HeERO 112

Harmonised eCall European Deployment

Next Generation 112 eCall

eCall Final Event - Brussels
15th May 2018

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Luxembourg

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Agenda

- Introduction Next Generation eCall
- Migration Path
- Satellite and eCall
- Proof of Concept

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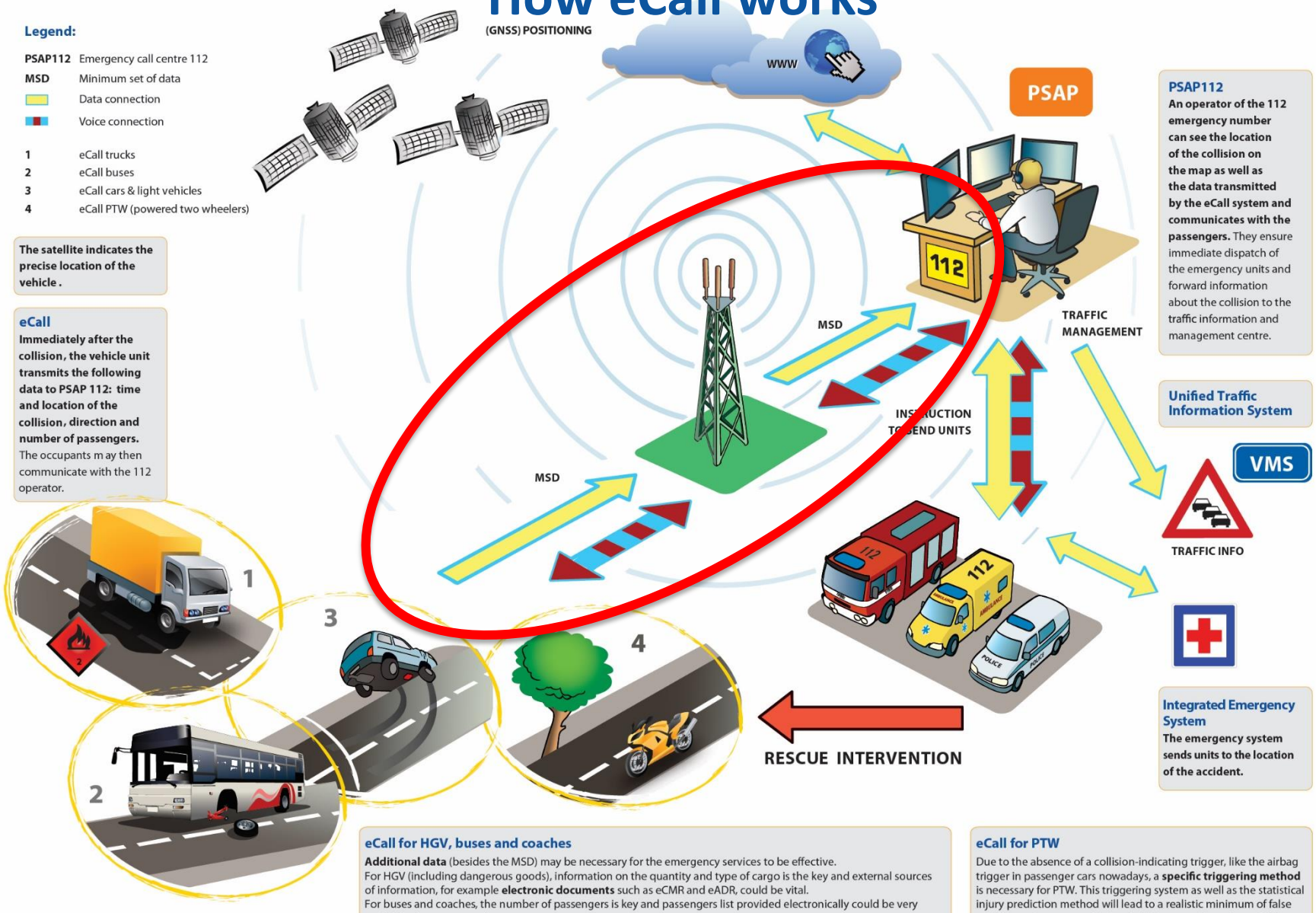
How eCall works



The satellite indicates the precise location of the vehicle .

eCall

Immediately after the collision, the vehicle unit transmits the following data to PSAP 112: time and location of the collision, direction and number of passengers. The occupants m ay then communicate with the 112 operator.

PSAP112

An operator of the 112 emergency number can see the location of the collision on the map as well as the data transmitted by the eCall system and communicates with the passengers. They ensure immediate dispatch of the emergency units and forward information about the collision to the traffic information and management centre.

Unified Traffic Information System

Integrated Emergency System

The emergency system sends units to the location of the accident.

eCall for HGV, buses and coaches

Additional data (besides the MSD) may be necessary for the emergency services to be effective.
For HGV (including dangerous goods), information on the quantity and type of cargo is the key and external sources of information, for example **electronic documents** such as eCMR and eADR, could be vital.
For buses and coaches, the number of passengers is key and passengers list provided electronically could be very useful for the rescue services.

eCall for PTW

Due to the absence of a collision-indicating trigger, like the airbag trigger in passenger cars nowadays, a **specific triggering method** is necessary for PTW. This triggering system as well as the statistical injury prediction method will lead to a realistic minimum of false positive and an acceptable level of false negative calls to PSAPs.

Why Next Generation eCall

- eCall today is designed for circuit switched networks – GSM – ISDN
- LTE provides all IP mobile networks
- Telecommunication infrastructure is migrating to all IP infrastructures
  - Replacing infrastructure with newer standards
  - Increasing 4G VoIP coverage
  - Decommissioning of 2G networks is planned in some regions already
    - E.g. Swisscom, Switzerland Dec 2021, T-Mobile, NL, DEC 2020, Telenor, Norway Dec 2025

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eCall Support for IP networks provides advantages

- Possibility to use any IP network
  - Fixed, Mobile (4G, 5G), Satellite
- MSD is part of call setup (SIP invite) message - Standards are defined
  - e.g. IETF NG ecall specification (RFC8147) and additional data specification (RFC8147)
  - e.g. 3GPP IMS ecall requirements and migration from CS ecall

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eCall Support for IP networks provides advantages

- Possibility to transmit more information
  - Today MSD 140 Bytes
  - Extension for NG eCall to 200 or more bytes under discussion

- Possibility to access vehicle cameras from the PSAP
  - Could solve silent call problem
  - But: severe privacy issues!!

