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Advanced Surface Movement Guidance and Control System (A-SMGCS); Part 3: Community Specification for a deployed cooperative sensor including its interfaces

Reference

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The presumption of conformity which is linked to the full application of ETSI EN 303 213 (parts 1 to 4, 7 and 8) can only be claimed after ETSI EN 303 213 (parts 1 to 4, 7 and 8) have been listed in the Official Journal of the European Union as Community Specification.

General requirements for presumption of conformity to Regulation (EU) No 2018/1139 [i.5] are given in the normative annexes of the present document.

NOTE: Other requirements and other EU Regulations and/or Directives may be applicable to the product(s) falling within the scope of the present document.

The present document is part 3 of a multi-part deliverable covering Advanced Surface Movement Guidance and Control System (A-SMGCS), as identified below:

Part 1: "Community Specification for A-SMGCS surveillance service including external interfaces";

Part 2: "Community Specification for A-SMGCS airport safety support service";

Part 3: "Community Specification for a deployed cooperative sensor including its interfaces";

Part 4: "Community Specification for a deployed non-cooperative sensor including its interfaces";

Part 5: "Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment;

Part 6: "Harmonised Standard for access to radio spectrum for deployed surface movement radar sensors";

Part 7: "Community Specification for A-SMGCS routing service";

Part 8: "Community Specification for A-SMGCS guidance service".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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 is applicable to Advanced Surface Movement Guidance and Control System (A-SMGCS) Surveillance Service. This system provides enhanced surveillance functionalities, as well as a display to controllers with accurate and unambiguous identity and position information on the entire manoeuvring and movement area of aerodromes.

The present document provides a European Standard for manufacturers, Air Navigation Service Providers and/or Airport Operators, who have to demonstrate and declare compliance of their systems and constituents to the Essential Requirements (ERs) of Annex VIII of Regulation (EU) No 2018/1139 [i.1].

NOTE 1: The ERs in Annex VIII of Regulation (EU) No 2018/1139 [i.5] covered by the present document are outlined in Table A.1.

NOTE 2: Although the ERs of the SES Interoperability Regulation [i.1] have been repealed with effect from 11 September 2018 [i.5], a mapping of the requirements for a deployed cooperative sensor including its interfaces to this same regulation [i.1] is provided in Annex B.

Any software elements related to the software assurance level of an A-SMGCS are out of scope of the present document. As such the ERs of Regulation EU 2018/1139 [i.5] are not considered for software elements within the present document.

The present document does not give presumption of conformity related to the maintenance requirements, constraints, procedure level, effect of harmful interference and civil/military coordination.

NOTE 3: For these ERs, the Air Navigation Service Provider will need to provide supplementary compliance within their Interoperability Technical Files.

The present document does not give presumption of conformity to any current interoperability Implementing Rules (IRs).

NOTE 4: Currently there are no relevant Implementing Rules for A-SMGCS.

Requirements in the present document which refer to "should" statements or recommendations in the normatively referenced material (clause 2.1) are only to be interpreted as fully normative ("shall") for the purpose of compliance with the present document if they are unambiguously referred to from the present document.

The reference to particular requirements is done either by citing the unambiguous requirement number or range of numbers (e.g. "[REQ 30.] to [REQ 35.]") or, if no requirement numbers are available, by indicating the paragraph and clause of the reference material where the requirement can be found.

NOTE 5: Other requirements and other EU Regulations and/or Directives may be applicable to the product(s) falling within the scope of the present document.

2 References

2.1 Normative references

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

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

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

[1] EUROCAE ED-117A (September 2016): "Minimum Operational Performance Specification for Mode S Multilateration Systems for use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS)".

[2] EUROCAE ED-87D (June 2019): "Minimim Aviation System Performance Standard (MASPS) for Advanced Surface Movement Guidance and Control Systems (A-SMGCS)".

[3] Void.

[4] ETSI EN 300 019-1-3 (V2.4.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".

[5] ETSI EN 300 019-1-4 (V2.2.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".

2.2 Informative references

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

[i.1] Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (interoperability Regulation), OJ L 96, 31.03.2004, p. 26 as amended by Regulation (EC) No 1070/2009, OJ L 300, 14.11.2009, p. 34.

[i.2] ICAO Document 9830, AN/452: "Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual", First Edition, 2004.

[i.3] EUROCONTROL-SPEC-171: "EUROCONTROL Specification for Advanced-Surfaced Movement Guidance and Control System (A-SMGCS) Services" (Edition 1, March 2018).

