                    **Next-Generation Pan-European eCall**
                        **draft-ietf-ecrit-ecall-00.txt**

Abstract

   This document describes how to use IP-based emergency services
   mechanisms to support the next generation of the Pan European in-
   vehicle emergency call service defined under the eSafety initiative
   of the European Commission (generally referred to as "eCall"). eCall
   is a standardized and mandated system for a special form of emergency
   calls placed by vehicles.  eCall deployment is required by 2015 in
   European Union member states, and eCall (and eCall-compatible
   systems) are also being deployed in other regions.  eCall provides an
   integrated voice path and a standardized set of vehicle, sensor
   (e.g., crash related), and location data.  An eCall is recognized and
   handled as a specialized form of emergency call and is routed to a
   specialized eCall-capable Public Safety Answering Point (PSAP)
   capable of processing the vehicle data and trained in handling
   emergency calls from vehicles.

   Currently, eCall functions over circuit-switched cellular telephony;
   work on next-generation eCall (NG-eCall, sometimes called packet-
   switched eCall or PS-eCall) is now in process, and this document
   assists in that work by describing how to support eCall within the
   IP-based emergency services infrastructure.

   This document also registers a MIME Content Type and an Emergency
   Call Additional Data Block for the eCall vehicle data.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

   Internet-Drafts are working documents of the Internet Engineering
   Task Force (IETF).  Note that other groups may also distribute
   working documents as Internet-Drafts.  The list of current Internet-
   Drafts is at http://datatracker.ietf.org/drafts/current/.

   Internet-Drafts are draft documents valid for a maximum of six months
   and may be updated, replaced, or obsoleted by other documents at any

   time.  It is inappropriate to use Internet-Drafts as reference
   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on January 5, 2015.

Table of Contents

## 1.  Terminology

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in [RFC2119].

   This document re-uses terminology defined in Section 3 of [RFC5012].

   Additionally, we use the following abbreviations:

   3GPP:  3rd Generation Partnership Project
   CEN:  European Committee for Standardization
   EENA:  European Emergency Number Association
   ESInet:  Emergency Services IP network
   IVS:  In-Vehicle System
   MNO:  Mobile Network Operator
   MSD:  Minimum Set of Data
   PSAP:  Public Safety Answering Point

## 2.  Document Scope

   This document is limited to the signaling, data exchange, and
   protocol needs of next-generation eCall (NG-eCall, also referred to
   as packet-switched eCall (PS-eCall) and all-IP eCall).  eCall itself
   is specified by 3GPP and CEN and these specifications include far
   greater scope than is covered here.

## 3.  Introduction

   Emergency calls made from vehicles (e.g., in the event of a crash)
   assist in significantly reducing road deaths and injuries by allowing
   emergency services to be aware of the incident, the state of the
   vehicle, the location of the vehicle, and to have a voice channel
   with the vehicle occupants.  This enables a quick and appropriate
   response.

   The European Commission initiative of eCall was conceived in the late
   1990s, and has evolved to a European Parliament decision requiring
   the implementation of compliant in-vehicle systems (IVS) in new
   vehicles and the deployment of eCall in the European Member States in
   2015.  eCall (and eCall-compatible systems) are also being adopted in
   other regions.

The pan-European eCall system provides a standardized and mandated
mechanism for emergency calls by vehicles.  eCall establishes
procedures for such calls to be placed by in-vehicle systems,
recognized and processed by the network, and routed to a specialized
PSAP where the vehicle data is available to assist the call taker in
assessing and responding to the situation.  eCall provides a standard
set of vehicle, sensor (e.g., crash related), and location data.

An eCall may be either user-initiated or automatically triggered.
Automatically triggered eCalls indicate a car crash or some other
serious incident (e.g., a fire) and carry a greater presumption of
risk of injury.  Manually triggered eCalls may be reports of serious
hazards and are likely to require a different response than an
automatically triggered eCall.  Manually triggered eCalls are also
more likely to be false (e.g., accidental) calls and may thus be
subject to different handling by the PSAP.

