LINHT

OPEN-SOURCE LINUX SDR HANDHELD

Vlastimil Slinták (OK5VAS)

OpenAlt 2025 · Brno

WHO AM I

- Embedded developer · freelancer
- Radio amateur · Callsign OK5VAS
- Hardware designer · 3D printing enthusiast
- Web uart.cz · Twitter @vascocz

AMATEUR RADIO

“A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateur.”

- Access to frequencies unavailable to the public
- Higher transmit power, experiments allowed
- Focus on education and technical research

THEN AND NOW

- **Then:** Antennas, amplifiers, analog radios
- **Now:** Digital comms, HAMNET, packet radio, SDR
- Same curiosity, new tools

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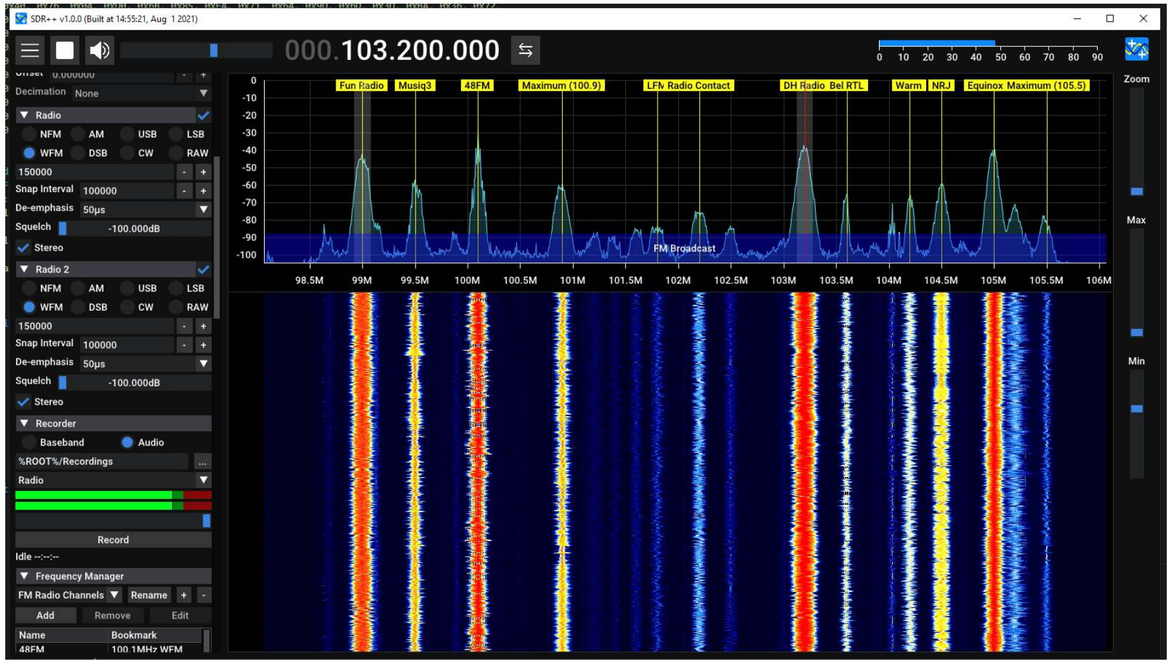
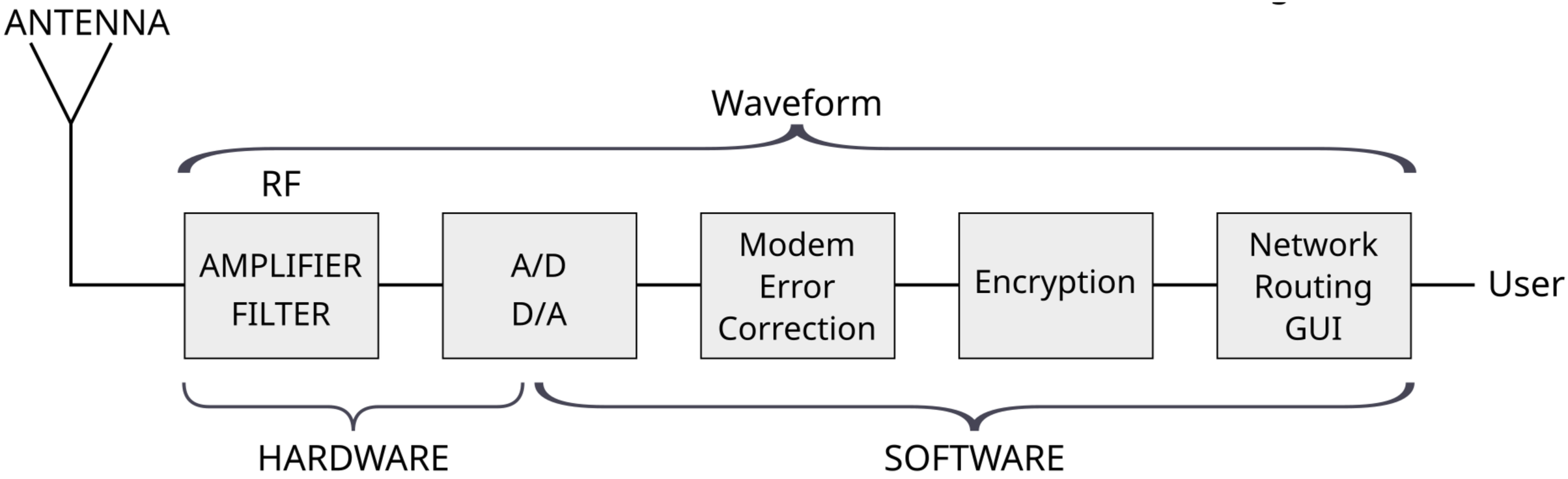