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Main difference of NG112 eCall

eCall today

- Accident
- IVS calls 112 centre via GSM

- Setup of voice channel
- Send MSD via inband modem
- Connect driver with 112 centre operator
- Operator can talk to driver and see MSD data

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Main difference of NG112 eCall

eCall today	NG112 eCall
• Accident	• Accident
• IVS calls 112 centre via GSM	• IVS calls 112 centre via VoIP (MSD is send with call setup message)
• Setup of voice channel	• Setup of voice channel
• Send MSD via inband modem	
• Connect driver with 112 centre operator	• Connect driver with 112 centre operator
• Operator can talk to driver and see MSD data	• Operator can talk to driver and see MSD data

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Migration path (1)

- Standard European eCall is available as of April 2018
- Full deployment of NG112 eCall may take 5 to 10 years
- Cars have a life time of over 10 years
- Parallel existence of Standard eCall and NG112 eCall for more than 10 years.
- IVS and PSAPS have to support Standard eCall and NG112 eCall in parallel.

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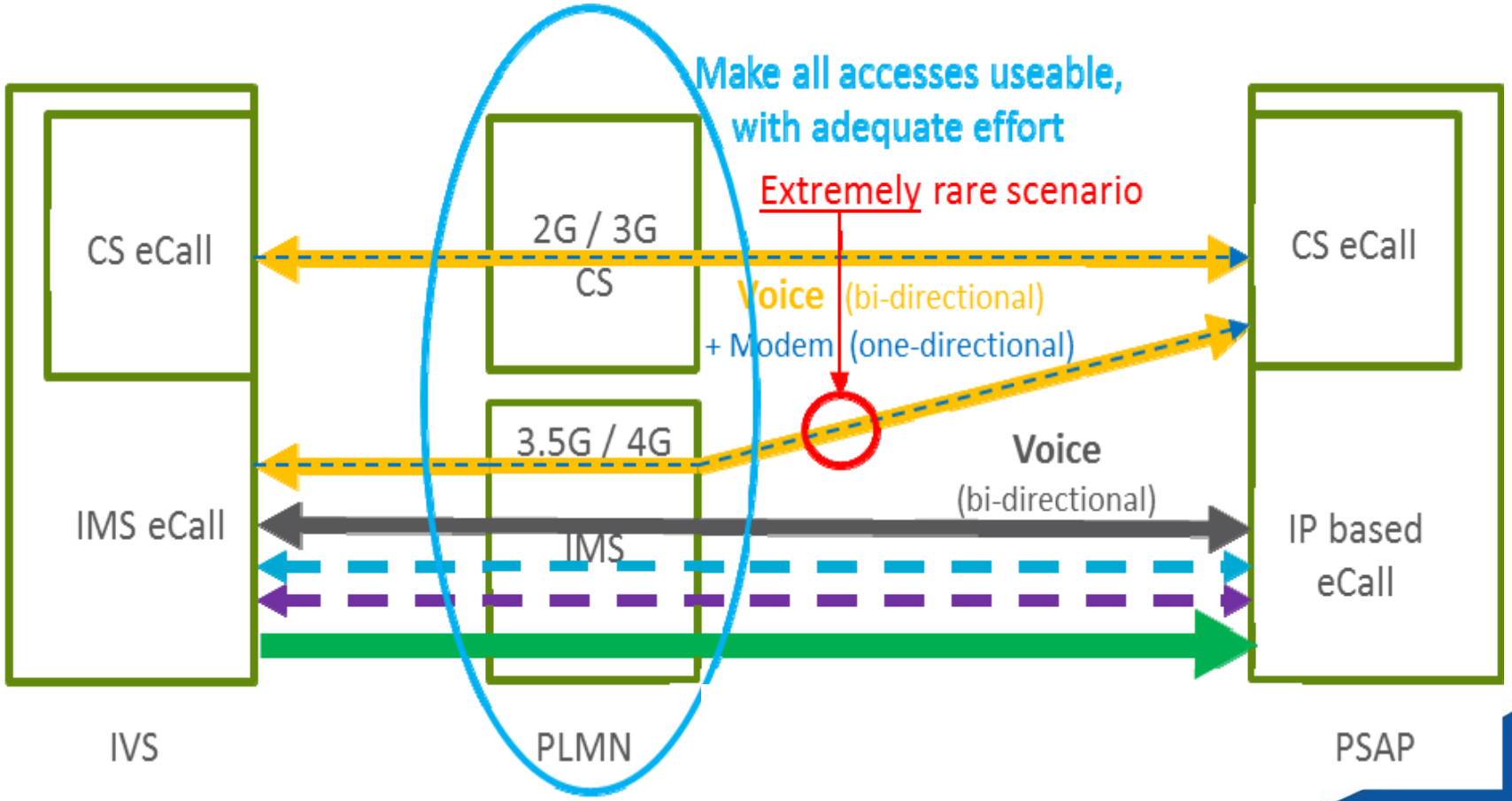
Migration path (2)



