
Intelligent transport systems — Fast service announcement protocol (FSAP)

*Systèmes de transport intelligents — Protocole d'annonce de service
rapide (FSAP)*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This first edition cancels and replaces ISO 24102-5:2013 which has been technically revised.

Introduction

Provisioning of ITS services at specific locations on the road network requires awareness of the availability and the purpose of such services in order to allow a road network user deciding on the potential consumption of such a service. Awareness of services can be achieved by pull and push mechanisms. Whilst pull mechanisms are well understood and deployed for non-time-critical usage, several use cases depend on a push mechanism. Whilst pull mechanisms require a-priori knowledge of an intended service, push mechanisms support also "mandatory services" that may be locally and dynamically applicable and defined by local policies rather than global regulations.

This document illustrates and specifies the features of the cooperative push mechanism "Service Advertisement" based on the internationally harmonized message format specified in ISO/TS 16460:2016, and builds on top of any localized communications protocol stack.

WAVE service advertisement (WSA) specified in IEEE 1609.3^[3] is interoperable with the service advertisement specified in this document. However this document supports more features from ISO/TS 16460:2016 than WSA does.

Understanding service advertisement and the related protocol specified in this document requires understanding of ISO/TS 16460:2016.

Requirements are specified in the following clauses of this document.

- [Clause 5](#) specifies general requirements.
- [Clause 6](#) presents a tutorial on architectural issues related to FSAP.
- [Clause 7](#) specifies protocol elements of FSAP.
- [Clause 8](#) specifies protocol procedures of FSAP.
- [Clause 9](#) specifies conformance declaration.
- [Clause 10](#) specifies test methods.
- [Annex A](#) specifies the ASN.1 module for FSAP.
- [Annex B](#) specifies details of the optional support of presenting communication requirements of FSAP to the ITS station management compliant with ISO 17423:2018.
- [Annex C](#) specifies details of the optional support of path and flow management for FSAP compliant with ISO 24102-6:2018.
- [Annex D](#) presents the implementation conformance statement proforma.

Intelligent transport systems — Fast service announcement protocol (FSAP)

1 Scope

This document specifies the "Fast Service Announcement Protocol" (FSAP).

FSAP is in support of locally advertised ITS services uniquely identified by an ITS application identifier (ITS-AID).

This document specifies message formats and related basic protocol procedures by reference to ISO/TS 16460:2016, and further related protocol requirements for operation of FSAP in the context of an ITS station specified in ISO 21217:2014.

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/IEC 8825-2, *Information technology — ASN.1 encoding rules — Part 2: Specification of Packed Encoding Rules (PER) — Part 2*

ISO/IEC 8825-7, *Information technology — ASN.1 encoding rules — Part 7: Specification of Octet Encoding Rules (OER)*

ISO/TS 16460:2016, *Intelligent transport systems — Communications access for land mobiles (CALM) — Communication protocol messages for global usage*

ISO 17419, *Intelligent Transport Systems — Cooperative ITS — Globally unique identification*

ISO 17423:2018, *Intelligent Transport Systems — Cooperative ITS — Application requirements for selection of communication profiles*

ISO 21217:2014, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO 21218, *Intelligent Transport Systems — Hybrid communications — Access technology support*

ISO 24102-3, *Intelligent Transport Systems — ITS station management — Part 3: Service access points*

ISO 24102-4, *Intelligent Transport Systems — ITS station management — Part 4: Station-internal management communications*

ISO 24102-6:2018, *Intelligent Transport Systems — ITS station management — Part 6: Path and flow management*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217:2014 apply.

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

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

4 Symbols and abbreviated terms

FSAM	Fast service advertisement message
FSAP	Fast service announcement protocol
FSRM	Fast service response message
REQN	Request message PDU, no response message PDU expected
REQRES	Request or response message PDU out of the set REQW, REQN, RES
REQW	Request message PDU, response message PDU expected
RES	Response message PDU, acknowledging a REQW
S-FSAM	Secured FSAM
S-FSRM	Secured FSRM
SrvIniP	Service initialization phase
SrvOpP	Service operation phase

5 General requirements

The normative part of the specification of the "Service Advertisement messages" in ISO/TS 16460:2016 is a normative part of this document.

The "Fast Service Announcement Protocol" (FSAP) specified in this document shall be identified in FSAP application protocol data units (APDUs) by the version number three.

APDUs specified in this document are the "Fast Service Advertisement Message" (FSAM) and the "Fast Service Response Message" (FSRM).

The messages FSAM and FSRM shall be encapsulated by a security frame, resulting in a Secured FSAM (S-FSAM) and a Secured FSRM (S-FSRM).

Fragmented transmission of FSRMs and FSAMs is prohibited, thus the maximum size of S-FSAMs and S-FSRMs is limited by the capabilities of the protocol stack used for transmission.

FSAP is identified at the ITS-S networking & transport layer by

- the well-known registered ITS port number (ITS-PN) PORT_SAM = 1 = 0x00.01 published on [10], identifying the FSAP port that is receiving groupcasted S-FSAMs, and
- dynamically assigned ITS-PNs:
 - PORT_DYN_FSAM identifying the FSAP port that is receiving unicast S-FSAMs. The dynamic assignment is done in the ITS-SU that is transmitting S-FSRMs;
 - PORT_DYN_FSRM identifying the FSAP port that is receiving unicast S-FSRMs. The dynamic assignment is done in the ITS-SU that is transmitting S-FSAMs;

as illustrated in Table 1; see also 7.3 on ITS port numbers.

Table 1 — FSAP ITS port numbers

Direction	Source ITS-PN	Destination ITS-PN	MAC mode
From service advertiser to service user	PORT_DYN_FSRM	PORT_SAM	Groupcast (broadcast or multicast)
		PORT_DYN_FSAM	Unicast
From service user to service advertiser	PORT_SAM	PORT_DYN_FSRM	Unicast
	PORT_DYN_FSAM		

NOTE Procedures on how to perform multicast transmission of S-FSAs are not specified in this document.

Unicast transmissions of S-FSRMs and S-FSAs may be repeated, e.g. after timeout for a respective acknowledgement, as defined by implementation.

Further on the FSAP is identified by

- the ITS application identifier (ITS-AID) 2.113.664 published on [10]; see also 7.4. The p-encoded (ASN.1 unaligned packed encoding rules) presentation of this number of ASN.1 type *ITSaid* specified in ISO 17419 is 0pE0.00.00.00, i.e. fits into a four octet field.

An implementation supporting path and flow management shall be compliant with ISO 24102-6:2018.

An implementation for a distributed ITS-SU, i.e. an ITS-SU consisting of several ITS-SCUs interconnected with an ITS station-internal network, shall be compliant with ISO 24102-4.

As

- identical message formats for service advertisement are used in IEEE 1609.3[2] (WAVE SAM) and ETSI TS 102 890[16] (ESAM), and
- the features specifications in IEEE 1609.3[2] and ETSI TS 102 890[16] are sub-sets of the specification in this document,

an implementation of FSAP optionally may support the service advertisement from IEEE WAVE devices and the service announcement from ETSI ITS stations by considering the following:

- WAVE SAM support
 - 1) The only supported access technology is IEEE 802.11 OCB mode specified in IEEE 802.11[4] (ISO 21215[6] with US frequency allocation and WAVE-specific details).
 - 2) The only networking & transport layer protocol supported is the WAVE Short Message protocol (WSMP) specified in IEEE 1609.3[2], which uses the same message format as FNTTP with TPID-FS zero[8].
 - 3) Port numbers are not used. Instead, the service advertisement message SAM is identified by the value 135 of ITS-AID, used as a transport layer destination address in WSMP (i.e. in FNTTP with TPID-FS zero[8]).
 - 4) The WAVE SAM is identical to FSAM.
 - 5) S-FSAM (Security encapsulated FSAM) uses the same format and encoding as WAVE does. WAVE security is specified in IEEE 1609.2[3].
 - 6) FSRM and other features, e.g. mandatory applications and private service channels, are not supported.
- ESAM support
 - 1) The only supported access technology is IEEE 802.11 OCB mode (ISO 21215[6] with EU frequency allocation and ETSI-specific details).

- 2) The only networking & transport layer protocol currently supported is ETSI GeoNetworking/ETSI Basic Transport Protocol.
- 3) The ESAM is identified by the BTP port number for SAM specified in ETSI TS 103 248.
- 4) The ESAM is identical to FSAM except that ESAM is preceded by the ETSI common message header.
- 5) Security encapsulation is not specified.
- 6) FSRM and other features, e.g. mandatory applications and private service channels, are not supported.

6 Architecture

6.1 ITS communications architecture

The "FAST Service Announcement Protocol" (FSAP) is designed as a functionality of the ITS station and communication architecture specified in ISO 21217:2014.

6.2 Implementation architecture

The "Fast Service Announcement Protocol" (FSAP) specified in this document supports the implementation architectures introduced in ISO 21217:2014.

6.3 Communication roles and entities

The "FAST Service Announcement Protocol" (FSAP) distinguishes the following roles identified in ISO/TS 16460:2016:

- a) Service Advertiser:
 - Management of advertisement requests from Service Providers
 - Transmission of FSAMs and reception of FSRMs
- b) Service Provider:
 - Provision of ITS services
- c) Service User:
 - Reception of FSAMs and transmission of FSRMs
 - Consumption of ITS services

An ITS-SU may simultaneously or sequentially act as a service advertiser, service provider, and service user.

This document does not explicitly consider the distinction of service advertiser ITS-SUs and service provider ITS-SUs; for the purpose here the two roles are assumed to be located in the same ITS-SU.

An instance of any kind of ITS station identified in ISO 21217:2014 (roadside, vehicle, portable, centre) may implement the FSAP.

6.4 Communication phases

6.4.1 Overview

In order to allow an ITS-SU to offer an ITS service to another ITS-SU by means of an application session, a service initialization phase (SrvIniP) is performed by the FSAP, where the SrvIniP is based on localized communication, e.g. applying the FNETP networking & transport layer protocol specified in ISO 29281-1[8].

After initialization, the application session is performed during the service operation phase (SrvOpP), where the SrvOpP may be based on either localized communication or networking, e.g. IPv6 communication, over any kind of access technology.

During SrvIniP, handover to another protocol stack, e.g. another access technology and IPv6, may be demanded.

The real-time SrvIniP procedures preferably are implemented in an ITS-S router.

NOTE The specification of SrvOpP is outside the scope of this document.

6.4.2 Service initialization phase

The purpose of SrvIniP is to invite a peer ITS-SU by means of a "Fast Service Announcement Message" (FSAM) to use an ITS service which is uniquely identified by an ITS application identifier (ITS-AID) specified in ISO 17419; ITS-AID points to an ITS application object.

NOTE 1 Usage of some allocated ITS-AID values may not be meaningful in FSAM.

Acceptance of such an invitation typically results in a session, where the two peer ITS-S applications exchange data. However, a session is not necessarily needed, i.e. the service may be provided completely by the FSAM. Thus FSAM provides also the means to periodically broadcast information from ITS broadcast services.

Three operational options of SrvIniP are specified. The distinction originally was motivated by the two ITS application objects

- 1) ITS application class[1] and
 - 2) ITS application,
- and was extended
- 3) to allocate private communication channels to individual ITS station units (ITS-SUs).

Option one, originally designed for ITS application classes (DSRC-like SrvIniP)[1], is illustrated in [Figure 1](#). FSAM is sent by a service advertiser ITS station to invite for a service initialization phase. FSRM is sent by a service user ITS station to acknowledge FSAM. Successful SrvIniP is given by the first successful REQW or REQN of the service provider.

NOTE 2 In [1], BST corresponds functionally to FSAM, and VST corresponds functionally to FSRM.

