Communications Infrastructure

CSE 490c
Administrivia

• Office Hours
  • Richard Anderson, Wed, 2:30-3:20, CSE 582
  • Samia Ibtasam, Tues, 4:00-4:50, CSE 007
  • Naveena Karusala, Mon, 4:00-4:50, CSE 220

• Homework #1, Due Wednesday.
• Programming Assignment #1, Available Wednesday. To get started, create Twilio account and build Hello World Application
  • Possibly we will have a lab session for this
Basic Mobile Phones

Nokia 105
Quad band, GSM, Dual Sim
999 rs

Viva V1
Single Sim, 2G Flashlight, Snake
432 rs

Fero F1100
1.2 MP Camera
900/1800Mhz GPRS
BlueTooth
1050 Ksh

Tecno T350
GSM 900 Mhz Camera, Radio, Facebook, Palmchat
5100 Ngn
Handset Constraints

• Connectivity
• Simcard Ownership
• Simcard Registration
• Airtime Balance
• Electrical charging
• Handset Cost
Basic Mobile Phones (GSM Standard)

• Voice
• DTMF
  • Dual Tone Multi-Frequency
• SMS
  • Short Message Service
• USSD
  • Unstructured Supplementary Service Data
Voice + DTMF

• Analog signal for sound waves
• Converted by handset to digital data for transmission
• Multiple codecs can be used for conversion
• Voice Fundamental Frequency:
  • Male (85 to 180 Hz), Female (165 to 255 Hz)
• Speaking frequency 20Hz to 20000 Hz
• Audible through 20000 Hz
• Telephony: Frequency band 300Hz to 3400 Hz.
SMS (Short Messaging Service)

- Defined in 1985 as part of the GSM Standard
- Protocol allows seeing of up to 160 character alpha-numeric messages
- The hard thing in designing SMS was getting an agreed upon standard
  - Deutsche Telekom + France Telecom
- The first SMS was sent over Vodafone GSM Network on December 3, 1992 in the UK
- Initial growth was very slow, significant growth around 2000
  - Designed for Engineers
  - Took off when European Teenagers started using it
- SMS Gateway services are very important for building SMS applications – more later
- Hack: You can send SMS from email – 206375[redacted]@tmomail.net
Trivia

• What was the content of the first voice call? (Alexander Graham Bell to Thomas Watson, March 10, 1876)

• What was the content of the first text message? (Neil Papworth to Richard Jarvis, December 3, 1992)

• Why are SMS messages limited to 160 Characters.
SMS Challenges

• Character limitation
• Expense
• Character Set – restricted to basic Latin characters (7-bit characters)
  • Unicode extensions require 16 bit – greatly reducing message length
• Difficulty of entering letters on a keypad
• Reliability
USSD Unstructured Supplementary Service Data

- Session based protocol for communicating by text between handset and service provider
- Initiated with a short code, e.g., *144# to check Safaricom balance
- 160 character strings sent back and forth between handset and provider until session is terminated
- Key differences from SMS
  - Synchronized communication
  - Direct with service provider: better security
  - Does not leave messages on the phone
- Applications
  - Adding services to cell service
  - Mobile Money
  - Yellow Pages Directory
Universal Apps (Trevor Perrier)