ETSI-01

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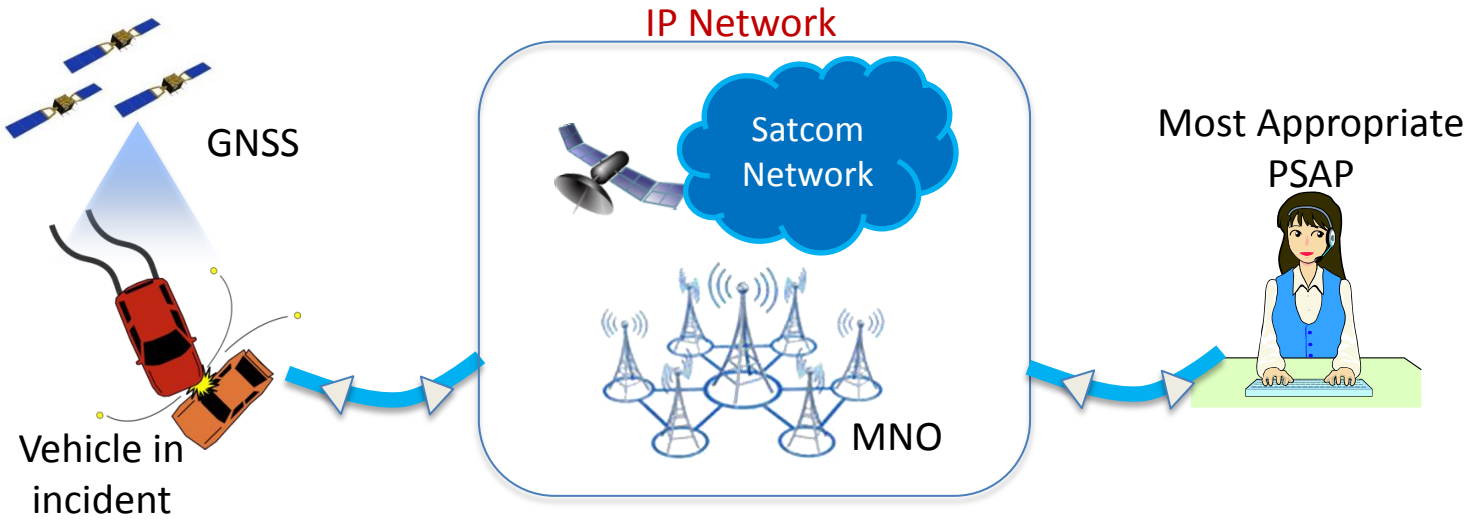
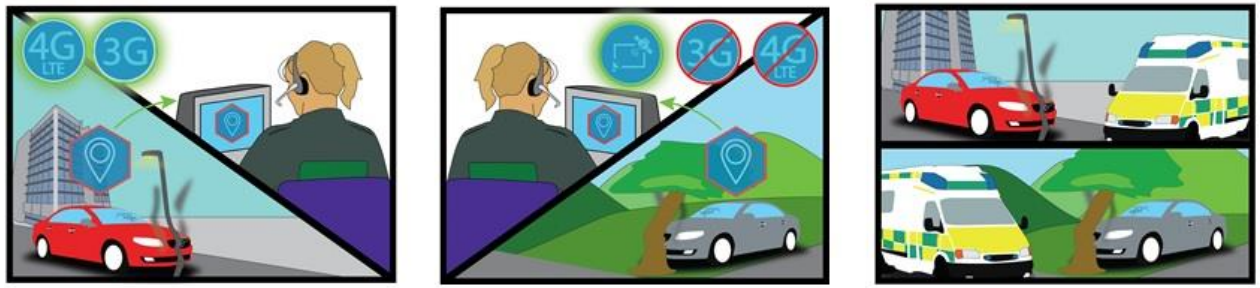
NG112 – Opportunity for Resilience and Reach





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Satcom Network and Emergency Calls

Satellite Networks are capable of handling emergency calls today.

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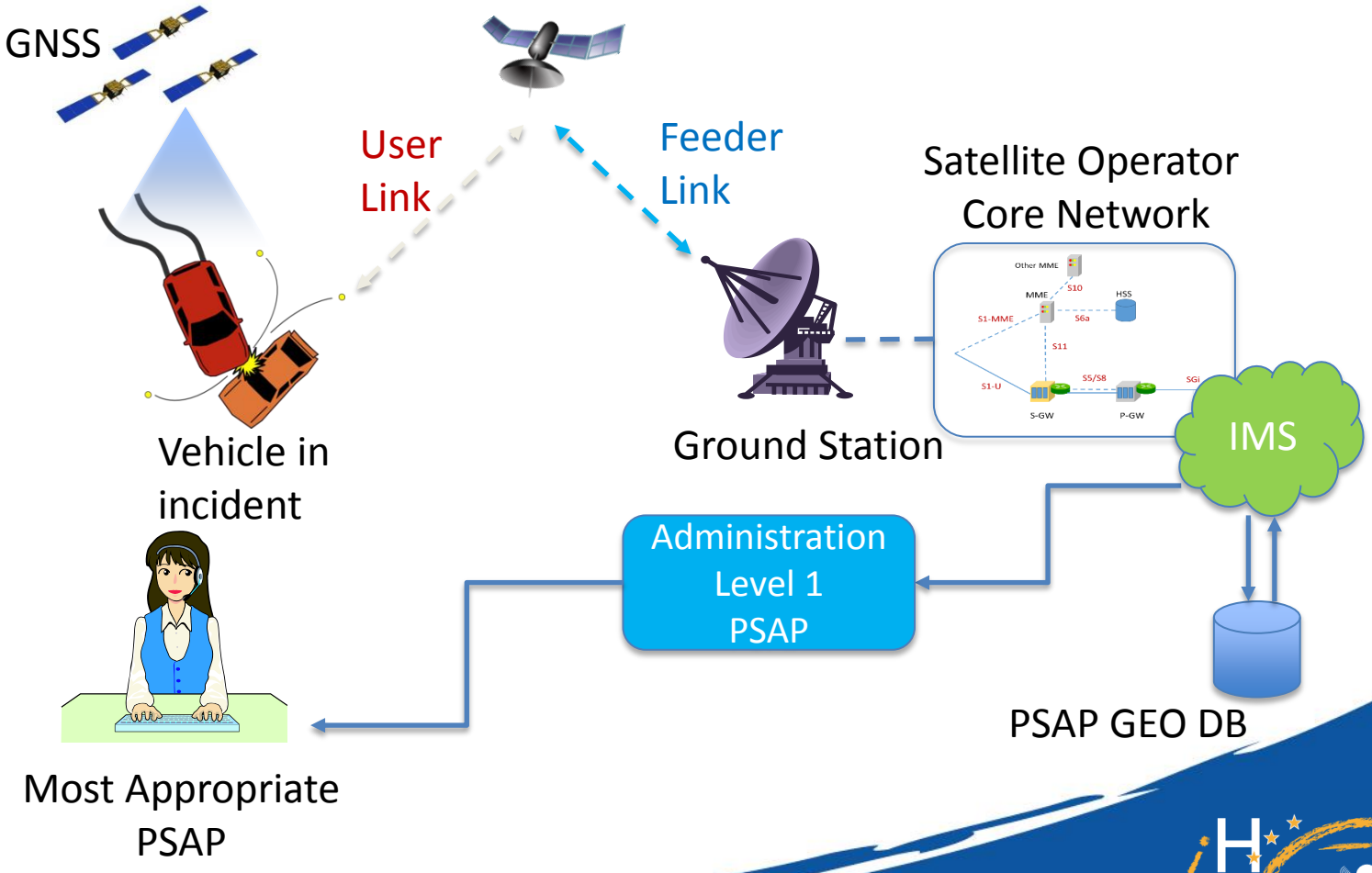
Emergency Call over Satellite – the details



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Proof of Concepts

- FICOSA (Spain)
  - IP enabled IVS – (LTE Network)
- Catapult (UK)
  - IP enabled IVS – (SatCom)
  - IP enabled PSAP
  - IMS
- CUT (Cyprus)
  - IP enabled IVS – (LTE Network)
  - IP enabled PSAP (Open PSAP)
- ISKRATEL (Slovenia)
  - IP enabled PSAP