Currently, eCall is standardized (by 3GPP [SDO-3GPP] and CEN [CEN])
as a 3GPP circuit-switched call over GSM (2G) or UMTS (3G).  An eCall
flag in the call setup marks the call as an eCall, and further
indicates if the call was automatically or manually triggered.  The
call is routed to an eCall-capable PSAP, a voice channel is
established between the vehicle and the PSAP, and an eCall in-band
modem is used to carry a defined set of vehicle, sensor (e.g., crash
related), and location data (the Minimum Set of Data or MSD) within
the voice channel.  The same in-band mechanism is used for the PSAP
to acknowledge successful receipt of the MSD, and optionally to
request the vehicle to send a new MSD (e.g., to check if the state of
or location of the vehicle or its occupants has changed).  Work on
next-generation eCall (NG-eCall, also referred to as packet-switched
eCall or PS eCall) is now in process.  As part of this work, the
European Telecommunications Standards Institute (ETSI) [SDO-ETSI] has
published a Technical Report titled "Mobile Standards Group (MSG);
eCall for VoIP" [MSG_TR] that presents findings and recommendations
regarding support for eCall in an all-IP environment.  NG-eCall moves
from circuit switched to all-IP, and carries the vehicle data and
other eCall-specific data as additional data associated with the
call.  This document describes how IETF mechanisms for IP-based
emergency calls, including [RFC6443] and [additional-data-draft] are
used to provide the signaling and data exchange of the next
generation of pan-European eCall.

A transition period will exist during which time the various entities
involved in initiating and handling an eCall might support next-
generation eCall, legacy eCall, or both.  This transition period
might last several years or longer.  The issue of migration/co-
existence during the transition period is very important but is
outside the scope of this document.  The ETSI TR "Mobile Standards

Group (MSG); eCall for VoIP" [MSG_TR] discusses these issues in
Clause 7.

4.  eCall Requirements

Overall eCall requirements are specified by by by CEN in [EN_16072]
and by 3GPP in [TS22.101] clauses 10.7 and A.27.  Requirements
specific to vehicle data are contained in EN 15722 [msd].  For
convenience, the requirements most applicable to the limited scope of
this document are summarized very briefly below.

eCall requires:

o  The call be recognized as an eCall (which is inherently an
   emergency call)
o  The call setup indicates if the call was manually or automatically
   triggered
o  A voice channel between the vehicle and the PSAP
o  Carrying the MSD intrinsically with the call (the MSD needs to be
   available to the same call-taker as the voice)
o  The ability for the PSAP to acknowledge receipt of the MSD
o  The ability for the PSAP to request that the vehicle generate and
   transmit a new MSD
o  The ability of the PSAP to be able to re-contact the occupants of
   vehicle after the initial eCall is concluded
o  The ability to perform a test call (which may be routed to a PSAP
   but is not treated as an emergency call and not handled by a call
   taker)

It is recognized that NG-eCall offers many potential enhancements,
although these are not required by current EU regulations.  For
convenience, the enhancements most applicable to the limited scope of
this document are summarized very briefly below.

NG-eCall is expected to offer:

o  The ability to carry more data (e.g., an enhanced MSD or an MSD
   plus additional sets of data)
o  The ability to handle video
o  The ability to handle text
o  The ability for the PSAP to access vehicle components (e.g., an
   onboard camera (such as rear facing or blind-spot cameras) for a
   visual assessment of the crash site situation)
o  The ability for the PSAP to request the vehicle to take actions
   (e.g., sound the horn, disable the ignition, lock/unlock doors)
o  The ability to avoid audio muting of the voice channel (because
   the MSD is not transferred using an in-band modem)

## 5.  Vehicle Data

Pan-European eCall provides a standardized and mandated set of
vehicle related data, known as the Minimum Set of Data (MSD).  The
European Committee for Standardization (CEN) has specified this data
in EN 15722 [msd], along with both ASN.1 and XML encodings for the
MSD [msd].  Circuit-switched eCall uses the ASN.1 encoding (due to
its more compact size).  The XML encoding is better suited for use in
SIP messages and is used in this document.  (The ASN.1 encoding is
specified in Annex A of EN 15722 [msd], while the XML encoding is
specified in Annex C.)