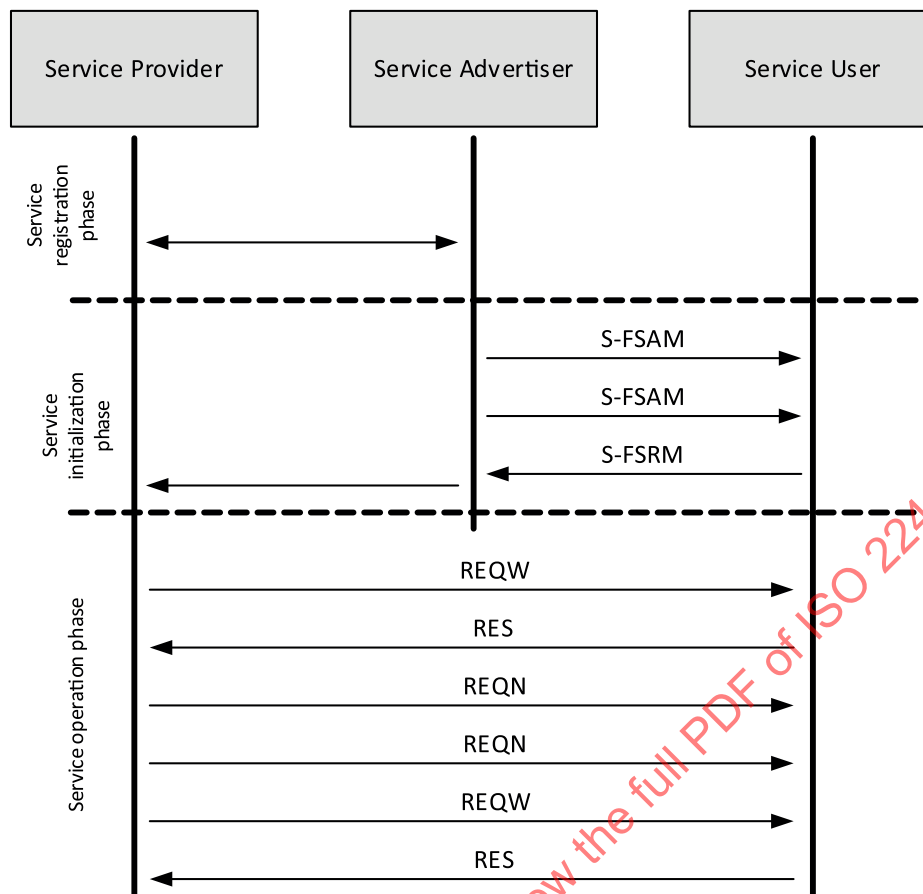


Figure 1 — ITS application session with FSRM

NOTE 3 The concept of application classes was introduced in [1]. Distinction of classes was done with an identifier of ASN.1 type `DSRCApplicationEntityID`. The difference between an ITS application class and an ITS application is, that for an ITS application class several contexts exist. Each context itself can be referred to as an ITS application.

During a `SrvOpP`

- requests, either with or without an expected response, typically are sent by the service provider, but may also be sent by the service user, and
- responses typically are sent by the service user, but may also be sent by the service provider, dependent on the specification of the ITS application.

NOTE 4 Rules on which data are sent by a service provider or by a service user apply strictly for [1]. In general, for ITS there are no such rules.

NOTE 5 As specified in ISO 21217:2014, the service user and service client instances of an ITS application are referred to as ITS-S application processes; ITS-S application processes residing in the "Applications" entity are referred to as ITS-S applications.

Option two, originally designed for ITS applications (WAVE-like `SrvIniP`) [2], is illustrated in Figure 2. FSAM is sent by a service advertiser to perform service service initialization. Successful `SrvIniP` is given by the first successful REQW or REQN of the service user.

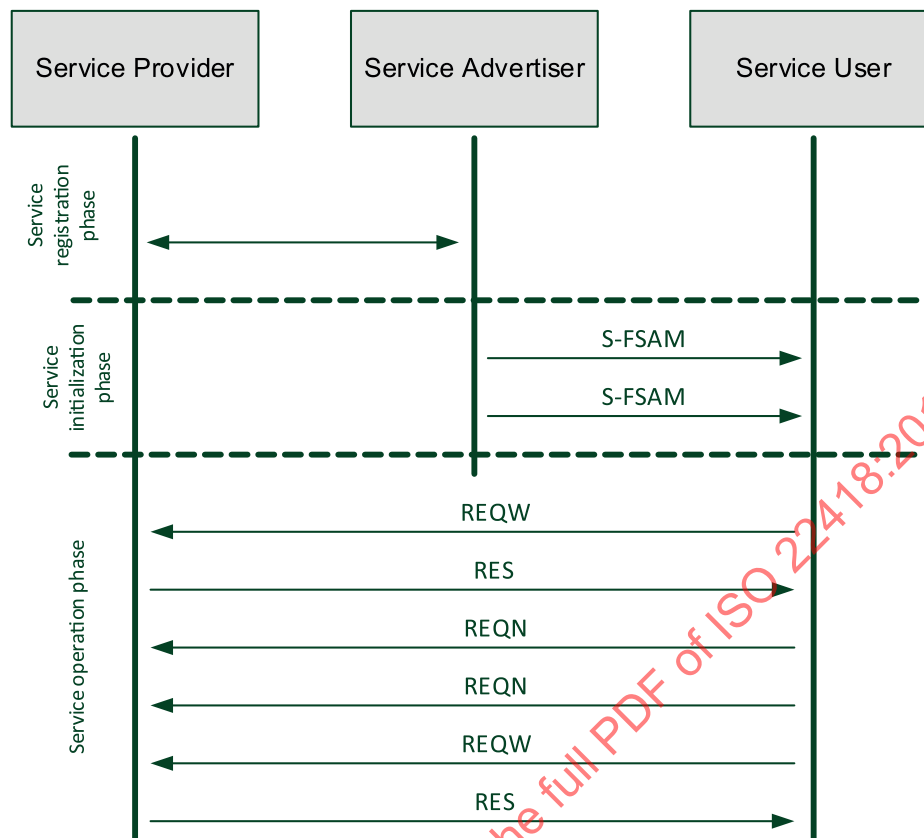


Figure 2 — ITS application session without FSRM

During a SrvOpP

- requests, either with or without an expected response, typically are sent by the service user, but may also be sent by the service provider, and
- responses typically are sent by the service provider, but may also be sent by the service user, dependent on the specification of the ITS application.

NOTE 6 In general for ITS there is no such strict rule which station type is sending which type of message.

Option three presents the situation when a service advertiser wants to allocate private communication channels to service users. In this option an additional handshake between the service advertiser and the service user is needed prior to start of the SrvOpP. The option three is applicable for ITS applications and ITS application classes.

NOTE 7 "Private communication channel" does not necessarily mean that only a single service user station operates on it. It is up to the service advertiser station to allocate a private communication channel to one or several service user stations.

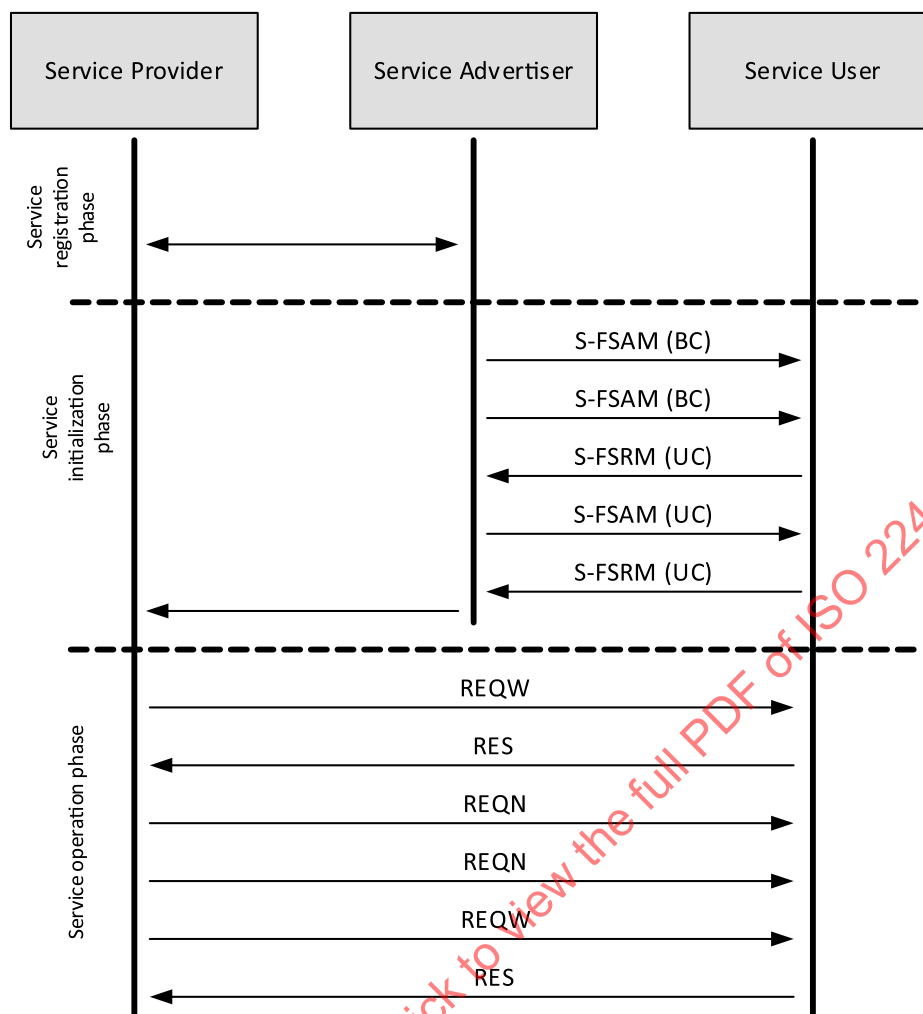


Figure 3 — ITS application session with privately allocated communication channel

6.4.3 Service operation phase

Management of reception and transmission of session messages, e.g.

- "Request with No response expected" (REQN),
- "Request With response expected" (REQW),
- "Response to a request" (RES)

as illustrated in [Figures 1, 2, and 3](#) is outside the scope of this document.

6.5 Advertised services

ITS services being advertised with FSAP are provided by ITS applications which typically are specified with two complementary ITS-S application processes, e.g. one implementing the provider part, the other implementing the user part; see ISO 21217:2014.

An ITS application is uniquely identified by an ITS-AID specified in ISO 17419. The one or several ITS-S application processes of such a single ITS application are distinguished by means of the ITS-S application process identifier (ITS-SAPID) specified in ISO 17419. Thus a specific ITS-S application process is uniquely identified by the tuple {ITS-AID, ITS-SAPID}.

ITS-SAPIDs can also be used to distinguish different versions of the ITS-S application process.

In order to identify and execute the proper ITS-S application processes during the SrvOpP, two approaches are identified:

- a) management by FSAP;
- b) management by the ITS application not using specific features of FSAP.

The approach a) defines in general an ITS application as an ITS application class, i.e. an ITS application with different contexts; see ISO 17419. Thus upon reception of an FSAM advertising such an ITS application class, the service user station first will reply with an FSRM presenting the supported ITS-SAPID values. Based on this information, the service provider will select a suited ITS-S application process identified by the ITS-SAPID, if possible, or will not be able to provide the service.

A possible procedure b) would be to use version numbers in the APDUs of the ITS-S application processes, allowing a receiving entity to select the appropriate protocol.

6.6 FSAP reference architecture

The FSAP reference architecture is illustrated in [Figure 4](#).

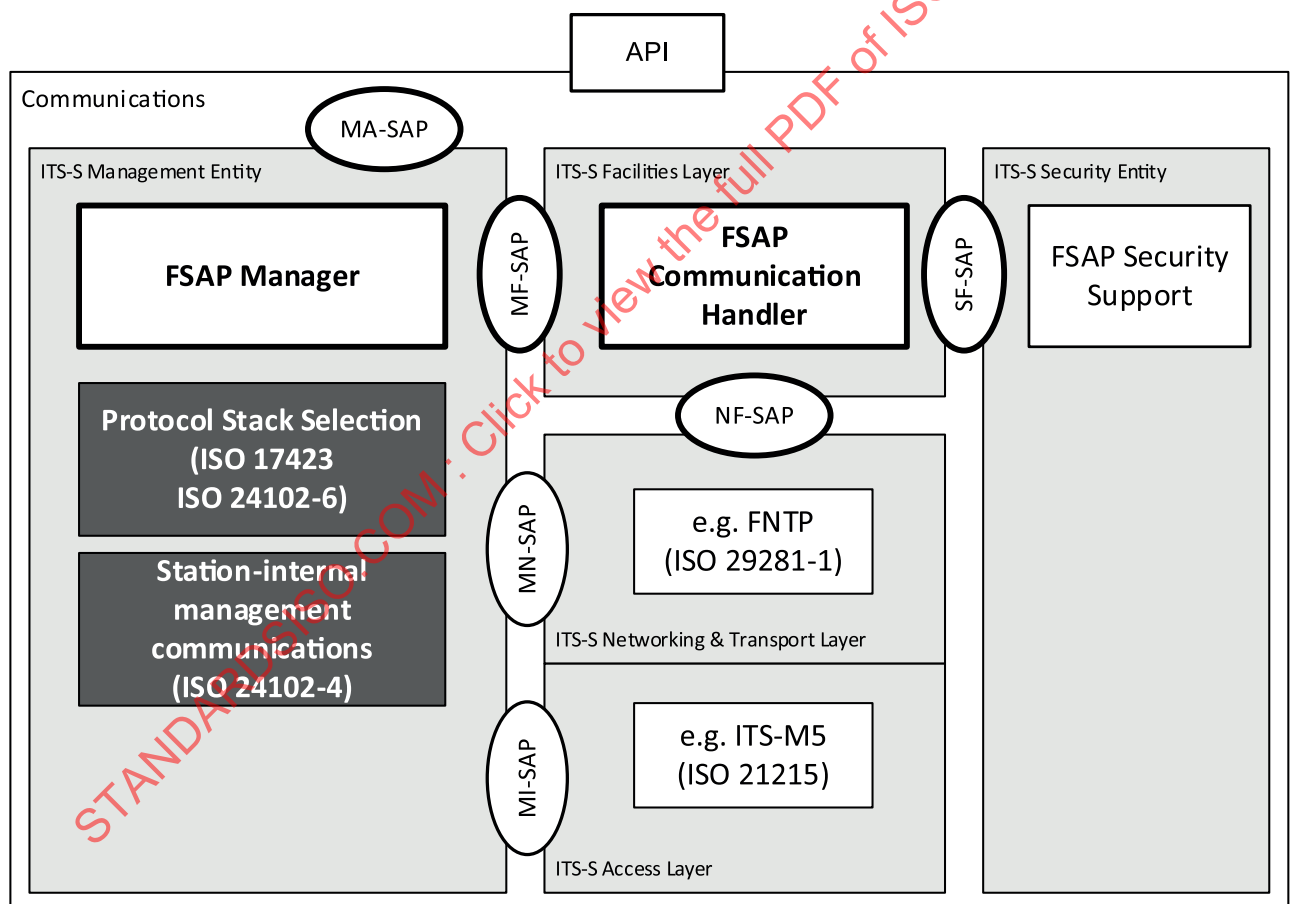


Figure 4 — FSAP reference architecture

The FSAP is specified by means of two functional entities located in the ITS station, see ISO 21217:2014, i.e.