WHAT IS SDR?

Software-Defined Radio moves analog signal processing into software.



SDR TOOLS

- RTL-SDR, HackRF, ADALM Pluto
- GNU Radio, SDR++, OpenWebRX
- Great for lab use, less for portable devices

CHEAP HANDHELD RADIOS

Radios like Quansheng, TYT, Retevis — under 60 EUR.

- FM/AM, sometimes DMR/TETRA
- Hardware is capable, software is not
- Open-source FW by community
  - Egzumer FW for Quansheng
  - OpenRTX

MODES AND PROTOCOLS

- CW / AM / FM / NBFM / SSB
- D-STAR / YSF / DMR / TETRA
- **FreeDV / M17**

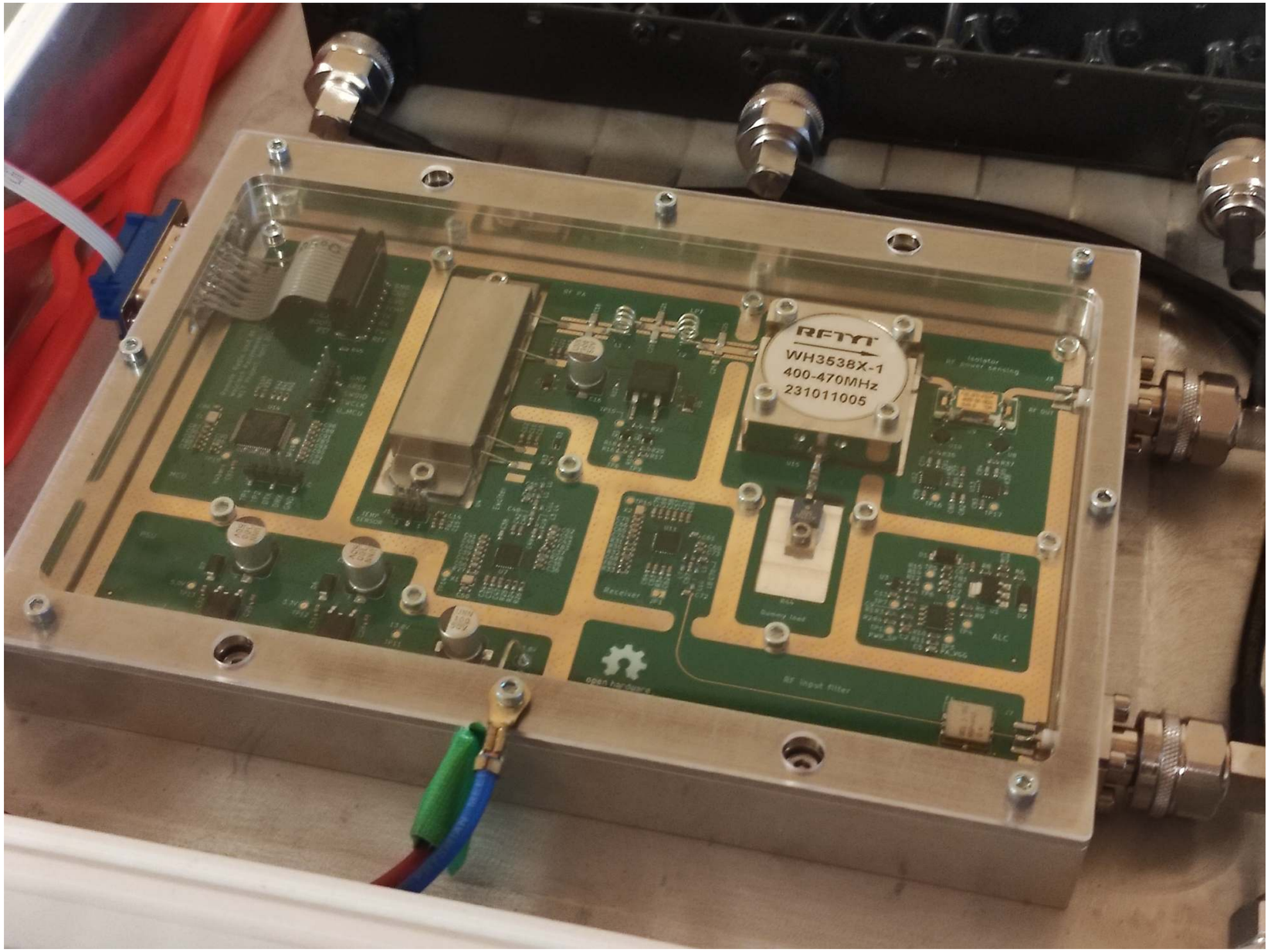
M17 DIGITAL MODE

Open-source digital voice and data protocol for amateur radio.

- Fully documented and free
- Uses **Codec2** (open-source speech codec)
- Alternative to closed DMR/TETRA systems

M17 FOUNDATION

- Founder: Wojciech SP5WWP
- Open-source digital radio protocols
- Created by hams, for hams
- Main project: M17 digital voice mode
- Other initiatives: hardware, codecs, software tools


RFTX
WH3538X-1
400-470MHz
231011005


Modified Nokia 3310
A good, old Nokia 3310 phone with its mainboard replaced. The proposed PCB uses a NiceRF SA868S module running OpenRTX, bringing versatile FM capabilities (including M17 and APRS) and 70cm band coverage.
M17
NOKIA

