MODULE 10: Networking

Lecture 10.1
Networking Basics

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Lecture 10.1 Objectives

- Define network
- Describe the evolution of telecommunications networks, including the Internet
- Enumerate standards bodies involved in the standardization of network protocols and technologies

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What is a Network?

- A network is the interconnection of two or more cooperating devices
  - An internetwork is the connection of two or more networks
- Two broad types of network
  - Telephone network: interconnection of telephones and switches
  - Computer networks: interconnection of computers
  - The distinction is increasingly blurred

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A Brief History of Networks (1)

- Antiquity – drum telegraph, fire and smoke signals to relay information at a distance
- 1800s – telegraph (tele = distant, graph = writing) and telephone (phone = voice)
    - By the end of the1800s, telephone network included switching offices and allowed for long distance connections between switching offices
- Late 1800s – wireless communications
    - By mid 1900s, wireless telephony
- 1960s – satellite communications

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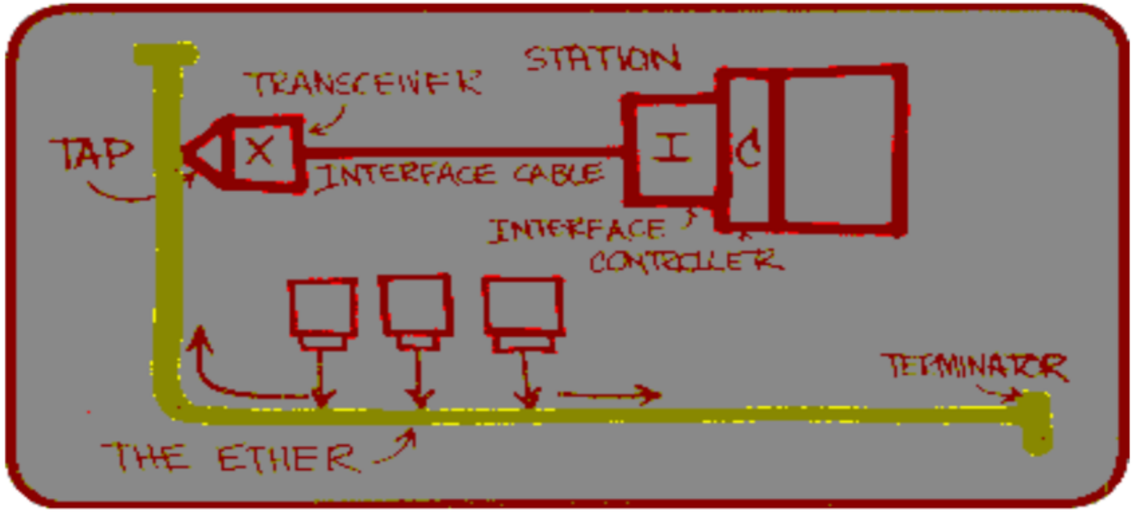
A Brief History of Networks (2)

- 1960s/1970s – laying the grounds for the Internet
  - Deployment of the ARPANET
  - Packet switching as a new paradigm for carrying data
- Mid 1970s – Ethernet LANs



Robert Metcalf's Ethernet, 1976

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A Brief History of Networks (3)

- 1980s – TCP/IP
- Early 1990s – The web
  - HTML, HTTP, web servers and web browsers
- Mid 1990s – Ubiquity of mobile telephony
  - Integration of data and voice
- 2000s – sensor networks, pervasive computing, cognitive radio, peer-to-peer networks, Internet of Things, …

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CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can do the following:

- Define network
- Describe the evolution of telecommunications networks, including the Internet

If you have any difficulties, please review the lecture video before continuing.

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Standards (1)

- Essential to enable interoperability and reduce costs
- International Organization for Standardization (ISO)
  - International agency, whose members are standards bodies of participating nations
  - US is represented by American National Standards Institute
  - Responsible for the Open Systems Interconnection (OSI) model

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Standards (2)

- European Telecommunications Standards Institute (ETSI)
  - GSM cellular system, TETRA land mobile radio system
- ITU Telecommunications Standardization Sector (ITU-T)
  - Issues Recommendations with a view to standardizing telecommunications on a worldwide basis
  - United Nations agency (members are governments)

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Standards (3)

- Internet Engineering Task Force (IETF)
  - Issues Requests for Comments (RFCs), some of which may become Internet standards
  - Membership in a working group is open and voluntary
- Institute of Electrical and Electronics Engineers (IEEE)
  - Standards for local area networks, such as Ethernet and WiFi
- Industry consortia
  - ATM Forum, ADSL Forum, etc.

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Summary

- Two or more communicating devices form a network
- Telecommunications networks have a long evolutionary history, with the development of telephony, wireless communications, and the Internet as some of the major milestones
- Standards are fundamental for interoperability
- IEEE, IETF, ISO, ETSI, ITU and industry consortia are some of the standardization bodies responsible for network standards

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