

OPERATING MANUAL V1.0

TetraSpot

TETRA Base Station

Configuration and operation through the web panel, step by step.

This document describes TetraSpot v1.0.

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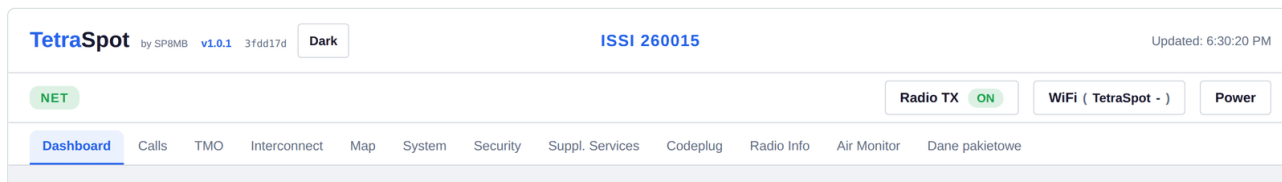
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1. Before you start — getting into the panel

Open the panel in a browser at the station's IP address: `http://<station-address>/`. If you don't know the address, the station brings up its own WiFi network (**TetraSpot**) by default, and the panel is reachable at the gateway address once you join it.

The panel is password-protected. There are two roles: **admin** (full rights) and **viewer** (read-only). Passwords are set under **Security** → **Web panel access**.



The bar across the top stays visible on every tab:

ELEMENT	MEANING
TetraSpot / by ...	station callsign, software version and build
ISSI	the station's own subscriber number
NET	networked mode — the station works with the central switch
Radio TX	transmitter on/off — one click stops emission
WiFi	current mode and network name
Power	restart and shut down the station
Dark	light/dark theme switch

Below it, the tabs: **Dashboard** · **Calls** · **TMO** · **Interconnect** · **Map** · **System** · **Security** · **Suppl. Services** · **Codeplug** · **Radio Info** · **Air Monitor** · **Packet data**.

The interface language is switched under **System** → **Settings**.

1.1 Radio TX — turning the transmitter on and off

The **Radio TX** button shows the transmitter state (**ON** / **OFF**) and toggles it with one click. The panel asks for confirmation, because the effect is immediate.

Turning it off is useful for antenna work, retuning and measurements — the station stays up and reachable through the panel, but stops radiating.

CAUTION

Once off, **every radio loses the network** and will report no service shortly after. When you switch it back on they have to register again, which takes a dozen seconds or so.

1.2 WiFi

The **WiFi** button opens the wireless panel:

Mode	AP
------	----

SSID	TetraSpot
------	-----------

IP	10.42.0.1/24
----	--------------

Signal	-
--------	---

[Scan Networks](#)[Disconnect](#)[Disable WiFi \(rfkill\)](#)

► Saved networks (priority)

Access Point

SSID	TetraSpot
------	------------------

Password	-
----------	---

Channel	6
---------	---

IP	192.168.4.1
----	-------------

► AP Mode

The top part shows the current state: **mode** (AP or client), **SSID**, **IP address** and **signal strength**.

The station runs in one of two modes:

- **Access point (AP)** — the station broadcasts its own network (**TetraSpot** by default) and hands out addresses. This is how you reach the panel in the field with no infrastructure at all. The *Access Point* card shows the SSID, password, channel and the address the panel sits on.
- **Client** — the station joins an existing network. Click **Scan Networks**, pick one from the list and enter the password.

The rest:

BUTTON / SECTION	WHAT IT DOES
Scan Networks	finds networks in range and lets you connect
Disconnect	drops the current network
Disable WiFi (rfkill)	switches the WiFi radio off in hardware
Saved networks (priority)	remembered networks and the order they are tried in
AP Mode	switches to access point and back to client

The chosen mode is **persistent** — after a restart the station comes back the way you left it.

CAUTION

Disabling WiFi via rfkill is a hardware switch-off. You cannot undo it over WiFi, because you have just turned WiFi off — you will need a cable. The same applies when switching to client mode: get the network password wrong and you lose access to the station.

1.3 Power — restart and shutdown

The **Power** button opens two commands:



- **Restart System** — a full restart. The station comes back on its own after about a minute.
- **Shutdown System** — a clean shutdown and power-off.

Both ask for confirmation.

CAUTION

A shutdown cannot be undone remotely. The station will not come back by itself — somebody has to go and power it up physically. If it sits on a mast or in somebody else's house, think twice. For an ordinary "something got stuck", restarting a single service under **System** → **Services** is enough.

2. Step 1: connecting to the Hub

The Hub (hub.tetra-poland.pl) links stations to each other. Without it your station works alone: radios register and talk locally, but hear nobody from other stations.

There is exactly one field to fill in. Go to the **Interconnect** tab and find the **Poland Client** card:

POLAND CLIENT
LOGGED IN (SP8MB)

Config

Hub
hub.tetra-poland.pl:4450

Site Name
SP8MB

Save Config
Start
Stop
Restart

Steps:

1. In **Site Name**, enter your station's name — normally your **callsign**, e.g. **SP8MB** . It must be unique across the network; the station appears under this name on the hub.
2. Click **Save config**.
3. Click **Restart** on the same card.
4. After a moment the card header should show a green **LOGGED IN (SP8MB)**.

The hub address (hub.tetra-poland.pl:4450) is fixed — the field is informational and does not need changing.

Checking from the hub side. Above the client card sits the **TetraPoland Hub** card with the state of the whole network — how many stations are connected, how many subscribers, and which calls are running:

TETRAPOLAND HUB

CONNECTED

Status

Sites9

Subscribers11

Active Calls0

Affiliated Groups

GSSI	TP	Members
7	-	2303014 2601432 2604409
9	-	2303014
10	-	2601432 2602648 2603077 2603280 2604299 2604409
11	-	2603077 2604299
20	-	2303014 2601432 2601432 2603003 2603077 2604299 2604366 2604409 2609020 2740005
25	-	2604299 2604409
33	-	2303014
39	-	2603003
58	-	2740005
80	-	2740005
89	-	2740005
230	-	2303014
23033	-	2303014
260050	-	2303014
2319112	-	2303014

Subscribers

DMR ID	Site
2604299	iOS App
2603003	Android App
2603464	SP1JT
2603077	Android App
2604366	Android App
2609020	SQ9GIN
2603280	iOS App
2303014	Android App
2740005	SR2OX
2601432	Android App
2604409	Android App

Dashboard: [hub.tetra-poland.pl](#)

If you see **CONNECTED** and your station in the list, the hub is working.

