

GroupTrack

User Guide — Version 2.4

March 2026 | Android | For Authorized Testers

GroupTrack is a custom Android app for coordinating multi-vehicle group rides without cellular or internet connectivity. It uses Meshtastic mesh radio hardware to share GPS positions between all vehicles in real time. No phone signal required. No server. No manual radio configuration.

1. USER ROLES

ROLE	DESCRIPTION
ORGANIZER	Creates rides, configures radios, distributes ride configs. Has access to developer settings panel via long press on GroupTrack header.
RIDER	Receives ride config, imports it, connects radio, applies config automatically. Standard user role.

2. SPLASH SCREEN

When GroupTrack launches for the first time or after restart, a branded splash screen displays while the app initializes and waits for mesh nodes. The splash shows the GroupTrack logo, UTV desert background, developer credit, and website. It automatically dismisses when the first mesh node is detected or after a brief initialization period.

3. MAIN MAP SCREEN

The main screen shows a live map with all convoy vehicles plotted as labeled markers. This is the primary operational screen during a ride.

ELEMENT	DESCRIPTION
GroupTrack Header	Tap to open the GroupTrack submenu. Long press to access developer settings (organizer only, password required).
RECORD Button	Top-left red dot. Tap to start GPS track recording. Tap again to access pause/stop options.
Map Settings Panel	Top-right panel showing MAP + current source (e.g. MAP SAT) with ONLINE/LOCAL indicator. Tap to expand layer, zoom, search, and offline controls.
Node Markers	Each vehicle shown as a labeled circle. Your cart is larger. Tap any marker to open NODE detail panel.
HUD Overlay	Transparent info panel over the map. Shows convoy or cart stats depending on mode selected.
Button Bar	Fixed bar at bottom: GROUP MY CART HIDE GEAR
Download Progress Chip	Appears above button bar during tile download. Shows tile count, progress, and time remaining.

NOTE: MAP TYPES: SAT = Esri satellite imagery. HYB = Google satellite + roads hybrid. TOPO = Esri topographic with terrain. RD = Carto road map with points of interest.

4. BUTTON BAR

BUTTON	DESCRIPTION
GROUP	Shows convoy-wide HUD: all carts, span, lead, tail, active/lost count, channel utilization, GPS interval slider.
MY CART	Shows your vehicle's individual stats: speed, heading, battery, altitude, distance to lead/tail. Also contains lead lock override buttons.
HIDE	Hides the HUD — map-only view.
GEAR (⚙️)	Opens map settings: map type, zoom controls, search, offline maps, download region.

5. GROUP HUD PANEL

The GROUP HUD displays convoy-wide statistics as a transparent overlay on the left side of the map.

FIELD	DESCRIPTION
Ride Title	Name of the active ride.
UNITS	Total number of cart nodes on the mesh.
ACTIVE	Vehicles heard recently.
LOST	Vehicles that have gone silent.
LEAD	Callsign of the frontmost vehicle (green). After 1/4 mile of movement, the lead is locked and displayed as LEAD LOCKED. Tap RECALC LEAD in MY CART to reassign.
TAIL	Callsign of the rearmost vehicle (orange). Always derived dynamically.
SPAN	Distance in miles from LEAD to TAIL.
CH%	Channel utilization percentage from radio telemetry. Green <25%, Amber 25-40%, Red >40%.
INT Slider	GPS broadcast interval slider (2-8 seconds). Vertical slider on left side of HUD.

6. MY CART HUD PANEL

FIELD	DESCRIPTION
Callsign	Your convoy callsign.
SPD	Current speed in mph.
HDG	Heading in degrees (0-359).
BAT	Radio battery percentage.
ALT	Altitude in feet.

AHEAD / BEHIND	Distance to nearest vehicles ahead and behind you in the convoy.
TO LEAD / TO TAIL	Distance to front and back of the convoy.
I AM LEAD	Immediately designates your cart as the lead vehicle for the remainder of the ride. No distance accumulation required. Use when you are starting at the front and want instant lock.
RECALC LEAD	Unlocks the current lead assignment. The algorithm runs freely for 1/4 mile of movement, then re-locks to the new lead. Use if the wrong cart was locked as lead, or after a re-staging.

