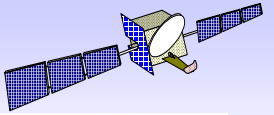
Satellite Communication and Broadcasting System Applications for PPDR (Public Protection and Disaster Relief)

Feb.13 2004

Broadband Multimedia Research Team
Communications Satellite Research Group
Digital Broadcasting Research Division

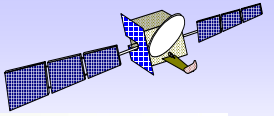
ETRI

Contents



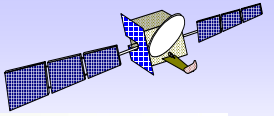
- General
- PPDR
- Satellite Communications
  - Global
  - National
- PPDR Applications

General



- **Policy**
  - Protecting from Terrorism
  - Enhancing National Welfare
- **Standardization**
  - ITU WRC2003 PPDR Frequency Allocation
  - MESA (TIA and ETSI)
  - ETSI EMTEL
- **Developments**
  - **GIS**
  - **Broadcasting**
  - **Communications**

PPDR

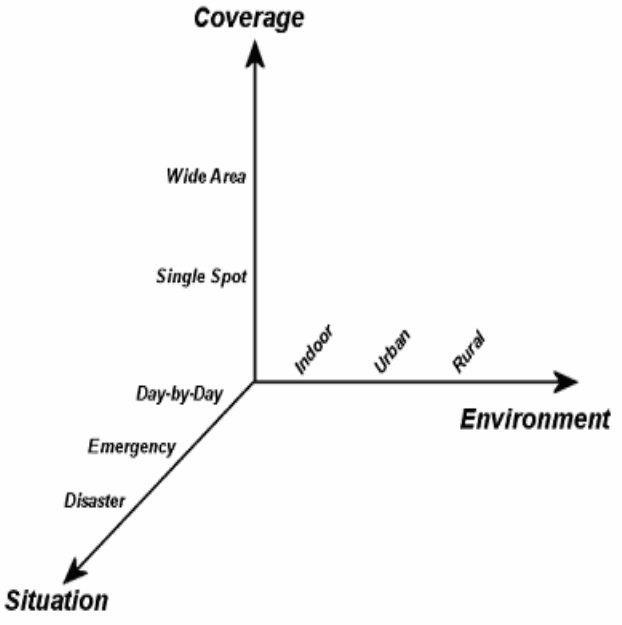


- **Global**
  - Criminal justice services
    - Automated criminal history and low enforcement records systems and providers
  - Emergency management or disaster recovery agencies
  - Health services
    - Emergency Medical Services (EMS)
    - Disaster Medicine
  - Fire services
  - Land and natural resource management
    - Wildlife management
  - Search and rescue activities
  - Coast guard services
  - Airport/stations/tube/… security
  - Humanitarian assistance
  - Hazardous materials and related public safety services
  - Correctional institutions
  - Transportation

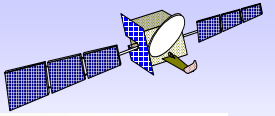
PPDR

Scenario (MESA)

- **Day-by-Day**: routine scenarios present in eve ryday life (like monitoring, surveillance…) that h ave high predictability and require an ordinary o perational resources deployment (in terms of pe rsonnel and means allocated)
- **Emergency**: specific events characterized by medium predictability (that imply the acknowled gement of factors of possible danger) and requir e additional operational resource deployment
- **Disaster**: specific, unpredictable events that r equire extra-ordinary (national, international) op erational resource deployment
- **Indoor**: areas of hundreds of meters character ized by harsh signal propagation environments (high multi-path, n-LOS…)
- **Urban**: areas from hundreds of meters (district s) to up 10 kilometres (city) with signal propagat ion degraded by the many existing obstacles
- **Rural**: areas more than 10 kilometres wide ch aracterized by a critical signal propagation that i s less critical than in the previous environments

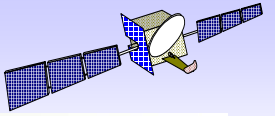


- **Single Spot:** a finite and easily identifiable specific coverage area
- **Wide Area:** an extended coverage area



Technical Requirements (MESA)

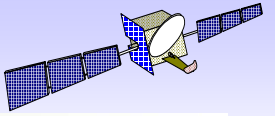
Mobility	Systems Interoperability	Power	Reliability	Security
Fixed	TETRA (TETRA II)	Critical	Service reliability can be taken into account by using different levels of priority:	Physical layer
Pedestrian 0.1-5 m/s (typical walking speed 1.2 m/s)	Tetrapol	Non Critical	1 - Executive Leadership and Policy Makers	Data link
Vehicular Urban: 1-50 km/h Extra-urban: 50-150 km/h	Project-25		2 - Military Command and Control	IP layer
Aeronautical 150 km/h and higher	Cellular public systems 2G/2.5G/3G		3 - Public Health, Safety and Law Enforcement Command	TCP/UDP layer
	Fixed and Mobile BWA		4 - Public Services, Utilities and Public Welfare	Application layer
	WLAN, PAN		5 - Disaster Recovery	
	Satellite, Free Space Optics			
	GiBE, PON			



Technical Requirements (MESA)

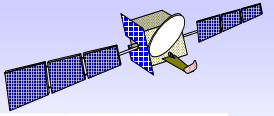
Voice		Video		Other Data
AUDIO CODEC dependent MOS: 5 levels of quality	Other parameters	VIDEO CODEC dependent Picture format - Resolution	Other parameters	
MPEG L3 (CD Stereo) 56-128 kb/s	End-to-end delay	CODEC H.263, H.261, MPEG2, MPEG4	Color depth	End-to-end delay
European mobile phone ETSI full-Rate GSM 6.10 13 kb/s (3.5/5)	Jitter (Delay variation)	Windows Media 8, RealVideo 8, Index 3.2	Compressed /Uncompressed data rate	Jitter (Delay variation)
2G/2.5G/3G GSM-HR 6.3 kb/s (3.4) GSM-EFR 12.2 kb/s (4.0/5.0)	Simmetry	Low Resolution (LR) BW	Frame Rate	Simmetry
TDMA mobile N. America IS 641 7.4 kb/s (4.0)	Real time service	Low Resolution (LR) Color	End-to-end delay	Real time service
Audio and video conferencing over LAN (ITU H.323) G.723.1 5.3 kb/s (3.7/5)	Non-Real time services	Medium Resolutiom (MR) BW	Jitter (Delay variation)	No-real time services
...	...	Medium Resolutiom (MR) Color	Simmetry	BER
		High Resolution (HR) BW	Real time services	
		High Resolution (HR) Color	Non-Real time services	
		Infrared (IR)	Screen size	

