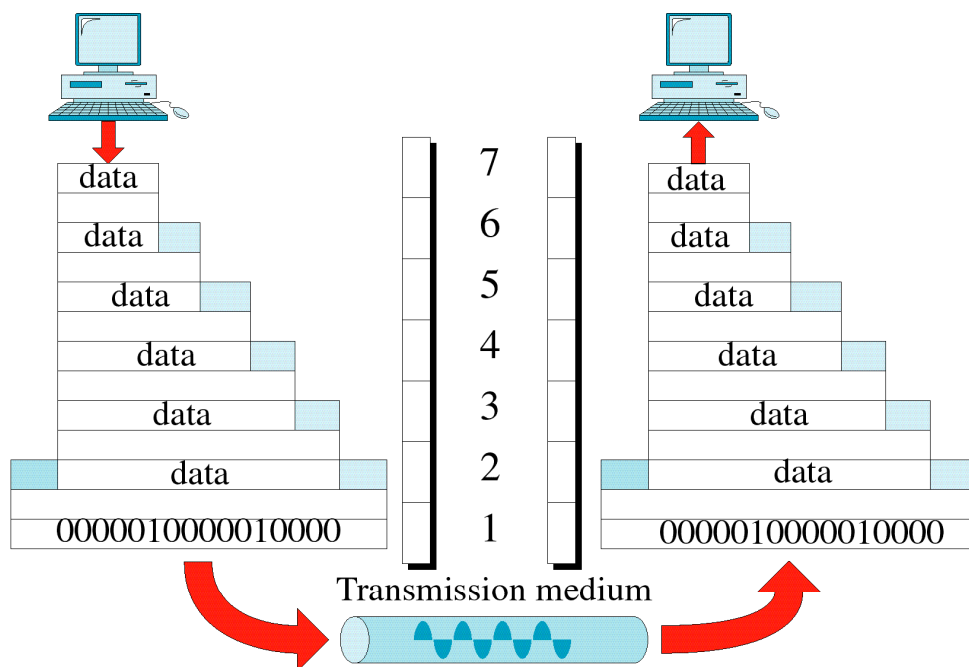
The OSI model



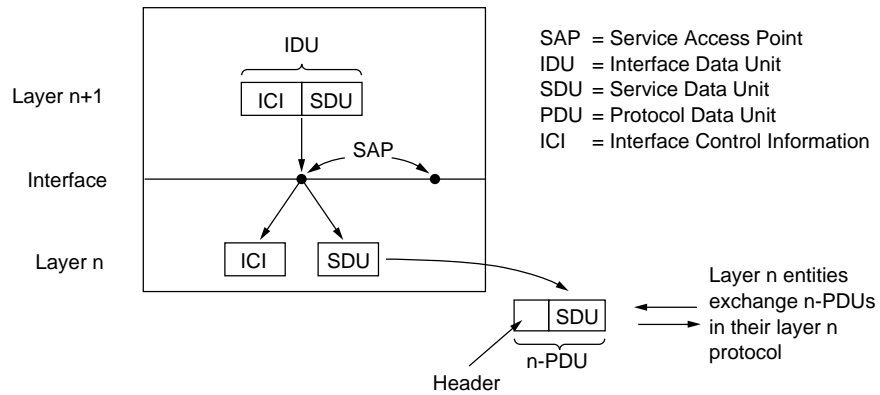
OSI layers



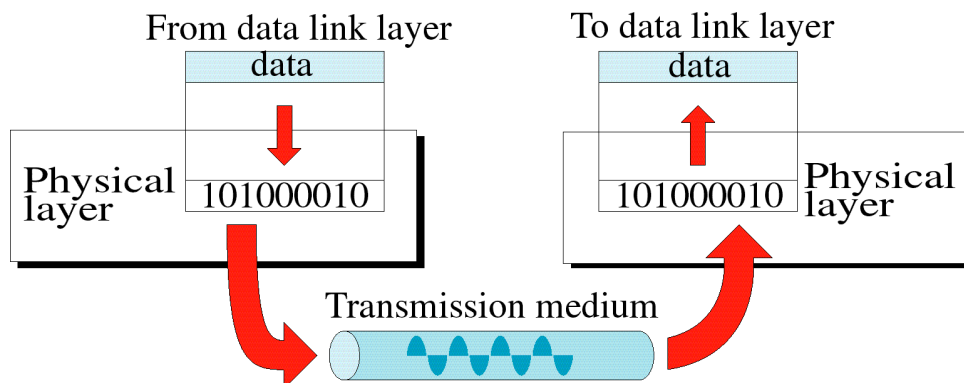
exchange using OSI



Layer Interfaces



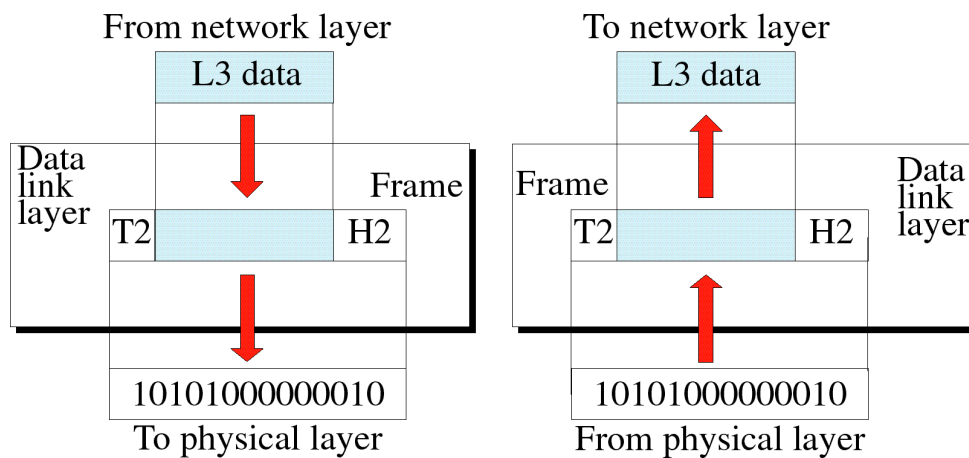
Physical Layer



Physical Layer

- media characteristics
- representation of bits: encoding
- transmission rate
- synchronisation between sender and receiver
- line configuration (point to point, multipoint)
- topology (star, ...)
- transmission mode (x-duplex)

