ETSO-C159e

NEXT GENERATION SATELLITE SYSTEMS (NGSS) EQUIPMENT

1 Applicability

This ETSO provides the requirements which next generation satellite systems (NGSS) equipment that is designed and manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 Procedures

2.1 General

The applicable procedures are detailed in CS-ETSO, Subpart A.

2.2 Specific

None.

3 Technical Conditions

3.1 Basic

3.1.1 Minimum Performance Standard

The standards are those provided in EUROCAE ED-243C / RTCA DO-262F 'Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)', dated June 2021, including Errata 1 published in September 2021, Change 1 published in September 2022 and Change 2 published in November 2023.

3.1.2 Environmental Standard

See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 Software

See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 Airborne Electronic Hardware

See CS-ETSO, Subpart A, paragraph 2.3.

3.2 Specific

The MPS allows for different equipment classes and subclasses as defined by EUROCAE ED-243C / RTCA DO-262F. There are 10 applicable equipment classes and 11 equipment subclass components identified as shown in Tables 1A, 1B and 1C and Tables 2A and 2B of this ETSO. Tables 1A and 2A show the requirements for SATCOM Short Burst Data (SBD) equipment classes and subclass components. Tables 1B and 2B show the requirements for SATCOM SwiftBroadband (SBB) equipment classes and subclass components. Table 1C shows the requirements for SATCOM Certus Broadband (CBB). The manufacturer must declare the equipment class requirements from those identified in the applicable table of this ETSO. The equipment configuration shall satisfy the relevant requirements of the EUROCAE ED-243C / RTCA DO-262F (as modified by Errata 1, Change 1 and Change 2) minimum operational performance standards (MOPS) as identified in Tables 1A, 1B and 1C, and Tables 2A and 2B of this ETSO.

Table 1A — Equipment Class Identifiers supporting SATCOM Short Burst Data (SBD)

Equipment Class Identifier	Description	Requirement
All SATCOM SBD equipment classes	All SATCOM SBD equipment produced under EUROCAE ED-243C / RTCA DO-262F, Appendix D, identified as Equipment Class AES1, AES2 or AES3	Appendix D, Sections D.2.1 and D.2.2, for requirements applicable to all SATCOM SBD equipment classes, and Section D.2.4 for the applicable test requirements
AES1	AES using a single channel Satellite Data Unit (SDU) that contains one SBD (96XX) transceiver for Aeronautical Mobile Satellite (Route) Services (AMS(R)S) data-only applications. AES1 is a Short Burst Data (SBD)-only transceiver and cannot support voice calling. A passive Low Gain Antenna (LGA) is required for use with the AES1. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix D, Figure D-13	Appendix D, Section D.2.2, for requirements specifically applicable to AES1 Appendix D, Section D.2.2.1.1 and Section D.2.4 for the applicable test requirements
AES2	AES using a single- or dual-channel SDU that contains one or two LBT (95XX) transceivers for voice and/or data applications. A passive LGA is part of the AES2 system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix D, Figure D-14	Appendix D, Section D.2.2, for requirements specifically applicable to AES2 Appendix D, Section D.2.2.1.2 and Section D.2.4 for the applicable test requirements
AES3	AES using two or more LBT (95XX) and/or SBD (96XX) transceivers for multiple-channel data and/or voice applications. A passive LGA is part of the AES3 system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix D, Figure D-15	Appendix D, Section D.2.2, for requirements specifically applicable to AES3 Appendix D, Section D.2.2.1.3 and Section D.2.4 for the applicable test requirements

Table 1B — Equipment Class Identifiers supporting SATCOM SwiftBroadband (SBB)

Equipment Class Identifier	Description	Requirement
All SATCOM SBB equipment classes	All SATCOM SBB equipment produced under EUROCAE ED-243C / RTCA DO-262F, Appendix E, identified as Equipment Class AES4, AES6 or AES7	Appendix E, Sections E.2.1 and E.2.2, for requirements applicable to all SATCOM SBB equipment classes, and Section E.2.4 for the applicable test requirements
AES4	AES using an enhanced Low Gain Antenna (ELGA). AES4 configured as a complete system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix E, Figure E-8	Appendix E, Section E.2.2, for requirements specifically applicable to AES4, including Section 2.2.1.1.1 and Section E.2.4 for the applicable test requirements

AES6	AES using a High Gain Antenna (HGA) transceiver and Diplexer Low Noise Amplifier (DLNA). AES6 is defined as an entire system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix E, Figure E-9	Appendix E, Section E.2.2, for requirements specifically applicable to AES6, including Section 2.2.1.1.2 and Section E.2.4 for the applicable test requirements
AES7	AES using an Intermediate Gain Antenna (IGA) transceiver and DLNA. AES7 is defined as an entire system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix E, Figure E-10	Appendix E, Section E.2.2, for requirements specifically applicable to AES7, including Section 2.2.1.1.3 and Section E.2.4 for the applicable test requirements