PPDR



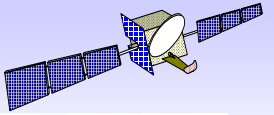
- **Satellite Communications Applicable PPDR Area (Sorted by MESA)**
  - Urban/Disaster/Wide Area
  - Rural/Day-by-day/Single Spot
  - Rural/Day-by-day/Wide Area
  - Rural/Emergency/Single Spot
  - Rural/Emergency/Wide Area
  - Rural/Disaster/Single Spot
  - Rural/Disaster/Wide Area
- **Flexibility (Self-organizing, Ad-hoc, Easy Deployment) for PPDR**

PPDR



National

- Precision Image System for flood prediction, hazardous material surveillance, and protection forest, water and environments
- Satellite Backbone inter-operable with wire and wireless communication networks
- Satellite Video Command and Control System
- Satellite Video Conference System for cities, districts and area
- Automatic Rain Measurement
- Alarm networks for disaster announcement, village sirens, civil defense alarm, etc

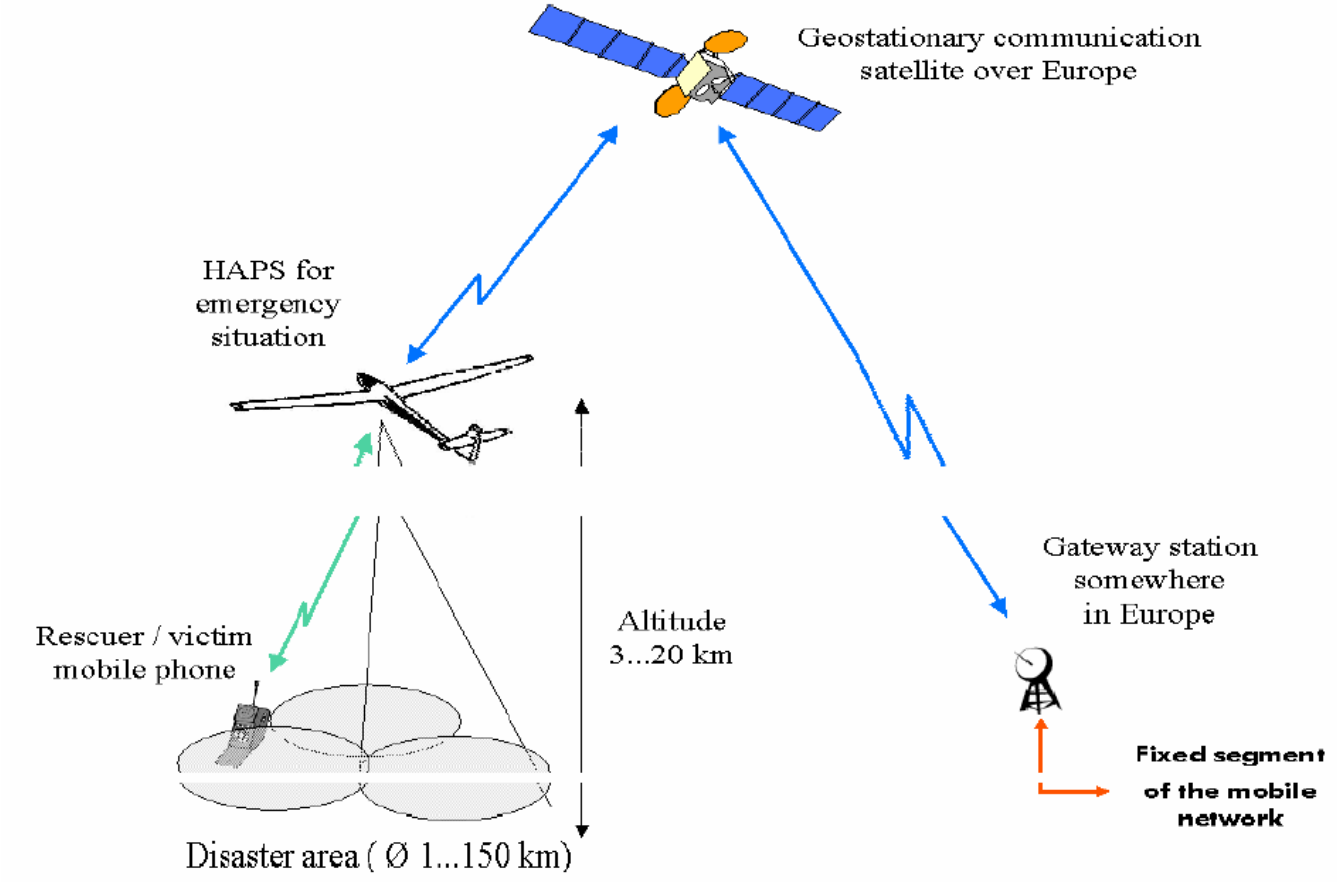


Satellite Communication Standardization

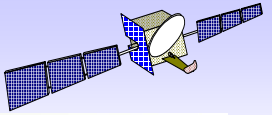
- DVB
  - Forward Channel: S2
  - Return Channel: RCS2
- ETSI
  - Broadband Satellite Multimedia (BSM)
  - Aircraft Earth Stations (AES)
  - Earth Stations located on board Vessels (ESV)
- ITU

Global Satellite Communications

➢ Developments (CRIES)

