BrandMeister & TetraPack
RoIP in Practice

Dreiländereck-Sysoptreffen 2026

Artöm DL5ABM


ROHILL


TetraNode

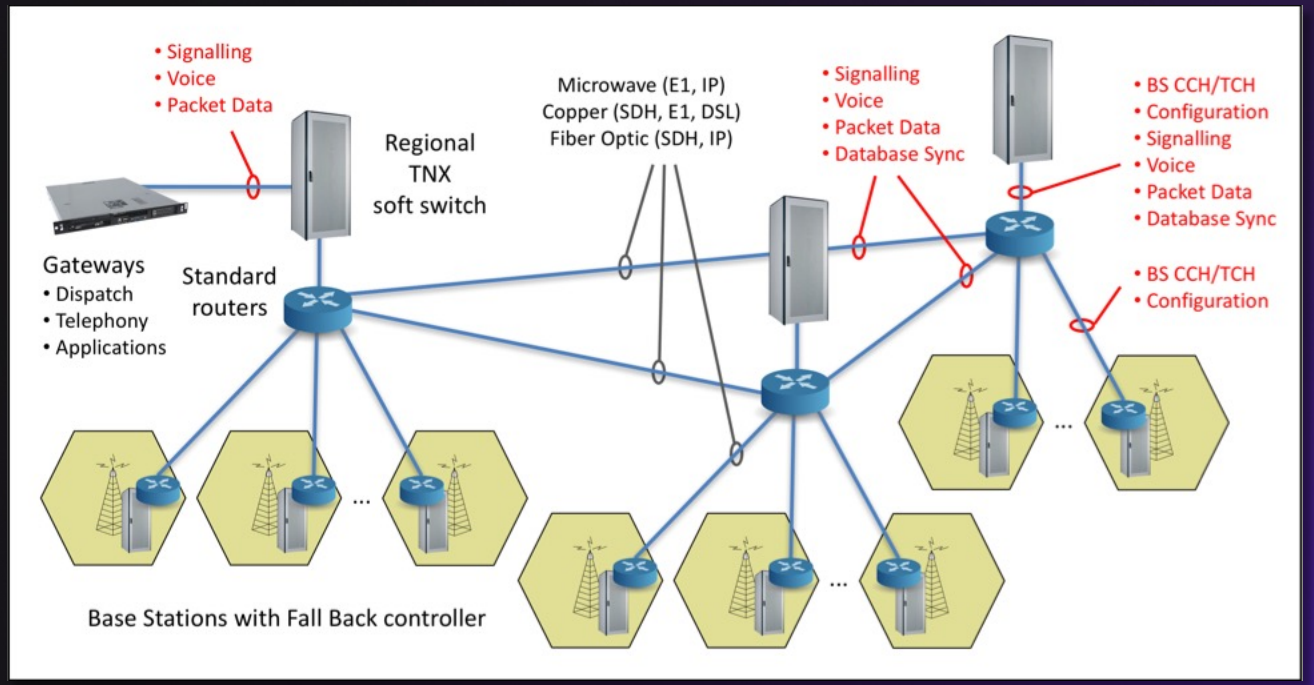
Rohill TetraNode

Overview

- Our research and development is done using Rohill R-8060 and TetraNode 2.28.37
- TetraNode system contains following components:
  - Base station transceiver (BSS) module with IP connectivity
  - TetraNode eXchange (TNX) SwMI which is normally a Linux-based server
  - Several optional systems such as Dispatch Server, Logging Server, etc.
- Each TNX can handle traffic from BSSs on different sites
- TNXs could form a redundant distributed network
- Normally applications should be connected to TNX using proprietary TIGv2 protocol