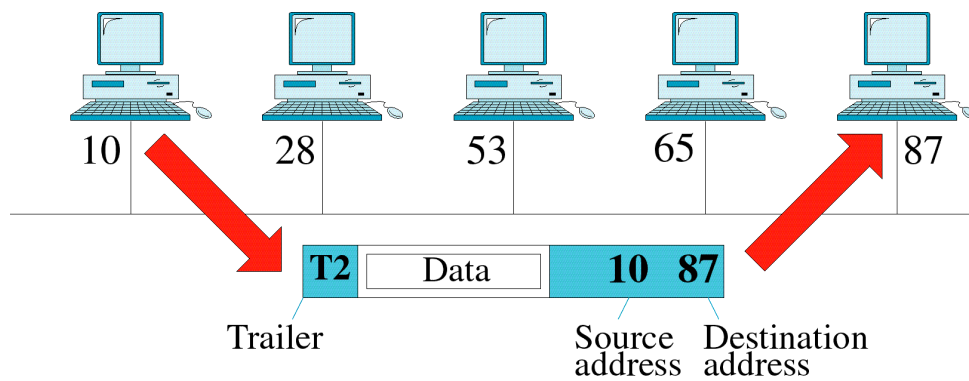
Data Link Layer



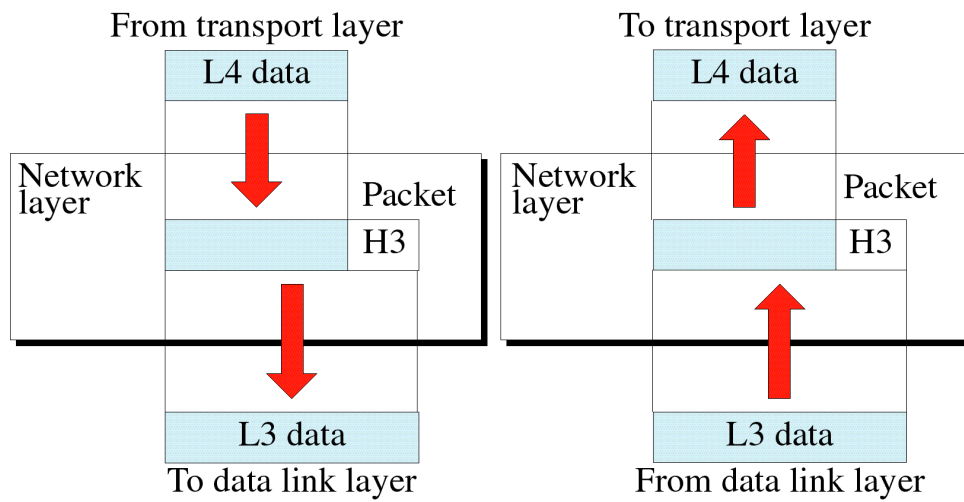
Data Link Layer

- framing
- physical addressing
- flow control (rate difference)
- error control
- access control (which device has link)