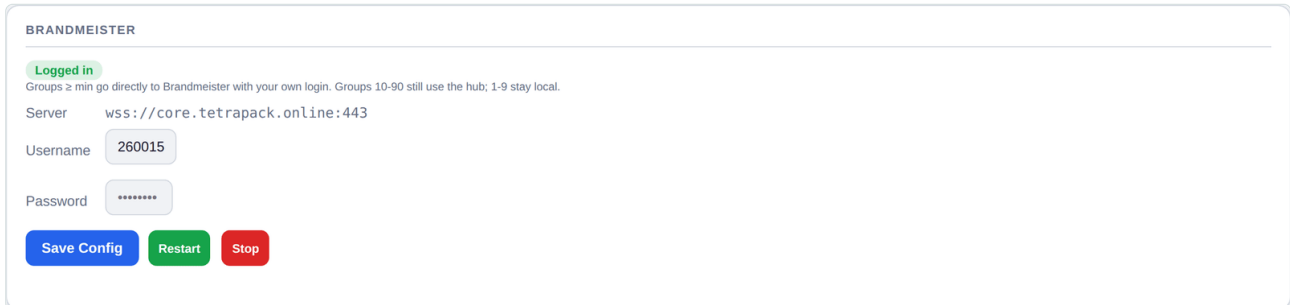
CAUTION

For your station to register its radios' ISSIs on the hub, its **base DMR ID** must be on the hub's list of permitted gateways. Without that the client logs in, but the hub rejects radio registrations in a loop every 15 seconds. If that happens, contact the hub operator — this cannot be fixed on your side.

3. Step 2: connecting to BrandMeister

BrandMeister is reached through the TetraPack core. **There are two fields to fill in: login and password.**

Same **Interconnect** tab, the **BrandMeister** card:



The screenshot shows a configuration card titled "BRANDMEISTER". At the top, it says "Logged in" in a green box. Below that, a note states: "Groups ≥ min go directly to Brandmeister with your own login. Groups 10-90 still use the hub; 1-9 stay local." The "Server" field is set to "wss://core.tetrapack.online:443". The "Username" field contains "260015". The "Password" field is masked with "*****". At the bottom, there are three buttons: "Save Config" (blue), "Restart" (green), and "Stop" (red).

Steps:

1. **Username** — your BrandMeister hotspot login: **DMR ID plus a two-digit suffix**, e.g. `2600824 05`.
2. **Password** — your BrandMeister **hotspot** password (not your website account password).
3. Click **Save config**, then **Restart**.
4. The card should show a green **Logged in**.

The server address (`wss://core.tetrapack.online:443`) is fixed and needs no setting. The station's ISSI is derived from the login automatically — the device suffix is trimmed so the number fits in 24 bits.

CAUTION

Leaving the password field **empty** on save means "keep the current password". It is not cleared — so when correcting just the login you don't have to retype the password.

Once logged in, groups numbered **91 and above** go straight to BrandMeister under your login.

4. Step 3: checking that radios register

Open the **Dashboard**. This is the station's main control screen:

The screenshot shows the TetraSpot Dashboard interface. At the top, it displays 'TetraSpot by SP8MB v1.0.1 3fdd17d' and 'Dark' theme. The station identifier 'ISSI 260015' is shown, along with the update time 'Updated: 6:31:13 PM'. Below this, there are status indicators for 'NET', 'Radio TX ON', 'WiFi (TetraSpot -)', and 'Power'. A navigation bar includes tabs for 'Dashboard', 'Calls', 'TMO', 'Interconnect', 'Map', 'System', 'Security', 'Suppl. Services', 'Codeplug', 'Radio Info', 'Air Monitor', and 'Dane pakietowe'. The main content area is divided into several sections: 'CONNECTED CLIENTS (1)' with a table showing one client (SSI: 2600824, State: Attached, Groups: 10, RSSI: -86.5 dBm, Last: 1m); 'ACTIVE CALLS (0)' with a table showing no active calls; 'TIMESLOTS (0/3)' showing 'Carrier 1600 MAIN — MCCH' and four time slots (TS1: MCCH control channel, TS2: free, TS3: free, TS4: free); and a 'SEND SDS' section with fields for 'Destination SSI', 'Message text', and a 'Send' button.

What to read:

- **Connected clients** — registered radios: **SSI**, state (**Attached** = registered and attached to groups), number of groups, **RSSI** (signal strength from radio to station) and time since last activity. A few green seconds under *Last* means the radio is currently active.
- **Active calls** — conversations in progress.
- **Timeslots** — how the radio resource is being used. One carrier gives 4 slots, of which **TS1 is the MCCH** (control channel, always busy) — leaving 3 for calls and data.
- **Send SDS** — a quick text message to a radio (SSI) or a group (GSSI).

If a radio won't register, check in this order:

1. Whether the radio's codeplug has the same **MCC/MNC, colour code and Location Area** as the station (the **TMO** tab).
2. Whether **Radio TX** at the top of the panel is **ON**.
3. Whether the radio is being filtered out by the whitelist under **Security** → **Auth control** — see [section 7](#).
4. Whether the radio has *Mutual Authentication* enabled while the station holds no key for it — the most common cause of "the radio sees the station but keeps dropping".

5. Group split — where each call goes

The group number decides where a conversation goes:

GROUP NUMBER (GSSI)	GOES TO	HANDLED BY
1–9	stays local, inside your cell only	—
10–90	TetraPoland Hub — other stations hear it	Poland Client
91 and above	BrandMeister	BrandMeister

The split is a convention, but it **must be the same across the whole network**. If group 20 goes to BrandMeister on your station while everyone else keeps it on the hub, that group goes silent for you.

For a radio to hear a group, the group must be **in its codeplug** and the radio attached to it. A group can also be granted remotely, with no reprogramming — see [DGNA](#).

6. Radio configuration — the TMO tab

Everything to do with transmission: frequencies, network identity and cell parameters.

RADIO CONFIG

Base station and SDR parameters. Changes require BS restart.

Network Info

MCC

901

MNC

9998

Cell Info

Freq Band

4

Main Carrier

1600

Duplex Spacing

0 — 10.0 MHz

Custom Duplex (MHz)

not set

Freq Offset

0

Colour Code

1

Location Area

2

MS TX Power

30 dBm (1W)

Reverse Operation

☐

SDR / Frequencies

TX Freq (MHz)

440.0000

RX Freq (MHz)

430.0000

PPM Error

0.16

Sample Rate

600 kHz

Driver

SXceiver

► Wzmocnienia + rejestry SX1255 (zaawansowane) ►

► Duplex Spacing Table (TS 100 392-15)

Save & Restart BS

6.1 Network identity

FIELD	MEANING
MCC	country code
MNC	TETRA network number within the country

CAUTION

For the station to work in our network, set MCC = 901 and MNC = 9998. These are the values used across the whole system — anything else cuts the station off from the rest of the network, even if it transmits perfectly well on its own.

