ETSI TR 103 338 V1.1.1 (2015-05)

Satellite Earth Stations and Systems (SES); Satellite Emergency Communications (SatEC); Multiple Alert Message Encapsulation over Satellite (MAMES) deployment guidelines

Reference
DTR/SES-00342

Keywords
emergency, satellite

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
http://portal.etsi.org/tb/status/status.asp

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

Copyright Notification

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

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

1 Scope

The present document provides guidelines for integrating the MAMES alert message encapsulation scheme specified in [i.1] into communications networks. Starting from an outline of the overall integration framework in terms of the entities and actors involved in an end-to-end alerting system, a set of generic integration scenarios are developed. These considerations apply to both satellite-based and terrestrial networks.

The actual integration guidelines are formulated by providing a mapping of the MAMES entities onto the entities of common types of SatCom and SatNav networks. For each class of SatCom and SatNav network considered, the interconnection points between the MAMES and the SatCom/SatNav networks are identified, highlighting also the respective lower-layer technologies of the satellite-based networks.

In order to illustrate the operation of integrated MAMES-enabled networks, a number of representative end-to-end alerting scenarios are developed and the key procedures involved are described.

2 References

2.1 Normative references

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

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

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 necessary for the application of the present document.

Not applicable.

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 103 337: "Satellite Earth Stations and Systems (SES); Satellite Emergency Communications; Multiple Alert Message Encapsulation over Satellite (MAMES)".

[i.2] ETSI EN 300 421: "Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for 11/12 GHz satellite services".

NOTE: Referred to as DVB-S.

[i.3] ETSI EN 302 307-1: "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 1: DVB-S2".

[i.4] ETSI EN 302 307-2: "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 2: DVB-S2 Extensions (DVB-S2X)".

[i.5] ETSI TS 102 585: "Digital Video Broadcasting (DVB); System specifications for satellite services to handheld devices (SH) below 3 GHz".

[i.6] ETSI EN 302 550-1-1: "Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 1: Outer Physical Layer".

[i.7] ETSI EN 302 550-1-2: "Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 2: Inner Physical Layer Single Carrier Modulation".

[i.8] ETSI EN 302 550-1-3: "Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) Systems; Part 1: Physical Layer of the Radio Interface; Sub-part 3: Inner Physical Layer Multi Carrier Modulation".

[i.9] ETSI TR 102 525: "Satellite Earth Stations and Systems (SES); Satellite Digital Radio (SDR) service; Functionalities, architecture and technologies".

[i.10] ETSI EN 301 790: "Digital Video Broadcasting (DVB); Interaction channel for satellite distribution systems".

NOTE: Referred to as DVB-RCS.

[i.11] ETSI TS 101 545-1: "Digital Video Broadcasting (DVB); Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 1: Overview and System Level specification".

[i.12] ETSI EN 301 545-2: "Digital Video Broadcasting (DVB); Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 2: Lower Layers for Satellite standard".

[i.13] ETSI TS 101 376-1-2: "GEO-Mobile Radio Interface Specifications (Release 3); Third Generation Satellite Packet Radio Service; Part 1: General specifications; Sub-part 2: Introduction to the GMR-1 family; GMR-1 3G 41.201".

[i.14] ETSI TS 101 377-1-2: "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 2: Introduction to the GMR-2 family of specifications; GMR-2 01.201".

[i.15] ETSI TR 101 865: "Satellite Earth Stations and Systems (SES); Satellite component of UMTS/IMT-2000; General aspects and principles".

[i.16] ETSI TS 102 721-1: "Satellite Earth Stations and Systems (SES); Air Interface for S-band Mobile Interactive Multimedia (S-MIM); Part 1: General System Architecture and Configurations".

[i.17] "Communication system for the dissemination of alert messages: Architecture and design document", Deliverable D3.6, Alert for All (A4A) project.

[i.18] Recommendation ITU-T X.1303: "Common alerting protocol (CAP 1.1)".

[i.19] OASIS Standard: "Common Alerting Protocol Version 1.2".

[i.20] ETSI TS 102 182: "Emergency Communications (EMTEL); Requirements for communications from authorities/organizations to individuals, groups or the general public during emergencies".

[i.21] ETSI TS 102 900: "Emergency Communications (EMTEL); European Public Warning System (EU-Alert) using the Cell Broadcast Service".

[i.22] ETSI TR 102 850: "Emergency Communications (EMTEL); Analysis of Mobile Device Functionality for PWS".

[i.23] ETSI TS 122 268: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Public Warning System (PWS) requirements (3GPP TS 22.258 Release 12)".