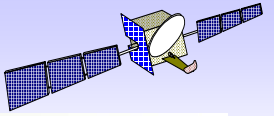


Global Satellite Communications



- **ESA (** European Space Agency**) Development Projects**
  - REMSAT (Real-time Emergency Management via Satellites)
  - Telemedicine
    - Broadband, Highly Interactive Applications projects: DELTASS (3D Simulation component)
    - Distributed Environment for Medical Simulation projects: MULTIMED
    - Emergency Consultation projects: SECOM, IEMN, MIST, DELTASS (Mobile Field Hospital and Search and Rescue component), TELANY (Emergency component), I-DISCARE, NESA
    - Tele-consultation projects: SHARED, EUROMEDNET, RCST
    - Clinical Research projects: WEBGMS
    - Access to Patient Multimedia Data Base projects: HERMES, TELANY (Medtronic component)
    - Continuing Medical Education projects: EMN, SANTTSUR, MAYFLOWER, SM@RT, SKYMED, HPS IN SURGERY, HPS IN HOME
  - Numerous projects done

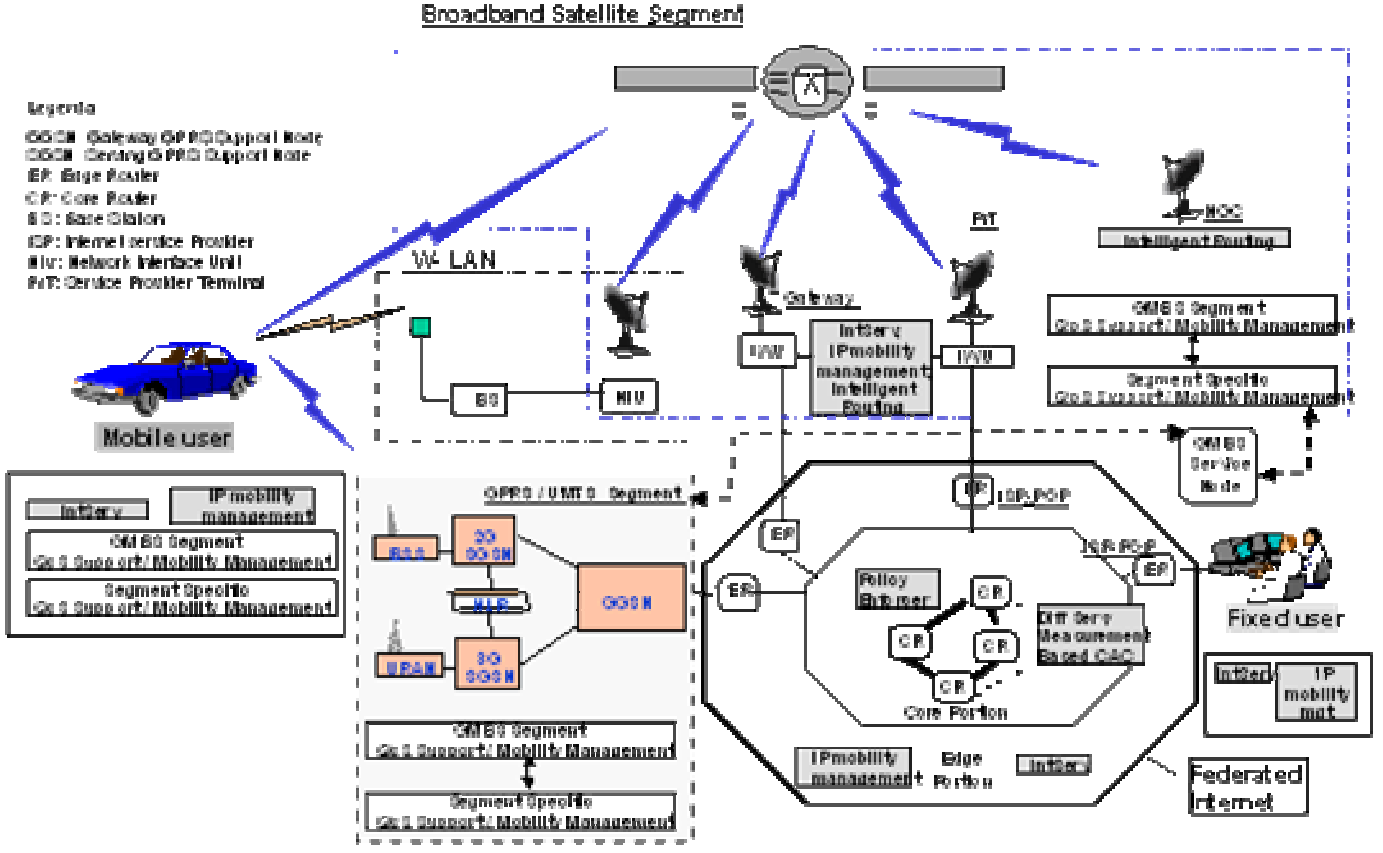
Global Satellite Communications



- **IST (**Information Society Technologies**) Development Project**
  - BRAHMS (Broadband Access for High Speed multimedia via Satellite)
  - CODIS (Content Delivery Improvement by Satellite)
  - GEOCAST (Multicast Over Geostationary EHF Satellites)
  - IBIS (Integrated Broadcast Interaction System)
  - MODIS (Mobile Digital Broadcast Satellite)
  - OVERDRIVE (Spectrum Efficient Uni- and Multicast Services Over Dynamic Multi-Radio Networks in Vehicular Environments)
  - SATIN (Satellite-UMTS IP-based Network)
  - SATIP6 (Satellite Broadband Multimedia System for IPv6 Access)
  - SUITED (Multi-Segment System for Broadband Ubiquitous Access to Internet Services and Demonstrator)

