



White Paper: The BeaconMatch Framework

Subtitle: *Optimizing the "Golden Hour" via Decentralized, Mesh-Networked Resource Orchestration in Disaster-Induced Communication Blackouts.*

Author: Sohaib Khan

Field: Public Health & Emergency Preparedness

Date: January 2026

License: Creative Commons Attribution-Non-commercial 4.0 International (CC BY-NC 4.0)

I. Abstract

In the immediate aftermath of rapid-onset disasters (seismic events, flash floods, or wildfires), the total failure of centralized communication infrastructure creates an "Information Blackout." This period, often lasting 48 to 72 hours, is characterized by high mortality rates due to the inability to match localized medical needs with available community resources. This paper proposes **BeaconMatch**, a decentralized framework utilizing Bluetooth Low Energy (BLE) mesh networking and a low-cognitive-load "Matching" interface. By shifting the disaster response paradigm from "Top-Down" to "Peer-to-Peer," BeaconMatch empowers community resilience, reduces the burden on professional first responders, and provides a scalable digital infrastructure for public health preservation in grid-down scenarios.

II. Introduction: The Information Gap in Public Health

Traditional humanitarian response models assume a functioning "Last Mile" of communication. However, real-world data from events like the 2023 Turkey-Syria earthquake show that when the grid fails, survivors become "data-invisible."

The public health impact of this invisibility is two-fold:

"Licensed under CC BY-NC 4.0. Attribution required. Non-commercial use only."

1. **Inefficient Triage:** Critical resources (e.g., oxygen, clean water, trauma kits) remain stagnant in one household while a neighbor 200 meters away suffers a preventable death.
 2. **Cognitive Overload:** Survivors in high-stress states cannot navigate complex emergency systems.
-

III. The BeaconMatch Architecture

A. Decentralized Connectivity (The Mesh)

BeaconMatch bypasses the need for cellular towers and internet gateways. By utilizing the **Store-and-Forward** protocol, every smartphone becomes a "node." A request for help "hops" from phone to phone until it finds a match or reaches a rescue team.

B. The "Swipe-for-Impact" UI

To address the neurological effects of trauma—which can reduce fine motor skills and complex decision-making—BeaconMatch employs a **Binary Interaction Model** (inspired by Tinder).

- **The Requester:** Broadcasts a "Need Card" (Medical, Extraction, Supplies).
- **The Provider:** Views a "Mission Stack" and swipes to commit. This reduces the time-to-action from minutes to seconds.

C. The "Pulse" Battery Stewardship

A critical constraint in public health tech is device longevity. BeaconMatch utilizes a **Synchronized Duty Cycle (The Pulse)**. Radios activate for 15-second windows every 5 minutes to sync data, extending the survivability of a standard smartphone battery to 72+ hours.

IV. Public Health Outcomes & Impact

1. Reduction in Preventable Mortality

By facilitating the "Handshake" between a neighbor with a first-aid kit and a victim with a haemorrhage, BeaconMatch optimizes the "Golden Hour," directly reducing mortality rates before professional NGOs can penetrate the disaster zone.

2. Epidemiological Mapping

As the mesh network syncs, it creates a "Health Heatmap." When professional agencies (WHO/UNDRR) eventually arrive, they can "download" the mesh history, gaining an instant map of disease clusters, injury density, and resource depletion.

"Licensed under CC BY-NC 4.0. Attribution required. Non-commercial use only."

3. Community Psychosocial Resilience

Empowering neighbours to help one another reduces the "Helper's Helplessness" syndrome. Active participation in a peer-to-peer network serves as a psychological buffer against PTSD and community-wide panic.

V. The "Peace-to-Crisis" Transition Model

To ensure the system is "Warm" during a disaster, the framework includes a **Peace-Time Community Inventory**. Neighbours use the app for mundane resource sharing (e.g., tool libraries). This ensures:

- The software is already installed on devices.
 - The "Skill Registry" (Nurses, Engineers, Drivers) is pre-verified.
-

VI. Conclusion

BeaconMatch is not merely an application; it is a public health intervention. By decentralizing aid orchestration and leveraging existing mobile hardware, we can turn isolated survivors into a coordinated community of responders.

Call to Action: This framework is offered for institutional adoption by organizations such as the **WHO**, **UNDRR**, and **International Red Cross**. The author seeks to lead the strategic implementation and public health alignment of this technology in global pilot programs.