- "FSAP communication handler" located in the ITS-S facilities layer;
- "FSAP manager" located in the ITS-S management entity.

Security services in support of FSAP are located in the ITS-S security entity shown in [Figure 4](#). Related specifications, except very general ones in [7.2.4](#), are out of scope of this document.

Further support functionalities are

- protocol stack selection, e.g. as specified in ISO 17423:2018 and ISO 24102-6:2018;
- station-internal management communications, e.g. as specified in ISO 24102-4.

NOTE There are initial investigations in ISO TC204 to provide the functionality of the FSAP Communication Handler as part of an ITS station capability defined in ISO TS 17429[9].

7 Protocol elements

7.1 Management service access points

NOTE SAPs are functional descriptions which in many cases are not implemented as observable interfaces. Thus in general SAPs are not testable. The requirements set up in this document with respect of SAPs thus just mean the functional behaviour rather than a specific implementation. As far as related ASN.1 definitions are given, these become mandatory as soon as the defined elements become observable, e.g. within PDUs for ITS station-internal management communications specified in ISO 24102-4.

FSAP uses functionality of the MA-SAP, MF-SAP, and SF-SAP. This functionality is provided by means of procedures with parameters presented in Tables. Appropriate ASN.1 type definitions implementing this functionality are specified.

7.2 Protocol data units

7.2.1 General

The format of FSAM shall be identical to the format of SAM specified in ISO/TS 16460:2016; it is presented in [Figure 5](#).

FSAM							
Header					Body		
4 bits	4 bits	4 bits	4 bits	Optional Variable	Optional Variable	Optional Variable	Optional Variable
Version	Option Selector	FSAM-ID	FSAM-Count	FSAM Extensions	Service Info Segment	Channel Info Segment	IPv6 Routing Advertisement

Figure 5 — General format of FSAM

The format of FSRM shall be identical to the format of SRM specified in ISO/TS 16460:2016; it is presented in [Figure 6](#).

FSRM					
Header			Body		
4 bits	4 bits	Optional Variable	Optional Variable	Optional Variable	Optional Variable
Version	Option Selector	FSRM Extensions	Private Channel Allocation Request	Context Information	Private Channel Allocation Confirm

Figure 6 — General format of FSRM

None of the features specified in ISO/TS 16460:2016 are prohibited for FSAM and FSRM.

7.2.2 Fast service advertisement message

The "Fast Service Advertisement Message" (FSAM) is of ASN.1 type `Fsam` specified in [A.2](#). It is identical to the service advertisement message SAM of ASN.1 type `Sam` specified in ISO/TS 16460:2016.

7.2.3 Fast service response message

The "Fast Service Response Message" (FSRM) is of ASN.1 type `FsrM` specified in [A.2](#). It is identical to the service response message SRM of ASN.1 type `Srm` specified in ISO/TS 16460:2016.

7.2.4 Secured messages

The messages FSAM and FSRM shall be encapsulated by a security frame, resulting in a Secured FSAM (S-FSAM) and a Secured FSRM (S-FSRM) as presented in [Figure 7](#).

Secured message				
Header			Body	Trailer
4 bit	4 bit	Optional Variable	Variable	Optional Variable
Version	Security Option Selector	Security Header	Original or processed FSAM / FSRM	Security Trailer

Figure 7 — Encapsulated FSAM and FSRM

Basic requirements are specified in ISO/TS 16460:2016.

The "Secured message" in [Figure 7](#) is specified with the following ASN.1 code, applying octet encoding rules (OER) specified in ISO/IEC 8825-7:

```

Smessage ::= SEQUENCE {
    protocolVersion    INTEGER (0..255), -- actual version value is three
    content             SmessageContent
}

SmessageContent ::= CHOICE {
    unsecuredData      OCTET STRING, -- contains unmodified FSAM or FSRM
    signedData         SignedData,
    encryptedData      EncryptedData,
    ...
}

```

Currently identified values of the "Security Option Selector" are:

- 0x80: Unsecured message.

The optional security header and security trailer are not present. The body contains the unmodified FSAM or FSRM preceded by a length field indicating the number of octets contained in FSAM and FSRM, respectively.

- 0x81: Signed message.

The optional security header and trailer are present. The body contains the unmodified FSAM or FSRM preceded by a length field indicating the number of octets contained in FSAM and FSRM, respectively.

- 0x82: Encrypted message.

The optional security header and trailer are present. The body contains encrypted data.

Different methods to sign or encrypt messages are possible. One approach is specified in IEEE 1609.2[3] with `Smessage ::= Ieee1609Dot2Data`.

FSAP uses the services of the ITS-S Security Entity for signing and encrypting messages.

Further security details are out of scope of this document.

7.2.5 Request and response messages

Request and response messages may be exchanged between peer ITS-S units within SrvOpP.

NOTE Details are outside the scope of this document.

7.3 Port numbers

FSAP uses an ITS-S network & transport layer protocol, where ITS port numbers (ITS-PNs) are used to identify source and destination endpoints in an ITS station. ITS-PNs are of ASN.1 type `PortNumber` specified in ISO f.

Source and destination endpoints of ITS-S applications, i.e. peer instances of ITS applications, advertised with FSAP are accessible either with static (well-known) port numbers, or with dynamically assigned port numbers according to the rules of the ITS-S networking & transport layer protocol and the protocol procedures specified in this document. The number range of dynamically assigned port numbers `PORT_DYN`, and assigned values of static port numbers `PORT_REG` are identified in ISO 17419 and published on the ISO Standards Maintenance Portal[10].

7.4 ITS application object identifier

ITS application objects are identified by means of an "ITS Application object Identifier" (ITS-AID) specified in ISO 17419. ITS-AID is of ASN.1 type `ITSaid`. Assigned numbers are published on the ISO Standards Maintenance Portal[10].

8 Protocol procedures

8.1 General

8.1.1 FSAP communication handler procedures

The FSAP communication handler located in the ITS-S facilities layer shown in [Figure 4](#) performs the following tasks:

- Cooperate with the FSAP manager located in the ITS-S management entity via the MF-SAP as illustrated in [Figure 1](#), using MF-Commands and MF-Requests specified in ISO 24102-3 with details specified in this document. The purposes are:
 - Receive registering, updating and deregistering requests from the FSAP manager for FSAM real-time groupcasting;
 - Receive requests from the FSAP manager for sending FSAMs and FSRMs in unicast mode to identified peer stations;
 - Forward received FSAMs and FSRMs from peer stations to the FSAP manager, and perform appropriate procedures.
- Prepare necessary ITS-S networking & transport layer protocols for communication.

- Assemble and maintain FSAM PDUs and FSRM PDUs.
- Involve the FSAP security support located in the ITS-S security entity via the SF-SAP illustrated in [Figure 1](#), using SF-Commands and SF-Requests specified in ISO 24102-3 with details specified in other standards or specification documents, for:
 - converting FSAM PDUs into S-FSAM PDUs, and FSRM PDUs into S-FSRM PDUs;
 - converting S-FSAM PDUs into FSAM PDUs, and S-FSRM PDUs into FSRM PDUs.
- Request transmission of S-FSAM PDUs and S-FSRM PDUs via the proper lower communications protocol stack accessible via the NF-SAP.
- Receive S-FSAM PDUs and S-FSRM PDUs from the proper lower communications protocol stack via the NF-SAP.

Details are given by dedicated procedures specified in this document.

8.1.2 FSAP manager procedures

The FSAP manager located in the ITS-S management entity shown in [Figure 4](#) performs the following tasks:

- Cooperate with ITS-S application objects via the MA-SAP as illustrated in [Figure 1](#), using MA-Commands and MA-Requests specified in ISO 24102-3.
 - Register and deregister ITS-S application processes as service providers or service users, and maintain such registrations.
 - Notify registered ITS-S application processes about events of the FSAP. Details depend on the role as service provider or service user.
- Cooperate with the FSAP communication handler, see [8.1.1](#).
- Manage forwarding of FSAP related information between ITS-SCUs of the same ITS station applying ITS station-internal management communications specified in ISO 24102-4, if applicable.
- Contribute to the management of selecting communication protocol stacks for ITS-S applications, e.g. specified in ISO 24102-1[2], ISO 17423:2018, ISO 24102-6:2018.

Details are given by dedicated procedures specified in this document.

8.1.3 Extension elements

Processing of extension elements contained in FSAMs and FSRMs, if applicable, shall be as specified in ISO/TS 16460:2016 and in this document. Details of management of some "Extension elements" specified in ISO/TS 16460 may depend on implementations.

Applicable extension elements identified so far are:

- a) SAM extensions listed in ISO/TS 16460:2016, Table 5;
 - The extended channel info segment extension shall be supported by FSAP for implementations (ITS-SUs) supporting hybrid communications.

NOTE The extended channel info segment extension is not supported in IEEE 1609.3[2].
- b) Service info extensions listed in ISO/TS 16460:2016, Table 7;
 - The SAM application data extension shall be supported by FSAP.
 - The SrvOpP Protocol Stack extension of ASN.1 type `SrvOpP-ProtocolStack` specified in [A.4](#) shall be supported by FSAP for implementations (ITS-SUs) supporting hybrid communications.

NOTE The SAM application data extension is not supported in IEEE 1609.3[2].

- c) Channel info extensions listed in ISO/TS 16460:2016, Table 8;
- d) IPv6 routing extensions listed in ISO/TS 16460:2016, Table 9.

8.2 Service provider

8.2.1 FSAP registration

For the purpose of registering its offered service at the FSAP manager, a service provider ITS-S application process shall use the services of the FSAP manager. The registration data are presented in [Table 2](#). The appropriate MA-REQUEST.request service primitive function is of ASN.1 type `FsapProviderRegistration` specified in [A.2](#). The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type `FsapProviderRegistrationConf` specified in [A.2](#).

Table 2 — Registration at FSAP service provider

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	Application identifier / <code>ITSsapiid</code>	Identifier uniquely identifying the ITS-S application process providing the service to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	ITS-S FlowID / <code>FlowID</code>	ITS-S FlowID of the flow registered for the service provider and to be used in a subsequent <code>SrvOpP</code> . If path and flow management specified in ISO 24102-6:2018 is not support, this parameter is not relevant and may be set to the value 65535.
	Priority / <code>UserPriority</code>	The priority of the ITS-S application process. The maximum value is limited by the priority value (<code>CSP_MaxPrio</code>) presented by the ITS-S application process at time of registration at the ITS-S management entity specified in ISO 17423:2018. Note that the FSAP manager may use other registration information specified in ISO 17423:2018, e.g. <code>CSP_LogicalChannelType</code> .
	Dissemination information / <code>FsamDissemination</code>	Provides information on required or preferred communication protocol stacks, scheduling requirements, and directivity of antennas (only applicable in case an access technology supports software controlled antenna patterns)
	Service Data / <code>FsapServiceDataRegistration</code>	Application specific service data for inclusion in FSAMs, i.e extensions, system service, provider ITS-PN, IPv6 routing.

Table 2 (continued)

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to service provider ITS-S application process	Application identifier / <i>ITSsapiid</i>	As reported by ITS-S application process
	Advertised ITS-AID / <i>ITSaid</i>	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful registration, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	FSAM-ID / <i>SrvAdvID</i>	The content of the SAM-ID field of the FSAM shall be reported.
	FSAM-Count / <i>SrvAdvContentCount</i>	The content of the SAM-Count field of the FSAM shall be reported.
	Response code	Result of a request indicated by the ASN.1 type <i>ErrStatus</i> specified in ISO 24102-3.