Rohill TetraNode

Network topology



Rohill TetraNode

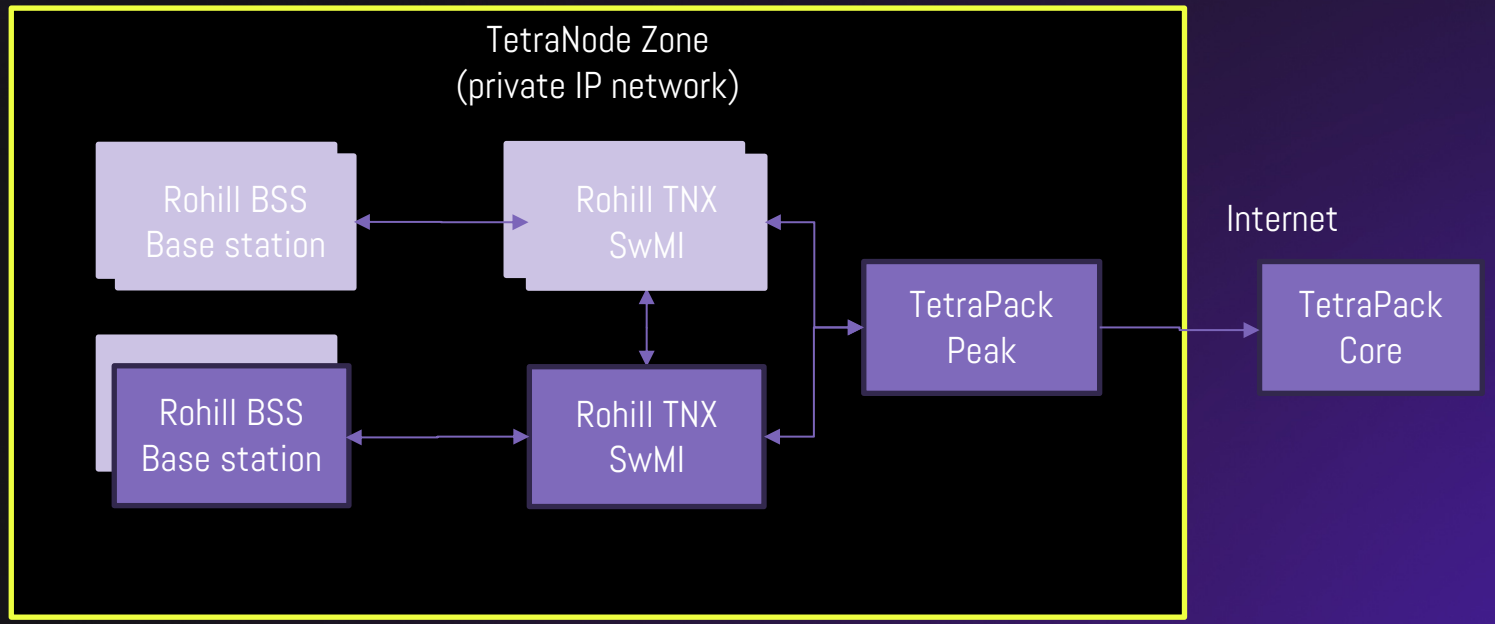
Integration

- **We decided to avoid TIGv2**
  - TIGv2 uses XML over UDP for everything, mostly very abstracted from TETRA-specific
  - TIG is very restrictive, allows to emit traffic from limited ISSIs
  - Requires licensing by capacity
- **We decided to emulate TNX through Internode protocol**
  - Covers our typical cases for TetraPack integration
  - Has many advantages such as database synchronization and ISSIs routing
  - Less CPU overhead on message processing
- **Internode protocol**
  - Proprietary
  - Uses XML over UDP only for (automatic) discovery and keep-alive
  - Uses own UDPCP-based transport and proprietary IPC

TetraPack Peak

- Client software to connect Rohill TetraNode zones
- Emulates Rohill TetraNode, supports up to 61 nodes in zone
- Has next requirements for zone:
  - TetraPack Peak should be run inside TNX' private network
  - It requires separated Debian Linux host with amd64 or arm64 architecture (could be dedicated PC, Raspberry PI or virtual machine)
  - All TNX nodes inside zone have to use numeric node names from 1 to 62
  - TetraPack phone trunks should have numeric names that equal to corresponding ISSIs (16777184, 16777186)
  - At least TetraNode 2.28
  - Good license to pass as much ISSIs as possible :)
  - Every ISSI to be accepted by TNX from TetraPack should be added to TNX database (e.g. to make a Group Call, every ID involved in the call needs to be in TNX database)
- https://wiki.tetrapack.online/books/tetra/page/tetranode

Rohill TetraNode + TetraPack Peak



TETRAPACK

Brew: open-sourced connectivity

Open-source TETRA?