7. NODE HUD — INDIVIDUAL CART DETAIL

Tap any cart marker on the map to open the NODE detail panel for that vehicle.

FIELD	DESCRIPTION
Cart Name	Convoy callsign of the selected cart.
Status	ACTIVE, SIGNAL DROP, or LOST.
SPD / HDG / BAT / ALT	Speed, heading, battery, altitude of the selected cart.
SNR	Signal quality of the last received radio packet.
Position in convoy	Order position, e.g. 3 of 8.
Last seen	Time since last position packet.
RETURN	Returns to full convoy view.
SET AS LEAD	Immediately designates this cart as the lead vehicle. Lock applies instantly — no distance needed. Use as an emergency override if lead oscillation occurs.
REMOVE FROM RIDE	Removes cart from active ride roster.

8. MAP SETTINGS PANEL

Tap the map panel header (top right, showing MAP + source name) to expand the full settings panel. The header always shows the current tile source and ONLINE/LOCAL status.

8.1 Layer Selection

Four tile source buttons: SAT | HYB | TOPO | RD. Tap to switch. The active source is highlighted blue. Switching to an online source sets the indicator to ONLINE. Switching to offline mode serves tiles from local cache.

8.2 Download Zoom

Slider controlling the maximum zoom level for tile downloads. Range z16-z18. Higher zoom = more detail but more tiles and larger storage.

8.3 Fly Radius

Slider controlling how close the map zooms when flying to a search result. Range 1-10 miles. 10 miles gives a regional view for selecting a download zone. 1 mile gives a tight trail-level view.

8.4 Online / Offline Switch

Toggle between ONLINE (streaming tiles from internet) and LOCAL (serving tiles from device storage). Set to LOCAL before heading into the field. Set to ONLINE when back in connectivity.

NOTE: The ONLINE/LOCAL indicator in the map header always reflects the current switch state: green = ONLINE, blue = LOCAL.

8.5 Location Search

Search for a named area before downloading map tiles. Type a location name (city, park, trail system, or region) and tap FIND AREA. The map flies to the search result and stays there — it will not snap back to your cart position while the search result is displayed.

STEP	DESCRIPTION
1. Type location	Enter city, park name, or trail area. Examples: Zion National Park UT, Gooseberry Mesa, Leeds UT.
2. Tap FIND AREA	Geocoder searches for matching locations. Returns up to 5 results.
3. Select result	If multiple results, tap the correct one from the list. Single results fly directly.
4. Map flies to center	Map zooms to the search result center. A blue pin marks the location. Crosshair lines show lat/lon reference. Map stays at this location.
5. Zoom and explore	Use pinch-to-zoom to explore trails. The map will not snap back. Touch anywhere on the map to freely pan.
6. Tap DOWNLOAD REGION	Activates the rectangle draw tool. Draw your download area over the search result.

NOTE: If the geocoder cannot find your location, try adding the state abbreviation (e.g. 'Sand Hollow UT'). For precise locations, raw coordinates are supported: 37.44, -113.25.

8.6 Download Region

Tap DOWNLOAD REGION to activate the rectangle draw tool on the map. Draw a box over the area you want to cache for offline use. When you release, a size estimation dialog appears.

DIALOG ELEMENT	DESCRIPTION
Dimensions	Area width x height in miles (e.g. 3.2 mi x 2.1 mi).
Tile count	Number of tiles to download across all zoom levels.
Estimated size	Storage estimate in MB based on average tile size.
Source	Which tile layer will be downloaded (e.g. Source: SAT).
DOWNLOAD button	Starts the download. Gear panel closes. Toast notification confirms download started.
CANCEL button	Cancels without downloading.

500MB ceiling	If estimated size exceeds 500MB, the download is blocked. Reduce the selected area and try again.
----------------------	---

8.7 Download Progress

During download, a progress chip appears above the button bar showing tile count (X of Y tiles) and estimated time remaining. The gear panel closes — you can continue using the map while tiles download.

NOTE: Keep app open during download. Background download is not yet supported — closing the app will stop the download. Resume is automatic — tiles already on disk are skipped if you restart a download over the same area.