PoC at ITS in Strasbourg

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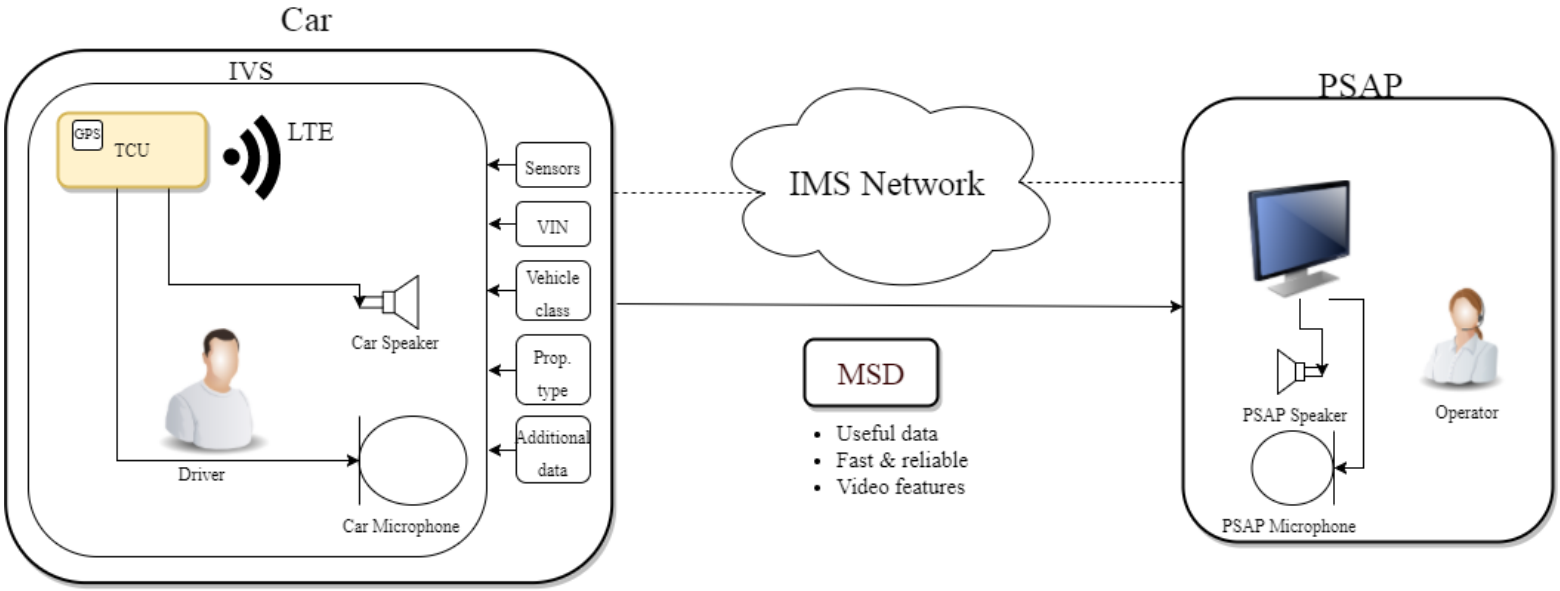
FICOSA



- HW- Platform: Raspberry Pi 3 - SW-Platform: PJSIP open source SIP client
- Test executed:
  - Internal tests
  - Demo at ITS Strassbourg
  - Ficosa NG eCall IVS and Iskratel NG PSAP - PSAP received MSD. real IMS network and LTE conectivity

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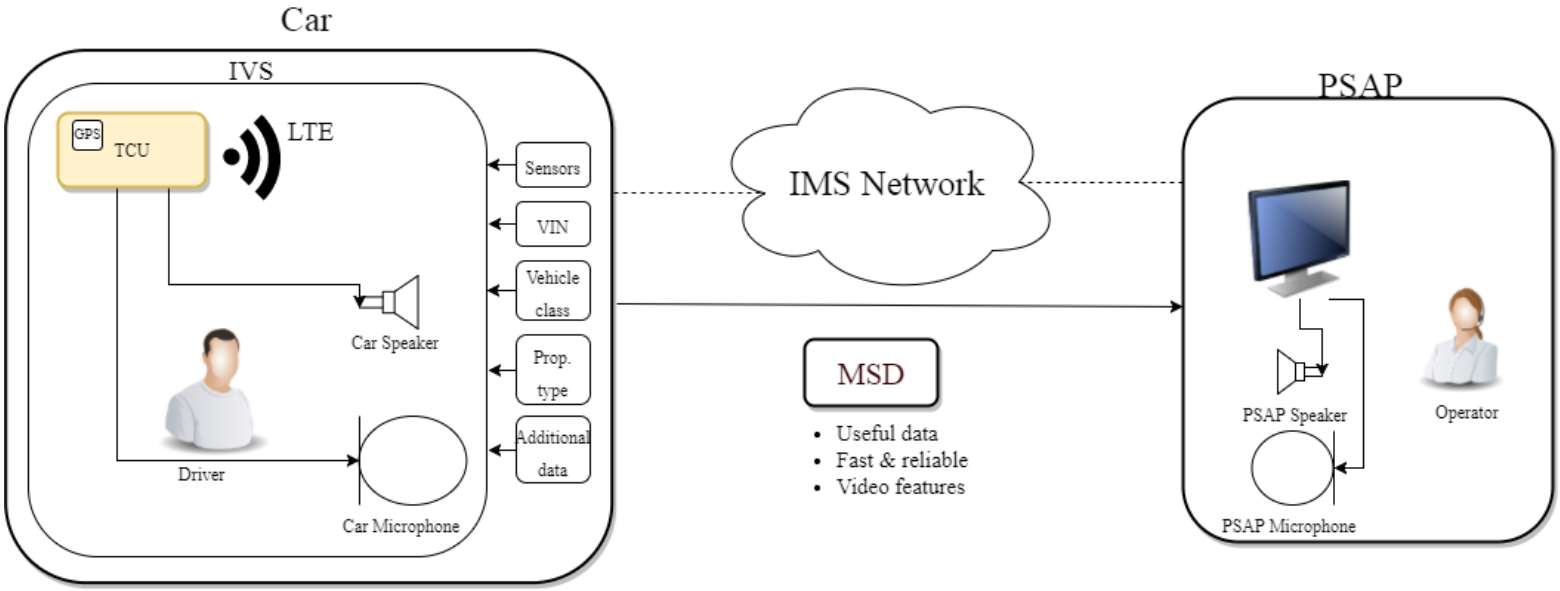
FICOSA



Lessons learned from tests between Iskratel and Ficosa:

- IVS SIP Client should always check that the traffic used type is **UDP**, and PSAP IMS infrastructure responsible for the traffic control (such as *SBC*) should have it unblocked.
- PSAP and IVS should agree on using **the same MSD version**.
- Observation: video **latency** during a videocall is higher than in average SIP applications, but it's under a sufficiency threshold for an eCall

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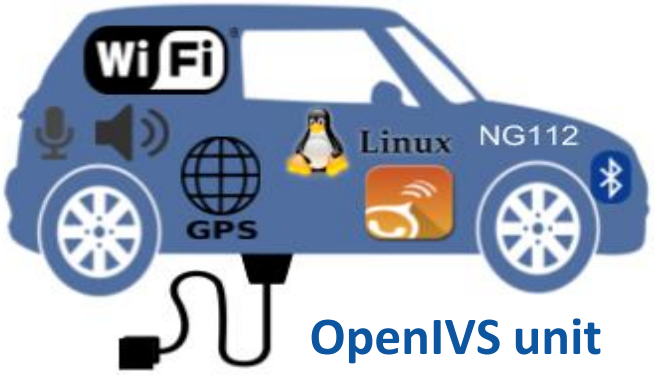
Cyprus Univ. of Technology



OpenIVS unit

NG112

Sip call

OpenPSAP Server

Sip call

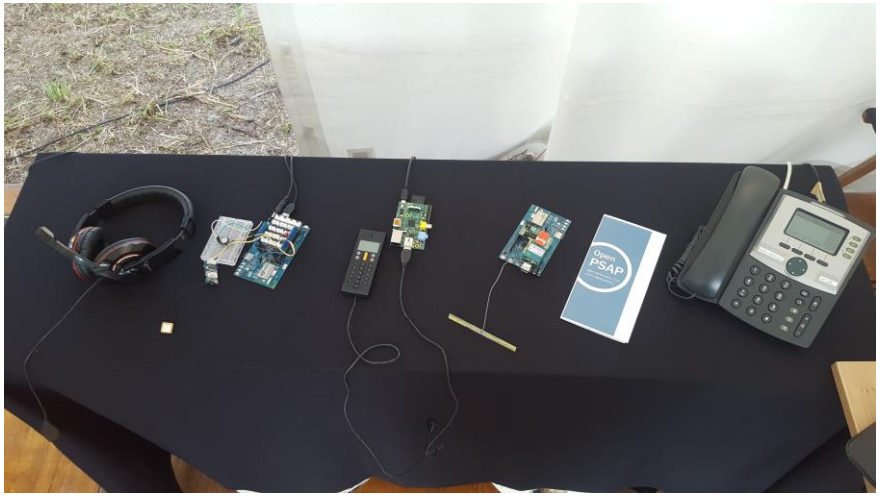
OpenPSAP Agent Client

An open source IVS unit & PSAP available for testing by any organisation

Example - Cyprus Univ. of Technology

Tests executed:

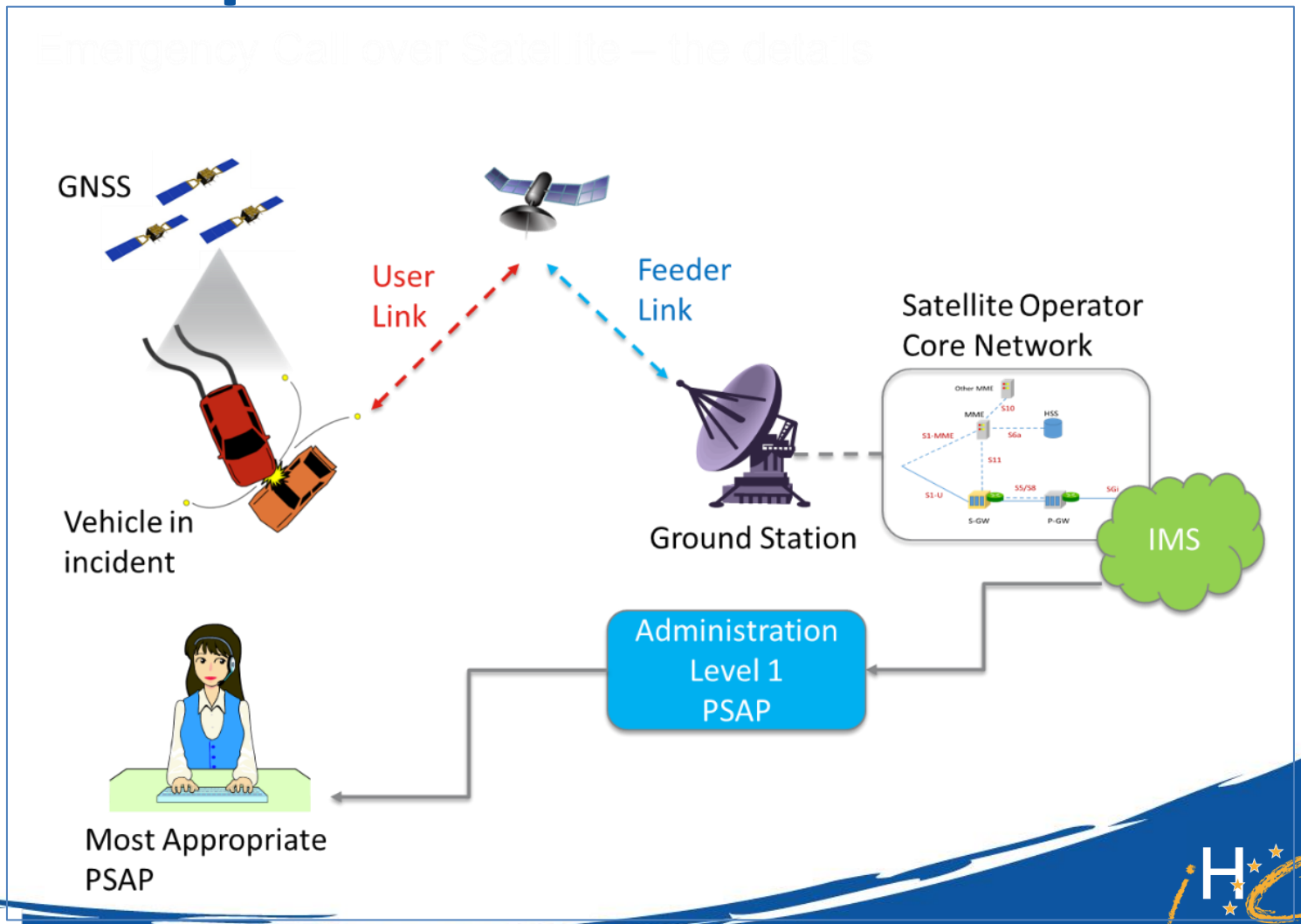
- Local network tests
- Public network tests
  - Frankfurt, Nov 2017
- Interoperability tests
  - FICOSA – CUT



Lessons learned:

- All parties involved should be sending and expecting to receive UDP packages. To support this, the network transport mechanisms used in a real deployment should ensure that UDP-based communication for emergency calls is prioritised in the network to avoid delays in call setup and subsequent media exchange
- The implementation of the MSD schema and sip structure should be universal among vendors. This equally applies to the encoding of the MSD (binary and/or hex encoding).
- All parties involved should be using the same schema for the MSD and be using the "emergencyCallData.eCall.MSD" sip header.