Table 1C – Equipment Class Identifiers Supporting SATCOM Certus Broadband (CBB)

Equipment Class Identifier	Description	Requirement
All SATCOM CBB equipment classes	All SATCOM CBB equipment produced under EUROCAE ED-243C / RTCA DO-262F, Appendix F, identified as Equipment Class AES8, AES9, AES10 or AES11	Appendix F, Sections F.2.1 and F.2.2, for requirements applicable to all SATCOM CBB equipment classes, and Section F.2.4 for the applicable test requirements
AES8	AES using either an omni L-Class (ALGA) or steered M-class antenna (MGA) for one carrier uplink. AES8 is configured as a complete system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix F, Table F-9	Appendix F, Section F.2.2, for requirements specifically applicable to AES8, and Section F.2.4 for the applicable test requirements
AES9	AES using either an omni L-Class (ALGA) or a steered M-Class antenna (MGA) for two sub-carrier uplinks. AES9 is configured as a complete system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix F, Table F-9	Appendix F, Section F.2.2, for requirements specifically applicable to AES9, and Section F.2.4 for the applicable test requirements
AES10	AES using a steered H-Class antenna (HGA) for one carrier uplink. AES10 is configured as a complete system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix F, Table F-9.	Appendix F, Section F.2.2, for requirements specifically applicable to AES10, and Section F.2.4 for the applicable test requirements
AES11	AES using a steered H-Class antenna (HGA) for two sub-carrier uplinks. AES11 is configured as a complete system. Also see EUROCAE ED-243C / RTCA DO-262F, Appendix F, Table F-9	Appendix F, Section F.2.2, for requirements specifically applicable to AES11, and Section F.2.4 for the applicable test requirements

Table 2A — Equipment Subclass Identifiers supporting SATCOM Short Burst Data (SBD)

Subclass Identifier	Description	Requirement

LGA	Passive LGA for use with AES1, AES2 or AES3	Appendix D, Section D.2.1, for requirements that apply to LGAs. Appendix D, Section D.2.2, for requirements applicable to all SATCOM SBD equipment Appendix D, Section D.2.2, for requirements specifically applicable to LGAs, including Section D.2.2.3.1.1

Table 2B — Equipment Subclass Identifiers supporting SATCOM SwiftBroadband (SBB)

Subclass Identifier	Description	Requirement
All SATCOM SBB equipment subclasses	All SATCOM SBB system components produced under EUROCAE ED-243C / RTCA DO-262F, Appendix E, identified as Equipment Subclass HGA, IGA, 6J, 6F, 7J, 7F, 6D, 7D, DJ or DFL.	Appendix E, Section E.2.1, for requirements applicable to equipment subclass Appendix E, Section E.2.2, for requirements applicable to all SATCOM SBB equipment Appendix E, Section E.2.2, for requirements specifically applicable to the equipment subclass, including the sections listed for each subclass in the rows below
HGA	HGA for AES6.	Appendix E, Section E.2.2.3.1.2
IGA	IGA for AES7.	Appendix E, Section E.2.2.3.1.2
6J	Transceiver for AES6, using a DJ (or, in certain conditions, DFL) DLNA and an HGA	Appendix E, Section E.2.2.1.1.4, as modified by RTCA DO-262F Errata 1
6F	Transceiver for AES6, using a DFL DLNA and an HGA	Appendix E, Section E.2.2.1.1.5
7J	Transceiver for AES7, using a DJ (or, in certain conditions, DFL) DLNA and an IGA	Appendix E, Section E.2.2.1.1.6, as modified by RTCA DO-262F Errata 1
7F	Transceiver for AES7, using a DFL DLNA and an IGA	Appendix E, Section E.2.2.1.1.7
6D	Transceiver with integrated DLNA for AES6, using an HGA	Appendix E, Section E.2.2.1.1.8
7D	Transceiver with integrated DLNA for AES7, using an IGA	Appendix E, Section E.2.2.1.1.9
DJ	Type J diplexer (DLNA) as described in ARINC-781. Configures with a 6J transceiver and an HGA for use with AES6, or a 7J transceiver and an IGA for use with AES7	Appendix E, Section E.2.2.1.1.10
DFL	Type F LTE diplexer (DLNA) as described in ARINC-781. Configures with 6F (and, under certain conditions, 6J) transceiver	Appendix E, Section E.2.2.1.1.11

Subclass Identifier	Description	Requirement
	and HGA for use with AES6, or with 7F (and, under certain conditions, 7J) transceiver and IGA for use with AES7	

This ETSO standard applies to equipment intended for long-range communication services, procedural and continental communication services, aeronautical mobile satellite (route) services (AMS(R)S) by means of satellite communications between AES, corresponding satellites, and ground earth stations (GES). The NGSS supports voice and data communications between aircraft users and ground-based users, such as air navigation service providers (ANSPs) and aircraft operators.

