ETSI TS 104 091 V2.1.1 (2025-11)

TECHNICAL SPECIFICATION

Intelligent Transport Systems (ITS); Facilities Layer; Services Announcement (SA) Service; Release 2

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Foreword

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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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 to allow an ITS station to identify the availability of ITS-S services. The push mechanism is named "services announcement" which is also known as "service advertisement". Throughout the present document this service is referred to as services announcement service (SA service).

The 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-S service will tailor the services 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 services announcement, i.e. to profile the services announcement appropriately (for example the use of services 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.

The Release 1 edition of the SA service has been published as ETSI EN 302 890-1 [i.3]. The present document is the Release 2 edition of the same document, which is based on an update of the base standard ISO 16460 [1].

1   Scope

The present document provides the specification of the Services Announcement (SA) service, including its protocol functions, based on ISO 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 and 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 in the ETSI docbox.

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

[1]   ISO 16460:2021: "Intelligent transport systems — Localized communications — Communication protocol messages for global usage".

[2]   ETSI TS 102 965: "Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration; Release 2".

[3]   ETSI TS 103 899: "Intelligent Transport Systems (ITS); Vehicular Communications; Geographical Area Definition; Release 2".

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

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

[6]   ETSI TS 103 097: "Intelligent Transport Systems (ITS); Security; Security header and certificate formats; Release 2".

[7]   ETSI TS 102 940: "Intelligent Transport Systems (ITS); Security; ITS communications security architecture and security management; Release 2".

[8]   IEEE 1609.3™ - 2020: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services".

[9]   ETSI TS 103 836-4-1: "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; Release 2".

[10]   ETSI TS 103 836-5-1: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 5: Transport Protocols; Sub-part 1: Basic Transport Protocol; Release 2".

2.2   Informative references

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The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1]   ETSI TR 102 638: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Release 2".

[i.2]   ETSI TR 103 902: "Intelligent Transport Systems (ITS); General; Terms and Abbreviations; Release 2".

[i.3]   ETSI EN 302 890-1: "Intelligent Transport Systems (ITS); Facilities layer function; Part 1: Services Announcement (SA) specification".

[i.4]   ISO/TS 17423: "Intelligent transport systems -- Cooperative systems -- Application requirements and objectives".

3   Definition of terms, symbols and abbreviations

3.1   Terms

For the purposes of the present document, the terms given in ETSI TR 103 902 [i.2] and the following apply:

Services Announcement (SA): provision, via an ITS communication functionality, of information about an ITS-S service

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

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

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

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

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*

SrvOpP-ProtocolStack	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 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 abbreviations given in ETSI TR 103 902 [i.2] and the following apply:

NOTE: Where an abbreviation defined in ETSI TR 103 902 [i.2] has multiple definitions, the definition appropriate to the context of the present document applies.

SU   Service User

4 SA service introduction

The SA service is an ITS application support functionality operating at the facilities layer of an ITS station. It provides information about available ITS applications and ITS-S services to other ITS stations. It also reports services announced by SA services inside other ITS stations to the ITS applications. The SA service is responsible for the generation of SAEM based on request from ITS applications. The SAEM carries information about provided ITS-S services, such as the unique identification of the service, details about how to access the service, and ITS application specific service data. The SA service also enables ITS applications to register for potential services of interest and correspondingly reports corresponding received SAEMs to those ITS applications.

The SA service distinguishes the following roles:

- Service Provider: role that provides an ITS-S service.

- Service Announcer: role that is responsible for the announcement of services on behalf of the service provider.

- Service User: role that consumes an ITS-S service.

5 SA service functional specification

5.1 SA service in the ITS-S reference architecture

The Services Announcement (SA) service is located at the facilities layer of the ITS-S reference architecture and is divided into a management plane entity and a data plane entity. It interfaces with ITS applications to receive the application registration and to provide the received SAEM content to the ITS applications. Furthermore, the SA service may interact with other facilities layer entities (see figure 1), in particular:

- The facility layer Resource Management services, to manage the dissemination of SAEM.

- Other application support facilities, to trigger the dissemination of messages.

The SAEM is secured as defined in clause 6.2.1. The secured SAEM is referred to as SAEM in the present document.

