



Functional Requirements Document (The Technical Blueprint)

Title: *Technical Specifications for the BeaconMatch Protocol v1.0*

1. System Overview BeaconMatch is a local-first, decentralized orchestration platform. The technical objective is to facilitate the exchange of JSON-based "Need/Skill" packets between mobile devices without an active internet connection (GPRS/LTE/5G or Wi-Fi).

2. Connectivity Layer (The Mesh)

- **Protocol:** Bluetooth Low Energy (BLE) and Wi-Fi Direct.
- **Networking Logic:** Peer-to-Peer (P2P) "Store-and-Forward" architecture.
- **Range Target:** Minimum 50m–100m per hop; multi-hop propagation to cover a 1km radius within a dense neighbourhood.
- **Security:** AES-256 end-to-end encryption for all mesh-transmitted identifiers.

3. Power Stewardship (The Pulse)

- **Duty Cycle:** Radios must remain in "Deep Sleep" for 95% of operation.
- **Sync Window:** Automatic "Wake" every 300 seconds (5 minutes) for a 15-second discovery and synchronization window.
- **Battery Thresholds:** Forced "Emergency Only" mode if device battery falls below 15%.

4. Offline Navigation Logic

- **Input:** Real-time GPS coordinates (via NMEA data from the phone's internal receiver).
- **Output:** Static Bearing/Azimuth calculation.
- **Interface:** A "Directional Needle" (Compass) UI that provides a straight-line vector to the target coordinate without requiring map tiles.

5. Verification Handshake

- **Mechanism:** Local QR Code generation (Base64 encoded string).
- **Validation:** Rescuer must scan the Requester's QR code to "Close" the mission. This status update is then broadcast back to the mesh to remove the card from other users' stacks.

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