Data Link transfer



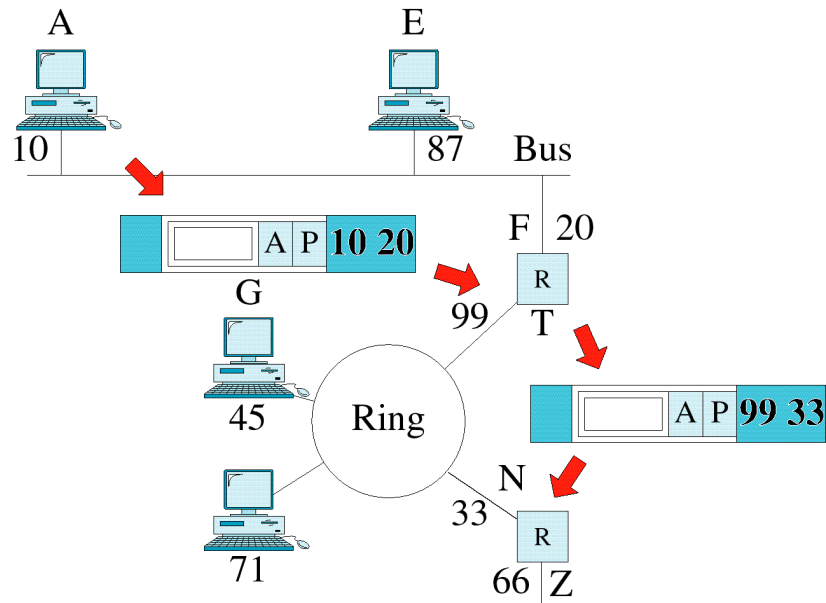
Network Layer



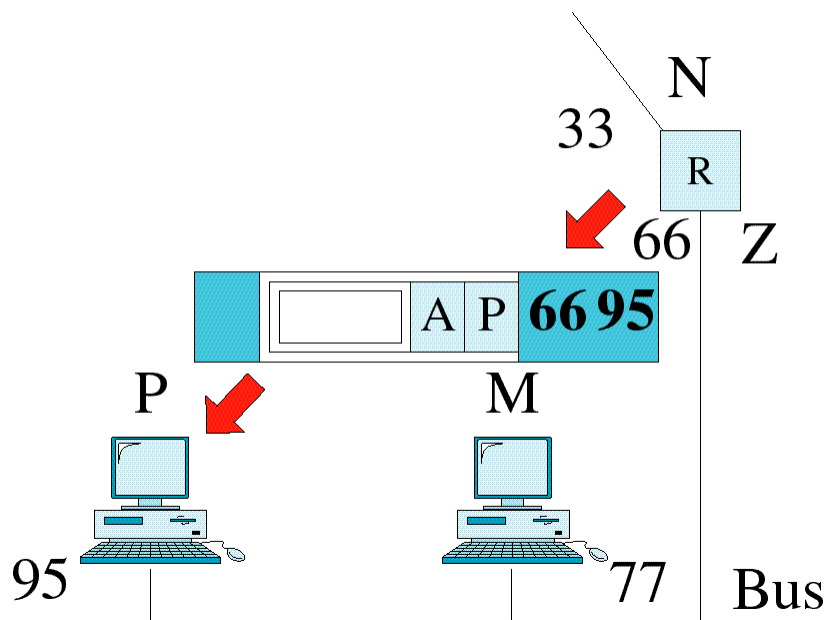
Network Layer

- logical addressing
- routing

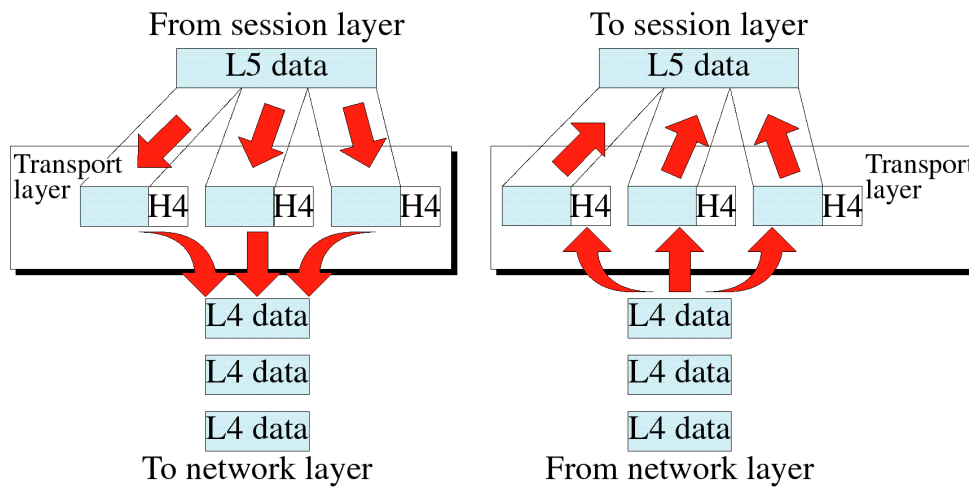
Network Layer Example



Network Layer Example



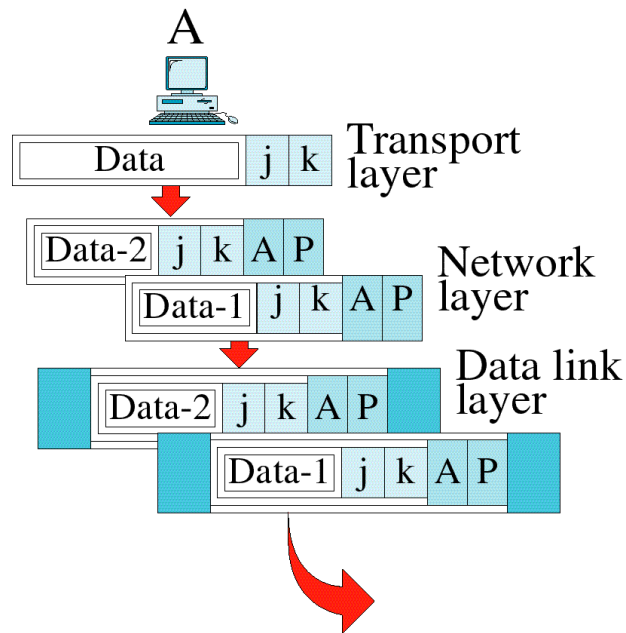
Transport Layer



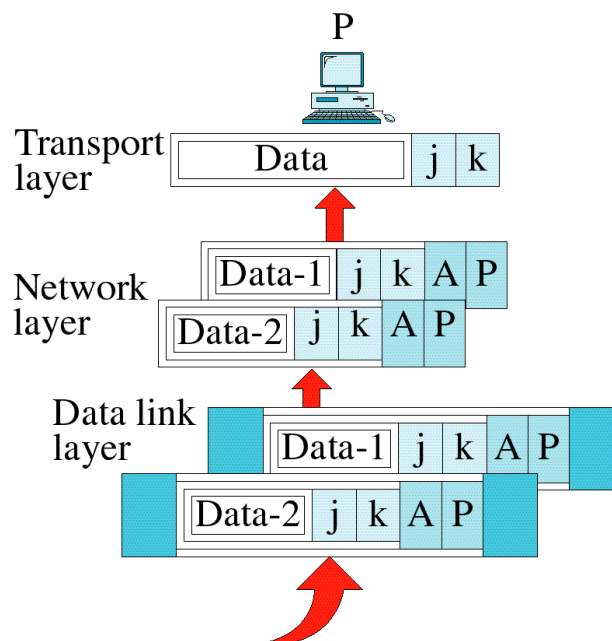
Transport Layer

- service point addressing (process – port)
- segmentation and re-assembly
- connection control (connection(less))
- flow control (end to end)
- error control

