ETSO-C159b
Date: 5.8.2016

European Aviation Safety Agency

European Technical Standard Order

Subject: 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

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

Standards set forth in the RTCA DO-262B 'Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)', dated June 17, 2014; except that the article is not required to meet any requirement of RTCA DO-326, ' Airworthiness Security Process Specification', in Normative Appendix D or E (as applicable) of RTCA DO-262B where referenced.

***Note**: There are no MPS security requirements for the NGSS equipment. However, a security risk assessment may be required at the time of installation, and if needed, security controls may be implemented in connected aircraft systems or addressed by flight crew procedures.*

3.1.2 — Environmental Standard

See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 — Computer Software

See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 — Electronic Hardware Qualification

See CS-ETSO, Subpart A, paragraph 2.3.

3.2 — Specific

The MPS allows for different equipment classes and subclasses as defined by RTCA DO-262B. There are 6 applicable equipment classes and 13 equipment subclass components identified (see RTCA DO-262B, Appendix D and Appendix E). The manufacturer must declare the equipment class requirements from those identified in the applicable appendix. The equipment configuration shall satisfy the relevant requirements of RTCA DO-262B 'Minimum Operational Performance Standards (MOPS)' as identified in Tables 1 and 2 of Appendix 1 to this ETSO.

This ETSO standard applies to equipment intended for long-range 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 data communications, or data and voice communications, between aircraft users and ground-based users, such as air navigation service providers (ANSP) and aircraft operators. Equipment class AES1 supports data communications only. All other equipment classes support both data and voice communications.

(1) The functionality of NGSS supports four categories of communication service. Two are in the safety of flight category: air traffic services (ATS) and aeronautical operational control (AOC). The other two are in the non-safety of flight category: aeronautical administrative communication (AAC) and aeronautical passenger communication (APC).
(2) NGSS equipment is intended for procedural airspace area operations. The failure conditions specified in paragraph 3.2.1 of this ETSO have been determined based on NGSS equipment operating as an approved Long-Range Communication System (LRCS) in oceanic airspace area environments. 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.

Failure resulting in an erroneous behaviour of the function defined in paragraph 3.1.1 of this ETSO is a minor failure condition. Loss of the function as defined in paragraph 3.1.1 of this ETSO is a minor failure condition.

4 — Marking

4.1 — General

Marking as detailed in CS-ETSO, Subpart A, paragraph 1.2.

4.2 — Specific

The NGSS class and subclass markings should include the complete equipment identifier reference (such as AES1, AES4, or AES7). An example subclass component (such as HGA, Transceiver, or DLNA) marking would display AES6-2/HGA, Type A Transceiver AES7-7/7MA, or Type F Diplexer AES6-3/DF, etc. For valid combinations of system component marking, see Table 3 of Appendix 1 to this ETSO.

5 — Availability of Referenced Document

See CS-ETSO, Subpart A, paragraph 3.

Appendix 1

Tables

Table 1: Equipment Class Identifiers

Equipment Class Identifier	Description	Requirement
AES1	AES using a single channel Satellite Data Unit (SDU) that contains one transceiver for 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.	Appendix D, Section 2.2.1.1
AES2	AES2 is capable of multiple services using a single or dual channel SDU that contains one or two transceivers for data and/or voice applications. A passive LGA is required for use with the AES2.	Appendix D, Section 2.2.1.2
AES3	AES using two or more transceivers for multiple data and/or voice applications. Passive or active (powered) antennas may be configured such as an LGA Omni, Intermediate Gain Antenna (IGA) switched beam or IGA/High Gain Antenna (HGA) phased steering array.	Appendix D, Section 2.2.1.3
AES4	AES using an Enhanced Low Gain Antenna (ELGA). AES4 is configured as a complete system.	Appendix E, Section 2.2.1.1.1
AES6	AES using an HGA, transceiver, and Diplexer Low Noise Amplifier (DLNA).	Appendix E, Section 2.2.1.1.2

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Table 2: Equipment Sub-Class Identifiers

Sub-Class Identifier	Description	Requirement
LGA	Passive LGA for use with AES1, AES2 or AES3.	Appendix D, Section 2.2.3.1.1
IGA	Active IGA for AES3.	Appendix D, Section 2.2.3.1.1
HGA	Active HGA for AES3.	Appendix D, Section 2.2.3.1.1
HGA	HGA for AES6.	Appendix E, Section 2.2.3.1.2
IGA	IGA for AES7.	Appendix E, Section 2.2.3.1.2
6MA	Transceiver, SDU Configuration Module (SCM), SDU, Modified Type A (DMA) DLNA, and HGA for use with AES6.	Appendix E, Section 2.2.1.1.5
7MA	Transceiver, SDU, SCM, DMA DLNA, and IGA for use with AES7.	Appendix E, Section 2.2.1.1.7
6D	Transceiver and DLNA combination includes SDU, High Power Amplifier (HPA), DLNA, SCM, and HGA functions for use with AES6.	Appendix E, Section 2.2.1.1.9
7D	Transceiver and DLNA combination includes SDU, HPA, DLNA, SCM, and IGA functions for use with AES7.	Appendix E, Section 2.2.1.1.10
6F	Transceiver and Type F (DF) DLNA includes SDU, HPA, SCM, and HGA functions for use with AES6.	Appendix E, Section 2.2.1.1.6
7F	Transceiver and DF DLNA includes SDU, HPA, SCM, and IGA functions for use with AES7.	Appendix E, Section 2.2.1.1.8
DMA	DLNA with standard Transmitter (Tx) filter configures with 6MA transceiver and HGA for use with AES6, or 7MA transceiver and IGA for use with AES7.	Appendix E, Section 2.2.1.1.11
DF	DLNA with enhanced Tx filter configures with 6MA or 6F transceiver and HGA for use with AES6, or with 7MA or 7F transceiver and IGA for use with AES7.	Appendix E, Section 2.2.1.1.12

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Table 3: Valid Combinations of System Components

Valid Combi-nations		System	Transceiver						Trans-ceiver & DLNA		DLNA		Antenna					Complete System
			SBD	LBT	6MA	6F	7MA	7F	6D	7D	DMA	DF	LGA (passive)	IGA switched beam	IGA/HGA phased steering array	HGA	IGA	
AES1	1	Appendix D																X
	2	Appendix D	X										X					
AES2	3	Appendix D																X
	4	Appendix D		X									X					
AES3	5	Appendix D																X
	6	Appendix D	X	X									X					
	7	Appendix D	X	X										X				
	8	Appendix D	X	X											X			
AES 4	1	Appendix E																X
AES 6	2	Appendix E			X						X					X		
	3	Appendix E				X						X				X		
	4	Appendix E							X							X		
	5	Appendix E			X							X				X		
	6	Appendix E																X
AES 7	7	Appendix E					X				X						X	
	8	Appendix E						X				X					X	
	9	Appendix E								X							X	
	10	Appendix E					X					X					X	
	11	Appendix E																X