The "Additional Data related to an Emergency Call" document
[additional-data-draft] establishes a general mechanism for attaching
blocks of data to a SIP emergency call.  This document makes use of
that mechanism to carry the eCall MSD in a SIP emergency call.

This document registers the 'application/
emergencyCallData.eCall.MSD+xml') MIME Content-Type to enable the MSD
to be carried in SIP.  This document also adds the 'eCall.MSD' entry
to the Emergency Call Additional Data Blocks registry (established by
[additional-data-draft]) to enable the MSD to be recognized as such
in a SIP-based eCall emergency call.

## 6.  Call Setup

In circuit-switched eCall, the IVS places a special form of a 112
emergency call which carries the eCall flag (indicating that the call
is an eCall and also if the call was manually or automatically
triggered); the mobile network operator (MNO) recognizes the eCall
flag and routes the call to an eCall-capable PSAP; vehicle data is
transmitted to the PSAP via the eCall in-band modem (in the voice
channel).

```
   ///----\\\      112 voice call with eCall flag     +------+
  ||| IVS  |||--------------------------------------->+ PSAP |
   \\\----///   vehicle data via eCall in-band modem   +------+
```

Figure 1: circuit-switched eCall

An In-Vehicle System (IVS) which supports NG-eCall transmits the MSD
in accordance with [additional-data-draft] by encoding it as
specified (per Appendix C of EN 15722 [msd]) and attaching it to an
INVITE as a MIME body part.  The body part is identified by its MIME
content-type 'application/emergencyCallData.eCall.MSD+xml') in the
Content-Type header field of the body part.  The body part is
assigned a unique identifier which is listed in a Content-ID header

field in the body part.  The INVITE is marked as containing the MSD
by adding (or appending to) a Call-Info header field at the top level
of the INVITE.  This Call-Info header field contains a CID URL
referencing the body part's unique identifier, and a 'purpose'
parameter identifying the data as the eCall MSD per the registry
entry; the 'purpose' parameter's value is 'emergencyCallData.' and
the root of the MIME type (not including the 'emergencyCallData'
prefix and any suffix such as '+xml' (e.g.,
'purpose=emergencyCallData.eCall.MSD').

For NG-eCall, the IVS establishes an emergency call using the 3GPP
IMS solution with a Request-URI indicating an eCall type of emergency
call and with vehicle data attached; the MNO or ESInet recognizes the
eCall URN and routes the call to a NG-eCall capable PSAP; the PSAP
interpets the vehicle data sent with the call and makes it available
to the call taker.

```
///----\\\      IMS emergency call with eCall URN    +------+
   IVS      ---------------------------------------->+ PSAP |
\\\----///    vehicle data included in call setup    +------+
```

                        Figure 2: NG-eCall

This document registers new service URN children within the "sos"
subservice.  These URNs provide the mechanism by which an eCall is
identified, and differentiate between manually and automatically
triggered eCalls (which may be subject to different treatment,
depending on policy).  The two service URNs are:
urn:service:sos.ecall.automatic and urn:service:sos.ecall.manual

## 7.  Call Routing

The routing rules for eCalls are likely to differ from those of other
emergency calls because eCalls are special types of emergency calls
(with implications for the types of response required) and need to be
handled by specially designated PSAPs.  In an environment that uses
ESInets, the originating network passes all types of emergency calls
to an ESInet (which have a request URI containing the "SOS" service
URN).  The ESInet is then responsible for routing such calls to the
appropriate PSAP.  In an environment without an ESInet, the emergency
services authorities and the originating network jointly determine
how such calls are routed.