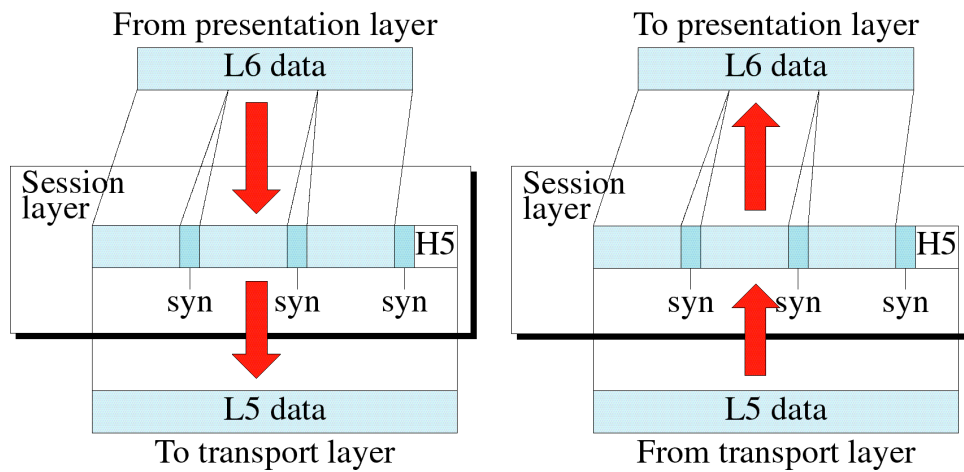
Transport Layer Example



Transport Layer Example



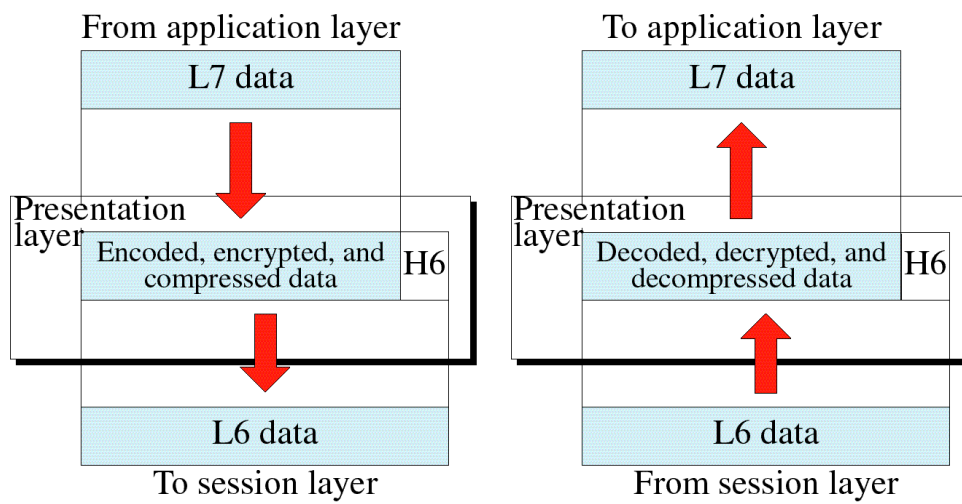
Session Layer



Session Layer

- dialog control
- synchronization

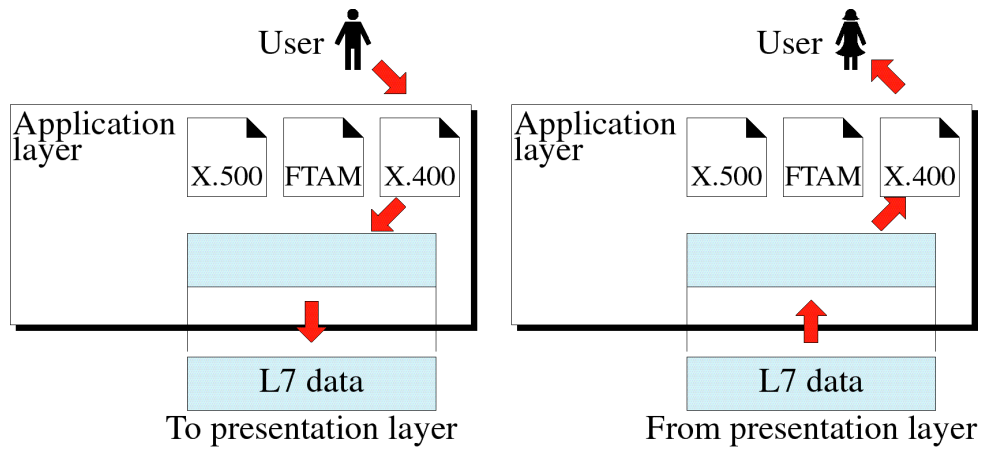
Presentation Layer



Presentation Layer

- Translation
- Encryption
- Compression

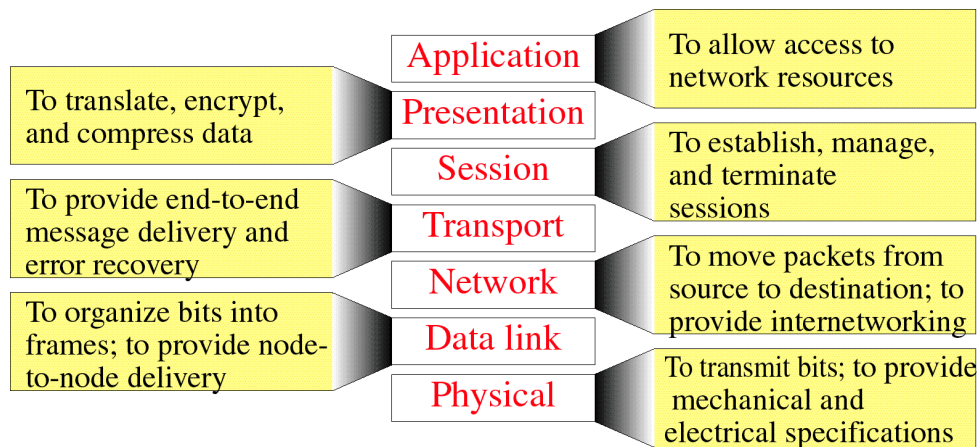
Application Layer



