

Digital voice forum

(and LoRa APRS too)

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Digital voice modes experimented in Finland

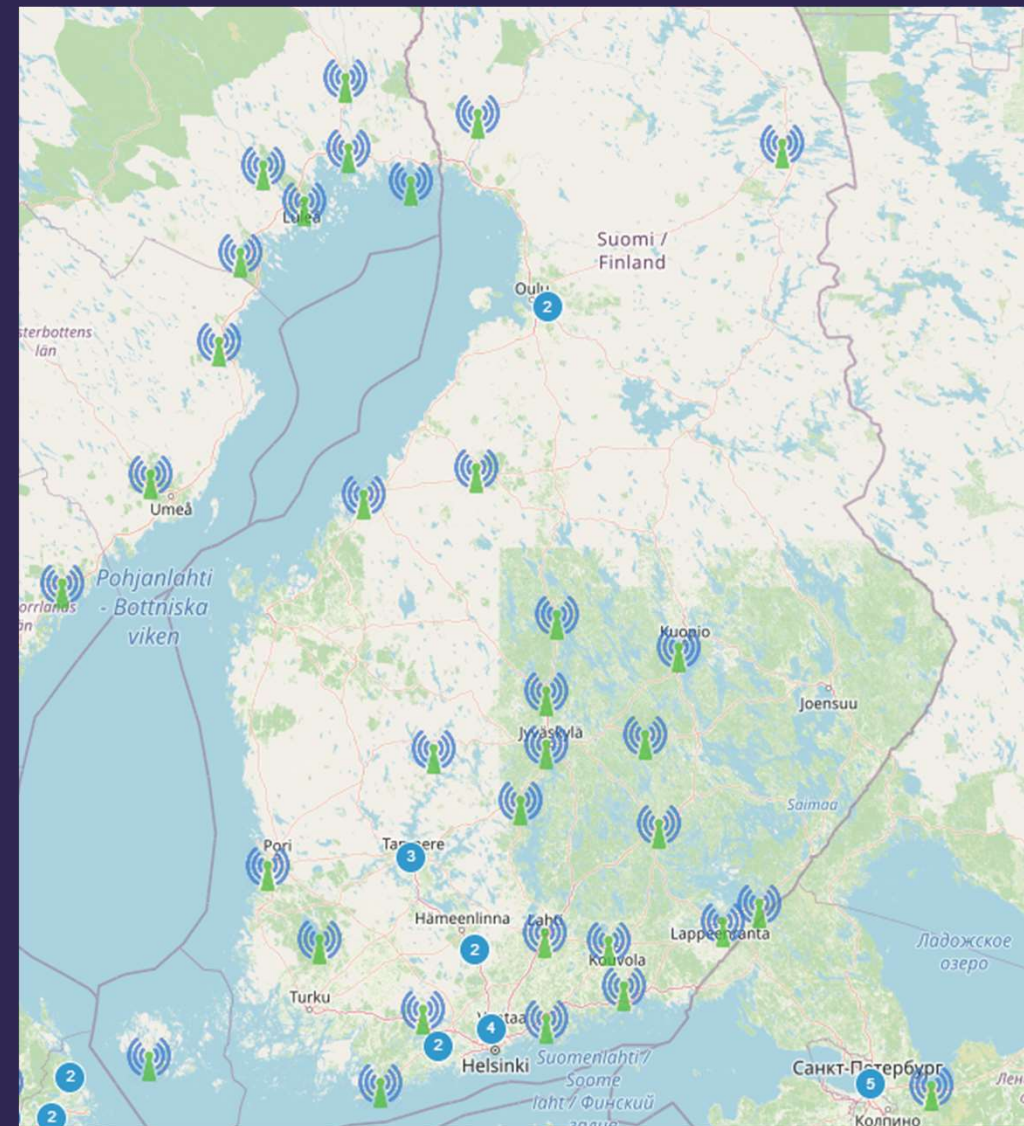
- P25
 - Equipment from the USA, second hand commercial radios from Motorola, Harris, etc.
- D-STAR
- Yaesu Fusion (YSF)
- DMR
 - Multiple vendors for terminals and repeaters
 - Repeater mainly from Motorola and Hytera, added with modified FM repeaters with MMDVM controller
 - International network
- TETRA
 - HamTETRA project to use TETRA in amateur radio frequencies, 434MHz that is
- M17
 - Not yet but interest exists
- FreeDV / Codec2
 - FreeDV activity on HF

Life of BrianDMR



DMR infrastructure in Finland Brandmeister network

- Currently 34 fully interlinked repeaters;
6 on VHF and 28 on UHF
- Static talkgroups on all repeaters with same layout
 - Countrywide and regional talkgroups
 - International groups available dynamically (users subscribe)
- Roaming capability in the system with compatible terminals
- 763 active ID numbers (Brandmeister LH after June 2011)