## 7.1.  ESInets

This section provides background information on ESInets for
information only.

An Emergency Services IP Network (ESInet) is a network operated by
emergency services authorities.  It handles emergency call routing
and processing before delivery to a PSAP.  In the NG1-1-2
architecture adopted by EENA, each PSAP is connected to one or more
ESInets.  Each originating network is also connected to one or more
ESInets.  The ESInets maintain policy-based routing rules which
control the routing and processing of emergency calls.  The
centralization of such rules within ESInets provides for a cleaner
separation between the responsibilities of the originating network
and that of the emergency services network, and provides greater
flexibility and control over processing of emergency calls by the
emergency services authorities.  This makes it easier to react
quickly to unusual situations that require changes in how emergency
calls are routed or handled (e.g., a natural disaster closes a PSAP),
as well as ease in making long-term changes that affect such routing
(e.g., cooperative agreements to specially handle calls requiring
translation or relay services).  ESInets may support the ability to
interwork NG-eCall to legacy eCall to handle eCall-capable PSAPs that
are not IP PSAPs (similarly to the ability to interwork IP emergency
calls to legacy non-IP PSAPs).  Note that in order to support legacy
eCall-capable PSAPs that are not IP PSAPs and are not attached to an
ESInet, an originating network may need the ability to route an eCall
itself (e.g., to an interworking facility with interconnection to a
suitable legacy eCall capable PSAP) based on the eCall and manual or
automatic indications.  The ETSI TR "Mobile Standards Group (MSG);
eCall for VoIP" [MSG_TR] discusses transition issues in Clause 7.

## 8.  Test Calls

eCall requires the ability to place test calls.  These are calls that
are recognized and treated as eCalls but are not given emergency call
treatment and are not handled by call takers.

A service URN starting with "test." indicates a test call.  For
eCall, "urn:service:test.sos.ecall" indicates such a test feature.
This functionality is defined in [RFC6881].

This document registers "urn:service:test.sos.ecall" for eCall test
calls.

## 9.  eCall-Specific Data from PSAP to IVS

eCall requires the ability for the PSAP to acknowledge successful
receipt of the MSD, and for the PSAP to optionally request that the
IVS send a new MSD (e.g., if the call taker wishes to see if the
vehicle's state or location has changed).  Future enhancements are
desired, for example, to enable the PSAP to send other requests to
the vehicle, such as starting a video stream from on-board cameras
(such as rear focus or blind-spot), locking or unlocking doors,
sounding the horn, flashing the lights, etc.

The same mechanism established in [additional-data-draft], used in
this document to carry the MSD from the IVS to the PSAP, can be
additionally used to carry a control data block from the PSAP to the
IVS.  This eCall control block (also referred to as eCall metadata)
is an XML structure containing eCall-specific elements.  When the
PSAP needs to send an eCall control block that is in response to the
MSD or other data sent by the IVS in a SIP request, the control block
can be sent in the SIP response to the message that contained the MSD
or other data (e.g., the INVITE).  When the PSAP needs to send an
eCall control block that is not an immediate response to an MSD or
other data sent by the IVS, the control block can be transmitted from
the PSAP to the IVS in a SIP INFO message within the established
session.  The IVS can then send any requested data (such as a new
MSD) in the reply to the INFO message.  This creates a framework
mechanism by which the PSAP can send eCall-specific data to the IVS
and the IVS can respond with data if requested.  If control data sent
in a response message requests the IVS to send a new MSD or other
data block, the IVS can do so in an INFO message within the session
(it could also use re-INVITE but that is unnecessary when no aspect
of the session or media is changing).

