SLOVENSKI STANDARD
SIST-TS CEN/TS 17875:2023

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Inteligentni transportni sistemi - e-Varnost - Arhitektura informacijskega sistema za podporo incidentom (ISIS)

Intelligent transport systems - eSafety - Incident Support Information System (ISIS) Architecture

Intelligente Verkehrssysteme - ESicherheit - Abstützen bei Vorfällen Informationssystem (ISIS) Architektur

Systèmes de transport intelligents - eSafety - Architecture du système d'information sur la prise en charge des incidents (ISIS)

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English Version

Intelligent transport systems - eSafety - Incident Support Information System (ISIS) Architecture

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (CEN/TS 17875:2022) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, WG15 eSafety, the secretariat of which is held by NEN.

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Introduction

A 112-eCall is an incident alert system, specified in Regulation 305/2013/EC and Regulation 758/2015/EC, which specify that the 112-based eCall in-vehicle system " *'eCall' means an in-vehicle emergency call to 112, made either automatically by means of the activation of in-vehicle sensors or manually, which establishes a 112-based audio channel between the occupants of the vehicle and a PSAP over which it sends a minimum set of data as defined in EN 15722 to the PSAP and subsequently opens the audio channel for dialogue between the PSAP and the occupants of the vehicle".* The PSAP instigates response by sending emergency responders to the scene, talks with the occupants of the vehicle if possible, and at some point at the PSAP's choosing, terminates the eCall.

A 112-eCall is described as an incident alert system, because

a) it is a call between a vehicle and a Public Service Answering Point;

b) Regulation 758/2015 specifies (Article 6 (8)) that *"The MSD sent by the 112-based eCall in-vehicle system shall include only the minimum information as referred to in the standard EN 15722: 'Intelligent transport systems — eSafety — eCall minimum set of data (MSD)'. No additional data shall be transmitted by the 112-based eCall in-vehicle system*, "; and

c) Regulation 758/2015 further specifies (whereas (15)) *Manufacturers shall ensure that the 112-based eCall in-vehicle system and any additional system providing TPS eCall* or an added-value service *are designed in such a way that no exchange of personal data between them is possible.*

eCall therefore, by Regulatory definition, terminates once emergency responders have been activated and the PSAP elects to terminate the call (in some circumstances that may only be when the responders arrive on the scene of the incident, but in most cases, well before).

EU CEF Project sAFE, and CEF Project I-HeERO before it, identified that as in-vehicle technology advances, new opportunities to provide additional helpful data to emergency responders arise. Data from cameras and sensors can be of significant assistance to emergency responders. Project iHeERO identifies:

- *Additional sensor information could be*
  - *Cameras (video or still image)*
  - *Special sensors e.g. gas or leakage*
  - *Passenger detection sensors*

and

1. PSAP operator initiates a query to get a list of all accessible data sources (including sensors) on the vehicl
2. The IVS accepts the request and posts all available data sources including sensors
3. PSAP notes that an internal camera in the cabin is available for query

But does not say how this is to be achieved. We know that because of the Regulation, it will not be achieved by the PSAP in the eCall, and Activity (3.6) of project sAFE has identified that

a) The crucial participants to this action are the affected vehicle (and its occupants) and the 'emergency responders' – the paramedic and police etc., who arrive on the scene to handle the incident (not the PSAP [although in some 112 response configurations the level 1 PSAP may remain in contact or control until the incident is concluded]).

b) This information support is not an eCall, but a post eCall incident support activity between the emergency responders and vehicles at the scene of the incident and their occupants.

It is further observed, though not elsewhere commented in the main body of the sAFE project report, that aerial drones are increasingly being used to provide information to emergency responders. Providing the opportunity to link these devices with these other new capabilities therefore also makes sense.

However, rather than a loose indication of what might happen next, this document proposes the architecture to provide an 'Incident Support Information System' ISIS.

The objective of the ISIS at the highest level is shown in Figure 1.

