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MIGRATION OF eCALL TRANSPORT

This information is based upon STF456 working assumptions.
The views expressed do not necessarily represent the position of ETSI in this context.

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Agenda

- What is eCall?
- How does eCall work?
- STF -Project need
- The objectives of STF456
- What do we need to achieve in IETF?
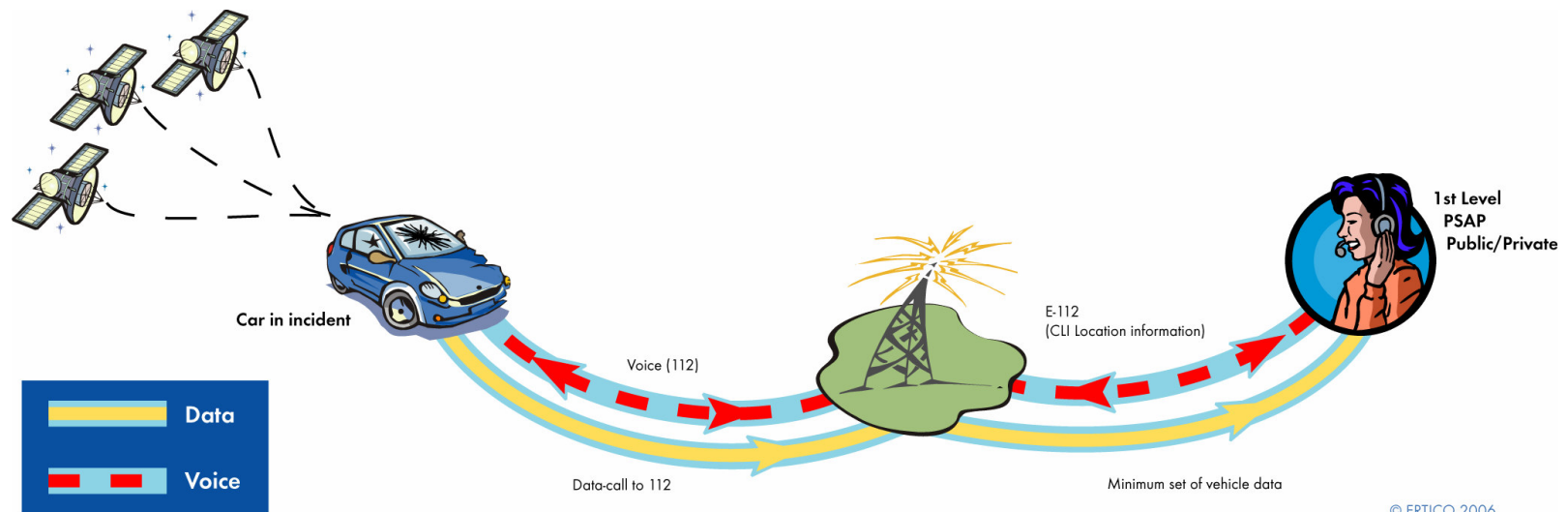- ACN and eCall
- Related IETF drafts

What is eCall?

- The European Commission has agreed to promote a harmonised pan-European in-vehicle emergency call (e-Call) service that builds on the location-enhanced emergency call E112 to improve the notification of such accidents and ensure providing emergency assistance effectively to save lives and reduce social burdens of road accidents.

- In the event of a road accident, an eCall equipped vehicle will automatically (or manually) establishes an emergency voice call that is routed to the appropriate Public Safety Answering Point (PSAP).

  The eCall equipped vehicle also sends an emergency message known as the minimum set of data (MSD), including key information about the accident, such as number of vehicle occupants, time, accurate location, driving direction resulting from accurate satellite-based data and vehicle description.

How does eCall work?

Car in incident

Voice (112)

Data

Voice

Data-call to 112

E-112
(CLI Location information)

Minimum set of vehicle data

1st Level
PSAP
Public/Private

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See http://www.icarsupport.eu/ecall/

STF - Project need

ETSI STF456, partly funded by the European Commission, is investigating migration of eCall transport over IP Multimedia Subsystem (IMS).

- Current eCall is based on CS emergency call in GSM and UMTS networks.

- LTE spectrum auctions are taking place in the EU and there will be extensive LTE coverage before the implementation of eCall becomes mandatory in 2015. There is no CS emergency call in LTE.

- The longevity of GSM networks in the EU over the lifetime of vehicles is uncertain and GSM spectrum is likely to be re-allocated for UMTS and/or LTE.

