The NG112 Long Term Definition Standard

EU Emergency Workshop 2012

Riga – 19 of April 2012

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Agenda

1. History
2. What is the NG112 LTD?
3. Document Objectives
4. Selected Items from the NG112 LTD Document
5. Future Work & Next Steps

Where do the standards come from?

- Emergency services builds on a communication architecture. The industry decided that it will be SIP – the Session Initiation Protocol
  - February 1996: Initial submissions for SIP were made in the IETF
  - Later chosen by other SDOs, including 3GPP with their IMS.
- Emergency services extensions to SIP:
  - November 2004: IETF ECRIT BOF – Jon Peterson & Hannes Tschofenig
  - Co-chaired the IETF ECRIT working group from 2005 to early 2010 together with Marc Linsner.

Where do the standards come from?

- A lot of access network specific emergency services extensions
  - 3GPP for cellular WiFi, Wimax, CableLabs, DSLForum/Broadband Forum, enterprise networks
- Location standards:
  - OMA, and IETF GEOPRIV for protocols
  - OGC for geodetic location encoding
- Coordination with many other groups:
  - 2007 – The first SDO emergency services workshop takes place in New York, see http://www.emergency-services-coordination.info
  - NENA is among that group of organizations.

History

EENA

- Hannes became EENA NG112 TC co-chair in 2010.
  - Interaction with NENA soon started because of the similar organizational structure.
- From 2010 lots of information sharing about the European emergency system in the NG112 group was made.
- In March 2011 we published the Introduction to the European Next Generation 112.
- A requirements analysis for NG112 was conducted and matched against the service requirements developed by the operations committee.
- Mid 2011 we did a poll in the NG112 TC on the next steps for the work on the technical architecture. Group reinforced the desire to progress the work on the NG112 LTD document.
- Many conference calls and email exchanges later we announced the publication of the NG112 LTD version 1 on the 11th of April. Link to the document here.

What is the NG112 LTD?

- It is the TECHNICAL standard for our next generation IP-based emergency services architecture.
- It describes the final outcome (with interconnection points to legacy network elements).
- It defines INTERFACES to a set of FUNCTIONAL ELEMENTS.

Document Objectives

- Focuses on the emergency services infrastructure
  - Leaves the access network interaction flexible
- Based on NENA i3 architecture
  - Heavy re-use of available, global standards
  - Foundation: SIP and HTTP
- Compatible with European emergency services organisational structure
  - See also recent EENA's PSAP in Europe publication.
- Out-of-scope: Communication to First Responders

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NG112 LTD meets EENA Operational Requirements

NG112 LTD	EENA Survey 8/11
1. Standards based approach	✓ Q13: 98% yes
1. Geo-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

NG1-1-2: A standards-based SIP/IP Emergency Services Network (ESInet), with dynamic call routing of multi-media communications and advanced call processing functions

