



Staying Connected During a Revolution or Disaster

Thomas Wilhelm



Introduction / Background

Speaker Info – Thomas Wilhelm

Education

- Masters Degrees in Computer Security:
 - Computer Science
 - Management
- Ph.D. Student in Information Technology:
 - Information Assurance and Security

Signal Intelligence

- U.S. Army – SIGINT Analyst / Cryptanalyst

Certifications

- ISSMP, CISSP, SCSECA, SCNA, SCSA, IEM/IAM

Current Events

Revolutions

- Egypt / Middle-East
- Orchestrated via social networks
- Decentralized

Natural Disasters

- Tōhoku Earthquake and Tsunami
- Hurricane Katrina

Impact to Telecommunication Loss

Impact of Telecommunication Loss

- Loss of Life
- Limits Response by Emergency Services
- Disruption of organized events
- Economic Loss

We need a method of creating an alternate method of communicating with each other.

“People could not communicate. It got to the point that people were literally writing messages on paper, putting them in bottles and dropping them from helicopters to other people on the ground.”

Louisiana Sen. Robert Barham (R)



What Happens During Communication Breakdown

Telecommunication Loss

Loss of Communication for Different Reasons

Natural Disasters

- Wipes out telecommunication infrastructures
- Require days to months to re-establish

Government Suppression

- Infrastructure remains intact
- “Flip the Switch” and it is restored
 - Historically, down for only a few days

Natural Disasters

Japanese Earthquake & Tsunami

Impacted:

- Cellular / Landline phones
- Power
- Transportation
- Undersea communication

Government / Corporate Response:

- Use of loudspeakers
- Television news broadcasts
- Mobile cellular base stations
- Increased of WiFi hotspots

Natural Disasters

Hurricane Katrina

Impacted:

- Cellular / Landline phones
- Local television stations
- Power
- Transportation

Response:

- Relocation of news services
- Mobile cellular base stations
- Amateur radio operators

Human Impact of Katrina

Communication breakdown caused deaths

“With communications breakdowns critical information could not be transmitted. The levees broke and no one other than local residents knew about the massive flooding for several hours. Victims could not communicate with possible responders which increased the lack of response and devastation... Lack of communications at all levels increased the chaos, deaths and destruction in the aftermath of Hurricane Katrina.”

Lieutenant Colonel Heather K. Meeds
United States Army National Guard

Revolutions

Egyptian Revolution

Impacted:

- Social networks
- Mobile phones
- Television network coverage
- Internet (Started Jan 27, finished Jan 31)
- SMS
- Landlines

Revolutions

Egyptian Revolution

Response:

- Used Smartphones as modems
- Landlines with dial-up modems
- Fax machines
- Amateur radio

Proposed Alternative:

- Wireless mesh network using laptops



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Hand Held Technology

Ad Hoc Technology

Mesh Network

Data Dissemination:

- Each node acts as a relay
- Captures and disseminates data

Two Types:

- Flooding Relay
- Routing Relay

Interesting Examples:

- Mobile ad hoc network (MANET)
- Vehicular ad hoc network (VANET)

Purpose of Ad Hoc Technology

During a Revolution / Natural Disaster

Information Dissemination:

- Revolution activities
- Evacuation notices
- Weather alerts
- Decrease misinformation and fear

Emergency Services:

- Fire / Police / Ambulance
- Hospital locations and closures

Communication with relatives:

- Rally points
- Reassurance

Potential Ad Hoc Nodes

Laptops

Advantages:

- TCP/IP stack already integrated
- Meets / exceeds capabilities of routers
- Flexible
 - Apps, data storage, accessories

Disadvantages:

- Expensive
- Not very portable
- Power hungry
- Requires pre-existing software to be installed

Potential Ad Hoc Nodes

Amateur Radios

Advantages:

- Big and small
- Can be used to relay TCP/IP
- Portable
- Long signal reach

Disadvantages:

- Specialized knowledge
- Not ubiquitous

Potential Ad Hoc Nodes

Corporate / Government Options:

(Loudspeakers, mobile cellular base stations, television)

Advantages:

- Authoritative information

Disadvantages:

- Slow to respond
- Requires infrastructure (base stations, television)
- Consumes resources (helicopters, mobile police force)

Potential Ad Hoc Nodes

Cellular Smart Phones

(Assuming no cellular network)

Advantages:

- Ubiquitous / Accepted technology
- Low power consumption
- Very portable
- Flexible
 - Apps, data storage, accessories

Disadvantages:

- Limited range
- Requires pre-existing software to be installed

Disaster Response

Need to have combination

- Cellular phone services are very vulnerable to disruption
- Power outages impact most responses
- Portability is critical due to shifting circumstances
- Security – need both secure and non-secure
- Interoperability



Proposal for Future Ad Hoc Communication Methods

Today's Focus – Smart Phones

Communication Protocols

Wireless:

- IEEE 802.11a/b/g
- Bluetooth

Messaging and Data:

- POP3
- IMAP4
- SMS

Location:

- GPS antenna

Today's Focus – Smart Phones

Potential Ad Hoc Networks

Mobile ad hoc network (MANET):

- **Works with current Internet technology**
- **Longer ranges**
- **Requires phone be capable of relaying data**
- **Consumes power rapidly**

Bluetooth ad hoc network:

- **Low power requirements**
- **Short ranges**

MANET vs. Bluetooth

Which to choose?

Mobile ad hoc network (MANET):

- Internet connectivity is the goal
- Useful when power is not an issue

Bluetooth ad hoc network:

- Preferred when power is an issue
- Data stays local – easier to disseminate information to a specific region

What Data?

During a Revolution / Natural Disaster

Emergency Alert Information Dissemination:

- Revolution activities
- Evacuation notices
- Weather alerts
- Hospital locations and closures

Emergency Services Command, Control & Communication (C3):

- Fire / Police / Ambulance

Requires message validation and encryption



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Auto-BAHN

Auto-BAHN Open Source Project

Automated Broadcast Ad Hoc Network

Goals:

- Use existing smart phone technology to create ad hoc networks
- Find shortest path possible to/from emergency services
- Allow the population to create/join ad hoc communication channels as needed
- Provide Confidentiality and Integrity to some messages
- Easy user interface
- Integrated into current phone kernels

Technical Details

To be announced.

For information after the convention, please visit:

<http://Hackerdemia.com>



Conclusion