This mechanism requires

o  An XML definition of the eCall control object
o  An extension mechanism by which new elements can be added to the
   control object definition (which may be as simple as permitting
   additional elements to be included by adding their namespace)
o  A MIME type registration for the control object (so it can be
   carried in SIP messages and responses)
o  An entry in the Emergency Call Additional Data Blocks sub-registry
   (established by [additional-data-draft]) so that the control block
   can be recognized as emergency call specific data within the SIP
   messages
o  An Info-Package registration per [RFC6086] permitting the control
   block within Info messages

## 10.  Example

   Figure 3 shows an eCall.  The call uses the request URI
   'urn:service:sos.ecall.automatic' service URN and is recognized as an
   eCall, and further as one that was invoked automatically by the IVS
   due to a crash or other serious incident.  In this example, the
   originating network routes the call to an ESInet (as for any
   emergency call in an environment with an ESInet).  The ESInet routes
   the call to the appropriate NG-eCall capable PSAP.  (In deployments
   where there is no ESInet, the originating network routes the call
   directly to the appropriate NG-eCall capable PSAP.)  The emergency
   call is received by the ESInet's Emergency Services Routing Proxy
   (ESRP), as the entry point to the ESInet.  The ESRP routes the call
   to a PSAP, where it is received by a call taker.

```
              +-----------+  +-----------------------------------------+
              |           |  |                                         |
              |           |  |                  +-------+              |
              |           |  |                  | PSAP2 |              |
              |           |  |                  +-------+              |
              |           |  |                                         |
              |           |  |  +------+    +-------+                  |
    Vehicle-->|           |--+->| ESRP |---->| PSAP1 |---> Call-Taker  |
              |           |  |  +------+    +-------+                  |
              |           |  |                                         |
              |           |  |                  +-------+              |
              |           |  |                  | PSAP3 |              |
              |           |  |                  +-------+              |
              |           |  |                                         |
              | Originating|  |                                         |
              |   Mobile  |  |                                         |
              |  Network  |  |             ESInet                      |
              +-----------+  +-----------------------------------------+
```
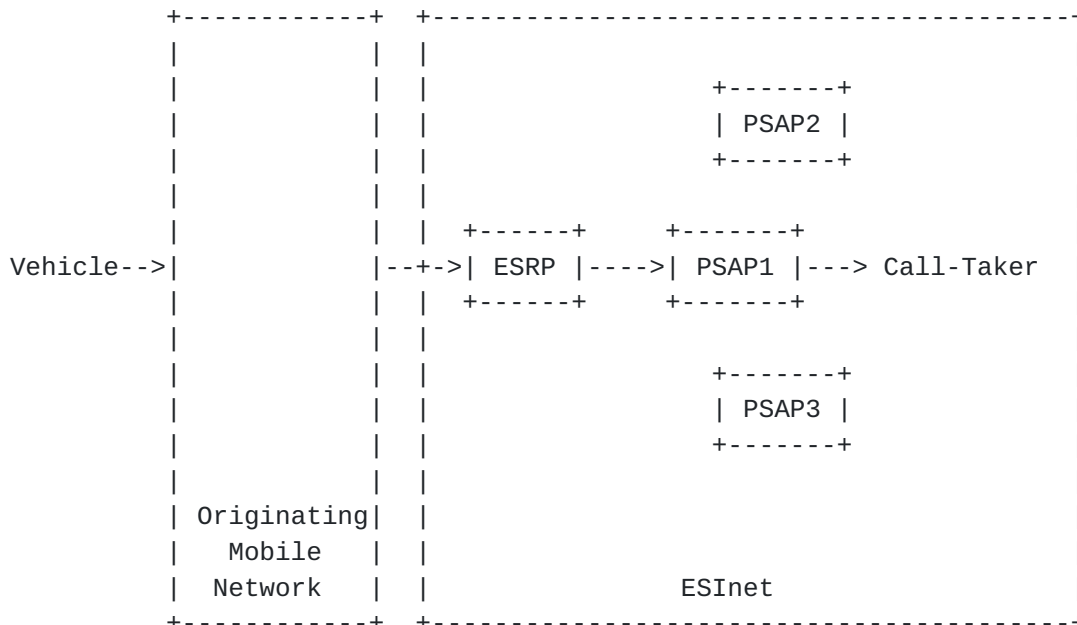
                  Figure 3: Example of NG-eCall Message Flow

