



Comment-Response Document 2012-19

Approval requirements for Air-Ground Data Link and ADS-B in support of Interoperability requirements

CRD TO NPA 2012-19 — RMT.0559 (20.016) — 17/12/2013
Related Decision 2013/030/R and 2013/031/R

EXECUTIVE SUMMARY

This Comment-Response Document (CRD) contains the comments received on NPA 2012-19 (published on 21 November 2012) and the responses, provided thereto by the Agency.

The purpose of the NPA was to introduce Certification Specifications for Airborne Communications Navigation and Surveillance (CS-ACNS) applicable to all aircraft, that initially contains the standards for surveillance systems. This Certification Specification ensure airborne surveillance installations are in compliance with the interoperability requirements of Commission Regulation (EU) No 1207/2011 for aircraft that are subject to that regulation. The Certification Specification will ultimately contain all communication, navigation and surveillance airworthiness requirements.

Following an Agency assessment of the comments received, the only resulting major change to that proposed in the NPA is that AMC 20-24 will continue to be a valid standard.

Based on the comments and responses, ED Decisions 2013/030/R and 2013/031/R were developed and published simultaneously with this CRD, as allowed by the rulemaking procedure adopted by the Agency's Management Board on 13 March 2012.

Applicability		Process map	
Affected regulations and decisions:	CS-ACNS	Concept Paper:	No
		Rulemaking group:	No
		RIA type:	Light
Affected stakeholders:	Manufacturers: TC (and STC) holders	Technical consultation during NPA drafting:	No
		Publication date of the NPA:	16/11/2012
Driver/origin:	Level Playing Field and Safety	Duration of NPA consultation:	2 months
		Review group:	No
Reference:	Commission Regulation (EU) No 1206/2011 and Commission Regulation (EU) No 1207/2011	Focussed consultation:	No
		Publication date of the Opinion:	N/A
		Publication date of the Decision:	In parallel with this CRD

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1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this Comment-Response Document (CRD) in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure².

This rulemaking activity is included in the Agency's Rulemaking Programme for 2013, under RMT.0559 (20.016). The scope and timescale of the task were defined in the related Terms of Reference (see process map on the title page).

The draft Certification Specification has been developed by the Agency. All interested parties were consulted through NPA 2012-19³, which was published on 21 November 2012. 350 comments were received from interested parties, including industry and national aviation authorities.

The text of this CRD has been developed by the Agency.

The process map on the title page contains the major milestones of this rulemaking activity.

1.2. The structure of this CRD and related documents

This CRD provides the full set of individual comments (and responses thereto) received to NPA 2012-19. The resulting text is provided in Annex I to ED Decision 2013/030/R and Annex I to ED Decision 2013/031/R that are published simultaneously with this CRD.

1.3. The next steps in the procedure

The related ED Decisions are published by the Agency together with this CRD.

¹ Regulation (EC) No 216/2008 of the European Parliament and the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1), as last amended by Commission Regulation (EU) No 6/2013 of 8 January 2013 (OJ L 4, 9.1.2013, p. 34).

² The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure), EASA MB Decision No 01-2012 of 13 March 2012.

³ <http://easa.europa.eu/rulemaking/notices-of-proposed-amendment-NPA.php>

2. Summary of comments and responses

The purpose of the NPA 2012-19 was to propose the introduction of a new Certification Specifications containing the standards for surveillance within sections of Subpart D of the proposed Certification Specification (CS-ACNS). Subpart D contains four sections covering the airworthiness requirements for

- i. Mode A/C surveillance,
- ii. Mode S Elementary Surveillance (ELS),
- iii. Mode S Enhanced Surveillance (EHS) and
- iv. ADS-B Out 1090 MHz Extended Squitter (ADS-B Out).

The sections for ELS, EHS and ADS-B out ensure airborne surveillance installations are in compliance with the interoperability Commission Regulation (EU) No 1207/2011⁴ for aircraft that are subject to that regulation.

Commission Regulation (EU) No 1207/2011 mandates for all aircraft flying IFR GAT:

- Mode S Elementary Surveillance capability; and
- for all aeroplanes flying IFR GAT and having a maximum take-off mass exceeding 5 700 kg or having a maximum cruising true airspeed capability greater than 250 knots
 - ADS-B Out 1090 MHz Extended Squitter; and
 - Mode S Enhanced Surveillance capability.

In total, 350 comments were received during the consultation of the NPA. The comments were made by 30 users on 113 segments on this NPA. These 350 comments were responded as follows: 136 - accepted, 85 - partially accepted, 73 - noted, 56 – not accepted.

The distribution of the comments per NPA sectors is the following:

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12	16	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart A - CS ACNS.GEN.1000	6
13	16-17	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart A - CS ACNS.GEN.1010	16

⁴ Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 laying down requirements for the performance and the interoperability of surveillance for the single European sky (OJ L 305, 23.11.2011, p. 35).

14	18	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart A - CS ACNS.GEN.1020	1
15	21	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.2000	4
16	21	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.2010	2
17	21	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.2020	1
18	22	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.2030	6
19	22	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.3000	2
20	22	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.3010	3
21	23	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.1000	2
22	23	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.2000	1
23	23-24	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.2010	2
24	24	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.2018	1
25	24	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.2020	2
26	24	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.2030	6
27	25	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.3000	3
28	25	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.3010	3
29	25	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.4020	2
30	25	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.4030	1
31	26	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.1000	1
32	26	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.2000	1
33	26	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.2010	2
34	26	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.3000	1
35	26	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.3010	3
36	27	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.1000	1
37	27	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2000	2
38	27-28	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2005	12
39	28	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2008	2
40	28	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2010	1
41	28	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2012	2
42	28	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2013	1
43	28-29	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2018	1

44	29	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2020	4
45	29	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2030	1
46	29	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2034	1
47	29-30	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3000	6
48	30	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3010	6
49	30	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3022	1
50	30	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3024	1
51	32	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2	1
52	33	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - (b) Presentation	1
53	34	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart A - AMC1 ACNS.GEN.102	4
54	35	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart B	1
55	37-38	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.AC.2000	5
56	38	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.AC.2020	4
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58	39	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.1000	1
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61	41-42	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.2018	4
62	42	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.2020	4
63	42	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.2030	4
64	42	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.4000	1
65	43	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.4020	2
66	43	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ELS.4030	1
67	44	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.EHS.1000	1
68	44-46	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.EHS.2010	13
69	47	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - GM1 ACNS.ADS.1000	5
70	47	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2000	2
71	47	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2005(a-b)	1
72	47-48	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2008(a)	1
73	48	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2008(c)	2

74	48	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2010	1
75	48	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2012	1
76	49	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2018	3
77	49-51	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2020	7
78	51-52	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2030	2
79	52-53	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2034	1
80	53	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2040(a)	1
81	53	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2040(b)	6
82	53-55	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.3022 and 3024	1
83	62-66	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix C	5
84	67	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix D	3
85	68	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix E	4
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97	89	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 2 - Definition 21	2
98	89	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 2 - Definition 22	1
99	90	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 3	1
100	91	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 4	2
101	92	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5	7
102	92	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.2(a)	3
103	93	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.3	2

104	93	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.2(d)	1
105	94	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.2(e)	4
106	94-95	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.2(f)	3
107	95-96	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2034	1
108	97-102	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 6	8
109	103	B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix I	1
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111	107	B. Draft Decision - II. Draft Decision on AMC-20 - Contents	3
112	108-128	C. Cross reference with interoperability Regulation	3

All comments received were generally supportive of the proposed Certification Specification and either propose improvement to the text or requested clarification.

As proposed in the NPA the requirements associated with the certification standard for ADS-B Out fully address and exceed the standard of AMC 20-24 (Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter) as it to support surveillance operations equivalent to a radar environment. Therefore, the NPA proposed to withdraw AMC 20-24 as a valid standards for new applications. 6 Comments were received requesting the Agency to maintain AMC 20-24 as a valid standard as this AMC 20-24 has become the de-facto global ADS-B-NRA certification standard, applicable to a range of large scale implementations across the world. In particular ICAO's APANPIRG has also adopted AMC20-24 as an accepted compliance method supporting all the countries of Asia Pac region and that withdrawal would hinder the continued expansion in the use of ADS-B Out globally. The Agency notes the importance of AMC 20-24 to the global ADS-B implementation and has accepted the request to maintain AMC 20-24 as a valid standard.

Following publication of the NPA, the Agency has amended the format of the reference numbers to be used in new Certification Specifications. Thus for CS-ACNS the reference numbers are as follows.

CS ACNS.X.YY.NNN

Where

X= Subpart

YY = Section

NNN = reference number.

The following table provides a cross reference between the NPA reference and is published in ED Decision 2013/031/R.

NPA Reference	Decision Reference	Subject
Subpart A – General		
CS ACNS.GEN.1000	CS ACNS.A.GEN.001	Applicability
CS ACNS.GEN.1010	CS ACNS.A.GEN.005	Definitions
CS ACNS.GEN.1020	CS ACNS.A.GEN.010	Instructions for continued airworthiness
Subpart D Surveillance (SUR)		
Section 1 – Mode A/C only surveillance		
CS ACNS.AC.1000	CS ACNS.D.AC.001	Applicability
CS ACNS.AC.2000	CS ACNS.D.AC.010	Transponder characteristics
CS ACNS.AC.2010	CS ACNS.D.AC.015	Data transmission
CS ACNS.AC.2020	CS ACNS.D.AC.020	Altitude source
CS ACNS.AC.2030	CS ACNS.D.AC.025	Flight deck interface
CS ACNS.AC.3000	CS ACNS.D.AC.030	Integrity
CS ACNS.AC.3010	CS ACNS.D.AC.035	Continuity
CS ACNS.AC.4000	CS ACNS.D.AC.040	Dual/multiple transponder installation
CS ACNS.AC.4020	CS ACNS.D.AC.045	Antenna installation
Section 2 – Mode S elementary surveillance		
CS ACNS.ELS.1000	CS ACNS.D.ELS.001	Applicability
CS ACNS.ELS.2000	CS ACNS.D.ELS.010	Transponder characteristics
CS ACNS.ELS.2010	CS ACNS.D.ELS.015	Data transmission
CS ACNS.ELS.2018	CS ACNS.D.ELS.020	On-the-ground status determination
CS ACNS.ELS.2020	CS ACNS.D.ELS.025	Altitude source
CS ACNS.ELS.2030	CS ACNS.D.ELS.030	Flight deck interface
CS ACNS.ELS.3000	CS ACNS.D.ELS.040	Integrity
CS ACNS.ELS.3010	CS ACNS.D.ELS.045	Continuity
CS ACNS.ELS.4000	CS ACNS.D.ELS.050	Dual/multiple transponder installation
CS ACNS.ELS.4010	CS ACNS.D.ELS.055	ICAO 24-bit Aircraft address
CS ACNS.ELS.4020	CS ACNS.D.ELS.060	Antenna installation
CS ACNS.ELS.4030	CS ACNS.D.ELS.065	Antenna diversity
Section 3 – Mode S Enhanced Surveillance		
CS ACNS.EHS.1000	CS ACNS.D.EHS.001	Applicability
CS ACNS.EHS.2000	CS ACNS.D.EHS.010	Transponder characteristics
CS ACNS.EHS.2010	CS ACNS.D.EHS.015	Data transmission
CS ACNS.EHS.3000	CS ACNS.D.EHS.020	Integrity
CS ACNS.EHS.3010	CS ACNS.D.EHS.025	Continuity
Section 4 – 1090 MHz Extended Squitter ADS-B		

