# ETSI TS 102 890-1 V1.1.1 (2017-05)

**TECHNICAL SPECIFICATION**

**Intelligent Transport Systems (ITS);**
**Facilities layer function;**
**Part 1: Services Announcement (SA) specification**

Reference

DTS/ITS-0020044

Keywords

interoperability, ITS, service, validation

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# Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 1 of a multi-part deliverable covering Intelligent Transport Systems; Facilities layer function, as identified below:

**Part 1: "Services Announcement (SA) specification";**

Part 2: "Position and time facility specification".

# Modal verbs terminology

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# Introduction

Some of the applications of the Basic Set of Applications (see ETSI TR 102 638 [i.1]) require ITS stations (Service Users) to have knowledge of a certain service of interest that is provided by other ITS stations (Service Providers) via defined communication access technologies.

The C-ITS protocol stack supports push and pull mechanisms in order to allow an ITS station to identify the availability of ITS services. The push mechanism is named "ITS service announcement" which is also known as "ITS service advertisement" (see ETSI EN 302 665 [i.2]). Throughout this document this service is referred to as service announcement service (SA service).

The ITS SA service is a functionality agnostic to the medium and the announced service that can be used by specific services to provide the push functionality mentioned above. In this sense, each specification of an ITS service will tailor the ITS service announcement to its needs. This means that ITS service definitions (e.g. in other standards or technical specifications) should make use of the provisions of the present document to define its service-specific use of ITS service announcement, i.e. to profile the ITS service announcement appropriately (for example the use of service announcement in a Platooning service). The present document defines therefore a general framework which needs to be followed whenever a specific service is specified. Compliance should be tested according to this service specification that defines the application-specific requirements for the service announcement.

# 1 Scope

The present document provides the specification of the Services Announcement (SA) service, including its protocol functions, based on ISO/TS 16460 [1].

The definition of the interface between Service Provider and Service Announcer ITS stations (ITS-S) as well as of the communication steps following the service announcement protocol procedure and related protocol details between Service Announcer and Service User ITS-S are application-specific are not covered by the present document.

# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

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The following referenced documents are necessary for the application of the present document.

[1]      ISO/TS 16460:2016: "Intelligent transport systems -- Communications access for land mobiles (CALM) -- Communications protocol messages for global usage".

[2]      ETSI TS 102 894-2: "Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionary".

[3]      ETSI EN 302 636-4-1: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 1: Media-Independent Functionality".

[4]      ETSI TS 103 097 (V1.2.1): "Intelligent Transport Systems (ITS); Security; Security header and certificate formats".

[5]      ETSI EN 302 931 (V1.1.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Geographical Area Definition".

[6]      Recommendation ITU-T X.691/ISO/IEC 8825-2 (2015): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[7]      ETSI TS 102 965: "Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration".

[8]      ETSI TS 103 248: "Intelligent Transport Systems (ITS); GeoNetworking; Port Numbers for the Basic Transport Protocol (BTP)".

[9]      IEEE 1609.3™ - 2016: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1]          ETSI TR 102 638 (V1.1.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Definitions".

[i.2]          ETSI EN 302 665 (V1.1.1): "Intelligent Transport Systems (ITS); Communications Architecture".

[i.3]          ISO/TS 17423:2014: "Intelligent transport systems -- Cooperative systems -- ITS application requirements and objectives for selection of communication profiles".

[i.4]          ETSI TS 102 723-11: "Intelligent Transport Systems (ITS); OSI cross-layer topics; Part 11: Interface between networking and transport layer and facilities layer".

[i.5]          ETSI TS 102 723-5 (V1.1.1): "Intelligent Transport Systems (ITS); OSI cross-layer topics; Part 5: Interface between management entity and facilities layer".

[i.6]          ETSI EN 302 636-5-1: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 5: Transport Protocols; Sub-part 1: Basic Transport Protocol".

[i.7]          ETSI TS 103 301: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services".

