IP-based Emergency Services

Challenges to emergency communications services in the context of the Internet and the multinational European environment

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REGULATORY VIEWS

FCC Chairman Julius Genachowski

August 2011

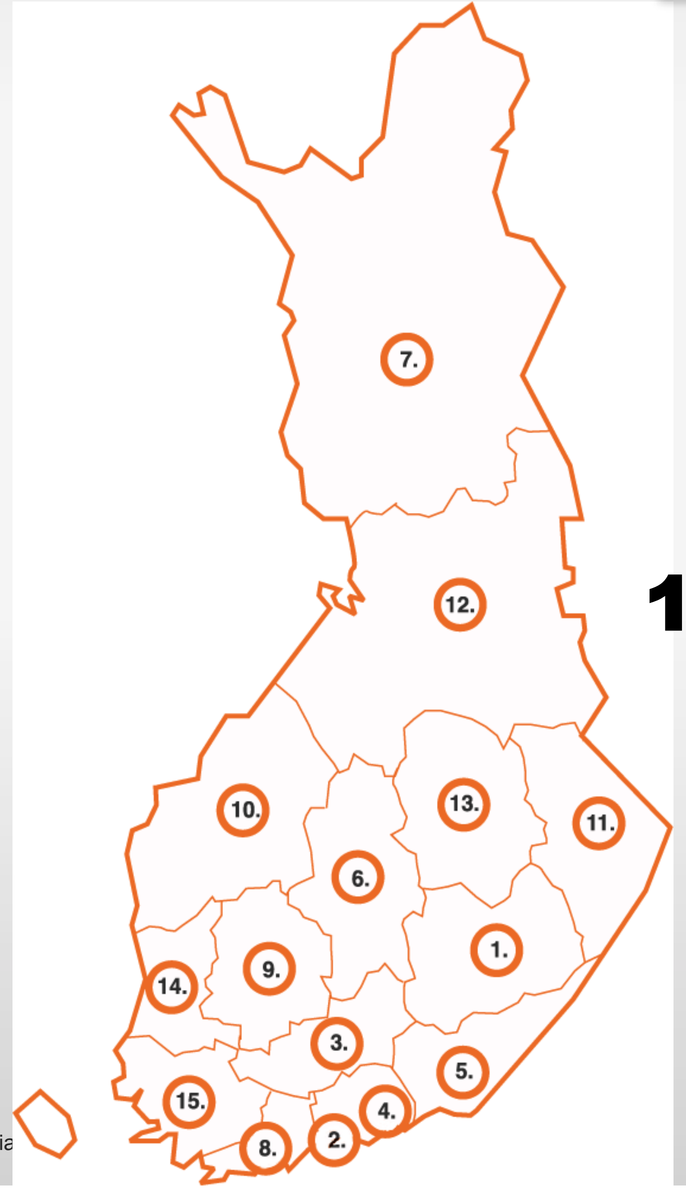
- "*It's hard to imagine that airlines can send text messages if your flight is delayed, but you can't send a text message to 911 in an emergency.*"
- He continues, "*The unfortunate truth is that the capability of our emergency-response communications has not kept pace with commercial innovation, has not kept pace with what ordinary people now do every day with communications devices.*"

EC VPs Neelie Kroes & Siim Kallas
February 2012

- They decided to work together to ensure every European can access a 112 smartphone app, in their own language.
- This announcement was made on the European 112 day when surveys revealed that "74 % of Europeans don't know what emergency number to call when traveling in the EU".

