Satellite Based Solutions for Disaster Recovery and Prevention

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Why Satellite?

- Terrestrial Infrastructure is vulnerable to natural disaster
- Safe Comm Repeater in Atmosphere
- Readily available in short lead time
- Scalable from small network to larger network network.
Satellite Solutions for Disaster Recovery

- **Post-Disaster Recovery Network via Satellite Services**
  - Emergency recovery – first 3 to 6 months

- **Medium-Term Solution: Rehabilitation Network**
  - 6 months to two years

- **Reconstruction – new infrastructure**
  - Overlay by terrestrial and satellite network in disaster-prone areas

- **Prevention – Tsunami Detection System via Satellite**
Regional/National Satellite Operators

- APT Satellite (Hong Kong)
- AsiaSat (Hong Kong)
- SCC (Japan)
- JSAT (Japan)
- MEASAT (Malaysia)
- Insat (India)
- Indosat (Indonesia)
- ACeS (Indonesia)
- PT Telkom (Indonesia)
- ChinaSat (China)
- SinoSat (China)
- KoreaSat (Korea)
- Mabuhay (Philippines)
- Thaicom (Thailand)
- SingTel/OPTUS
- Thuraya (UAE)

Global Satellite Operators

- Intelsat/PanAmSat (USA)
- Loral Skynet (USA)
- SES/New Skies (Europe)
- Inmarsat (UK)
All terrestrial telecommunication networks could be destroyed or stymied by natural causes.

Viable Solutions - Recovery

- Satellite Phones
  - ACeS (GEO), Iridium (LEO), Inmarsat (GEO), Thuraya (GEO)

- DMB (Digital Multimedia Broadcasting) Services
Mobile Satellite System Architecture

- **SPACE SEGMENT**
  - **L Band**
  - **C Band**

- **GROUND SEGMENT**
  - **SOC**
  - **AOC**
  - **MSC**
  - **PLMN**
  - **PSTN**

- **USER SEGMENT**
  - **Hand-held**
  - **Vehicular**
  - **Semi-fixed**
  - **Maritime**

- **Primary Gateway**
  - FEEDER LINK GATEWAY
  - UBS

- **National Gateways**
  - **PSTN**
  - **MSC**
  - **OSS**
  - **PLMN**
The call is not dependent on the wire-line network

Satellite phone user in affected area
origination

Satellite phone user anywhere in the world
termination
Call Flow – ISU to PSTN Call

Calls can be routed to any PSTN phone

Satellite phone user in affected area

PSTN Worldwide

Tempe Gateway

Int’l. Carrier
Satellite DMB signals will be delivered via multiple paths: Gap fillers as well as directly from satellite.

Source: TU Media Corp.
Satellite Solution for Intermediary

- Internet Access – Access to the Internet for disaster-stricken area

- Intranet/LAN/WAN Connectivity – Connectivity between remote sites, either one way or two way services

- Network for Relief Agencies:
  - Basic telecommunications for remote agencies
  - Government network for coordination

- VoIP via Satellite
Broadband Interactive Bi-Directional Data
Longer Term Solution via satellite

- Use of satellite broadband technologies
- Limit of terrestrial network and other wireless network
  - Bandwidth (PSTN/ ISDN/xDSL /Cable Modem )
  - Reach and extend

- Satellite network for disaster prone areas
- Satellite based e-government network
- Convergence of voice and data
- Community e-center via satellite for community development
Broadband Applications & Services 1

- Broadband Internet access
- High-speed Internet or web browsing, e-mail, news, downloads, video online, etc.

Diagram showing connections between Hub Station, Internet, PSTN, DVB Receiver Card, Phone/ISDN Modem, PC VSAT 1, and PC VSAT n.
Distance Learning
- E-learning solutions based on satellite broadcast
- Interactive material
- Cost-effective terminal equipment
- Rich and colorful education resources

Terminal Equipment
Distance Medicine
• Tele-diagnostics
• Remote consultations
• Remote training & certification

Digital Media Streaming & Content delivery
• Interactive TV
• On-demand video (movies, music, etc.)
• MPEG streaming
Broadband Applications & Services 4

Outbound: DVB-S
Inbound: MF-TDMA

PUTIAN LINKCOM Hub Station

Internet
ISP/HQ
PSTN

AAA Server
Web/Email/FTP Server

Fire Wall
VoIP Gateway
Hub Baseband and RFSS
Applications to prevent Natural Disaster

- Monitoring & Control:
  - Water management
  - Environmental
  - Pipeline
  - Traffic
  - Earthquake/tsunami
  - Forest fire
  - Flood
Thailand Tsunami Trigger Comms. Schematic

Bangkok Disaster Control Center

Inmarsat Satellite

D+ Set

Siren Sites or Sensor Locations

Circuit Switch or Data Network/IP etc

Message Handling Server

Appropriate Inmarsat D+ Earth Station

Inmarsat D+ Comms Server

Siren/sensors Control Center

Appropriate Inmarsat D+ Earth Station

Schematic
TSUNAMI EARLY WARNING SYSTEM INSTALLED IN THAILAND
By Kemilinks International Group.
Conclusions and Recommendations

- **Immediate Emergency Relief**
  - Satellite phones from LEO and GEO Satellites
    - DMB-Satellite terminals - GEO

- **Intermediary** - Rehabilitation
  - VSAT Solution to connect relief agencies and government coordination

- **Reconstruction for Longer-Term Solution**
  - Satellite based warning and prevention network in disaster-prone areas.
Thank you!!

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