The functionality of an NGSS supports four categories of communication service in the aircraft control domain (ACD) and/or aircraft information services domain (AISD). Two are safety of flight communication used for air traffic services (ATS) and aeronautical operational control (AOC) communication. The other two are aeronautical administrative communication (AAC) and special-purpose aeronautical passenger communication (APC) under the physical or virtual access control of the flight crew.

EUROCAE ED-243C / RTCA DO-262F, Normative Appendix E (as modified by Errata 1) and Appendix F (as modified by Changes 1 and 2), also contain provisions for supporting a non-priority and non-safety of flight communications service known as passenger information and entertainment services (PIES). EUROCAE ED-243, Normative Appendix E, states that non-priority services are outside the scope of that Appendix. However, PIES communications, if supported, must be partitioned from communications in the ACD and AISD for security reasons. Therefore, PIES communications are non-ETSO functions, and equipment that supports shared ACD and PIES communications must provide security partitioning of the PIES functionality from priority communications services in the ACD and AISD in accordance with this ETSO.

See paragraphs 3.1.3, 3.1.4, 3.2.1 and 3.2.2 of this ETSO for specific additional data, design/security assurance and verification requirements related to the required security partitioning for equipment intended to support shared ACD/AISD and PIES communications.

NGSS equipment is intended for procedural/continental airspace area operations. The failure conditions specified in paragraph 3.2.1 of this ETSO have been determined based on NGSS equipment that supplements or complements primary HF/VHF voice or data communications in procedural/continental airspace area operations, and on equipment that provides ‘Segregation & arbitration’ as described in EUROCAE ED-243, Appendix E, Section 1.3.4, or the equivalent functionality. Use of NGSS equipment in other operating environments (for example, high-density terminal/en route airspace) may impact equipment performance and safety considerations.

3.2.1 Failure Condition Classification

See CS-ETSO, Subpart A, paragraph 2.4.

A loss or malfunction of the functions defined in paragraph 3.1.1 of this ETSO is a minor failure condition.

A loss or malfunction of the partitioning function required by paragraph 3.2 of this ETSO is a major failure condition.

Note: The use of NGSS equipment as the sole means of routine ATS communication may change the classification of the failure conditions.

3.2.2 Threat Condition Classification

Failure of the AES, described in paragraph 3.2 of this ETSO, that enables unauthorised or inadvertent access to the ACD from outside the ACD partition is a major threat condition.

ETSO applicants can develop a specific security assessment to demonstrate the possibility of reducing the threat condition classification based on the ACD services implemented.

See CS-ETSO, Subpart A, paragraph 2.6.

4 Marking

4.1 General

See CS-ETSO, Subpart A, paragraph 1.2.

4.2 Specific

(1) For an article produced as a complete system according to Table 3 of this ETSO (AES1-1, AES2-3, AES3-5, AES4-101, AES6-106, AES7-111, AES8-1, AES8-2, AES9-3, AES9-4, AES10-5 or AES11-6), additionally mark at least one major component of the system with the applicable valid combination for the system according to Table 3 of this ETSO.

(2) For an article produced as an individual component, additionally mark the article with the applicable Subclass Identifier according to Table 2A or Table 2B of this ETSO; or, for SBD (96XX) or LBT (95XX) transceivers, with ‘SBD’ or ‘LBT’ as applicable.

For valid combinations of system component markings, see Table 3 below.

Table 3 — Valid Combinations of System Components

Valid Combinations		DO-262F Normative Appendix	Transceiver							Transceiver & DLNA		DLNA		Antenna					Complete System
			SBD (96XX)	LBT (95XX)	BCX	6J	6F	7J	7F	6D	7D	DJ	DFL	LGA (passive)	ALGA	MGA (Steered)	HGA (Steered)	IGA	
AES1	1	D																	X
	2	D	X											X					
AES2	3	D																	X
	4	D		X										X					
AES3	5	D																	X
	6	D	X	X										X					
AES4	101	E																	X
AES6	102	E				X						X					X		
	103	E					X						X [1]				X		
	104	E								X							X		
	105	E				X							X [1]				X		
	106	E																	X
AES7	107	E						X				X						X	
	108	E							X				X [1]					X	
	109	E									X							X	
	110	E						X					X [1]					X	
	111	E																	X
AES8	1	F																	X
	2	F																	X
AES9	3	F																	X
	4	F																	X
AES10	5	F																	X
AES11	6	F																	X

([1]) Systems with DLNA-type DFL do not have blocking immunity to interfering signals in the 1 526–1 536 MHz band. These may be used in regions where this blocker is not present due to local spectrum management. See EUROCAE ED-243C / RTCA DO-262F, Appendix E, Section E.2.2.1.1.11, for a description.

Note: Also see EUROCAE ED-243C / RTCA DO-262F, Tables D-6 and E-4, and Errata 1.

5 Availability of Referenced Documents

See CS-ETSO, Subpart A, paragraph 3.

[Amdt ETSO/11]
[Amdt ETSO/13]
[Amdt ETSO/16]
[Amdt ETSO/18]