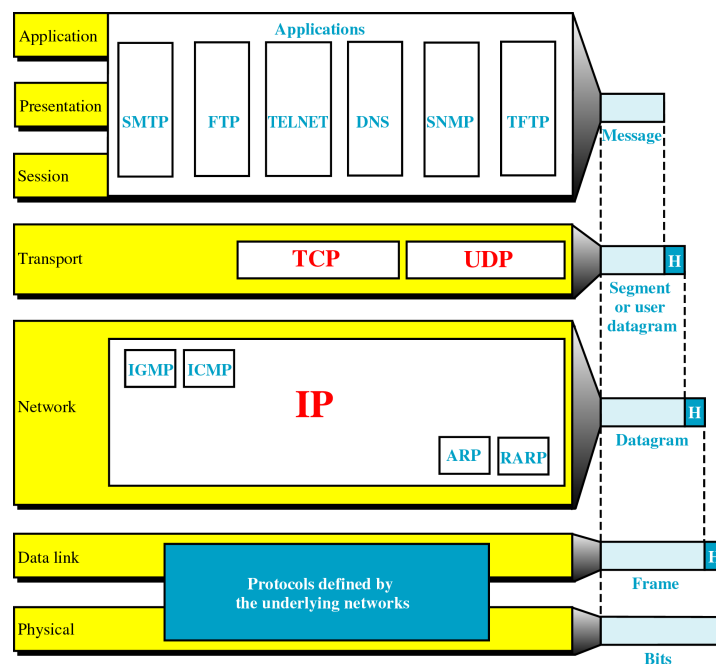
Application Layer

- mail
- directory
- File Transfer, Access and Management

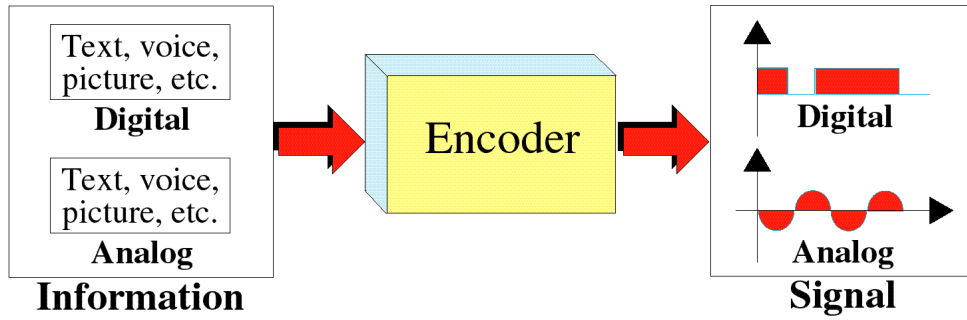
The OSI model



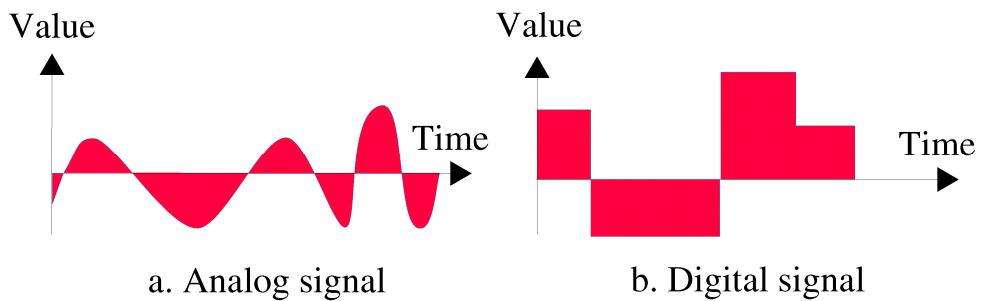
TCP/IP and the OSI model



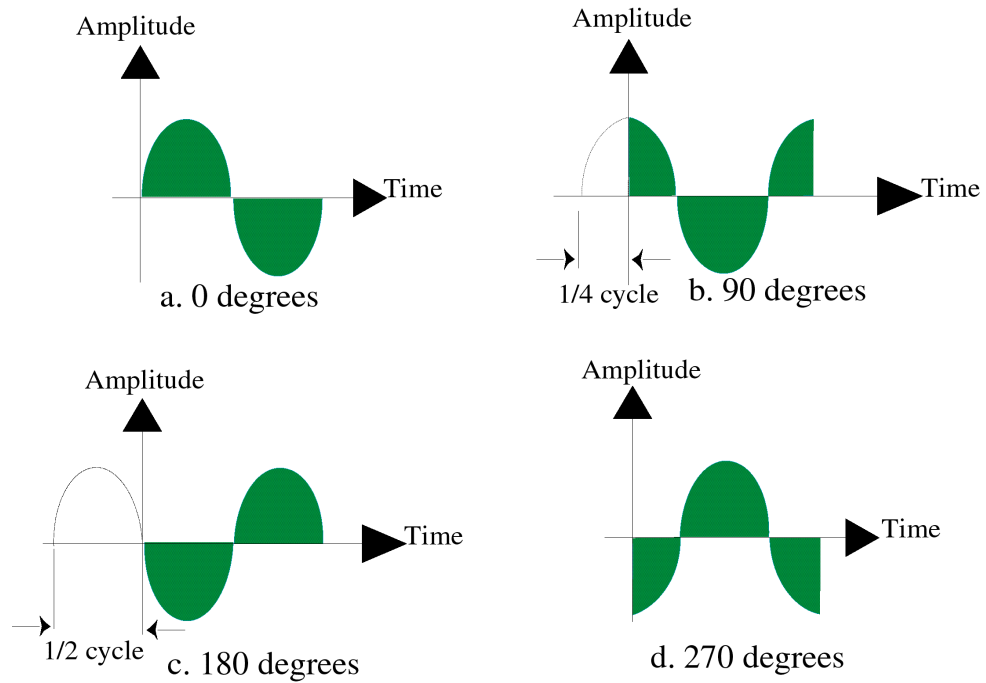
Analog to Digital



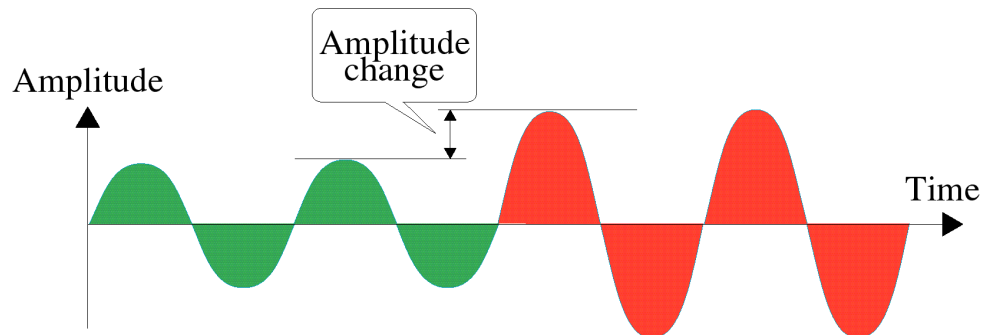
Analog to Digital