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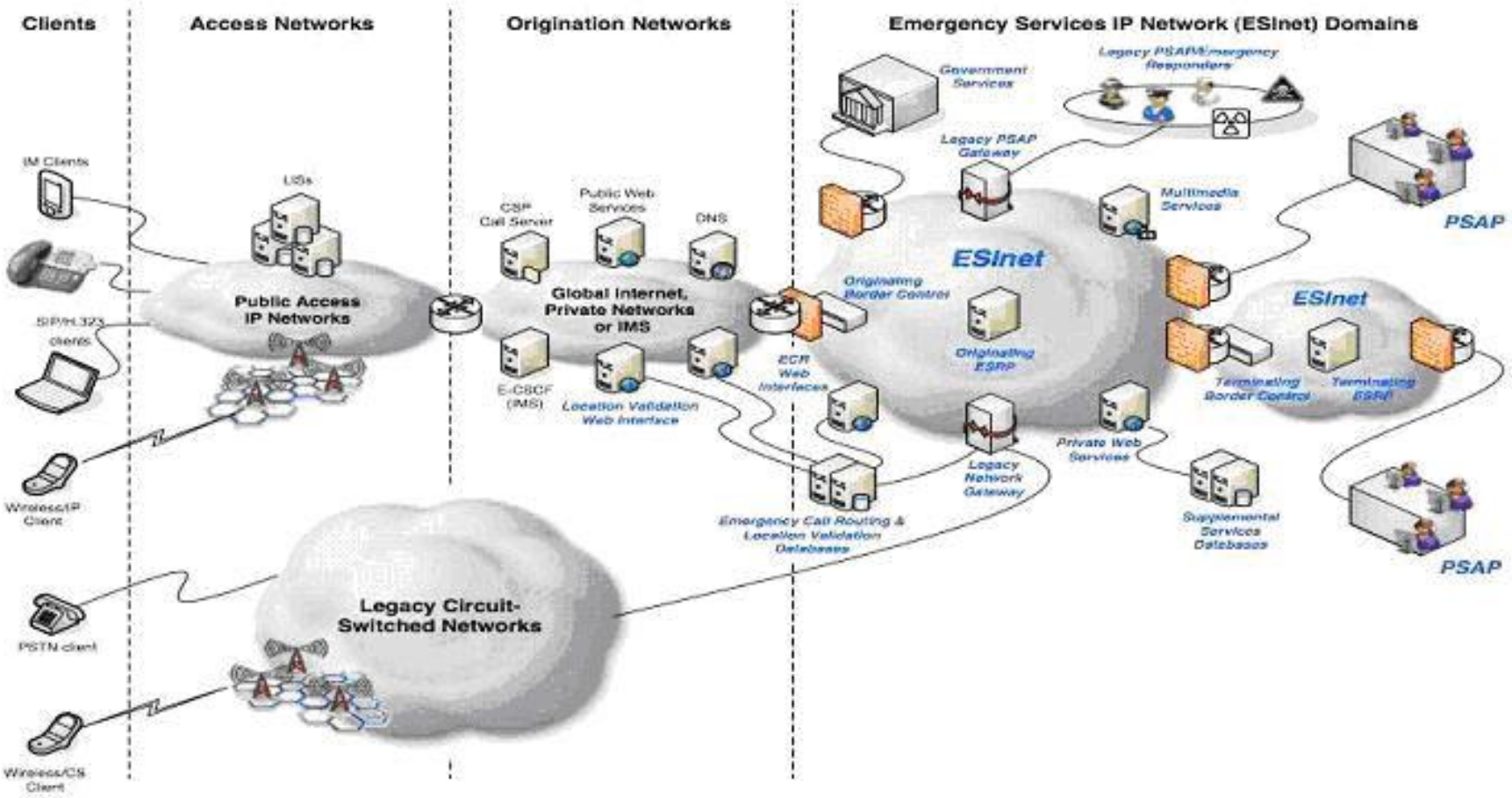
