A Mobile ad-hoc Network based Emergency Communication System for Natural Disasters

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Impact of Communication System Crash

- Golden 72 Hour
- Trained professional rescue squads, police, army, and fire fighters were far from sufficient for the emergency rescue mission.
- Transportation system was paralyzed not only by broken bridges and roads, but also by a large number of disorganized voluntary rescue vehicles.
- A large volume of rescue and relief resources were misplaced because the assessment of disasters distribution is virtually blind and inaccurate in the early hours even days after a big quake.
Causes for Communication Systems Crash

- Base stations were crashed.
- Backup power generators were out because of fuel getting exhausted.
- Critical hardware equipments were down because cooling tower fell down or cooling pipes were broken.
- Communication systems were overwhelmed by extremely huge traffic.
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Environmental Constraints for a Disastrous Spot

- Outgoing link (Internet) is either not available or very limited.
- Servers are probably not available.
- There is a very stringent time constraint that volunteers are not able to use those devices that have a complicated user interface.
- WiFi-ready notebook PCs are assumed very popular.
- Portable power generators are assumed available.
Functional Requirements

- User interface must be simple.
- Devices do not need complicated setup procedure.
- Devices must be fault-tolerant.
- The system must support broadcast based multimedia communications, while unicast communication mode is optional.
- Only basic functions are required, advanced features are optional.
- The system must not demand high power, must be able to recharge using a portable power generator.
Available Options of Emergency Communication Systems

- Walkie-Talkie.
- Devices must be fault-tolerant.
- MANET based P2Pnet.
- Uncontrolled K-Hop Group Communication Network (UKNet).
- Controlled K-Hop Group Communication Network (CKNet).
MANET Based P2Pnet
Rescue Information System for Earthquake Disaster (RISED)
Mobile learning

- The transmission quality of wireless radio signals is highly depend on conditions, especially in rainy days. As a result, the stability of wireless network connection is lower than fixed networks.

- The software system in a mobile computing environment must be robust.