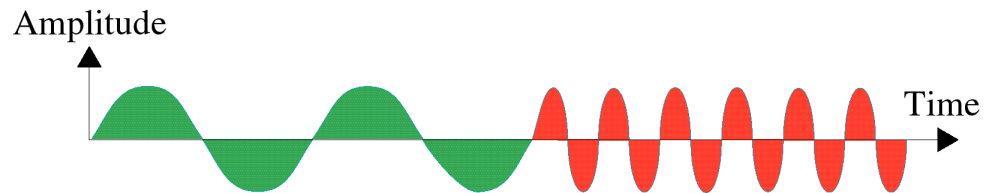
Phase, Frequency, Amplitude



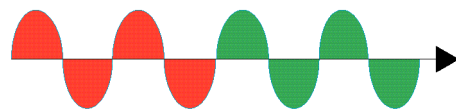
Amplitude Change



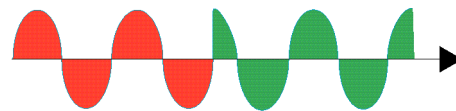
Frequency Change



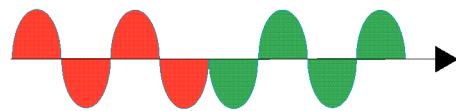
Phase Change



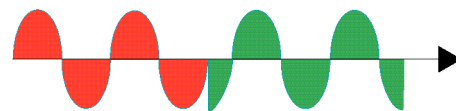
a. No phase change



b. 90 degree phase change

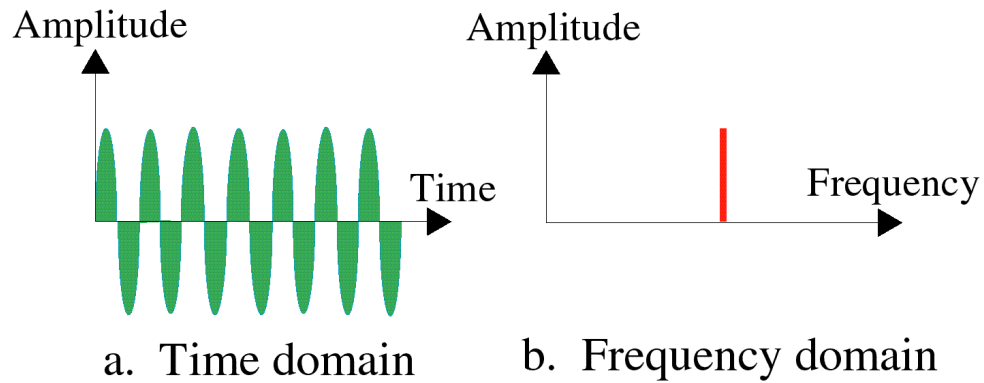


c. 180 degree phase change