If establishment of a session is intended, the registration shall include the optional ITS-PN assigned to the service provider ITS-S application process.

NOTE The procedure to assign a port number to the service provider ITS-S application can depend on the ITS-S networking & transport layer protocol, thus it is outside the scope of this document.

Requirements on when to register a service provider ITS-S application process are not specified in this document.

If an ITS-S application process presents a registration request, but it is already registered, then the FSAP manager shall acknowledge this request with

- *ErrStatus* "sequenceError" specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count as currently used for the existing registration.

8.2.2 FSAP registration update

For the purpose of updating an offered service already registered at the FSAP manager, a service provider ITS-S application process shall use the services of the FSAP manager. The update data are presented in Table 3. The appropriate MA-REQUEST.request service primitive function is of ASN.1 type *FsapProviderUpdate* specified in A.2. The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type *FsapProviderUpdateConf* specified in A.2.

Table 3 — Update of registration at FSAP service provider

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	Application identifier / <i>ITSsapiid</i>	Identifier uniquely identifying the ITS-S application process providing the service to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	ITS-S FlowID / <i>FlowID</i>	ITS-S FlowID of the flow registered for the service provider and to be used in a subsequent SrvOpP. If path and flow management specified in ISO 24102-6:2018 is not support, this parameter is not relevant and may be set to the value 65535.
	FSAM-ID / <i>SrvAdvID</i>	The content of the SAM-ID field of the used FSAM as reported in the initial registration or in the previous update.
	FSAM-Count / <i>SrvAdvContentCount</i>	The content of the SAM-Count field of the previously used FSAM as reported in the initial registration or in the previous update.
	Dissemination information / <i>FsamDissemination</i>	Provides information on required or preferred access technologies, scheduling requirements, and directivity of antennas (only applicable in case an access technology supports software controlled antenna patterns)
	Service Data / <i>FsapServiceDataRegistration</i>	Application specific service data for inclusion in FSAMs, i.e extensions, system service, provider ITS-PN, IPv6 routing.
From FSAP manager to service provider ITS-S application process	Application identifier / <i>ITSsapiid</i>	As reported by ITS-S application process
	Advertised ITS-AID / <i>ITSsaid</i>	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful registration update, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	FSAM-ID	The content of the SAM-ID field of the new FSAM shall be reported.
	FSAM-Count	The content of the SAM-Count field of the new FSAM shall be reported.
	Response code	Result of a request indicated by the ASN.1 type <i>ErrStatus</i> specified in ISO 24102-3.

Requirements on when to update a service provider ITS-S application are not specified in this document.

If an ITS-S application presents a registration update request, but it is not yet registered, then the FSAP manager shall acknowledge this request with

- *ErrStatus* "sequenceError" specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count set to zero each.

8.2.3 FSAP deregistration

For the purpose of deregistering an offered service already registered at the FSAP manager, a service provider ITS-S application process shall use the services of the FSAP manager. The deregister data are presented in Table 4. The appropriate MA-REQUEST.request service primitive function is of ASN.1 type `FsapProviderDeregistration` specified in A.3. The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type `FsapProviderDeregistrationConf` specified in A.2.

Table 4 — Deregistration at FSAP service provider

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	Application identifier / <code>ITSSapiid</code>	Identifier uniquely identifying the ITS-S application process providing the service to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	ITS-S FlowID / <code>FlowID</code>	ITS-S FlowID of the flow registered for the service provider and to be used in a subsequent <code>SrvOpP</code> . If path and flow management specified in ISO 24102-6:2018 is not support, this parameter is not relevant and may be set to the value 65535.
	FSAM-ID / <code>SrvAdvID</code>	The content of the SAM-ID field of the used FSAM as reported in the initial registration or in the previous update.
	FSAM-Count / <code>SrvAdvContentCount</code>	The content of the SAM-Count field of the previously used FSAM as reported in the initial registration or in the previous update.
From FSAP manager to service provider ITS-S application process	Application identifier / <code>ITSSapiid</code>	As reported by ITS-S application process
	Advertised ITS-AID / <code>ITSaid</code>	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful deregistration, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	Response code	Result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

Upon reception of a deregistration request from the service provider ITS-S application, dynamically assigned port numbers of this ITS-S application process may be released, if not needed for purposes out of scope of this document.

NOTE Deletion of port numbers will result in deletion of related entries in forwarding tables of ITS-S networking & transport layer protocols.

Requirements on when to deregister a service provider ITS-S application are not specified in this document.

If an ITS-S application presents a deregistration request, but it is not yet registered, then the FSAP manager shall acknowledge this request with

- `ErrStatus "sequenceError"` specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object".

8.2.4 FSAP communication management

The FSAP manager shall evaluate the dissemination information sets of ASN.1 type `FsamDisseminationSet` contained in the data element of ASN.1 type `FsamDissemination` for every registration / registration update request in order to select the proper communications protocol stack in the ITS-station for communication.

In case the "medium" component in an `FsamDisseminationSet` indicates a specific access technology, this one shall be selected for transmission of FSAMs, if it is available. If none of the requested access technologies presented in `FsamDissemination` is available, the registration request shall be acknowledged using the corresponding MF-Request.confirm service primitive `FsapProviderRegistrationConf` or `FsapProviderUpdateConf`, respectively, specified in [A.2](#) with

- ErrStatus "nonavailValue"
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count set to zero each.

In case no specific access technology is requested, the default access technology shall be used, e.g. as identified by the CI selection management specified e.g. in [ISO 24102-1](#)^[7], [ISO 17423:2018](#), [ISO 24102-6:2018](#).

In case the "protocols" component in an `FsamDisseminationSet` indicates a specific communications protocol stack or a part of it, this one shall be selected for transmission of FSAMs, if it is available. If none of the requested protocols presented in `FsamDissemination` is available, the registration request shall be acknowledged using the corresponding MF-Request.confirm service primitive `FsapProviderRegistrationConf` or `FsapProviderUpdateConf`, respectively, specified in [A.3](#) with

- ErrStatus "nonavailValue"
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count set to zero each.

In case no specific communications protocols for transmission of FSAMs are requested, the default networking & transport layer protocol shall be used, i.e. the FNTF specified in [ISO 29281-1:2017](#)^[8].

NOTE There is a potential conflicting overlap between the components "medium" and "protocols" in case protocols of the ITS-S access layer are presented. Assuming "medium" selects the ITS-M5 access technology (this is IEEE 802.11 OCB), then "protocols" can provide complementary information such as "applying IEEE 1609.4" or "applying ETSI ITS-G5 rules".

The component "directivity" in an `FsamDisseminationSet` is not necessarily applicable. In case it is not to be used, "fixed, pre-defined direction" is selected. In case a requested directivity cannot be applied, the request is ignored without notification.

The component "gcInterval" in an `FsamDisseminationSet` provides optional information on the most appropriate repetition interval for FSAM transmission. The value zero indicates that no specific interval is recommended. The FSAP manager may use predetermined quantized values of the interval between subsequent transmissions of the service advertisement message that match best the recommended interval.

For the purpose of registering a service at the FSAP communication handler for periodic announcement in an FSAM, the FSAP manager shall present the registration or update data listed in [Table 5](#). The appropriate MF-REQUEST.request service primitive function is of ASN.1 type `FsamRequest` specified in [A.3](#). The appropriate MF-REQUEST.confirm service primitive function is of ASN.1 type `FsamRequestConf` specified in [A.3](#).

Table 5 — Registration for FSAM transmission at FSAP communication handler

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Application identifier / ITSsapiid	Identifier uniquely identifying the ITS-S application process providing the service to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	Dissemination details / GcStacks	Information on one or several protocol stacks to be used for transmission of FSAMs, each with the recommended repetition interval.
	Priority / UserPriority	The priority of the ITS-S application process. This value cannot be updated!
	Service Data / FsapServiceDataRegistration	Application specific service data for inclusion in FSAMs, i.e extensions, system service, provider ITS-PN, IPv6 routing.
From FSAP communications handler to FSAP manager	Application identifier / ITSsapiid	As reported by ITS-S application process
	Advertised ITS-AID / ITSaid	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful registration, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	FSAM-ID / SrvAdvID	The content of the SAM-ID field of the FSAM shall be reported.
	FSAM-Count / SrvAdvContentCount	The content of the SAM-Count field of the FSAM shall be reported.
	Response code	Result of a request indicated by the ASN.1 type ErrStatus specified in ISO 24102-3.

If the FSAP manager presents a registration request for an ITS-S application that is already registered, then the FSAP communication handler shall acknowledge this request with

- ErrStatus "sequenceError" specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count as currently used for the existing registration.

For the purpose of updating a service at the FSAP communication handler for periodic announcement in an FSAM, the FSAP manager shall present the registration or update data listed in [Table 6](#). The appropriate MF-REQUEST.request service primitive function is of ASN.1 type FsamUpdate specified in [A.3](#). The appropriate MF-REQUEST.confirm service primitive function is of ASN.1 type FsamUpdateConf specified in [A.3](#).

Table 6 — Registration update for FSAM transmission at FSAP communication handler

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Application identifier / <i>ITSsapiid</i>	Identifier uniquely identifying the ITS-S application process providing the service to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	FSAM-ID / <i>SrvAdvID</i>	The content of the SAM-ID field of the used FSAM as reported in the initial registration or in the previous update.
	FSAM-Count / <i>SrvAdvContentCount</i>	The content of the SAM-Count field of the previously used FSAM as reported in the initial registration or in the previous update.
	Dissemination details / <i>GcStacks</i>	Information on one or several protocol stacks to be used for transmission of FSAM, each with the required repetition interval.
	Service Data / <i>FsapServiceDataRegistration</i>	Application specific service data for inclusion in FSAMs, i.e extensions, system service, provider ITS-PN, IPv6 routing.
From FSAP communications handler to FSAP manager	Application identifier / <i>ITSsapiid</i>	As reported by ITS-S application process
	Advertised ITS-AID / <i>ITSaid</i>	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful registration update, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	FSAM-ID / <i>SrvAdvID</i>	The content of the SAM-ID field of the FSAM shall be reported.
	FSAM-Count / <i>SrvAdvContentCount</i>	The content of the SAM-Count field of the FSAM shall be reported.
	Response code	Result of a request indicated by the ASN.1 type <i>ErrStatus</i> specified in ISO 24102-3.

If the FSAP manager presents a registration update for an ITS-S application that is not yet registered, then the FSAP communication handler shall acknowledge this request with

- *ErrStatus* "sequenceError" specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object",
- FSAM-ID and FSAM-Count set to zero each.

For the purpose of deregistering a service at the FSAP communication handler from periodic announcement in an FSAM, the FSAP manager shall present the registration or update data listed in [Table 7](#). The appropriate MF-REQUEST.request service primitive function is of ASN.1 type *FsamDelete* specified in [A.3](#). The appropriate MF-REQUEST.confirm service primitive function is of ASN.1 type *FsamDeleteConf* specified in [A.3](#).

Table 7 — Deregistration from FSAM transmission at FSAP communication handler

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Application identifier / ITSSapiid	Identifier uniquely identifying the ITS-S application process of which the related service is no more to be announced in an FSAM. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	FSAM-ID / SrvAdvID	The content of the SAM-ID field of the used FSAM as reported in the initial registration or in the previous update.
	FSAM-Count / SrvAdvContentCount	The content of the SAM-Count field of the previously used FSAM as reported in the initial registration or in the previous update.
From FSAP communications handler to FSAP manager	Application identifier / ITSSapiid	As reported by ITS-S application process
	Advertised ITS-AID / ITSaid	The content of the ITS-AID field in the Service Info Segment of the FSAM shall be reported. In case of a successful deregistration, the value in this parameter is identical to the ITS-AID parameter value contained in the parameter "Application identifier"
	Response code	Result of a request indicated by the ASN.1 type ErrStatus specified in ISO 24102-3.

If the FSAP manager presents a deregistration for an ITS-S application that is not yet registered, then the FSAP communication handler shall acknowledge this request with

- ErrStatus "sequenceError" specified in ISO 24102-3,
- the "Advertised ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object".

8.2.5 Transmission of FSAM

As requested by the FSAP manager, the FSAP communication handler is in charge of

- assembling and maintaining FSAMs,
- invoking security services for conversion of FSAMs into S-FSAMs (details are out of scope of this document),
- periodic groupcasting of S-FSAMs,
- identifying available communication channels for requested protocol stacks to be used in the SrvOpP, including channels for private usage (details are out of scope of this document),
- transmitting of S-FSAMs in unicast mode for the purpose of assigning private communication channels.

Unicast transmissions of S-FSAMs may be repeated if the respective S-FSRM is not received prior to timeout. Details are out of scope of this document.

8.2.6 Reception of FSRM

8.2.6.1 General

Upon reception of an S-FSRM from a service user ITS station the procedure illustrated in [Figure 8](#) applies.