# 3        Definitions, symbols and abbreviations

## 3.1      Definitions

For the purposes of the present document, the following terms and definitions apply:

**ITS application:** association of two or more complementary ITS-S applications

**ITS-S application:** fragment of an ITS application available at an ITS-S that uses ITS-S services to connect to one or more other fragments of the same ITS application

**ITS-S gateway:** gateway functionality based on the ITS-S reference architecture

**ITS-S router:** routing functionality based on the ITS-S reference architecture

**ITS service:** service provided by an ITS application to the user of ITS

**ITS-S service:** communication functionality offered by an ITS-S to an ITS-S application

**Services announcement:** provision, via an ITS communication functionality, of information about an ITS service

NOTE:     Such information can include the ITS service identity, availability and communication details.

**Service announcer ITS-S:** ITS-S that announces services on behalf of the service provider ITS-S by transmitting SAEM

**Service provider ITS-S:** ITS-S that provides remote or local ITS services

**Service user ITS-S:** consumer of ITS services monitoring SAEM for an announced ITS service opportunity of interest

NOTE:     These definitions are in line with ETSI EN 302 665 [i.2].

## 3.2      Symbols

For the purposes of the present document, the following symbols apply:

| | |
|---|---|
| *changeCount* | Component of *samBody* |
| *channelIndex* | Component of *ServiceInfo* pointer to *ChannelInfo* |
| *ChannelInfo* | Datatype of *channelInfos* list entry |
| *channelInfos* | Component of *samBody* |
| *chOptions* | Component of *ServiceInfo* |
| *contentCount* | Component of *changeCount* |
| *defaultGateway* | Component of *routingAdvertisement* |
| *ExtendedChannelInfos* | Component of *extensions* of *samBody* |
| *extensions* | Component of *samBody* |
| *GatewayMACaddress* | Component of *routingAdvertisement* |
| *IPv6Address* | Component of *chOptions* |
| *ItsPduHeader* | Header component of the SAEM |
| *messageID* | Component of the *ItsPduHeader* |
| *protocolType* | Component of *chOptions* |
| *protocolVersion* | Component of the *ItsPduHeader* |
| *ProviderMACaddress* | Component of *chOptions* |
| *routingAdvertisement* | Component of *samBody* |
| *saID* | Component of *changeCount* |
| *sam* | Component of the SAEM |
| *Sam* | Datatype specified in ISO/TS 16460 [1] |
| *samBody* | Component of *sam* |
| *serviceID* | Component of *ServiceInfo* |
| *ServiceInfo* | Datatype of *serviceInfos* list entry |
| *serviceInfos* | Component of *samBody* |
| *serviceProviderPort* | Unused component of *chOptions* |
| *SrvAdvChangeCount* | Datatype of *changeCount* |
| *stationID* | Component of the *ItsPduHeader* |
| *systemService* | Unused component of *chOptions* |

## 3.3      Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| AID | Application Identifier |
| API | Application Programming Interface |
| ASN | Abstract Syntax Notation |
| BTP | Basic Transport Protocol |
| C-ITS | Cooperative ITS |
| GN | GeoNetworking |
| ID | Identifier |
| IETF | Internet Engineering Task Force |
| IP | Internet Protocol |
| IPv6 | Internet Protocol Version 6 |
| ISO | International Organization for Standardization |
| ITS | Intelligent Transport System |
| ITS-S | ITS Station |
| ITU-T | International Telecommunication Union - Telecommunication Standardization Sector |
| MAC | Medium Access Control |
| MA-SAP | Management to Application Service Access Point |
| MDA | Minimum Dissemination Area |
| MF | Management to Facilities |
| MF-SAP | Management to Facilities Service Access Point |
| NF | Networking & Transport to Facilities |
| NF-SAP | Networking & Transport to Facilities Service Access Point |
| PER | Packed Encoding Rules |
| RX | Reception |
| SA | Services Announcement |

| SAEM | Services Announcement Extended Message |
|------|----------------------------------------|
| SAM  | Service Announcement |
| SAP  | Service Access Point |
| SfCH | Safety channel (logical) |
| SSP  | Service Specific Permissions |
| TX   | Transmission |