8.8 Show / Hide Downloaded Areas

The SHOW DOWNLOADED button in the map settings panel displays a blue overlay on the map showing all areas where offline tiles have been downloaded. Use this to identify coverage gaps before heading into the field.

NOTE: The overlay is computed at zoom level 14 for performance. Each blue rectangle represents approximately a 2.5 square mile area. For precise field-level coverage, zoom in past zoom 16 with offline mode active to confirm tile rendering directly.

9. CONVOY SETTINGS

Convoy settings control how GroupTrack tracks the convoy, records the route, and identifies the lead vehicle. These settings are designed around two primary use cases: motorcycle group rides and SXS / UTV convoy rides. Choosing the right combination of settings significantly affects map track clarity and situational awareness.

9.1 Lead Lock

GroupTrack automatically identifies the lead cart by analyzing each vehicle's position in the convoy order. On straight sections this works perfectly. On switchbacks and tight turns at slow speed, position relationships temporarily shift and the algorithm can oscillate between carts, producing spaghetti track lines.

Lead Lock solves this by freezing the lead assignment after the convoy has physically sorted itself into a stable order. The lock fires automatically after 1/4 mile of movement from the RECORD button press — by that distance the convoy is strung out and the lead is clearly established.

BEHAVIOR	DESCRIPTION
Auto-lock after 1/4 mile	After 1/4 mile of movement from RECORD, the lead is locked to whoever the algorithm identified as lead at that point. Lock holds for the entire ride.
LEAD_LOCK_DISTANCE_MILES	Tunable constant in ConvoyConfig.kt. Default: 0.25 miles. Can be adjusted by the organizer for different ride types without a code change.
Lock persists all ride	Once locked, the lead cart does not change regardless of position oscillation. The track line draws from one cart consistently.
SET AS LEAD override	Tap any cart marker on the map, then tap SET AS LEAD in the NODE panel. Immediate lock to that cart. No distance required.
I AM LEAD override	In MY CART panel. Immediately designates your own cart as lead. Use when you are staging at the front and want lead locked before departure.

RECALC LEAD	In MY CART panel. Unlocks the current lead, resets the distance accumulator to zero, and re-locks after another 1/4 mile of movement. Use if the wrong cart was locked, or after a re-staging.
--------------------	--

9.2 Track Recording Mode — Choosing the Right Setting

GroupTrack records GPS track lines during a ride. The Track Recording Mode controls which vehicles draw track lines and what colors are used. Choosing the right mode for your ride type dramatically affects the usefulness of the recorded track.

TRACK ALL (Recommended for Motorcycle Group Rides)

Every cart in the convoy draws its own track line on the map in a distinct color. Each rider's path is individually visible. This is ideal for motorcycle group rides where individual lines, spread, and lateral positioning are meaningful data.

CHARACTERISTIC	DETAIL
Track lines	All carts — each in a distinct assigned color.
Best for	Motorcycle group rides, bicycle groups, any ride where individual paths matter.
Map result	Multiple colored lines showing each rider's exact path. Spread and lateral position visible at a glance.
On tight trails	Multiple colored lines may overlap on single-track sections. This is expected — it shows all riders followed the same line.
Setting	GROUP HUD: Track Mode = ALL CARTS. Multicolor enabled.

LEAD ONLY with Black Track (Recommended for SXS / UTV Convoy Rides)

Only the lead cart draws a track line, in solid black. All other carts follow the lead and do not draw independent lines. This produces a single clean authoritative track — the route the convoy actually traveled. This is the recommended mode for SXS, UTV, and truck convoys where all vehicles follow the same trail and individual lines add visual clutter without informational value.

CHARACTERISTIC	DETAIL
Track lines	Lead cart only — solid black line.
Best for	SXS, UTV, truck, and off-road vehicle convoys where all carts follow the same trail.
Map result	Single clean black track showing the convoy's route. No visual clutter.
Lead Lock importance	Lead Lock is especially important in this mode. If lead oscillates before locking, spaghetti lines appear in the first 1/4 mile. After lock, the track is clean for the entire ride.
Setting	GROUP HUD: Track Mode = LEAD ONLY. Multicolor disabled (black track).

