General Purpose Android Modem

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I build stuff and drive boats

Surface Navy, Strike Officer

USNA ‘17, Cyber Security Team

Spend my spare time building things for people… if you have an interesting project, let me know

Loosely affiliated with Rogue Squadron, ala Rizer, Wicker, etc…

Have you ever needed to send less than a GB of data but didn’t have IP connectivity between devices?

Have you ever had to fall back to cellular connectivity on a network owned by someone else?

Have you ever had to pass information that should probably be encrypted between two unencrypted radios?

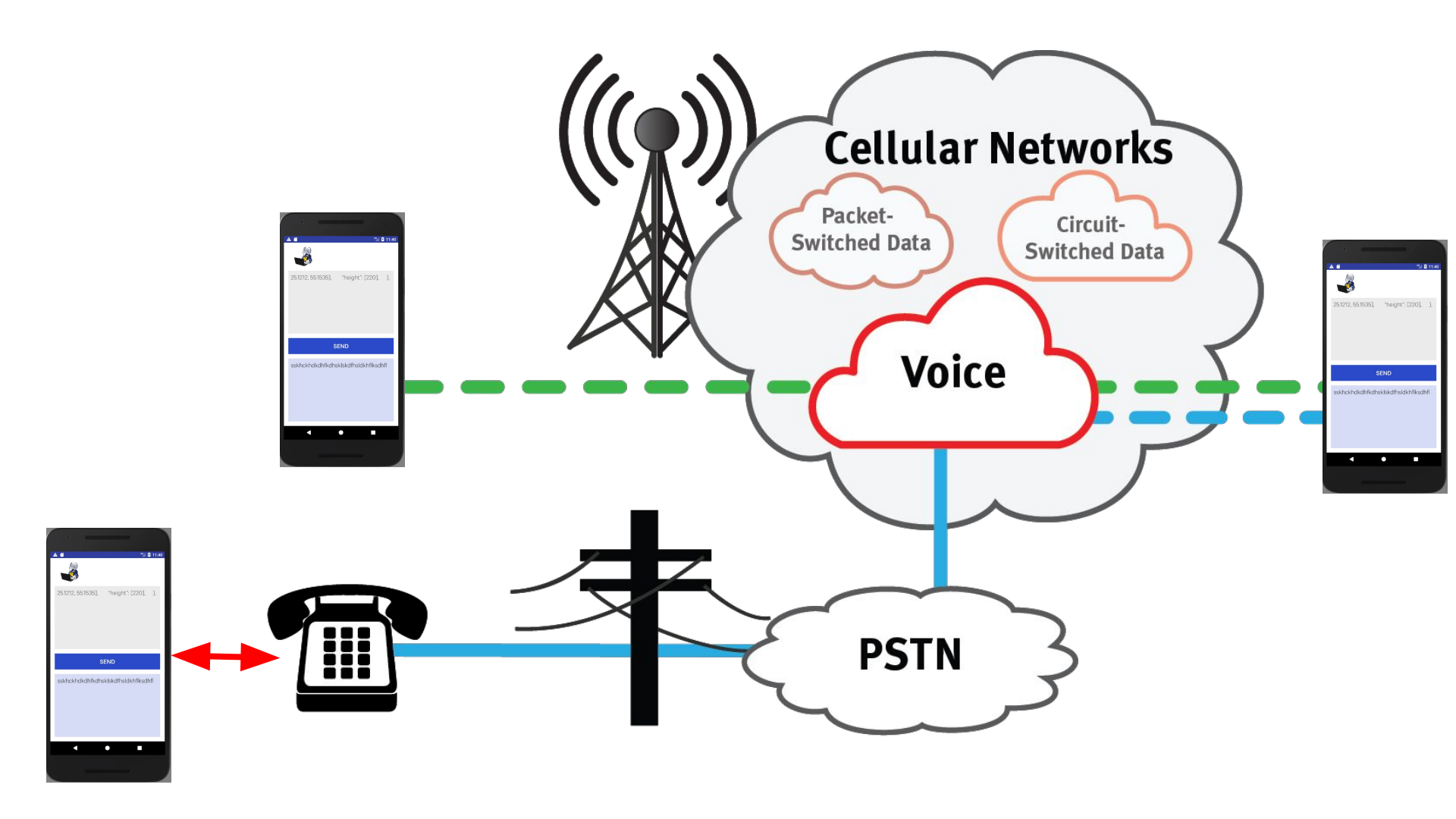
Party like it’s 1985, because we’re talking modems

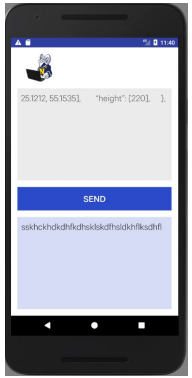
Why a modem on Android?