NPA Reference	Decision Reference	Subject
CS ACNS.ADS.1000	CS ACNS.D.ADSB.001	Applicability
CS ACNS.ADS.2000	CS ACNS.D.ADSB.010	ADS-B Out system approval
CS ACNS.ADS.2005	CS ACNS.D.ADSB.020	ADS-B Out Data Parameters
CS ACNS.ADS.2008	CS ACNS.D.ADSB.025	Provision of Data
CS ACNS.ADS.2010	CS ACNS.D.ADSB.030	ADS-B Transmit Unit Approval
CS ACNS.ADS.2011	CS ACNS.D.ADSB.035	ICAO 24-bit Aircraft address
CS ACNS.ADS.2012	CS ACNS.D.ADSB.040	Antenna diversity
CS ACNS.ADS.2013	CS ACNS.D.ADSB.045	Antenna installation
CS ACNS.ADS.2014	CS ACNS.D.ADSB.050	Transmit power
CS ACNS.ADS.2016	CS ACNS.D.ADSB.055	Simultaneous operation of ADS-B transmit units
CS ACNS.ADS.2018	CS ACNS.D.ADSB.060	On-the-ground status determination
CS ACNS.ADS.2020	CS ACNS.D.ADSB.070	Horizontal Position and Velocity Data Sources
CS ACNS.ADS.2030	CS ACNS.D.ADSB.080	Data Sources as defined by Mode S Elementary and Enhanced Surveillance
CS ACNS.ADS.2034	CS ACNS.D.ADSB.085	Geometric Altitude
CS ACNS.ADS.2040	CS ACNS.D.ADSB.090	Flight deck interface
CS ACNS.ADS.3000	CS ACNS.D.ADSB.100	Integrity
CS ACNS.ADS.3010	CS ACNS.D.ADSB.105	Continuity
CS ACNS.ADS.3020	CS ACNS.D.ADSB.110	Horizontal Position and Velocity Data Refresh Rate
CS ACNS.ADS.3022	CS ACNS.D.ADSB.115	Horizontal Position and Velocity Total Latency
CS ACNS.ADS.3024	CS ACNS.D.ADSB.120	Horizontal Position Uncompensated Latency

3. Individual comments (and responses)

In responding to comments, a standard terminology has been applied to attest the Agency's position. This terminology is as follows:

- (a) **Accepted** — The Agency agrees with the comment and any proposed amendment is wholly transferred to the revised text.
- (b) **Partially accepted** — The Agency either agrees partially with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.
- (c) **Noted** — The Agency acknowledges the comment but no change to the existing text is considered necessary.
- (d) **Not accepted** — The comment or proposed amendment is not shared by the Agency.

(General comments)	-
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comment	<div style="display: flex; justify-content: space-between;"> 3 comment by: <i>Cessna Aircraft Company</i> </div> <p>Attachment #1</p> <p>Please see attached file for Cessna Aircraft comments on this issue.</p>
response	<p>Partially Accepted</p> <p>Comment 1: accepted, The reference will be made to FAA AC 20-165A.</p> <p>Comment 2: noted. Cessna aircraft are correct with the assumption that ADS-B is not considered novel or unique thus specific recording is not required. However, as stated in ED-112, Table IV-B.1: CNS/ATM Recording requirements ADS-B surveillance data should be recorded where practicable within the system architecture and that where parametric data is reported within the message it should be recorded unless data from the same source is recorded on the FDR.</p> <p>Comment 3: noted, CS ACNS does not explicitly require flight test as a means of demonstrating compliance, it is the applicant responsibility to ensure that the appropriate flight tests are accomplished as required. Furthermore there is no requirement to perform such flight test in any specific region.</p> <p>Comment 4: noted, The content of Book 2 Subpart D Appendix H Part 5 of CS ACNS provides these guidelines and has been harmonised with the content of AC 20-138C Appendix 4 (and FAA AC 20-165A, respectively).</p> <p>Comment 5: Noted, There is no requirement for UAT airborne equipage in Commission Regulation (EU) No 1207/2011 therefore UAT is outside the scope of this NPA</p>
comment	<div style="display: flex; justify-content: space-between;"> 60 comment by: <i>IATA</i> </div> <p>Attachment #2</p> <p>IATA/AEA strongly advocate synchronized implementation dates of regulatory requirements for ADS-B out (DO 260B) in the USA and Europe, especially for</p>

	<p>aircraft retrofit. The actual situation for Europe SPI IR is by Dec 2017 and for the USA 2020</p> <p>For various reasons, i.e. 1. industry (OEM) readiness for DO260B compliance and 2. alignment of the Surveillance Performance and Interoperability Implementing Rule (SPI IR) with the upcoming PBN Implementing rule in Europe (envisaged for 2020) etc., the preference is to shift the 2017 date closer towards the 2020 date. Alignment of implementation timescales across regions and different EC mandates is deemed essential in order to enable airlines to minimize equipage costs.</p> <p>There should be clearer indication of ADS-B IN products proposed to support use of the new standard where clear and convincing cost benefit analyses have been undertaken to support such products.</p>
response	<p>Noted</p> <p>As recognised in the comment, the applicability dates for the carriage of ADS-B out are as specified in Commission Regulation (EU) No 1207/2011. These have been agreed in full consultation initially via the Eurocontrol ENPRM process and subsequently via commission comitology process. The Intent of this NPA is to propose CS-ACNS as a means of compliance to the regulation. Proposing amendment to the applicability dates for the carriage is outside the scope this rulemaking task..</p> <p>As indicated above this task is to provide a means of compliance to Commission Regulation (EU) 1207/2011 which is only requiring with respect to ADS-B and ADS_B out equipage. The requirements and standards for ADS-B IN will be subject to further rulemaking task (see also response to comment 7).</p>
comment	<p>69</p> <p>comment by: <i>Boeing</i></p> <p>GENERAL COMMENT:</p> <p>The development, certification, production, and installation of modifications ensuring compliance with EU Regulation 1207/2011 will impact not only the ATC transponder and its installation, but also other systems such as, but not limited to, FMS, GNSS sensor, and flight crew alerting/indicating systems. These activities have to be performed for all aircraft types and models, and often with several avionics suppliers. The lead time will be <u>at least 24 months</u>, possibly more for some complex and highly integrated installations, starting from the date on which the certification criteria are known and frozen.</p> <p><u>REQUESTED CHANGE:</u></p> <p>Provide in the EASA ACNS (Book 1 – CS, or Book 2 AMC) an in-production cut-in date that is at least <u>24 months</u> after the official publication of the CS ACNS. The retrofit date should also be published in the ACNS and should be on the order of <u>60 months</u> after the CS ACNS publication date.</p> <p><u>JUSTIFICATION:</u></p> <p>In order to meet the requirements in the NPA, at least 24 months between publication of final certification criteria and the date for mandatory installation of Elementary and Enhanced Surveillance capability, and ADS-B for newly produced aircraft and a commensurate change in the date for mandatory installation in in-service aircraft, and practical exemption provisions.</p> <p>The dates MUST be identified in the CS-ACNS (similar to how compliance dates are provided in FAA Part 121 Federal Aviation Regulations (14 CFR part 21) so that airframe manufacturers and operators are aware of the compliance dates.</p>
response	<p>Noted</p> <p>As recognised in the comment, the applicability dates for the carriage of ADS-B</p>

out are as specified in Commission Regulation (EU) No 1207/2011. These have been agreed in full consultation initially via the Eurocontrol ENPRM process and subsequently via commission comitology process. The Intent of this NPA is to propose CS ACNS as a means of compliance to the regulation. Proposing amendment to the applicability dates for the carriage is outside the scope this rulemaking task. It should also be recognised that the means of notifying manufactures and operators of mandatory equipage requirements within the European regulatory system is different to that used by the FAA.

The Agency also recognises the late availability of the CS-ACNS as a means of compliance and will endeavour to support early applications

comment 70

comment by: Boeing

GENERAL COMMENT:

There are models of airplanes (i.e., MD-80, MD-90, and Classic 747) that were not able to comply with the initial Enhanced Surveillance requirements (AMC 20-13). Operators were required to file for an exemption with EUROCONTROL. These same airplanes will not be able to comply with the new proposed requirements. NPA 2012-19 does not provide any guidelines/rules for exemption of airplanes that will not be capable of meeting the requirements stated in the NPA.

REQUESTED CHANGE:

Provide guidelines/rules for exemption for operators that plan to use these models of airplanes after the mandate date.

JUSTIFICATION:

Operators will need to know how to proceed if they plan to operate these airplanes after the mandate date.

response Noted

The exemption conditions are specified in Commission Regulation (EU) No Regulation No 1207/2011 Article 14. Aircraft Operators who have concerns that their aircraft may not be able to fully comply with the requirements and the aircraft fulfil the criteria of article 14 of regulation (EU) No 1207/2011 should initially contact their NAA

comment 119

comment by: Swiss International Airlines / Bruno Pfister

SWISS Intl Air Lines supports the joint AEA/IATA comments by JURG dated 08JAN13 and submitted to EASA on the subject of
"EASA NPA 2012-19 CS, AMC, GM ON AIRBORNE COM NAV AND SUR FOR MODE A/C, MODE S ELS, EHS AND ADS-B OUT 1090 MHZ EXTENDED SQUITTER"

response Noted

see responses comments 60, 61, 62, 63, 64 and 65.

comment 120

comment by: SVFB/SAMA

ECOGAS

European Council for Business and General Aviation

2012-19

CS for Mode A/C Mode S & S enhanced ADS-B out extended squitter

130121-2146

General remark

As a principal remark, our constituency is frustrated that erasing differences to come to **one** comprehensive regulation between the main regulatory bodies FAA EASA and other major Authorities is long overdue. Such streamlining, synchronising and making **enduserfriendly** regulation is of course depending of the willingness of the participants to give up some of their "own" beloved long standing well-proven rules which one body considers as not complex and not safe enough and vv. The final comprehensive rule must become better, more user friendly and make (GA and Business) Aviation more competitive and more economical: it must have less volume. It should also be perfectly adapted to size, risk, complexity and public interest **of the ruled operation/aircraft/MRO&SME.**

For cost reduction, EASA should implement without change the FAA System of the "AML" approved Model List, AC23-22,
[http://rgl.faa.gov/Regulatory and Guidance Library/rgAdvisoryCircular.nsf/list/AC23-22/\\$FILE/AC23-22.pdf](http://rgl.faa.gov/Regulatory%20and%20Guidance%20Library/rgAdvisoryCircular.nsf/list/AC23-22/$FILE/AC23-22.pdf) .

An example what this means in relation to investment is (approximately) shown below for the GARMIN G600 PFD

http://www.seabee.info/pdf/STC_SA02153LA_AML.pdf

whereby a STC is approved for one specific aircraft type and then all aircraft on the AML List are eligible for the installation of this STC without further certification cost according to the process in AC23-22.