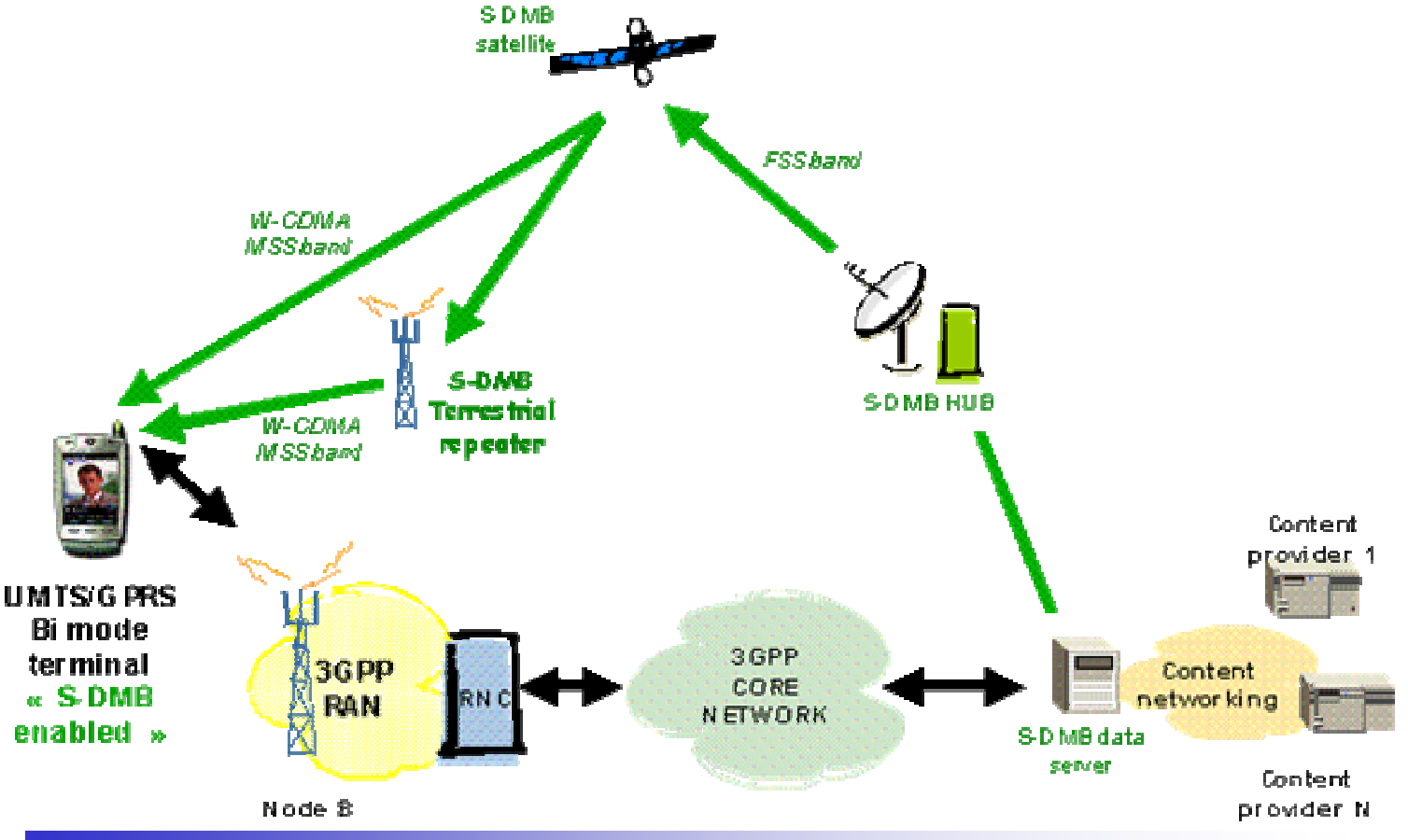
Global Satellite Communications

Developments (SUITED)