LINHT PROJECT

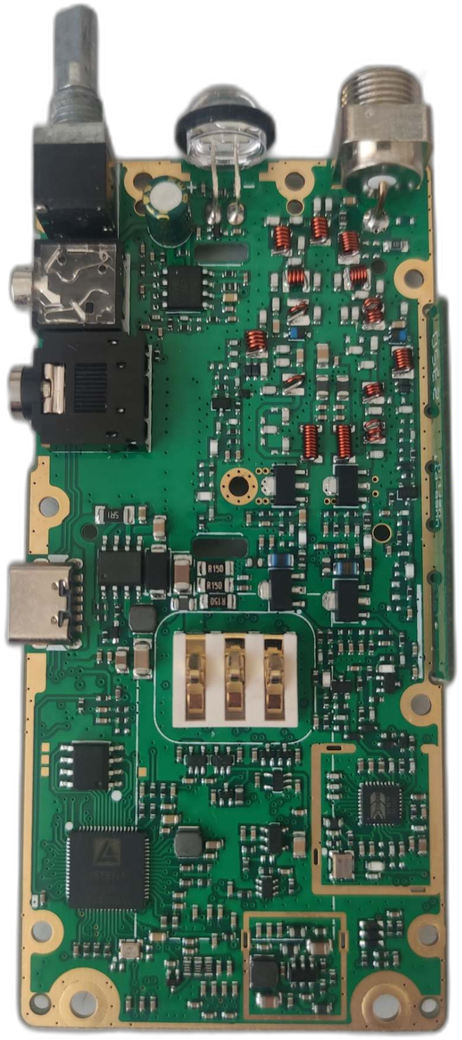
What if a handheld radio could run Linux, GNU Radio, and be fully programmable?

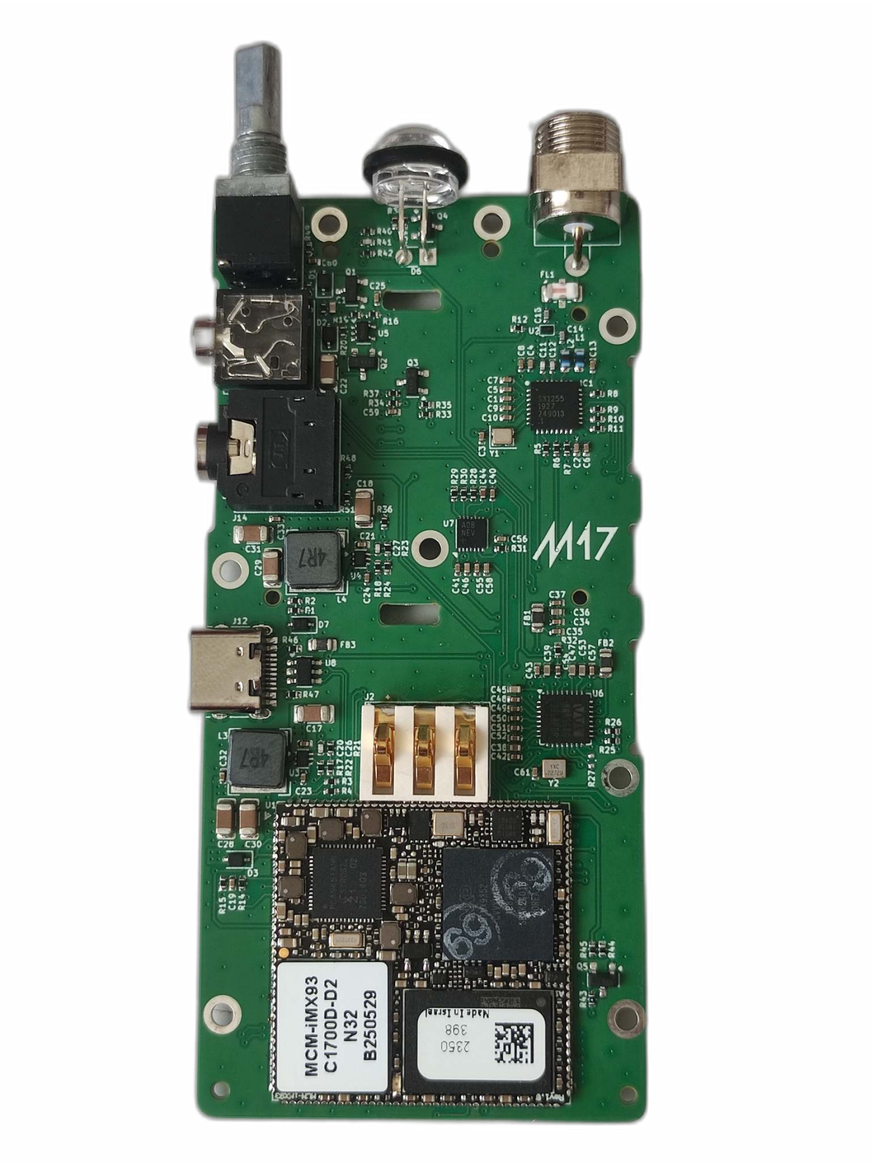
- Core team: Wojciech SP5WWP, Andreas OE3ANC, Vlastimil OK5VAS
- Goal: open-source SDR handheld radio