[i.24] Recommendation ITU-R M.584-2: "Codes and formats for radio paging".

[i.25] Flex™ technology overview.

NOTE: Available at: http://web.archive.org/web/20031211033436/www.motorola.com/MIMS/MSPG/FLEX/overview/overview.html#introduction.html

[i.26] ETSI TS 123 041: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Technical realization of Cell Broadcast Service (CBS) (3GPP TS 23.041)".

[i.27] http://www.gdacs.org/.

[i.28] http://www.fcc.gov/guides/emergency-alert-system-eas.

[i.29] http://www.fcc.gov/encyclopedia/wireless-emergency-alerts.

[i.30] https://www.fema.gov/integrated-public-alert-warning-system.

[i.31] Satellite-based warning system - SatWaS.

NOTE: Available at: http://www.bbk.bund.de/DE/AufgabenundAusstattung/Krisenmanagement/WarnungderBevoelkerung/Warnmittel/SatWaS/AatWaS_node.html (in German).

[i.32] Modular Warning System (MoWaS).

NOTE: Available at: http://www.bbk.bund.de/DE/AufgabenundAusstattung/Krisenmanagement/WarnungderBevoelkerung/Warnmittel/MoWaS/MoWaS_node.html (in German).

[i.33] http://www.nl-alert.nl/ (in Dutch).

[i.34] http://www.umsalert.com/.

[i.35] http://www.gripweb.org/gripweb/?q=countries-risk-information/databases-information-systems/pacific-tsunami-warning-system-ptws.

[i.36] http://ptwc.weather.gov/.

[i.37] http://www.jma.go.jp/jma/en/Activities/eew.html.

[i.38] http://www.nws.noaa.gov/nwr/info/nwrsame.html.

[i.39] http://www.oasis-emergency.org/specifications.

[i.40] http://www.w3.org/TR/2002/REC-xmldsig-core-20020212/.

[i.41] http://cap-cp.ca/.

[i.42] http://capan.ca/index.php?/en/npas/.

[i.43] http://www.siriusxm.com.

[i.44] http://www.solarismobile.com.

[i.45] http://www.inmarsat.com.

[i.46] http://www.thuraya.com.

[i.47] http://www.globalstar.com.

[i.48] http://www.iridium.com.

[i.49] http://www.navipedia.org.

[i.50] http://www.navipedia.org/index.php/Category:GALILEO.

[i.51] http://www.navipedia.net/index.php/Galileo-Navigation-Message.

[i.52] "Galileo's Commercial Service: Testing GNSS High Accuracy and Authentication", by I. Fernandez Hernandez et al., InsideGNSS (www.insidegnss.com), January/February 2015.

[i.53] http://www.navipedia.org/index.php/Category:EGNOS.

[i.54] http://www.navipedia.org/index.php/The_EGNOS_SBAS_Message_Format_Explained.

[i.55] Recommendation ITU-R BT.1774-1 (04/2007): "Use of satellite and terrestrial broadcast infrastructures for public warning, disaster mitigation and relief".

[i.56] Recommendation ITU-R M.1854-1 (01/2012): "Use of mobile-satellite service in disaster response and relief".

[i.57] Recommendation ITU-R S.1001-2 (01/2010): "Use of systems in the fixed-satellite service in the event of natural disasters and similar emergencies for warning and relief operations".

[i.58] Recommendation ITU-R M.2149-1 (10/2011): "Use and examples of mobile-satellite service systems for relief operation in the event of natural disasters and similar emergencies".

[i.59] Recommendation ITU-R S.2151-1 (09/2012): "Use and examples of systems in the fixed satellite service in the event of natural disasters and similar emergencies for warning and relief operations".

[i.60] IETF Internet Draft: "draft-barnes-atoca-escape-02" (now expired).

NOTE: Available at: https://www.ietf.org/archive/id/draft-barnes-atoca-escape-02.txt.

3 Definitions and abbreviations

3.1 Definitions

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

Alert Intermediary System: telecommunications network or node that is located at the user side of the Alert Network and that forwards alert-related (MAMES or non-MAMES) messages

Alert Issuer: entity that generates Alert Messages and forwards them to a MAMES Alert Provider for MAMES Encapsulation; more generally, an entity that terminates an Alert Protocol at the alerter side of an Alert Network

NOTE: Depending on the Alert Protocol used, an Alert Issuer may be capable of updating or cancelling a previously issued Alert Message, and of requesting and accepting acknowledgement messages.