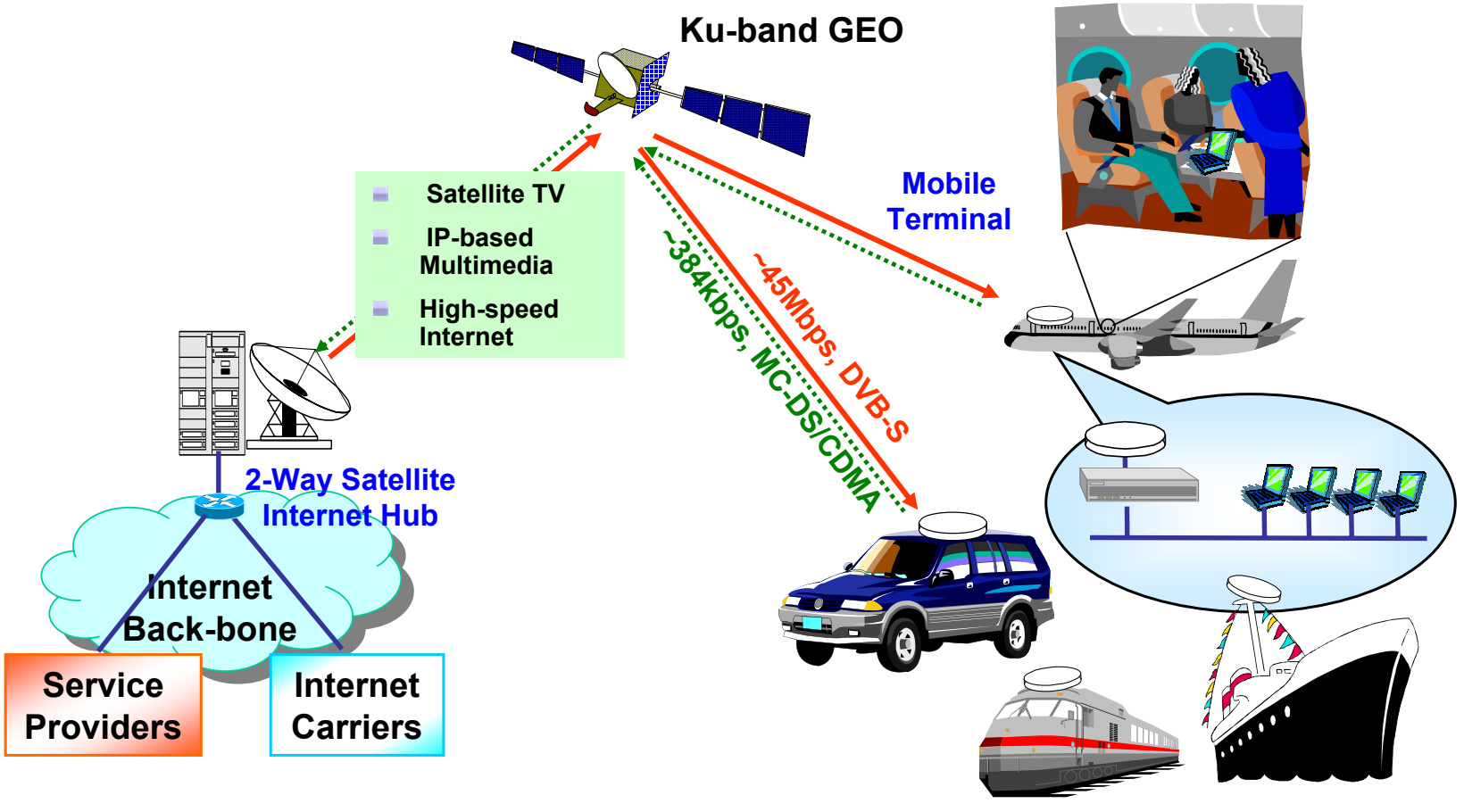
Global Satellite Communications

Developments (MODIS)



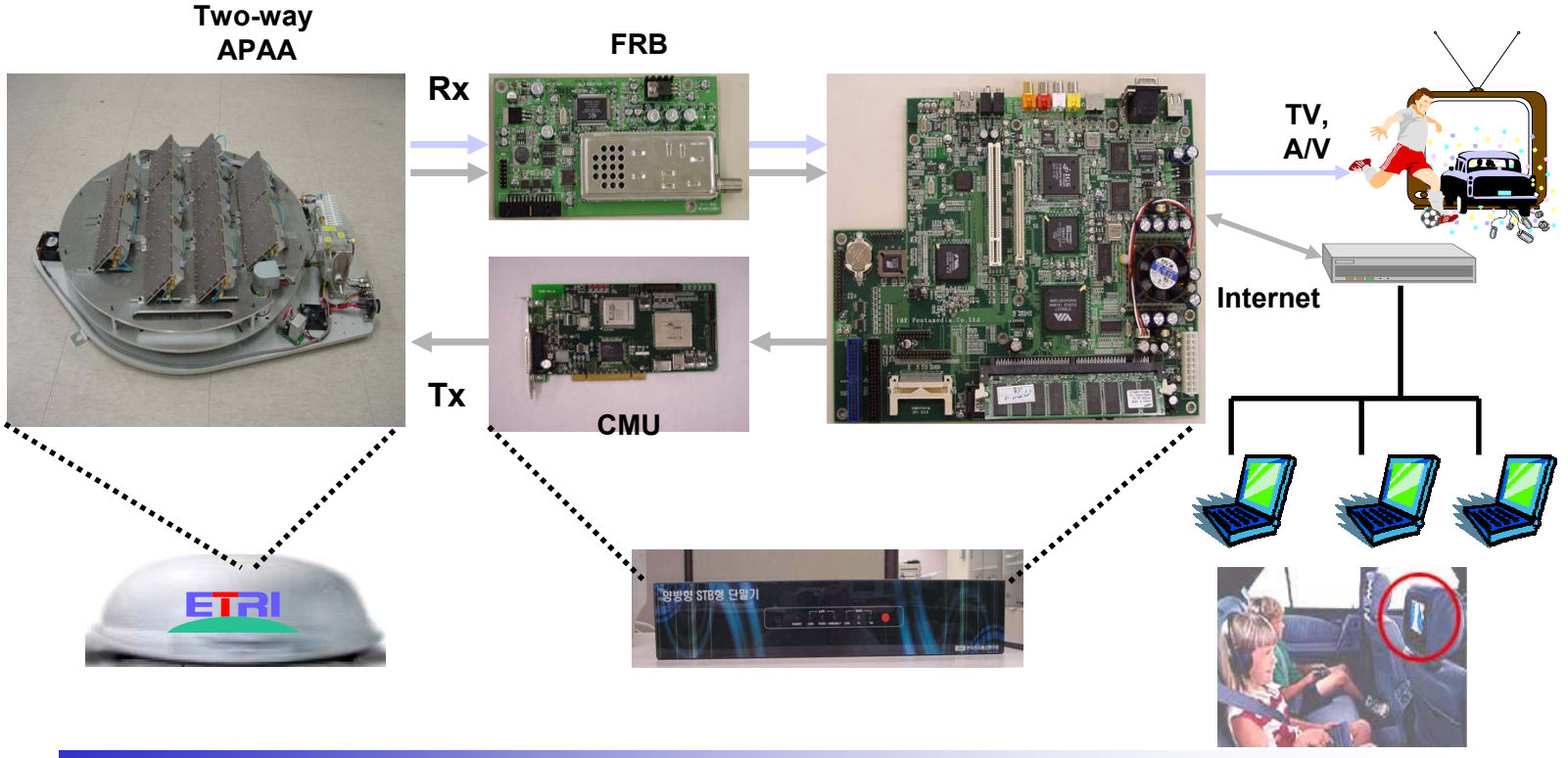
National Satellite Communications

Developments in Korea (MSIA)

