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Intelligent transport systems — Information for emergency service support via personal ITS station — General requirements and technical definition

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The existing standard on emergency call services (EN 16072) excludes the accident detecting process and focuses on the automotive manufacturer's perspective. In order for emergency call services to be widespread in the automotive industry, a unified system requirement and methodology for accident data gathering and data processing are necessary.

In terms of an accident detection system, the existing emergency call services assess an accident by checking solely impact data. However, impact occurrence from a non-accident incident, such as crossing a speed hump and/or pothole, can be determined as an accident, which can generate a false report. This false report can cause waste of labour, time, and expense for eCall service centres (e.g. PSAP [Public Safety Answering Point]). Therefore, it is necessary to define an accident detection process to identify an accident while filtering a false report.

Intelligent transport systems — Information for emergency service support via personal ITS station — General requirements and technical definition

1 Scope

This document defines the use cases and general requirements to support emergency services via P-ITS-S. Any automotive related service providers can refer to this document for developing eCall service systems into eCall non-supportive vehicle.

The P-ITS-S acts as a monitoring and data transmitting device which gathers a vehicle's speed, impact, and airbag deployment signal to assess the accident occurrence and type of accident. Once gathered data has been determined as an accident, accident related information shall be sent to an emergency service centre.

Only notable events, such as an airbag-deployed event, rollover and stationary accident, are concerned by this document. In addition, the vehicle data gathering device requirement and implementation methodology for the emergency service are not applicable to this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13185-2, *Intelligent transport systems — Vehicle interface for provisioning and support of ITS services — Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface*

ISO 13185-3, *Intelligent transport systems — Vehicle interface for provisioning and support of ITS Services — Part 3: Unified vehicle interface protocol (UVIP) server and client API specification*

ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13185-2, ISO 13185-3, ISO 21217 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
accident determination
judgement of whether an event is a real accident or not, following an analysis based on gathered data

3.2
G-sensor
<accelerometer> sensor module that detects impact by measuring acceleration change

3.3
gyro sensor
<yaw-rate sensor> angular rate sensor in roll and pitch axis

3.4
ITS station
ITS-S
entity in a communication network, comprised of application, facilities, networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

[SOURCE: ISO 13184-2:2016, 3.5]

3.5
personal/vehicle ITS station
P/V-ITS-S
ITS station implemented in a vehicle or mobile device

[SOURCE: ISO 17438-4:2019, 3.1.4]

3.6
stationary vehicle accident
accident where a stopped vehicle is struck by a moving vehicle

3.7
accident detection system
system which runs a process for determining accident occurrence based on the data gathered from a P-ITS-S

3.8
accident data
data relevant to an accident

Note 1 to entry: An example is impact and rollover magnitude gathered during an accident (i.e. vehicle speed, impact magnitude, *airbag deployment signal* [3.9], angular rate). These data are evaluated for an *accident determination* (3.1) process.

3.9
airbag deployment signal
ECU signal for airbag deployment during an accident which is gathered from the *UVIP server* (3.10)

3.10
UVIP server
server implementing the UVIP services

3.11
preset threshold
specified maximum value of impact magnitude which triggers the further *accident determination* (3.1) process

Note 1 to entry: Determining impact threshold value is out of scope of this document.

3.12
emergency service centre
response centre to which accident information is sent

4 Abbreviated terms

ECU electronic control unit

UVIP unified vehicle interface protocol

ITS intelligent transport system

5 General information

This document specifies the general requirements for the accident detection system via P-ITS-S. It contains information on the following:

— accident detection system structure;

— requirements for impact detection;

— accident determination process by accident case (airbag deployed/rollover/stationary).

The accident detection system consists of the UVIP server, which is a part of an in-vehicle system and a P-ITS-S. The role of a P-ITS-S is to gather accident data from the UVIP server, to analyse this data, and send the location of the accident detected to the emergency service centre.

The accident detection system implementation method differs according to G-sensor availability within a vehicle. Whether there is an in-vehicle or P-ITS-S G-sensor, impact data is gathered and sent to the P-ITS-S for the further accident determination process.

The accident determination process differs according to the accident case (e.g. airbag-deployed, rollover and stationary) as well as the required data. Required data is covered in use case cluster 2. Figure 1 shows the accident detection reference system.