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

Figure 1 presents the SA service in the context of the ITS-S reference architecture and depicts 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.
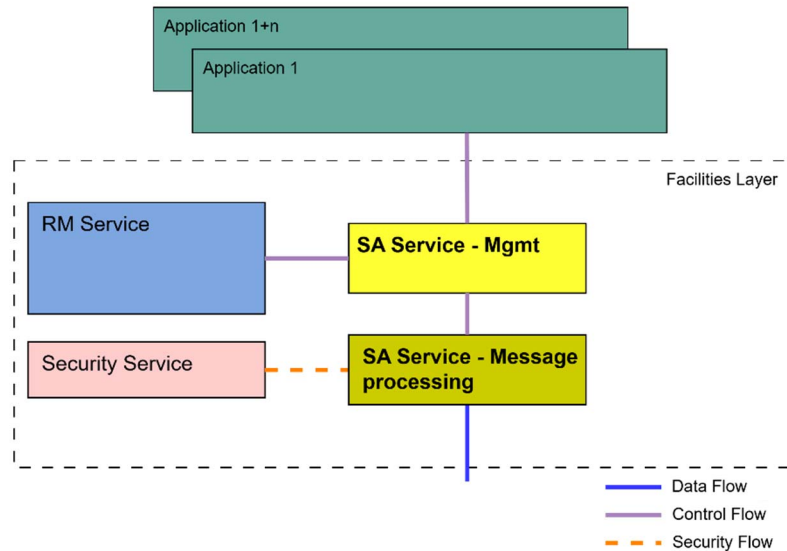
Figure 1: SA in the context of the ITS-S reference architecture

5.2   SA service functional architecture

The SA management entity is responsible for the registration/update/deregistration of applications and the notifications to applications. It shall offer the following functions:

- Register SP: this function enables a Service Provider ITS application to register/update/deregister its offered ITS-S service, or

- Register SU: this function enables a Service User ITS application to register/update/deregister potential services of interest, and

- Notify SU: this function notifies a Service User ITS application of the reception of an SAEM corresponding to one of the registered services of interest.

The SA message processing entity is responsible for the periodic dissemination and/or collection of SAEM. It shall offer the following functions:

- Encode SAEM: This function defines the actual content of the SAEM based on input from the SA management entity and encodes a SAEM according to the format specified in Annex A of the present document.

- Decode SAEM: This function decodes a received SAEM.

- SAEM dissemination management: This function implements the SAEM protocol operation of the originating ITS-S, including in particular:

    - Triggering the *Encode SAEM* function to generate the SAEM.

    - Activation and termination of SAEM dissemination based on input from the SA management entity by passing the SAEM to either another facility layer entity such as Resource Management or to a lower layer functionality such as the Networking & Transport layer for transmission.

- SAEM Collection management: This sub-function implements the SAEM protocol operation of the receiving ITS-S, including in particular:

    - The gathering of SAEM from either another facilities layer entity such as Resource Management or a lower layer functionality such as the Networking & Transport layer.

    - Triggering the *Decode SAEM* function to decode the collected SAEM.

    - Provisioning of the collected SAEM data to the SA management entity.

    - Optionally, checking the validity of the information of received SAEM.

Figure 2 and figure 3 illustrate the functional diagram of the SA and its interfaces to other facilities and layers.
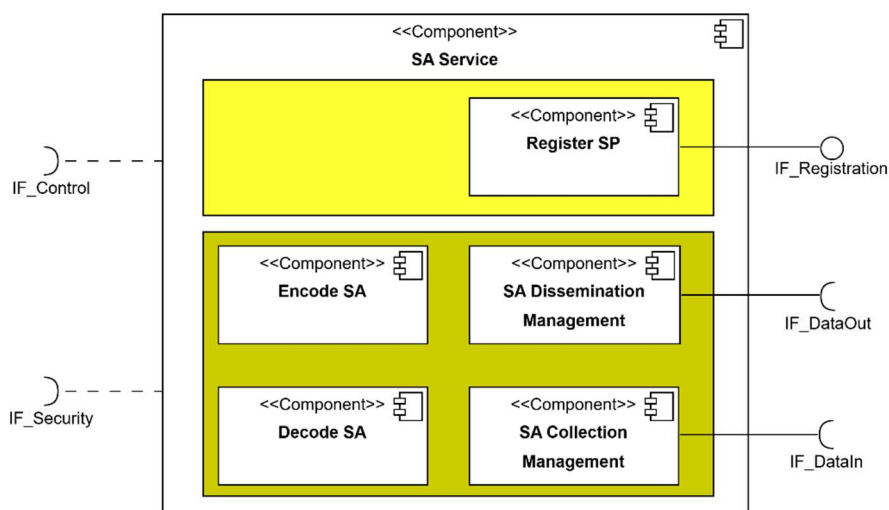