HARDWARE

- Based on **Retevis C62** handheld
- Our PCB replaces internals with SDR + SoM.


RETEVIS Two Way Radio
Model:C62
Frequency:400-480MHz
136-174MHz
USB -C Input: 5V⎓1A
S/N:2409R0621101280
Shenzhen Retevis Technology Co.,Ltd.
7/F, 13-C, Zhonghaixin Science&Technology
Park, No.12 Gaoli 6th Road, Jihua Street,
Longgang District, Shenzhen, China
MADE IN CHINA



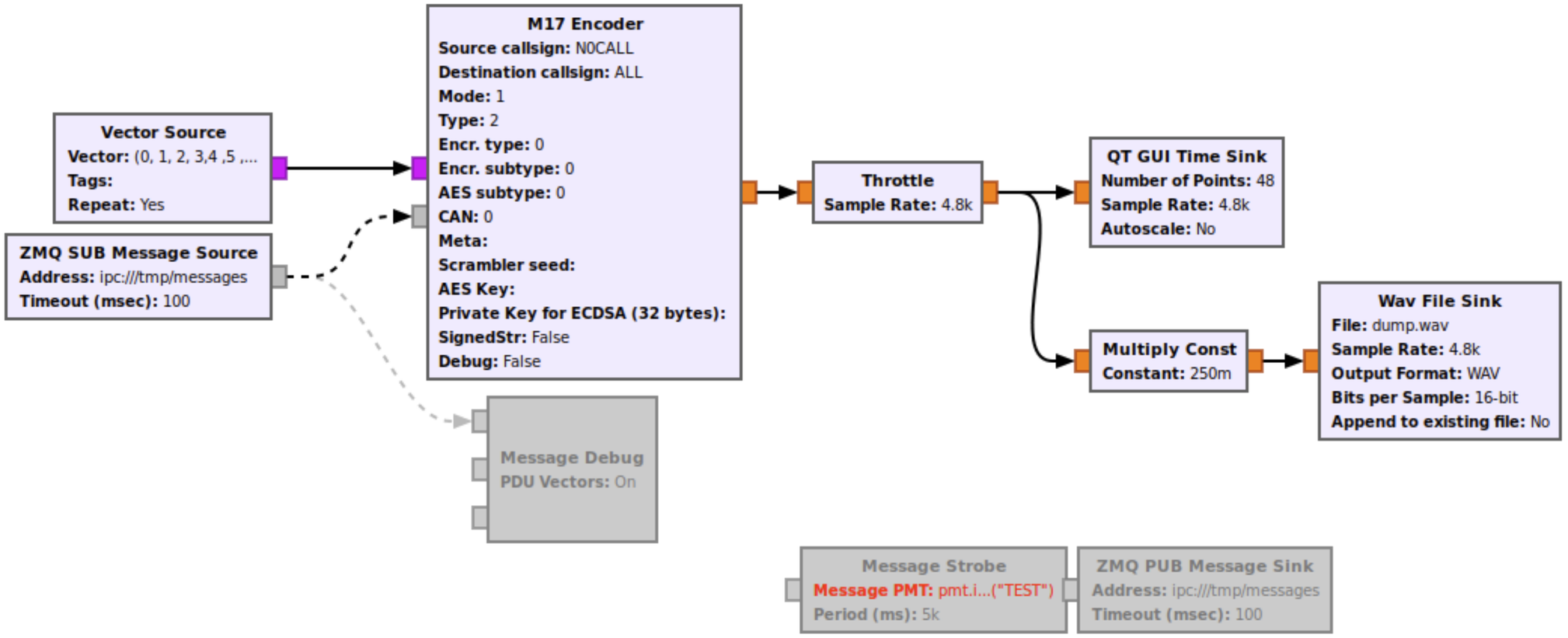

M17
MCM-iMX93
C1700D-D2
N32
B250529

MCM-iMX93
C1700D-D2
N32
B250529
PCA9451AHN
SYR062.
ZSD2403
Made In Israel
2350
398

INSIDE LINHT

- SoM with NXP i.MX93 (dual Cortex-A55 + M33 + NPU)
- GNU Radio running under custom Yocto Linux
- SX1255 RF frontend
- WM8960 audio codec
- No RF PA, yet.