- A long term plan to deliver eCall over IP Multimedia Subsystem (IMS) in LTE networks is desirable to benefit from availability and efficiency of the resources .

The objectives of STF456

- Among the objectives of STF 456 is to perform a study and derive recommendations concerning migration from 2G/3G to 4G based eCall systems considering:

  - Migration away from Circuit Switched emergency call towards VoIP based emergency call/ IMS emergency call.

  - Routing eCall to the appropriate PSAP (eCall flag).

  - In-vehicle System (IVS) Minimum Set of Data (MSD) transport mechanisms, and the means of transporting both MSD and potential future eCall data with IMS.

  - Public safety Answering Point (PSAP) requirements and interfaces.

  - Support of eCall's current and potential future requirements with 3GPP IMS emergency call.

What do we need to achieve in IETF?

- eCall Identification and Routing to the appropriate PSAP (*supporting eCall*)

  - URNs to indicate the eCall (Manual vs. Automatic)

  - URNs to indicate the eCall IVS Test call (Manual vs. Automatic)

  - Required:

  - IANA registration for the following need to be confirmed:

    URN **'urn:service:sos.ecall'** - under the sub-services 'sos' registry.

    Two sub-services are registered as well, namely:

    urn:service:sos.ecall.manual

    urn:service:sos.ecall.automatic

    Also,

    urn:service:test.sos.ecall.manual

    urn:service:test.sos.ecall.automatic

What do we need to achieve in IETF?

- Means of conveying the Minimum Set of Data (MSD) (between the IVS and the PSAP)
  - MSD is standardized by CEN (15722)
  - MSD is standardized to be ASN.1 , of 140 bytes (different from other possible ACN)
  - MSD to be routed to the same PSAP as the emergency voice call
  - Transmission of MSD has to be reliable
  - MSD is to be sent transparently between IVS and PSAP and is subject to privacy
  - means to provide additional data concepts might be required in the future, that should be considered in the design

What do we need to achieve in IETF?

Other considerations

- The time for the PSAP to forward the eCall to another PSAP/ emergency service should not exceed 2 seconds from when the IVS receives notification that the PSAP has answered the call

- The emergency service category (fire, ambulance, police, etc..) need to be provided to the PSAP operator in a standardised way

- It shall be possible for the PSAP to send a confirmation to the IVS that the MSD has been acted upon

- It shall be possible for the PSAP to request the IVS to re-send its most recent MSD

- It shall be possible for the PSAP to instruct the IVS to terminate the eCall

- It shall be possible for the PSAP to perform call-back towards the IVS

ACN and eCall

- **ACN and eCall : similar objectives but different concepts**

  - Joining the requirements for ACN and eCall within a common standard was attempted in 2007

  - It failed to gain consensus because there were differences in the concepts

  - The Regulatory requirements in the EC and Russia are implementing delivery of the ASN.1 PER elaborated MSD

  - ASN.1 based eCall is being implemented in the 26 member states of Europe, Russia, and New Zealand by legislation; and is being considered in Australia and some of the states that used to be in the USSR and have close links to Russia.

Related IETF drafts

Available IETF drafts should be taken into consideration in relation to the value it may provide, especially in reference to MSD transfer for eCall over IMS.

- [draft-rosen-ecrit-ecall-10](#)
- [draft-ietf-ecrit-additional-data-10](#)
- [draft-jesske-ecrit-ecall-urn-extension-01.txt](#)

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Questions

Thank you for your attention

Questions?

Questions
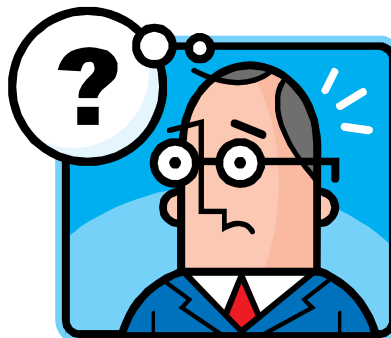
Backup slides

"eCall for IMS" requirements

The following are selected requirements from 3GPP specification TS22.101 that apply to UEs and networks designed to be able to perform transfer of data during an emergency call (*proposed amendments to 3GPP TS 22.101 are underlined*), and the aim is to collect comments on possible impacts of the selected requirements on IETF work.

- The data may be sent prior to, in parallel with, or at the start of the voice component of an emergency call.

IMS> the MSD is to be sent with the SIP INVITE signalling, or with a separate media session.

- Should the PSAP request additional data then this may be possible during the established emergency call.