EMERGENCY SERVICES AUTHORITIES

Cost Reduction leads to Consolidation
Example Finland



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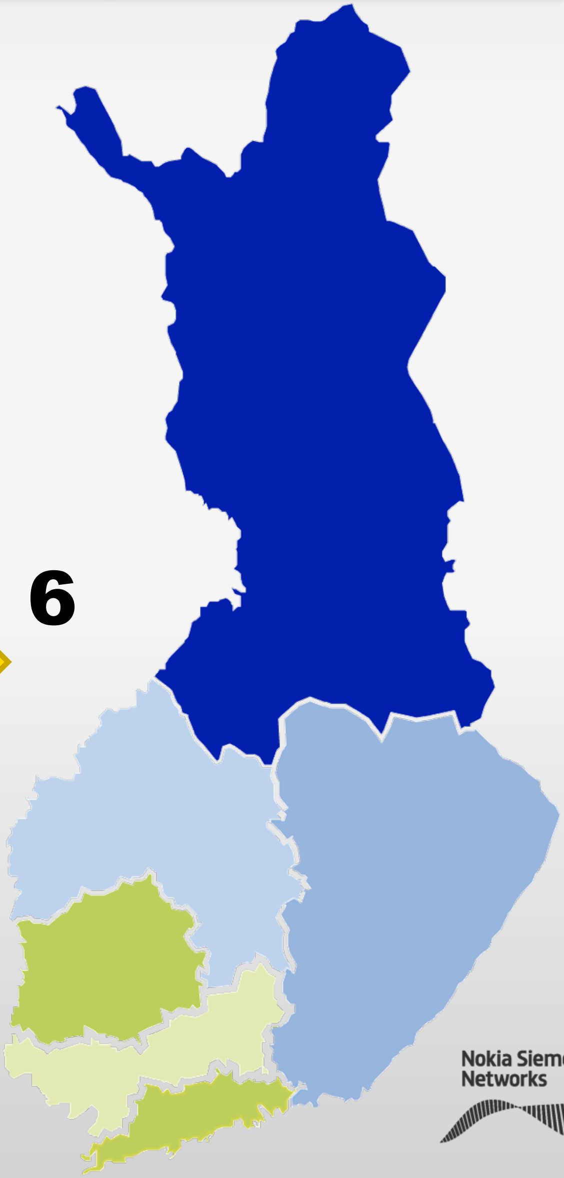


~160 PSAPs in 1970.
At the moment 14.

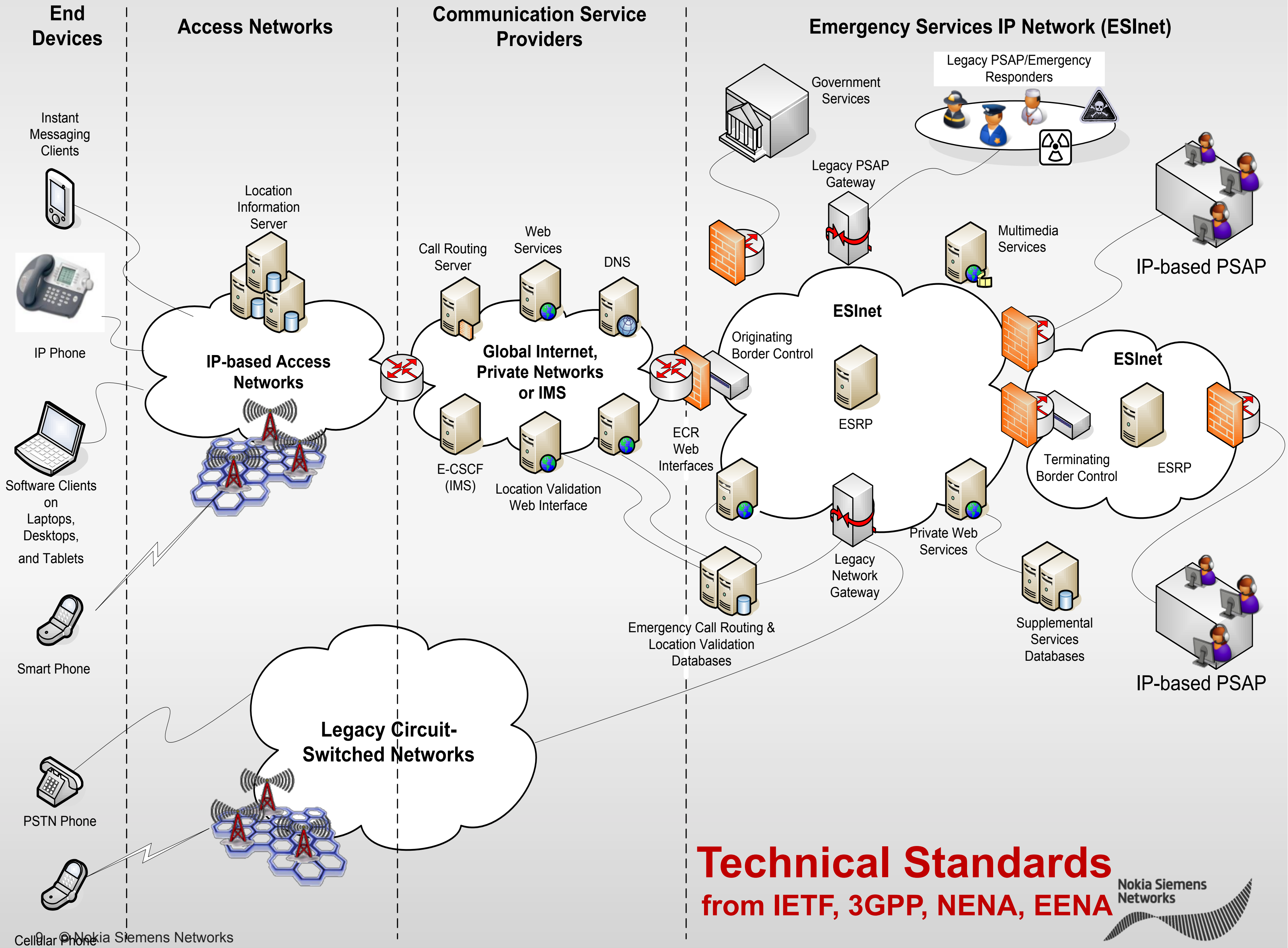
Requirements
From Emergency Services Authorities