MCC and MNC must be identical to the radio's codeplug — otherwise the radio will not accept the station as its own network.

6.2 Cell parameters

FIELD	MEANING
Freq Band	band; 4 = 400–500 MHz (standard TETRA)
Main Carrier	carrier number; calculated automatically from the TX frequency
Duplex Spacing	duplex offset from the ETSI table; usually 10 MHz in the 400 band
Colour Code	0–3, distinguishes neighbouring stations on the same frequency
Location Area	location area, used for registration and paging
MS TX Power	maximum power a radio may transmit in this cell

Colour Code and Location Area must also match the radio's programming.

6.3 Frequencies and SDR

FIELD	MEANING
TX Freq	the frequency the station transmits on (radios listen here)
RX Freq	the frequency the station receives on; derived from TX and the duplex offset
PPM Error	oscillator error correction
Driver	which SDR hardware is in use
Gains	transmit and receive gain settings

CAUTION

Too little transmit gain produces a classic symptom: **the radio sees the carrier but cannot register**, and reports the network as unavailable. If that happens, raise the TX gain.

Apply changes with **Save & Restart BS**. The station stops transmitting for a dozen seconds or so.

6.4 Service flags

BS SERVICE FLAGS (SYSINFO BROADCAST)

Tryb pracy: **CLEAR**
Flags broadcast in D-MLE-SYSINFO. Terminals use them to determine available services. Changes require BS restart.

☒ **Registration**
MS może się rejestrować na tej komórce

☐ **Priority Cell**
Komórka priorytetowa — MS preferuje ją do rejestracji

☐ **Migration**
Obsługa migracji MS między sieciami (multi-site roaming)

☒ **Voice Service**
Usługa głosowa (group/individual call)

☒ **SNDCP (Packet Data)**
Sub-Network Dependent Convergence Protocol — dane pakietowe (IP over TETRA)

☒ **Advanced Link**
Multi-slot transmisje — łączenie slotów dla większej przepustowości

☒ **Deregistration**
MS może się wyrejestrować

☐ **No Minimum Mode**
Wyłącza minimum mode — MS musi mieć pełen dostęp do usług

☒ **System Wide Services**
Usługi ogólnosystemowe dostępne — wymagane dla normalnej pracy

☒ **Circuit Mode Data (SDS)**
Short Data Service — wiadomości tekstowe, statusy, LIP

☐ **AIE (Encryption)**
Air Interface Encryption — TEA1/TEA2/TEA3 szyfrowanie łącza radiowego

Save & Restart BS

The station broadcasts a list of available services, and radios decide what they can use from it. The important ones: voice service, packet data (**required for internet on the radio**) and encryption.

6.5 Second carrier (Dual Carrier)

DUAL CARRIER **EKSPERYMENTALNE**

Dруга nośna 25 kHz obok głównej: sygnalizacja MCCH zostaje na nośnej głównej, ruch (grupowe/P2P) przelewa się na TS1–4 nośnej dodatkowej, gdy główna jest zajęta. Numer nośnej jest zachowywany po wyłączeniu przełącznika. Zmiany wymagają restartu BS.

Włączone ☒

Nośna dodatkowa np. główna+1

Nośna główna 1600

Stan wyłączony (1 nośna)

△ SXceiver/SX125S (zero-IF): dual carrier jest EKSPERYMENTALNY na tym sprzęcie. Obserwuj intermodulację TX (±25/50 kHz wokół pary), rozważ obniżenie tx_gain_dac (~-3 dB) i tx_gain_mixer o stopień. Wymagany jawny sample_rate (użyj rzeczywistej wartości SDR, np. 600 kHz). Szczegóły: doc/DUAL_CARRIER_SXCEIVER_TEST.md.

Save & Restart BS

The station can transmit on two carriers at once. The second carrier adds four more timeslots — all for calls and data, since the control channel stays on the main carrier. It is the simplest way to stop packet data from starving voice.

6.6 Calibration

► SDR — Kalibracja PPM ►

The panel can measure and correct oscillator error (**PPM calibration**) and IQ imbalance (**IQ calibration**). Each has *Run*, *Verify* and *Apply* — you run the calibration first, then commit it.

7. Terminals and authorisation — Security

7.1 Panel access

WEB PANEL ACCESS

HTTP Basic auth dla panelu (oprócz /api/health). Username ignorowane, sprawdzane tylko hasło. Zmiana wchodzi natychmiast (bez restartu serwisu).

☒ Wymagaj hasła do panelu

Hasło viewera (ustawione — zostaw puste, by nie zmieniać)

Pokaż

Hasło admina (ustawione — zostaw puste, by nie zmieniać) (odblokowuje funkcje admin-only)

Save

Set the admin and viewer passwords here, and whether a login is required at all.

7.2 Who may register to the network

AUTH CONTROL

☐ Whitelist mode Whitelist OFF — every ISSI is accepted (no filtering)
Controls the registration whitelist. ON = only terminals with the 'Allowed' flag in the list below may register. OFF = all radios are accepted, the list is ignored.

☒ Use Ki for authentication Ki auth ON — 3 radio(s) with a Ki will be challenged
ON = every radio that has a Ki in the database is challenged (TAA1 mutual authentication). A radio whose Ki does not match the one programmed into it will NOT register (reject cause 5). OFF = a stored Ki is ignored and the whitelist alone decides.

Two modes:

- **Whitelist on** — only radios entered in the database and flagged as allowed may register. This is how a closed network runs.
- **Whitelist off (bypass)** — **every** radio is accepted, with no checking. Convenient when starting out and for testing.

A separate **Ki authentication** switch makes every radio that has a key in the database authenticate itself. Radios without a key are not challenged.

CAUTION

After a station restart, check that the mode is what you expect — it's easy to miss that the network has been left open.

7.3 Terminals and groups

TERMINALS (AUTH DB) (10)

ISSI Name ☒ Allowed Add Terminal

ISSI	Name	Allowed	Actions
111	MS_TEST	Yes	Delete
1000	Radio 1	Yes	Delete
1001	Radio 3	Yes	Delete
1002	Radio 2	Yes	Delete
2600824	SP8MB	Yes	Delete

Add a radio: its **ISSI**, a name (e.g. callsign and operator) and the *Allowed* flag. The list shows every radio the station knows about; **Delete** removes an entry.

This is the list the whitelist checks — when it is on, only radios on this list and flagged as allowed may register.

The groups a radio belongs to come from its **codeplug**. An extra group can be granted over the air with **DGNA** — see [section 10.1](#).