IMS> use any method that fulfils this requirement between the PSAP and the IVS .

"eCall for IMS" requirements

- The realisation of the transfer of data during an emergency call shall minimise changes to the originating and transit networks.

IMS> eCall for IMS is an IMS emergency call with the additional required data (MSD).

- Both the voice and data components of the emergency call shall be routed to the same PSAP or appropriate emergency call centre.

IMS> sending the MSD with the INVITE shall guarantee arriving the same PSAP.

- <u>eCall voice component (and other media if available) and the Minimum Set of Data (MSD) shall be transported transparently and are subject to privacy consideration.</u>

IMS> MSD transfer should be transparent and subject to privacy; does carrying MSD in INVITE message satisfy this requirement?? otherwise we may need a separate session to send the MSD.

"eCall for IMS" requirements

- In eCall for CS domain, Tthe transmission of the data shall be acknowledged and if necessary data shall be retransmitted. In eCall for IMS, it is required to make the transmission of data reliable.

IMS> is IMS based SIP signalling messages reliable enough?

- The UE shall indicate at call setup if the emergency call will carry supplementary data.

IMS> when the SIP INVITE message URN indicates eCall, then the PSAP expects the MSD data to be received in the same message. Otherwise the eCall urn shall indicate to the PSAP that additional data are to be received.

- The UE shall contain an USIM application.

IMS> IMS registration can identify the user.

- It shall be possible for the UE upon request from the user to initiate a call to an operator designated non-emergency MSISDN or URN/URI for the purpose of accessing test and terminal reconfiguration services.

IMS> do we need to define URNs for the test and reconfiguration services?

"eCall for IMS" requirements

- ## Among the requirements for the transfer of eCall Minimum Set of Data (MSD):

  - An IVS, or other UE designed to support eCall functionality, shall include in the emergency call set-up an indication that the present call is either a Manually Initiated eCall (MIeC) or an Automatically Initiated eCall (AIeC);

  IMS>indication by URN that the eCall is triggered manual or automatic.

  - In case of eCall for CS domain, Tthe Minimum Set of Data (MSD) sent by the In vehicle System (IVS) to the network shall not exceed 140 bytes;

  IMS> there is no limitation on the MSD length carried with IMS messages. However, in the future, if we plan on adding the FSD then the INVITE message may not be appropriate and we may need additional session to be set-up.

"eCall for IMS" requirements

- In eCall for CS domain,~~Tt~~he MSD should typically be made available to the PSAP within 4 seconds measured from the time when end to end connection with the PSAP is established;

IMS> what would be the right time in eCall for IMS? Probably not applicable requirement if the MSD is carried over the SIP signalling (INVITE message), otherwise if the MSD is carried over a separate session then we may need to define the minimum required time.

- Should the MSD component not be included in an eCall, or is corrupted or lost for any reason, then this shall not affect the associated ~~TS12~~ emergency call speech functionality.

IMS> if the MSD is corrupted or lost, the eCall for IMS voice set up and connection should not be impacted.

"eCall for IMS" requirements

- Based on national regulations, PLMNs ~~should~~ may be configured to make use of eCall indicators, received in the emergency call set-up, to differentiate eCalls from other ~~TS12~~ emergency calls.

  IMS> the CSCF, if configured, should use the information in the URN to identify the eCall and route it to the appropriate PSAP according to the configurations provided by the MNO (based on local regulation). An alternative is to allow the emergency IP network to perform the differentiation of eCall from other emergency services rather than the MNO.

- Where the eCall indicators are not supported by the serving network, the time needed for the PSAP (eCall modem in case of eCall for CS domain)~~(when used)~~ to differentiate between eCalls and other ~~TS12~~ emergency calls, before routing the call to ~~an~~ PSAP operator, shall not exceed 2 seconds from when the IVS receives notification that the PSAP has answered the call.

  IMS> if the PSAP understands the URN services it could perform this. So what is the time required for the PSAP to route the eCall to the right emergency operator in IP based network?

"eCall for IMS" requirements

- The PSAP shall be given an indication that the incoming call is an eCall.

IMS> this indication is by sending the eCall specific URN.

Throughout the duration of the emergency call and following receipt of the MSD by the PSAP:

- It shall be possible for the PSAP to send a confirmation to the IVS that the MSD has been acted upon.

IMS> use any method that fulfils this requirement between the PSAP and the IVS.

- It shall be possible for the PSAP to request the IVS to re-send its most recent MSD.

IMS> this can be using SIP messages within the session or other methods allowing data communication between the PSAP and the UE.