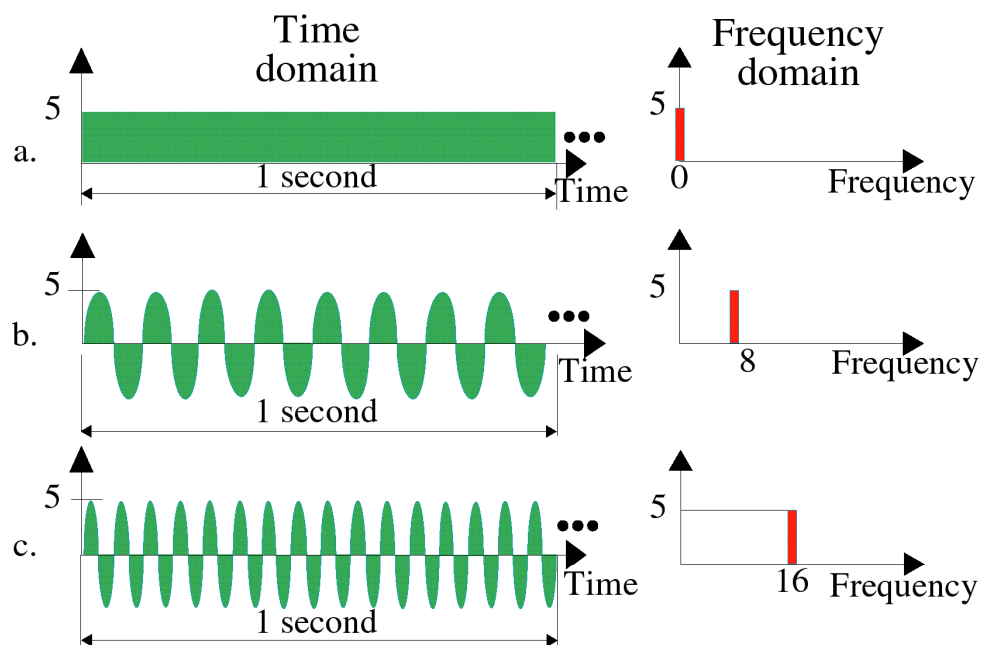


d. 270 degree phase change

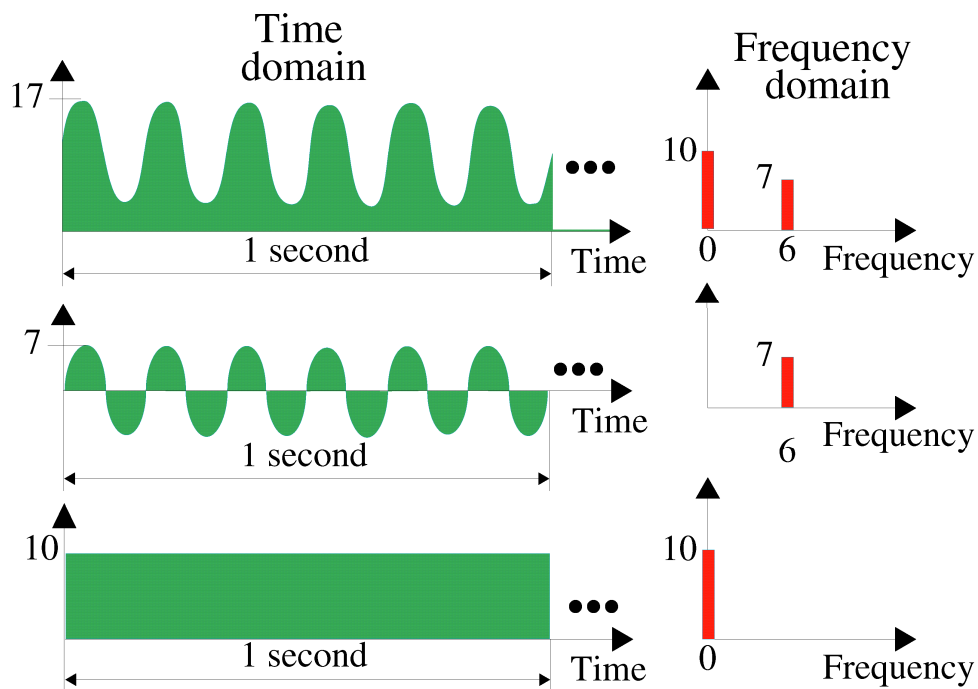
Fourier Transformation



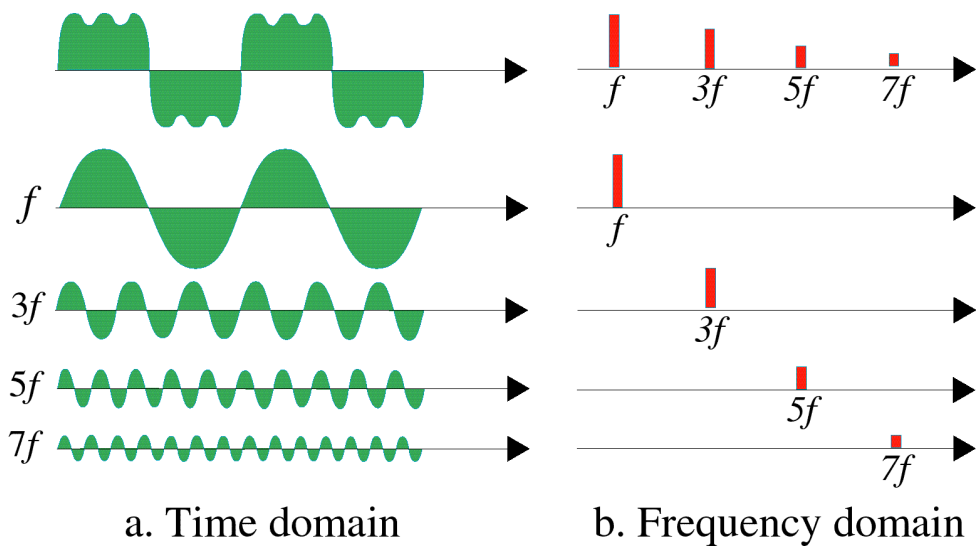
Time and Frequency Domain



Composite Signal



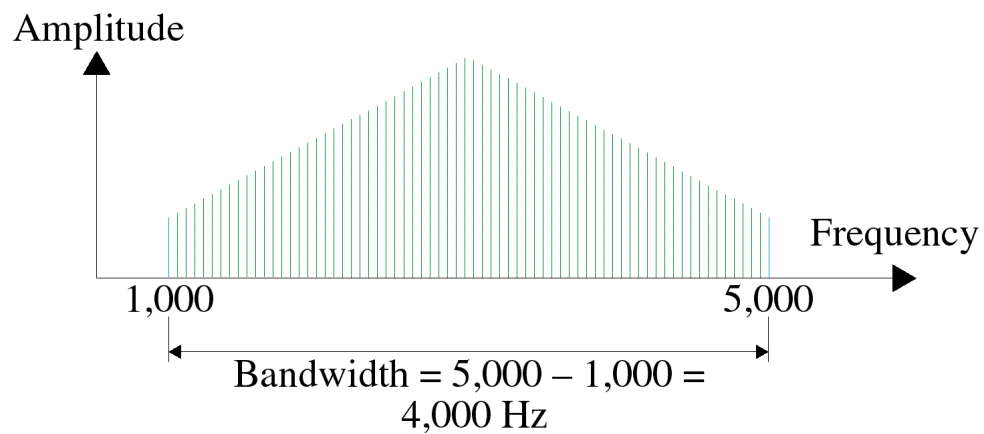
Composite Signal



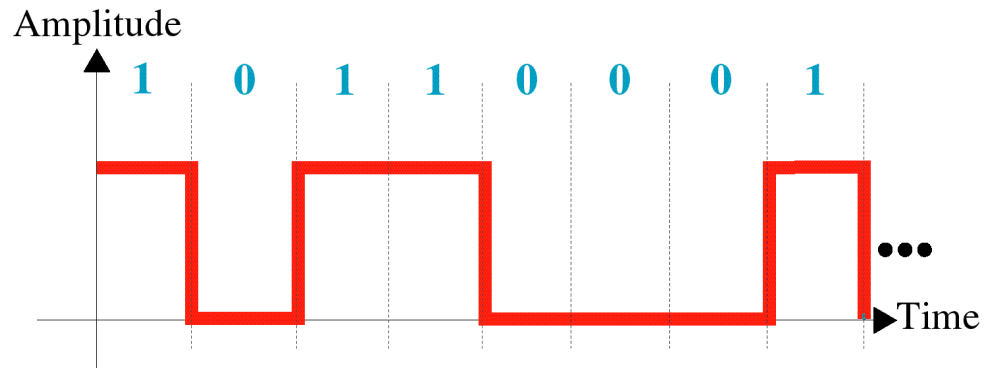
Full Duplex Communication

use separate frequency bands