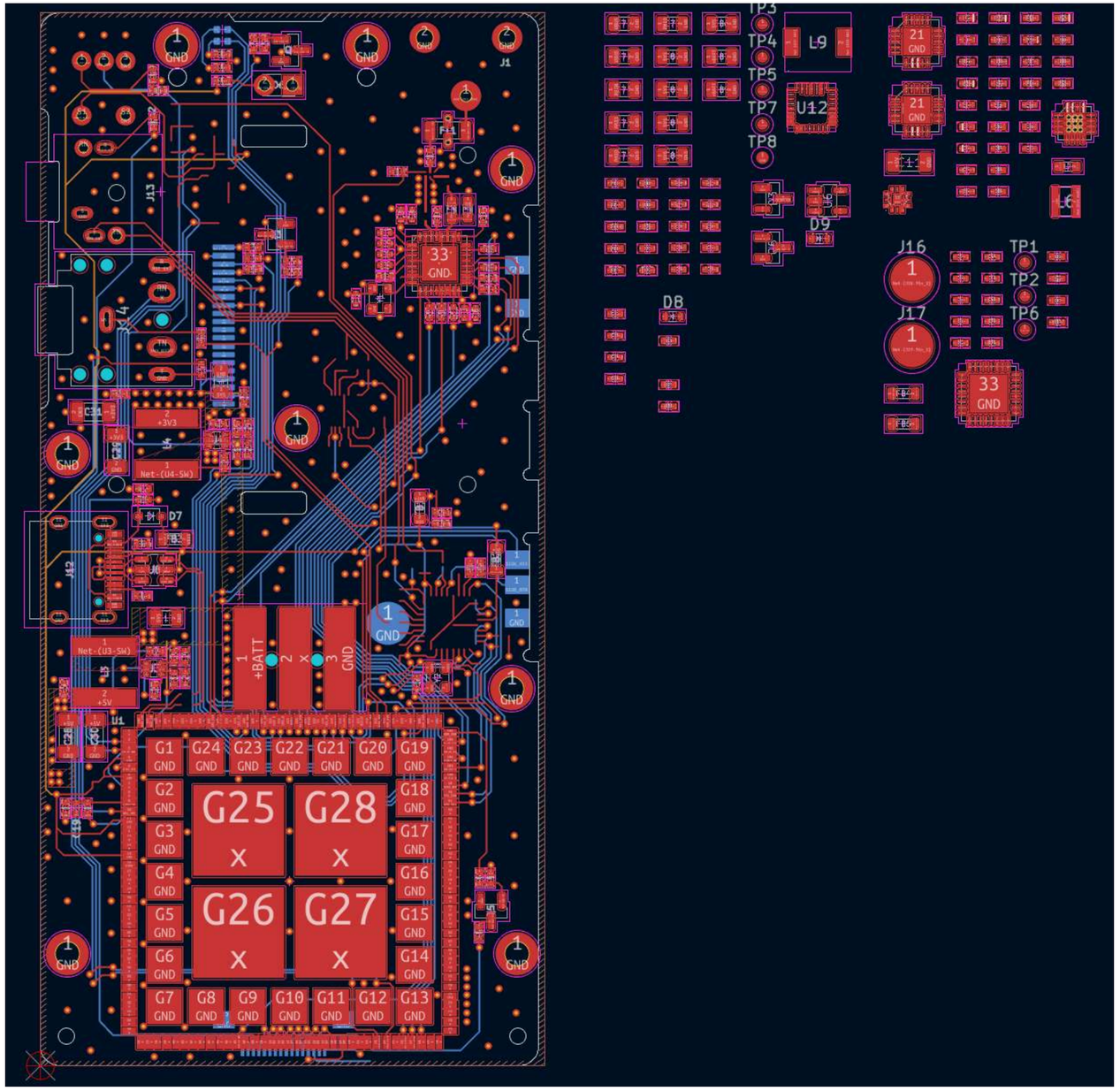
GNU RADIO

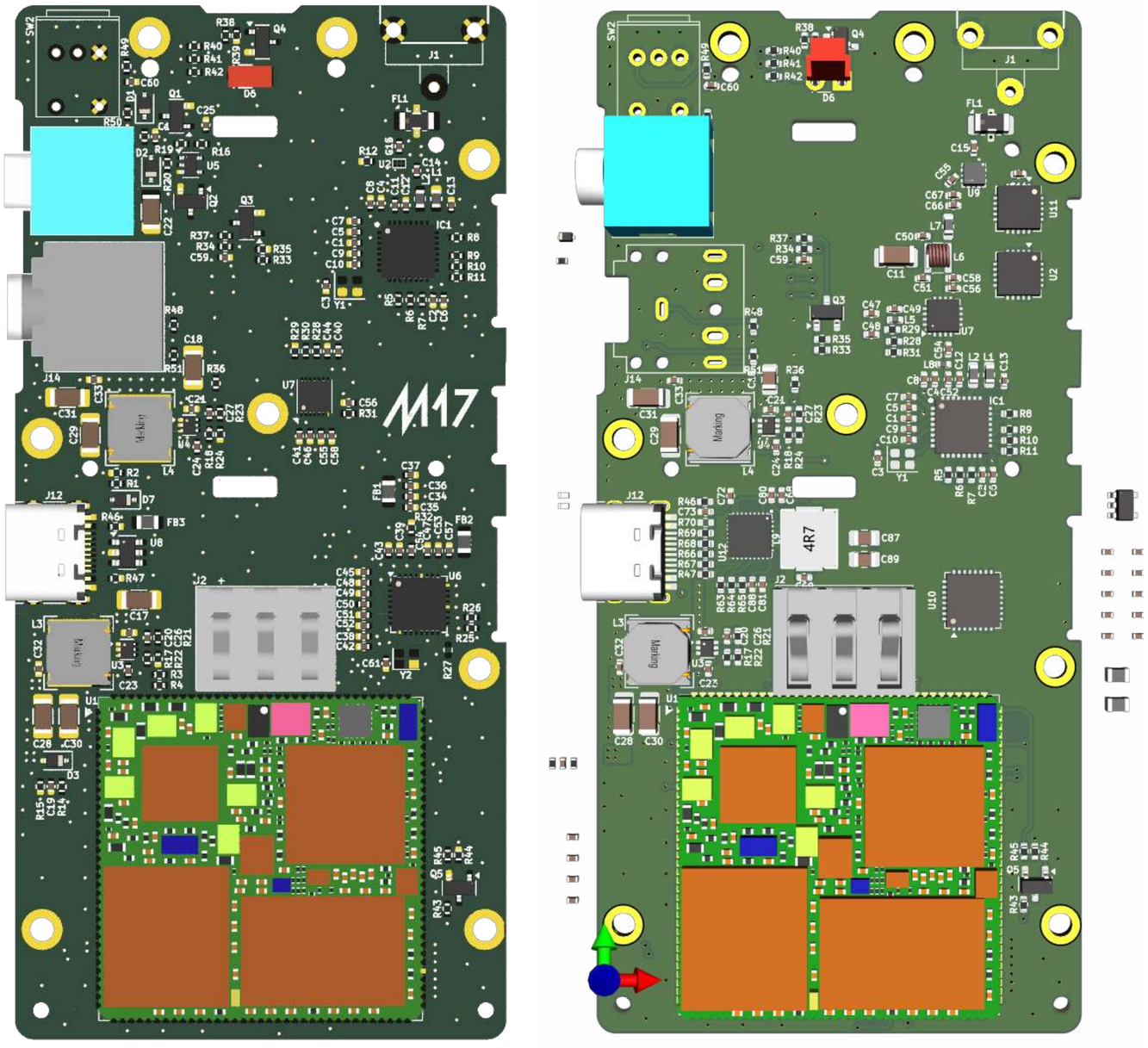

Vector Source
Vector: (0, 1, 2, 3,4 ,5 ,...
Tags:
Repeat: Yes
ZMQ SUB Message Source
Address: ipc:///tmp/messages
Timeout (msec): 100
M17 Encoder
Source callsign: N0CALL
Destination callsign: ALL
Mode: 1
Type: 2
Encr. type: 0
Encr. subtype: 0
AES subtype: 0
CAN: 0
Meta:
Scrambler seed:
AES Key:
Private Key for ECDSA (32 bytes):
SignedStr: False
Debug: False
Message Debug
PDU Vectors: On
Throttle
Sample Rate: 4.8k
QT GUI Time Sink
Number of Points: 48
Sample Rate: 4.8k
Autoscale: No
Multiply Const