Several groups of TETRA enthusiasts wanted hotspots

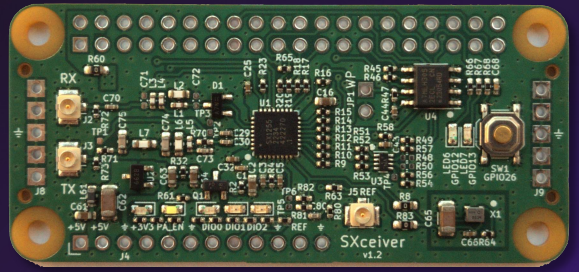
- From early experiments to working tools
  - Early open-source stack from Osmocom – osmocom-tetra
  - rust-soapysdr by Tatu Peltola
  - Affordable SDR-based setups

    USRP, LimeSDR, LimeSDR Mini or SXceiver
- A practical implementation finally arrived
  - **tetra-bluestation by Midnight Blue** (published in the fall 2025)
    https://github.com/MidnightBlueLabs/tetra-bluestation

PA1WBU's compact homebrew cell

What is Brew?

Our-own open protocol for TETRA cells and client connectivity



- Based on WebSocket transport
  - Good NAT traversal
  - TCP_NODELAY, TCP_QUICKACK
  - HTTP Digest Access Authentication
- Suitable for
  - Home-made TMO cells
  - Dispatch console / monitoring (hoseline)
- Announced in spring 2025
- Specification is still evolving (not yet stable)
  https://wiki.tetrapack.online/books/tetra/page/brew

Next steps?

Midnight Blue native support

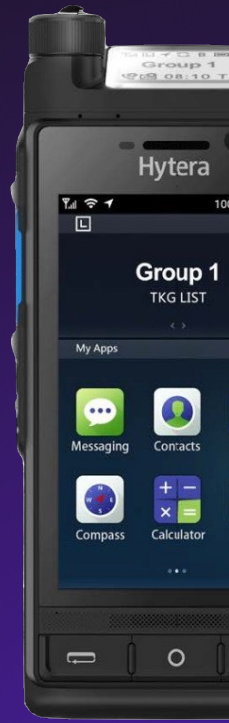
- Early public work appeared on GitHub in February 2026
- Since February 2026 few open-source developers joined
- Community decided to use Brew as a base for interconnect
- We are staying in contact to implement native support on both sides

TETRA-BLUESTATION

RoIP and HyTalk in Practice

Hytera RoIP - Overview

- Hytera RoIP was introduced on PDC760 in 2018
- BrandMeister implemented production support immediately
- Core concept: convergence between narrowband DMR and IP domain
- If narrowband DMR is available, terminal operates in DMR domain
- If narrowband DMR is not available, terminal moves to IP domain
- Result: communication continuity across RF coverage changes



Hytera HyTalk - Overview

- HyTalk has been in commercial PoC use since late 2018
- Core idea: communication entirely over IP (cellular or Wi-Fi)
- Primary target: pure IP terminals, smartphones, bodycams and tablets
- Convergent radios are supported as an additional package in hybrid deployments
- HyTalk MC branch was launched in 2020 for mission-critical MCX evolution

Sources: hytera.com case studies (Saudi/Max Media) and HyTalk MC launch post (2020)

Business Model Difference: RoIP vs HyTalk

Aspect	RoIP	HyTalk
Core model	Convergence model: DMR + IP continuity	Pure IP service model
Primary domain	RF DMR first, IP as continuity path	IP only (cellular / Wi-Fi)
Provisioning	Offline provisioning / MDM (codeplug / CPS workflow)	Online provisioning at connection time. Real-time configuration reload
Group management	Managed per terminal via codeplug profile	Managed centrally on platform/server side
Operations	Device/radio-centric field operations	Platform-centric central operations
Audience	Radio-centric fleets that need RF continuity	IP-first users: phones, tablets, bodycams, IP terminals
Business fit	Protects existing DMR investment; gradual migration	Fast centralized scaling and policy control

HyTalk vs DMR RoIP vs TETRA RoIP

Aspect	HyTalk	DMR RoIP	TETRA RoIP
Service model	PoC	PoC + auto switch DMR/PoC	Pure TETRA call control over IP
Control protocol	2.x: PNAS 3.x: PNAS2	v1: SIP + OMA PoC floor control v2: PNAS v3: PNAS2	PTTC (proxy to ACAPI)
Transport	2.x: TCP 3.x: KCP/UDP (3.1/3.2 differ)	v1: SIP stack v2: TCP v3: KCP/UDP	TCP
Provisioning	Online provisioning (HTTP)	No equivalent online provisioning in baseline flow	Via TETRA vendor tooling
GPS/Data	3.1: XMPP 3.2: GTRP/TCP	v1: NMEA/UDP v2: not researched	
Notes	3.2 adds KCP segment aggregation	v1 -> v3 shift from SIP to proprietary PNAS2	Different model vs PoC stacks