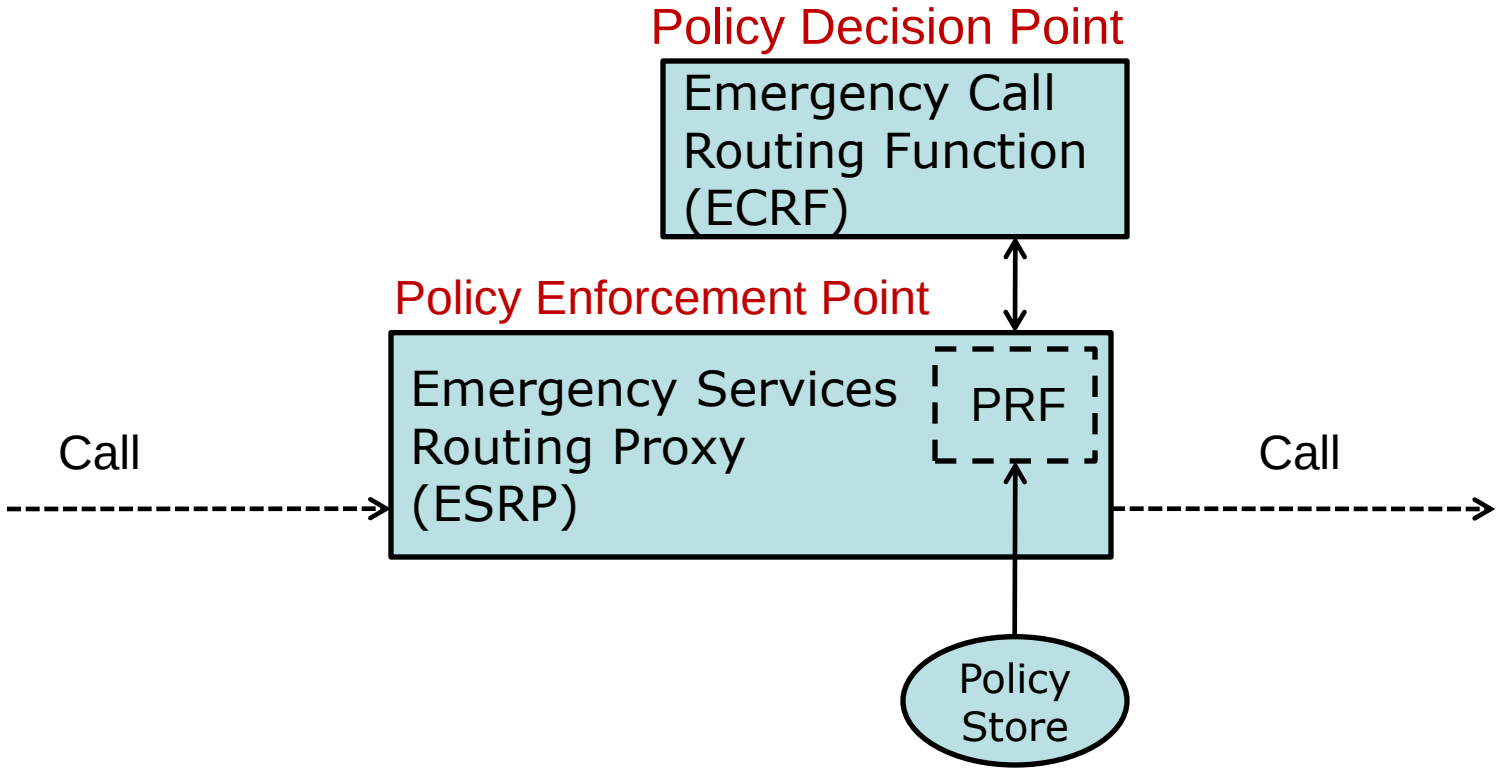
The Big Picture