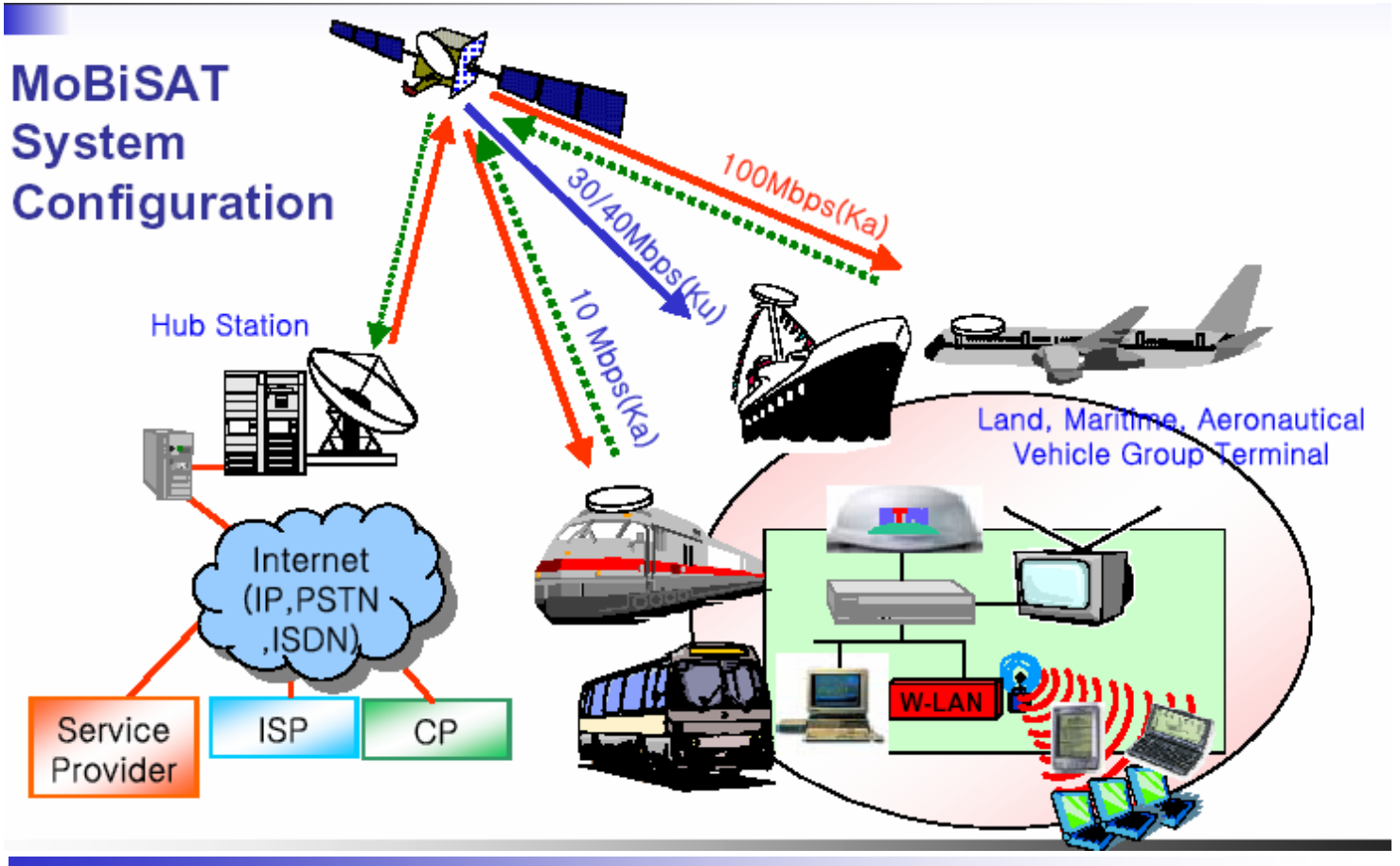


Developments in Korea (MSIA)

- MIT (Mobile Interactive Terminal)

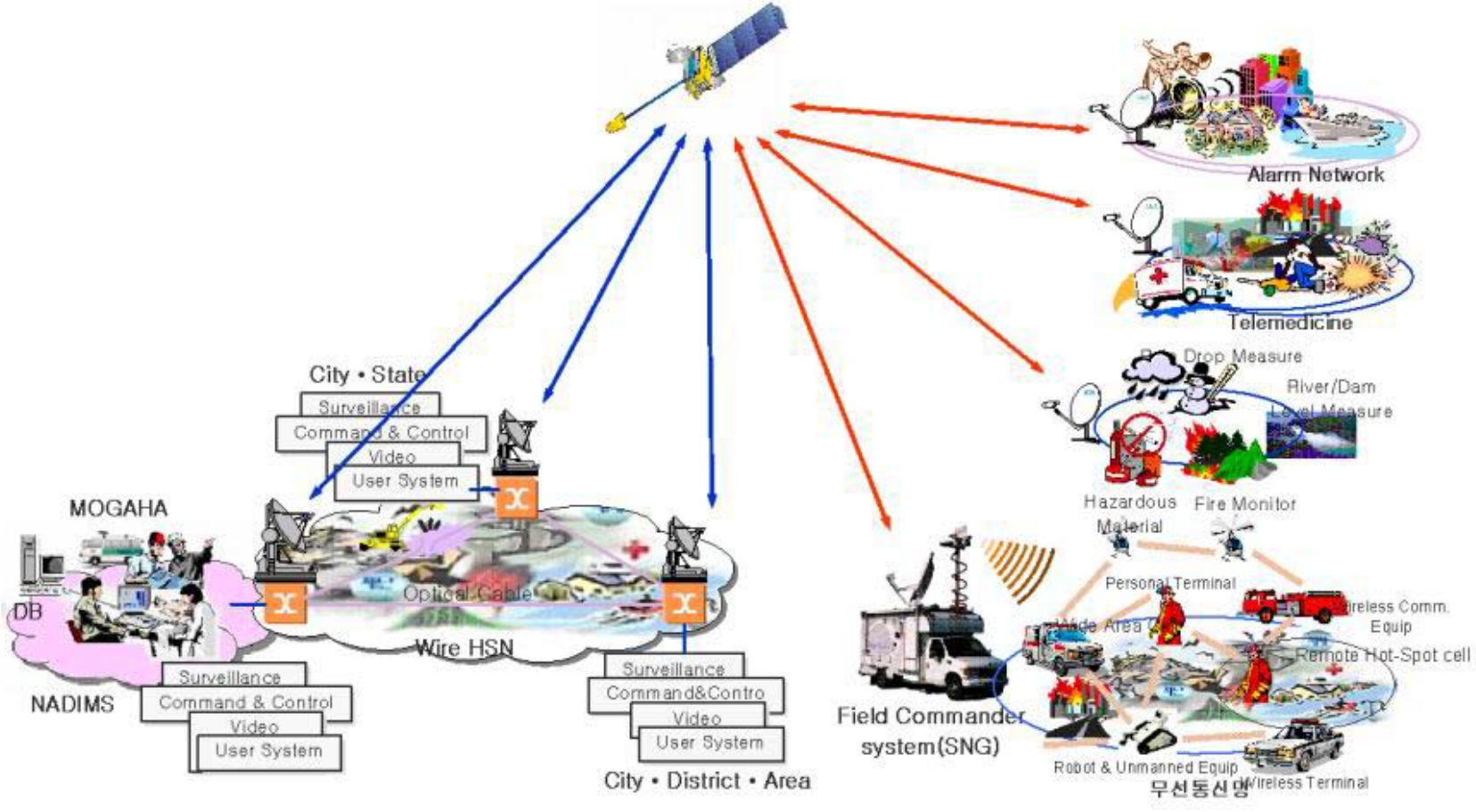


Developments in Korea (MOBISAT)