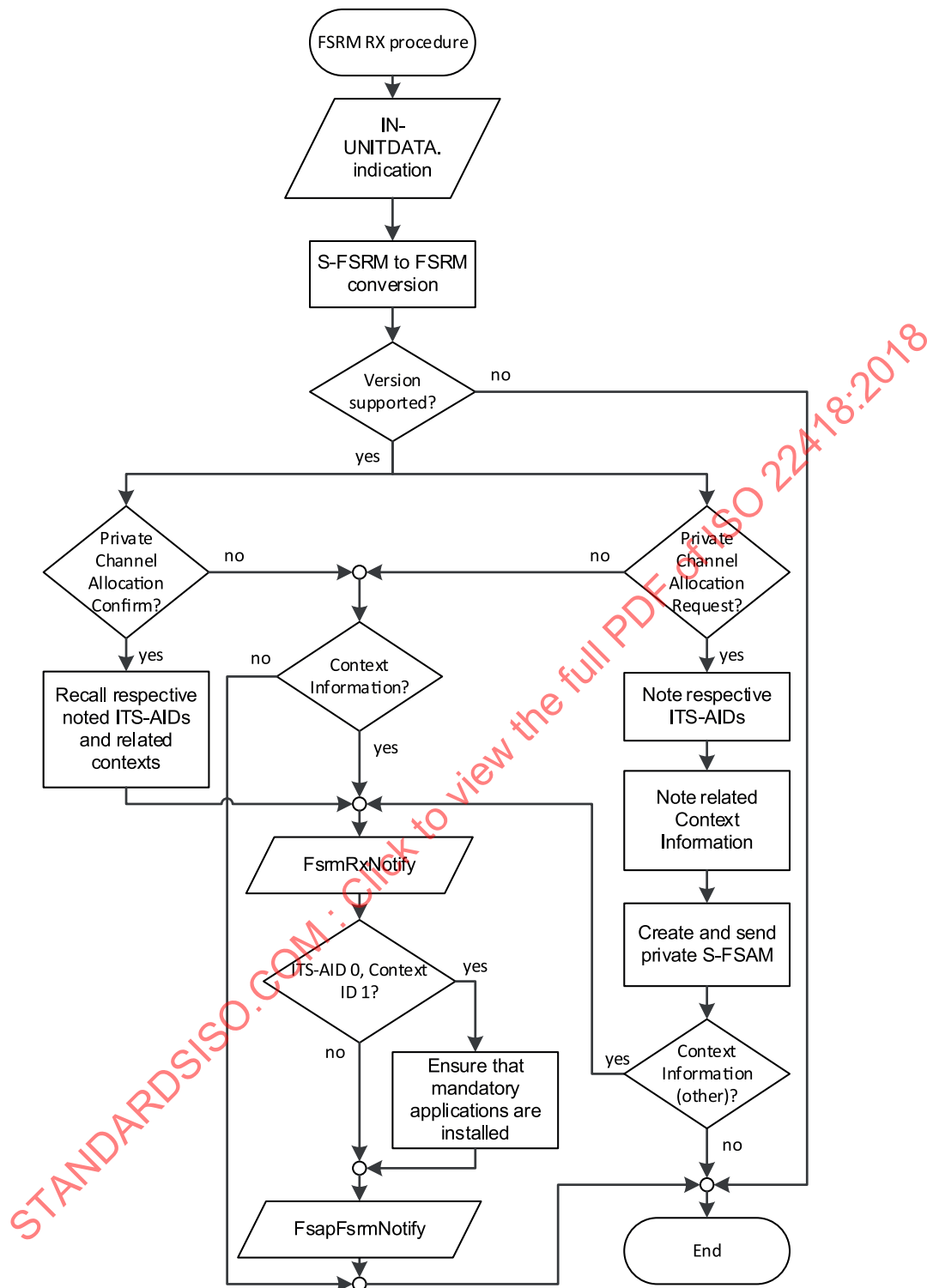


Figure 8 — Procedure upon reception of an FSRM

The service provider FSAP communication handler shall perform the following tasks:

- Initiate conversion of S-FSRMs to FSRMs. Details are out of scope of this document.
- Check whether the "Private Allocation Request" field is present. If the field is present, the "Service Provider Private Channel Allocation Request" procedure specified in [8.2.6.3](#) shall be performed.

- c) Check whether the "Private Allocation Confirm" field is present. If the field is present, the "Service Provider Private Channel Allocation Confirm" procedure specified in 8.2.6.4 shall be performed.
- d) Check whether the "Context Information" field is present with ITS-AIDs contained in it that are not used in an optionally present "Private Allocation Request" field. If this is given, the "Service provider context processing" procedure specified in 8.2.6.2 shall be performed.

8.2.6.2 Service provider context processing

Upon notification of the received context information by the FSAP communication handler to the FSAP manager with notification data presented in Table 8 - the appropriate MF-REQUEST.request service primitive function for notification of context information to the FSAP manager is of ASN.1 type `FsrRxNotify` specified in A.3 - the FSAP manager shall perform the following tasks:

- Check for ITS-AID = zero (System ITS application class). Context ID zero shall be ignored, as this is managed by the FSAP communications handler. For context ID one (Mandatory applications) the FSAP manager shall perform the task specified in 8.7.2.
- For all other ITS-AIDs the FSAP manager shall notify the respective service provider ITS-S application with data presented in Table 9. The appropriate MA-COMMAND.request service primitive function for notification of context information to the ITS-S application process is of ASN.1 type `FsapFsrRxNotify` specified in A.3. Such notifications shall be forwarded to the proper ITS-S host ITS-SCU, applying "ITS station-internal management communication" specified in ISO 24102-4, if the ITS-S application does not reside in the same ITS-SCU.

Table 8 — Notification of context information to the FSAP manager

Direction	Parameter / ASN.1 type	Purpose
From FSAP communications handler to FSAP manager	Receive protocol stack / <code>UcStack</code>	Information on the protocol stack on which the <code>SrvOpP</code> shall be performed.
	Context Informations <code>SrmContexts</code>	"Context Information" field contained in a received FSRM
From FSAP manager to FSAP communications handler	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

Table 9 — Notification of context information to the ITS-S application process

Direction	Parameter / ASN.1 type	Purpose
From FSAP communications handler to FSAP manager	User application identifier / <code>ITsSapiid</code>	Identifier uniquely identifying the ITS-S application process related to the given context. The essential part of this application identifier is the ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	Context Informations (<code>SrmContexts</code>)	"Context Information" field contained in a received FSRM
	Protocol stack / <code>UcStack</code>	Information on protocol stack to be used in <code>SrvOpP</code>
From FSAP manager to FSAP communications handler	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

8.2.6.3 Service provider private channel allocation request

The FSAP communication handler shall

- note the ITS-AIDs for which a private channel allocation is requested;

- note the respective Context Information, if present, for processing once a subsequent S-FSRM confirming usage of a private channel is received;
- identify an appropriate communication channel and notify this to the respective FSAP user ITS-SU in the FSAM Channel Info Segment or in the Extended ChannelInfos FSAM Extension element, as applicable, of a privately addressed S-FSAM containing the original groupcasted advertisement for the respective ITS-AIDs.

8.2.6.4 Service provider private channel allocation confirm

The FSAP communication handler shall notify the requested services to the FSAP manager as specified in [8.2.6.2](#).

8.3 Service user

8.3.1 FSAP registration

A service user ITS-S application may register its intended service at the FSAP. The registration data are presented in [Table 10](#). The appropriate MA-REQUEST.request service primitive function is of ASN.1 type `FsapUserRegistration` specified in [A.3](#). The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type `FsapUserRegistrationConf` specified in [A.3](#).

Table 10 — Registration at FSAP service user

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	User application identifier / <code>ITSsapiid</code>	Identifier uniquely identifying the ITS-S application process consuming the intended service to be identified in an FSAM with the Service ITS-AID. The essential part of this user application identifier is its ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	Service ITS-AID / <code>ITSaid</code>	ITS-AID of the ITS application object that is providing the intended ITS service. The value of the service ITS-AID may be the same as the ITS-AID value contained in the user application identifier.
	FSRM Context data / <code>SrmContexts</code>	FSRM context data contains one or several sets of: a) ITS port number (ITS-PN) of the service user process to be used by a service provider as destination port number during the session phase b) In case the ITS-AID identifies an ITS application class, context information is needed. Details of context information depends on the specific ITS application class.
From FSAP manager to service provider ITS-S application process	User application identifier / <code>ITSsapiid</code>	As reported by user ITS-S application process
	Service ITS-AID / <code>ITSaid</code>	As reported by user ITS-S application process
	Response code	Result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

Requirements on when to register a service user ITS-S application are not specified in this document.

If an ITS-S application presents a registration request, but it is already registered, then the FSAP manager shall acknowledge this request with

- `ErrStatus "sequenceError"` specified in ISO 24102-3,
- the "Service ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object".

8.3.2 FSAP registration update

A service user ITS-S application may update registration information of its intended service at the FSAP manager. The registration update data are presented in [Table 11](#). The appropriate MA-REQUEST.request service primitive function is of ASN.1 type `FsapUserUpdate` specified in [A.3](#). The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type `FsapUserUpdateConf` specified in [A.3](#).

Table 11 — Registration update at FSAP service user

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	User application identifier / <code>ITSsapiid</code>	Identifier uniquely identifying the ITS-S application process consuming the intended service to be identified in an FSAM with the Service ITS-AID. The essential part of this user application identifier is its ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	Service ITS-AID / <code>ITSaid</code>	ITS-AID of the ITS application object that is providing the intended ITS service. The value of the service ITS-AID may be the same as the ITS-AID value contained in the user application identifier.
	FSRM Context data / <code>SrmContexts</code>	FSRM context data contains one or several sets of: a) ITS port number (ITS-PN) of the service user process to be used by a service provider as destination port number during the session phase b) In case the ITS-AID identifies an ITS application class, context information is needed. Details of context information depends on the specific ITS application class.
From FSAP manager to service provider ITS-S application process	User application identifier / <code>ITSsapiid</code>	As reported by user ITS-S application process
	Service ITS-AID / <code>ITSaid</code>	As reported by user ITS-S application process
	Response code	Result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

Requirements on when to update a service user ITS-S application are not specified in this document.

If an ITS-S application presents a registration update request, but it is not yet registered, then the FSAP manager shall acknowledge this request with

- `ErrStatus` "sequenceError" specified in ISO 24102-3,
- the "Service ITS-AID" parameter set to the value 270.549.119 = 0pef.ff.ff with the meaning "unknown / invalid ITS-S application object".

8.3.3 FSAP deregistration

A service user ITS-S application may deregister its registration information at the FSAP manager. The deregistration data are presented in [Table 12](#). The appropriate MA-REQUEST.request service primitive function is of ASN.1 type `FsapUserDeregistration` specified in [A.3](#). The appropriate MA-REQUEST.confirm service primitive function is of ASN.1 type `FsapUserDeregistrationConf` specified in [A.3](#).

Table 12 — Deregistration at FSAP service user

Direction	Parameter / ASN.1 type	Purpose
From service provider ITS-S application process to FSAP manager	User application identifier / <i>ITSSapiid</i>	Identifier uniquely identifying the ITS-S application process consuming the intended service to be identified in an FSAM with the Service ITS-AID. The essential part of this user application identifier is its ITS-AID that may be accompanied on purpose by the unique identifier of the instance of this ITS-S application process, and by the unique identifier of the ITS-SCU in which this ITS-S application process resides.
	Service ITS-AID / <i>ITSaid</i>	ITS-AID of the ITS application object that is providing the intended ITS service. The value of the service ITS-AID may be the same as the ITS-AID value contained in the user application identifier.
From FSAP manager to service provider ITS-S application process	User application identifier / <i>ITSSapiid</i>	As reported by user ITS-S application process
	Service ITS-AID / <i>ITSaid</i>	As reported by user ITS-S application process
	Response code	Result of a request indicated by the ASN.1 type <i>ErrStatus</i> specified in ISO 24102-3.

Requirements on when to deregister a service user ITS-S application are not specified in this document.

If an ITS-S application presents a deregistration request, but it is not yet registered, then the FSAP manager shall acknowledge this request with

- *ErrStatus* "sequenceError" specified in ISO 24102-3,
- the "Service ITS-AID" parameter set to the value 270.549.119 = 0p ef. ff. ff. ff with the meaning "unknown / invalid ITS-S application object".

8.3.4 Reception of FSAM

8.3.4.1 General

Upon reception of a S-FSAM from a service user ITS station the procedure illustrated in [Figure 9](#) applies.