DMR RoIP vs TETRA RoIP: Practical Difference

- Despite similar marketing positioning and similar GUI, these are not the same product internally
- DMR RoIP and TETRA RoIP are two different implementations from different development teams
- DMR RoIP is based on HyTalk PoC service logic
- TETRA RoIP is based on native TETRA Call Control over IP
- Operationally, they require different planning, troubleshooting, and lifecycle management
- Conclusion: treat them as two separate integration tracks, not one unified RoIP stack

Supported in BrandMeister & TetraPack

- DMR RoIP v1 – since **BrandMeister Core 20180601-033505 as Hytera PTT, PDC760 firmware 1.2+**
- DMR RoIP v2 – since **BrandMeister Core 20190919-1033xx as Hytera PNAS, PDC760 firmware 2.5+**
- DMR RoIP v3, HyTalk 3.x – since **BrandMeister Core 20251218-112614 as Hytera HyTalk/RoIP, PDCxx0 firmware 2.5+**
- TETRA RoIP – TetraPack **Core** 2024/Q3, PTC760 firmware 3.x+

- **ALL VERSIONS ARE STILL SUPPORTED**

- https://wiki.brandmeister.network/index.php/Hytera/PDC760
- https://wiki.brandmeister.network/index.php/Hytera/HytalkPoc
- https://wiki.tetrapack.online/books/tetra/page/ptc760-and-ptc680

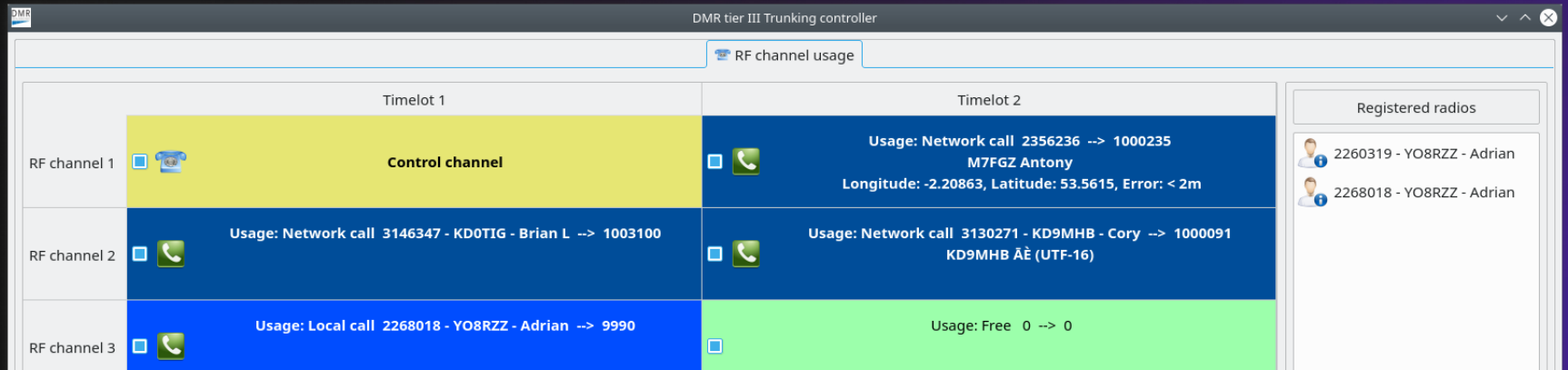
HyTalk devices

- PDC/PDC-series – HyTalk is available as installable packages
- PNC/P-series – built-in support

QRadioLink
DMR tier III trunking controller GUI for MMDVM

QRadioLink TMRTC

- Proof-of-concept implementation of a DMR tier III trunked radio controller GUI
- Licenced under the GPL v3 and is primarily intended for amateur radio and educational use
- Intended to work together with modified version of DMRGateway, MMDVMHost-SDR, MMDVM-SDR and QRadioLink in order to create a DMR tier III radio site
- Directly integrated with BrandMeister for the best- effort service
  https://github.com/qradiolink/dmrtc/issues/5



Thank you!