DMR services for individuals and clubs

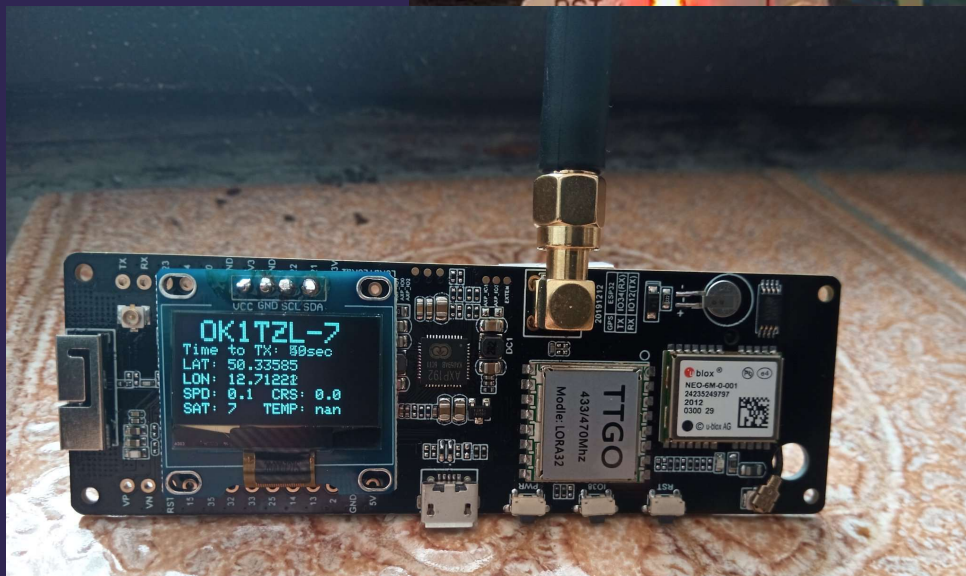
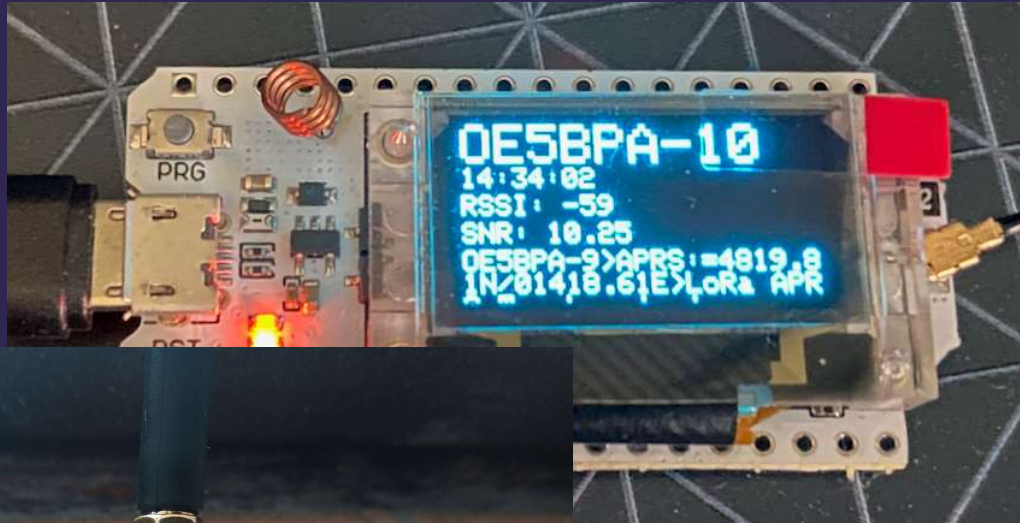
- Group and direct (peer to peer) voice calls
 - P2P calls are routed correctly by BM
- Group and individual SMS messages
 - BM has SMSC capability and can store-and-forward for users who have enabled the feature
- Open API for individuals and clubs to consume;
 - Group SMS's for clubs to use as announcement channel

Integrations with Brandmeister network

- APRS over DMR
 - APRS position update to APRS-IS from DMR terminals
 - DIGITAL APRS????
- XLX and other multiprotocol reflectors (D-STAR, Yaesu Fusion, NXDN, P25)
 - Group voice
- Zello and Mumble PTT app integration
 - DMR TG linked to PTT app group
- SIP integration
 - VoIP system can be integrated and voice calls to individual and groups can be done both ways

LoRa APRS

APRS packets over milliwatt-power LoRa technology



LoRa APRS

What is LoRa?

- Data mode technology for sub-gigahertz bands (433 and 868 in Europe)
- Configurable connection parameters and bandwidth, gives different data rates
- Uses proprietary spread-spectrum modulation, similar to chirp spread spectrum modulation
- NOT the same as LORAN (the WW2-era radio navigation system)
- Based on ESP32 hardware (Lilygo TTGO T-BEAM etc) (References 1 on last page)
- Dedicated igate and tracker software, can be run on same hardware (References 2,3,4 on last page)
- Open source, code available on GitHub
- Easily compilable with Visual Studio Code and PlatformIO
- Single text-based configuration file

LoRa APRS

LoRa APRS iGates

- Can be run as an rx-only igate, or as a full-fledged digipeater
- Connects directly to APRS-IS
- Supports syslog protocol

LoRa APRS

We need to standardise!

- Common European settings starting to be fixed
 - 433.775 MHz
 - Spreading factor 12
 - Bandwidth 125 kHz
 - Coding rate 4:5
 - Equates to a data rate of about 293 bps

LoRa APRS

So why is it so good?

- Gaining popularity pretty fast, especially in central Europe, also in Finland
- Very easy to set up rx-igates
- Hardware cost well below 100 €/unit
- Surprisingly good coverage considering the power levels (15-30 km radius per igate depending on antenna height)
- Also works in a crowded spectrum (cities etc)

LoRa APRS

References

- [1] https://www.eudirect.shop/product/lilygo-ttgo-t-beam-esp32-433-868-915-923mhz-v1-1-wifi-wireless-bluetooth-module-gps-neo-6m-sma-lora32-18650-battery-holder-with-oled/?attribute_pa_frequency=433mhz
- [2] https://github.com/lora-aprs/LoRa_APRS_iGate
- [3] https://github.com/lora-aprs/LoRa_APRS_Tracker
- [4] <https://github.com/SQ9MDD/TTGO-T-Beam-LoRa-APRS>