- It shall be possible for the PSAP to instruct the IVS to terminate the eCall.

IMS> the PSAP can terminate the eCall, or the PSAP, using SIP messages within the session or other methods allowing data communication, to request the eCall UE to terminate the emergency call

eCall Flag:

- Used for routing, eCall identification, and differentiation of eCall (Manual or Automatic)

- Required:

- IANA registration for the following need to be confirmed:

    URN **'urn:service:sos.ecall'** - under the sub-services 'sos' registry.

    Two sub-services are registered as well, namely:

    urn:service:sos.ecall.manual

    urn:service:sos.ecall.automatic

NOTE: additional urns may be required for the test and reconfiguration services.

Analysis

- ## Voice and any additional media sessions:

  Any voice, video, or real-text communication will be negotiated over IMS using the Session Description Protocol (SDP), and the actual media stream will then take place in RTP packets. This follows the same procedures as for Voice and Multimedia IMS emergency services.

- ## Caller identity:

  The Calling line identification is required allowing the PSAP to call back the eCall UE. This is provided similar to any IMS emergency services call back feature.

- ## Location information of the vehicle

  The MNO provides location information in the SIP INVITE message as for IMS emergency calls based on their location services supported features. This location information may be used for routing and is made available to the PSAP.

  Since the MSD includes location information as determined by the IVS, IMS eCall provides the PSAP with the MSD (where the MSD is carried transparently), hence an additional source of location is provided to the PSAP.

Transfer of MSD data *(MSD data is defined in CEN Technical Specification (CEN 15722)*

Several options exist to transport the MSD;

1-Carried inband within the packet voice session, however the PSAP solution is eCall modem based (CS based). This solution adds delays and design complexity, where the mapping and conversion of PS to CS (eCall modem based) is to be performed in the IMS Media-Gateway. Furthermore, the transmission of the MSD via inband within a packet-switched voice session can be delayed or degraded by VoIP processing functions such as time-warping in the VoIP de-jitter buffers.

2-Carried inband within the packet voice to transmit data from a vehicle to a PSAP. This solution adds complexity, where it requires multiplexing / filtering at the end points. Furthermore, the performance of MSD delivery over inband within the packet-switched voice session can be degraded by any time-warping operations performed in the VoIP de-jitter buffers at the end points.

Analysis

3-Carried on by the IMS signalling as:

a) sending the MSD in the INVITE message as described in Internet Protocol-based In-Vehicle Emergency Call: draft-rosen-ecrit-ecall-08. This method guarantees that the destination receiving the invite message receives the MSD inband at the same time.

b) indicating the capability in the INVITE message, and using SIP specific messages (example Real Time Streaming Protocol (RTSP)- RFC 4567) that takes the same route while applying additional security mechanism, however complexity could arrive in security key source and coordination.

4-Carried out of band via a separate media session with security encryption considerations (using TCP connection) between the UE and the PSAP, this method may add additional delay, complexity and cost since it requires a TCP connection.

5-Using out of band as for example Message Session Relay Protocol (MSRP) - RFC 4975, however it is not clear if all operators implement this protocol in their networks.

6-Carried over SMS over IMS; this option is not found advantageous or favourable since the arrival of SMS in time to the same PSAP where the voice service is connected cannot be guaranteed. Also emergency SMS, with high priority, may not be supported in all networks.

The preferred solution is to implement 3a) considering the available draft-rosen-ecrit-ecall-08 as a starting point.

Additional open issues:

- It is also possible to define one URN **'urn:service:sos.ecall'** and the PSAP is to differentiate if the eCall is manual or automatic based on the content of MSD. This reduces the impact on IMS where the routing is performed by the PSAP, however on the other hand it is a limitation for the configuration of routing eCalls (manual and automatic) to different PSAPs (or filtering points) as required by some country's authorities. Different countries have different PSAP configurations and this needs to be taken into consideration.

- It was also proposed that required routing of eCalls to the appropriate PSAPs should be performed by the Emergency service IP network (ESInet) and not the PLMN. This ensures no impact on IMS network in this respect.

- Available IETF drafts should also be taken into consideration in relation to the value it may provide, especially in reference to MSD transfer for eCall over IMS.
    - draft-rosen-ecrit-ecall-08
    - draft-ietf-ecrit-additional-data-09
    - draft-jesske-ecrit-ecall-urn-extension-00.txt

Information about ETSI and funding partners

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- **_and, for STFs funded by EC/EFTA:_**

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