



# **ITU Kaleidoscope 2013**

**Building Sustainable Communities**

## **A World without Telecommunications as an Extreme Event**

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# Risk Factors in Telecommunication Services

- Telecommunication services
  - Infrastructure + operations support systems + methods and procedures + content
- Risk factors
  - Failure of infrastructure
  - Unavailability of OSS applications
  - Inexperienced personnel
  - Content affecting the integrity of infrastructure or OSS
  - Lack of financing

# Infrastructure Vulnerability

## ■ Physical

- ➔ Cable cuts
- ➔ Atmospheric conditions including solar storms, super solar storms (1 every 100 years)

## ■ Network

- ➔ Failure of network elements (mostly due to software errors)
- ➔ Extreme congestion

# Other Factors

- OSS Vulnerability
  - Unix and C clock expiration
    - 4-octets vs. 6 octets representation of time
  - With 4 -octets, clock expires on 19 January 2038
- Training of workforce
- Malware in content
- Financial stability is affected by the overall economic conditions

# Vulnerability Pre and Post- Internet

<b>Reliability</b>	<b>Pre-Internet</b>	<b>Internet</b>
No single point of failure	Signaling and control separate from user traffic	Control and user traffic share same physical infrastructure
Diversity of physical networks	Broadcast POTS Data Networks Postal Network Mobile networks	Convergence on a core IP network
Quality of Service	Guaranteed	No Guarantees
Authentication	Access control	No easy way
Overall Stability	Controlled within national network	Any node can affect the rest of the global network

# Risk Evaluation

- Sources of risks: political, financial, natural causes, etc.
- Risk characterization
  - Event, probability and impact
  - Extreme risks: very low probability and onerous consequences
  - Extreme Value Theory: to predict the unpredictable

# Strategies for Risk Management

- Transfer risk to another party
- Risk mitigation
- Risk avoidance

# Risk Mitigation and Avoidance

- Need for quarterly returns → long term horizon is a low priority
  - Impact on long-term budgets, availability of funds for research and schedules
  - The cost of preparing for rare events cannot be justified from a strictly financial viewpoint.
- Network adaptability:
  - IP protocol suite was built to survive disasters
  - Islands of connectivity can be available
  - Electric supply is necessary. National grids may be affected.
  - Network synchronization systems
- Risks cannot be transferred to governments due to austerity

measures



# Is there something to be done?

- An ITU-T initiative to use Extreme Value Theory to analyze the changes of total telecommunications loss
- Modeling the various risk factors, their probabilities and their impact on the global connectivity