Why: The equipment to change as an example a Cessna single engine aircraft with a glass cockpit costs around

Hardware 17'000 \$, the

installation 15'000 \$

sum **32'000 \$**

Most owners will accept such costs, as apart from a safety benefit which we as MRO's and they as operators support, it's a major step in flying comfort. Oversight of navigation, position, other traffic is much easier. However, the cost to STC paperwork alone of this installation may be another **25'000 \$** for the EASA STC plus time plus stress plus...plus.. ground time plus....

This is a barrier which suppresses technical support and kills jobs. Owners will change from flying to yachting, or another less regulated activity or mode of transportation, which does require far less ongoing investments.

It goes even further than that: MRO's and aircraft owner have seen in parallel with EASA rulemaking, an explosion on the cost of replacement parts and components or repair of those, where the repair of an (avionics or other component, like e.g. an engine cowling for a Cessna 172 aircraft) is very close to the price of the new equipment. We assume that the costs have been rising in parallel to the volume and complexity of regulations, and manufacturers are confirming this.

response

Noted

Thank you for your comment pertaining to the costs associated with modifying aircraft to comply with the standards proposed by this NPA. It should be noted that compliance with the CS is not a mandatory for all aircraft and is dependent upon the operations of the aircraft. The standard proposed in this NPA has been developed as a means of compliance to Commission Regulation (EU) No 107/2011. In determining the scope of the regulation and in particular the affected aircraft due consideration of the modification costs was addressed assessing the associated benefits. This was accomplished as part of the Eurocontrol consultation process.

With respect to the Approved Model List STC please see FAQ at the following link <http://easa.europa.eu/certification/faq/general-aviation-FAQ.php#6>

This says:

How does EASA deal with Applicable Model Lists?

In general, an STC can apply to only one Type Certificate. Certain exceptions can be made where the installation of a piece of simple equipment is clearly identical from one aircraft type to another, but EASA procedures state that an STC should apply to one TC only. Each new TC should be the subject of a new application. This principle also applies to the validation of FAA STCs.

We are constrained by the fees and charges regulation, hence the limited scope of AML STCs that we can do. However, in spite of this we can still do quite a lot, e.g. STC 10037574 validates the FAA STC for single and dual Garmin GTN 6XX/7XX installations, in this case there is an installation checklist and a minor mod has to be completed for each installation and the completed checklist forms part of the records for the minor mod. We are currently considering an application to extend the approval to high performance/commuter aircraft and to include new features e.g. text messaging and iridium weather.

In some cases we also allow extended model lists for minor modifications, see <http://easa.europa.eu/certification/faq/general-aviation-FAQ.php#15>.

comment 122

comment by: ERA

The European Regions Airline Association [ERA] represents some 60 intra-European airlines which annually carry 70.6m passengers on 1.6m flights to 426 destinations in 61 European countries. ERA members currently operate nearly 60 variants of around 16 aircraft types. ERA supports in general the comments made by IATA and AEA. ERA would add that the unique operational characteristics of ERA members [small fleets, multiple unique aircraft types, etc.] means that allowance needs to be made in the regulatory requirements for the lack of compatible equipment in the limited space available, the resultant high initial costs and the extended cost recovery due to lower volume of seats and shorter sector times.

response Noted

see responses comments 60, 61, 62, 63, 64 and 65.
Concerning additional specific comment, exemption conditions are defined in Commission Regulation (EU) No 1207/2011 Article 14. Aircraft Operators who have concerns that their aircraft may not be able to fully comply with the requirements and the aircraft fulfil the criteria of article 14 of regulation (EU) No 1207/2011 should initially contact their NAA

comment 141

comment by: Bombardier Aerospace

From the perspective of an aircraft systems integrator, Bombardier agrees that the differences between the proposed standards and FAA ACs 20-165 and 20-165A are not extensive and should allow for the implementation of ADS-B Out systems that are simultaneously compliant with FAA and EASA requirements. However, the development of this standard is too late relative to the January 2015 implementation date of (EU)1207/2011. Two years should be used as the minimum interval between a mandate's implementation date and the

	<p>development of all required standards and guidance, particularly for equipment that is mandated for ATN performance reasons, and not to address any safety concerns. Without the timely development of clearly defined certification standards, we cannot make arrangements with suppliers to develop equipment without assuming a significant risk of costly equipment redesign when those standards are eventually finalized by the airworthiness authority. Delays in standards lead to delays in product development which ultimately put operators at risk of not being compliant before the implementation date and being prevented from operating their aircraft.</p> <p>This is not the first occurrence of this problem, as the implementation of data link communication (Link2000+) under (EC)29/2009 has suffered from the same issue of late development of certification standards by EASA following the publication of a regulation by the European Commission. In this particular case, the development of the FAA regulation for ADS-B Out has allowed considerable development to take place even in the absence of EASA standards, given informal assurances from regulatory authorities that European requirements would be no more stringent than those of the FAA. While this appears to be confirmed by the requirements proposed in this NPA and will likely avoid many of the certification issues that were encountered with Link2000+, we cannot continue to develop avionics without the related certification standards being formally defined and harmonized well in advance of any regulatory mandate.</p> <p>Clearly there needs to be improved communication and collaboration between EASA and the European Commission on these matters, and we hope that measures have already been taken in response to the problems encountered with the implementation of both regulation (EU)1207/2011 and (EC)29/2009.</p>
response	<p>Noted</p> <p>As recognised in the comment, the applicability dates for the carriage of ADS-B out are as specified in Commission Regulation (EU) No 1207/2011. These have been agreed in full consultation initially via the Eurocontrol ENPRM process and subsequently via commission comitology process. The Intent of this NPA is to propose CS-ACNS as a means of compliance to the regulation. Proposing amendment to the applicability dates for the carriage is outside the scope this rulemaking task.</p> <p>The Agency recognises the late availability of the CS-ACNS and potential issues that could possible raise. However as mentioned above the CS is a means of compliance regulation and other means are possible. Furthermore, EASA will endeavour to support early applications.</p> <p>The need to improve communication and collaboration between EASA and the European Commission has been fully recognised and EASA is working with the commission to ensure the availability of suitable means of compliance for the future.</p>
comment	<p>190 comment by: Eurocopter</p> <p>CS ACNS is intended to replace JAA TGL 13, AMC 20-13, and AMC 20-24. However, operational and maintenance considerations contained in those existing documents does not appear in this new CS, and there is no information about whether and where such information will be transferred.</p>
response	<p>Noted</p> <p>Maintenance considerations are located under CS-ACNS. A.GEN.010 (formally CS ACNS.GEN.1020) Instructions for continued airworthiness and its associated</p>

AMC. When Operational considerations are deemed necessary they will be located in the appropriate section of the rule applicable to air operators (i.e. Commission Regulation (EU) No 965/2012) and the AMC thereof.

comment 191

comment by: Eurocopter

General comments about safety performance requirements (subsections "SYSTEM PERFORMANCE REQUIREMENTS" of each relevant subpart or section):

- It seems (although not always explicit) that "Design assurance" applies to the anomalous behaviour of the function, and "Continuity" applies to the loss of the function; however, this wording is not appropriate; especially, design assurance, although the main source to ensure a proper function, may be not the only one: a more appropriate (safety related) wording should be used.
- Unexpected events should be clearly specified (e.g. undetected erroneous data transmission, loss of function, ...),
- Only the severity of the events (Minor, Major ...) should be indicated; neither quantitative probabilities (like 2×10^{-4}) nor qualitative probabilities (like "probable"), should be given, as this is dependent on the type of aircraft and associated certification specification (CS-23, CS-25, CS-27, CS-29 ...); the same comment applies for references to aircraft type specific regulation (like AMC 25.1309); it is up to the aircraft manufacturer to ensure that appropriate precautions are taken to cope with the severity of the undesired events, according to applicable safety rules,
- In addition, the unexpected events and associated severities should be considered at function level, not at equipment level and this should be explicitly stated in the text.

NOTE: These general comments are applicable for paragraphs CS ACNS.AC.3000, CS ACNS.AC.3010, CS ACNS.ELS.300 (probably meant CS ACNS.ELS.3000), CS ACNS.ELS.3010, CS ACNS.EHS.3000, CS ACNS.EHS.3010, CS ACNS.ADS.3000 and CS ACNS.ADS.3010. No complementary comment is provided for those paragraphs, unless specific issues are found.

response Partially Accepted

The requirements that were numbered 3000 are renamed Integrity (instead of Design Assurance) and are expressed for the system and per data items (when applicable) in terms of 'major/minor' failure condition, Reference to AMC 25.1309 section 7 has been deleted as the classification should be consistent with the aircraft type.

The requirements that were numbered 3010 are expressed for the system in terms of qualitative probability.

comment 192

comment by: Eurocopter

As a matter of fact, CS ACNS does not provide the applicability criteria:

- CS ACNS.GEN.1000 (Applicability) refers to Commission Regulation (EU) No 1207/2011, but does not remind the applicability criteria defined in that regulation,
- Subsequent paragraphs named "Applicability" (CS ACNS.AC.1000, CS-ACNS.ELS.1000, CS ACNS.EHS.1000 and CS ACNS.ADS.1000) do not provide any information about the applicability conditions (airspace and aircraft characteristics) of the concerned function.

Adversely, paragraph CS ACNS.ELS.4030 Antenna diversity gives the applicability

response	<p>conditions based on aircraft characteristics (MTOM and maximum TAS). This is a heterogeneous approach.</p> <p>Partially Accepted</p> <p>It is not normal practice to repeat or reiterate the requirement of a rule in the supporting means of compliance, however, to aid understanding the applicability criteria stemming from Commission Regulation (EU) No 1207/2011 will be repeated as a note in the applicability AMC sections (i.e. AMC1 ACNS.ELS.1000, AMC1 ACNS.EHS.1000 and AMC1 ACNS.ADS.1000) for completeness and readability.</p> <p>Note for AMC1 ACNS.ELS.1000: In accordance with Commission Regulation (EU) No 1207/2011, aircraft operating flights as general air traffic in accordance with instrument flight rules in the airspace within the ICAO EUR and AFI regions where EU Member States are responsible for the provision of air traffic services are to be compliant with CS ACNS Book 1 Subpart D section 2.</p> <p>Note for AMC1 ACNS.EHS.1000: In accordance with Commission Regulation (EU) No 1207/2011, fixed wing aircraft having a maximum take off mass greater than 5 700 kg or a maximum cruising true airspeed greater than 250 knots and operating flights as general air traffic in accordance with instrument flight rules in the airspace within the ICAO EUR and AFI regions where EU Member States are responsible for the provision of air traffic services are to be compliant with CS ACNS Book 1 Subpart D section 3.</p> <p>Note for AMC1 ACNS.ADS.1000: In accordance with Commission Regulation (EU) No 1207/2011, aircraft having a maximum take off mass greater than 5 700 kg or a maximum cruising true airspeed greater than 250 knots and operating flights as general air traffic in accordance with instrument flight rules in the airspace within the ICAO EUR and AFI regions where EU Member States are responsible for the provision of air traffic services are to be compliant with CS ACNS Book 1 Subpart D section 4.</p>
comment	<p>193 comment by: Eurocopter</p> <p>Book 2 subpart D includes:</p> <ul style="list-style-type: none"> • An appendix D, giving a summary of differences between CS ACNS.ELS and TGL-13 rev 1, • An appendix E, giving a summary of differences between CS ACNS.EHS and AMC 20-13. <p>In the summary, item 26 on page 7 states "<i>The requirements of CS-ACNS.ADS fully cover (and exceed) the standards of AMC 20-24</i>", which indicates that there is not equivalence.</p> <p>Consequently, a similar appendix should be added to highlight differences between CS ACNS.ADS and AMC 20-24, and especially to highlight where CS ACNS.ADS is more constraining.</p>
response	<p>Not Accepted</p> <p>The differences between CS-ACNS.ELS and TGL-13 or between CS-ACNS.EHS and AMC 20-13 are rather limited and well contained. In contrast, the differences between CS ACNS.ADS and AMC 20-24 are more numerous, also with respect to detailed aspects spanning across the whole of the CS ACNS.ADS provisions. For that reason, a similar approach as for Mode S ELS/EHS is not appropriate.</p>
comment	<p>263 comment by: Eurocopter</p>

