AIRSOFTMAPS // MESHTASTIC PROTOCOL

ENCRYPTED LORA MESH DEPLOYMENT, GNSS TELEMETRY & SQUAD TACTICAL LINK

MILSIM OPERATIONAL READY

DOC REF: MAN-MESH-V2.22-EN

1. T-Echo Node (868 MHz) — Quectel L76K GNSS + SX1262 → **2. Bluetooth LE (GATT)** — Web BLE Binary Subscription → **3. Bluefy (iOS) / Chrome (Android)** — Device Mounted on Tactical Vest → **4. AirsoftMaps PWA** — Topographic 1:25k IGN + Satellite

PHASE 01 — Private Network Setup & Precision Unlock (Channels)

`Meshtastic App ➔ Settings (⚙) ➔ Channels ➔ Channel 0 (Primary)`

CHANNEL NAME

Squad Identifier (e.g. GHOST)

Common tactical callsign grouping all teammates onto the same LoRa radio mesh.

MILITARY ENCRYPTION (CRITICAL)

AES-256 (or 128-bit) + Regenerate Key

Switch "Default" to 256 bits and tap the circular key icon to replace public key `AQ==`.

⚠️ **CRITICAL IMPACT ON iOS / PRIVACY LOCATION BLUR:**
If the factory default public key (`AQ==`) is retained, iOS and the Meshtastic protocol treat the channel as an open public network and **forcefully degrade GPS accuracy to a minimum 700-meter radius** for privacy reasons. Generating a private **AES-256** key completely bypasses this limitation, unlocking exact tactical precision at 0 meters offset.

- ✓ **Exact Location:** In the channel's *Position* section, make sure **Position Enabled** is `ON` and disable **Approximate Location** (or slide the tolerance slider all the way to 0 meters).
- ✓ **Save & Reboot:** Tap **Save** and wait a few seconds for the node to apply cryptography and reboot its radio stack.

PHASE 02 — Milsim GPS Engine Tuning (Position)

`Meshtastic App ➔ Settings (⚙) ➔ Position`

TACTICAL PARAMETER	CONFIGURED VALUE	OPERATIONAL PURPOSE IN MILSIM & FIELD COMBAT
GPS Mode	`ENABLED`	Forces exclusive use of the T-Echo's internal Quectel L76K GNSS receiver, isolating telemetry from smartphone power-saving OS kills when screen is off.
Smart Position	`ON` (Min Distance: **10 meters**)	**Bypasses the 1-hour Broadcast Interval limit.** Saves battery and RF spectrum while static; fires an instant transmission the moment you move 10 real meters.
GPS Attempt Time	`15 to 20 seconds`	Guarantees satellite lock and continuous recalculation under thick forest canopies, ravines, and trenches.
Position Flags	`Altitude + Sats in View + PDOP`	Feeds AirsoftMaps quality filters to discard multipath reflection errors and display accurate MSL elevation.

PHASE 03 — Radio Stability & Bluetooth Link (Device & LoRa)

`Meshtastic App ➔ Settings (⚙) ➔ Device / LoRa`

DEVICE ROLE

CLIENT strictly

The only role that maintains Bluetooth LE active continuously to communicate with AirsoftMaps.

MODEM PRESET (LORA)

Long Range - Fast (LongFast)

Optimal balance between mountain foliage penetration (868 MHz) and transmission rate. (ShortFast optional for CQB).

⛔ **CRITICAL COMPATIBILITY WARNING (Firmware v2.7.10+):**
NEVER set the role to `TRACKER` or `SENSOR` if the node is linked to a smartphone. In these firmware versions, those roles shut down Bluetooth LE after boot to save battery, permanently severing data communications with AirsoftMaps.

PHASE 04 Instant Squad Cloning (QR Code Deployment)

`Meshtastic App ➔ Channels Tab ➔ Share (QR Code / URL)`

To synchronize your entire squad in under 30 seconds without manual passcode entry:

STEP 1: GENERATE QR (SQUAD LEADER)
In the *Channels* tab of your Meshtastic app, tap the Share or QR icon. Make sure to select **"Replace Channels"**.

STEP 2: SCAN (SQUAD TEAMMATES)
Teammates open Meshtastic and scan your QR code. In 1 second they inherit channel name, AES-256 key, and 0m precision.

💡 **Quick Check on Teammate Nodes:** After scanning, teammates simply verify in their *Position* menu that **Smart Position** is active at **10 meters**.

PHASE 05 Field Connection & Verification (AirsoftMaps PWA)

`https://airsoftmaps.es ➔ Settings Menu (🛠️ / 📡) ➔ Connect Radio`

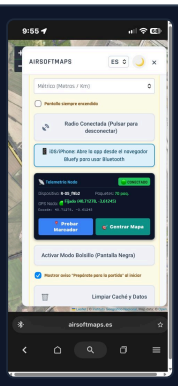
ON IOS (IPHONE / IPAD)
Bluefy Browser (App Store)
Mandatory on iOS to enable native Web Bluetooth with the tactical node in your vest.

ON ANDROID
Google Chrome / Installed PWA
Direct Web Bluetooth support with full hardware graphics acceleration.

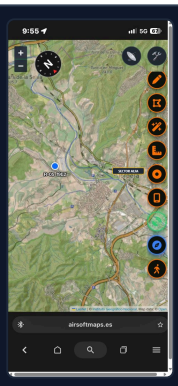
Bluetooth Isolation: Before tapping "Connect Radio" in AirsoftMaps, ensure the official Meshtastic app is closed in background to prevent BLE GATT connection conflicts.

On-Screen Telemetry Confirmation (AirsoftMaps UI):

```
📡 Node Telemetry                                   CONNECTED
Device: R-05_f9b2                    Packets: 70 pkts (Incrementing)
Node GPS: 🟢 Fixed (40.71278, -3.61245)
```



1. Linked Telemetry with Satellite Lock (5 Decimals)



2. R-05 Tactical Marker Placed on IGN Topographic Layer

✓ **Center on Map:** Tap the green **"Center Map"** button on the telemetry card. Close the modal and confirm your squad marker (e.g. `R-05_f9b2`) appears pinned with millimeter precision over the IGN topographic or PNOA satellite layer.

CHECK Pocket Diagnostics Protocol & Hardware Safety

`Quick Field Resolution in Operations Zone`

⚠️ SMA ANTENNA GOLDEN RULE
Never power on the T-Echo without the 868 MHz antenna screwed in. Reflected RF power destroys the Semtech SX1262 power amplifier in milliseconds.

🛰️ "NO GPS LOCK" ON BOOT
No satellite signal indoors or under concrete. In open terrain, the T-Echo takes 45 to 90 seconds for a cold satellite fix.

🔄 BLUETOOTH NOT DETECTED IN BLUEFY
If the node does not show up during scan, click the Reset button (Button 1) on the T-Echo once, or tap "Forget this device" in iOS Bluetooth settings.

🛡️ E-PAPER SCREEN PROTECTION
E-ink glass substrate is ultra-thin. Carry the node in a closed pouch or with a polycarbonate screen protector against BB impacts.