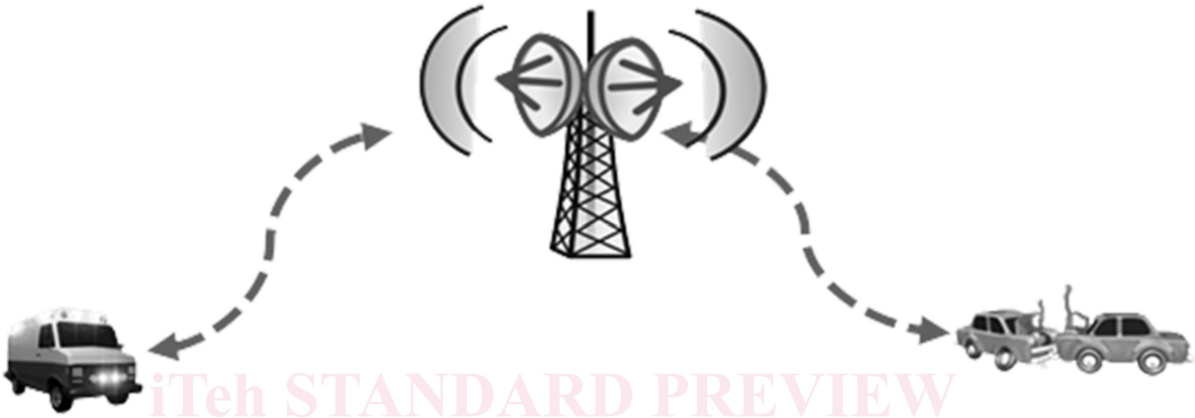

Figure 1 — ISIS –1 – Architecture - Objective

1 Scope

This document describes the architecture of a secure process flow between a source ITS system and a destination ITS system to provide an 'incident support information system' (ISIS) to emergency responders by accessing (with the agreement of the vehicle owners/keepers) data from a crashed vehicle and/or other vehicles, or drones, in the vicinity of the incident.

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/DIS 21177, *Intelligent transport systems — ITS-station security services for secure session establishment and authentication between trusted devices*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
bounded secured managed domain
ITS-stations

Note 1 to entry: The ITS-station concept provides for secure peer-to-peer communications between entities that are themselves capable of being secured and remotely managed; while this is an abstract definition, it has very specific physical consequences; the bounded nature is derived from the requirement for ITS-stations to be able to communicate amongst themselves, i.e. peer-to-peer, as well as with devices that are not secured; realising that to achieve this in a secure manner often requires distribution and storage of security-related material that must be protected within the boundaries of the ITS-station, leads to the secured nature of the entity; thus ITS-stations are referred to as bounded secured managed domains (BSMD).

3.2
data
representations of static or dynamic objects in a formalized manner suitable for communication, interpretation, or processing by humans or by machines

Note 1 to entry: In packet switched networks, voice is carried in packets of data.

3.3
data concept
any of a group of *data* structures (i.e. object class, property, value domain, *data elements*, message, interface dialogue, association) referring to abstractions or things in the natural world that can be identified with explicit boundaries and meaning and whose properties and behaviour all follow the same rules

3.4
data element

single unit of information of interest (such as a fact, proposition, observation, etc.) about some (entity) class of interest (e.g. a person, place, process, property, concept, state, event) considered to be indivisible in a particular context

3.5
eCall

emergency call which is generated either automatically via activation of in-vehicle sensors or manually by the *vehicle occupants* (or person(s) riding on a vehicle that is not fitted with an enclosed compartment and/or (a) seatbelt(s)), and which, when activated, provides notification and relevant location information to the most appropriate *'Public Safety Answering Point'*, by means of *mobile wir*eless communications *networks,* carries a defined standardized '*Minimum Set of Data'* [MSD] notifying that there has been an incident that requires response from the emergency services, and establishes an audio channel between the occupants of the vehicle and the most appropriate '*Public Safety Answering Point'*

3.6
GeoAnycast

as defined in ETSI TS 102 636-2

Note 1 to entry:

GEOANYCAST 3 Geographically-Scoped Anycast (GAC)

GEOANYCAST_CIRCLE 0 Circular area

GEOANYCAST_RECT 1 Rectangular area

GEOANYCAST_ELIP 2 Ellipsoidal area

GEOBROADCAST 4 Geographically-Scoped

3.7
global transport data format

function of data conversion of sensor and control network raw data in a flexible way, using configuration data specific for the sensor and control network connected to them

Note 1 to entry: This technical solution is specified in ISO/TS 21184 which addresses the complexity of converting protocol data units with raw (device-specific) data of any sensor and control network, of any kind of technical equipment, into a standardized data format, which it defines as global transport data format (GTDF); the advantage of the configuration concept is the flexibility to use the same implementation architecture for different sensor and control networks.