response	<p>Several ETSO are referenced and, depending on the section, either compliance of equipment or ETSO authorisation is required.</p> <p>This heterogeneous approach should be clarified. Especially, it should be clearly specified whether ETSO authorisation is required or if compliance is sufficient.</p> <p>Also, if authorisation is considered required, it would be useful to state whether FAA TSO authorisation is acceptable, provided there is technical equivalence between the TSO and ETSO, knowing that it is always a constraint to validate a TSO authorisation into an ETSO authorisation.</p> <p>Partially Accepted</p> <p>Wording will be harmonised to have an homogeneous approach: '... should hold an EASA equipment authorisation in accordance with ETSO XYZ, or an equivalent standard that is consistent with applicable ICAO SARPS, and which is acceptable to EASA.'</p> <p>The ETSO is the applicable European equipment standard, if is the equipment holds an FAA TSO or other authorisation it will need be demonstrated by the applicant to be equivalent to the ETSO.</p>
comment	<p>267 comment by: IAOPA Europe</p> <p>IAOPA Europe welcomes that with this NPA EASA will finally give the needed clarity to the Aviation Industry which Standards have to be expected for Surveillance Equipage.</p> <p>Unfortunately an important opportunity has been missed with this NPA to find a solution tailored to the specific needs of General Aviation. "Affordability of SESAR equipage requirements" has been identified as one of the "Specific issues to address, subject to revision after Member States and stakeholders have presented their priority lists as requested under actions 1, 5 and 6 of the General Aviation Safety Strategy", but the solutions discussed in this NPA are either no real safety improvements for GA (Mode A/C, Mode S Elementary do not allow aircraft to see each other) or too expensive (Mode S Enhanced Surveillance and ADS-B Out 1090 MHz Extended Squitter) for installation in the typical light GA aircraft.</p> <p>For a number of years the need to develop a low cost, low power ADS-B -In and -Out system for General Aviation has been discussed. Low-cost and effective ADS-B solutions are available on the market, but they are not certified to aviation standards and banned to frequencies outside of the aviation band. Consequently the signals from these devices can't be received from Air Traffic Control on the ground and TCAS systems in the air, which clearly limits the benefit of these systems. Various studies have been conducted on the issue in Europe and the USA.</p> <p>We ask EASA to include the development of low-cost surveillance and collision avoidance systems in the context of the new General Aviation Safety Strategy as soon as possible.</p>
response	<p>Noted</p> <p>The standard proposed in this NPA in accordance with the scope of the rulemaking task has been develop as a means of compliance to Commission Regulation (EU) No 1207/2011.</p> <p>EASA fully recognise the benefits to safety that could be achieved through the application of ADS-B IN and are cognisant of work being undertaking EUROCAE and RTCA to develop appropriate standards for such applications. Furthermore, the rulemaking task - Standards and implementation of collision warning systems in the field of general aviation due to increasing number of near misses and mid-</p>

air collisions - is envisaged to commence when suitable standards are available.

TITLE PAGE

p. 1

comment	<p>35</p> <p>comment by: <i>NATS National Air Traffic Services Limited</i></p> <p>General comment</p> <p>No reference or mention has been made regarding Lightweight or Ultra Lightweight Transponders or ADS-B only Transmitters and how this certification specification might apply outside of controlled airspace to General Aviation operating under VFR. For example, ADS-B emissions could be used for conspicuity by General Aviation. This seems to be an opportunity missed and may hinder making GA aircraft more visible to surveillance systems.</p> <p>Suggest the inclusion of guidance on how this certification specification should be applied to General Aviation operating under VFR outside of controlled airspace. Additionally, include text to define the limitations of applicability of this NPA, for example:</p> <ul style="list-style-type: none"> · a maximum take-off mass of more than 5700kg or · a cruising true airspeed capability of more than 250kt and operating inside Class A-C airspace, above FL 100 or inside of Transponder Mandatory Zones.
response	<p>Partially Accepted</p> <p>The standard proposed in this NPA in accordance with the scope of the rulemaking task has been primarily developed as a means of compliance to Commission Regulation (EU) No 1207/2011. Although there is no EU mandated airborne surveillance equipage requirements for aircraft operating as VFR in uncontrolled airspace, it does not prevent these aircraft from equipping voluntarily, which should be encouraged. For those aircraft that wish to voluntarily equip with airborne transponders the installations should be compliant with the appropriate section of subpart D</p>

EXECUTIVE SUMMARY

p. 2

comment	<p>131</p> <p>comment by: <i>René Meier, Europe Air Sports</i></p> <p>Europe Air Sports thanks the Agency for the preparation of NPA 2012-19. "Electronic visibility" was a key term when our organisations co-operated with SESAR JU some month ago. During these meetings we became fully aware of the importance of appropriate surveillance and communication in densely used airspaces at all levels. We assisted the preparation of the "Concept of Operations" texts within the "General Aviation and Rotorcraft" Review Group.</p> <p>Within the Board of Europe Air Sports, the Board of the European Powered Flight Union (EPFU), and the expert group "International Affairs" of the Aero-Club of Switzerland (AeCS) NPA 2012-19 was discussed.</p> <p>We actually have no comments to submit to this very technical document. However, as devices as FLARM, PowerFLARM are widely used, and as the advantages of ADS-B are evident, we shall carefully follow the the CRD to NPA 2012-19: When we correctly interpret Table "Emitter Category Encoding", "ADS-B Emitter Category Set "A", and "ADS-B Emitter Category Set "B" on page 83/128 we believe to have found out that somewhere in the future nearly all of the activities of our members might be subject to regulations asking for high</p>
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	<p>degree in electronic visibility on the one hand, asking for improved communications on the other.</p> <p>For the time being Europe Air Sports, EPFU and EcS conclude that "electronic visibility" for VFR operation ins VMC will not be required in all airspace classes for all aircraft, especially not in uncontrolled airspace.</p> <p>We kindly offer our assistance to the Agency as regards the vital elements of the future regulation from the sports and recreational aviation point of view, covering hanggliding, para-gliding (both listed in "Set B" mentioned above, today, however, not falling under EU/EASA provisions), sailplanes ops, ballooning, powered flight ect if review groups would be formed or external experts knowledge could be helpful</p>
response	<p>Noted</p> <p>The Agency thanks you for your support for this NPA and looks forward to working with you in the future.</p>

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comment	<p>72</p> <p>comment by: <i>Boeing</i></p> <p>Page: 3 Paragraph: <i>Table of Contents</i> <u>EDITORIAL COMMENT ONLY</u> <u>REQUESTED CHANGE:</u> Draft Decision on Certification Specification Acceptable Means of Compliance and Guidance material for Communication Navigation and Surveillance — CS ACNS Book 1 and Book 2 Also, it should be clear in the Table of Contents where Book 1 and Book 2 begin and end, so that the user can navigate to the required section. <u>JUSTIFICATION:</u> Change is needed for clarification and ease of navigation of the document.</p>
response	<p>Accepted</p> <p>The table of contents will be adjusted accordingly</p>

A. Explanatory Note - I. General

p. 4

comment	<p>4</p> <p>comment by: <i>NetJets Europe</i></p> <p>Comment: Although the reason for this CS is to propose airworthiness and interoperability standards. Interoperability with FAA AC 20-165 was not considered. This would double the compliance cost for ADS systems because each OEM must deliver two different solutions: FAA AC 20-165 and EASA CS ACNS.ADS Justification: Typically all Business aviation solutions are developed by FAA standards and later they are converted to EASA (if necessary), by not unifying the requirements, this puts a burden on NON-US operators (e.g. European Operators) to perform additional investment to comply with EASA CS ACNS.ADS, therefore placing European Operators at a disadvantage with US operators.</p>
response	<p>Noted</p>

The respective requirements in CS-ACNS and AC 20-165A have been harmonised to a large degree of commonality between Europe and the USA throughout the last decennium, including the definition of common application (SPR) and system (MOPS) requirements. The few differences that do exist are documented in Appendix J. These differences are largely due to the different scopes of the Commission Regulation (EU) No 1207/2011 and (14 CFR) 91.227 requirements.

comment 34 comment by: *IACA International Air Carrier Association*

IACA supports the IATA/AEA JURG comments summarised as follows:

1. Synchronise ADS-B OUT implementation in Europe (December 2017) with US (2020)
2. Harmonise and standardise regulatory requirements across regions
3. Align CNS requirements globally (EASA, FAA...)
4. Provide credit to equipment previously certified per AMC 20-24
5. Develop (in cooperation with industry) mitigating measures for equipment currently certified per AMC 20-24 before cancelling/removing AMC 20-24
6. Align system requirement NPA (MTBF 1.10-7) with Regulation 1207/2011 (MTBF of 2.10-4)
7. Provide alternate solution to change Flight ID during flight
8. Consider future ADS-B IN when proposing new standards

response Noted

1. see response to comment 60
2. see response to comment 61
3. see response to comment 61
4. see response to comment 63
5. see response to comment 62
6. see response to comment 64
7. see response to comment 65
8. see response to comment 60.

comment 124 comment by: *General Aviation Manufacturers Association / Hennig*
Attachment [#3](#)

The General Aviation Manufacturers Association (GAMA) would like to draw the agency's attention to the included letter sent jointly by GAMA and AeroSpace and Defense Industries Association of Europe (ASD) and the Aerospace Industries Associations for the United States (AIA), Canada (AIAC), and Brazil (AIAB). The letter lays out broad concerns with the availability for guidance from EASA as well as coordination between the agency, the European Commission and Eurocontrol for Commission Regulation (EU) No 1207/2011 of November 22, 2011 laying down requirements for the performance and the interoperability of surveillance for the Single European Sky.
Please attached letter (see, GAMA13-01).

response Noted

The Agency thanks GAMA for drawing our attention to the letter. A response to the concerns raised in the letter was sent by the European Commission, DG

Move, dated 27/02/2013 Ref Ares (2013) 43163 refers.

