Cell Phones
Review
ITS 214
• What is a channel
   For that matter, what is “frequency” (or “wavelength”)?
• We defined frequency as cycles per sec (Hz)
• Frequency and wavelength are related for Radio signals (if we know one we know the other)
• Channels are defined as one or two frequencies
• A channel has a width, the number of Hz it occupies
• A digital channel has a data rate in Bits/sec
• What is the nature of information?
What does the reading mean by “analog” and “digital” systems?

• Analog: continuous variation; any value within a range
• Digital: fixed symbol times; fixed number of symbols possible
• Information can be a block of data, or a stream
• Streams can consist of analog or digital information
• Streams are measured in bandwidth (Hz) for analog, data rate (bps) in digital
• What is “spectrum”
  • (A) the frequency content of a data stream
  • (B) a generic term for the range of frequencies available for communications

• What is “spectrum coordination”?

What is the ITU and the FCC, and what do they do?
  • International regulatory structure that keeps users from interfering with each other
  • ITU coordinates among countries and recommends
  • US: FCC and NTIA regulate
  • NTIA:
    National Telecommunications and Information Administration
• How do we transmit information?
  • Convert analog streams to digital
  • Encode using Amplitude, Frequency, or Phase Modulation (or Keying)
  • Multiplex by Frequency Division, Time Division, or Code Division
• What are the parts that make a mobile system work?
  • Base stations define cells
  • Base station controllers and Mobile Switching Centers handle signaling for call initiation, call delivery, and hand-offs.
  • Mobile Switching Centers cooperate to implement roaming
  • Different cell phone standards differ in
    • Frequencies used
    • Multiple Access methods (the "air interface")
    • Encoding (for voice and data)
    • Signaling inside the mobile network
Based on a telephone number, how do we figure out where a call is supposed to go?

- Need a signaling network
- SS7 lets switches and database servers communicate
- Figure out a route
- Send useful information (Caller ID)
- Look up you serve a telephone number
- Query the HLR/VLR data bases to locate a mobile
• Who keeps track of telephone numbers and who they are assigned to?
  • We only started on this one
  • We will get back to this in week 7-8
  • We do know that the information ends up in SS7 SCPs
  • We do know that multiple carriers are involved, and the numbers are assigned and tracked by a neutral 3rd party.
  • We know that US mobile numbers are geographic, like all other plain telephone numbers
  • Other parts of the world use special mobile numbers