Catapult: Emergency Call of Satellite Concept



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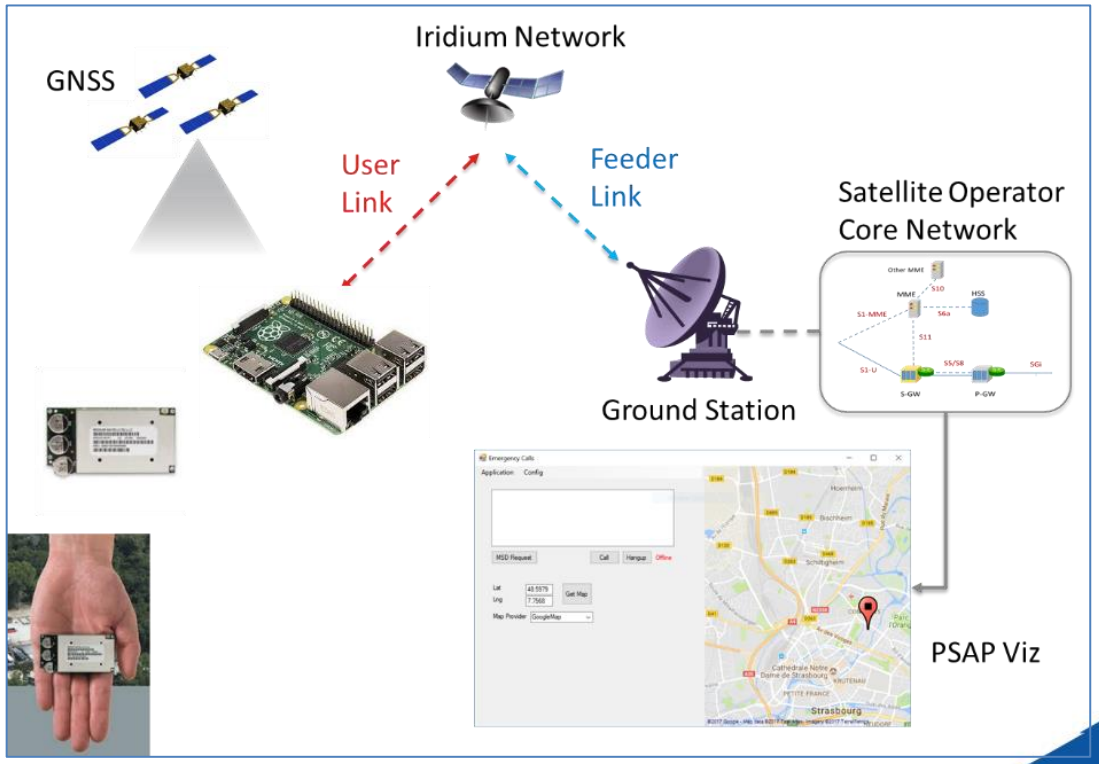
Catapult: Emergency Call of Satellite Implementation

Lessons learned

- NG112 eCall architecture provides a good opportunity to use different IP bearers – and without the use of In-band modem, the development libraries required are simpler
- More remains to be done to make SIP libraries as well as MSD encoding/decoding libraries accessible to developers. This would impact the development cost of NG112 eCall IVS and PSAPs.
- Other satellite networks should be tested – along with the use of different types of IMS implementations



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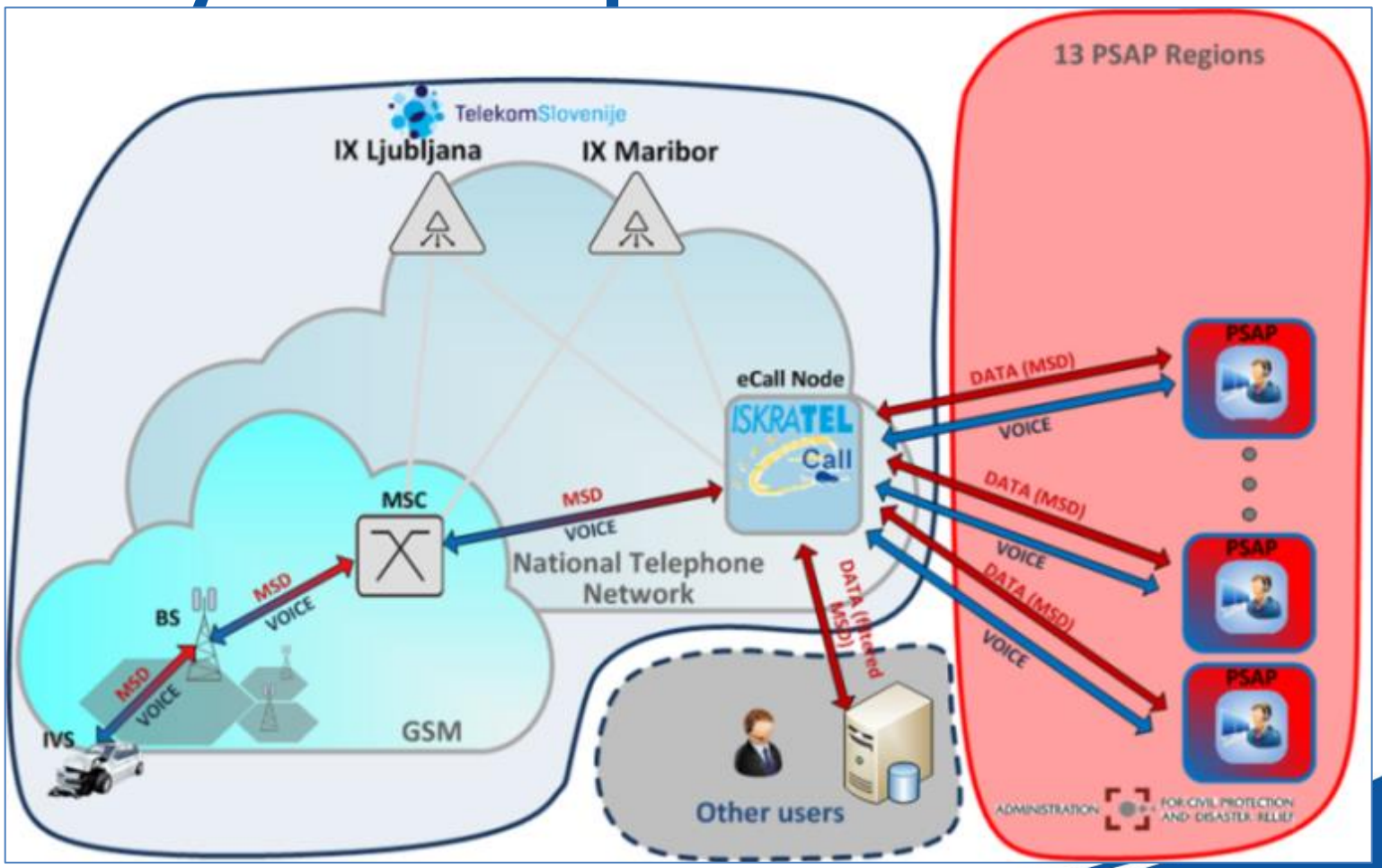
Iscratel – PoC
todays eCall implementation