Emergency Services IP network (ESInet)

- It's just an IP network, nothing at all special about the network.
- It's private and managed but it is not a walled garden.
  - The ESInet is connected to the Internet
- All public safety, not just 112.
- ESInet refers to the network (routers and links) and NOT the services that run on it.
- The key to reliability is redundancy and security protection.
  - Use every ISP you can get, if they are diverse
  - Lots of cheap bandwidth is good.

Emergency Call Routing



Emergency Call Routing, Cont.

- Accomplished via the Emergency Call Routing Function (ECRF)
  - Used for ALL calls
- Queried automatically – using a protocol (RFC 5222)
  - Send location (PIDF) in, plus a "service urn" and get a URI of where to send the call out
  - Conceptually, geocode civic & point-in-polygon
- ECRF also used to route to correct police, fire, ambulance, poison control, mountain rescue, …

Emergency Call Routing, Cont.

- Data is provisioned by 112 authorities
  - Polygons define service boundaries
  - Real-time updates
  - Change the boundary, and in a couple of minutes, new calls route with new polygons. Useful in disasters.
- Sounds complex? Actually, it isn't.
  - Uses data that is already available.
  - Computer driven approach of what is already done today.
  - See EENA Transnational Calls

Emergency Call Routing Proxy

- This is the call routing engine
- Uses the ECRF to choose a nominal next hop
- Then, applies the route policy of the nominal next hop to determine actual next hop
  - Route policy can take into account state of PSAPs, congestion, media, source, suspicion level, …
  - Route decisions can be: next ESRP, nominal PSAP, diversion PSAP, IMR, busy

Policy Routing Function (PRF)

- PSAP controlled rules for how calls are routed in ESRP
- Inputs are PSAP state, congestion state, security posture, call suspicion, call state (SIP headers and additional data), call taker skills, etc.
- Output is a routing decision
- ESRP queries ECRF with location for “nominal next hop’. That entity’s policy is fetched from a policy store and interpreted
- Rules are of the form:
  IF “This Condition” is true, THEN do “That Action”
- Policy is dynamic = change it at any time, new calls route with new rules
- Policy rules have a standardized format

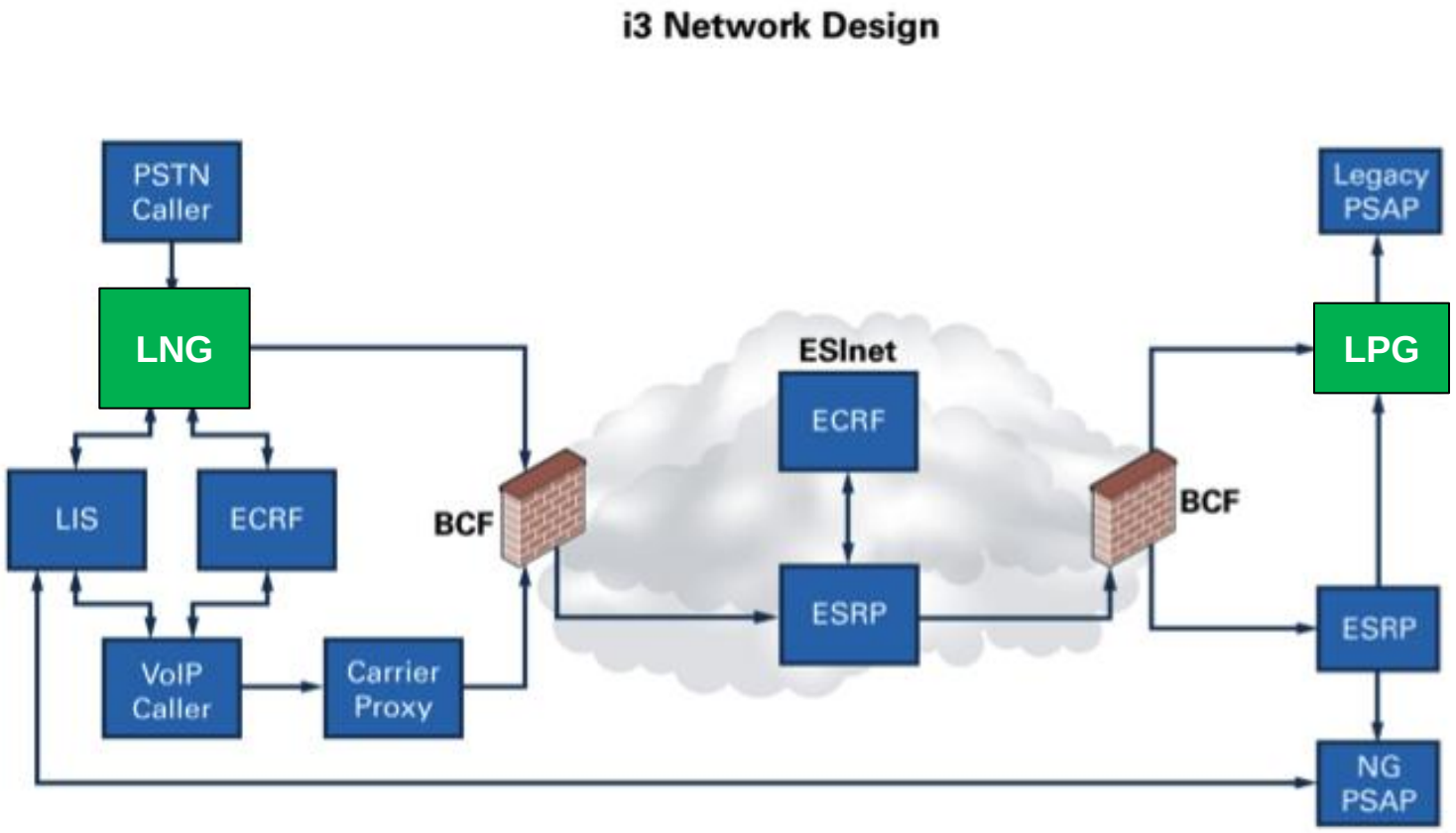
Border Control Function (BCF)