A. Explanatory Note - IV. Content of the draft Decision - Summary

p. 5-6

comment	10	comment by: <i>Hawker Beechcraft Corporation</i>
	<p>Paragraph 15: Hawker Beechcraft is concerned that the Applicability paragraphs of CS-ACNS.ELS and CS-ACNS.EHS do not clearly identify that aircraft at and under 5700 kg and a maximum cruise true airspeed at and under 250 knots with EHS do not need to upgrade to the new definition of EHS as established in Commission Regulation (EU) No. 1207/2011.</p>	
response	<p>Partially Accepted</p> <p>It should be noted that compliance with CS-ACNS is not mandatory for all aircraft and is dependent upon the operations of the aircraft. The aircraft subject to mandatory equipage of elementary and enhanced surveillance are specified in Commission Regulation (EU) No 1207/2011 . The standards proposed in this NPA provides a means of compliance for those aircraft required to be equipped. Aircraft that are not subject to Commission Regulation (EU)No 1207/2011 but voluntarily transponding surveillance parameters will need to demonstrate that these parameters are correct. for these aircraft the installations should also be compliant with the appropriate section of subpart D</p> <p>The applicability criteria of EU regulation No 1207/2011 will be repeated as note in the applicability AMC sections (AMC1 ACNS.ELS.1000, AMC1 ACNS.EHS.1000 and AMC1 ACNS.ADS.1000) for completeness and to aid understanding (see response to comment 192).</p>	
comment	73	comment by: <i>Boeing</i>
	<p>Page: 5 Paragraph: A. IV.#17 <u>The proposed text states:</u> "To avoid any unnecessary burden for aircraft and avionics manufacturers, Article 6(a) of the interoperability Regulation introduces an alternative verification of compliance on the basis of certificates issued by EASA providing that they include a demonstration of compliance with the essential requirements of the interoperability Regulation and the relevant Implementing Rules for interoperability." [highlight added] <u>REQUESTED CHANGE:</u> It is not clear which "interoperability regulation" is being referenced. EU No 1207/2011 or EU No 552/2004? <u>JUSTIFICATION:</u> Clarification is needed.</p>	
response	<p>Noted</p> <p>In this context the term interoperability Regulation refers to means Regulation (EC) No 552/2004 of the European Parliament and of the Council as amended by Regulation EC No 1070/2009 of the European Parliament and of the Council. .</p>	
comment	217	comment by: <i>Embraer - Indústria Brasileira de Aeronáutica - S.A.</i>
	<p>The NPA text does not specify accurately to which article in which regulation it</p>	

	<p>refers to. This renders the reading of the document more difficult than is necessary.</p> <p>In item A-IV-17, it is written that "to avoid any unnecessary burden for aircraft and avionics manufacturers, Article 6(a) of the interoperability Regulation introduces an alternative verification of compliance on the basis of certificates issued by EASA (...)". However if one assumes that the interoperability Regulation is Commission Regulation (EU) No 1207/2011, one will not find Article 6(a), but only Article 6(1), (2), (3) and (4) addressing Spectrum Protection. If one assumes that the interoperability Regulation is the Single European Sky interoperability Commission Regulation (EC) No 552/2004, which is unlikely, one also will not find Article 6(a), but only Article 6(1), (2), (3) and (4) addressing EC declaration of verification of systems.</p> <p>The same mistake is repeated in item A-V-b(3).</p>
response	<p>Noted</p> <p>In the context of the NPA the term interoperability Regulation refers to means Regulation (EC) No 552/2004 of the European Parliament and of the Council as amended by Regulation EC No 1070/2009 of the European Parliament and of the Council. Article 6a to which reference is made was introduced by the amending regulation. .</p>
comment	<p>304 comment by: UK CAA</p> <p>Page No: 5 Paragraph No: 13. Comment: "This application will be limited to very few installations in aircraft that are not operating IFR flights in Europe." This statement is intended to apply to Mode A/C installations (which is not the main subject of this NPA) nevertheless it does not appear to add clarity; and it could lead to further questions and misunderstanding on the scope/applicability of the CS on areas which are not necessarily the remit of this NPA. Justification: This statement is not necessarily true across all Airspace User groups, and does not add clarity to the guidelines. Proposed Text: Delete the sentence 'This application will be limited to very few installations in aircraft that are not operating IFR flights in Europe.'</p>
response	<p>Noted</p> <p>It is agreed that this sentence in the Explanatory Note could have been better phrased. This, however, does not affect the content of the proposed CS-ACNS.</p>

A. Explanatory Note - IV. Content of the draft Decision - Summary of structure

p. 6

comment	<p>268 comment by: AIRBUS</p> <p>Paragraph 20: Typo error: "of" is missing in the first sentence.</p>
response	<p>Noted</p> <p>EASA apologies for the spelling error in the Explanatory Note..</p>

comment	303	comment by: <i>UK General Aviation Alliance</i>
	<p>Comment placed on behalf of the UK General Aviation Alliance representing the majority of sport and recreational aviation sector organisations in the UK. This is a complex and technical document which has proved difficult to understand fully. Whilst we believe it to be satisfactory we seek assurance that the introduction of new certification standards will not require existing equipments and installations to be subject to new approvals which would be very costly for our sector. Unlike the commercial sector where the number of different aircraft types is quite small, the S&RA sector, even in the UK alone, has many thousands so the cost of new approvals would be disproportionate.</p>	
response	<p>Noted</p> <p>This document is not applicable to aircraft flying VFR. Compliance with CS-ACNS is not mandatory and is dependent upon the operations of the aircraft thus the existing approval are still valid. The aircraft subject to mandatory equipage are specified in Commission Regulation (EU) No 1207/2011. The standards proposed in this NPA provides a means of compliance for those aircraft required to be equipped. Aircraft that are not subject to Commission Regulation (EU) No 1207/2011 for but voluntarily transponding surveillance parameters will need to demonstrate that these parameters are correct.</p>	
comment	341	comment by: <i>European Cockpit Association</i>
	<p>Summary 14. and 15. (and 22.), then throughout Section 4 These CS explicitly address ADS-B Out ES and not ADS-C. While within the body text this fact is clearly shown by consistent use of the acronym ADS-B, in the reference explanation and in the coding of the provisions the acronym is abbreviated to "(ADS)". This may lead to confusion, in particular, if at a later moment CS for ADS-C might be developed. It is recommended to change the acronym in the second bullet point in point 15. to "(ADS-B)", and label all ADS-B provisions ACNS.ADSB to avoid confusion with a potential future ACNS.ADSC.</p>	
response	<p>Accepted</p> <p>The labels will be changed to 'ADSB' instead of 'ADS' in the CS ACNS.</p>	
comment	342	comment by: <i>European Cockpit Association</i>
	<p>Summary of structure 20. With all respect to the need for consistent structure labels, the human should not be subordinate to schemes. For clarity and ease of understanding and reference, it is recommended to use obvious labels for the subparts – Subpart COM, Subpart NAV, Subpart SUR (in stead of B, C, D). (It appears that such a scheme was already used by EASA internally – see the title used for the cross-reference table to 1207/2011 (page 108) referring to "CS-ACNS SUR Book 1" – this is the preferred way.)</p>	
response	<p>Not Accepted</p> <p>Each book of the CS ACNS is subdivided into several subparts which are clearly titled:</p>	

- Subpart A General
- Subpart B Communications (COM)
- Subpart C Navigation (NAV)
- Subpart D Surveillance (SUR)
- Subpart E Others (like TAWS and RVSM in the future).

A. Explanatory Note - IV. Content of the draft Decision - Current regulatory context

p. 6-7

comment	9	comment by: <i>Federal Aviation Administration</i>
	<p>Comment:</p> <p>Paragraph 26 states that the CS-ACNS.ADS fully covers the standards outlined in AMC 20-24 for operations equivalent to a radar environment. ADS-B Out Installations certified to AMC 20-24 enhance ATS in non-radar areas (NRA). AMC 20-24 is designed to provide continual support of ADS-B in NRA operations. Cancellation of AMC 20-24 before all IFR aircraft operating in European airspace are required to comply with CS-ACNS.ADS, would be premature.</p> <p>Suggested Resolution:</p> <p>Remove the cancellation of AMC 20-24 in CS-ACNS.ADS.</p>	
response	<p>Accepted</p> <p>AMC 20-24 will not be withdrawn .</p>	
comment	17	comment by: <i>General Aviation Manufacturers Association / Hennig</i>
	<p>EASA states that there "is currently no EASA guidance on GNSS installations to be used as GNSS based position sources of ADS-B installations. Further rulemaking tasks 0519 and 0520 will ensure that such guidance is developed" (see, Explanatory Note at 29).</p> <p>The agency's 2013-2016 rulemaking program indicates that RMT.0519 will complete and publish guidance by 2015. Since compliance with Commission Regulation (EU) No 1207/2011 with the regulation includes aircraft with an individual certificate of airworthiness issued on or after 8 January 2015, it places manufacturers in an untenable position.</p> <p>GAMA is disappointed that EASA is not in a position to provide all the required guidance for ADS-B installation. It is essential that the agency immediately initiate work with the European Commission and other agencies to address the conflict between the compliance data in Regulation 1207/2011 and the availability of ADS-B and GNSS position source guidance. There are two practical ways forward 1) change the compliance date in Regulation 1207/2011 or 2) establish a simple and streamlined process for exempting aircraft from compliance with Regulation 1207/2011.</p>	
response	<p>Not Accepted</p> <p>See response to 4th sub-comment of comment 3</p> <p>GAMMA are correct in their observation that the target date for the completion of the rulemaking task associated with navigation accuracy that will support both ADS-B and PBN applications is 2015, EASA also understands why GAMMA would be disappointed with this situation. However, this situation was recognised when</p>	

developing this standards and has been addressed in AMC1 ACNS.ADSB.2020 paragraph (b), which states 'The GNSS based position sources should be installed in accordance with FAA AC 20-138B (or later)'. Thus non availability of the EASA standard is not a valid reason to request a change to the compliance dates of Commission Regulation (EU) No 1207/2011.

The establishment of exemption process for noncompliance with Regulation (EU) No 1207/2011 is not within EASA scope. Any such requests should be addressed to the European Commission.

comment

74

comment by: Boeing

Page: 7

Paragraph: A. IV. #26

The proposed text states:

"The requirements of CS-ACNS.ADS fully cover (and exceed) the standards of AMC 20-24 (Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter) and are for operations equivalent to a radar environment. It will, therefore, supersede AMC 20-24".

REQUESTED CHANGE:

Item 24 clearly states that aircraft previously compliant with JAA TGL 13 are not considered compliant with the implementing regulation 1207/2011; and Item 25 clearly states that aircraft previously compliant with AMC 20-13 are also not considered compliant with 1207/2011 and will supersede AMC 20-13. However, it is not clear in Item 26 – where it states, "*It will, therefore, supersede AMC 20-24*" -- if aircraft previously compliant with AMC 20-24 will need to be re-certified (including commensurate changes to Airplane Flight Manuals and Airplane Maintenance manuals to designate certification under the new CS-ACNS.ADS criteria). This needs to be clearly stated.

JUSTIFICATION:

Clarification is needed.

response

Noted

In accordance with the provisions of Commission Regulation (EU) No 748/2012 (Part 21) certificates issued are valid for an unlimited duration unless surrender or revoked. Thus as compliance with the CS is not mandatory, aircraft previously complaint with AMC 20-24 are deemed compliant with that standard. However, if the aircraft a subject to the provisions of Commission Regulation (EU) No 1207/2011 compliance against the proposed CS would be a suitable means of compliance to the regulation.

comment

75

comment by: Boeing

Page: 7

Paragraph: A. IV. #29

The proposed text states:

"There is currently no EASA guidance on GNSS installations to be used as GNSS based position sources of ADS-B installations. Further rulemaking tasks 0519 and 0520 will ensure that such guidance is developed."