# 4 SA functional description

## 4.1 SA functional architecture

The Services Announcement (SA) service is a protocol service that is distributed over the facilities layer and the management entity of the ITS-S reference architecture as defined in ETSI EN 302 665 [i.2]. The SA service provides information on available services, applying the Services Announcement protocol with the following functions:

- The SA message processing function of the facility layer is responsible for the periodic transmission and/or reception of SAEM. It shall offer the following functionalities:

  - For the SAEM transmission (TX) service:

    - message encoding;

    - transmission management.

  - For the SAEM reception (RX) service:

    - message decoding;

    - reception management.

- The SA management function of the management entity is responsible for the registration / update / deregistration of applications.

The SA service is implemented in a Service Provider, Service Announcer, or Service User ITS-S.

Figure 1 presents the SA service in the context of the ITS-S reference architecture and its logical interfaces with other entities and layers.

The SA service supports different configurations with respect of the Service Provider role and the Service Announcer role, such as:

- Service Provider and Service Announcer functionality are implemented in the same ITS-S;

- Service Provider and Service Announcer functionality are implemented in separate ITS-S;
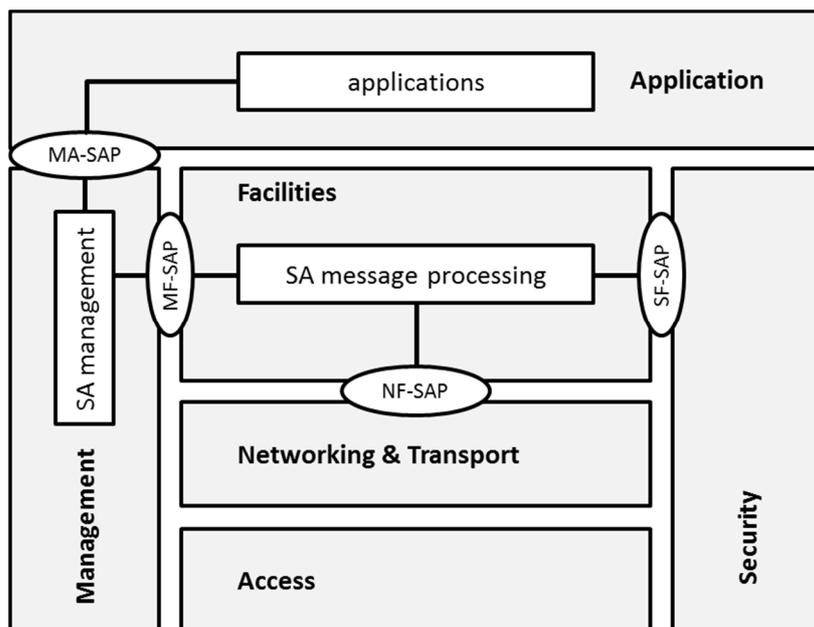
- and other configurations.

**Figure 1: SA in the context of the ITS-S reference architecture**

# 4.2      Interfaces of the SA service

## 4.2.1      Interface between Application entity and Management entity

A Service Provider ITS-S application may register / update / deregister its offered ITS service at the management entity using the parameters specified in table 1.

A Service User ITS-S application may register / update / deregister potential services of interest at the management entity using the parameters specified in table 2.

A Service User ITS-S application may be notified of the reception of an SAEM corresponding to one of the registered services of interest by the management entity using the parameters specified in table 3.

This interface may be implemented as an API or as MA-SAP.