3.8
Intelligent transport system

information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the transport systems sector

3.9
ITS-station
functional entity comprised of an ITS-station facilities layer, ITS-station networking & transport layer, ITS-station access layer, ITS-station management entity, ITS-station security entity and ITS-station applications entity providing ITS services

Note 1 to entry: From an abstract point of view, the term “ITS-station” refers to a set of functionalities. The term is often used to refer to an instantiation of these functionalities in a physical unit. Often the appropriate interpretation is obvious from the context. The proper name of physical instantiation of an ITS-station is ITS-station unit (ITS-station).

3.10
latency
latency from a general point of view is a time delay between the cause and the effect of some physical change in the system being observed; latency is a time interval between the input to a simulation and the visual or auditory response, often occurring because of network delay in two way communications where the lower limit of latency is determined by the medium being used to transfer information – c in two-way communication systems, latency is the delay between transmission and the ability to use information received from that transmission. The latency being caused by processing speed, transmission speed, processing delays, transmission delays, available bandwidth, transmission and security protocols and processes, etc

3.11
low latency
implication of few if any latency delays providing more or less immediate transmission, usability, and ability to respond/react

4 Symbols and abbreviations

112	European emergency call number
AP DU	application data unit
C-ITS	cooperative ITS (also known as ‘connected vehicle’0
CAN	control area network (ISO 11898-1)
CANBUS	control area network data-bus (ISO 11898-1)
CANBUS ID	control area network data-bus node identifier (ISO 11898-1)
CAV	connected or automated vehicle
CCAM	cooperative connected and automated mobility
EC	European Commission
ECU	electronic control unit
EENA	European Emergency Number Association
EU	European Union
GDPR	General Data Protection Regulation (EU 2016/679)
GDTF	global transport data format (ISO/TS 21184)
I_HeERO	Infrastructure Harmonized eCall European Pilot (CEF Project)
IPv6	internet protocol

ISIS	incident support information system
ITS	Intelligent transport system
IVS	in-vehicle system
LLC	link layer control
MAC	Medium access control
MSD	minimum set of data (EN 15722)
OAD	optional additional data (EN 15722)
OSI	Open Systems Interconnection, (ISO/IEC 7498-1)
PSAP	Public Safety Answering Point
RPM	revolutions per minute
sAFE	Safe Aftermarket eCall (EU CEF Project)
SAP DU	service announcement protocol data unit
SI	secure interface
SVI	secure vehicle interface
TLS	transport layer security
TPS	third party service
TS	Technical Specification
VOIP	voice over internet protocol
VRU	vulnerable road user

5 Conformance

ISIS systems operate using the ISO 21217 ITS Intelligent transport systems — Station and communication architecture with cybersecurity as defined in ISO/DIS 21177 and within the ITS data governance paradigm defined in ISO TS 5616 (draft), so it is a prerequisite that ISIS systems are in conformance with these systems in every respect.

