

# 15.020 Competition in Telecoms

## Recitation #1

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# Agenda

- US Telecom History
- Phone Network Overview
- Networking Introduction

# History

# Industry Structure

## **Pre-1984: Bell System**

- AT&T:
  - 22 local Bell companies
  - Local, interstate and international long distance
  - Manufactured and sold central office switches, telephones, electronics
  - Yellow and white page telephone directories
- Long-distance competitors (MCI, Sprint)
  - Owned long-distance networks, but not connection to the homes
  - Relied on local (Bell) companies for call termination
  - Numerous complaints filed about AT&T's unfair practices

## **1974: Anti-trust suit against ATT, resolved in 1984**

### **1984: Divestiture**

- 22 Bell companies transferred to 7 Regional Bell Operating Companies (RBOCs)
- Local Access Transport Area (LATA): RBOCs - local & toll calling
- AT&T: manufacturing (became Lucent) and long distance
- Bellcore formed (owned jointly by RBOCs): administered numbering plans. Renamed to Telecordia and acquired by Science Applications International Corporation (SAIC)

### **1996: Telecommunications Act**

- Local competition opened up to long distance, cable, local access and utility companies
- Unbundling of ILEC network
- Creation of Competitive Local Exchange Carriers (CLECs) to compete with Incumbent Local Exchange Carriers (ILECs)

# Original RBOC Territories

- SBC Communications
- USWest
- Ameritech
- SNET (Southern New England Telecom)
- BellAtlantic
- BellSouth
- Pacific Telesis
- Nynex

For this map of the U.S. and where the RBOC operate,  
see: <http://www.cedmagazine.com/ced/9912/9912dsl.htm>

# ...and then Natural Selection Stepped In

- Qwest
- Verizon
- BellSouth
- SBC Communications

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# Abbreviations

- FCC: Federal Communications Commission
- LATA: Local Access Transport Area
- RBOC: Regional Bell Operating Company
- LEC: Local Exchange Carrier
- ILEC: Incumbent LEC
- CLEC: Competitive LEC
- IXC: inter-exchange carrier

# Phone Network Overview

# Public Switched Telephone Network (PSTN)

For this diagram of a PSTN, see: *Dell White Paper: WAN Technologies & Digital Subscriber Line*, 1998.

# Anatomy of a Phone Call

For this diagram, see Figure A.7.14 in Ericsson.  
*Understanding Telecommunications*, 2003.

<http://www.ericsson.com/support/telecom/>

# Two Views on Network Hierarchy

See Figure A.3.34 in: Ericsson.  
*Understanding  
Telecommunications*, 2003.  
<http://www.ericsson.com/support/telecom/>

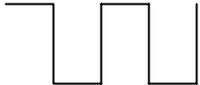
See Figure A.5.4 in Ericsson.  
*Understanding  
Telecommunications*, 2003.  
<http://www.ericsson.com/support/telecom/>

# Abbreviations

- POTS: Plain Old Telephone Service
- PSTN: Public Switched Telephone Network
- PoP: Point of Presence
- PBX: Private Branch Exchange
- MoDem: Modulator/Demodulator
- ISDN: Integrated Services Digital Network

# Networking Introduction

# Analog vs. Digital

- Analog 
  - Continuous signal (i.e. non-discrete)
  - Voice, like many real-world “things” are analog
  - Slower and more prone to errors (less efficient)
- Digital 
  - Discrete data
  - Most often binary (i.e. 1's and 0's)
  - Higher speed and more reliable
- Analog  $\leftrightarrow$  Digital
  - Modems are an example of devices that make analog  $\leftrightarrow$  digital conversions

# Circuit Switched vs. Packet Switched

- Circuit Switched
  - Dedicated connection between two parties
  - Communication process:
    - Setup
    - Communication
    - Tear-down
  - Advantage: consistent channel/bandwidth
  - Disadvantage: inefficient use of network resources
- Packet Switched
  - “Packetized” and “addressed” data
  - Communications process:
    - Sender formats data into packet(s)
    - Sender sends data
    - Network routes data
    - Receiver receives data, re-organizes data and potentially sends acknowledgement
  - Advantage: better use of network resources
  - Disadvantage: less predictable communication delay