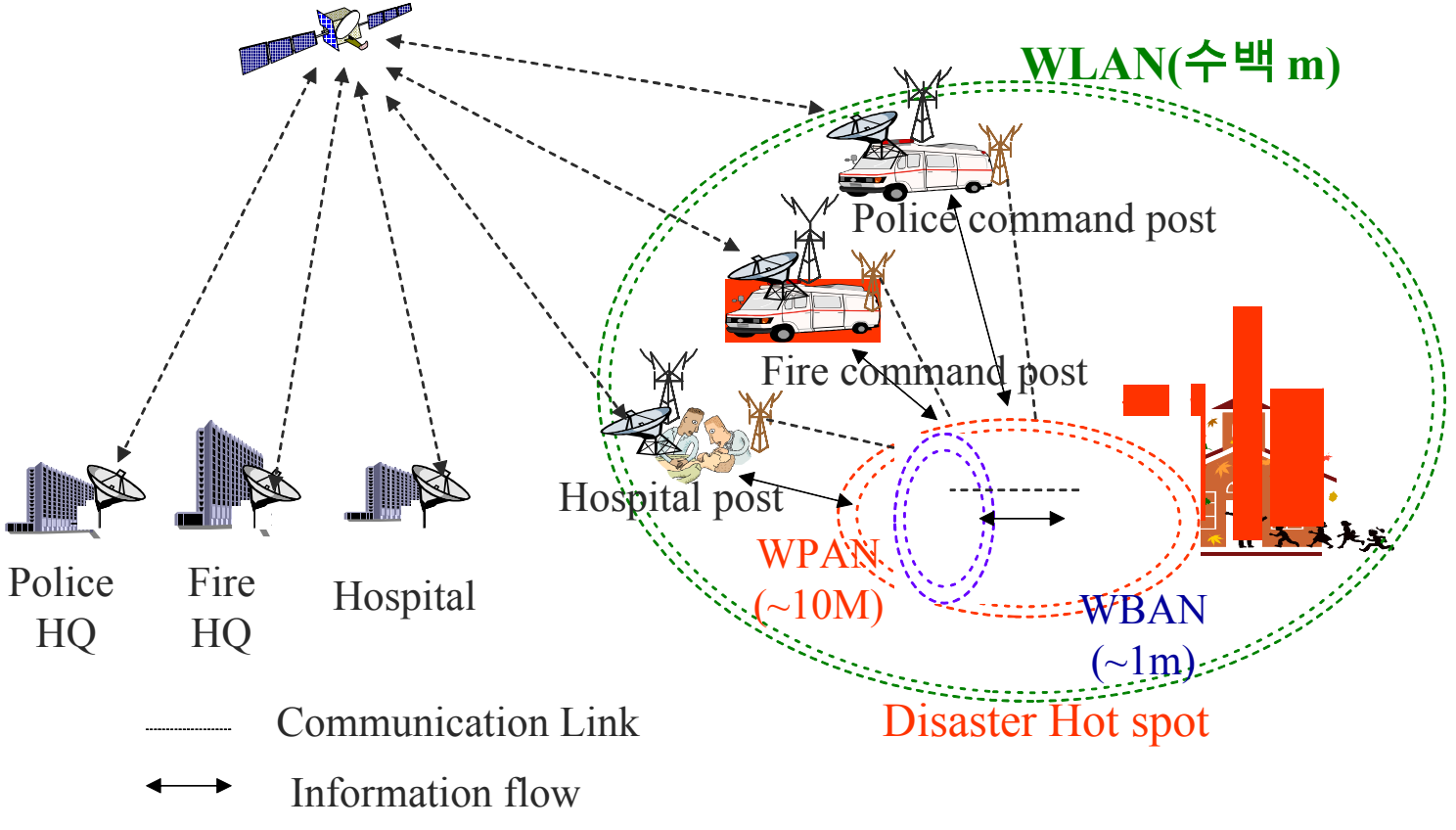
PPDR Applications

➢ PPDR Possibilities



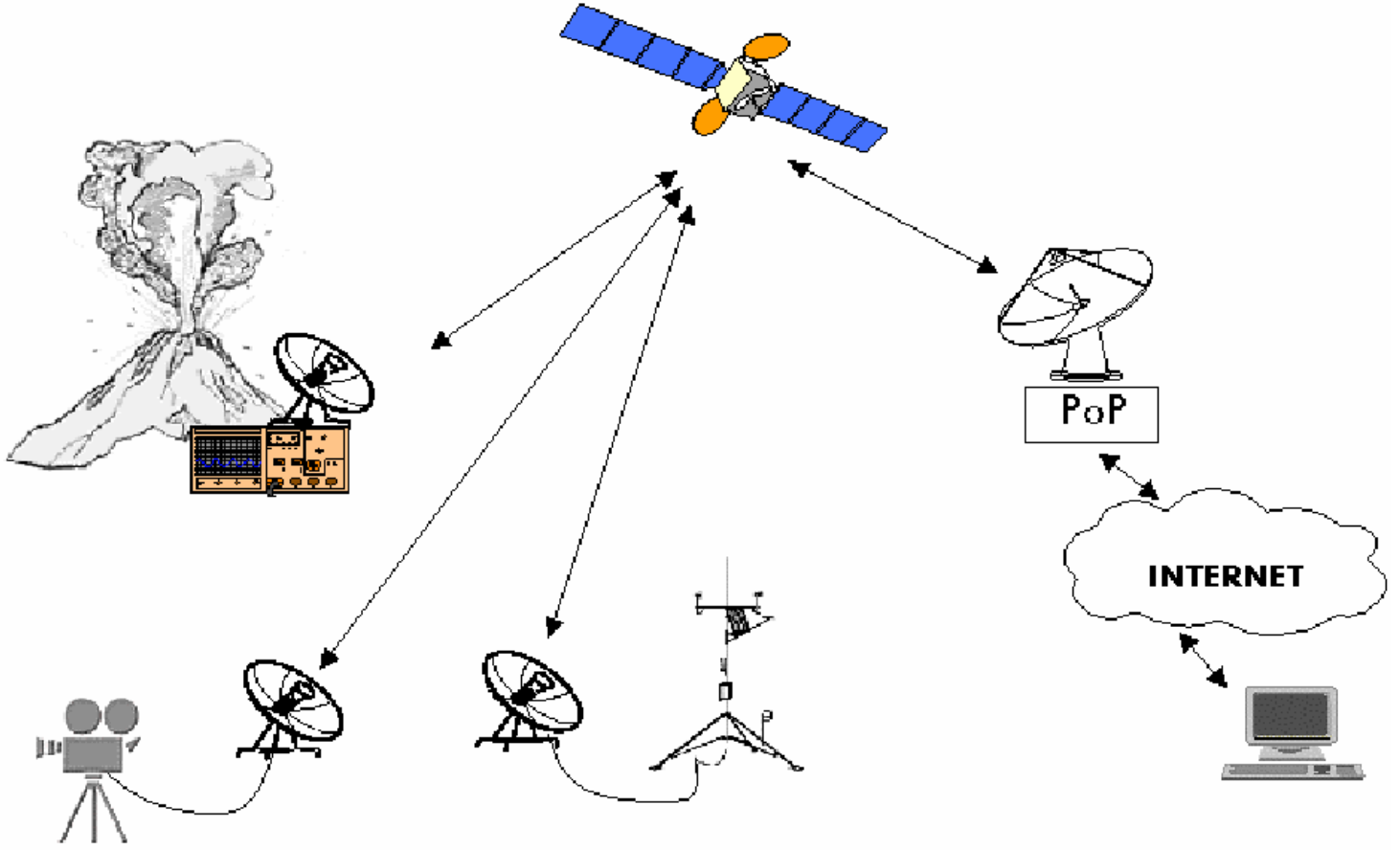
PPDR Applications

PPDR Possibilities



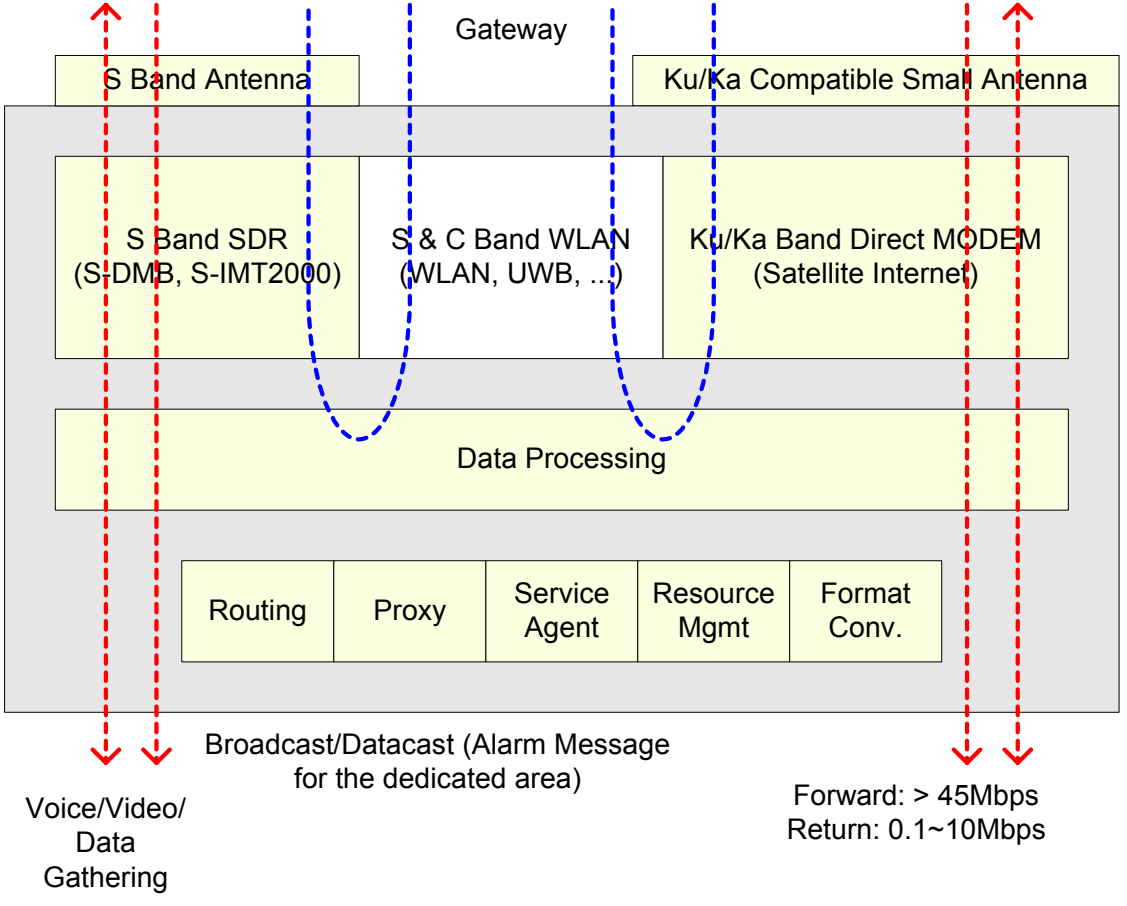
PPDR Applications

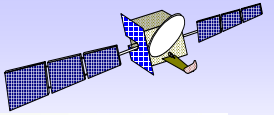
PPDR Possibilities



PPDR Applications

PPDR Possibilities (Future Works Example)





Thank You

Contact Point : hokykim@etri.re.kr

Young Wan KIM (ywkim@etri.re.kr)

Deock Gil OH (dgoh@etri.re.kr)

Ho Jin LEE (hjlee@etri.re.kr)