REQUESTED CHANGE:

This item should be deleted OR should provide all GNSS-position requirements within the CS ACNS document.

JUSTIFICATION:

In order to certify the ADS-B Out function, **ALL** requirements need to be known

response	<p>prior to launching an avionics development and certification program. If the requirements cannot be identified at this time, then the ADS-B Out mandate date should be delayed until these crucial system requirements are defined. The aviation industry cannot afford to perform two certifications of ADS-B Out.</p> <p>Noted</p> <p>The rulemaking task associated with navigation accuracy that will support both ADS-B and PBN applications is scheduled to be completed in 2015, However, this situation was recognised when developing this standards and has been addressed in AMC1 ACNS.ADSB.2020 paragraph (b), which states 'The GNSS based position sources should be installed in accordance with FAA AC 20-138B (or later)'. Thus providing the necessary information to permit the aviation industry to conform to an acceptable standard.</p>
comment	<p>142 comment by: <i>Bombardier Aerospace</i></p> <p>The promise of future rulemaking tasks 0519 and 0520 in point 29 introduces a risk that equipment redesign will be needed, highlighting the need to establish requirements ahead of the mandate.</p>
response	<p>Noted</p> <p>The necessary information to permit the aviation industry to conform to an acceptable standard has been established in the proposed standard. Should the future rulemaking task, determine requirements that are different for those currently establish they would only be applicable for new applications. Any certificate issued in accordance the proposed standard with continue to be valid.</p>
comment	<p>269 comment by: <i>AIRBUS</i></p> <p>Item 24 explains that "<i>Aircraft previously compliant with TGL 13 are not considered as compliant with the requirements as specified in Commission Regulation (EU) N° 1207/2011 for the Mode S Elementary Surveillance</i>". For aircraft approved in compliance with TGL13 and whose design - as described in certification documentation - is compliant with the new CS ACNS requirements for Mode S Elementary Surveillance, the rule shall add a waiver explaining that these installations are acceptable without any need for further demonstration in front of new CS ACNS & update of Aircraft Flight Manual shall be granted from the agency through "simplified certification process" (ie the "AFM stand-alone" application process).</p>
response	<p>Partially Accepted</p> <p>Provision has been made for the use of previously demonstrated compliance with TGL 13 to be used in the demonstration of compliance with the requirements of the proposed CS, provided the difference have been addressed. If the previous compliance statement already includes the differences it could be reused without further demonstration.</p> <p>For clarification the text for AMC1 ACNS.ELS.1000 Applicability has been amended to state 'Provided that the differences listed in Appendix D have also been addressed, then previous compliance declarations with JAA TGL 13 Revision1 (Certification of Mode S Transponder Systems for Elementary Surveillance) supplemented with the additional assessments is another</p>

Acceptable Means of Compliance.'

It should be noted that proposing amendment to the rule are outside of the scope of this task.

comment 270

comment by: AIRBUS

Item 25 explains that *"Aircraft previously compliant with AMC 20-13 are also not considered compliant with the requirements as specified in Commission Regulation (EU) No 1207/2011 for the Modes S Enhanced Surveillance; for example, AMC 20-13 does not include the requirement for the Barometric Pressure setting parameter"*.

For aircraft approved in compliance with AMC 20-13 and whose design - as described in certification documentation - is compliant with the new CS ACNS requirements for Mode S Enhanced Surveillance, the rule shall add a waiver explaining that these installations are acceptable without any need for further demonstration in front of new CS ACNS & update of Aircraft Flight Manual shall be granted from the agency through "simplified certification process" (ie the "AFM stand-alone" application process).

response Partially Accepted

Provision has been made for the use of previously demonstrated compliance with AMC 20-13 to be used in the demonstration of compliance with the requirements of the proposed CS, provided the difference have been addressed. If the previous compliance statement already includes the differences it could be reused without further demonstration.

For clarification the text for AMC1 ACNS.EHS.1000 Applicability has been amended to state 'Provided that the differences listed in Appendix D have also been addressed, then previous compliance declarations with JAA TGL 13 Revision1 (Certification of Mode S Transponder Systems for Elementary Surveillance) supplemented with the additional assessments is another Acceptable Means of Compliance.'

comment 271

comment by: AIRBUS

Item 26 explains that *"The requirements of CS-ACNS.ADS fully cover (and exceed) the standards of AMC 20-24 (Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter) and are for operations equivalent to a radar environment. It will, therefore, supersede AMC 20-24."*

Draft CS ACNS defines certification requirements applicable to aircraft for ADS-B Out operations in Radar Airspaces. It is based on EUROCAE document ED-161 "SAFETY, PERFORMANCE AND INTEROPERABILITY REQUIREMENTS DOCUMENT FOR ADS-B-RAD APPLICATION".

AMC 20-24 defines certification requirements applicable to aircraft for ADS-B Out operations in Non Radar Airspaces. It is based on ED-126 "SAFETY, PERFORMANCE AND INTEROPERABILITY REQUIREMENTS DOCUMENT FOR ADS-B NRA APPLICATION". Requirements defined in AMC 20-24 are "globally" less stringent. Such guidance material shall be kept by the Agency for aircraft not intended to operate in Europe.

response Accepted

AMC 20-24 will not be withdrawn.

comment	<div>272</div> <div>comment by: AIRBUS</div> <p>Item 27 explains that "<i>Differences between CS-ACNS.ADS and FAA AC 20-165 are listed in Appendix J of Subpart D Book 2.</i>"</p> <p><u>Comment 1:</u></p> <p>FAA certification standard is the AC 20-165A. The list provided in Appendix J of Subpart D Book 2 is obsolete, since the FAA issued a revision of its advisory circular, now AC 20-165A, on 7 November 2012. Draft NPA shall be updated accordingly.</p> <p>Note also that the scope of draft CS ACNS is not the same as the FAA AC 20-165. Draft CS ACNS is addressing Mode A/C, Mode S ELS, Mode S EHS & ADS-B Out through 1090 MHz Extended Squitter, whereas the FAA AC 20-165 is addressing ADS-B Out systems.</p> <p><u>Comment 2:</u></p> <p>Some differences are outlined between the draft CS ACNS & AC 20-165. The analysis of differences as provided in Appendix J of Subpart D Book 2 is incomplete. Contrary to draft CS ACNS, the FAA AC 20-165 () does not require the capability to change the Flight Id in Flight. AC 20-165 () also defines applicable requirements for an GPIRS position source. See other AIRBUS comments below.</p> <p><u>Comment 3:</u></p> <p>Draft CS ACNS & the FAA AC 20-165() aim at addressing aircraft applicable certification requirements to support the same targeted operation, ie the "ADS-B Out operations in Radar environment" as defined in EUROCAE ED-161. AC 20-165A, in paragraph 1.1, warns applicants about possible non-compliance of FAA approved installations with non-U.S. ADS-B Out criteria, such as AMC 20-24 – which will be superseded by CS ACNS.ADS. Industry cannot afford to develop and deliver systems that would be usable in some airspaces only, and needs stable and harmonized criteria early enough before the implementation dates. A clear comparison between the respective latest criteria should be established, and the best should be done to resolve possible differences.</p>
response	<div>Partially Accepted</div> <ol style="list-style-type: none"> 1. Traceability will be provided to AC 20-165A. Indeed the scope of CS-ACNS is different than FAA AC 20-165A which is limited to ADS-B Out and covers implementations based on both 1090 MHz ES and on UAT. 2. See responses to the Airbus detailed comments 3. EASA recognise the concern and it is the intent that aircraft certified against CS-ACNS are operable in all airspaces. .
comment	<div>273</div> <div>comment by: AIRBUS</div> <p>This comment is applicable to paragraphs 28 & 30, CS ACNS.ELS.2030 (3) and Appendix D item (c).</p> <p>CS ACNS.ELS.2030 (3) requests the following capability from the aircraft: "<i>for a aircraft identification to be inserted or amended by the flight crew if the aircraft uses variable aircraft identification;</i>".</p> <p>This requirement is not harmonized with the FAA (see above AIRBUS comments). In addition, AIRBUS want to outline that only new generation of FMS are capable of this functionality.</p>

response	<p>Old Flight Management systems (FMS1) are not capable of modifying the flight identification in flight. The industrial impact of the retrofit on the aircraft is quite heavy: the FMG(E)C need to be upgraded by changing the whole platform, the Flight Guidance (FG) and Flight Management (FM) are also impacted and potentially Electronic Instrument System, Multi Mode Receiver and Flight Warning Computer depending on the FG/FMG(E)C/FM options chosen by the company. Operational mitigation means such as reinforced training procedures to ensure that the procedure of the flight id check before the departure exists and is correctly applied by the pilots (and related supporting operational documentation) shall be examined by the Agency has an acceptable means to cope with the concerns expressed through Item 30 p7.</p> <p>Accepted</p> <p>Aircraft identification is currently one of the means to be used to identify aircraft, in Europe in 2020. ANSP's shall have the capability to allow them to establish individual aircraft identification using the downlinked aircraft identification feature (cf. Commission Regulation (EU) No 1206/2011). It is, therefore, essential for the flight crew to be able enter the information that matches the information specified in Item 7 of the ICAO flight plan. In cases of a mismatch, the flight crew must be capable to correct the information upon notification.</p> <p>The text has been amended such that the Appendix D item (c) is deleted and CS ACNS.ELS.2030 (3) to read: <i>"for an aircraft identification to be inserted by the flight crew if the aircraft uses variable aircraft identification"</i></p>
comment	<p>274 comment by: AIRBUS</p> <p>Item 29 explains that <i>"There is currently no EASA guidance on GNSS installations to be used as GNSS based position sources of ADS-B installations. Further rulemaking tasks 0519 and 0520 will ensure that such guidance is developed."</i></p> <p>Rulemaking tasks RMT.0519 and RMT.0520, which will include development of EASA guidance on GNSS installations to be used as GNSS based position sources of ADS-B installations, are planned for a start in 2013 and completion in 2016, i.e. after the EU ADS-B Out mandate for newly delivered aircraft flying in European Sky.</p> <p>Changes in the definition of applicable position source requirements for ADS-B Out is not acceptable from an industrial standpoint.</p>
response	<p>Accepted</p> <p>The necessary information to permit the aviation industry to conform to an acceptable standard has been established in the proposed standard. Should a future rulemaking task, determine requirements that are different for those currently establish they would only be applicable for new applications. Any certificate issued in accordance the proposed standard with continue to be valid</p>
comment	<p>310 comment by: UK CAA</p> <p>Page No: 6 Paragraph No: 24. Comment: "Aircraft previously compliant with JAA TGL 13 are not considered compliant with the requirements as specified in Commission Regulation (EU) No 1207/2011 for the Mode S Elementary Surveillance." There are four differences in relation to Mode S ELS for which demonstration is required over and above JAA TGL 13 Rev1. These are listed under Annex D. Of these four, one implies the</p>