7.4 Encryption

Air interface encryption **is not configured from the panel** — this version has no such card on the Security tab. Keys and security class are set through a configuration file; see the **advanced manual**.

8. Calls and messages

The **Calls** tab is the station's activity history.

VOICE CALL LOG (5)							
Date: 08/11/2026							
ID	Type	Caller	Called	TS	Bridged	Started	Duration
9	Group	1	20	TS2	-	2026-08-11 04:00:00	4.2s
8	Group	1	20	TS2	-	2026-08-11 03:00:00	4.2s
7	Group	1	20	TS2	-	2026-08-11 02:00:00	4.3s
6	Group	1	20	TS2	TP	2026-08-11 01:00:00	4.2s
5	Group	1	20	TS2	TP	2026-08-11 00:00:00	4.1s

Voice call log — who called whom, when, for how long, on which timeslot, and whether the call was bridged outside (hub / BrandMeister).

SDS LOG (246)							
Dir	From	To	Type	Message	Status	Time	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 18:28:31	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 18:18:32	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 18:08:31	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 17:58:31	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 17:48:31	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 17:39:03	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 17:28:31	
↑	2600824 SP8MB	260043 SR8LST	LIP 3	51.22089, 22.699653 · 0 km/h · 338°	-	11.08.2026 17:18:31	

SDS log — text messages with delivery reports. Messages are sent from the **Dashboard** (*Send SDS* card): give a radio number (ISSI) or group number (GSSI) and the text.

History can be cleared with the buttons on each card.

CAUTION

Messages sent **to a radio** longer than 16 characters are sometimes silently lost — you get no error, they simply don't arrive. Keep them short.

9. Map and APRS

The **Map** tab shows radios' GPS positions — current, plus historical tracks (pick a day and load the tracks).

TetraSpot by SP8MB v1.0.1 3fdd17d Dark
ISSI 260015
Updated: 6:31:25 PM

NET
Radio TX ON
WiFi (TetraSpot -)
Power

Dashboard Calls TMO Interconnect **Map** System Security Suppl. Services Codeplug Radio Info Air Monitor Dane pakietow

Day: 08/11/2026 Load tracks Clear location history 1 terminali, 81 punktow (2026-08-11)

APRS-IS GATEWAY CONNECTED

☒ Enable APRS forwarding

Server rotate.aprs2.net:14580
Callsign SP8MB

SSID (0-15) 10
Passcode *****

Poll interval (sec) 60
Path WIDE1-1,WIDE2-1

Symbol />
Comment TETRA LIP via TetraSpot

Filter SSI (comma-separated, empty = all) 1000,1002,2603280

SSI → Callsign mapping
No mappings
SSI Callsign + Add

BS BEACON

☐ Enable BS beacon

Lat Lon

Symbol /r Comment TetraSpot BS SP8MB

Beacon interval (s) 600

Save APRS Config

19 packets sent | last: 14:59:18

Below the map is the **APRS-IS** gateway, which forwards radio positions to aprs.fi:

APRS-IS GATEWAY CONNECTED

☒ Enable APRS forwarding

Server
Callsign

SSID (0-15)
Passcode

Poll interval (sec)
Path

Symbol
Comment

Filter SSI (comma-separated, empty = all)

SSi → Callsign mapping
No mappings

BS BEACON

☐ Enable BS beacon

Lat
Lon

Symbol
Comment

Beacon interval (s)

19 packets sent | last: 14:59:18

The important fields:

FIELD	MEANING
Callsign and SSID	your callsign; SSID 10 conventionally marks an internet gateway
Passcode	the APRS-IS verification code derived from your callsign — nothing is sent without it
Interval	how often positions are sent (minimum 10 s)
Symbol	map icon: /> car, /r repeater, /- house
Filter SSI	which radios to forward; empty = all
SSi → callsign	maps a radio number to a callsign
BS Beacon	the station's own fixed position: latitude, longitude, symbol, comment

10. Supplementary services

The **Suppl. Services** tab collects functions that sit "above" plain communication.

10.1 DGNA — adding a group over the air

DGNA (DYNAMIC GROUP NUMBER ASSIGNMENT)

Select terminal...

GSSI

Group name (max 15)

Folder (unaffiliated)

4

DGNA Assign

DGNA Detach

[Help — DGNA](#)

Lets you **give a radio a talkgroup without reprogramming its codeplug**. Pick the radio, the group number and a mode: just placed in the folder, attached until the next registration, or permanently attached. You can also give the group a name shown on the radio's display.

10.2 Idle screen message (Home Mode Display)

HOME MODE DISPLAY (PID 220)

Wiersze z etykieta addr: * są zarządzane automatycznie przez serwis adresowy — edycja nie ma sensu, zostaną nadpisane przy następnym cyklu.

Recipient	Text	Refresh (s)	Coding	On	Actions
addr:2600824 (2600824)	Wyszynskiego 7	31	LATIN	on	Delete

Broadcast (all radios)

Label

Text shown on radio screen

LATIN

Refresh (s) 60

Repeat 0

Add

Save

[Help — Home Mode Display](#)

A short text the radio shows on its screen when idle. Address it to all radios, to one radio (ISSI) or to a group (GSSI). Entries form a list — after changing it, click save to apply.

10.3 Battery saving (Energy Economy)

ENERGY ECONOMY (EG SLEEP MODES)

☒ Enabled
 Level EG5 — sleep 17 frames (~1 s)
 Policy Allow (cap — honor MS request)
 Save

In EG (persisted): 1000 — EG1, 1002 — EG1, 2600824 — EG1, 2602648 — EG1, 2603280 — EG1, 2609020 — EG1

[Help — Energy Economy](#)

Lets radios sleep between wake frames. Levels run from EG1 (~56 ms) to EG7 (~20 s). **Cap** grants only as much as the radio asks for; **force** imposes the level on every radio that requests sleep at all.

CAUTION

Stay with EG1–EG3. Deeper sleep is not yet reliable and the radio may miss incoming calls.

10.4 Remote station control

REMOTE CONTROL (STATUS CODES)

☒ Enabled
Command SSI
SSI
Authorized ISSIs
2603280
Restart service
tetra-hotspot

STATUS value	Action	Actions
32000	Power off host ▾	Remove
32001	Reboot host ▾	Remove
32769	Restart BS service ▾	Remove
32770	Release all calls ▾	Remove

Text-message commands (send this text to Command SSI)

Text	Action	Actions
reboot	Reboot host ▾	Remove

[+ Add status](#)
[+ Add text](#)
[Save](#)

[Help — Remote control](#)

An authorised radio can control the station by sending a **STATUS code** (from the radio's Status menu) to an agreed number. By default: shut down, reboot, restart the radio service, and release all calls. Sending an agreed **text** works too.