Figure 2: Functional diagram of SA Service in Service Provider or Service Announcer ITS-S
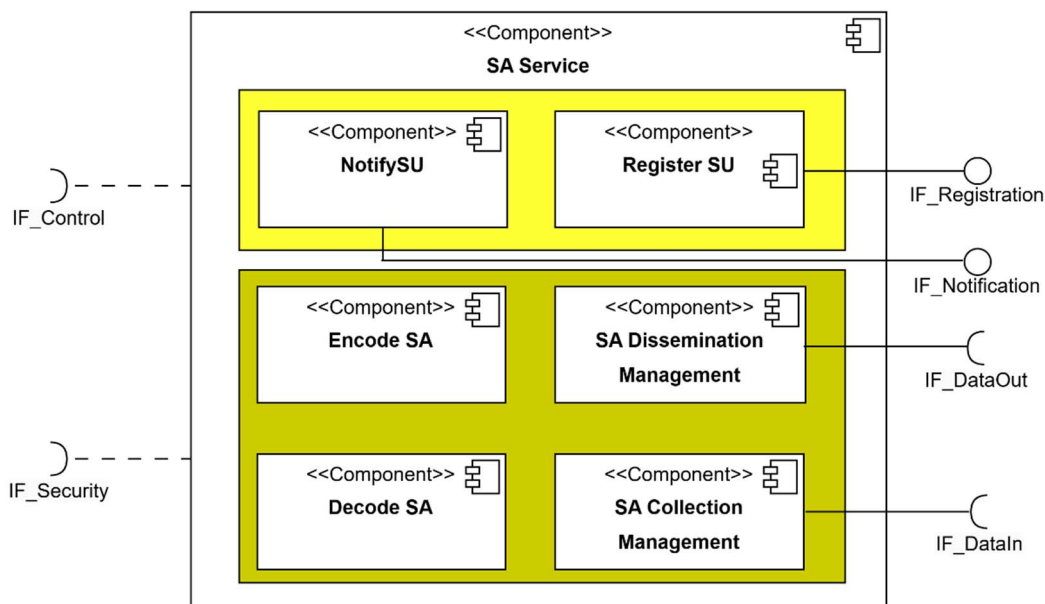
Figure 3: Functional diagram of SA Service in Service User ITS-S

5.3   Interfaces of the SA service

5.3.1   Interface to ITS applications

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

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

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

Table 1: Parameters for the service primitive of a SA provider request via the IF.Registration

Category	Data	Definition
Data passed from service provider application to SA management	Request type	Integer type indicating the SA Provider registration (1)/update (2) /deregistration (3)
	ITS-AID	ITS-AID to be indicated in a SAEM, identifying the service provider application (see ETSI TS 102 965 [2])
	Dissemination parameter	See Table 8
	Payload	Application-specific service announcement data to be contained in SAEM, see clause 7.2
SA data returned to the requesting application	saID	See clause 6.1.1
	contentCount	See clause 6.1.1
	Response code	Integer type indicating the status of the SA Provider announcement registration: • OK (1) • NOK (2)

Table 2: Parameters for the service primitive of a SA user request via the IF.Registration

Category	Data	Definition
Data passed from service user application to SA management	Request type	Integer type indicating the SA user registration (1)/deregistration (2)
	ITS-AID	ITS-AID that identifies in received SAEM the service user application (see clause 7.2)
SA data returned to the requesting application	Response code	Integer type indicating the status of the SA user request: • OK (1) • NOK (2)