6 Phases of the ISIS

6.1 Summary of phases

Phase 1: Instigation

Phase 2: Initiation

Phase 3: Multiple Provider Management

Phase 4: Establish Capability

Phase 5: Search and Offering

Phase 6: Data/service Provision

Phase 7: Shutdown Management

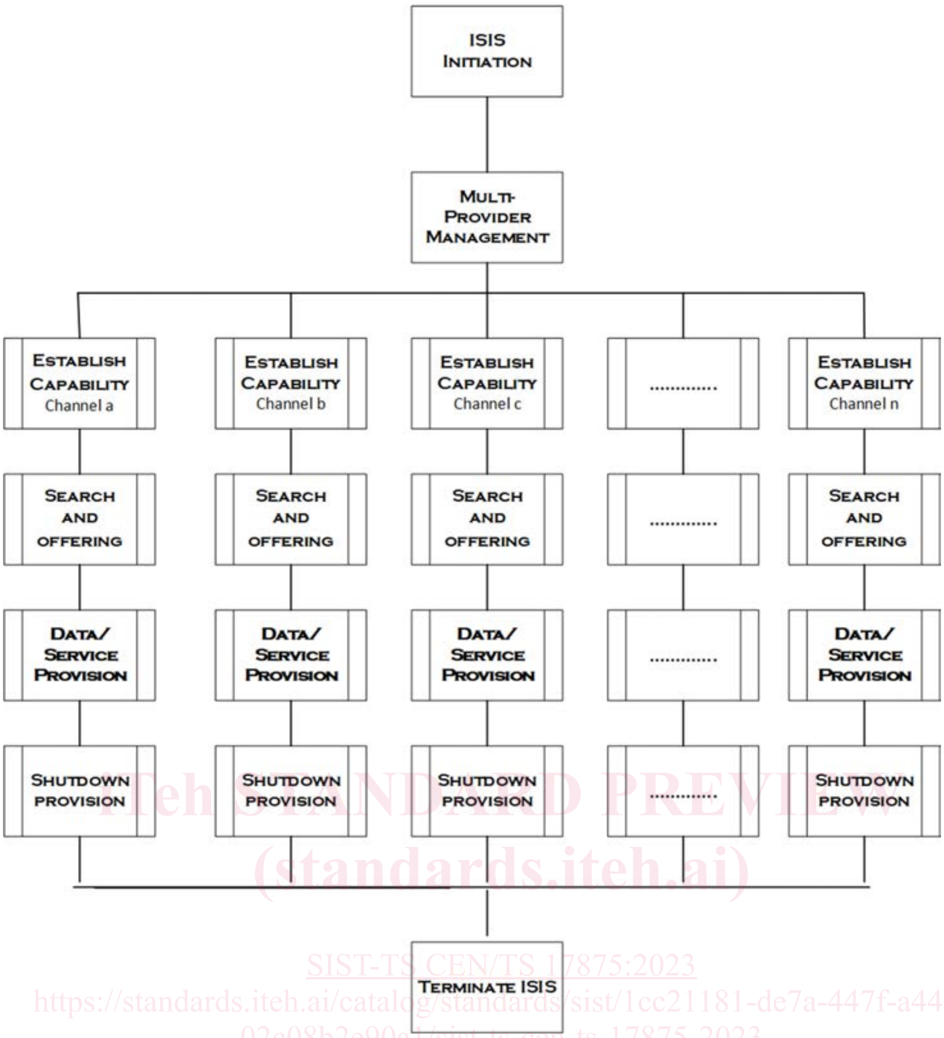
ISIS INITIATION
MULTI-PROVIDER MANAGEMENT
ESTABLISH CAPABILITY Channel a
ESTABLISH CAPABILITY Channel b
ESTABLISH CAPABILITY Channel c
....
ESTABLISH CAPABILITY Channel n
SEARCH AND OFFERING
DATA/ SERVICE PROVISION
SHUTDOWN PROVISION
TERMINATE ISIS

Figure 2 — ISIS-2 – Process flow

Figure 2 illustrates, at a very high level, an ISIS system process flow where the emergency responder is receiving data from multiple sources. These may be multiple sources within on vehicle, may be streams from different vehicles, or a combination of both.

The following subClauses describe ISIS at an architectural level, and do not purport to be a system specification.

6.2 Phase 1: Instigation

Instigation of the ISIS shall always be to the command of the lead emergency responder or his nominee.

a) Instigation will be at the actuation of the emergency responder carrying out a search for vehicles at the incident location (a GeoAnycast according to ETSI TS 102 636-2) who are prepared to share their camera/sensor data with emergency responders (on a confidential basis with privacy rights respected); or

b) Instigation will be at the actuation of the emergency responder having received an ISIS consent request (in the form of an OAD* message transmitted in the MSD sent to the PSAP as part of a 112-eCall, or as a result of dialogue between the PSAP and the occupants of the vehicle**).