Hardware Agnostic

- Any device with a mic can receive, any device with speaker can transmit
- Androids are used on both ends to do the encryption, and encoding of data

No pairing required

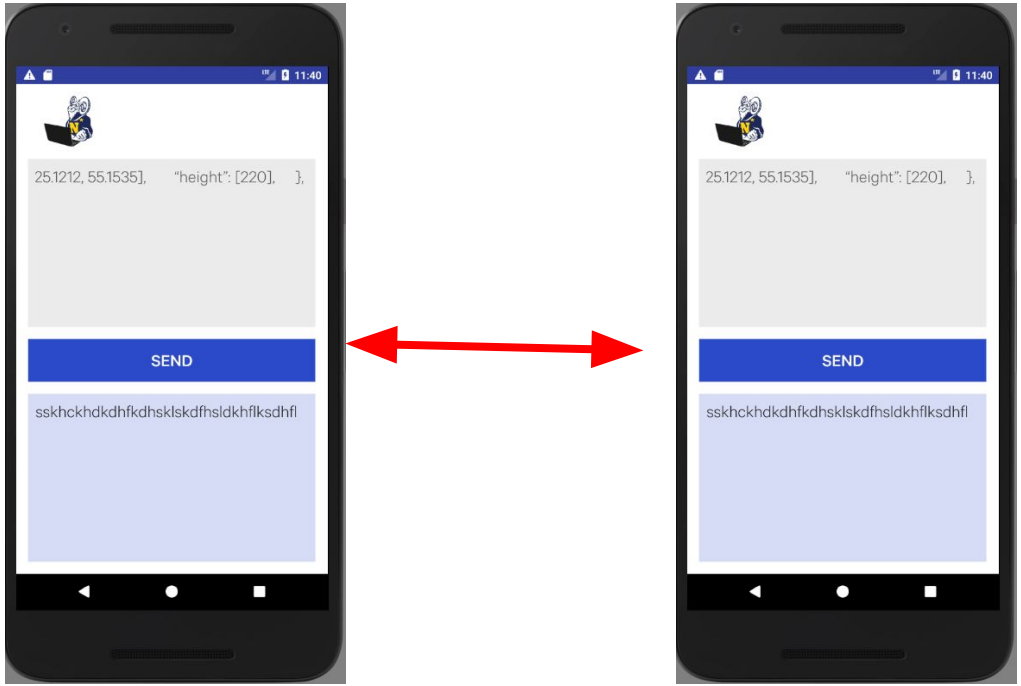

Cellular Networks
Packet-
Switched Data
Circuit-
Switched Data
Voice
PSTN
SEND
SEND
SEND



11:40
25.1212, 55.1535], "height": [220], },
SEND
sskhckhdkdhfkdhskskdfhskdkhfksdhfl

PL-118
TECSUN
ETM
VOL.
FM STEREO
DSP RECEIVER

HARRIS
SEND

TX RX
VOLUME
PTT
MULTI FUNCTION
11:40
25.1212, 55.1535], "height": [220], },
SEND
sskhckhdkdhfkdhskskdfhskdkhfksdhfl


11:40
25.1212, 55.1535], "height": [220], },
SEND
sskhckhdkdhfkdhsklskdfhsldkhflksdhfl
11:40
25.1212, 55.1535], "height": [220], },
SEND
sskhckhdkdhfkdhsklskdfhsldkhflksdhfl