- External security border for ESInet
- Internal isolation border for PSAP
- Has both firewall and Session Border Controller (SIP specific) parts
- Can mark calls with suspicion levels
- Has functions to block specific call sources
- ESInet BCF must withstand DoS attacks

IP-based PSAP

- Gets all calls via the ESInet
  - Uses SIP as a core component
  - With location
  - Routed by ECRFs
- Can use ECRF/ESRP to route to queues of call takers
- All IP-based PSAPs are multimedia capable: voice, video, real-time text, and messaging
- Allows for virtual PSAPs

Legacy Interworking Overview



LNG: Legacy Network Gateway
LPG: Legacy PSAP Gateway

Source: NENA Developers Conference 2/12

Legacy Interworking

Legacy Network Gateway (LNG)

- Mandatory component to interconnect with legacy origination networks
- Bridge between existing origination network and ESInet
- SS7 interface to origination network, SIP interface towards ESInet
- Routes via ECRF, always. Comes through the BCF, always. Uses the ESRP, always.
- Interworks location
- SIP/HELD (MLP) interface for LbyR towards ESInet

Source basis: Brian.Rosen@neustar.biz (NENA Developers Conference 2/12

Legacy Interworking
Legacy PSAP Gateway (LPG)

- Mandatory component to connect existing “legacy” PSAPs to ESInet
- Full NG/SIP interface towards ESInet, BRI/ PRI interfaces towards PSAP
- Ensures a common PSAP interface (based on SIP/IP) towards ESInet
- More than one PSAP per LPG possible
- No upgrades needed at PSAP to protect assets, but needs a GIS compatible with NG112