[i.4] Regulation (EC) No 1070/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system, OJ L 300, 14.11.2009.

[i.5] Regulation (EU) No 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in chapter 1.4.1 of ED-117A [1], clause 1.7 of EUROCONTROL Specification for A-SMGCS Services [i.3] and the following apply:

Advanced Surface Movement Guidance and Control System (A-SMGCS): system providing as a minimum Surveillance and which can include Airport Safety Support, Routing and Guidance to aircraft and vehicles in order to maintain the airport throughput under all local weather conditions whilst maintaining the required level of safety

NOTE: This definition is derived from EUROCAE ED-87D [2].

aerodrome: defined area (including any buildings, installations and equipment) intended to be used either wholly or in part for arrival, departure and surface movement of aircraft

NOTE: This definition is derived from the ICAO Document 9830 [i.2].

apron: defined area on an aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance

NOTE 1: This definition is derived from the ICAO Document 9830 [i.2].

NOTE 2: De-icing platforms, including remote de-icing areas, are considered as apron areas.

availability: probability that the system will operate satisfactorily at a given point in time when used under stated conditions in an ideal support environment

NOTE: This definition is derived from EUROCAE ED-87D [2].

classification: function which groups targets into various types (e.g. large, medium, small)

constituents: tangible objects such as hardware and intangible objects such as software upon which the interoperability of the EATMN depends

manoeuvring area: part of an aerodrome to be used for take-off, landing and taxiing of aircraft, excluding aprons

NOTE: This definition is derived from the ICAO Document 9830 [i.2].

movement area: part of an aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and apron(s)

NOTE: This definition is derived from the ICAO Document 9830 [i.2].

procedure: standard method for either the technical or operational use of the system, in the context of agreed and validated concepts of operation requiring uniform implementation throughout the EATMN

system: aggregation of airborne and ground based constituents, as well as space-based equipment, that provides support for air navigation services for all phases of flight

target: vehicle or aircraft equipped with a Mode S, Mode A/C transponder or non-transponder device, which has been turned on and is functioning in compliance with its minimum operational performance specification

NOTE 1: Aircraft and vehicles are collectively referred to as mobiles.

NOTE 2: This definition is derived from EUROCAE ED-117A [1].

test targets: form of either fixed reflectors or active devices transponders, mounted at fixed positions or moving (with a known reference position) within the coverage volume

update: renewal of target reports relating to all targets under surveillance

3.2 Symbols

Void.

3.3 Abbreviations

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

A-SMGCS	Advanced Surface Movement Guidance and Control System
ASTERIX	All-purpose Structured EUROCONTROL Surveillance Information Exchange
ATM	Air Traffic Management
ATS	Air Traffic Service
EATMN	European Air Traffic Management Network
EC	European Communities
EN	European Norm - (standard)
ER	Essential Requirement
EUROCAE	EURopean Organization for Civil Aviation Equipment
EUROCONTROL	EURopean Organization for the safety of air navigation
HMI	Human Machine Interface
ICAO	International Civil Aviation Organization
MASPS	Minimum Aviation Systems Performance Specification
MLAT	MuLtilATeration
SES	Single European Sky
TMA	Terminal Manoeuvring Area
SMGCS	Surface Movement Guidance and Control System
ORQ	Optional ReQuirement

4 Requirements for implementing cooperative sensors for A-SMGCS Systems

4.1 Design Requirements for cooperative sensors for A-SMGCS Systems

4.1.1 Operating principles of the cooperative sensor

The operating principles of the cooperative sensor are defined in ED-117A [1], chapter 1.6.2. The cooperative sensor shall receive Mode S messages as defined in ED-117A [1], chapter 2.4.1 [REQ 5.].

4.1.2 Certification

The cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 2.3, [REQ 1.] and chapter 2.8.1 [REQ 24.].

4.1.3 Software and Hardware Design

The Software and the design of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 2.1 [REQ 1.], [REQ 2.], [REQ 3.], [REQ 4.] and chapter 2.8 [REQ 22.], [REQ 23.], [REQ 25.] and [REQ 26.] and chapter 2.9. All MLAT electrical equipment shall operate from standard mains voltage and frequency at the Aerodrome as defined in ED-117A [1], chapter 2.8 [REC 17].

4.1.4 Capacity

The capacity of the cooperative sensor shall comply with the requirements as defined in ED-117A [1] chapter 3.3.12 [REQ 66.], [REQ 67.] and [REQ 68.].