SECURITY

Without encryption the sender's number can be spoofed. Only enable this on a trusted network, fill in the list of authorised numbers, and don't use an obvious command number. Remember that **a shutdown cannot be undone remotely** — somebody has to power the station back on physically.

10.5 Dispatcher services

DISPATCHER SS (AL / DL / IC / CAD)

AL Ambience
target ISSI
listener ISSI
Listen
Stop

DL Discreet
monitor ISSI
monitored ISSI
Inform

IC Include
target ISSI
group GSSI
Include

CAD Authorize
calling ISSI
dispatcher ISSI
Intercept
Accept
Reject

[Help — Dispatcher SS](#)

Four functions initiated from the panel: remotely opening a radio's microphone, discreetly monitoring a conversation in progress, pulling a radio into an ongoing call, and authorising calls as dispatcher. The same tab also holds call barring, caller-ID hiding and forwarding.

10.6 Street address on the display

ADRES NA WYŚWIETLACZU DZIAŁA

Zamienia pozycję GPS radia na nazwę ulicy i pokazuje ją przez Home Mode Display. Jedyna funkcja odpytująca usługę w internecie (Nominatim / OpenStreetMap).

☒ Włączony

Odświeżanie (s) 300

Próg ruchu (m) 50

Zapisz

ISSI — puste = wszystkie radia (rozdziel przecinkami)
np. 2603280, 2600824

User-Agent dla Nominatim — musi zawierać adres kontaktowy, inaczej odpowiada 403
TetraSpot-address-service/1.0 (info@tetra-poland.pl)

Tells radios **which street they are standing on**. It takes the radio's GPS position, turns it into an address and pushes it to the display as a Home Mode Display message.

FIELD	MEANING
Enabled	starts the service
ISSI	which radios to describe; empty = all radios with a known position
Interval	how often to refresh (minimum 30 s)
Minimum movement	re-check the address only after moving this far
User-Agent	required by the external address service; must contain an e-mail address

CAUTION

Without a proper **User-Agent** carrying a contact address the geocoding service refuses to answer — the panel will not let you save such a configuration, so the service can't look configured while every lookup fails. Don't lower the minimum movement without reason either: it stops the external service being flooded with queries about stationary radios.

CAUTION

The service writes its own entries onto the Home Mode Display list. Don't edit them by hand — they are overwritten on the next refresh.

10.7 Remote control of position reporting (LIP)

LIP REMOTE CONTROL

Send LIP ENABLE + backlog request to radio on first GPS report. Disabling prevents the remote control icon on radios.

☒ Send LIP ENABLE to radios

Controls **how often radios report their position**. After a radio's first GPS report the station tells it to enable reporting and asks for any backlog.

Switching this off means the station leaves the radio's own settings alone — positions arrive only as often as the codeplug dictates.

10.8 Call forwarding

CALL FORWARDING (0)

Select terminal...
CFU (Unconditional)
Target SSI
Add Rule

ISSI	Name	Type	Target SSI	Enabled	Actions
No CF rules					

Forwards incoming calls to another number. For a given radio you set the destination and the condition — for example when the radio is unreachable or does not answer.

10.9 Caller ID (CLIP / CLIR)

CLIP / CLIR (0)

CLIR hides the caller's SSI in the D-SETUP the callee receives. A radio that asks to show its identity on one call (CLIR override) still wins over the setting here.

Select terminal...
CLIP (show caller)
Set

ISSI	Name	Mode	Actions
No CLIP/CLIR settings (default: CLIP)			

Controls whether the caller's number is shown:

- **CLIP** — the called party sees who is calling.
- **CLIR** — the caller's number is withheld.

Set per radio.

10.10 Call barring

CALL BARRING (0)

Enforced at call setup — a barred call is refused with D-RELEASE cause 17. Outgoing barring covers group and PABX calls too; emergency calls are never barred.

Select terminal...
☐ Incoming
☐ Outgoing
Set

ISSI	Name	Incoming	Outgoing	Actions
No barring rules				

Blocks a radio from making or receiving calls. A barred call is refused right at setup — the radio is told the call was denied.

Useful when a radio has ended up in the wrong hands, or should only work in one direction.

10.11 Speaking clock

ZEGARYNKA

DZIAŁA

O pełnej godzinie ogłasza czas na wybranej grupie. Dźwięk jest nagrany wcześniej — stacja nie potrzebuje syntezy mowy ani internetu.

Grupa (GSSI)

Nadawca (SSI)

☒ Włączona

20

1

Zapisz

Powiedz teraz

Godziny — wszystkie zaznaczone = co godzinę, całą dobę

☒ 00 ☒ 01 ☒ 02 ☒ 03 ☒ 04 ☒ 05 ☒ 06 ☒ 07 ☒ 08 ☒ 09 ☒ 10 ☒ 11 ☒ 12 ☒ 13 ☒ 14 ☒ 15 ☒ 16 ☒ 17 ☒ 18 ☒ 19 ☒ 20 ☒ 21 ☒ 22 ☒ 23

Wyczyść

Zaznacz wszystkie

Tylko 6-22

Announces the time on a chosen group on the hour. You pick the group, the number shown as the caller, and the hours (an empty list means around the clock). A test button plays the current hour immediately without touching the schedule.

11. Packet data

Packet data gives radios **internet access over the TETRA network**: the station leases them an IP address and passes their traffic on. Bringing it up has two sides — the station and the radio. **Nothing works without the radio-side settings**, even when everything on the station shows green.

11.1 How it works

The radio establishes a **PDP context** — a data session. The station then leases it an IP address from a pool (`10.0.0.2` – `10.0.0.254` by default) and passes all of the radio's traffic through itself to the internet. The station's address on that subnet is `10.0.0.1`, and it acts as both the gateway and the proxy server for the radio's WAP browser.

11.2 The station side

DANE PAKIETOWE (SNDP)					
Usługa: włączona	TUN: tetra0	Pula IP: 0 / 253	Aktywne konteksty PDP: 0		
ISSI	Adres IP	NSAPI	Stan	↑ UL (B)	↓ DL (B)
Brak aktywnych kontekstów PDP					
Kontekst pojawia się gdy radio aktywuje sesję danych (SN-ACTIVATE PDP CONTEXT) i dostaje adres IP z puli. Ruch idzie przez interfejs TUN switcha z NAT do internetu. Odświeżanie co 5 s.					

The **Packet data** tab shows:

FIELD	MEANING
Service	whether packet data is enabled
TUN	the interface carrying radio traffic
IP pool	addresses in use versus available
Active PDP contexts	how many radios currently hold a data session

The table below lists each session: the radio's **ISSI**, its leased **IP address**, the **NSAPI** (session number inside the radio), the **state**, and bytes sent and received. It refreshes every 5 seconds. A row appears the moment a radio activates a session.

