EMERGENCY NETWORK CELL TOWER

All it takes to save someone is an SOS signal

PREMISE

Power and communication systems are at high risk of failure during a natural disaster. In 2017, Hurricane Harvey took out 95% of all cell towers in Aransas County, TX, isolating people from family and friends.

During Hurricane Katrina in 2005, ~700 amateur radio operators were the primary communication link between the American Red Cross and the outside world. Their usage of the APRS emergency network to relay information saved many lives.

AUTOMATIC PACKET REPORTING SYSTEM (APRS)

APRS is an amateur radio based system for real-time digital communication. The range and heavy monitoring of this network make it ideal for emergency usage. FEMA monitors and uses APRS extensively. It is used to transmit:
- GPS data
- Weather reports
- SMS
- Telemetry data
It can be combined with a mapping software to point to a packet’s source.

OUR SOLUTION - ENCT

- There are 2.5 billion smartphone users in the world.
- ENCT pairs a smartphone app with custom tower that transmits over APRS.
- Any WiFi capable Android device with the app can connect and broadcast GPS tagged emergency signals.
- Hardware is just as expensive as a budget Android phone (~$200).

ENCT SERVER NODE

An ENCT node uses a Raspberry Pi Zero to manage a WiFi network and its interaction with a 144.39 MHz transmitter to communicate over APRS. Most of the hardware can be bought off the shelf, with the exception of a TNC shield designed in-house.

Server features:
- Plug and play with no assembly required.
- Scalable with WiFi mesh capabilities.
- Runs on rechargeable battery for 36 hours.
- Weather resistant.

ENCT APP

- Developed for Android devices because 87% of all smartphones run it.
- Needs to be pre-installed on the device and will only be functional in the presence of a functional ENCT node.
- Runs automatically when the device cannot detect a cell network – it looks for and connects to any ENCT node nearby.

Download the app with the QR code below.

CONCLUSION

- Achieved proof of concept for a low cost emergency communication device.
- Built 3 functional server nodes and a backup test node.
- Android phones with the app connect to servers automatically.
- Enabled 1-1 texting and GPS tagged signals transmission over APRS.
- Hardware/software infrastructure ready for ENCT 2.0 and beyond.

FUTURE OF ENCT

Server upgrades:
- Mesh network infrastructure present in 1.0, but will be implemented in 2.0.
- Upgrade WiFi mesh capabilities for added range and to support more users per node.
- Using a more capable processor, perhaps a more powerful Raspberry Pi or a BeagleBone.
- Increased sturdiness.

App upgrades:
- iOS and Windows support.
- “Rescue mode” for emergency personnel to monitor ENCT node.
- Battery saver mode.
- VoIP calling and phonebook integration.
- Message board upgrades.

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