NOTE: For the cleanest SXS convoy track: use LEAD ONLY mode with black track, enable Lead Lock, and tap I AM LEAD in MY CART before departure to lock the lead immediately without waiting for 1/4 mile accumulation.

9.3 Convoy Settings Summary — Quick Reference

SETTING	RECOMMENDED VALUE	EFFECT
Track Mode — Motorcycles	ALL CARTS	Every rider's path drawn in individual color. Full route spread visible.
Track Mode — SXS / UTV	LEAD ONLY	Single clean black track from lead cart. No clutter. Best for single-file trail riding.
Multicolor Track	ON for motorcycles / OFF for SXS	ON assigns distinct colors per cart. OFF uses solid black for all tracks.
Lead Lock Distance	0.25 miles (default)	Tunable. Lock fires after this distance from RECORD. Shorter = faster lock but less time for convoy to sort. Longer = more stable sort but more potential spaghetti.
I AM LEAD	Tap before departure	Bypasses distance accumulation. Immediate lock to self. Recommended when lead position is known before departure.

10. GROUPTRACK MENU

Tap the GroupTrack header at the top of the map to open the submenu. This is the main navigation hub for ride management and radio configuration.

ITEM	DESCRIPTION
Create a Ride	Create a new ride with name, date, and auto-generated encrypted channel. Organizer only.
Transfer Event/Ride Details via Email	Select a ride and send to riders as a .convoy email attachment.
Apply Ride Info to Radio	Configure the connected radio for MASTER baseline or a specific ride.
Restore Prior Config Post Ride	Select and restore a saved radio backup from the archive list.

11. APPLY RIDE INFO TO RADIO

GroupTrack menu → EVENT / RIDE → Apply Ride Info to Radio. Configures the connected radio for use in a convoy.

MODE	DESCRIPTION
MASTER	Resets radio to GroupTrack baseline: US region, LONG_FAST, 903 MHz (channel 5), 60s GPS, Convoy channel, AES-256 master key.
RIDE	Applies master baseline plus the selected ride's unique channel name and AES-256 encryption key.

NOTE: V2.4: Channel name, encryption key, and all 38 config fields travel in a single binary install. One reboot. No second stage required. Total process takes approximately 90 seconds.

12. GPS TRACK RECORDING

ACTION	DESCRIPTION
Start Recording	Tap the red RECORD dot (top left of map). Recording begins immediately. Lead lock distance accumulation begins.
Pause Recording	Tap RECORD while recording — select PAUSE from the menu.
Stop and Save	Tap RECORD while recording — select STOP. File save dialog appears. Name your track file.
Track File Format	GPX format. Saved to device storage. Can be imported into mapping apps.

13. TROUBLESHOOTING

PROBLEM	SOLUTION
No vehicles on map	Check radio is connected (green status). Verify all radios use same channel name and PSK. Run Verify Config to confirm.
Yellow lock icon on radio	Encryption not active. Run Apply Radio again — complete the full process.
Spaghetti track lines	Lead oscillating before lock. Use I AM LEAD before departure for instant lock. Or increase LEAD_LOCK_DISTANCE_MILES if 1/4 mile is insufficient for your convoy.
Wrong cart locked as lead	Tap RECALC LEAD in MY CART panel. Algorithm re-runs for 1/4 mile and re-locks. Or tap the correct cart marker and use SET AS LEAD for immediate override.
Map snaps back after zoom	Tap GROUP or MY CART button to re-center intentionally. Any touch on the map disables auto-pan until you press GROUP or MY CART again.
Map snaps back after search	Fixed in V2.4. Map stays at search result. If still occurring, tap the search result again.
Map tiles not loading online	Check ONLINE/LOCAL switch in map settings. If ONLINE, check WiFi or cell data.
Map shows blank tiles offline	No tiles downloaded for this area or zoom level. Use SHOW DOWNLOADED in map settings to see coverage. Return to connectivity and download tiles before going offline.
Download blocked — too large	Area exceeds 500MB ceiling. Reduce the selected rectangle and try again.
Location search no results	Add state abbreviation (e.g. 'Zion UT'). For precise locations use coordinates: 37.44, -113.25.
Bluetooth disconnects	Set GroupTrack battery to Unrestricted. Settings > Apps > GroupTrack > Battery > Unrestricted.