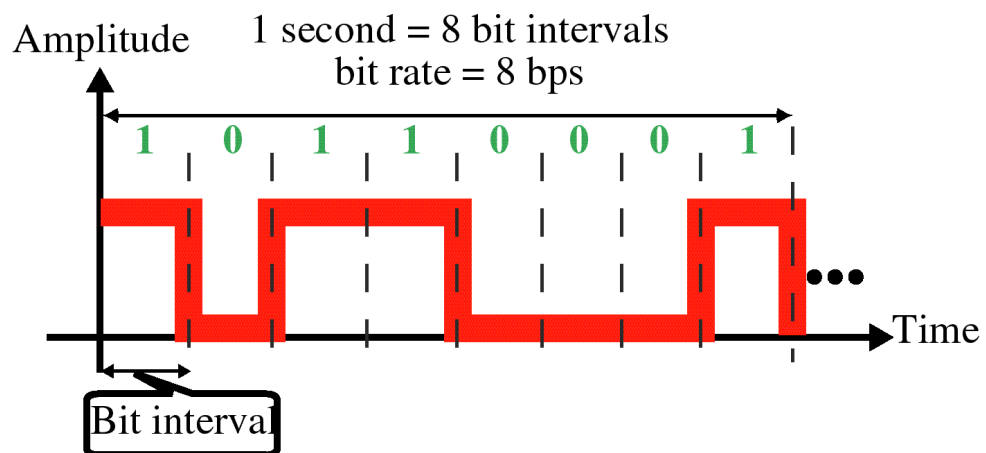
Bandwidth (highest - lowest frequency)



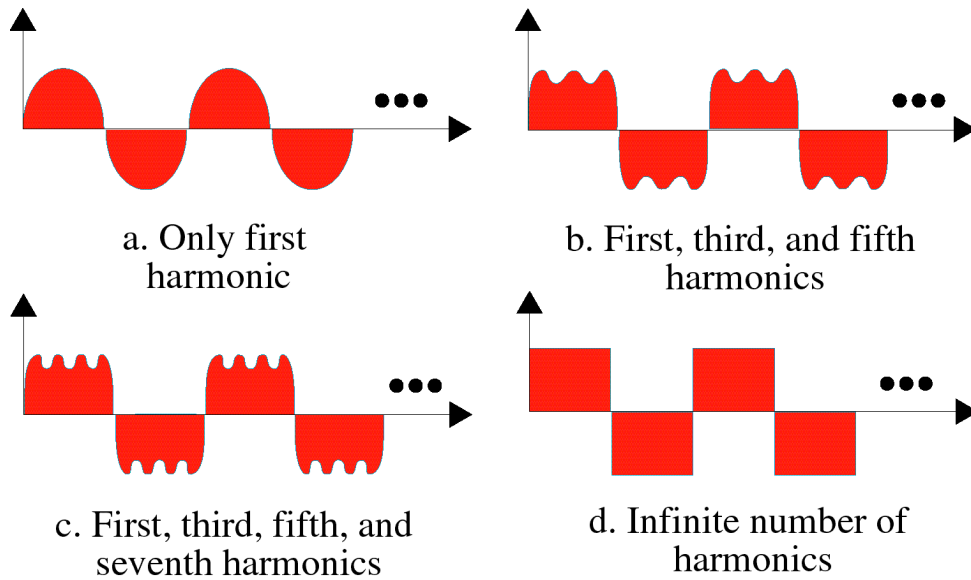
Digital Signal



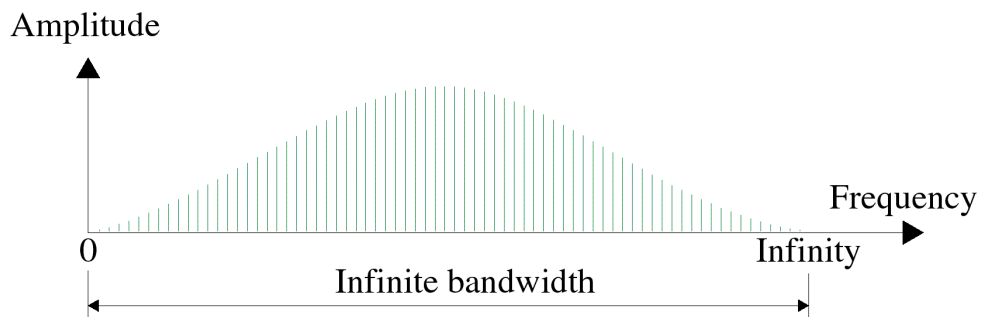
Bit Rate and Interval



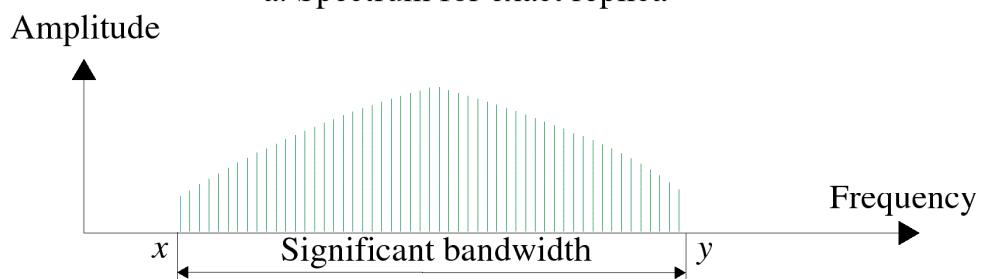
Harmonics (digital composed of analog)



Spectrum



a. Spectrum for exact replica



b. Significant spectrum

Limited Bandwidth