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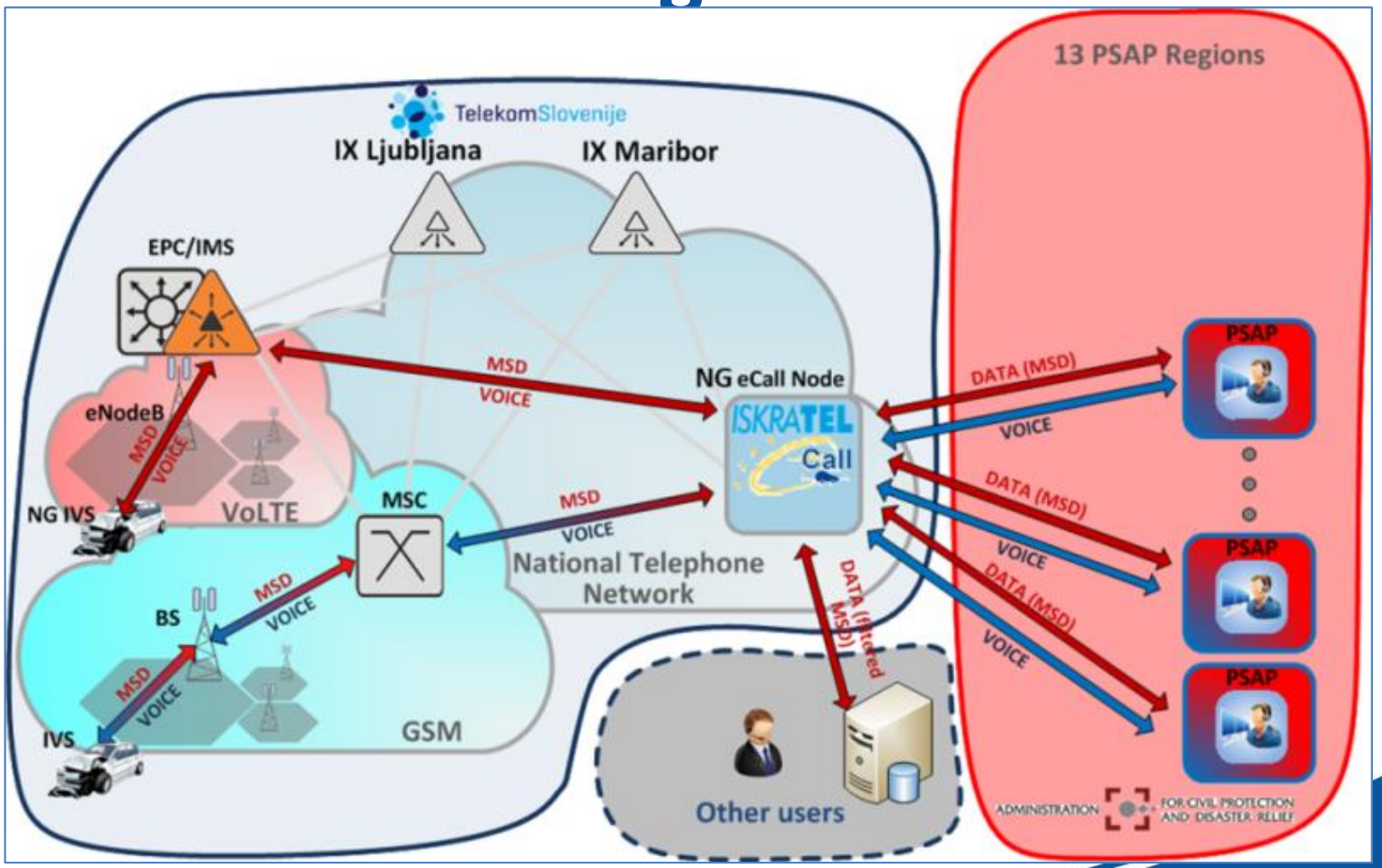
Iscratel – PoC
NG112 eCall integration