Table 3: Parameters for the service primitive of a SA notification event via the IF.Notification

Category	Data	Definition
Data passed from SA management to registered SA user application	Notification ID	Integer data type containing a notification ID
	ITS-AID	ITS-AID that identifies the application as indicated in a received SAEM (see clause 7.2)
	Payload	Application-specific service announcement data retrieved from a SAEM
	saID	As indicated in a received SAEM, see clause 6.1.1
	contentCount	As indicated in a received SAEM, see clause 6.1.1
	Response code	Integer type application specific value indicating the status of the announcement response
	TimeStamp	SAEM reception time stamp

5.3.2   Interface between SA message processing and SA management

The SA service entities allocated in the data plane and in the management plane exchange information among each other for the purpose of the service announcement.

The SA management uses the communication requirements (see clause 6.2.1) to select a suitable ITS-S communication protocol stack, also referred to as "ITS-S Communication Profile" (ITS-SCP). The SA management in the management plane shall register for a transmission of SAEM at the local Facilities layer or at a remote Facilities layer.

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

Category	Data	Definition
Data passed from SA management to SA message processing	Request type	Integer type indicating the SA Provider registration (1)/update (2) /deregistration (3)
	ITS-AID	ITS-AID to be indicated in an SAEM, identifying the service provider application (see ETSI TS 102 965 [2])
	ProtId	Id of the protocol stack to be used for transmissions as specified in clause B.2.1
	Traffic class	Classification that represents the facilities layer requirements on packet transport
	Service info	Service info segment data, see clause 7.2
	Payload	Application-specific service announcement data to be contained in SAEM, see clause 7.2
SA data returned to SA management	saID	See clause 6.1.1
	contentCount	See clause 6.1.1
	Response code	Integer type indicating the status of the SA Provider announcement registration: • OK (1) • NOK (2)

Table 5: Parameters for the service primitive of a SA user request

Category	Data	Definition
Data passed from SA management to SA message processing	Request type	Integer type indicating the SA User Registration (1)/update (2) /deregistration (3)
	ITS-AID	ITS-AID that identifies in received SAEM the service user application (see clause 7.2)
SA data returned to SA management	Response code	Integer type indicating the status of the SA user request: OK (1), NOK (2)

Table 6: Parameters for the service primitive of a SA notification event

Category	Data	Definition
Data passed from SA message processing to SA management	Notification ID	Integer data type containing a notification ID
	ITS-AID	ITS-AID that identifies the application as indicated in a received SAEM (see clause 7.2)
	Payload	Application-specific service announcement data retrieved from an SAEM
	saID	As indicated in a received SAEM, see clause 6.1.1
	contentCount	As indicated in a received SAEM, see clause 6.1.1
	Response code	Integer type with application specific value indicating the status of the announcement response
	TimeStamp	SAEM reception time stamp

5.3.3   Interface to security plane entities

In case ETSI ITS security [6] at the facilities layer is used, the SA service shall exchange information directly with the entity(ies) in the security plane via the interface IF.Security.

5.3.4   Interface to management plane entities

The SA service may exchange information with the entity(ies) in the ITS management plane via the interface IF.Control.

5.3.5   Interfaces DataIn and DataOut

The SA message processing shall provide the SAEM for dissemination via the IF_DataOut to either another facility layer entity such as Resource Management or a lower layer functionality such as the Networking & Transport layer as specified in Table 7.

The SA message processing shall gather collected SAEM via the IF_DataIn from either another facility layer entity such as Resource Management or a lower layer functionality such as the Networking & Transport layer as specified in Table 7.

Table 7: Data exchanged over Interfaces DataIn and DataOut

Category	Data	Data requirement	Mandatory/Conditional /Optional
Data provided by the SA service via IF_DataOut	SAEM	{SAEM} as specified in Annex A, including security header if ETSI ITS security [6] at the facilities layer is used.	Mandatory
	SCI	Security Control Information	Optional, present only if ETSI ITS security [6] at the network layer security is used.
	PCI	Protocol Control Information. Depending on the protocol stack applied in the networking and transport layer.	Mandatory
	RMI	Resource Management Information. Required if the default parameters have not been configured or need to be overwritten for a specific SAEM.	Conditional, only if Resource Management is available in the ITS-S.