Current Configuration

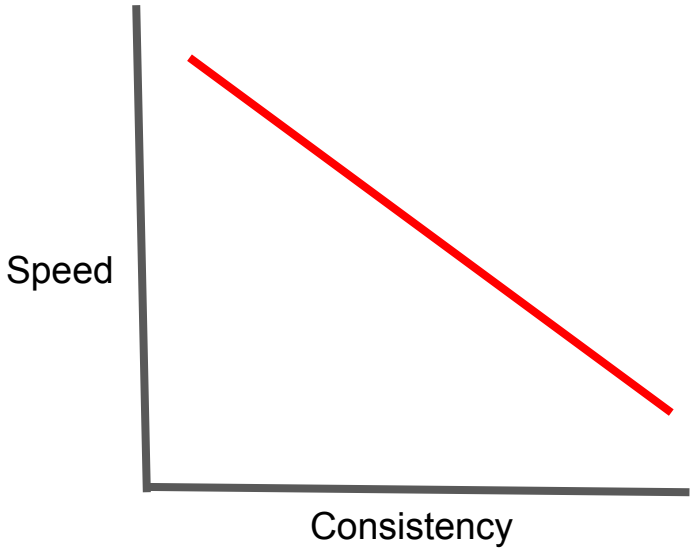
Uses Chirp Libraries

Current configuration is 8 KHz for a quick and easy frequency that will work over voice

AES Encryption

~150 bits per second

Research to get bitrate up



What can we do with 150 bits per second?

200 bits = ~2 seconds

```
{
  "GPSmarkers": [
{
      "name": "Rixos The Palm Dubai",
      "position": [25.1212, 55.1535],
      “height”: [220],
    },
    {
      "name": "Shangri-La Hotel",
      "location": [25.2084, 55.2719]
      “height”: [250],
    },
    {
      "name": "Grand Hyatt",
      "location": [25.2285, 55.3273]
      “height”: [240],
    }
  ]
 }
```

1024 bit key = 7 seconds or so

```
-----BEGIN RSA PRIVATE KEY-----
MIICXgIBAAKBgQDHikastc8+I81zCg/qWW8dMr8mqvXQ3qbPAmu0RjxoZVI47tvs
kYlFAXOf0sPrhO2nUuooJngnHV0639iTTEYG1vckNaW2R6U5QTdQ5Rq5u+uV3pMk
7w7Vs4n3urQ6jnqt2rTXbC1DNa/PFeAZatbf7ffBBy0IGO0zc128IshYcwIDAQAB
AoGBALTNl2JxTvq4SDW/3VH0fZkQXWH1MM10oeMbB2qO5beWb11FGaOO77nGKfWc
bYgfp5Ogrql4yhBvLAXnxH8bcqqwORtFhlyV68U1y4R+8WxDNh0aevxH8hRS/1X5
031DJm1JlU0E+vStiktN0tC3ebH5hE+1OxbIHSZ+WOWLYX7JAkEA5uigRgKp8ScG
auUijvdOLZIhHWq7y5Wz+nOHUuDw8P7wOTKU34QJAoWEe771p9Pf/GTA/kr0BQnP
QvWUDxGzJwJBAN05C6krwPeryFKrKtjOGJIniIoY72wRnoNcdEEs3HDRhf48YWFo
riRbZylzzzNFy/gmzT6XJQTfktGqq+FZD9UCQGIJaGrxHJgfmpDuAhMzGsUsYtTr
iRox0D1Iqa7dhE693t5aBG010OF6MLqdZA1CXrn5SRtuVVaCSLZEL/2J5UcCQQDA
d3MXucNnN4NPuS/L9HMYJWD7lPoosaORcgyK77bSSNgk+u9WSjbH1uYIAIPSffUZ
bti+jc1dUg5wb+aeZlgJAkEAurrpmpqj5vg087ZngKfFGR5rozDiTsK5DceTV97K
a3Y+Nzl+XWTxDBWk4YPh2ZlKv402hZEfWBYxUDn5ZkH/bw==
-----END RSA PRIVATE KEY-----
```

20,000 bytes = 2 minutes

Future Work: Basic Protocols

Chunk large files

UDP esque

- Lossy , no ack

TCP eque

- Lossless, acked.

Future Work: Connection Setup

Test to find better sound profiles - https://quiet.github.io/quiet-profile-lab

On connect, identify optimal sound profile over a medium

Find Shannon Limit ie increase bps, minimize loss

Adjust volume, center freq, bps, encoding, encryption

Questions?

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