

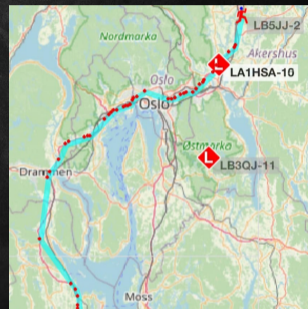
Long-Range Tracking and Messaging on 433 MHz

LB5JJ

<https://lb5jj.no/aprs/lora/>

Introduction

- What is APRS?
 - Automatic Packet Reporting System
 - Tracking and messaging in amateur radio
 - Mostly used on 144.800 MHz (let's change that)
- What is APRS for?
 - Tracking
 - Messaging
 - Weather station and other sensors



Introduction to LoRa

- What is LoRa?
 - Long Range, Low Power wireless technology
 - Based on Chirp Spread Spectrum (CSS) modulation
- LoRa Properties
 - Long-range communication (100+ km in open areas)
 - Low power consumption



What is LoRa APRS?

- Combining LoRa and APRS
- Advantages over traditional APRS
 - Greater range with lower power
 - Suitable for modern, low-cost hardware
 - Enhanced reliability in challenging environments









Hardware

- SX1276/78
- Arduino, ESP32
- GPS receivers for position tracking
- Pre-built modules with all 3 functions on one PCB



Software Components

- Ricardo Guzman (CA2RXU) firmware:
 - Tracker
 - iGate/Digipeater
- APRS.fi app for iPhone (BLE)
- APRSDroid for Android (BLE)
- PinPoint APRS for Windows (BLE, USB Serial or WiFi)

	LB5JJ-2 33d 19m53s info: https://lb5jj.no/aprs/lor	9.8 m 163°>
	LB5JJ-1 24d 1h20m	24 m 176°>
	LB5JJ-15 122d 6h3m PinPointAPRS/Direwolf/IC-705	17 m 176°>
	LA7MHA-7 5h39m29s Tord, TH-D72E	0 km/h 11° 40 km 307°>
	LB3CJ-7 38d 12h47m https://github.com/richonguzman/LoRa_APRS_Tracker 2024.10.25	18 km/h 16 km 226°>
	LA2NCA-7 132d 2h8m Knut paa fieldday	0 km/h 23° 33 km 16°>

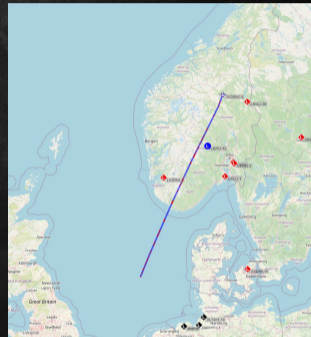
How LoRa APRS Works

- Get position from GPS, or;
- Enter message on phone or keyboard
- Encode as APRS message
- Packet sent over LoRa
- Repeated by Digipeaters
- Relayed via the Internet by iGates
- Received by other LoRa APRS devices



Applications and Use Cases

- Adventure tracking (SOTA, POTA, Hiking)
- Off-grid messaging
- Disaster and emergency communication and tracking
- Monitoring weather stations and other sensors
 - Alarms
 - Temperature
 - Battery voltage
 - Others



Setting Up Your LoRa APRS System

- Acquire LoRa module (eBay, AliExpress, etc)
- Install firmware (Web installer for Guzman Firmware)
- Configure (Web config for Guzman Firmware)
- Connect to APRS-IS (for iGate)
- Connect to phone / PC (Optional; for tracking / messaging)

The screenshot displays a web configuration interface for a LoRa APRS system, divided into two sections labeled 1) and 2). Each section contains a 'Callsign' field, a 'Symbol' field, an 'Overlay' field, and a 'Mic-E' field. Section 1) has 'Callsign' set to 'LB5J 7', 'Symbol' to '[', 'Overlay' to '/', and 'Mic-E' to an empty field. Below these fields is a 'Comment' text area. Underneath the comment area are two toggle switches: 'Smart Beacon Active' (checked) and 'GPS Eco Mode' (unchecked). Below the toggles is a 'Smart Beacon Setting' dropdown menu currently set to 'Human/Runner (Slow Speed)'. Section 2) has 'Callsign' set to 'NOCALL-7', 'Symbol' to '>', 'Overlay' to '/', and 'Mic-E' to an empty field. It also features a 'Comment' text area, 'Smart Beacon Active' (checked) and 'GPS Eco Mode' (unchecked) toggle switches, and a 'Smart Beacon Setting' dropdown menu.

Challenges and Limitations

- Regulatory restrictions and frequency allocation
 - Up to 200 kHz bandwidth between 433,600 og 434,000 MHz now allowed in Norway
 - LoRa APRS sits on 433.775 MHz and uses 125 kHz bandwidth
- LoRa network congestion / limited bandwidth
 - Only about 1/7th the transfer rate of 1200 Baud packet
 - Keep your transmissions as short as possible!

Links, and thanks for listening

- https://github.com/richonguzman/LoRa_APRS_Tracker
- https://github.com/richonguzman/LoRa_APRS_iGate
- <https://lilygo.cc/>
- <https://lora-aprs.live/>
- <https://aprs.fi/>
- <https://lb5jj.no/aprs/lora/>
- cq@lb5jj.no