**Table 1: Parameters for the service primitive of a SA provider request via the MA-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from service provider application to SA management | Request type | SA Provider registration / update / deregistration |
| | ITS-AID | ITS-AID to be indicated in an SAEM, identifying the service provider application (see ETSI TS 102 965 [7]) |
| | Dissemination parameter | See table 7 |
| | Traffic class | If GeoNetworking / BTP (ETSI EN 302 636-5-1 [i.6]) is used for transmission of SAEM, then the GN traffic class as defined in ETSI EN 302 636-4-1 [3] shall be used for message prioritization |
| | Payload | Application-specific service announcement data to be contained in SAEM, see clause 5.2 |
| SA data returned to the requesting application | saID | See clause 6.1 |
| | contentCount | See clause 6.1 |
| | Response code | Code indicating the status of the SA Provider announcement registration |

**Table 2: Parameters for the service primitive of a SA user request via the MA-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from service user application to SA management | Request type | SA User Registration / deregistration |
| | ITS-AID | ITS-AID that identifies in received SAEM the service user application (see clause 6.4) |
| SA data returned to the requesting application | Response code | Code indicating the status of the SA user request |

**Table 3: Parameters for the service primitive of a SA notification event via the MA-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from SA management to registered SA user application | Notification ID | Implementation-specific notification ID |
| | ITS-AID | ITS-AID that identifies the application as indicated in a received SAEM (see clause 6.4) |
| | Payload | Application-specific service announcement data retrieved from an SAEM |
| | saID | As indicated in a received SAEM, see clause 6.1 |
| | contentCount | As indicated in a received SAEM, see clause 6.1 |
| | Response code | Code indicating the status of the announcement response |
| | TimeStamp | SAEM reception time stamp |

## 4.2.2 Interface between Facilities layer and the Management entity

The SA service functions allocated in the facilities layer and management entity exchange information among each other for the purpose of the service announcement.

The management entity uses the communication requirements (see clause 6.3) to select a suitable ITS-S communication protocol stack, also referred to as "ITS-S Communication Profile" (ITS-SCP). The SA service management in the management entity may register for a transmission of SAEM at the local Facilities layer or at a remote Facilities layer.

The MF interface may be realized as specified in ETSI TS 102 723-5 [i.5] or as an interface.

The parameters for SA registration, update, deregistration, and notification are passed through the SA management from the SA application to the SA message processing and vice versa. The parameters listed in table 4, table 5, and table 6 may be used for this purpose.

**Table 4: Parameters for the service primitive of a SA provider request via the MF-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from SA management to SA message processing | Request type | SA Provider registration / update / deregistration |
| | ITS-AID | ITS-AID to be indicated in an SAEM, identifying the service provider application (see ETSI TS 102 965 [7]) |
| | ProtId | Id of the protocol stack to be used for transmissions as specified in clause B.2.1 |
| | Traffic class | If GeoNetworking/BTP (ETSI EN 302 636-5-1 [i.6]) is used for transmission of SAEM, then the GN traffic class as defined in ETSI EN 302 636-4-1 [3] shall be used for message prioritization |
| | Payload | Application-specific service announcement data to be contained in SAEM, see clause 5.2 |
| SA data returned to SA management | saID | See clause 6.1 |
| | contentCount | See clause 6.1 |
| | Response code | Code indicating the status of the SA Provider announcement registration |

**Table 5: Parameters for the service primitive of a SA user request via the MF-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from SA management to SA message processing | Request type | SA User Registration / update / deregistration |
| | ITS-AID | ITS-AID that identifies in received SAEM the service user application (see clause 6.4) |
| SA data returned to SA management | Response code | Code indicating the status of the SA user request |

**Table 6: Parameters for the service primitive of a SA notification event via the MF-SAP**

| Category | Data | Definition |
|---|---|---|
| Data passed from SA message processing to SA management | Notification ID | Implementation-specific notification ID |
| | ITS-AID | ITS-AID that identifies the application as indicated in a received SAEM (see clause 6.4) |
| | Payload | Application-specific service announcement data retrieved from an SAEM |
| | saID | As indicated in a received SAEM, see clause 6.1 |
| | contentCount | As indicated in a received SAEM, see clause 6.1 |
| | Response code | Code indicating the status of the announcement response |
| | TimeStamp | SAEM reception time stamp |

## 4.2.3     Interface between Facilities layer and the Security entity

The SA service may invoke the Security entity services.

