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Overview

- Inmarsat's track record
  - Resilient ICT beyond the edge
- Use of satellite communications during the disaster cycle
- Recent case studies
- Future developments : hybrid satellite / terrestrial communications
- Conclusions and recommendations
  - Spectrum
  - EU policy context

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The mobile satellite company™

- The market leader
- Global mobile satellite services
- Across land, sea and air
- Operating on the most advanced, fully funded commercial communications satellites
  - Constellation of 11 satellites
  - Investment of 1.5 bn in 4rd generation
- Inmarsat Global Xpress by 2013
  - Investment of 1.2 billion in 5th generation
  - Broadband applications in Ka band
- 30+ year history of unsurpassed reliability
- Pre-emption for safety services

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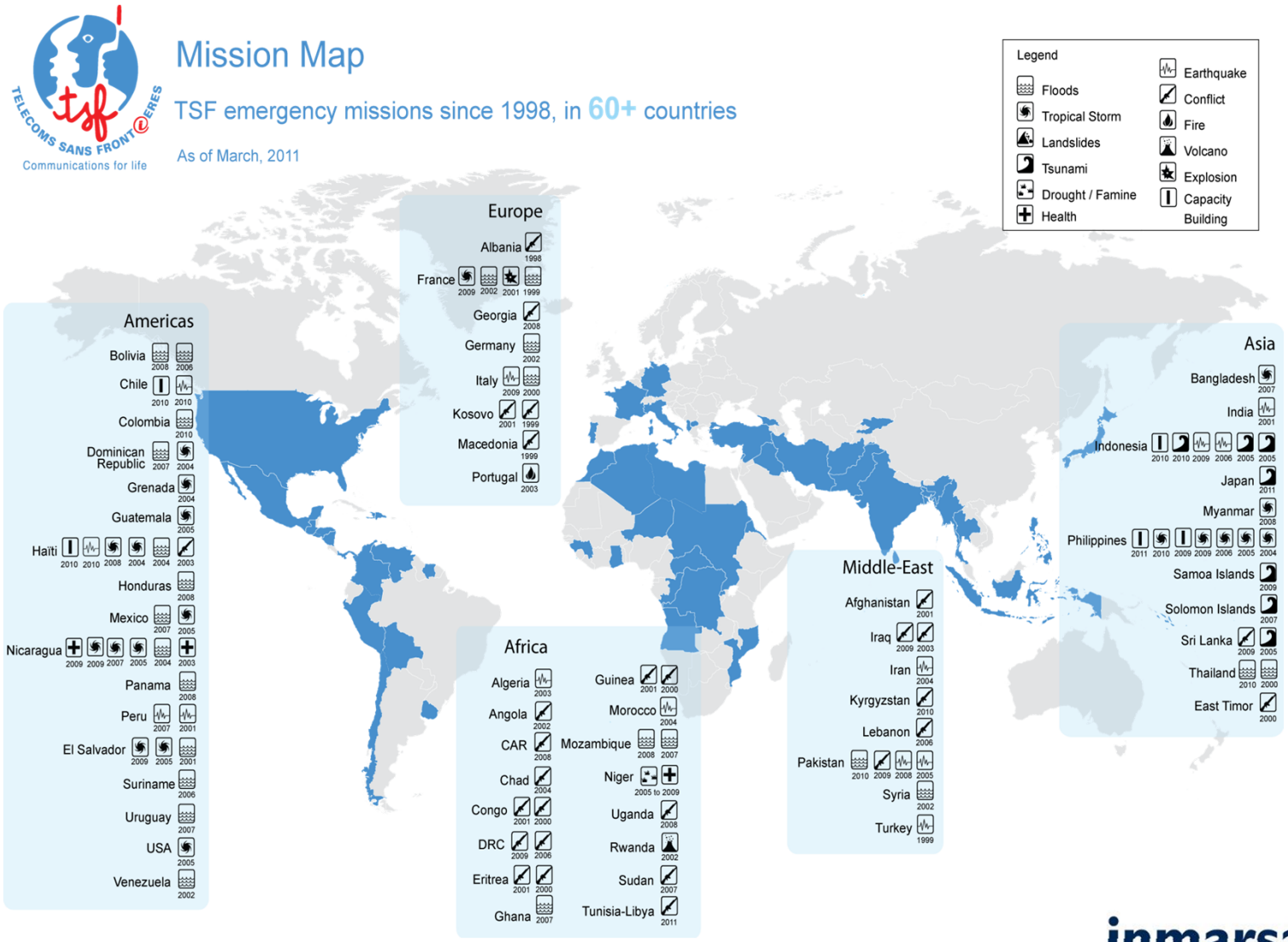
Our Disaster-Prone World



Deployments by TSF to disaster sites since 1998

Disasters Are Communications Events

- Emergency communications save lives and protect property:
  - Restore operability
  - Provide communications among non-interoperable groups
  - Restore lifeline service
  - Situational awareness
  - Damage and needs assessment
  - Continuity of Government
  - Evacuation and mass care management