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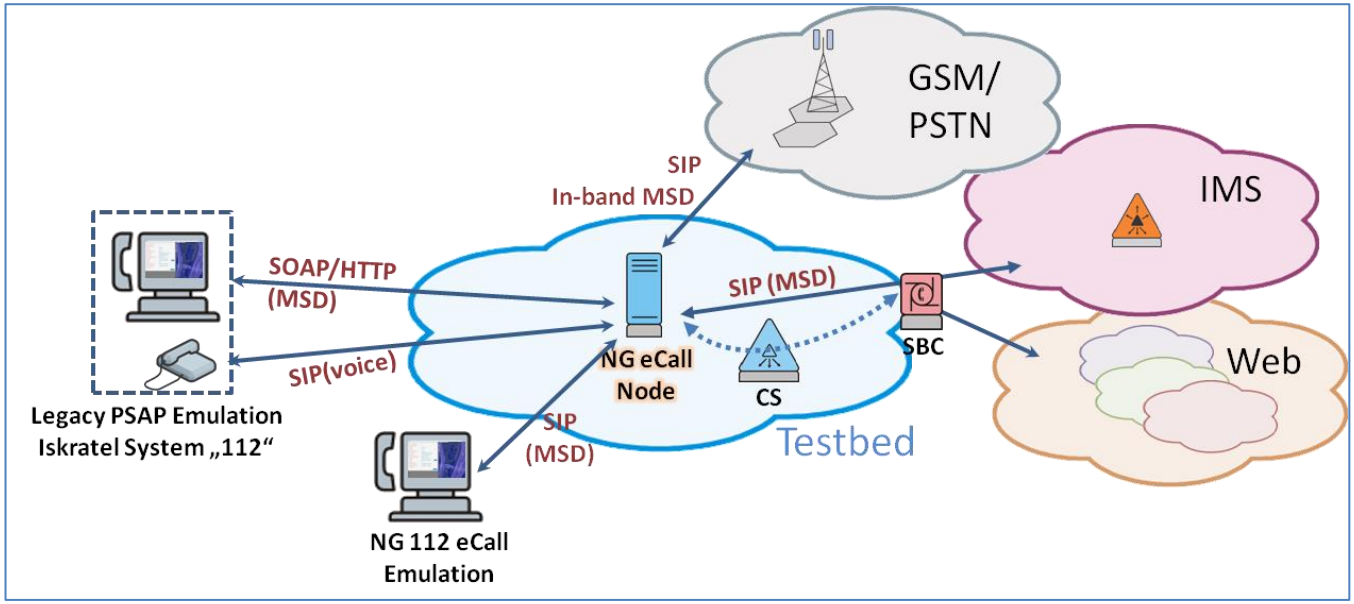
Iscratel – PoC
NG112 test environment



Tests performed:

- circuit-switched eCall IVS device and SIP simulator for handling standard and NG 112 eCall calls in parallel
- 3rd party NG IVS prototype - FICOSA

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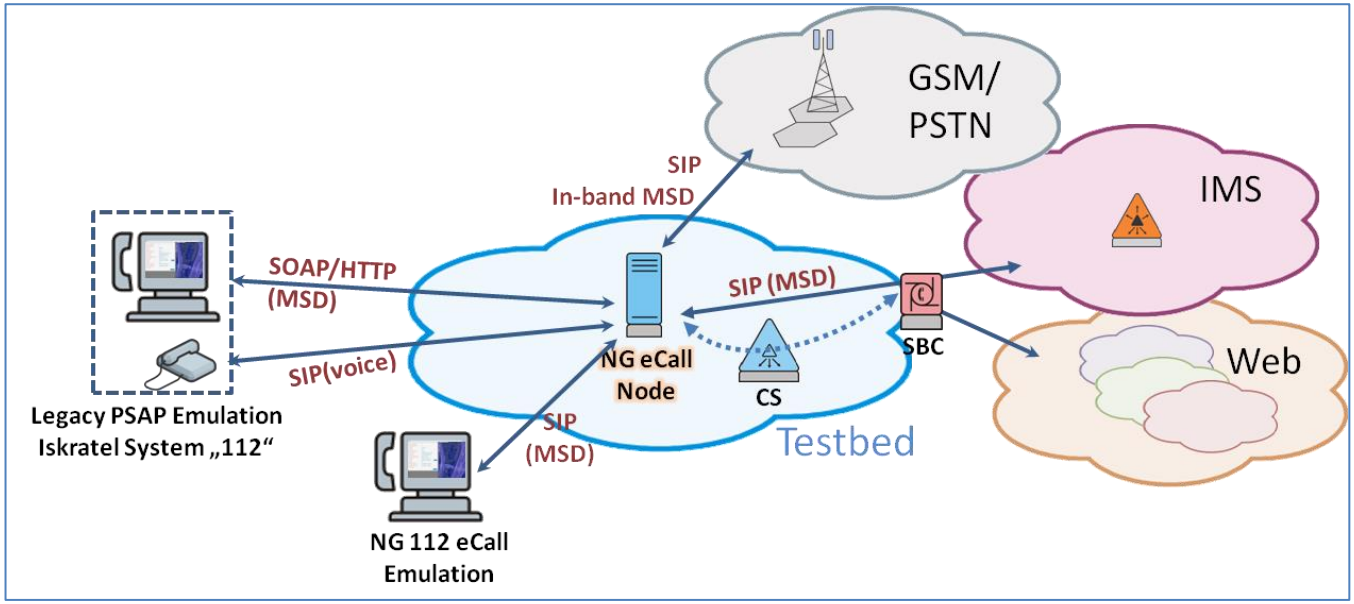
Iscratel – PoC
NG112 test environment



Lessons learned:

- Parallel NG 112 eCall and today’s circuit switched eCall services have been successfully supported by the NG eCall Node that plays the role of universal eCall Gateway for legacy PSAP.
- NG 112 eCall has been successfully received at NG eCall Node and MSD inside SIP message has been decoded and mapped to proprietary interface towards legacy PSAP.

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Future topics

- PSAP to PSAP

  The concept for NG112 eCall includes as main feature that the MSD is included in the SIP invite header.

  It needs to be analysed if it is possible to keep the MSD information in the SIP header, when an eCall is forwarded from a PSAP to another PSAP who may be more relevant to handle the call.

- MSD extension

  The MSD size is limited to 140 Bytes in CS and today also in SIP calls.

  An extension of the MSD size to 200-250 Bytes for NG112 eCalls would allow the transfer of additional information (e.g. Additonal information for HGVs)

- SatCom integration

  As shown in the PoC it is possible with NG112 eCall to integrate SATCOM into the eCall chain.

  This possibility allows to use eCall independent from the available infrastructure. In future studies it needs to be analysed how SATCOM could be integrated into the IVS and how NG112 eCall via SatCom could be integrated into the existing SatCom infrastructure.

- 5G

  The next generation of communication network 5G provides the ideal construct for providing seamless connectivity to the user through the use of heterogeneous networks. This needs to be further investigated

- IMS

  IMS is a core component of NG112 eCall. There are various opensource and proprietary versions of the IMS. In the past, there has been some work undertaken on the concept of an Emergency Call Session Control Function in the IMS architecture. However, this work has not been pursued in subsequent versions of the IMS. For effective prioritisation and handling of eCall, the implementation of this function is to be further studied.

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Conclusion

- NG112 eCall is coming
  Proof of concepts show the capabilities
  Interoperability between PoCs needs to be tested

- To allow a good migration it is essential that PSAPs and IVS start to support the NG112 eCall interface as soon as possible. Otherwise CS eCalls cannot be executed anymore when the 2G/3G infrastructure may be switched off by mobile operators.

- NG112 ecall has the potential to provide new features, it needs to be discussed carefully, which feature are really useful for the operators

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Questions ?

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