> NOTE:     At the time of preparation of the present document no specification of the SAP between Facilities layer and the Security entity was available.

## 4.2.4     Interface between Facilities layer and the Networking &Transport layer

The SA services deliver the SAEM as payload to the Networking & Transport layer for dissemination via the NF-SAP.

The Networking & Transport layer indicates the reception of an SAEM to the SA services.

If GeoNetworking/BTP (specified in ETSI EN 302 636-5-1 [i.6]) is used, the NF interface may be realized as described in ETSI TS 102 723-11 [i.4].

# 5          SAEM format

## 5.1       General

The SA service shall transmit the SAEM with the format as specified in Annex A.

The header component of the SAEM shall be of type *ItsPduHeader*, as defined in the ETSI TS 102 894-2 [2]:

* The *protocolVersion* component of the header shall be set to value "1" for the present version of this Technical Specification.

* The *messageID* component of the header shall be set to the value for "SAEM" as defined in ETSI TS 102 894-2 [2].

* The *stationID* component shall be set to the Station ID of the Service Announcer ITS-S.

The *sam* component of the SAEM shall be of type *Sam* as specified in ISO/TS 16460 [1].

The *samBody* component of *sam* shall include the component *changeCount*. This component shall be of type *SrvAdvChangeCount* and shall be handled as defined in clause 6.1.

If one of the announced services can be consumed using a communication technology, which is different from the one used to transmit the SAEM, the *samBody* component of *sam* shall include the component *extensions*; the *extensions* component shall include the extension *ExtendedChannelInfos*. The component *ExtendedChannelInfos* shall include an entry for each communication technology on which an announced service can be used.

NOTE: The SAEM format allows further *sam* Extension elements and / or Channel Info Extension elements to be defined.

For the encoding of the SAEM the Unaligned PER encoding scheme as specified in Recommendation ITU-T X.691 [6] shall be used.

## 5.2 Service info component

The *samBody* component of *sam* shall always include the *serviceInfos* component. This *serviceInfos* component shall contain at least one element. Each element shall be of type *ServiceInfo* and contain the following information for a distinct ITS service:

- component *serviceID* shall contain the ITS-AID of the announced ITS service as assigned in ETSI TS 102 965 [7];

- component *channelIndex* shall contain a pointer to an entry in the *channelInfos* component (see clause 5.3) applicable to the announced ITS service or in the *ExtendedChannelInfos* extension;

- component *chOptions*:

  - may contain optional Service Info Extensions within the *extensions* component:

    - The extension *protocolType* defined in Annex B shall be present and indicate the protocol to be used by the Service User ITS-S for the announced service.

    - The extension *IPv6Address* shall be only present if the *protocolType* indicates "IPv6", and shall indicate the IP address of the Service Provider ITS-S.

    - When the Service Provider is implemented in a different ITS-S than the Advertiser and forwarding at data link layer is used,, the extension *ProviderMACaddress* shall be present and indicate the MAC address of the Provider ITS-S.

    - The extension *SAMapplicationData* contains application specific announcement data.

  - The subcomponents *systemService* and *serviceProviderPort* shall not be used.

## 5.3 Channel info component

The *samBody* component of *sam* shall include the *channelInfos* component and / or the *ExtendedChannelInfos* extension (see ISO/TS 16460 [1]) if the ITS service can be consumed on a channel that is different from the channel on which the SAEM is transmitted. This *channelInfos* component, when present, shall contain at least one element. Each element shall be of type *ChannelInfo* and contain a channel information set. Each set shall indicate the characteristics of a channel associated with the same communication technology as used for the transmission of the SAEM. Usage of the *ExtendedChannelInfos* extension, if applicable, shall be as specified in ISO/TS 16460 [1].