Category	Data	Data requirement	Mandatory/Conditional /Optional
Data gathered by the SA service via IF_DataIn	Received SAEM	*{SAEM}* as specified in Annex A,including security header if ETSI ITS security [6] at the facilities layer is used.	Mandatory
	SCI	Security Control Information	Optional, present only if ETSI ITS security [6] at the network layer security is used.

6 SAEM dissemination requirements

6.1 SAEM dissemination concept

6.1.1 SA identification

The component *changeCount* (see clause 7.1) shall be handled according to ISO 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 disseminated 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*.

6.1.2 SA service trigger, update, repetition and termination

The SA facilities layer message processing functional block (see figure 1) shall trigger, update or end the dissemination of SAEM according to the parameters received from the management entity via the MF interface (see clause 5.3.2).

6.2 SAEM dissemination constraints

6.2.1 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 TS 103 899 [3].

The communication requirements for the broadcast communication flow shall be as specified in Table 8. The structure of the requirements is in accordance with ISO/TS 17423 [i.4].

Table 8: SA communication requirements for service announcement

Requirement	Value	Comment
Operational communication service parameters		
CSP_LogicalChannelType	service announcement channel	Service announcement 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 second (default)	TimeDurationValue specified in ISO/TS 17423 [i.4] 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	Port number of the applicable transport protocol	Port number of the applicable transport protocol used to receive/transmit SAEM
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). See note	-- 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.	
NOTE: ms100 (8) is a reference to the parameter choice 'ms100' in ISO/TS 17423 [i.4].		

6.2.2   Security

6.2.2.1   Introduction

Clause 6.2.2 is applicable to ITS stations that are part of an ecosystem that uses the trust model according to ETSI TS 102 940 [7] and ITS certificates according to ETSI TS 103 097 [6]. The security mechanisms for ITS consider the authentication of messages transferred between ITS-Ss with certificates. A certificate indicates its holder's permissions, i.e. what statements the holder is allowed to make or privileges it is allowed to assert in a message signed by that certificate. The format for the certificates is specified in ETSI TS 103 097 [6]. Permissions are indicated by a pair of identifiers within the certificate, the ITS-AID and the SSP.

The ITS-Application Identifier (ITS-AID) indicates the overall type of permissions being granted: for example, there is an ITS-AID that indicates that the originating ITS-S is entitled to send SAEMs, see ETSI TS 102 965 [2].

The Service Specific Permissions (SSP) is a field that indicates specific sets of permissions within the overall permissions indicated by the ITS-AID: for example, there may be an SSP value associated with the ITS-AID for SAEM that indicates the originating ITS-S is entitled to send SAEMs with an ITS-AID value contained (as defined in clause 7.2).

6.2.2.2   Service Specific Permissions (SSP)

SAEM shall be signed using private keys associated to Authorization Tickets of type explicit that contain a pair of: ITS-AID associated to the SA service as specified in ETSI TS 102 965 [2] and SSPs of type *BitmapSsp* as specified in ETSI TS 103 097 [6].

The *BitmapSsp* for SAEMs shall conform to the SSPs specified in IEEE 1609.3 [8], encoded using the Unaligned PER encoding scheme as specified in ISO/IEC 8825-2 [5].

The generic security profile as defined in ETSI TS 103 097 [6] shall be applied to SAEM. Additional header field types are not allowed.

6.2.3   Priority

Priority information is provided in the PCI across the OSI layers and/or transmitted by lower layers as Traffic Class.

7   SAEM specification

7.1   General

The SA service shall disseminate 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 [4]:

- The *protocolVersion* component of the header shall be set to value "1" for the present document.

- The *messageId* component of the header shall be set to the value for "SAEM" as defined in ETSI TS 102 894-2 [4].

- 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 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 6.1.1.

If one of the announced services can be consumed using a communication technology, which is different from the one used to disseminate the SAEM, the *samBody* component of *sam* shall include the component *extensions*; the *extensions* component shall include the extension *ExtendedChannelInfos*. The component *ExtendedChannelInfos* may 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 [5] shall be used.