response	<p>provision of a capability that was not previously required under the previous regulatory context: to be able to change aircraft ID in flight. While it is made clear that further assurances have to be made over and above those previously required in JAA TGL 13, there is no specific guidance offered in this NPA on what constitutes acceptable evidence, and any transitional measures that apply for aircraft previously certified under the provisions of JAA TGL 13.</p> <p>Justification: Clarity.</p> <p>Proposed Text: Appropriate guidance is required to inform GA and aircraft operators on the implications of the new certification requirements on current installations.</p> <p>Noted</p> <p>Aircraft previous certified under the provisions of JAA TGL13 will continue to be valid and will not be withdrawn, and these aircraft may continue to operate provided they are not subject to the provisions of Commission Regulation (EU) No 1207/2011. For all new application compliance with the CS will be required. For aircraft that are subject the Commission Regulation (EU) No 1207/2011 compliance with this CS is a means of compliance to the rule. To assist, provision has been made for the use of previously demonstrated compliance with TGL 13 to be used in the demonstration of compliance with the requirements of the proposed CS, provided the difference have been addressed.</p>
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A. Explanatory Note - IV. Content of the draft Decision - Review of events and lessons learnt from early implementation

p. 7

comment	<p>2</p> <p>comment by: <i>Airservices Australia</i></p> <p>1. AMC 20-24 has become the de-facto global ADS-B-NRA certification standard, applicable to a range of large scale implementations across the world. In our case, the Australian ADS-B Out airspace regulation heavily relies on AMC 20-24 based certifications as part of the operator's approval process (refer to Civil Aviation Order 20.18 Appendix XI paragraph 8). ICAO's APANPIRG has also adopted AMC20-24 as an accepted compliance method supporting all the countries of Asia Pac. It would be greatly appreciated if AMC20-24 could be retained as a standard - even if it is no longer used within Europe.</p> <p>2. AMC 20-24 is still required to support ADS-B-NRA operations in Europe for the foreseeable future (such as Avinor's operations in the Ekofisk area). If AMC20-24 is removed, ADS-B use will stall in Europe waiting for the fleet to equip with the new avionics. If AMC 20-24 is retained, aircraft already equipped will be able to receive ADS-B NRA services.</p>
response	<p>Accepted</p> <p>AMC 20-24 will not be withdrawn.</p>
comment	<p>343</p> <p>comment by: <i>European Cockpit Association</i></p> <p>Review of events and lessons learnt 30. and 31.</p> <p>Possibly, these two general decisions could provoke a positive, supporting statement – introduction of</p> <ul style="list-style-type: none"> ➤ Capability to change a/c ID in-flight <p>Validation of all parameters sent</p>

response

Noted

Your Support is noted with appreciation.

A. Explanatory Note - V. Regulatory Impact Assessment

p. 8-10

comment

5

comment by: *NetJets Europe*

RIA paragraph (e) (4)

Comment:

There was no real economic impact study presented, certification costs are one fraction of total investment required to the operator. A fully economic impact should be presented to the affecter Airspace users.

Justification:

Economic return to airspace user is unknown, concept of "best equipped, best served" should be clarified, otherwise this regulation would not bring any return to the air operator.

response

Noted

Compliance with CS-ACNS is not mandatory and is dependent upon the operations of the aircraft, thus a full economic impact cannot be established. However, a regulatory impact assessment was performed in the frame of preparation of Commission Regulation (EU) No 1207/2011 which determines the mandatory carriage requirements and is available at <http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/mandates/20100709-spi-final-report-v2.pdf>.

comment

11

comment by: *Hawker Beechcraft Corporation*

Paragraph (f) (2): Hawker Beechcraft believes the invalidation of all EHS and ELS certifications that already exist will be extremely expensive to re-confirm. Many of those aircraft types are out of production including many of the avionics components.

response

Noted

Aircraft previously certified under the provisions of JAA TGL13 or AMC 20-13 will continue to be valid and will not be withdrawn/invalidated, and these aircraft may continue to operate provided they are not subject to the provisions of Commission Regulation (EU) No 1207/2011. For aircraft that are subject to the Commission Regulation (EU) No 1207/2011 compliance with this CS is a means of compliance to the rule. To assist, provision has been made for the use of previously demonstrated compliance with TGL 13 and AMC 20-13 to be used in the demonstration of compliance with the requirements of the proposed CS, provided the differences have been addressed.

comment

36

comment by: *NATS National Air Traffic Services Limited*

e) Analysis of Impact (4) Economic Impacts

The ADS-B guidance notes in the later part of the document, and particularly the performance references in appendix H, imply that the Safety and Performance Requirements for ADS-B transmission must meet ED-161 for the ADS-B RAD application. The previous commission regulation No 1207/2011 was based on

response	<p>safety and performance requirements for the ADS-B NRA application. Therefore, the increased performance requirements necessary to meet the proposed NPA will have an economic impact on current equipped / certified aircraft that perform the ADS-B NRA application, such as in Canadian and Australian airspace. Suggest that the economic impact on the upgrade of existing transponders that met the ADS-B NRA performance requirements of commission regulation No 1207/2011 needs to be quantified and presented.</p> <p>Noted</p> <p>Compliance with CS ACNS is not mandatory and is dependent upon the operations of the aircraft, thus a full economic impact cannot be established. However a regulatory impact assessment performed in the frame of preparation of Commission Regulation (EU) Regulation No 1207/2011, which determines the mandatory carriage requirements is available at http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/mandates/20100709-spi-final-report-v2.pdf and was based on ADS-B RAD.</p>
comment	<p>121 comment by: SVFB/SAMA</p> <p>(4) Economic impacts:</p> <p>We think that costs and benefits must be specified in much more detail in a project of such magnitude.</p> <p>Probably there are many aircraft affected and the total cost for upgrades must be at least estimated.</p>
response	<p>Noted</p> <p>Compliance with CS-ACNS is not mandatory and is dependent upon the operations of the aircraft, thus a full economic impact cannot be established. However a regulatory impact assessment performed in the frame of preparation of Commission Regulation (EU) Regulation No 1207/2011, which determines the mandatory carriage requirements is available at http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/mandates/20100709-spi-final-report-v2.pdf.</p>
comment	<p>275 comment by: AIRBUS</p> <p>This comment is applicable to paragraph V(e)(4) Economic impacts. Analysis resulting in the following "Economic impacts" for option 2 is wrong for aircraft manufacturers:</p> <p><i>"Option 2: This will provide transparency with respect to the required certification standard, so the avionics manufacturers and integrators will not lose time during the certification process, thus reducing the cost with respect to options 0 and 1."</i></p> <p>Draft CS ACNS is published too late for aircraft manufacturer to avoid losing time during the certification process, in particular for the definition of certification basis.</p> <p>The development, certification, production and installation of modifications ensuring compliance with Regulation 1207/2011 will impact not only the ATC transponder and its installation, but also other systems, such as and not limited to FMS, GNSS sensor, flight crew alerting and indicating systems. Additional certification activities are in particular expected to demonstrate compliance of ADS-B Out position sources (even if GNSS sensors are already certified &</p>

	<p>installed in the aircraft).</p> <p>These activities have to be performed for all aircraft types and models, and often with several avionics suppliers per type, and even several offers per supplier for a given type. The lead time will be at least 24 months, possibly more for some complex and highly integrated installations, starting from the date on which the certification criteria are known and frozen.</p> <p>To be able to deliver some compliant aircraft configuration from Jan 8, 2015, application & certification plan shall be sent to the Agency within the next month. CRI process will likely not be avoided.</p>
response	<p>Noted</p> <p>The Agency recognises the late availability of the CS ACNS and potential issues that could possible raise and will endeavour to support early applications.</p>

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comment	<p>133</p> <p>comment by: <i>Luftfahrt-Bundesamt</i></p> <p>Page 13, typo: Appendix G-....ADS-B out..."</p>
response	<p>Accepted</p> <p>As a matter of consistency the term 'ADS-B Out' will be used thought out the CS.</p>

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comment	<p>184</p> <p>comment by: <i>EUROCONTROL</i></p> <p>Hera and at few other places the acronym "CS-ACNS" is used whereas in most of the cases the document acronym is "CS ACNS".</p> <p>It is suggested to use "CS ACNS" consistently throughout the document.</p>
response	<p>Accepted</p> <p>As a matter of consistency the term CS-ACNS will be used thought out the CS.</p>

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comment	<p>16</p> <p>comment by: <i>Hawker Beechcraft Corporation</i></p> <p>Hawker Beechcraft is concerned that the Applicability paragraphs of CS-ACNS.ELS and CS-ACNS.EHS do not clearly identify that aircraft under 5700 kg and less than 250 kts with EHS (today's definition) do not need to upgrade to the new definition of EHS as established in Commission Regulation (EU) No. 1207/2011.</p>
response	<p>Partially accepted</p> <p>It should be noted that compliance with CS-ACNS is not mandatory for all aircraft</p>

and is dependent upon the operations of the aircraft. The aircraft subject to mandatory equipage of elementary and enhanced surveillance are specified in Commission Regulation (EU) No 1207/2011. The standards proposed in this NPA provides a means of compliance for those aircraft required to be equipped. To improve clarity in a note has been introduced within the Applicability AMC's.

For new installations in aircraft that are not subject to Commission Regulation (EU) No 1207/2011 but voluntarily transmitting surveillance parameters will need to demonstrate that these parameters are correct for these aircraft the installations should also be compliant with the appropriate section of subpart D

comment 20 comment by: General Aviation Manufacturers Association / Hennig

EASA through this NPA is proposing a new section Certification Specifications (CS) of the regulation that will cover compliance with airspace equipage requirements with respect to on-board Communications, Navigation and Surveillance systems (see, CS ACNS.GEN.1000 Applicability). This would align the "ACNS" requirements with the current framework for other airworthiness standards such as CS-25 and CS-23.

Several GAMA member companies are concerned with how the agency would manage different ACNS "Amendment levels" and that this could, if not properly controlled, result in multiple changes to the standards as different Subparts are subject to changes.

GAMA recommends that EASA ensure that the "amendment" process for CS-ACNS is managed in a manner so that a change to the CS-section for ADS-B **would not** result in the agency proposing changes to the CS-section for communications. Additionally, the agency cannot place manufacturers in a position where they would have to show compliance again for each new release / amendment level of CS-ACNS.

response Noted

The amendment process will follow the normal EASA NPA process, which will make proposals to amended individual sections or multiply sections. EASA recognised the concerns the GAMA members may have, and it should recognised that certificates issued will not be invalidated with subsequent amendments of the CS. As per standard practice new application should comply the latest amendment of the CS.

Should compliance with an amendment be required by all aircraft (i.e. a retrofit) this will be subject to additional regulatory provisions.

comment 76 comment by: Boeing

Page: 16

Paragraph: CS ACNS.GEN.1000 Applicability; and
CS ACNS.GEN.1010 Definitions

Language used for requirements needs to clear and specific.

REQUESTED CHANGE:

Provide a definition for what requirements are mandatory and which are optional. Typical industry documents (like RTCA documents) use "**shall**" for mandatory requirements, and "**should**" for optional requirements.