Requirements

1. Standards based approach for
   1. Location conveyance (Q8: 100% yes)
   2. PSAP – interface (Q5: 95% yes)
   3. Call Routing (Q9: 72% yes)
2. Multi-Media communications with citizens
   - Q4 : 97% yes
3. Emergency Services Interoperability
   - Q11: Avg. 3,65
     (1 = less important; 5 = very important)

The survey, distributed in Europe in Aug. 2011, can be found here:
http://www.eena.org/ressource/static/files/2011_09_08_ng112opreqsurvey_v1.2.pdf

TECHNICAL COMMUNITY


End Devices
Access Networks
Communication Service Providers
Emergency Services IP Network (ESInet)
Instant Messaging Clients
IP Phone
Software Clients on Laptops, Desktops, and Tablets
Smart Phone
PSTN Phone
Cellular Phone
Location Information Server
IP-based Access Networks
Legacy Circuit-Switched Networks
Call Routing Server
Web Services
DNS
Global Internet, Private Networks or IMS
E-CSCF (IMS)
Location Validation Web Interface
ECR Web Interfaces
Emergency Call Routing & Location Validation Databases
Government Services
Legacy PSAP/Emergency Responders
Legacy PSAP Gateway
Multimedia Services
ESInet
Originating Border Control
ESRP
Legacy Network Gateway
Private Web Services
Supplemental Services Databases
ESInet
Terminating Border Control
ESRP
IP-based PSAP
IP-based PSAP

Technical Standards

from IETF, 3GPP, NENA, EENA

CHALLENGES

Security Concerns

- We are building on top of the regular IP-based infrastructure and SIP as a communication mechanism.
- Consequently vulnerabilities are inherited as well.
- Resource consumption at the PSAP based on false calls is one biggest security threats:
- Example: swatting
- There are many variants of false calls, see EENA publication.
- Some countries have very high numbers of false calls (>50% of the total # of calls are false calls).

The Attribution Problem*

- Attribution …
- Requires to identify the agent responsible for the action
- Determining the **identity or location of an attacker** (or an attacker's intermediary).
- Four aspects of attribution:
- Types: if users are expected to be identified in some way, what is the source of that identity? What can we conclude about the utility of different sorts of identity?
- Timing: what are the different roles of attribution before, during and after an event?
- Investigators: how might different parties exploit attribution as a part of deterrence?
- Jurisdiction: what are the variations that we can expect across different jurisdictions? How might this influence our choices in mechanism design?

(*) D. Clark, S. Landau, "Untangling Attribution", in Proceedings of a Workshop on Deterring CyberAttacks: Informing Strategies and Developing, 2010.