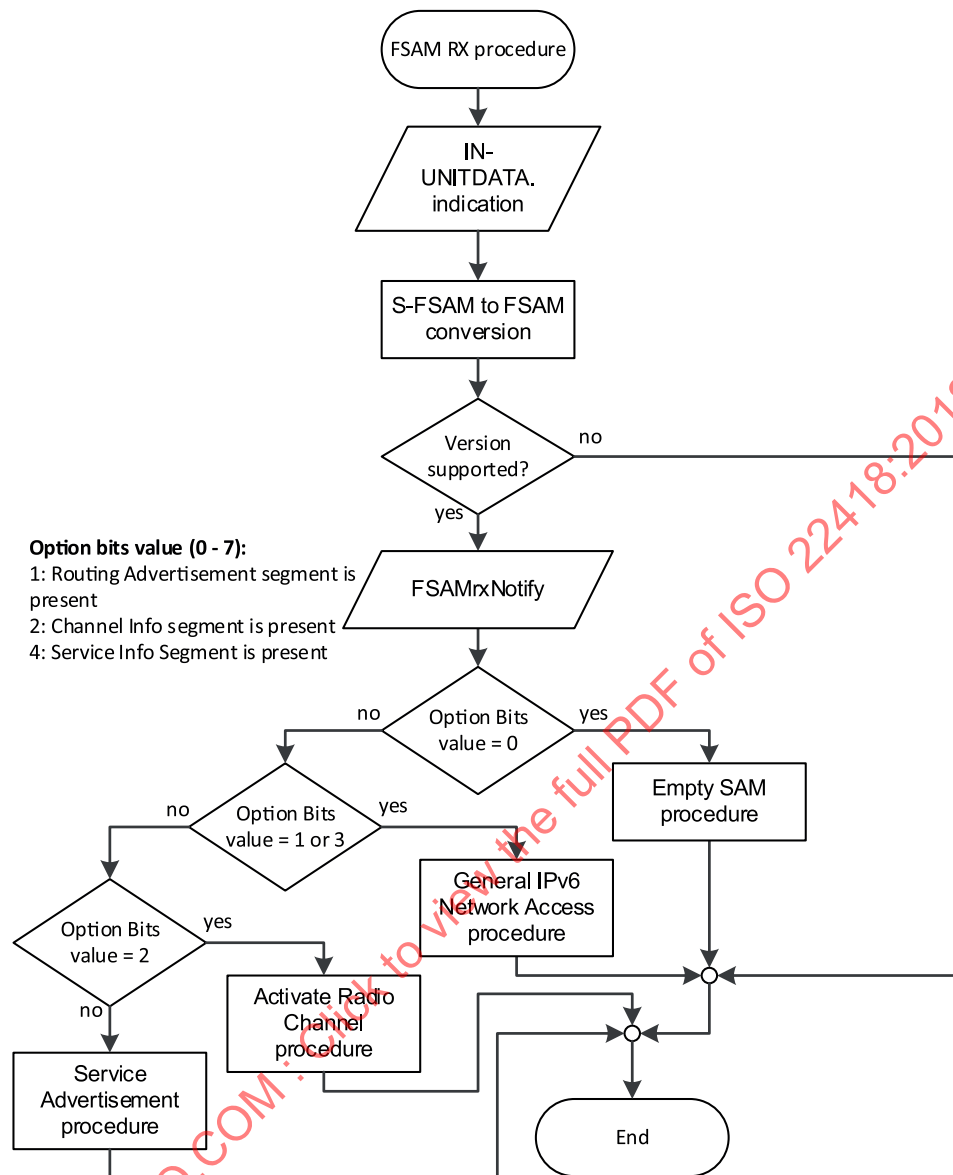


Figure 9 — Procedure upon reception of an FSAM

The FSAP communication handler requests conversion of S-FSAMS into FSAMS and checks the version number contained in the FSAM. Upon successful validation of the version number, the FSAP communication handler shall notify the received FSAM to the FSAP manager with notification data presented in [Table 13](#) - the appropriate MF-Request.request service primitive function for notification is `FsamRxNotify` specified in [A.2](#).

Table 13 — Notification of received FSAM to FSAP manager

Direction	Parameter / ASN.1 type	Purpose
From FSAP communications handler to FSAP manager	Receive protocol stack / <code>FsapStack</code>	Information on the protocol stack on which the <code>SrvOpP</code> shall be performed.
	FSAM <code>Fsam</code>	Received FSAM
From FSAP manager to FSAP communications handler	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

The FSAP manager shall check availability of options:

- Option bits value = 0: The "Empty SAM" procedure specified in [8.3.4.2](#) applies.
- Option bits value = 1: The "General IPv6 network" procedure specified in [8.3.4.3](#) applies.
- Option bits value = 2: The "Activate radio channel" procedure specified in [8.3.4.4](#) applies.
- Option bits value = 3: The "General IPv6 network" procedure with required change of radio channel specified in [8.3.4.3](#) applies.
- Option bits value >3: The "Service advertisement" procedure specified in [8.3.4.5](#) shall be performed.

8.3.4.2 Empty SAM procedure

The FSAM indicated by FSAM-ID and FSAM-Count, see [Figure 5](#), is empty. All previously announced services are no more available. Eventually present FSAM extensions may be ignored.

8.3.4.3 General IPv6 network access procedure

General access to an IPv6 network is available on the same or optionally on another radio channel as used for S-FSAM transmission. The FSAP manager shall inform the ITS station management about availability of this new IPv6 network and the required communication channel. Further details are out of scope of this document.

8.3.4.4 Activate radio channel procedure

The ITS-SU is invited to listen on another radio channel. The FSAP manager shall inform the ITS station management about potentially valuable information on another radio channel. Further details are out of scope of this document.

8.3.4.5 Service advertisement procedure

Specific services are announced. For every announced service that is required by a service user ITS-S application process the FSAP manager shall perform the one applicable procedure out of the three complementary procedures below:

- If allocation of a private channel specified in ISO/TS 16460:2016 is to be performed, the "Service User Private Channel Allocation" procedure specified in [8.3.4.6](#) shall be performed.
- If transmission of an FSRM specified in ISO/TS 16460:2016 is required for the purpose to provide context information for an ITS application class, the "Service User Context Processing" procedure specified in [8.3.4.7](#) shall be performed.
- If transmission of a FSRM for the purpose of confirming a private channel allocation is required, the "Service User Private Channel Confirmation" procedure specified in [8.3.4.8](#) shall be performed.
- If neither the "Service User Private Channel Allocation" procedure, nor the "Service User Context Processing" procedure, nor the "Service User Private Channel Confirmation" procedure applies, the FSAP manager shall perform the "FSAM reception notification" procedure specified in [8.3.4.9](#).

"ITS station-internal management communication" specified in ISO 24102-4 shall be applied to remotely access the MA-SAP of the ITS-S host if the service user ITS-S application resides in a different ITS-SCU.

NOTE Privately addressed FSRMs can simultaneously contain several of the optional fields which is achieved by combining the respective above procedures for the different ITS-AIDs. Details are out of scope of this document.

8.3.4.6 Service user private channel allocation

Upon request of the FSAP manager to the FSAP communication handler with data presented in [Table 14](#), an appropriate MF-COMMAND.request service primitive function is of ASN.1 type `FsrmtxRequest` specified in [A.3](#) - the FSAP communication handler shall

- a) initiate conversion of the given FSRM into a S-FSRM,
- b) send the S-FSRM via the selected UC-VCI.

Table 14 — Request of FSRM transmission for private channel allocation request

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Unicast protocol stack / <code>UcStack</code>	Information on the protocol stack to be used for unicast transmission of the S-FSRM
	FSRM / <code>FsrmtxRequest</code>	Containing private channel allocation request field, and an optionally needed context information field.
From FSAP communications handler to FSAP manager	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

NOTE Reception of a privately addressed S-FSRM is expected, providing information on the allocated private channel, and on missing context information if applicable.

8.3.4.7 Service user context processing

Upon request of the FSAP manager to the FSAP communication handler with data presented in [Table 15](#), an appropriate MF-COMMAND.request service primitive function is of ASN.1 type `FsrmtxRequest` specified in [A.3](#) - the FSAP communication handler shall

- a) initiate conversion of the given FSRM into a S-FSRM,
- b) send the S-FSRM via the selected UC-VCI.

Table 15 — Request of FSRM transmission for context notification

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Unicast protocol stack / <code>UcStack</code>	Information on the protocol stack to be used for unicast transmission of the S-FSRM
	FSRM / <code>FsrmtxRequest</code>	Containing context information
From FSAP communications handler to FSAP manager	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

8.3.4.8 Service user private channel confirmation procedure

Upon request of the FSAP manager to the FSAP communication handler with data presented in [Table 16](#) - an appropriate MF-COMMAND.request service primitive function is of ASN.1 type `FsrmtxRequest` specified in [A.3](#) - the FSAP communication handler shall

- a) initiate conversion of the given FSRM into a S-FSRM,
- b) send the S-FSRM via the selected UC-VCI.

Table 16 — Request of FSRM transmission for private channel confirmation

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to FSAP communications handler	Unicast protocol stack / <code>UcStack</code>	Information on the protocol stack to be used for unicast transmission of the S-FSRM
	FSRM / <code>Fsrm</code>	Containing the private channel confirmation
From FSAP communications handler to FSAP manager	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

8.3.4.9 FSAM reception notification

The FSAP manager shall notify reception of an FSAM to the service user ITS-S application process with data presented in [Table 17](#) - an appropriate MA-COMMAND.request service primitive function is of ASN.1 type `FsapFsamNotify`, specified in [A.2](#).

Table 17 — Notification of received service advertisement to ITS-S application process

Direction	Parameter / ASN.1 type	Purpose
From FSAP manager to ITS-S application process	Advertised ITS-AID / <code>ITSaid</code>	The content of the ITS-AID field in the Service Info Segment of the FSAM.
	Reply Port Number / <code>ReplyAddress</code>	As contained in the Service Info Segment of the FSAM for the given ITS-AID. Otherwise the value <code>PORT_UNK</code> specified in ISO 17419.
	Service Info Extensions / <code>ServiceInfoExts</code>	Service Info Extensions as contained in the Service Info Segment of the FSAM for the given ITS-AID.
	Protocol stack / <code>UcStack</code>	Information on the protocol stack to be used during the <code>SrvOpP</code> .
From ITS-S application process to FSAP manager	Response code	This empty acknowledgement is not required. It may carry only the result of a request indicated by the ASN.1 type <code>ErrStatus</code> specified in ISO 24102-3.

8.4 Service operation phase

During the service operation phase (`SrvOpP`), also referred to as service session, the service provider ITS-S application and the service user ITS-S application exchange packets based on the applicable communications protocol stack with port number values exchanged during the service initialisation phase.

The default applicable protocol stack for the `SrvOpP` is the same as used for FSAM transmission. During the `SrvOpP` the default protocol stack shall not be used according to requirements presented

- by the `channelIndex` component of the Service Info, pointing to either an entry in the optionally present Channel Info Segment, or the optionally present Extended Channel Infos FSAM Extension, specified in ISO/TS 16460:2016, or
- by requiring IPv6 connectivity indicated by the optionally present IPv6 Routing Advertisement field in the FSAM, specified in ISO/TS 16460:2016,
- and by the optionally present "Service Info" extension element "SrvOpP Protocol Stack" of ASN.1 type `SrvOpP-ProtocolStack` specified in [A.4](#).

The combined usage of the above listed mechanisms allows for a flexible selection of the communications protocol stack being applicable during the `SrvOpP`.

Management of the `SrvOpP` Protocol Stack extension element is done by the ITS-S station management in cooperation with the FSAP manager in an implementation-specific way.

Upon finalization of the session, the service user ITS-S application may release dynamically assigned port numbers used in the session.

Some ITS services may not need a service operation phase, namely information distribution services where provisioning of the service is done by means of the SAM Application Data extension.

8.5 ITS station-internal management communications

When ITS-S host and ITS-S router functionalities are located in different ITS-SCUs an implementation of the IICP shall use:

- the MF-rcmd PDU specified in ISO 24102-4 to transport MF-Commands specified in [A.2](#) and in ISO 24102-3.
- the MF-rreq PDU specified in ISO 24102-4 to transport MF-Requests specified in [A.2](#) and in ISO 24102-3.

8.6 Duplicate service detection

Duplicate execution of the same service can be avoided by evaluation of the

- FSAM-ID,
- FSAM-Count,
- Advertiser Identifier SAM extension,
- identifier of the station that transmits S-FSAMs, e.g. its MAC address,

as partly specified in ISO/TS 16460:2016. As a minimum, FSAM-ID and FSAM-Count shall be used to detect duplicate advertisement of services. Further details are out of scope of this document.

8.7 System Service

8.7.1 General

The ITS application class "system" specified in ISO 15628^[1] is identified by ITS-AID = zero specified in ISO 17419 and published on the ISO Standards Maintenance Portal^[10].

The system service context "Mandatory Applications" is specified in ISO/TS 16460:2016. Further system service contexts may be added.

In FSAMs containing a service info set with ITS-AID = zero, the "System Service" field of ASN.1 type `SystemService` specified in ISO/TS 16460:2016 shall be present.

