GrizzOS → Atlas / ResponderOS — Full PRD & Technical Specification (Gemini 2.5 Pro)

Revision 1.0 — 2025■10■16 — America/Chicago

Stakeholders: Grizz (Founder), H.U.G.H. (HA Orchestrator), Atlas (Nav), Helicarrier (Cloud Bridge). Default model Gemini 2.5 Pro; adapters for OpenRouter/local.

1. Purpose & Context

Build a self■sovereign, safety■critical navigation and situational awareness layer inside GrizzOS, with a future path to ResponderOS. Gemini 2.5 Pro provides reasoning; Helicarrier mediates ethical access to cloud AI. Atlas targets zero■crowd hiking discovery and disabled■aware urban parking, under Fury Protocol.

2. Goals & Non■Goals

Goals: Model■agnostic reasoning; zero■crowd discovery & legal access; mobility■aware parking; family tracking & rejoin; cloud vision w/ local control; full voice; strict ledgers. **Non■Goals:** Covert identity tracking; owner PII exposure; silent iMessage/Safari automation beyond Intents.

3. Personas & Scenarios

Grizz; Partner (zero crowds); Teen (silent geofence); Responder (authorized SAR). Scenarios: placard parking; quiet hike in new region; rejoin family; cliff hazard; Button/Fury.

4. System Architecture Overview

[Device] watchOS • iPhone • LokiCam • ESP32 BLE nodes → [H.U.G.H.] MQTT+ACL → [Helicarrier] proxy+policy+LLM adapters → [Cloud] Gemini tools, vision workers, terrain/ownership services, Swivel metadata store.

5. Dataflows (Edge■Cloud)

Voice: Watch mic → Deepgram → transcript → Gemini intent → H.U.G.H./Atlas actions. Vision: WebRTC/RTSP → GPU → result objects → devices. BLE hits → fusion → alerts.

6. Model Orchestration (Gemini + Tools)

Tools: mapbox_search, parcels_lookup, parking_rules, convex_memory, home_assistant_event, perception.query. Function■calling style outputs canonical JSON actions.

7. Functional Requirements (FR■1…FR■12)

- FR■1 Urban Navigation; FR■2 Off■Beat Discovery; FR■3 Ownership Overlay; FR■4 Platforms; FR■5 Model Agnosticism; FR■6 Memory & Context; FR■7 Offline; FR■8 Silent Geofences & Rejoin; FR■9 AR■Style Guidance; FR■10 Terrain Hazard Foresight; FR■11 RogerRoger; FR■12 Swivel.

8. Voice Control Pipeline

PTT/Hotword; Deepgram WS (VAD, interim/final); Gemini interpretCommand; ActionExecutor; Barge■in; watch TTS/haptics. Latency targets: interim <400ms, final <1.2s.

9. Navigation Intelligence (Urban + Off■Beat)

Urban: placard■aware parking, dynamic pricing, time limits. Off■Beat: zero■crowd via sparse POIs/review cadence/lot proxy/cams; legal trailheads/easements only.

10. Ownership Overlay & Legal Access

Parcel sources: county/state cadastre, BLM/USFS/state parks, OSM tags. UI color classes; alerts on private crossings; cache tiles with provenance.

11. Terrain Hazard Foresight

DEM/contours/Terrain■RGB for slope ahead; drop■off detection; micro■reroutes. Acceptance: >45° drop within 15 m triggers watch alert.

12. Camera/OSINT/LokiCam/Glasses Integration

RTSP/ONVIF/WebRTC; lawful OSINT cams; BLE/SoftAP/ONVIF provisioning; cloud GPU inference; Convex stores metadata; privacy quick■off.

13. Family Tracking, Silent Geofences, Rejoin

HA Companion positions; server■side silent geofences; guardian■visible events; rejoin routing; AR arrow guidance.

14. BLE■as■Radar / Proximity Detection

Passive scans; AoA when available; cluster/fuse; correlate with Swivel camera; detection■only default; raw hits auto■expire <24h.

15. Fury Protocol (Ethical Gate) incl. Implied Consent

FuryGate checks context/authority/proportionality; ledger entries with consent ('explicit'|'implied'); post■event reconciliation.

16. RogerRoger (Priority Comms)

Headers x■rr■priority (FLASH|PRIORITY|ROUTINE), x■rr■ack, x■rr■preempt; MQTT control; WebRTC data bursts; HLS media bridge.

17. Swivel (Perceptual Memory)

perceptual_log schema; perception.query; async analyzers back■fill hazard/parking; provenance and hashes.

18. Helicarrier Network & H.U.G.H. Bus

Helicarrier mediates cloud calls w/ intent packets + policy; H.U.G.H. enforces ACLs; envelopes include consent & JWS signatures.

19. Security, Privacy, Compliance

mTLS, JWT/JWS, ACLs; consent scopes (local■first, metadata■only, forensic); parental oversight documented; audit exports.

20. Caching, Offline, Failure Modes

Cache tiles/layers/trailheads; degrade gracefully; reason codes: DATA_STALE_14D, INFERENCE_UNAVAILABLE, OWNERSHIP_CONFLICT.

21. Data Schemas (Convex)

spots, routes, prefs, ownership_cache, events, perceptual_log, ble_hits, ble_tracks, fury_ledger — as defined.

22. APIs & Tool Schemas (AI Studio)

mapbox_search, parcels_lookup, parking_rules, convex_memory, home_assistant_event, perception.query — JSON signatures.

23. Platform Specs (iOS, watchOS, CarPlay)

watchOS PTT/haptics/AR■arrow; iOS WebKit wrapper + Intents/Shortcuts; CarPlay templates; required permissions list.

24. Observability & Decision Ledger

Per■action decision ledger: sources, scores, weights, ownership checks, timestamps; exportable JSON.

25. Performance Targets & Test Plan

STT interim <400ms; final <1.2s; vision <600ms; rejoin update ≤300ms; unit/integration/field/soak tests.

26. Release Plan (M1→M4)

M1 watchOS+CarPlay MVP; M2 Off■Beat+PPAI+offline; M3 HA pack+terrain+BLE alpha; M4 local model adapter + camera expansions.

27. Appendices (Schemas & Examples)

MQTT topics; example vision result; reason codes; sample envelopes; acceptance criteria excerpts.