Data Comm. & Networking

Date: 07/3

Data: Collection of facts, nos., words, observations or other useful information in various forms.
Eg: Numbers, text, audio, video etc.

Communication: It is an act of sending or receiving data.

DC: Refers to the exchange of data b/w two or more networked/connected devices which are capable of sending or receiving data over a communication medium.
Eg: PC, phones, laptops etc.

Aspects of Communication

Sender: Device capable of sending data.
Receiver: Device capable of receiving data.
} nodes

Message: Data/Info needed to be exchanged.

Comm. Media: Path through which the message travels b/w source & destination.

- Guided (Wired)
  - Twisted pair
  - Co-axial
  - Fiber-optic
- Un guided (Wireless)
  - Radio
  - Microwave
  - Infra red
  - Satellite

Protocols: Set of rules to be followed for successfull & reliable comm. Eg: Ethernet, HTTP

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Data Representation

1) Text : • ASCII (American Standard Code for Info. Interchange)
• Unicode : Multiple languages / symbols 16-32 bit encoded
Eg: Whatsapp msg → unicode

2) Number : • Binary Of 1
• Unsigned Binary (Whole nos.)
• Signed " (+ve & -ve)
• Floating point
Eg: Internal working of calculator.

3) Image : • Using pixels in RGB
• Bitmap (BMP, png, jpeg)
• Vector imgs (SVG, EPS)
Eg: Jpeg on instagram.

4) Audio : • Analog → Digital using sampling techniques.
• Sampling Rate - quality
• Audio formats - mp3, WAV
Eg: Song on Spotify

5) Video : • Combination of imgs & audio
• Fps → smoothness
• Compression formats (mp4, AVI, MOV)
Eg: Youtube.

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Data Flow

1) Simplex: • Communication is unidirectional, one-way
• Only one device can transmit, other can receive
Eg: Keyboards, mouse

2) Half-Duplex: • Both stations can receive, but not at same time.
• When one sending, other can only receive.
Eg: Walkie-Talkie, CB radios.

3) Full-Duplex: • Both stations can send and receive simultaneously.
Eg: Telephone communication

Networks

- Set of devices (nodes) connected by communication links.
- Node → Printer, computer ...etc

Distributed Processing: A task is divided among multiple computers instead of one large mach.

Network Criteria: Performance, Reliability, Security.

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1) Performance:
- Many ways to measure ie transit time / response.
  - Transit ⇒ time of msg A ⟷ B device.
  - Respons ⇒ time inquiry ⟷ response
- Factors:
  - no. of users
  - Transmission medium.
  - capability of connected hardware.
  - efficiency of software.
- Networking Metrics:
  - Throughput → more
  - Delay → less

2) Reliability:
- Measured by the frequency of failure.
- Time it takes a link to recover from failure.
- Network's robustness in a catastrophe.

3) Security:
- Protecting data from unauthorized access.
- Protection from damage / developement.
- Policies / procedure for recover from breaches.
- Authentication, Authorized, SSL

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Types of Connection

1) Point-to-point connection is direct link between two devices.

Advantages: • Dedicated bandwidth
• Low latency
• Easy to fix

Disadvantage: • Expensive
• Scalability
• More cables.

2) Point-to-multipoint is where multiple devices are connected via a single communication line

Advantages: • Easy scalabe
• Cost-effective

Disadvantages: • Shared bandwidth
• Security issues
• Delays