# POTs

Part 12b of
"Electronics and Telecommunications"
A Fairfield University E-Course
Powered by LearnLinc

# Section 11: Broadcast Systems

- Frequency Division Multiplexing
- AM
  - Modulation
  - Demodulation (The Envelope Detector)
- FM
  - Modulation
  - Demodulation (The Phase-Locked-Loop)
- Super Heterodyne Receivers
- Television
- Sampling

# Section 12: Transmission and Networks

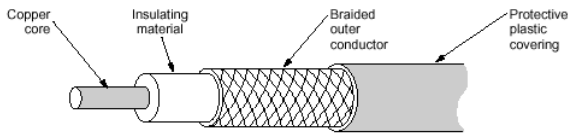
- Transmission Lines
  - Twisted pair
  - Coaxial Cable
  - Optical Fiber
- Microwave Systems
- Satellite Links
- Telephone Systems
- Local Area Networks
- Cellular Phone Systems

# Section 12 Schedule

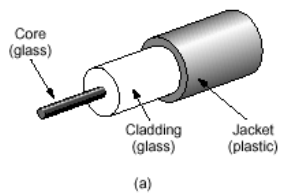
| | | | |
|---|---|---|---|
| Session 12a | 09/24 | Transmission Lines, Radio, Microwave & Satellites | Bigelow: 36-42; WWW, notes |
| **Session 12b** | **09/29** | **POTS** | **Bigelow: 1-36, 47-78, WWW, notes** |
| Session 12c<br>(No Class 10/06) | 10/01 | Telephone Systems & the CO | Bigelow: 79-106, 211-251 |
| Session 12d<br>(No class 10/13) | 10/08 | LANs | WWW, notes |
| Session 12e | 10/15 | Cell Phone Systems | Bigelow: 332-341; WWW, notes |
| Session 12f<br>(Lab - 10/25, Sat.)<br>(Quiz 12 due 10/26) | 10/20 | Review for Quiz 12 | |
| Session 12g | 10/27 | Quiz 12 Results | |
| Session 12h | 10/29 | MT 6 Q&A | |
| MT6 (Sat, Cheshire) | 11/01 | MT 6 | |
| MT6 Results | 11/03 | MT 6 Results | |

# **Transmission Media:** Get signals from here to there

- Copper
  - Unbalanced, open wire line
  - Pair (*used in telephone cables)
    - Untwisted or Twisted*
    - Unbalanced or Balanced*
  - Coaxial cable




- Radio
  - Free Space: Antennas
  - Microwave:
    - Free Space
    - Wave Guides
  - Satellite
- Optical
  - Free Space (Laser)
  - Fiber





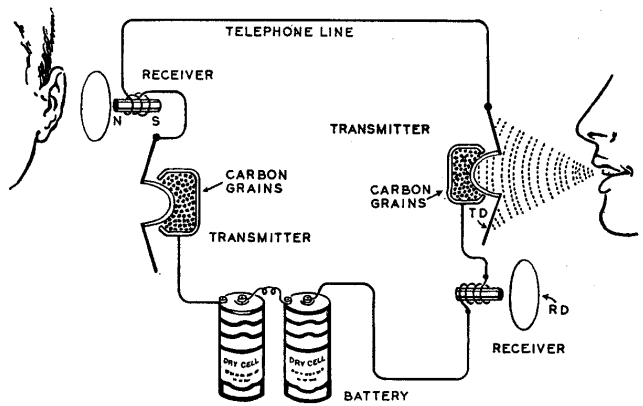
- Transmission Lines
  - Characteristic Impedance
  - Termination
    - = Zo: matched, energy absorbed
    - ≠ Zo: mismatched, energy reflected
  - Bridge Taps
    - Mismatch at tap location
    - Any reflection at end of bridging line⇨reflection returns to bridged line with a delay

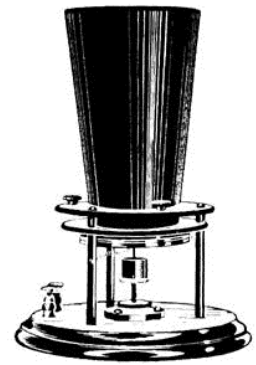
# Plain Old Telephone Service

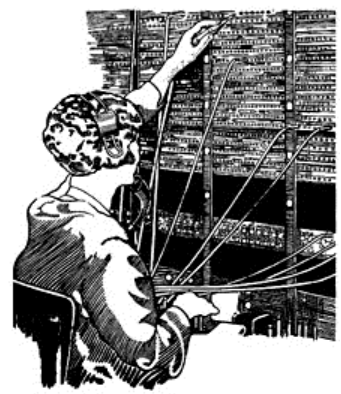
- POTS

  We'll go to: http://www.privateline.com/TelephoneHistory/History1.htm
  for an introduction to and history of POTS

- Phone Facts
  - Bell's liquid phone - 1876
  - Variable resistance transmitter
    1877 – Edison, Blake
  - Battery feed current
  - Electromagnetic receiver
  - Switchboard
    1878 – New Haven CT!!
  - Two-wire Circuit
    1881- Bell (Tip & Ring)
  - First Coin Phone
    1889- Hartford CT!!





1876 - Bell's original telephone


Cord switchboard

# Signaling & Supervision

- Ringing
  - "Crank delivered low frequency AC
    - ~ 20 Hz
    - High Voltage (ring a bell at the other end)
- "On-Off Hook"
  - Off Hook
    - completes the circuit
    - battery current flows (line resistance, 24 volts)
- "Dial Tone"
  - Supports user protocol
  - Tells the user that the other end is ready to receive dialing

# Signaling and Supervision 2

- Dialing
  - Dial pulses
    (Strowger Rotary Telephone Switch – next session)
    - Formed by momentary interruption of battery current
    - 10 per second rate
    - One through ten pulses send a digit (1-9,0)
  - Touch Tones (1950's)
    - Two simultaneous tones
      - One from low freq. group
      - One from high freq. group
      - 16 codes

| | **1209** | **1336** | **1477** | **1633** |
|---|---|---|---|---|
| **697** | 1 | 2 | 3 | **A** |
| **770** | 4 | 5 | 6 | **B** |
| **852** | 7 | 8 | 9 | **C** |
| **941** | * | 0 | # | **D** |

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