   The example, shown in Figure 4, illustrates a SIP eCall INVITE that
   contains an MSD.

```
      INVITE urn:service:sos.ecall.automatic SIP/2.0
      To: urn:service:sos.ecall.automatic
      From: <sip:+13145551111@example.com>;tag=9fxced76sl
      Call-ID: 3848276298220188511@atlanta.example.com
      Geolocation: <cid:target123@example.com>
      Geolocation-Routing: no
      Call-Info: cid:1234567890@atlanta.example.com;
                 purpose=emergencyCallData.eCall.MSD
      Accept: application/sdp, application/pidf+xml
      CSeq: 31862 INVITE
```

```
Content-Type: multipart/mixed; boundary=boundary1
Content-Length: ...

--boundary1

Content-Type: application/sdp

...Session Description Protocol (SDP) goes here

--boundary1

Content-Type: application/emergencyCallData.eCall.MSD+xml
Content-ID: 1234567890@atlanta.example.com

...eCall MSD data object goes here

 --boundary1--
```

                     Figure 4: SIP NG-eCall INVITE

## 11.  Security Considerations

   The security considerations described in [RFC5069] apply here.

   An eCall will carry two forms of location data: the network-provided
   location that is inherently part of IMS emergency calls (which might
   be determined solely by the network, or in cooperation with or
   possibly entirely by the originating device), and the IVS-supplied
   location within the MSD.  This is likely to be useful to the PSAP,
   especially when the two locations are independently determined.  Even
   in situations where the network-supplied location is limited to the
   cell site, this can be useful as a sanity check on the device-
   supplied location contained in the MSD.

   The document [I-D.ietf-ecrit-trustworthy-location] discusses trust
   issues regarding location provided by or determined in cooperation
   with end devices.

   The mechanism by which the PSAP sends acknowledgment and optional
   requests to the vehicle requires authenticity considerations; when
   the PSAP request is received within an established session initiated
   by the vehicle as an eCall emergency call, there is a higher degree
   of trust that the source is indeed a PSAP.  If the PSAP request is
   received in other situations, such as a call-back, the trust issues
   in verifying that a call-back is indeed from a PSAP are more complex
   (see the PSAP Callback document [I-D.ietf-ecrit-psap-callback]).

## 12.  IANA Considerations

### 12.1.  Service URN Registration

   IANA is requested to register the URN 'urn:service:sos.ecall' under
   the sub-services 'sos' registry defined in Section 4.2 of [RFC5031].

   This service identifies a type of emergency call (placed by a
   specialized in-vehicle system and carrying standardized set of data
   related to the vehicle and crash or incident, and is needed to direct
   the call to a specialized public safety answering point (PSAP) with
   technical and operational capabilities to handle such calls.  Two
   sub-services are registered as well, namely

   urn:service:sos.ecall.manual

      This service URN indicates that an eCall had been triggered based
      on the manual interaction of the driver or a passenger.

   urn:service:sos.ecall.automatic

      This service URN indicates that an eCall had been triggered
      automatically, for example, due to a crash or other serious
      incident (e.g., fire).

   IANA is also requested to register the URN
   'urn:service:test.sos.ecall' under the sub-service 'test' registry
   defined in Setcion 17.2 of [RFC6881].

### 12.2.  MIME Content-type Registration for 'application/ emergencyCallData.eCall.MSD+xml'

   This specification requests the registration of a new MIME type
   according to the procedures of RFC 4288 [RFC4288] and guidelines in
   RFC 3023 [RFC3023].

      MIME media type name: application

      MIME subtype name: emergencyCallData.eCall.MSD+xml

      Mandatory parameters: none

      Optional parameters: charset

      Indicates the character encoding of the XML content.

Encoding considerations: Uses XML, which can employ 8-bit characters, depending on the character encoding used.  See Section 3.2 of RFC 3023 [RFC3023].