Constant: 250m
Wav File Sink
File: dump.wav
Sample Rate: 4.8k
Output Format: WAV
Bits per Sample: 16-bit
Append to existing file: No
Message Strobe
Message PMT: pmt.i...("TEST")
Period (ms): 5k
ZMQ PUB Message Sink
Address: ipc:///tmp/messages
Timeout (msec): 100

REVISION B – IN PROGRESS

- Improved layout and thermal management
- Better audio and power distribution
- 5 W RF power amplifier (420–450 MHz)


>LinHT_
by M17 Foundation
P1
P2
2 ABC
3 DEF
5 JKL
6 MNO
8 TUV
9 WXYZ
FM
M17 Foundation
LinHT RF AMP
10 dB ATTENUATOR
50 OHM


J1
J13
J14
J12
33
GND
+3V3
Net-(U4-SW)
D7
Net-(U3-SW)
+5V
+BATT
U1
G1 G24 G23 G22 G21 G20 G19
G2 G18
G3 G17
G4 G16
G5 G15
G6 G14
G7 G8 G9 G10 G11 G12 G13
G25
G28
G26
G27
TP3
TP4
TP5
TP7
TP8
L9
U12
21
D9
D8
J16
J17
TP1
TP2
TP6


M17
4R7

CURRENT STATUS

- Linux (Yocto) booting on hardware
- M17, FM, AM TX/RX working with GNU Radio
- Demo apps use display, keyboard, mic, speaker
- Rev B under development, software in development

MORE INFORMATION

- m17project.org
- Discord: M17 Foundation
- https://uart.cz/2811
- Donations

THANK YOU

LinHT — Open SDR Handheld for Amateur Radio and Beyond

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