Alert Message: Alert Protocol Message containing data to alert and/or inform Alert Users about an impending or on-going emergency

Alert Network: in the context of the present document, a telecommunications or navigation network that supports Alert Protocol Messages

Alert Protocol: protocol used to exchange Alert Protocol Messages

NOTE 1: In its most basic form, an Alert Protocol is a simple, mutually agreed rule for encoding alert-related information (e.g. by specifying an Internet media type).

NOTE 2: An advanced Alert Protocol typically includes, in addition to an Alert Message, other specially formatted messages for the purpose of updating, cancelling or acknowledging a previous Alert Protocol Message. An example of an advanced Alert Protocol is CAP.

NOTE 3: The termination points of an Alert Protocol are the Alert Issuer (at the alerter side) and the Alerting Device or the Mediation Device (at the user side).

Alert Protocol Message: message conforming to an Alert Protocol

NOTE: The term Alert Protocol Message comprises messages designed to alert or update Alert Users, as well as messages designed to cancel or acknowledge a previously transmitted Alert Protocol Message.

Alert User: entity that consumes the rendered content of an Alert Protocol Message

NOTE 1: A typical Alert User is a physical person that (e.g.) reads an Alert Message text on a display; an Alert User may also be a technical system that is triggered by the contents of an Alert Message to perform certain tasks (e.g. close a floodgate).

NOTE 2: Alerting Devices are not considered to be Alert Users, since they do not consume, but in fact render the contents of Alert Messages.

Alerting Device: device that receives an Alert (Protocol) Message and renders its content to one or more Alert User(s) according to its rendering capabilities; more generally, an entity that terminates an Alert Protocol at the user side of an Alert Network

NOTE 1: Depending on the Alert Protocol used, an Alerting Device may be capable of returning acknowledgement messages.

NOTE 2: An Alerting Device contains one or more Alerting Function(s) and it may contain one or more Mediation Function(s).

NOTE 3: An example of an Alerting Device is a siren that activates the proper tone for alerting the population; another example is a smartphone that displays the Alert Message content.

Alerting Function: logical function within an Alerting Device that receives the alert indication or information and renders these data according to its capabilities

Alerting Services Regulator: authority that regulates the implementation and provision of alerting services within its area of authority

CAP Capable Device: Alerting Device or Mediation Device that is capable of processing a CAP-compliant Alert Protocol Message; more generally, a device that terminates the CAP protocol at the user side of a CAP-based Alert Network

Direct MAMES Alerting: MAMES-based alerting scheme whereby the Satellite Terminal and the MAMES Receiver are co-located, i.e. either integrated into a single device or interconnected via a direct physical link

Indirect MAMES Alerting: MAMES-based alerting scheme whereby the Satellite Terminal and the MAMES Receiver are interconnected via a network, referred to as an Alert Intermediary System

MAMES Agent: software module that executes the MAMES Protocol

NOTE: Two types of MAMES Agents exist: The MAMES Alerter-Side Agent and the MAMES User-Side Agent.

MAMES Alert Provider: entity that generates MAMES Messages; more generally, an entity that terminates the MAMES Protocol at the alerter side of a MAMES Network

NOTE: A MAMES Alert Provider is also capable of requesting and accepting MAMES-based acknowledgement (ACK) messages.

MAMES Alert Receiver: entity that is capable of receiving MAMES Messages; more generally, an entity that terminates the MAMES Protocol at the user side of a MAMES Network

NOTE: A MAMES Alert Receiver is also capable of generating MAMES-based acknowledgement (ACK) messages.

MAMES Alerter-Side Agent: MAMES Agent serving the MAMES Alert Provider

MAMES Alerter-Side Controller: entity within the MAMES Alert Provider that configures, monitors and controls a MAMES Alerter-Side Agent

NOTE: The MAMES Alerter-Side Controller may be a software module operated by a physical person in charge of initiating and configuring a MAMES Alerter-Side Agent, and of controlling its operation in coordination with the Alert Issuer; alternatively, it may be an autonomous software algorithm performing these tasks.

MAMES Decapsulation: process of decapsulating a MAMES Frame to obtain the message(s) contained in the MAMES Payload

NOTE: Both the MAMES User-Side Agent and the MAMES Alerter-Side Agent are capable of MAMES Decapsulation.

MAMES Encapsulation: process of encapsulating one or more Alert Protocol Message(s) into a MAMES Frame

NOTE: Both the MAMES Alerter-Side Agent and the MAMES User-Side Agent are capable of MAMES Encapsulation.