The ITS application class "system" shall be auto-registered at the service user FSAP manager if ITS application classes are supported.

8.7.2 Mandatory applications

Mandatory applications are ITS applications that are required by either regulations or policies. Information on details of mandatory applications, e.g. usage, and area and time of applicability, are contained in the related ITS-S applications. Mandatory applications shall be supported if ITS application classes are supported

Upon reception of an FSAM advertising ITS-AID = zero with the system service context "Mandatory Applications", the service user FSAP manager shall notify the ITS-S application processes with data presented in [Table 9](#) as indicated by the ITS-AIDs and related contexts contained in the "Mandatory Application" context, i.e. given by the ASN.1 type `MandAppCtx` specified in ISO/TS 16460:2016. If one or several of these ITS-S applications are not available in the service user ITS-SU, the FSAP manager shall

request the ITS station remote management to download and install the missing ITS-S applications, e.g. as specified in ISO 24102-4.

9 Optionally supported features

Further optionally supported features are specified in [Annex B](#) and [Annex C](#).

10 Conformance

The "Protocol Implementation Conformance Statements" (PICS) proforma presented in [Annex D](#) allows declaration of conformance of an implementation with this document. With respect of mandatory, conditional, and optional requirements, the statements provided in this PICS proforma shall prevail in case of unintended differences between the PICS proforma and the normative clauses of this document.

NOTE Conformance tests for WAVE SAM support and ETSI ESAM support are out of scope of this document.

11 Test methods

The "Test Suite Structure & Test Purposes" (TSS&TP), and the "Abstract Test Suite" (ATS) for conformance testing will be specified in a separate test standard.

A test architecture for cooperative ITS is specified in ISO 20026^[5]. This test architecture is based on ISO 24102-4.

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Annex A (normative)

ASN.1 modules

A.1 Overview

The following ASN.1 module is specified in this annex:

- ITSfsap { ISO (1) standard (0) fsap (22418) asnm-1 (1) version0 (0) }

Updates of this ASN.1 module will be published on <http://standards.iso.org/iso/22418/ed-1/en>

In case of unintended differences between the ASN.1 definitions in this annex and normative requirements in the other parts of this document, the definitions provided in this annex shall prevail.

A.2 Module ITSfsap

This module specifies ASN.1 type definitions together with useful ASN.1 value definitions.

The encoding rule being applicable for the definitions of this ASN.1 module depends on the target environment.

Unaligned packed encoding rules (PER) specified in ISO/IEC 8825-2 shall be applied for

- transmission of FSAM and FSRM with ENTP specified in ISO 29281-1[8];
- support of WSA and ESAM, see [Clause 5](#);
- SAP service primitives specified in ISO 24102-3 and transmitted with IICP specified in ISO 24102-4.

```
ITSfsap {iso (1) standard (0) fsap (22418) asnm-1 (1) version0 (0) }
```

```
DEFINITIONS AUTOMATIC TAGS::=BEGIN
```

```
IMPORTS
```

```
-- EN ISO 17419:2017 - Data Dictionary
```

```
UserPriority, NullType, PortNumber, TimeUnit FROM CITSdataDictionary1 {iso(1) standard(0)  
cits-applMgmt (17419) dataDictionary (1) version1 (1) }
```

```
-- EN ISO 17419:2017
```

```
ITSaid, ITSSapiid, ITSatt, ITSprotID FROM CITSapplMgmtApplReg {iso(1) standard(0)  
cits-applMgmt (17419) applRegistry (2) version2 (2) }
```

```
-- ISO 21218:2017
```

```
Directivity, Ethertype, SourceLinkID, DestinationLinkID FROM ITSllsap {iso(1) standard(0)  
calm-ll-sap(21218) asnm-1 (1) version2 (2) }
```

```
-- ISO 24102:2017
```

```
ITS-scuId, StationID FROM ITSmanagement { iso (1) standard (0) calm-management (24102)  
local (1) asnm-1 (1) version2 (2) }
```

```
-- ISO 16460:2016amd
```

```
Sam, Srm, RoutingAdvertisement, ChannelInfoExts, ServiceInfoExts, SystemService,  
SrvAdvMsgHeaderExts, ServiceInfo, SrmContexts, ReplyAddress, SrvAdvContentCount, SrvAdvID  
FROM ITSSa1 { iso (1) standard (0) localized(16460) sa(2) version1 (1) }
```

```
-- ISO 24102-6:2017
```

```
FlowID FROM ITSspfm2 { iso (1) standard (0) calm-management (24102) pfm (6) asnm-1 (1)  
version2(2) }
```

```

; -- End of IMPORTS
-- Note: C-ITS Release 2 results in reorganization of ASN.1 modules
-- This module is based on the set of C-ITS Release 2 ASN.1 modules

-- Service Advertisement Message
Fsam::=Sam -- As specified in ISO 16460

-- Service Response Message
Fsrn::=Srm -- As specified in ISO 16460

-- MA-SAP services --
-- MA-COMMAND.request primitive functions

-- Notification of received FSAM
FsapFsamNotify::= SEQUENCE{
    its-aid          ITSaid,
    replyPort        ReplyAddress,
    extensions        ServiceInfoExts,
    srvOpPlink        UcStack
}

-- Notification of received FSRM
FsapFsrnNotify::= SEQUENCE{
    applicationID     ITSSapiid, -- unique in the host
    serviceContext     SrmContexts, -- from ISO 16460
    srvOpPlink        UcStack
}

-- MA-COMMAND.confirm primitive functions

-- Not to be used, just for completeness
FsapFsamNotifyConf ::= NullType

-- Not to be used, just for completeness
FsapFsrnNotifyConf ::= NullType

-- MA-REQUEST.request primitive functions

-- Registration of server ITS-S application process
FsapProviderRegistration::= SEQUENCE{
    applicationID     ITSSapiid,
    flowId            FlowID, -- from ISO 24102-6
    priority          UserPriority,
    fsamDissem        FsamDissemination,
    serviceDataReg    FsapServiceDataRegistration
}

-- Registration update of server ITS-S application process
FsapProviderUpdate::= SEQUENCE{
    applicationID     ITSSapiid, -- as in GRegServer
    flowId            FlowID, -- from ISO 24102-6
    saID              SrvAdvID, -- ISO 16460
    contentCount       SrvAdvContentCount, -- ISO 16460
    fsamDissem        FsamDissemination, -- as in GRegServer
    serviceDataReg    FsapServiceDataRegistration -- as in GRegServer
}

-- deletion of registration of server ITS-S application process
FsapProviderDeregistration::= SEQUENCE{
    applicationID     ITSSapiid, -- ISO 17419
    flowId            FlowID, -- from ISO 24102-6
    saID              SrvAdvID, -- ISO 16460
    contentCount       SrvAdvContentCount -- ISO 16460
}

-- Registration of client ITS-S application process
FsapUserRegistration::= SEQUENCE{
    userApplicationID ITSSapiid, -- identifies the service user
    serviceID         ITSaid,

```

```

    contextData          SrmContexts -- from ISO 16460
  }

-- Registration update of client ITS-S application process
FsapUserUpdate ::= SEQUENCE{
    userApplicationID     ITSSapiid,
    serviceID             ITSaid,
    contextData           SrmContexts -- from ISO 16460
}

-- deletion of registration of client ITS-S application process
FsapUserDeregistration ::= SEQUENCE{
    userApplicationID     ITSSapiid,
    serviceID             ITSaid
}

-- MA-REQUEST.confirm primitive functions

FsapProviderRegistrationConf ::= SEQUENCE{
    applicationID         ITSSapiid, -- ISO 17419
    advertisedID          ITSaid,
    saID                  SrvAdvID, -- ISO 16460
    contentCount          SrvAdvContentCount -- ISO 16460
}

FsapProviderUpdateConf ::= SEQUENCE{
    applicationID         ITSSapiid, -- ISO 17419
    advertisedID          ITSaid,
    saID                  SrvAdvID, -- ISO 16460
    contentCount          SrvAdvContentCount -- ISO 16460
}

FsapProviderDeregistrationConf ::= SEQUENCE{
    applicationID         ITSSapiid,
    advertisedID          ITSaid
}

FsapUserRegistrationConf ::= SEQUENCE{
    userApplicationID     ITSSapiid,
    serviceID             ITSaid
}

FsapUserUpdateConf ::= SEQUENCE{
    applicationID         ITSSapiid,
    serviceID             ITSaid
}

FsapUserDeregistrationConf ::= SEQUENCE{
    applicationID         ITSSapiid,
    serviceID             ITSaid
}

-- MF-SAP services --
-- COMMAND.request primitive functions

-- Request for periodic transmission of FSAM
FsamRequest ::= SEQUENCE{
    applicationID         ITSSapiid, -- contains ITS-AID
    gcVCIs                GcStacks,
    priority               UserPriority, -- of advertisement
    serviceDataReg        FsapServiceDataRegistration -- advertisement details
}

-- Update of request for periodic transmission of FSAM
FsamUpdate ::= SEQUENCE{
    applicationID         ITSSapiid, -- contains ITS-AID
    saID                  SrvAdvID, -- ISO 16460
    contentCount          SrvAdvContentCount, -- ISO 16460
    gcVCIs                GcStacks,
    serviceDataReg        FsapServiceDataRegistration -- advertisement details
}

```

```
-- Cancellation of request for periodic transmission of FSAM
FsamDelete ::= SEQUENCE{
    applicationID    ITSSapiid, -- contains ITS-AID
    saID             SrvAdvID, -- ISO 16460
    contentCount     SrvAdvContentCount -- ISO 16460
}

-- Request for single unicast transmission of FSAM
FsamTxRequest ::= SEQUENCE{
    ucVCI    UcStack,
    fsam     Fsam
} -- single transmission to unicast address

-- Request for single unicast transmission of FSRM
FsrmtxRequest ::= SEQUENCE{
    ucVCI    UcStack,
    fsrm     Fsrmtx
} -- single transmission to unicast address

-- COMMAND.confirm primitive functions

FsamRequestConf ::= SEQUENCE{
    applicationID    ITSSapiid, -- contains ITS-AID
    saID             SrvAdvID, -- ISO 16460
    contentCount     SrvAdvContentCount -- ISO 16460
}

FsamUpdateConf ::= SEQUENCE{
    applicationID    ITSSapiid, -- contains ITS-AID
    advertisedID     ITSaid,
    saID             SrvAdvID, -- ISO 16460
    contentCount     SrvAdvContentCount -- ISO 16460
}

FsamDeleteConf ::= SEQUENCE{
    applicationID    ITSSapiid, -- contains ITS-AID
    advertisedID     ITSaid
}

FsamTxRequestConf ::= NullType

FsrmtxRequestConf ::= NullType

-- REQUEST.request primitive functions

-- Notification of FSAM reception to FSAP manager
FsamRxNotify ::= SEQUENCE{
    link    FsapStack,
    sam     Fsam
}

-- Notification of FSRM reception to FSAP manager
FsrmtxNotify ::= SEQUENCE{
    link    UcStack,
    srm     SrmContexts -- From ISO 16460
}

-- REQUEST.confirm primitive functions

FsrmtxNotifyConf ::= NullType -- never used

FsamRxNotifyConf ::= NullType -- never used

-- General types --

FsamDissemination ::= SEQUENCE OF FsamDisseminationSet

FsamDisseminationSet ::= SEQUENCE{
    protocols    FsamCommunicationsProtocols,
```

```

    medium      ITSatt,
    directivity  Directivity, -- ISO 21218
    gcInterval   GcInterval
  }

FsamCommunicationsProtocols ::= SEQUENCE OF ITSprotID

FsapServiceDataRegistration ::= SEQUENCE{
    unused      BIT STRING (SIZE(2)), -- all bits set to '0'b
    fsamExtensions  SrvAdvMsgHeaderExts OPTIONAL, -- from ISO 16460
    systemService  SystemService OPTIONAL, -- from ISO 16460
    providerPort   PortNumber OPTIONAL, -- if not used, PORT_UNK
    serviceExtensions  ServiceInfoExts OPTIONAL, -- from ISO 16460
    channelExtensions  ChannelInfoExts OPTIONAL, -- from ISO 16460
    routingIPv6      RoutingAdvertisement OPTIONAL -- from ISO 16460
  }

GcInterval ::= TimeUnit -- ISO 17419

-- Communication protocol stacks for FSAM transmission
GcStacks ::= SEQUENCE OF GcStack

GcStack ::= SEQUENCE{
    Stack      FsapStack,
    gcInterval GcInterval
  }

FsapStack ::= SEQUENCE{
    flowId      FlowID, -- from ISO 24102-6. 65535 if not used
    nt-protocol-id  Ethertype,
    source-addr  SourceLinkID, -- from ISO 21218
    dest-addr    DestinationLinkID -- from ISO 21218
  }

UcStack ::= FsapStack

/*
The ASN.1 specification has been checked for conformance to the ASN.1
standards by OSS ASN.1 Syntax Checker, and by OSS ASN-1STEP
*/

END

```

A.3 Definitions to be added in ISO 24102-3

The following definitions are dynamic extensions of types defined in ISO 24102-3 with CLASS. An up-to-date version of the respective ASN.1 module

- ITSmsap (iso (1) standard (0) calm-management (24102) msap (3) asnm-1 (1) version2(2)) of ISO 24102-3 including all dynamic updates is published at [\[12\]](#).