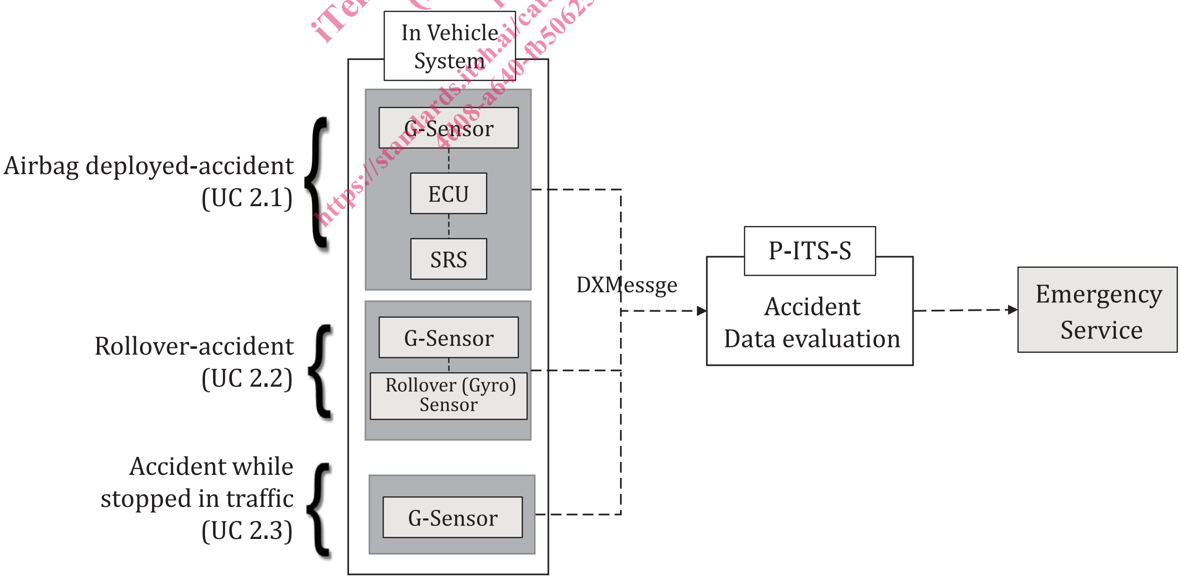

Figure 1 — Accident detection reference system

6 Use case implementation

6.1 Use case clusters and associated use cases

In general, a vehicle accident generates considerable impact along with sudden deceleration, rapid RPM drop, and airbag deployment. This series of data provides a reasonable source of information for

identifying accidents and filtering out false detections. In order for the P-ITS-S to detect an accident properly, the following functionalities are required:

— Exchange of data between the P-ITS-S and the vehicle's UVIP server and ability to monitor vehicle status, such as impact and speed in real time.

If an impact is detected which exceeds a preset threshold, then the P-ITS-S shall make a request for airbag deployment signal check through the UVIP server.

Once impact data has been determined as an accident, the P-ITS-S sends accident related information, such as time and accident detected location, to the emergency service centre.

Table 1 provides an overview of the different use cases. The use cases are grouped into use case clusters.

Table 1 — Overview of use case clusters and associated use cases

Title of use case cluster	Brief description
1 - Impact detection	This cluster describes an impact data gathering system which is classified according to G-sensor availability within a vehicle. If a vehicle doesn't support G-sensor, then P-ITS-S shall act as an impact gathering system. **UC 1.1** - Impact detection using in-vehicle G-sensor **UC 1.2** - Impact detection using P-ITS-S G-sensor
2 - Accident determination	Although there are various accident types, this cluster covers three particular use cases: airbag-deployed accident (UC 2.1), rollover accident (UC 2.2) and stationary accident (UC 2.3). After the P-ITS-S gathers impact data and checks with a preset threshold, each accident case shall follow the corresponding accident detection process. **UC 2.1** - Airbag-deployed accident **UC 2.2** - Rollover accident **UC 2.3** - Accident while stopped in traffic

6.2 Use case implementation

6.2.1 UC cluster 1 — Impact detection

The P-ITS-S monitors impact data through G-sensor in real-time and checks whether the impact has exceeded a preset threshold. Determining a preset impact threshold is not covered in this document.

This use case cluster involves the case where impact is gathered and sent to the P-ITS-S. The role of the P-ITS-S is differed by G-sensor availability within a vehicle.

6.2.1.1 UC 1.1 Impact detection through in-vehicle G-sensor

Table 2 defines the use case where impact data from G-sensor within a vehicle is gathered. In this use case, the P-ITS-S which communicates with a UVIP server gathers impact data directly from an in-vehicle G-sensor in DXMessage format. The UVIP client within the P-ITS-S shall receive impact data along with an airbag deployment signal and move on to the further process.