## 5.4 IPv6 routing advertisement

The *samBody* component of *sam* shall include the *routingAdvertisement* component if the ITS service can be consumed using IPv6 connectivity as detailed in ISO/TS 16460 [1].

If the Service Provider ITS-S provides its service via an ITS-S Router and if the communication between Service Provider ITS-S and ITS-S Router is a routed IPv6 connection then:

- The component *defaultGateway* shall provide the 128-bit IPv6 address of the ITS-S Router that provides connectivity to the Service Provider ITS-S.

- The component extensions shall contain the extension *GatewayMACaddress* which shall indicate the MAC address of the ITS-S Router.

NOTE:     The IPv6 routing advertisement provides information about ITS services and the corresponding IPv6 connectivity details to consume the services over an IPv6 network. Conversely a "router advertisement" used by IPv6 to manage and establish an IPv6 connectivity over a router is specified in the corresponding IETF standards and might be used to build up the IPv6 connectivity necessary to consume the announced ITS service. The process of building up an IPv6 connection is out of scope of the present document.

# 6        SAEM dissemination

## 6.1        Identification

The components of *changeCount* shall be handled according to ISO/TS 16460 [1]:

- *saID* shall distinguish different service announcement messages presented by the same Service Announcer ITS-S.

- *contentCount* shall identify a change of the content of the announced SA that corresponds to a certain *saID*.

The content of transmitted SAEM with identic *saID* and *contentCount* shall be identical for consecutive messages from the same ITS-S. Messages announcing a different set of services shall have a different *saID*. A change of the application-specific service announcement data shall be indicated by a change of the *contentCount*.

## 6.2        SA service trigger, update, repetition and termination

The SA facilities layer entities shall trigger, update or end the transmission of SAEM according to the parameters received from the management entity via the MF interface (see clause 4.2.2).

## 6.3        SA service communication requirements

An SAEM should be disseminated to reach as many ITS-S as possible, located in the Minimum Dissemination Area (MDA). The MDA is provided by the ITS application to the SA service in the dissemination parameter *CSP_CommDistance* and is typically defined in a way that every receiving ITS-S has received at least once the SAEM before entering the application's relevance area.

NOTE:     Applications that need different MDA values should not be announced in the same SAEM. This is taken into account by the SA message processing.

The SA service shall provide the MDA as destination area to the Networking & Transport layer in the format compliant to the one specified in ETSI EN 302 931 [5].

Table 7 provides the communication requirements for the broadcast communication flow in accordance with ISO/TS 17423 [i.3].

**Table 7: SA communication requirements for service announcement**

| Requirement | Value | Comment |
|---|---|---|
| Operational communication service parameters | | |
| CSP_LogicalChannelType | SfCH | Service advertisement channel (logical). Mappings of logical channels to physical channels depend on the access technology and the applicable region of operation of the ITS station providing the SA service |
| CSP_SessionCont | n.a. | No continuous connectivity |
| CSP_AvgADUrate | 255, 1 seconds (default) | TimeDurationValue specified in ISO/TS 17423 [i.3] As applicable, indicates the time between start of subsequent SAEM with same saID |
| CSP_FlowType | n.a. | |
| CSP_MaxPrio | ≤ 253 | The SA shall use the highest MaxPrio of the ITS application(s) it announces (not exceeding the CSP_MaxPrio) |
| CSP_PortNo | BTP port number | Port number of the applicable transport protocol used to receive / transmit SAEM. If BTP is used, the BTP port number shall be as specified in ETSI TS 103 248 [8] for service announcements (SAM) |
| CSP_ExpFlowLifetime | n.a. | |
| Destination communication service parameters | | |
| CSP_DestinationType | 1: broadcast transmission | |
| CSP_DestinationDomain | site-local | |
| CSP_CommDistance | 400 m radius (default value) | Given by MDA |
| CSP_Directivity | n.a. | |
| Performance communication service parameters | | |
| CSP_Resilience | High | Repeated transmission of the same message |
| CSP_MinThP | n.a. | |
| CSP_MaxLat | ms100 (8) | -- response within less than 100 ms |
| CSP_MaxADU | ≤ max message size in Bytes allowed by transport media | maximum size of SAEM |
| Security communication service parameters | | |
| CSP_DataConfidentiality | n.a. | |
| CSP_DataIntegrity | required | |
| CSP_NonRepudiation | required | |
| CSP_SourceAuthentication | required | |
| Protocol communication service parameter | | |
| CSP_Protocol | n.a. | |
| CSP_SpecificCommsProts | n.a. | |