Security considerations: This content type is designed to carry vehicle and incident-related data during an emergency call.  This data contains personal information including vehicle VIN, location, direction, etc.  Appropriate precautions need to be taken to limit unauthorized access, inappropriate disclosure to third parties, and eavesdropping of this information.  In general, it is permissible for the data to be unprotected while briefly in transit within the Mobile Network Operator (MNO); the MNO is trusted to not permit the data to be accessed by third parties. Sections 7 and Section 8 of [I-D.ietf-ecrit-additional-data] contain more discussion.

Interoperability considerations: None

Published specification: Annex C of EN 15722 [msd]

Applications which use this media type: Pan-European eCall compliant systems

Additional information: None

Magic Number: None

File Extension: .xml

Macintosh file type code: 'TEXT'

Person and email address for further information: Hannes Tschofenig, Hannes.Tschofenig@gmx.net

Intended usage: LIMITED USE

Author: This specification was produced by the European Committee For Standardization (CEN).  For contact information, please see <http://www.cen.eu/cen/Pages/contactus.aspx>.

Change controller: The European Committee For Standardization (CEN)

12.3.  Registration of the 'eCall.MSD' entry in the Emergency Call
       Additional Data Blocks registry

This specification requests IANA to add the 'eCall.MSD' entry to the
Emergency Call Additional Data Blocks registry (established by
[additional-data-draft]), with a reference to this document.

## 13.  Contributors

Brian Rosen was a co-author of the original document upon which this
document is based.

## 14.  Acknowledgements

We would like to thank Bob Williams and Ban Al-Bakri for their
feedback and suggestions.  We would like to thank Michael Montag,
Arnoud van Wijk, Gunnar Hellstrom, and Ulrich Dietz for their help
with the original document upon which this document is based.

## 15.  Changes from Previous Versions

### 15.1.  Changes from draft-gellens-03 to draft-ietf-00

o  Renamed from draft-gellens- to draft-ietf-.

o  Added mention of and reference to ETSI TR "Mobile Standards Group
   (MSG); eCall for VoIP"

o  Added text to Introduction regarding migration/co-existence being
   out of scope

o  Added mention in Security Considerations that even if the network-
   supplied location is just the cell site, this can be useful as a
   sanity check on the IVS-supplied location

o  Minor wording improvements and clarifications

### 15.2.  Changes from draft-gellens-02 to -03

o  Clarifications and editorial improvements.

### 15.3.  Changes from draft-gellens-01 to -02

o  Minor wording improvements

o  Removed ".automatic" and ".manual" from
   "urn:service:test.sos.ecall" registration and discussion text.

### 15.4.  Changes from draft-gellens-00 to -01

o  Now using 'EmergencyCallData' for purpose parameter values and
   MIME subtypes, in accordance with changes to
   [additional-data-draft]

o  Added reference to RFC 6443

o  Fixed bug that caused Figure captions to not appear

## 16.  References

### 16.1.  Normative References

[EN_16072]
            CEN, ., "Intelligent transport systems - eSafety - Pan-
            European eCall operating requirements", December 2011.

[I-D.ietf-ecrit-additional-data]
            Rosen, B., Tschofenig, H., Marshall, R., Randy, R., and J.
            Winterbottom, "Additional Data related to an Emergency
            Call", draft-ietf-ecrit-additional-data-15 (work in
            progress), November 2013.

[RFC2119]   Bradner, S., "Key words for use in RFCs to Indicate
            Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC3023]   Murata, M., St. Laurent, S., and D. Kohn, "XML Media
            Types", RFC 3023, January 2001.

[RFC4119]   Peterson, J., "A Presence-based GEOPRIV Location Object
            Format", RFC 4119, December 2005.

[RFC4288]   Freed, N. and J. Klensin, "Media Type Specifications and
            Registration Procedures", RFC 4288, December 2005.

