ETSI TR 103 444 V1.1.1 (2016-12)

Satellite Earth Stations and Systems (SES);
Broadband Satellite Multimedia (BSM);
Guide to Satellite Independent
Service Access Point (SI-SAP) use

Reference
DTR/SES-00403

Keywords
BSS, satellite, MSS, protocol, interface

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

Modal verbs terminology

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

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

The present document summarizes the main functions of the ETSI BSM architecture, with special emphasis on the services offered by Satellite Independent Service Access Point (SI-SAP) interface to the higher protocol layers as well as the primitives defined to invoke those services. In more detail, the present document provides a guide to the use of the related ETSI BSM documentation, worked out since year 2001 and updated in year 2015, providing precise pointers to the ETSI technical specifications (TSes) and reports (TRs), where the ETSI BSM architecture functions and SI-SAP interface services are defined and specified.

The aim of the present document is illustrate the main functions of the ETSI BSM architecture and the services offered by the SI-SAP interface.

Introduction

The present document focuses on the ETSI BSM architecture which defines the main actors involved in satellite communications, including the satellite network itself, external subnetworks, and the related interfaces. In particular, the ETSI BSM architecture defines a layered architecture separating the satellite dependent (SD, physical and datalink layers according to ISO/OSI terminology) from the satellite independent (SI, network layer) by means of the Satellite Independent Service Access Point (SI-SAP) interface, which provides an hardware abstraction layer easing the implementation of cross-layer mechanisms and interoperability of multi-vendor devices.

The SI-SAP interface can be actually implemented as logical or physical interface. In the former configuration, the SI-SAP interface extends and adapts the functions already provided by the interface existing between L1 and L2 of the ISO/OSI protocol stack, hence possibly enabling new services. On the other hand, the latter configuration corresponds to the case where the SI-SAP interface is actually implemented in two physically separated elements (e.g. a user terminal and a satellite modem), whereby the defined SI-SAP services can be run by means of a dedicated message exchange protocol.

The aforementioned capabilities offered by the SI-SAP interface are defined in terms of specific services that can be requested by the SI layer to the SD layer, respectively implementing SD and SI adaptation functions (provided namely by the SDAF and SIAF modules) for this purpose. In particular, the SI-SAP services currently defined deal with control and user plane functionalities, such as data transfer, address resolution, resource reservation, multicast management, logon/logoff, and configuration of the satellite independent (SI) layer.

The present document addresses the functions offered by the ETSI BSM architecture and the services implemented by the SI-SAP interface, illustrating the main characteristics and pointing to the related ETSI BSM literature, so as to offer a standalone guidance document for satellite system designers and implementers.

1 Scope

The present document provides a guide to ETSI BSM architecture and SI-SAP interface for satellite system designers and implementers, in terms of pointers to the relevant ETSI BSM literature.

Firstly, the document addresses the functions that are offered by the ETSI BSM architecture, providing the description of the main features and pointing to the specific TSs and TRs that detail these functions. In more detail, the following functions are illustrated:

- Data transfer.
- QoS management.
- Address resolution.
- Multicast management.
- Security.
- Network integration.
- Performance management.

Secondly, the document addresses the services that are offered by the SI-SAP interface and are run between the satellite independent (SI) and satellite dependent (SD) layers. Similarly to the description of the aforementioned ETSI BSM architecture functions, illustration of the main features is provided along with the pointers to the relevant ETSI BSM documents where the SI-SAP services are defined, specified, and analysed. The considered SI-SAP interface services are:

- Logon/logoff.
- Satellite independent layer configuration.
- Address resolution.
- Resource reservation.
- Multicast group receive and transmit.
- Data transfer.

The aim of the present document is to provide a standalone guide to the ETSI BSM standardization track, which is based on several technical specifications and reports.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

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

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

[i.1] ETSI TS 103 275: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Common air interface specification; Satellite Independent Service Access Point (SI-SAP) interface: Services".

[i.2] ETSI TS 102 856-2: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Multi-Protocol Label Switching (MPLS) interworking over satellite; Part 2: Negotiation and management of MPLS labels and MPLS signalling with attached networks".