Packet data must also be enabled under **TMO** → **Service flags**, or the radio will not even try. The address pool, gateway and traffic forwarding themselves are set through configuration files.

11.3 Radio configuration — Motorola / DIMETRA (CPS)

Everything below is set in CPS, under **Codeplug** → **Data Services**.

Packet Data Parameters

FIELD	VALUE
Request a Dynamic IP Address	tick — the station assigns the address
Default Packet Data Mode	<code>Data Only</code> or <code>Voice & Data</code>
User Authentication	UNTICK — see the warning below
Static IP Address	<code>0.0.0.0</code> (unused with a dynamic address)

CAUTION

User Authentication must be unticked. With it ticked, the Motorola radio demands CHAP authentication while establishing the session, and the station does not answer that yet. The result: the data session **never establishes**, and no PDP context ever appears in the panel. The protocol dropdown (CHAP/PAP) next to it is irrelevant then. This is the most common cause of "the radio won't get onto data".

WAP → Proxy Table 1

FIELD	VALUE
Proxy IP Address	10.0.0.1 — the station's address on the data subnet
Remote Port	9200
Force SAR	ticked (default)
SAR Group	3 (default)
Bearer Index	0 — points at Bearer Table 1

CAUTION

Motorola ships this as **0.0.0.0**, which **will not work**. The proxy address and port are the second most common cause of a failed bring-up.

WAP → Bearer Table 1 — leave Motorola's defaults: **Bearer Name = TETRA_PACKET**, **B-Type = 1**, **WDP B-Type = 0**, **Max Request Time = 45**.

WAP → AP Table 1 — leave **empty**. The native TETRA packet bearer needs no separate access point.

WAP → WAP Parameters

- select **Proxy Table 1** as the active proxy,
- set **Homepage** to **http://10.0.0.1:4440/wap** — the station's built-in status page (registered radios, calls, address pool usage, uptime). A good landing page for checking that everything works.

11.4 Checking it works

1. Switch the radio into data mode and open its browser.
2. On the **Packet data** tab a row should appear with the radio's number and leased IP address, and the **Active PDP contexts** counter should go up.
3. The UL/DL byte counters should climb as you browse.

If no row appears, the session was never established — the problem is on the radio or in authorisation, not in packet data itself.

11.5 When a radio won't get onto data

CAUSE	WHAT TO DO
User Authentication ticked in the codeplug	untick it — this is cause number one
Proxy IP 0.0.0.0 instead of 10.0.0.1	fix the address and port 9200 in Proxy Table 1

CAUSE	WHAT TO DO
Radio not on the whitelist	it won't even register to the network — see 15.1
Service flag off	enable packet data under TMO → Service flags and restart the station
Wrong station	packet data only works where it has been brought up — check which station the radio is registered to

11.6 Browsing limitations

The browser in the radio is **WAP**, not a modern browser. It will open lightweight [http://](#) pages; modern **HTTPS** sites **will not display**. The station's built-in status page is written for this format and always works.

CAUTION

Packet data **takes timeslots away from voice**. One carrier has only three available (the fourth is the control channel). Assign all three to data and nothing is left for calls and registrations. Watch the *Timeslots* card on the Dashboard after every change, and if you need both voice and data, bring up the [second carrier](#).

12. Telephony – SIP and GSM modem

12.1 SIP / PABX

SIP CONFIG

Enabled

☒

Status

Registered (tetra-sp8mb)

Registrar

127.0.0.1:5062

Username

tetra-sp8mb

Password

.....

Realm

asterisk

Save Config

Start

Stop

Restart

Connects the station to a telephone exchange: exchange address, username, password and realm. Below it, the **number plan**:

NUMBER PLAN

External Prefix

SSI

Phone number

+ Add

SSI	Phone Number	
2600824	2600824	Del
1000	100	Del
1001	101	Del
1002	102	Del

- **External prefix** — the digit a radio dials first to reach an outside line.
- **SSI ↔ number mappings** — which phone number reaches which radio.

12.2 GSM modem

MODEM GSM / KARTA SIM

ASTERISK: DZIAŁA

Modem	?	Sieć	NONE	Trunk do bazy	Registered
Głos	Nie	Rejestracja GSM	Unknown		
SMS	Nie	Sygnał	0, <= -113 dBm		
Stan	Not connected Start scheduled	IMSI	—	Gateway → Asterisk	zarejestrowany
IMEI	—	Centrum SMS	—		

Odśwież

Start Asterisk

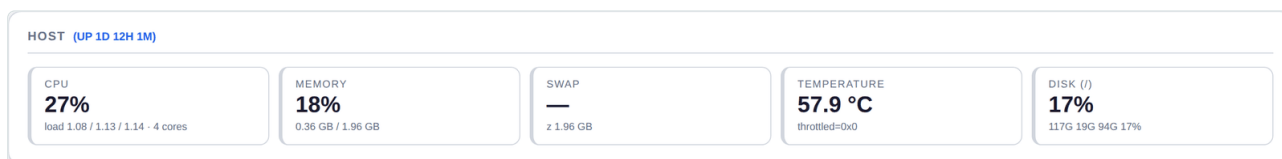
Restart Asterisk

Stop Asterisk

A gateway to the cellular network for calls and SMS. Incoming SMS arrive at the radio as SDS messages and vice versa. The card shows the state of the modem, the SIM and the phone service.

13. System — services, logs, power

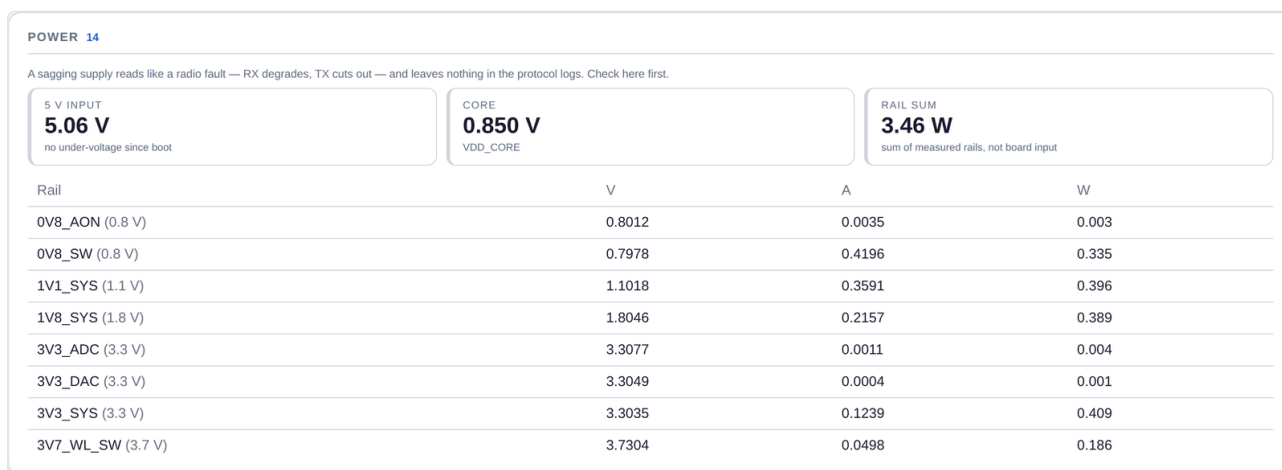
13.1 Station health



CPU load, memory, temperature and disk usage.

