Overview of Computer Communication Networks

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August 26, 2020

Outline

1. Computer Networks Overview

2. Internet Overview

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1. **Computer Networks Overview**

2. Internet Overview

Computer networks are evolving

- ▶ How do users and organization use computer networks?
- ▶ What has technological development enabled?
- ▶ How has the communication traffic pattern evolved?
- ▶ What sort of networks do users and organizations want?

How do we use computer networks?

1. Remotely access expensive computer hardware, e.g., a mainframe
2. Remotely access software and data, e.g., license software, library collections
3. Communicate remotely digitally, e.g.., from e-mails to multi-media messaging
4. Use multiple computer systems jointly, e.g., distributed and parallel computation
5. Expand a "computing platform" to a great number of computer systems and networks
6. *ldots*

how do computing and networking technologies evolve?

We examine multiple dimensions,

- ▶ Size of computer systems. Mainframe, workstation, desktop, laptop, smart phones, IoT devices, . . .
- ▶ Scale of computer networks. PAN, LAN, MAN, WAN.
- ▶ Transmission medium. Wireless, wired, . . .
- ▶ Protocols. 802.11, 802.3, . . .
- ▶ Applications. Mainframe applications, web applications, mobile applications, . . .

How does network traffic pattern evolve?

We examine multiple dimensions,

- ▶ The amount of data.
- ▶ The types of data.
- ▶ The regional distribution of data.

What sort of networks do users want?

We should consider to meet the requirements of users' applications

- ▶ Bandwidth
- ▶ Latency
- ▶ Jitter
- ▶ Quality of Service

Outline

Key Elements of the Internet

▶ The Internet is an internetwork, i.e., a network of networks.

▶ Networks

▶ Routers. Connects networks, i.e., forwarding data between networks

▶ Hosts. End systems on a network, e.g., mainframe, workstation, desktop computer, laptop computer, mobile phone

▶ Links. Connects two nodes.

▶ Hosts and IP packet (or IP datagrams)

▶ Processes (programs) and data messages

Internet Architecture

The internet architecture has evolved since its creation.

- ▶ Autonomous systems
- ▶ Overlapping hierarchical networks (networks of internetworks, network of networks)
- ▶ Peering, Internet Service Providers (ISP), Network Access Point (NAP)
- ▶ Central Office (CO)
- ▶ Point of Presence (POP), Customer Premises Equipment (CPE)