ChainLynx Bikepacking App – Integrations: Garmin, Wahoo, and Head Units

Pre-Release Technical Documentation — November 2025

1. Overview
This document outlines the integration strategy for GPS head units and satellite trackers within the ChainLynx Bikepacking App. The goal is to enable seamless GPX sync, route activation, and live position sharing while preserving user privacy and offline-first operation.

2. Objectives and Principles
Objectives:
• Provide reliable route sync (to and from devices).
• Enable live location sharing via supported platforms.
• Preserve privacy by minimizing stored personal data.
• Support offline-first workflows with background sync on reconnect.

Principles:
• User consent and control for all external links.
• OAuth-based authentication with least-privilege scopes.
• Clear separation between personal device data and community-shared content.

3. Garmin Integrations
Scope: Two integration paths are planned: Garmin Connect (route sync to Edge head units) and Garmin inReach (MapShare position updates for satellite tracking).

Garmin Connect (Routes):
• Feature: Push ChainLynx routes to Garmin Edge devices via Garmin Connect.
• Authentication: OAuth-based linking to the user's Garmin account.
• Workflow: User selects "Send to Garmin"; backend registers the route and pushes a sync job; user syncs via Garmin Connect.
• Data Types: GPX/TCX, route metadata (name, distance, elevation).
• Status: Planned integration, subject to Garmin developer program approval.

Garmin inReach (MapShare):
• Feature: Import periodic position updates from MapShare to visualize rider location along an active route.
• Authentication: User links their MapShare feed through secure token exchange.
• Workflow: Background polling (low frequency) fetches position updates and displays them to authorized viewers (meetup group or route peers).
• Privacy: Ephemeral display only; no long-term storage of historical tracks.
• Status: Planned future functionality (in development).

4. Wahoo Integrations
Wahoo ELEMNT (Routes):
• Feature: Sync ChainLynx routes to Wahoo head units through the Wahoo Cloud API.
• Authentication: OAuth with user consent (scopes limited to route management).
• Workflow: User chooses "Send to Wahoo"; backend publishes route; device pulls on next

sync.
• Data Types: GPX/FIT, route metadata and cues where supported.
• Status: Planned integration pending Wahoo partner access.

5. Generic Head Units and File Export

Direct Export: For devices without official APIs, ChainLynx supports GPX file export via secure download and USB/Bluetooth transfer where available.

QR and Deep Links (Future): Provide shareable route links or QR codes for quick import on supported companion apps.

6. Privacy and Security

Data Handling:
• OAuth tokens are encrypted at rest and refreshed securely.
• Only minimal device metadata is stored (device type, nickname).
• No health/biometric data is requested or stored.
• All transfers use TLS 1.3.

User Control:
• Users can disconnect integrations at any time, which revokes tokens and deletes cached device links.
• Visibility controls determine who can see live positions (meetup, route peers, or private).

7. Offline-First Behavior

Routes and position updates queue locally when offline. On reconnection, the app syncs any pending route pushes and fetches new device updates with rate limiting to preserve battery and bandwidth.

8. Developer Notes and Roadmap

Developer Program Requirements: Garmin and Wahoo integrations require partner approval and adherence to their API policies. Early planning should include sandbox testing and compliance checks.

Milestones:
• M1 — Implement export + manual import for all devices.
• M2 — Add Wahoo route push (pending partner access).
• M3 — Add Garmin Connect route push (pending partner access).
• M4 — Add Garmin inReach MapShare link (planned, after API approval).
• M5 — Developer documentation and user onboarding for integrations.

Recommendation: Start with universal GPX export and manual import for immediate utility. Layer in Wahoo and Garmin integrations as partner approvals are granted to deliver a seamless experience.