IMPORT statement to be added:

```

/* registration of ITS-S application process at FSAP */ FsapProviderRegistration,
FsapProviderUpdate, FsapProviderDeregistration, FsapUserRegistration, FsapUserUpdate,
FsapUserDeregistration, FsapProviderRegistrationConf, FsapProviderUpdateConf,
FsapProviderDeregistrationConf, FsapUserRegistrationConf, FsapUserUpdateConf,
FsapUserDeregistrationConf,

/* FSAM groupcast TX requests from FSAP */ FsamRequest, FsamUpdate, FsamDelete,
FsamRequestConf, FsamUpdateConf, FsamDeleteConf,

/* FSAM and FSRM unicast TX requests from FSAP */ FsamTxRequest, FsrmtxRequest,
FsamTxRequestConf, FsrmtxRequestConf,

/* RX notification to FSAP */ FsrmtxNotify, FsamRxNotify, FsrmtxNotifyConf,
FsamRxNotifyConf,

```

```
/* RX notification to ITS-S application process */ FsapFsamNotify, FsapFsrnNotify,  
FsapFsamNotifyConf, FsapFsrnNotifyConf
```

```
FROM ITSfsap {iso (1) standard (0) fsap (22418) asnm-1 (1) version0 (0)}
```

To be added to MA-Command:

```
fsapFsamNotify      MASAP-CR::={&mxref c-fsapFsamNotify, &MXParam FsapFsamNotify}  
fsapFsrnNotify      MASAP-CR::={&mxref c-fsapFsrnNotify, &MXParam FsapFsrnNotify}
```

To be added to MA-CmdConfirm:

```
fsapFsamNotifyConf  MASAP-CC::={&mxref c-fsapFsamNotify, &MXParam FsapFsamNotifyConf}  
fsapFsrnNotifyConf  MASAP-CC::={&mxref c-fsapFsrnNotify, &MXParam FsapFsrnNotifyConf}
```

To be added to MA-Request:

```
fsapProviderRegistration  MASAP-RR::={&mxref c-fsapProviderRegistration, &MXParam  
FsapProviderRegistration}  
fsapProviderUpdate       MASAP-RR::={&mxref c-fsapProviderUpdate, &MXParam  
FsapProviderUpdate}  
fsapProviderDeregistration MASAP-RR::={&mxref c-fsapProviderDeregistration, &MXParam  
FsapProviderDeregistration}  
fsapUserRegistration      MASAP-RR::={&mxref c-fsapUserRegistration, &MXParam  
FsapUserRegistration}  
fsapUserUpdate           MASAP-RR::={&mxref c-fsapUserUpdate, &MXParam  
FsapUserUpdate}  
fsapUserDeregistration   MASAP-RR::={&mxref c-fsapUserDeregistration, &MXParam  
FsapUserDeregistration}
```

To be added to MA-ReqConfirm:

```
fsapProviderRegistrationConf MASAP-RC::={&mxref c-fsapProviderRegistration, &MXParam  
FsapProviderRegistrationConf}  
fsapProviderUpdateConf      MASAP-RC::={&mxref c-fsapProviderUpdate, &MXParam  
FsapProviderUpdateConf}  
fsapProviderDeregistrationConf MASAP-RC::={&mxref c-fsapProviderDeregistration, &MXParam  
FsapProviderDeregistrationConf}  
fsapUserRegistrationConf     MASAP-RC::={&mxref c-fsapUserRegistration, &MXParam  
FsapUserRegistrationConf}  
fsapUserUpdateConf          MASAP-RC::={&mxref c-fsapUserUpdate, &MXParam  
FsapUserUpdateConf}  
fsapUserDeregistrationConf   MASAP-RC::={&mxref c-fsapUserDeregistration, &MXParam  
FsapUserDeregistrationConf}
```

To be added to MF-Command:

```
fsamRequest  MFSAP-CR::={&mxref c-fsamRequest, &MXParam FsamRequest}  
fsamUpdate   MFSAP-CR::={&mxref c-fsamUpdate, &MXParam FsamUpdate}  
fsamDelete   MFSAP-CR::={&mxref c-fsamDelete, &MXParam FsamDelete}  
fsamTxRequest MFSAP-CR::={&mxref c-fsamTxRequest, &MXParam FsamTxRequest}  
fsrmTxRequest MFSAP-CR::={&mxref c-fsrmTxRequest, &MXParam FsrmTxRequest}
```

To be added to MF-CmdConfirm:

```
fsamRequestConf  MFSAP-CC::={&mxref c-fsamRequest, &MXParam FsamRequestConf}  
fsamUpdateConf   MFSAP-CC::={&mxref c-fsamUpdate, &MXParam FsamUpdateConf}  
fsamDeleteConf   MFSAP-CC::={&mxref c-fsamDelete, &MXParam FsamDeleteConf}  
fsamTxRequestConf MFSAP-CC::={&mxref c-fsamTxRequest, &MXParam FsamTxRequestConf}  
fsrmTxRequestConf MFSAP-CC::={&mxref c-fsrmTxRequest, &MXParam FsrmTxRequestConf}
```

To be added to MF-Request:

```

fsamRxNotify      MFSAP-RR::={&mxref c-fsamRxNotify, &MXParam FsamRxNotify}
fsrcmRxNotify      MFSAP-RR::={&mxref c-fsrcmRxNotify, &MXParam FsrcmRxNotify}

```

To be added to MF-ReqConfirm:

```

fsamRxNotifyConf  MFSAP-RC::={&mxref c-fsamRxNotify, &MXParam FsamRxNotifyConf}
fsrcmRxNotifyConf MFSAP-RC::={&mxref c-fsrcmRxNotify, &MXParam FsrcmRxNotifyConf}

```

The following ASN.1 value definitions (values 'a1', 'a2', 'b1', 'b2', 'b3', 'b4', 'b5', 'b6', 'c1', 'c2', 'c3', 'c4', 'c5', 'd1', 'd2') will be assigned by the ISO TC204 WG16 registrar for ISO 24102-3. The result will be published in the respective ISO registry^[11].

```

c-fsapFsamNotify   RefMASAP-C ::= <'a1' tbd> -- 63
c-fsapFsrcmNotify  RefMASAP-C ::= <'a2' tbd> -- 64

```

```

c-fsapProviderRegistration  RefMASAP-R ::= <'b1' tbd> -- 60
c-fsapProviderUpdate        RefMASAP-R ::= <'b2' tbd> -- 61
c-fsapProviderDeregistration RefMASAP-R ::= <'b3' tbd> -- 62
c-fsapUserRegistration       RefMASAP-R ::= <'b4' tbd> -- 65
c-fsapUserUpdate             RefMASAP-R ::= <'b5' tbd> -- 66
c-fsapUserDeregistration     RefMASAP-R ::= <'b6' tbd> -- 67

```

```

c-fsamRequest      RefMFSAP-C ::= <'c1' tbd> -- 60
c-fsamUpdate        RefMFSAP-C ::= <'c2' tbd> -- 61
c-fsamDelete        RefMFSAP-C ::= <'c3' tbd> -- 62
c-famTxRequest      RefMFSAP-C ::= <'c4' tbd> -- 63
c-fsrcmTxRequest    RefMFSAP-C ::= <'c5' tbd> -- 64

```

```

c-fsamRxNotify      RefMFSAP-R ::= <'d1' tbd> -- 63
c-fsrcmRxNotify      RefMFSAP-R ::= <'d2' tbd> -- 64

```

A.4 Definitions to be added in ISO 16460

A.4.1 ITSsa1

The following definitions are dynamic extensions of types defined in ISO/TS 16460:2016 with CLASS. An up-to-date version of the respective ASN.1 module

— ITSsa1 { iso (1) standard (0) localized(16460) sa(2) version1 (1)}

of ISO/TS 16460:2016 including all dynamic updates is published at^[14].

IMPORT statement to be added:

```

SrvOpP-ProtocolStack, c-SrvOpP-ProtocolStack FROM ITSee1 { iso (1) standard (0)
localized(16460) ee(4) version1 (1)}

```

To be added to ServiceInfoExtTypes EXT-TYPE ::= {

```

{ SrvOpP-ProtocolStack IDENTIFIED BY c-SrvOpP-ProtocolStack },

```

A.4.2 ITSee1

The following definitions are dynamic extensions of types defined in ISO/TS 16460:2016 with CLASS. An up-to-date version of the respective ASN.1 module

— ITSee1 { iso (1) standard (0) localized(16460) ee(4) version1 (1)}

of ISO/TS 16460:2016 including all dynamic updates is published at^[14].

IMPORT statement to be added:

```
ITSprotID FROM CITSapplMgmtApplReg {iso(1) standard(0) cits-applMgmt (17419) applRegistry  
(2) version2 (2)}
```

To be added:

```
SrvOpP-ProtocolStack ::= SEQUENCE OF ITSprotID
```

The following ASN.1 value definition (values 'a1') will be assigned by the ISO TC204 WG16 registrar for ISO 16460. The result will be published in the respective ISO registry^[13].

```
c-SrvOpP-ProtocolStack      RefExt ::= <'a1' tbd> -- 100
```

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Annex B (normative)

Support of application requirements for communications

In ITS-SUs supporting

- hybrid communications and
- abstraction of applications from communication details,

ITS-S application processes initially shall register at the ITS station management to present their communication requirements as specified in ISO 17423:2018. This applies also for the FSAP ITS-S application process.

Parameter values to be used by FSAP in this registration process are specified in [Table B.1](#).

Table B.1 — FSAP initial registration - parameter values

Communication service parameter	Value	Comment		
Operational communication service parameters				
CSP_LogicalChannelType	SaCH	Service advertisement channel		
CSP_SessionCont	'false': no private channel allocation 'true': with private channel allocation	The default is 'false': No session continuity needed		
CSP_AvgADUrate	n.a.	Repetition rate of FSAMs depends on advertised services.		
CSP_FlowType	See registry.	Well-known registered flow type, if existent.		
CSP_MaxPrio	Dependent on advertised services < 254	FSAM transmission should be with highest priority of announced applications, not exceeding the value 253.		
CSP_PortNo	Service User: rx1, PORT_SAM rx2, PORT_DYN_SAM tx1, PORT_SAM tx2, PORT_DYN_SAM Service Advertiser: rx3, PORT_DYN_SRM tx3, PORT_DYN_SRM	Role	Source ITS-PN	Destination ITS-PN
		service user	tx1	rx3
			tx2	rx3
		service advertiser	tx3	rx1
			tx3	rx2
CSP_ExpFlowLifetime	n.a.: no private window allocation value: with private window allocation	The expected flow lifetime presented takes care of the handshake for private window allocation and a reasonable number of retransmissions needed to finalize the handshake.		
Destination communication service parameters				
CSP_DestinationType	broadcast multicast unicast	Default is broadcast. Multicast may be used in case FSAMs are only disclosed to selected multicast groups. Unicast applies as specified in this International Standard.		

Table B.1 (continued)

Communication service parameter	Value	Comment
CSP_DestinationDomain	local	No networking and no forwarding
CSP_CommDistance	Default value: 200 m	Depends on advertised services
CSP_Directivity	Default: n.a.	Depends on installation
Performance communication service parameters		
CSP_Resilience	'notRelevant': no private window allocation 'highestRelevance' with private window allocation	
CSP_MinThP	n.a.	
CSP_MaxLat	less than 10 ms	
CSP_MaxADU	<max message size>	Limited by capability of access technology. No fragmentation of FSAM allowed!
Security communication service parameters		
CSP_DataConfidentiality	n.a.	FSAP uses a built-in security mechanism.
CSP_DataIntegrity	n.a.	FSAP uses a built-in security mechanism.
CSP_NonRepudiation	n.a.	FSAP uses a built-in security mechanism.
CSP_SourceAuthentication	n.a.	FSAP uses a built-in security mechanism.
Protocol communication service parameters		
CSP_Protocol	optional as applicable	applicable protocol stack for transmission of S-FSAMs and S-FSRMs
CSP_SpecificCommsProts	optional as applicable	required protocols for transmission of S-FSAMs and S-FSRMs

Annex C

(normative)

Support of path and flow management

In ITS-SUs supporting path and flow management specified in ISO 24102-6:2018, ITS-S application processes initially shall register at the ITS station management to present their communication requirements as specified in ISO 17423:2018 with details specified in [Annex B](#). This applies also for the FSAP ITS-S application process.

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