[RFC5031]   Schulzrinne, H., "A Uniform Resource Name (URN) for
            Emergency and Other Well-Known Services", RFC 5031,
            January 2008.

[RFC5491]   Winterbottom, J., Thomson, M., and H. Tschofenig, "GEOPRIV
            Presence Information Data Format Location Object (PIDF-LO)
            Usage Clarification, Considerations, and Recommendations",
            RFC 5491, March 2009.

[RFC5962]   Schulzrinne, H., Singh, V., Tschofenig, H., and M.
            Thomson, "Dynamic Extensions to the Presence Information
            Data Format Location Object (PIDF-LO)", RFC 5962,
            September 2010.

[RFC6442]  Polk, J., Rosen, B., and J. Peterson, "Location Conveyance
           for the Session Initiation Protocol", RFC 6442, December
           2011.

[RFC6443]  Rosen, B., Schulzrinne, H., Polk, J., and A. Newton,
           "Framework for Emergency Calling Using Internet
           Multimedia", RFC 6443, December 2011.

[RFC6881]  Rosen, B. and J. Polk, "Best Current Practice for
           Communications Services in Support of Emergency Calling",
           BCP 181, RFC 6881, March 2013.

[TS22.101]
           3GPP, ., "Technical Specification Group Services and
           System Aspects; Service aspects; Service principles", .

[additional-data-draft]
           Rosen, B., Tschofenig, H., Marshall, R., Gellens, R., and
           J. Winterbottom, "Additional Data related to an Emergency
           Call", draft-ietf-ecrit-additional-data-11 (work in
           progress), July 2013.

[msd]      CEN, ., "Intelligent transport systems - eSafety - eCall
           minimum set of data (MSD), EN 15722", June 2011.

## 16.2.  Informative references

[CEN]      , "European Committee for Standardization",
           <http://www.cen.eu>.

[I-D.ietf-ecrit-psap-callback]
           Schulzrinne, H., Tschofenig, H., Holmberg, C., and M.
           Patel, "Public Safety Answering Point (PSAP) Callback",
           draft-ietf-ecrit-psap-callback-13 (work in progress),
           October 2013.

[I-D.ietf-ecrit-trustworthy-location]
           Tschofenig, H., Schulzrinne, H., and B. Aboba,
           "Trustworthy Location", draft-ietf-ecrit-trustworthy-
           location-07 (work in progress), July 2013.

[MSG_TR]   ETSI, ., "ETSI Mobile Standards Group (MSG); eCall for
           VoIP", ETSI Technical Report TR 103 140 V1.1.1 (2014-04),
           April 2014.

   [RFC4481]   Schulzrinne, H., "Timed Presence Extensions to the
               Presence Information Data Format (PIDF) to Indicate Status
               Information for Past and Future Time Intervals", RFC 4481,
               July 2006.

   [RFC5012]   Schulzrinne, H. and R. Marshall, "Requirements for
               Emergency Context Resolution with Internet Technologies",
               RFC 5012, January 2008.

   [RFC5069]   Taylor, T., Tschofenig, H., Schulzrinne, H., and M.
               Shanmugam, "Security Threats and Requirements for
               Emergency Call Marking and Mapping", RFC 5069, January
               2008.

   [RFC6086]   Holmberg, C., Burger, E., and H. Kaplan, "Session
               Initiation Protocol (SIP) INFO Method and Package
               Framework", RFC 6086, January 2011.

   [SDO-3GPP]
               , "3d Generation Partnership Project",
               <http://www.3gpp.org/>.

   [SDO-ETSI]
               , "European Telecommunications Standards Institute
               (ETSI)", <http://www.etsi.org>.

Authors' Addresses

   Randall Gellens
   Qualcomm Technologies, Inc.
   5775 Morehouse Drive
   San Diego  92651
   US

   Email: rg+ietf@qti.qualcomm.com


   Hannes Tschofenig
   (no affiliation)

   Email: Hannes.Tschofenig@gmx.net
   URI:   http://www.tschofenig.priv.at