The *untrusted* End Host

- In spring 2011 the European Commission issued Mandate 493 calling for new standardization work on caller location for emergency services.
  - The impression of the EC was that the lack of IP-based location is caused by the lack of European standards in that space.
  - A European SDO had to be found to execute this need for new standards. ETSI was happy to take on this task.
- Note: This is different from the recent attempt of the EC to improve location accuracy in Europe.
- The ETSI M493 group was formed and it operates under the assumption that information from the end host cannot be trusted (including location).
  - Changes require additional infrastructure support (e.g., Location Servers in every access network).
  - Transition path to new architecture is very complex.
  - Participating stakeholders do not necessarily represent the Internet eco-system.

The *missing* Business Model

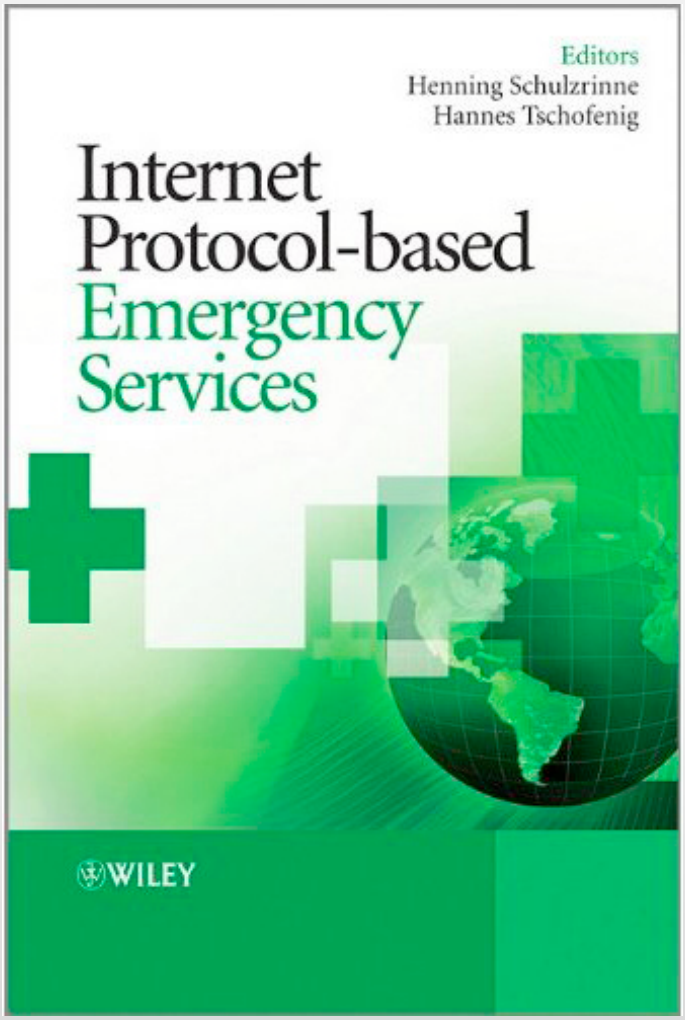
- Location is considered to be best provided by the access network provider (ANP).
- ANPs (in Europe) did not want to invest in location servers offering high quality positioning techniques.
- Commercial location based services have not worked out well for operators.
- Emergency services will not bring them new income either (based on constraints imposed on EC regulation).
- ANPs are fine with offering emergency services for their own IMS-style services.
- Interest to provide any support for OTT providers is “limited”.
- Additional challenges created by regulation in Europe.
- uses E.164 numbering to decide whether an VoIP provider is subject to regulatory requirements.
- Law does not distinguish between access provider & application provider

Nokia Siemens Networks

Conclusion

- Emergency services: a mix of technology, business models, regulation, and user expectations.
- Many stakeholders with different incentives.
- Emergency services heavily impacted by the underlying communication infrastructure.
- The cross-jurisdictional nature of the Internet communication makes agreements difficult.
  - Emergency services was previously a purely national matter. The contact persons of regulators now change.
- Security concerns may prevent re-use of innovative application and may impact extensibility.
- Allowing users to initiate emergency communication from any device, from any environment with rich multimedia will still take a long time.

Book Announcement



- Edited by Hannes Tschofenig & Henning Schulzrinne
- Long list of contributors from the emergency services community.
- More info: http://ip-emergency.net/