

# Interoperability: Heading Down the Right Road

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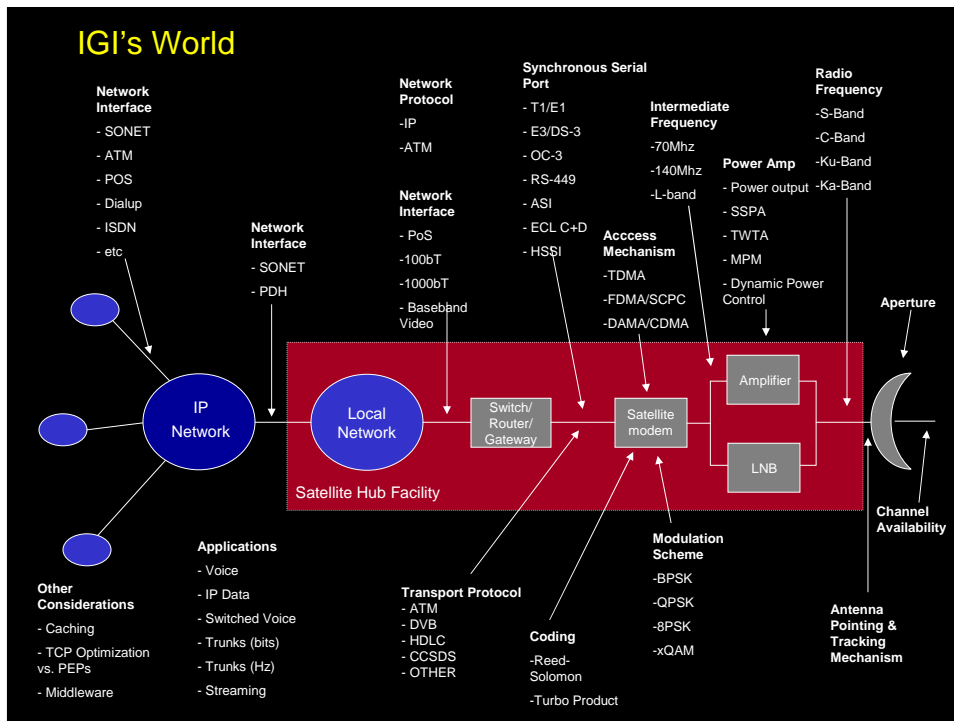


## Agenda

- Brief Background on Infinite Global Infrastructures, LLC
- New York City Response with the Naval Research Laboratory, Boeing, Cisco Systems, and Lucent Technologies
- Evolution of NYC response into InfraLynx
- Interoperability issues and opportunities

# Infinite Global Infrastructures, LLC

- Founded in 1997, IGI's primary focus is design, integration, and implementation of large-scale, high-performance communications systems
  - High-speed satellite & terrestrial networks
  - Networks for mobility
    - Land Mobile Vehicles
    - Aircraft
    - Ships
    - Spacecraft
  - Unusual network integration & design
  - End-to-end multimedia networks
  - Collaborative technology development efforts
  - National- or Global-Scale systems



## Original 9/11 New York City Response Requirements

- 24 hours notice
- Remote dial tone over satellite
  - 48 channels of 202 dial tone re-directed to NYC Ground Zero Site
- Internet Access (if possible)

## Situation at NYC

- While the disaster was limited to the immediate vicinity of the World Trade Center, the impact of the event on the regional communications infrastructure was profound
  - Dial tone was only sporadically available, even to people who had a connection to an operational Central Office
  - Capacity on the regional cellular systems was exhausted
  - Major Internet sites slowed to a crawl (but still worked!)
- Satellite capacity was scarce
  - Every major news organization set up camp close to the WTC to enable 24/7 broadcast
- Dozens of agencies from multiple jurisdictions were involved with rescue, recovery, and investigation efforts – with little chance of interoperability between their systems

## Original New York City HMMWV Configuration



## Current Core InfraLynx Capabilities

- Remote Dial Tone over satellite
  - Up to 48 channels of voice with dial tone provided from the US Naval Research Laboratory over IP or ATM
    - Unsecure
    - Secure
- Analog Cellular Base Station
- Video Broadcast (Standard Definition DVB) at 4 Mbps
- Direct Broadcast Satellite (DirecTV) Receive Suite
- Bi-directional IP over satellite at 4 Mbps
- Support for various radio systems
- Cross-linking and cross-banding of radios, telephones, and cell phones using ACU-1000

## Current InfraLynx HMMWV



## Lessons Learned from NYC and Subsequent Demonstrations & Exercises

- Having a vehicle (or a group of vehicles) that co-locate key communications assets allows for ready interconnection of disparate communications systems
- Satellite links are an extremely valuable tool to deliver critical communications services to affected areas from unaffected areas
  - Access to satellite hubs outside of the immediate region needs to be ensured
  - Guaranteed access to satellite space segment needs to be ensured
- Interoperability and cross-banding of radio and cellular systems is a critical capability, since most first responders' radio systems are not inherently interoperable
  - Different frequencies
  - Different waveforms and access schemes

## Ground Truths for Interoperability and Maximum Effectiveness

- Most transportable satellite systems utilize commercial Ku-Band satellite transponders today
  - Most bang for the buck in terms of
    - Aperture
    - Power
    - Atmospheric fade mitigation
    - Cost effectiveness
    - Relatively large number of transponders available
- Ka-Band satellite services will be available soon
  - Providing higher achievable data rates with less aperture
  - More vulnerable to atmospheric effects (especially rain)
- Over-the-air protocols are stabilizing to provide interoperability at the satellite layer
  - Digital Video Broadcast (DVB)
  - Internet Protocol (IP)

## Recommendations

- Establish transportable platforms that merge multiple types of communications assets on-board
  - Trailers, SUVs, ATVs, Vans, Trucks
- Equip these platforms with Ku-Band satellite terminals to enable reach-back of critical services from the site of the incident to a local hub facility (in the case of a small-scale incident) or a remote hub facility (in the case of a large-scale disaster)
  - The establishment of out-of-region hub facility agreements may be difficult for local or state municipalities
- Equip the platforms with standards-based communications equipment and cross-banding capabilities to provide the highest level of interoperability among first responders
- Use the systems frequently