7.2   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-S service:

- Component *serviceID* shall contain the ITS-AID of the announced ITS-S service as assigned in ETSI TS 102 965 [2].

- Component *channelIndex* shall contain a pointer to an entry in the *channelInfos* component (see clause 7.3) applicable to the announced ITS-S service or in the *ExtendedChannelInfos* extension; In case the optional *channelInfos* component and the *ExtendedChannelInfos* extension are not present, the *channelIndex* component shall be set to zero, as defined in ISO 16460 [1].

- Component *chOptions*:

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

The extension *SrvOpP-ProtocolStack* shall be present and indicate the protocol to be used by the Service User ITS-S for the announced service according to the values defined in Annex B:

   ▪ The extension *IPv6Address* shall be only present if the extension *SrvOpP-ProtocolStack* 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 for consistency with IEEE 1609.3 [8].

   NOTE: Other implementations of ISO 16460 [1] might specify the use of *systemService* and *serviceProviderPort.*

7.3 Channel info component

The *samBody* component of *sam* shall include the *channelInfos* component and/or the *ExtendedChannelInfos* extension (see ISO 16460 [1]) if the ITS-S 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 16460 [1].

7.4 IPv6 routing advertisement

The *samBody* component of *sam* shall include the *routingAdvertisement* component if the ITS-S service can be consumed using IPv6 connectivity as detailed in ISO 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-S 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-S service. The process of building up an IPv6 connection is out of scope of the present document.

Annex A (normative):
ASN.1 module

This clause provides the normative ASN.1 module containing the syntactical specification of the SAEM PDU, its containers, and the data frames, and data elements defined in the present document.

The SAEM-PDU-Descriptions module is identified by the Object Identifier itu-t (0) identified-organization (4) etsi (0) itsDomain (5) wg1 (1) ts104091 (104091) sam (0) major-version-2 (2) minor-version-1 (1). The module can be downloaded as a file as indicated in table A.1. The associated SHA-256 cryptographic hash digest of the referenced file offers a means to verify the integrity of that file.

The semantical specification of the SAEM components is contained in the same module in the form of ASN.1 comments and is also available in readable format as indicated in table A.1.

Table A.1: ETSI TS 104 091 ASN.1 module information

Module name	SAEM-PDU-Descriptions
OID	itu-t (0) identified-organization (4) etsi (0) itsDomain (5) wg1 (1) ts104091 (104091) sam (0) major-version-2 (2) minor-version-1 (1)
Link	https://forge.etsi.org/rep/ITS/asn1/saem_ts104091/-/raw/v2.1.1/SAEM-PDU-Descriptions.asn
SHA-256 hash	5c3d9c8d229d25f85c489e5961b15cbf90caa33a27cf52604f99046e4098b06f
Readable format	https://forge.etsi.org/rep/ITS/asn1/saem_ts104091/-/blob/v2.1.1/docs/SAEM-PDU-Descriptions.md

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

B.1 General

Provides the specification of extensions defined by the present document.

B.2 *ChannelInfo* extensions

B.2.1 *SrvOpP-ProtocolStack* value assignements

The value assignements as listed in table B.1 shall be used for the data type *SrvOpP-ProtocolStack*.

Table B.1: *ProtocolType* value assignements

Value	Assignment
0	Protocol stack unknown
1	Any protocol stack as desired by the service user
2	A protocol stack featuring the networking protocol: Wave Short Message Protocol according to IEEE 1609.3 [8]
3	A protocol stack featuring the networking protocol: Geonetworking as specified in ETSI TS 836-4-1 [9] and the transport protocol: Basic Transport Protocol as specified in ETSI TS 103 836-5-1 [10]
4	Reserved for future use by ETSI
5	Reserved for future use by ETSI
6	A protocol stack featuring the networking protocol: Internet Protocol Version 6 "IPv6" and the transport protocol: Transmission Control Protocol according to IEEE 1609.3 [8]
7-50	Reserved for future use by ETSI

Annex C (informative):
Change history

Date	Version	Information about changes
	V2.1.1	Release 2 version based on a complete re-work of ETSI EN 302 890-1 to comply with the Release 2 Format.

History

Document history		
V2.1.1	November 2025	Publication