Non disaster

Risk assessment for mitigation action

Hazard prediction, modelling - advocacy – public awareness- geo information

-training -

Before disaster

Information gathering – monitoring environment and critical infrastructure

Emergency planning and training, early warning

Recovery after disaster

Emergency management, damage assessment, site security, information for logistics and meeting community needs

During disaster

alert, real time monitoring mobilizing help, command and control co-ordination, situational awareness, information dissemination, emergency healthcare

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Use during different stages of disaster

	immediate	24-48 hours	After 48 hours
	Increasing bandwidth requirements		
Communications requirement	**Rapidly deployable and highly portable – lightweight terminals** Ease of use (non tech users) Voice/data for alert Internet/VPN for	**Netted comms-interoperability** Interoperability voice/data Integrations with imagery for decision support and logistics and information dissemination	**More permanent installations** Damage assessment – mapping – re-establishing transport and backhaul for terrestrial communications
Inmarsat Satellite solution	Search and rescue (GMDSS – aero safety) – first aid Handheld, low data rate and pre-emptive emergency communications	Telecom and access to data BGAN – simultaneous voice/data (450+Kb/sec), email, internet, broadcast quality IP streaming	Global Xpress VSAT higher bandwidth

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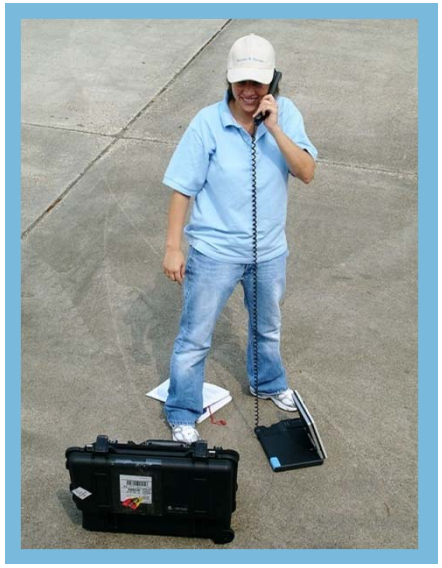
Power of IP

- Growing everyday use of wireless mobility reshaping emergency response

- Satcom provides IP pipe for remote data operations
  - Backhaul for ad hoc radio networks
  - Access to remote data bases
  - Collaborative tools
  - Email
  - VOIP
  - Video Conferencing



Recent uses of Inmarsat MSS services

- Reconnecting people
  - MoU with Telecom Sans Frontieres and ITU
  - Haiti, Indonesia, China, Chile, Japan
- Atalanta
  - Fighting piracy, combining ship and aircraft communications
- Environmental monitoring
  - Mapping the oil slick in the Gulf of Mexico
  - Tsunami early warning systems

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Inmarsat satellite communications : an effective option

- Quick deployment – small form factor - rapid response
- Reliable communications link when terrestrial or cellular networks are outdated, insufficient, damaged or overloaded
- Allows communication locally, nationally, internationally, globally
- Facilitates co-ordination of large-scale integrated communications
  - Transborder operations
  - Between civil and military actors
  - Receive/transmit images originating from air, sea or land
- High bandwidth
- Maximum interoperability

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S-band Hybrid satellite – terrestrial (CGC) system

- First pan-European award process organised by the EU Commission to select 2 winners out of 4 candidates
- In May 2009, the European Commission awarded two allocations of 2 x 15MHz each to Inmarsat and Solaris
- Inmarsat was awarded:1995-2010/2170-2185 MHz
- Assured access to EU-wide licensing of Complementary Ground Component (CGC) at Member State level
- Why is this a unique opportunity?
  - This spectrum is so far unused
  - “Prime real estate’ contiguous with UMTS allocations
  - Certainty for EU-wide market access for 18 years
  - CGC allows for smaller, speedier and higher bandwidth terminals
  - CGC overcomes “line of sight” issues in metropolitan areas

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Policy support for S band PMR services

PMR

- Momentum in the public policy environment – express requirement for pan-EU integrated satellite/terrestrial networks; aggregated demand provides the business case. Policies include:
  - *Maritime – 'Blue Book' network requirements*
  - *Critical National Infrastructure – UK Government Proposals*
  - *Public Protection Disaster Relief - CEPT*
- Focus on incorporating S-band public safety and security features identified in the ESA High Speed Bi-Way project (ARTES-1)
- Urgent request by Mrs Kroes to MS to put rapidly introduce all necessary legislative measures *"to allow the pan-EU deployment of mobile satellite services that could be used for high-speed internet, mobile television and radio or emergency communications to EU consumers and businesses"*