[i.3] ETSI TS 102 856-1: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Multi-Protocol Label Switching (MPLS) interworking over satellite Part 1: MPLS-based Functional Architecture".

[i.4] ETSI TS 102 855: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Interworking and Integration of BSM in Next Generation Networks (NGNs)".

[i.5] ETSI TR 102 676: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Performance Enhancing Proxies (PEPs)".

[i.6] ETSI TS 102 675-2: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Part 2: Performance Management Information Base".

[i.7] ETSI TS 102 675-1: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Part 1: Performance Management at the SI-SAP".

[i.8] ETSI TS 102 674: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); PIM-SM Adaptation".

[i.9] ETSI TS 102 673: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Performance Parameters".

[i.10] ETSI TS 102 672: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Management Functional Architecture".

[i.11] ETSI TR 102 467: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Transition to IPv06".

[i.12] ETSI TS 102 466: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Multicast Security Architecture".

[i.13] ETSI TS 102 465: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); General Security Architecture".

[i.14] ETSI TS 102 464: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Interworking with DiffServ QoS".

[i.15] ETSI TS 102 463: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Interworking with IntServ QoS".

[i.16] ETSI TS 102 462: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); QoS Functional Architecture".

[i.17] ETSI TS 102 461: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Multicast Source Management".

[i.18] ETSI TS 102 460: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Address Management at the SI-SAP".

[i.19] ETSI TS 102 357: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Common Air interface specification; Satellite Independent Service Access Point (SI-SAP) interface: Primitives".

[i.20] ETSI TR 102 353: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Guidelines for the Satellite Independent Service Access Point (SI-SAP)".

[i.21] ETSI TS 102 295: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM) services and architectures; BSM Traffic Classes".

[i.22] ETSI TS 102 294: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM) services and architectures; IP interworking via satellite; Multicast functional architecture".

[i.23] ETSI TS 102 293: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM) services and architectures; IP Interworking over satellite; Multicast group management; IGMP adaptation".

[i.24] ETSI TS 102 292: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM) services and architectures; Functional architecture for IP interworking with BSM networks".

[i.25] ETSI TR 102 287: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); IP Interworking over satellite; Security aspects".

[i.26] ETSI TR 102 187: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; Overview of BSM families".

[i.27] ETSI TR 102 157: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP Interworking over satellite; Performance, Availability and Quality of Service".

[i.28] ETSI TR 102 156: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP interworking over satellite; Multicasting".

[i.29] ETSI TR 102 155: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP interworking over satellite; Addressing and routing".

[i.30] ETSI TR 101 985: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia; IP over Satellite".

[i.31] ETSI TR 101 984: "Satellite Earth Stations and Systems (SES); Broadband Satellite Multimedia (BSM); Services and architectures".

[i.32] IETF RFC 4815: "RObust Header Compression (ROHC): Corrections and Clarifications to RFC 3095".

[i.33] IETF RFC 3261: "SIP: Session Initiation Protocol".

[i.34] IETF RFC 753: "Internet Message Protocol".

[i.35] IETF RFC 793: "Transmission Control Protocol".

[i.36] IETF RFC 768: "User Datagram Protocol".

[i.37] IETF RFC 3135: "Performance Enhancing Proxies Intended to Mitigate Link-Related Degradations".

[i.38] ISO/IEC 7498-1: "Information Technology - Open Systems Interconnection - Basic Reference Model: The Basic Model. International Standard".

[i.39] ISO/IEC 10731: "Information Technology - Open Systems Interconnection - Basic Reference Model-Conventions for the Definition of OSI Services. International Standard".

[i.40] IETF RFC 3376: "Internet Group Management Protocol, Version 3".

[i.41] IETF RFC 4601: "Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)".

[i.42] IETF RFC 2205: "Resource Reservation Protocol (RSVP) - Version 1 Functional Specification".

[i.43] IETF RFC 3031: "Multiprotocol Label Switching Architecture".