EXAMPLE: CPS_001 defined for infrastructure services (see ETSI TS 103 301 [i.7]) can be used to disseminate the SAEM.

The Generic security profile as defined in ETSI TS 103 097 [4] shall be applied to SAEM. Additional header field types are not allowed.

# 6.4 SA Application Identifier (AID)

The ITS-AID value of the SA service shall be as specified in ETSI TS 102 965 [7].

# 6.5 SA Service Specific Permissions (SSP)

The SA service shall use the SSPs as specified in IEEE 1609.3 [9], encoded using the Unaligned PER encoding scheme as specified in ISO/IEC 8825-2 [6].

# Annex A (normative):
# ASN.1 specification of SAEM

The ASN.1 specification of the data types of the SAEM shall be as specified below.

```
SAEM-PDU-Descriptions {
    itu-t (0) identified-organization (4) etsi (0) itsDomain (5) wg1 (1) en (1028901) sam (0)
version1 (1)
}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
Sam FROM ITSsa { iso (1) standard (0) localized(16460) sa(2) version0 (0)}
ItsPduHeader FROM ITS-Container { itu-t (0) identified-organization (4) etsi (0) itsDomain (5) wg1
(1) ts (102894) cdd (2) version (1)};

SAEM ::= SEQUENCE {
    header       ItsPduHeader, -- use value for SAEM, see [2]
    sam          Sam (WITH COMPONENTS {body (WITH COMPONENTS {serviceInfos PRESENT})})}

END
```

# Annex B (normative):
# ASN.1 specification of extensions

## B.1    General

Annex B provides the specification of extensions defined by the present document.

## B.2    *ChannelInfo* extensions

## B.2.1    *ProtocolType* extension

For a given implementation, the following definitions shall be added to the module ITSsa { iso (1) standard (0) localized(16460) sa(2) version0 (0)} as appropriate.

```
ProtocolType::= INTEGER{
unknown (0),
any (1),
wSMP (2), -- Wave short message protocol
gN (3), -- Geonetworking
iPv6 (6), -- IPv6
} (0..255)

c-ProtocolType RefExt ::= 100 – protocol type

-- next type to be substituted with this new definition:
ServiceInfoExtTypes EXT-TYPE ::= {
{ ProviderServiceContext IDENTIFIED BY c-ProviderServContext } |
{ IPv6Address IDENTIFIED BY c-IPv6Address } |
{ ServicePort IDENTIFIED BY c-servicePort } |
{ ProviderMacAddress IDENTIFIED BY c-ProviderMACaddress } |
{ RcpiThreshold IDENTIFIED BY c-RCPIthreshold } |
{ WsaCountThreshold IDENTIFIED BY c-WSAcountThreshold } |
{ WsaCountThresholdInterval IDENTIFIED BY c-WSAcountThresInt } |
{ SAMapplicationData IDENTIFIED BY c-SAMapplicationData } |
{ ProtocolType IDENTIFIED BY c-ProtocolType,
...
}
```

# History

| Document history | | |
|---|---|---|
| V1.1.1 | May 2017 | Publication |
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