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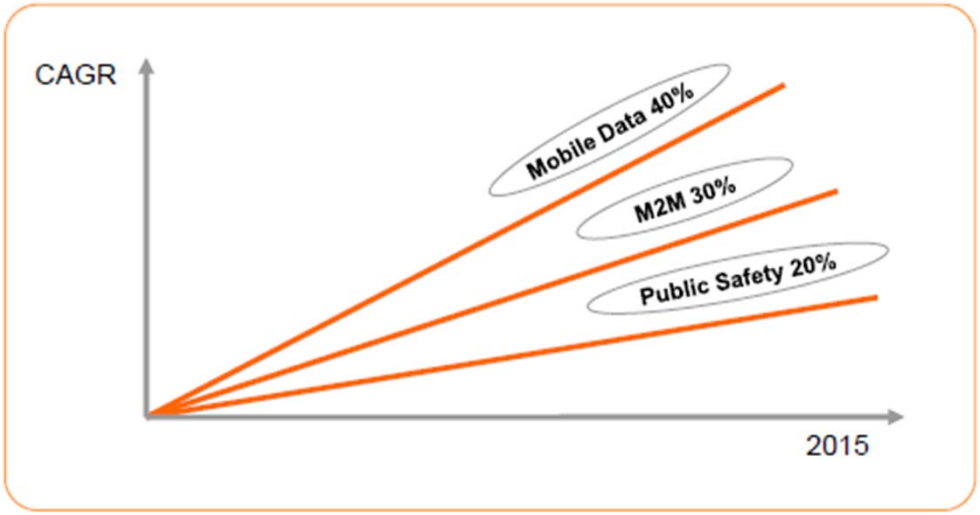
EuropaSat business model

- **EuropaSat will operate at the wholesale layer**
- **Three target user communities are targe**
  - Communications Service Providers (CSP's)
  - Machine to Machine (smart grid, telemetry, intelligent transport etc)
  - Public Protection, Disaster Relief (PPDR)



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S-band solution to increased PMR bandwidth needs

- The hybrid network overcomes line of sight limitations
- Integrated terminals allow one device for emergency and routine communications
  - Dual use TETRA / S-band terminal
    - Up to 10 Mbps enabling a richer data service than is possible today with TETRA or in the future with TEDS
  - Dual mode S-band / L-band terminal
    - Over 500 Mbps broadband service
  - Proximity to 4G bands

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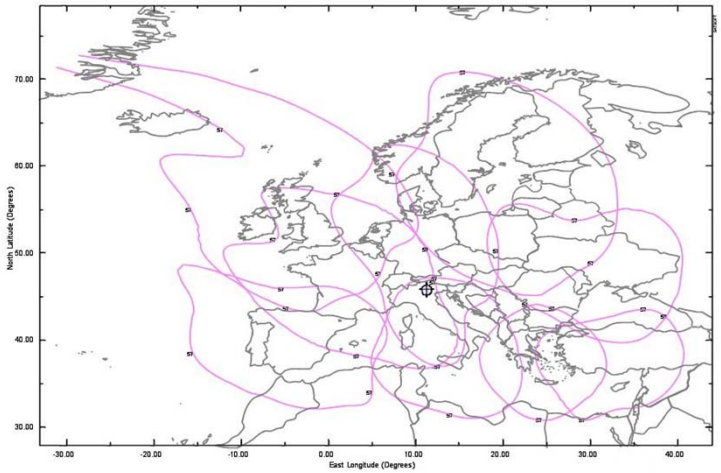
S-band Augmenting TETRA coverage

- CGC overcomes satellite limitations with regard to line of sight
- Fully interoperable pan-European service
  - Spectrum allocated on a pan-european scale
  - Economy of scale for terminal production
  - Cross border usage, including non EU countries
- Dual use S-band/TETRA terminal
  - Gap filling and seamless transition from terrestrial TETRA network to areas outside TETRA coverage
  - Satellite can take over if terrestrial network is not functioning



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Resilience of S-band PMR services

- Different ways to realise prioritising and pre-emption
  - Dynamic lease of a number of carriers in a certain area
  - Emergency Multi Layer Priority and Pre-emption (EMLPP)
  - Others e.g. priority access based on access level priority at SIM level
- S-band satellite provides redundancy in case terrestrial CGC fails
- L-band satellite provides additional redundancy
- CGC in S-band can be part of next generation main stream “blue light”
- S-band is ideally suited to augment main stream PMR services
  - CGC overcoming line of sight issues associated with satellite
  - Potential to offer higher bandwidth services
  - Pan-European coverage and interoperability
  - Resilience and redundancy

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Conclusion

- The unique role of classic MSS in providing communications should be explicitly recognised in the emerging new EU framework
- Inmarsat's services can facilitate synergies between defence and PPDR
- In addition to sub 1 Ghz spectrum, core satellite bands need to be maintained for satellite operators to develop broadband PPDR
  - 80% of Inmarsat traffic in L band is currently data and the future developments are related to increased data rates which Global Xpress will provide in Ka band
  - Feederlinks operate in C-band
  - CGC in S-band can be part of next generation main stream "blue light" , urban security and use of video surveillance
  - Other operators also heavily use Ku band

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