13.2 Power — voltage and throttling

This is the most valuable diagnostic card in the whole panel.



Why it matters. A sagging supply **looks exactly like a radio fault**: reception degrades, transmission cuts out, radios start dropping — and there is no error anywhere in the protocol logs, because as far as the software is concerned everything is fine. People spend a week retuning antennas and swapping coax when the culprit is the power brick or the USB-C cable.

The card shows three headline figures:

READING	WHAT IT MEANS
5 V input	supply voltage reaching the board. It should stay close to 5 V
Core	CPU core voltage
Rail sum	summed power of the measured rails — not the board's total draw, just an indication

Below them is a table of every power rail with voltage, current and power. A rail that is off its nominal value is flagged.

Messages that need acting on:

MESSAGE	MEANING
no under-voltage since boot	healthy — the supply has held up since power-on
UNDER-VOLTAGE NOW	the supply is collapsing right now — urgent
under-voltage happened since boot	it happened earlier; even if things look fine now, it was not a fluke

MESSAGE	MEANING
clock capped / throttled	the CPU has slowed itself down

What throttling is. When voltage drops or the chip overheats, the CPU automatically slows down to protect itself. For a base station that is serious: radio signal processing has to keep up with TETRA's frame timing, so a throttled CPU starts missing deadlines. The symptoms are misleading — crackling, broken audio, failed registrations — and nothing points at power.

What to do when you see under-voltage or throttling:

1. Fit a stronger power supply — a phone charger is not enough for a station with a transmitter.
2. Replace the power cable. A thin or long USB-C cable can drop enough voltage that even a good supply doesn't help.
3. Check the temperature on the **Host** card — throttling can also come from overheating, in which case you need better cooling, not a new supply.

CAUTION

Take an under-voltage reported even once since boot seriously, even if everything looks fine now. A supply on the edge of its capability collapses exactly when the station starts transmitting — the worst possible moment.

13.3 Services

SERVICES (12/12)

SWITCH active starts at boot	HOTSPOT active starts at boot	AUDIO-GATEWAY active starts at boot	TELEPHONY-GATEWAY active starts at boot	SDS-SERVER active starts at boot	AUTH-SERVER active starts at boot	BREW-CLIENT active starts at boot	POLAND-CLIENT active starts at boot
CLOCK-SERVICE active starts at boot	ADDRESS-SERVICE active starts at boot	CELLULAR-GATEWAY active starts at boot	MANAGEMENT active starts at boot				

Every station service, with start, stop and restart, and whether it starts automatically.

CAUTION

Restarting the central service (the switch) takes all the others down with it. They do not come back automatically — after such a restart, start the remaining services and the radio station again.

SERVICES STATUS			
Service	URL	Status	Actions
TMO_BS	https://localhost:4443	OK	Stop Restart
Core_SW	http://localhost:4440	OK	Stop Restart
SDS_SRV	http://localhost:4435	OK	Stop Restart
AUTH_SRV	http://localhost:4438	OK	Stop Restart
TetraPack	http://localhost:4434	OK	Stop Restart
Telephony	http://localhost:4439	OK	Stop Restart

The **Services status** card is the at-a-glance check on whether every part of the station is answering. A red entry means a service is down — and usually explains why some panel function stopped responding.

13.4 Logs

SERVICE LOG (200)

tetra-hotspot (BS)

all

200

filter text

btn.refresh

☐ auto 5s

```

circuit_data=true sndcp=true
2026-08-11T18:28:40+02:00 TetraSpot chrt[43494]: INFO
circuit_data=true sndcp=true
2026-08-11T18:28:45+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:28:52+02:00 TetraSpot chrt[43494]: INFO
tx=1 rx=1 tx_dac=1 tx_mix=15 lna=4 pga=15 rx_mean=-49.8 rx_peak=-0.0 dBFS
2026-08-11T18:29:00+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:29:11+02:00 TetraSpot chrt[43494]: INFO
0/23] (ok/crc-err, cumulative)
2026-08-11T18:29:15+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:29:28+02:00 TetraSpot chrt[43494]: INFO
ahead=0 behind=35602 missing=0 resync=0 last_offset=836
2026-08-11T18:29:30+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:29:41+02:00 TetraSpot chrt[43494]: INFO
0/24] (ok/crc-err, cumulative)
2026-08-11T18:29:41+02:00 TetraSpot chrt[43494]: INFO
circuit_data=true sndcp=true
2026-08-11T18:29:41+02:00 TetraSpot chrt[43494]: INFO
circuit_data=true sndcp=true
2026-08-11T18:29:41+02:00 TetraSpot chrt[43494]: INFO
circuit_data=true sndcp=true
2026-08-11T18:29:46+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:29:52+02:00 TetraSpot chrt[43494]: INFO
tx=1 rx=1 tx_dac=1 tx_mix=15 lna=4 pga=15 rx_mean=-38.0 rx_peak=0.0 dBFS
2026-08-11T18:30:01+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:30:16+02:00 TetraSpot chrt[43494]: INFO
2026-08-11T18:30:27+02:00 TetraSpot chrt[43494]: INFO
ahead=0 behind=35610 missing=0 resync=0 last_offset=488
2026-08-11T18:30:31+02:00 TetraSpot chrt[43494]: INFO

```

[entities/umac] bs_sched.rs:1930:

[entities/umac] umac_bs.rs:1772:

[entities/phy] soapio.rs:1027:

[entities/umac] bs_sched.rs:373:

[entities/lmac] lmac_bs.rs:715:

[entities/umac] umac_bs.rs:1772:

[entities/phy] soapio.rs:688:

[entities/umac] bs_sched.rs:373:

[entities/lmac] lmac_bs.rs:715:

[entities/umac] bs_sched.rs:1930:

[entities/umac] bs_sched.rs:1930:

[entities/umac] bs_sched.rs:1930:

[entities/umac] umac_bs.rs:1772:

[entities/phy] soapio.rs:1027:

[entities/umac] bs_sched.rs:373:

[entities/umac] umac_bs.rs:1772:

[entities/phy] soapio_dev.rs:688:

[entities/umac] bs_sched.rs:373:

BNCH SYSINFO on air: advanced_link=true system_wide=true voice=true

UMAC DL RESOURCE ssi=2600824 aie=None enc_mode=0 ts=1 sdu_len=198

SX1255 health: 00=0f 08=1f 09=12 0a=7f 0b=07 0c=9e 0d=3b 0e=06 pa=1

D-NWRK-BROADCAST tx: network_time=0x92CA6610D7FF (sdu_len=82 bits)

UL-QUAL c=1600 ts=1 schf=0/11 schhu=211/38 stch=0/46 [b1 0/23 b2

UMAC DL RESOURCE ssi=2600824 aie=None enc_mode=0 ts=1 sdu_len=198

TX level: -12.0 dBFS | late=0 lead=2 | c1600: mod=44040 no_bits=0

D-NWRK-BROADCAST tx: network_time=0x92CA7510D7FF (sdu_len=82 bits)

UL-QUAL c=1600 ts=1 schf=0/11 schhu=212/38 stch=0/48 [b1 0/24 b2

BNCH SYSINFO on air: advanced_link=true system_wide=true voice=true

BNCH SYSINFO on air: advanced_link=true system_wide=true voice=true

BNCH SYSINFO on air: advanced_link=true system_wide=true voice=true

UMAC DL RESOURCE ssi=2600824 aie=None enc_mode=0 ts=1 sdu_len=198

SX1255 health: 00=0f 08=1f 09=12 0a=7f 0b=07 0c=9e 0d=3b 0e=06 pa=1

D-NWRK-BROADCAST tx: network_time=0x92CA8410D7FF (sdu_len=82 bits)

UMAC DL RESOURCE ssi=2600824 aie=None enc_mode=0 ts=1 sdu_len=198

TX level: -12.0 dBFS | late=0 lead=2 | c1600: mod=44041 no_bits=0

D-NWRK-BROADCAST tx: network_time=0x92CA9310D7FF (sdu_len=82 bits)

Live view of any service's log, with a text filter and auto-refresh. This is the first place to look when something misbehaves.

13.5 Settings

SETTINGS

Language: English

TETRA SPOT ISSI

Fallback caller ISSI used for inter-site calls and TetraPack bridge. Stored in Switch config.

260015

Save & Restart Switch

The **station ISSI** is the base station's own subscriber number. It appears as the caller for inter-station calls and when bridging outside. Changing it requires a restart of the central service.

LOG LEVEL

Switch (DXT)

info

Apply

info

BS (Hotspot)

info

Apply

info

Custom filter (e.g. info,tetra_entities::cmce=debug)

info,tetra_entities::cmce=debug

All

Apply

Log level decides how much detail reaches the logs. The default is fine for normal operation; raise it while chasing a fault.

CAUTION

Don't leave the log level raised permanently — logs grow quickly and load the station.

13.6 VPN

The same tab handles **VPN (WireGuard)**: key generation, installation, peer configuration and bringing the tunnel up. It lets you reach the panel of a station sitting behind a connection with no public address.

14. Service tools

14.1 Codeplug

1. CONNECTION

Scan USB for radiosProbeEnter flash mode

Mode	VID	PID	Product
no Motorola radios detected on USB			

Reads and backs up a Motorola radio's configuration over USB. A codeplug backup is about 16 MB (~30 s); the full memory is 1.5 GB (several minutes). Tag files with the radio's TEI and a note so you can tell them apart later.

CAUTION

Editing a codeplug from the panel **does not work yet** — read and backup only.

14.2 Radio Info

Odczyt informacji z radia TETRA przez interfejs PEI/IAT (USB). Tylko odczyt — nie zmienia trybu ani ustawień radia.

Port (auto-detekcja) ▼

Porty

Baud 9600 ▼

Odczytaj radio

Eksport TXT

Eksport JSON

Nie wykryto radia TETRA (USB). Możesz podać port ręcznie po odświeżeniu.

Reads a radio's identity, network, signal strength, security settings and group list over the cable. It is **read-only** and deliberately does not switch the radio's mode, so it is safe to use on a radio that is in service.

14.3 Air Monitor

TYPY BURSTÓW

Typ	Liczba
-----	--------

Shows what is happening on the air, using a radio as a measurement receiver. You see the most active groups and radios plus a breakdown of transmission types. Start and stop are explicit — enabling monitoring changes the radio's operating mode.

15. Troubleshooting

15.1 A radio won't register

The most commonly reported problem. Check **in this order** — most likely cause first:

1. **Is the radio on the whitelist.** Go to **Security** → **Auth control**. If **Whitelist mode** is on, only radios present in the **Terminals (Auth DB)** list and flagged **Allowed** can register. A radio that isn't on the list is refused even though it sees the station and has everything else right. Fix: add the radio (ISSI + name, *Allowed* ticked) or, while testing, turn whitelist mode off, which lets any radio in.
2. **Does the ISSI match.** The number in the radio's codeplug must be exactly the one on the terminals list.
3. **Does the radio have a Ki, if authentication is on.** With *Use Ki for authentication* enabled, a radio whose key doesn't match the one stored in the station **will not register**. This is also the usual cause of "the radio sees the station but keeps dropping" when *Mutual Authentication* is enabled in the codeplug.
4. **Do MCC / MNC / colour code / Location Area match** — the **TMO** tab. For our network: **MCC 901, MNC 9998**.
5. **Is the transmitter on** — **Radio TX** at the top of the panel must be **ON**.
6. **Is the signal getting through at all** — too little transmit gain produces "the radio sees the carrier but cannot register".

15.2 Check in this order (other faults)

1. **Power supply** — the *System* tab, *Power* card. Under-voltage and throttling look like a radio fault; see [section 13.2](#).
2. **Services status** — is everything answering.
3. **Logs** — the *System* tab, the relevant service.

15.3 Common symptoms

SYMPTOM	WHERE TO LOOK
Radio sees the carrier but won't register	whitelist, Ki key or too little gain — 15.1
Audio crackles, registrations fail	under-voltage or throttling — 13.2
Radio registered but nothing is heard	group split and the radio's group assignment
Other stations can't be heard	Hub — Interconnect , Poland Client card
Groups 91+ don't work	BrandMeister login on the same tab
Calls break up when data is running	too many timeslots given to packet data
A service is "not responding" after a restart	the others didn't come up — System → Services
Station struggles under load	power and temperature — System → Power

15.4 The governing principle

A restart is not a fix. If something needs restarting regularly to keep working, the problem is elsewhere — and that is where it needs finding.