Source basis: Brian.Rosen@neustar.biz (NENA Developers Conference 2/12

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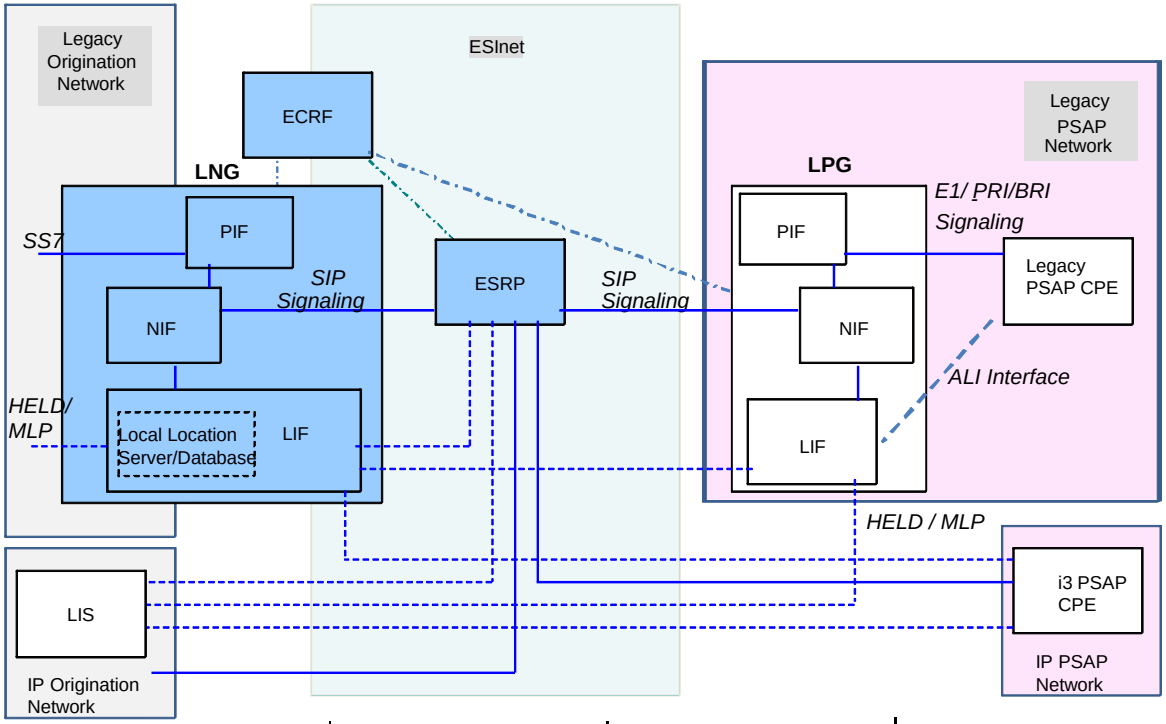
Legacy Interworking
Detailed View



Legacy Interworking, Cont.

Gateway related changes	Legacy Network GWY (LNG)	Legacy PSAP GWY (LPG)
Interfaces	SS7 as standard interface	SIP (LPG becomes part of legacy infrastructure)
Location Delivery	HELD, MLP	HELD, MLP
Number plan	ITU-T E.164	ITU-T E.164 (partially described, yet)
Service	Voice	Voice

Security

- Security is not a monolithic block. Security is not binary either.
- Document goes through a detailed threat analysis and provides a list of recommendations for addressing threats.
  - Threats range from attacks against individual emergency callers, to attacks against the emergency service system
- Four main areas are:
  - SIP signaling communication
  - Exchange of multi-media data
  - Mapping database
  - Location infrastructure
- Security for ESInet is based on working PKI.

NG112 LTD: Future Work (Selected Items)

XMPP had gained a lot of attention in the industry for instant messaging. How should it be integrated into NG112?
PSAP Callback: Standardization work still at an early stage.
Additional Data: Standardization progressing nicely and new results can be incorporated.
Legacy Network Gateway: Support for other media? (e.g., SMS, eCall)
Additional protocol support for sensor alerts
Security: •Creation of a certificate authority for usage with emergency services organizations. •Access control policies and user provisioning needs to be specified in more detail.
The EENA Registry Service (ERS) has to be established.

Beyond pure document work: Education, Regulation, Funding

Next Steps

Timeframe	Item
Starting with May 2012	1. Identification of open issues that need to be addressed. 2. Work on open issues started. 3. Incorporate feedback from interoperability events
Starting with July 2012	Transition architecture write-ups

NG112 LTD meets Summary

NG112 LTD	NG112 LTD

1. Standards based approach
  1. Geo-Location conveyance
  2. PSAP – interface
  3. Call Routing
2. Multi-Media communications with citizens
3. Emergency Services Interoperability
	✓ existing open standards are utilized (ETSI, IETF…)
	✓ Architecture and SIP/IP technology
	✓ Legacy Integration concept

NG1-1-2 LTD: EENAs contribution to the future standards-based SIP/IP Emergency Services deployments in the EU

Thank you!

Feel free to drop us a mail.

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