MAMES Frame: used interchangeably with the term MAMES Message

MAMES Governing Body: authority that governs and regulates the operations and communications of all MAMES entities

MAMES Message: message conforming to the MAMES format

NOTE: MAMES Messages consist of a MAMES Header and (optionally) a MAMES Payload.

MAMES Network: Alert Network that supports the distribution and exchange of MAMES Messages

MAMES Payload: Alert Protocol Message(s) contained within a MAMES Frame

MAMES Protocol: Alert Protocol that supports the distribution and exchange of MAMES Messages

MAMES Provider: used interchangeably with the term MAMES Alert Provider

MAMES Receiver: used interchangeably with the term MAMES Alert Receiver

MAMES User-Side Agent: MAMES Agent serving the MAMES Alert Receive

MAMES User-Side Controller: entity within the MAMES Alert Receiver that configures, monitors and controls a MAMES User-Side Agent

NOTE: Once initiated, the MAMES User-Side Controller is an autonomously running software algorithm.

Mediation Device: device hosting one or more Mediation Function(s)

Mediation Function: in the context of the present document, a logical function that performs a protocol conversion between two different Alert Protocols

NOTE 1: A Mediation Function is required in cases when the Alerting Device (e.g. a siren) is not capable of processing the incoming Alert Message (e.g. a CAP message).

NOTE 2: A Mediation Function may be implemented as a stand-alone device (Mediation Device), or it may be embedded within an Alerting Device.

SatCom/SatNav/Com Network: communications network based on satellite communications, satellite navigation or terrestrial communications (wired, wireless, or mobile) technology

SatCom/SatNav/Com Regulator: authority that regulates the deployment and provision of SatCom/SatNav/Com Networks and services

SatCom/SatNav/Com Service Provider: entity that provides a satellite communications, a satellite navigation or a terrestrial communications service to its subscribers

SatCom/SatNav/Com Subscriber: entity that subscribes to and/or uses a satellite communications, a satellite navigation or a terrestrial communications service offered by a SatCom/SatNav/Com Provider

SatCom/SatNav/Com User Segment: satellite communications, satellite navigation or terrestrial communications subsystem that comprises all SatCom/SatNav/Com network entities at the user side of the SatCom/SatNav/Com Network

SatCom/SatNav Ground Segment: satellite communications or satellite navigation subsystem comprising all SatCom/SatNav network entities at the provider side of the SatCom/SatNav Network

SatCom/SatNav Network: communications network based on satellite communications or satellite navigation technology

SatCom/SatNav Space Segment: communications or navigation satellite(s)

3.2 Abbreviations

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

A4A	Alert-For-All (Alert4All)
AFSK	Audio Frequency-Shift Keying
AM	Alert Message
ASN.1	Abstract Syntax Notation One
ATWC	Alaska Tsunami Warning Center
BBK	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (*German*)
BEIDOU	BEIDOU Navigation Satellite System
BGAN	Broadband Global Area Network
BTS	Base Transceiver Station
CAP	Common Alerting Protocol
CAP-CP	CAP Canadian Profile
CBS	Cell Broadcast Service
CD	Compact Disc
CDDS	Commercial Data Distribution Service
CDLC	Civil Defence Liaison Centre
CMAS	Commercial Mobile Alert System
CPF	Central Processing Facility
CS	Commercial Service
DVB	Digital Video Broadcasting
DVB-S	Digital Video Broadcasting - Satellite
DVB-SH	Digital Video Broadcasting - Satellite services to Handheld devices (SH) below 3 GHz
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDXL	Emergency Data Exchange Language
EEW	Earthquake Early Warning System
EGNOS	European Geostationary Navigation Overlay Service
FCC	Federal Communications Commission
FEC	Forward Error Correction
FEMA	Federal Emergency Management Agency
FLEX	Flexible wide area paging protocol
GCC	Ground Control Center
GDACS	Global Disaster Alert and Coordination System
GEO	Geostationary
GMR	GEO Mobile Radio
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GS	Generic Stream
GSC	GNSS Service Center
GSM	Global System for Mobile communications
GSS	GALILEO Sensor Station
I/F	Interface
INRSS	Indian Regional Navigation Satellite System
IP	Internet Protocol
IPAWS	Integrated Public Alert and Warning System
ITU	International Telecommunications Union
JMA	Japan Meteorological Agency
LAN	Local Area Network
LEO	Low Earth Orbit
MAMES	Multiple Alert Message Encapsulation over Satellite
MCC	Mission Control Center
MEO	Medium Earth Orbit
MF	Multiple Frequency