[i.44] IETF RFC 3209: "RSVP-TE Extensions to RSVP for LSP Tunnels".

[i.45] IETF RFC 2460: "Internet Protocol, Version 6 (IPv6) Specification" Deering, S. and R. Hinden.

[i.46] ETSI EN 302 307: "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)".

[i.47] ETSI TS 101 545-1: "Digital Video Broadcasting (DVB); Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 1: Overview and System Level specification".

3 Definitions and abbreviations

3.1 Definitions

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

architecture: abstract representation of a communications system

NOTE: Three complementary types of architecture are defined:

- Functional Architecture: the discrete functional elements of the system and the associated logical interfaces.
- Network Architecture: the discrete physical (network) elements of the system and the associated physical interfaces.
- Protocol Architecture: the protocol stacks involved in the operation of the system and the associated peering relationships.

BSM network: together with the BSM interworking and adaptation functions that are required to provide IP interfaces (i.e. layer 3 and below) to attached networks

BSM subnetwork: all the BSM network elements below the Satellite Independent Service Access Point (SI-SAP)

BSM System (BSMS): system comprising a BSM Network together with a Network Management Centre (NMC) and Network Control Centre (NCC)

NOTE: The BSM System also includes any additional elements that are required to provide the network services to the subscribers and their users.

control plane: plane that provides the control functions

NOTE: The control plane has a layered structure and performs the call control and connection control functions; it deals with the signalling necessary to set up, supervise and release calls and connections.

flow (of IP packets): traffic associated with a given connection-oriented, or connectionless, packet sequence having the same 5-tuple of source address, destination address, Source Port, Destination Port and Protocol type

forwarding: process of relaying a packet from source to destination through intermediate network segments and nodes

NOTE: The forwarding decision is based on information that is already available in the routing table. The decision on how to construct that routing table is the routing decision.

management plane: plane that provides the management functions

NOTE: The management plane provides two types of functions, namely Layer Management and plane management functions:

- Plane management functions are functions related to a system as a whole and provides coordination between all the planes. Plane management has no layered structure.
- Layer management functions are functions relating to resources and parameters residing in its protocol entities. Layer management handles the operation and maintenance (OAM) of information flows specific to the layer concerned.

network control centre: equipment at OSI Layer 2 that controls the access of terminals to a satellite network, including element management and resource management functionality

user plane: plane that has a layered structure and provides user information transfer, along with associated controls (e.g. flow control, recovery from errors, etc.)

3.2 Abbreviations

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

3GPP	3rd Generation Partnership Project
BSM	Broadband Satellite Multimedia
BSM_GID	BSM Group Identity
BSM_ID	BSM IDentifier
BSMS	BSM System
CFM	ConFirMation
DiffServ	Differentiated services
DVB-RCS2	Digital Video Broadcasting for Return Channel Satellite, 2nd generation
DVB-S2	Digital Video Broadcasting for Satellite, 2nd generation
FCAPS	Fault, Configuration, Accounting, Performance, Security
IGMP	Internet Group Membership Protocol
IMS	Internet Multimedia Subsystem
IND	INDication
IntServ	Integrated Services
IP	Internet Protocol
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
L2	Layer 2 (of the ISO/OSI protocol stack)
L3	Layer 3
MPLS	Multi-Protocol Label Switching
NCC	Network Control Centre
NGN	Next Generation Network
NMC	Network Management Centre
OSI	Open Systems Interconnection
PEP	Performance Enhancing Proxy
PIM-SM	Protocol Independent Multicast - Sparse Mode
QID	Queue Identifier
QIDSPEC	QID Specification
QoS	Quality of Service
REQ	REQuest
RES	RESponse
ROHC	Robust Header Compression
RSVP	Resource ReserVation Protocol
RSVP-TE	Resource Reservation Protocol - Traffic Engineering
SAP	Service Access Point
SD	Satellite Dependent
SDAF	Satellite Dependent Adaptation Functions
SI	Satellite Independent
SIAF	Satellite Independent Adaptation Functions
SIP	Session Initiation Protocol