4.1.5 Void

4.1.6 System coverage

The system coverage of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 3.1.1 [REQ 27.] and chapter 3.3.2 [REQ 56.].

4.1.7 Identification

The identification within the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 3.3.6 [REQ 60.], chapter 3.3.7 [REQ 61.], chapter 3.3.8 [REQ 62.] and ED-87D [2] chapter 2.1.2.3.

4.1.8 Surveillance data output

The surveillance data output of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 2.4.2 [REQ 6.] and [REQ 7], chapter 3.1.6 [REQ 44.], [REQ 45.], [REQ 46.], chapter 3.1.6.1 [REQ 48.], chapter 3.1.6.2 [REQ 50.], chapter 3.1.6.3 [REQ 51.] and [REQ 52.] and ED-87D [2] chapter 2.1.2.3. As defined in ED-117A [1], chapter 3.1.6, the MLAT System shall output MLAT Target Reports in accordance with ASTERIX Category 10 to support legacy systems.

4.1.9 Update Rate

The Target Report Update Rate of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 3.1.6.3 [REQ 51.] and chapter 3.3.3 [REQ 57.].

4.1.10 Integrity

The Integrity of the cooperative sensor shall comply with the requirements as defined in ED-117A [1], chapter 2.7 [REQ 21.].

As defined in ED-117A [1], chapter 2.7 [REC 13.], mechanisms shall be put into place to inform the users of areas where performance has been reduced in a way that may affect the operation.

As defined in ED-117A [1], chapter 2.7 [REC 14.], sensor cases and antennas shall be mounted on a suitable building, mast or tower.

As defined in ED-117A [1], chapter 2.7 [REC 15.], the stability of the installation site shall ensure system performance requirements under all specified operating weather conditions, in particular the specified operating wind speed and ice loading.

4.1.11 Expandability

The cooperative sensor shall be expandable as defined in ED-117A [1], chapter 2.9.5 [REC 19.].

4.1.12 ASTERIX Interface

The cooperative sensor shall provide an ASTERIX Interface as defined in ED-117A [1], chapter 3.1.6 [REQ 45.], [REQ 46.], [REQ 47.].

4.1.13 Mode S target processing

The cooperative sensor shall be capable to process Mode S target positions as defined in ED-117A [1], chapter 3.1.1 [REQ 27.] and process duplicate aircraft addresses according to chapter 3.1.2 [REQ 28.] and [REQ 29.].

The mode S target processing shall meet the requirements for reported position accuracy as defined in ED-117A [1], chapter 3.3.9 [REQ 63.] and for gaps as defined in ED-117A [1] in chapter 3.3.10 [REQ 64.].

4.1.14 Mode S Interrogation

The cooperative sensor shall be capable of interrogating mode S transponders as defined in ED-117A [1], chapter 3.1.3 [REQ 31.] to [REQ 38.].

4.1.15 Reference transponders

Any test and reference transponders of the multilateration system shall perform as defined in ED-117A [1], chapter 3.1.4 [REQ 39.] and [REQ 40.].

4.1.16 Target Report Initiation Time

The cooperative sensor shall have a target report initiation time as defined in ED-117A [1], chapter 3.3.11 [REQ 65.].

4.1.17 Probability of Target Report

The cooperative sensor shall have a probability of target report as defined in ED-117A [1], chapter 3.3.4 [REQ 58.] and a Probability of False Detection requirement as defined in ED-117A [1], chapter 3.3.5 [REQ 59.].

4.1.18 Probability of False Identification

The cooperative sensor shall comply with the Probability of False Identification requirement as defined in ED-117A [1], chapter 3.3.7 [REQ 61.].

4.1.19 Switchover Time

For redundant systems the Switchover time shall comply with the requirement as defined in ED-117A [1], chapter 3.3.15 [ORQ 15.].

4.1.20 Latency

The constituent latency shall meet the values specified in ED-117A [1], chapter 3.3.13 [REQ 69.] when operating in data driven output mode.

4.2 Acceptance testing requirements for cooperative sensors for A-SMGCS Systems

4.2.1 Surveillance Element tests

The cooperative sensor shall perform the surveillance element tests as defined in ED-87D [2], chapter 5.3.1.

4.2.2 Basic tests

The cooperative sensor shall perform the basic conformity tests as defined in ED-117A [1], chapter 5.3.

4.2.3 Performance tests

The cooperative sensor shall perform the performance tests as defined in ED-117A [1], chapters 5.4 and 5.5.