JUSTIFICATION:

Clarify whether requirements are mandatory or optional.

response Noted

The Present Tense is used in Book 1 (CS). 'Should' is used in Book 2 (AMC and GM) as it contains recommendations or guidance.

comment	123	comment by: <i>General Aviation Manufacturers Association / Hennig</i>
	<p>Commission Regulation (EU) No 1207/2011 provides applicability for Mode S Elementary Surveillance (ELS), ADS-B Out 1090 MHz Extended Squitter (ADS), and Mode S Enhanced Surveillance (EHS) which covers IFR GAT (ELS) and IFR GAT having a maximum take-off mass exceeding 5,700 kg or having a maximum cruising true airspeed capability greater than 250 knots.</p> <p>To provide clear compliance for CS-ACNS, GAMA recommends that EASA also directly identify the applicability from Commission Regulation (EU) No 1207/2011 in this Certification Specification to provide easier reference.</p>	
response	<p>Partially Accepted</p> <p>The aircraft subject to mandatory equipage of elementary and enhanced surveillance are specified in Commission Regulation (EU) No 1207/2011 and the standards proposed in this NPA provides a means of compliance for those aircraft required to be equipped. Aircraft that are not subject to Commission Regulation (EU) No 1207/2011 and for new application that are voluntarily transmitting surveillance parameters will need to demonstrate that these parameters are correct. For these aircraft the installations should also be compliant with the appropriate section of subpart D. Thus it is not appropriate to limit the applicability of this standard to aircraft in excess of 5,700 kg or having a maximum cruising true airspeed capability greater than 250 knots.</p> <p>The applicability criteria of EU regulation No 1207/2011 will be repeated as note in the applicability AMC sections (AMC1 ACNS.ELS.1000, AMC1 ACNS.EHS.1000 and AMC1 ACNS.ADS.1000) for completeness and understanding.</p>	
comment	127	comment by: <i>SVFB/SAMA</i>
	<p>We will leave all technical specifications from page 16-103/128 for review to the manufacturers. We trust they are competently judged by them.</p>	
response	<p>Noted</p> <p>The Agency thanks you for your support.</p>	
comment	224	comment by: <i>Garmin International</i>
	<p>Regarding CS ACNS.GEN.1000:</p> <p>Per the description of applicability in CS ACNS.GEN.1000, "these Certification Specifications are applicable to all aircraft for the purpose of compliance with airspace equipage requirements with respect to on-board Communication, Navigation and Surveillance systems." Guidance for Surveillance systems is presented in this draft decision. Guidance for communication and navigation systems "will be developed at a later date". It can be assumed that the CS ACNS will undergo multiple changes as more material is added. Multiple changes will create undue burden as industry must continually update and show compliance to the most recent version. Even if material is simply added, compliance must be shown again for each release. The agency is encouraged to break these specifications into at least three separate specification documents that address Communication, Navigation and Surveillance equipment separately.</p>	

response Not Accepted

The Agency is required to ensure the regulatory provisions are kept up to date and reflect the state of art, it is therefore correct that this CS, similar to the other CS's will be regularly updated. It should also be recognised that certificates issued will not be invalidated with subsequent amendments of the CS. As per standard practice only new application should comply the latest amendment of the CS.

Should compliance with an amendment be required by all aircraft (i.e. a retrofit) this will be subject to additional regulatory provisions.

The Agency does not see a benefit in publishing 3 separate standards as CS-ACNS is subdivided in several subparts that are clearly titled.

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p. 16-17

comment 37 comment by: *NATS National Air Traffic Services Limited*

Aircraft Address definition should reference ICAO, as this is written explicitly on page 23

ADS-B definition should also include 'identification' explicitly as one of the aircraft provided information set

ADS-B Function Failure definition should also include 'identification' in addition to horizontal position

response Partially Accepted

The definition of the 24 bit aircraft address has been amended to **ICAO** 24-bit Aircraft Address.

With respect to the inclusion Explicitly of Identification in the ADS-B definition, it should be recognised that this is encompassed under 'other information' in the ADS-B definition along with other parameters that are not explicitly listed..

The definition of the ADS-B function failure is the internationally agreed definition

comment 38 comment by: *NATS National Air Traffic Services Limited*

Track angle rate text includes unnecessary wording "Track Angle Rate means the rate of change of the track angle rate" Suggest deletion of the second "rate"

Transponder definition should also include SSR interrogations in addition to Mode S protocols, as the CS covers Mode A/C operations

Transmit definition should also include reference to an ADS-B transmit device, in addition to a transponder as used within the body of document (Section 4 - ADS-B)

response Partially Accepted

Accepted: new definition Track Angle Rate means the rate of change of the track angle.

Accepted: new definition Transponder means a device that transmits airborne surveillance data spontaneously or when requested. The transmissions are performed on 1090 MHz RF band and the interrogations are received on 1030

MHz RF band using SSR/Mode S protocols. It is also named Secondary Surveillance Radar transponder.

Partially accepted: the ADS-B transmit Unit does not required amendment as the ADS-B transmit Unit resides in the transponder. The definition of ADS-B transmit Unit has been amended accordingly.

comment 77

comment by: Boeing

Page: 17

Paragraph: *Subpart A — General, CS ACNS.GEN.1010 Definitions*

The proposed text states:

“Global Navigation Satellite System (GNSS). A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary, to support the required navigation performance for the intended operation.”.

REQUESTED CHANGE:

Delete the last portion of the definition so it reads as follows:

“Global Navigation Satellite System (GNSS). A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring ~~augmented as necessary, to support the required navigation performance for the intended operation~~”.

JUSTIFICATION:

The suggested deleted portion is not required, since it is not part of the GNSS definition.

response Accepted

The text has been amended to read **Global Navigation Satellite System (GNSS).** A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring.

comment 78

comment by: Boeing

Page: 18

Paragraph: *Subpart A — General, CS ACNS.GEN.1010 Definitions*

The proposed text states:

“MCP/FCU Selected Altitude means the altitude selected by the flight crew on the flight control panel of the aircraft. This corresponds to the altitude the auto-pilot will not transgress.”

REQUESTED CHANGE:

Delete the 2nd sentence so that the item reads as follows:

“MCP/FCU Selected Altitude means the altitude selected by the flight crew on the flight control panel of the aircraft. ~~This corresponds to the altitude the auto-pilot will not transgress.~~”

JUSTIFICATION:

The second sentence is not required and is not necessarily a correct statement, since it may depend on the value of the FMS Selected Altitude and what flight mode the aircraft is in.

response Accepted

The text has been amended to be in accordance with this comment and that of comment 345.

comment	79	comment by: Boeing
	<p>Page: 17 Paragraph: <i>Subpart A — General, CS ACNS.GEN.1010 Definitions</i> <u>The proposed text states:</u> "Mode S Elementary Surveillance refers to the use of Mode S surveillance data to downlink aircraft identification from airborne installations." REQUESTED CHANGE: Revised this sentence to read as follows: "Mode S Elementary Surveillance refers to the use of Mode S surveillance data to downlink aircraft identification from airborne installations <u>the parameters defined in CS ACNS.ELS.2010(a)</u>. JUSTIFICATION: According to ACNS.ELS.2010(a), there are other parameters (in addition to aircraft identification) that are required to be downlinked in the Mode S replies for Elementary Surveillance. These include the Mode A code, pressure altitude, on-the-ground status information, Special Position Indication (SPI), emergency status, the data link capability report, the common usage GICB capability report, the ICAO 24-bit aircraft address, and the ACAS active resolution advisory report.</p>	
response	Partially Accepted	
	<p>It is preferred to have a stand-alone definition rather than making a link to a later CS. The definition has been amended to read 'Mode S Elementary Surveillance' refers to the use of Mode S surveillance data to downlink aircraft information from airborne installations:</p>	
comment	80	comment by: Boeing
	<p>Page: 17 Paragraph: <i>Subpart A — General, CS ACNS.GEN.1010 Definitions</i> EDITORIAL CHANGE ONLY <u>The proposed text states:</u> "Track Angle Rate means the rate of change of the track angle rate." REQUESTED CHANGE: Revised this sentence as follows: "Track Angle Rate means the rate of change of the track angle rate." JUSTIFICATION: Editorial change needed to correct the definition.</p>	
response	Accepted	
	<p>The text has been amended accordingly.</p>	
comment	145	comment by: EUROCONTROL
	<p>As the NPA requires that the "ADS-B transmit unit" must be integrated in the Mode S transponder (CS ACNS.ADS.2010), the generic term "unit" might be misread in some areas to refer to the transponder as a whole (in particular when</p>	

response	<p>reference is made to the "ADS-B transmit unit" within ELS/EHS provisions). Proposal: To change "ADS-B transmit unit" to "ADS-B transmit function".</p> <p>Not Accepted</p> <p>There are places where it is not possible to replace "unit" by "function" it is therefore proposed to keep current wording.</p>
comment	<p>171 comment by: EUROCONTROL</p> <p>Barometric Pressure Setting is not limited to QNH reference. Proposal: Barometric Pressure Setting means the barometric pressure setting used by the pilot when flying the aircraft.</p>
response	<p>Accepted</p> <p>The text has been amended to delete reference to QNH.</p>
comment	<p>172 comment by: EUROCONTROL</p> <p>Ground speed definition: GNSS-based Ground speed is reported relative to a horizontal plane at present position. Proposal: add at the end of the definition "or relative to a horizontal plane at present position" "Inertial Vertical Velocity" definition and "Barometric Vertical Rate" definition should be removed the definitions the provided in the AMC1 CS ACNS.EHS.2010 are clearer. Track Angle Rate definition, the word "rate" is superfluous: Track Angle Rate means the rate of change of the track angle.</p>
response	<p>Partially Accepted</p> <p>The change to the Ground speed definition is accepted and the text amended accordingly</p> <p>The change proposed to the Inertial Vertical Velocity and Barometric Vertical Rate is not accepted. The text provided in AMC1 CS ACNS.EHS.2010 is about the sources not about the definitions</p> <p>The change to the Track angle rate definition is accepted and the text amended accordingly</p>
comment	<p>194 comment by: Eurocopter</p> <p>"Track angle rate" definition presents an error (re-entrant definition). <u>NOTE:</u> Notice that definitions (and the whole document) consider the terms "<i>true track angle</i>" and "<i>track angle rate</i>", but neither "<i>track angle</i>" nor "<i>true track angle rate</i>": this looks heterogeneous.</p>

response	Accepted
	Track rate definition has been amended. With respect to the comment on terminology, the use is consistent with ICAO (e.g. Doc 9871).
comment	218 comment by: <i>Embraer - Indústria Brasileira de Aeronáutica - S.A.</i>
	The definition of track angle rate is given as "means the rate of change of the track angle rate". Track angle rate is usually defined as the rate of change in the angle of the ground speed vector with respect to North.
	Proposed text: <i>"Track Angle Rate means the rate of change of the track angle".</i>
response	Accepted
	The text has been amended accordingly.
comment	228 comment by: <i>Garmin International</i>
	Regarding CS ACNS.GEN.1010: Change instances of 'enunciated' to 'annunciated'.
response	Partially Accepted
	The term announced is proposed to be used is in accordance with requirement to use simplified English.
comment	229 comment by: <i>Garmin International</i>
	Regarding CS ACNS.GEN.1010: 'Comm B' is defined as a Mode S Reply. Comm B is a protocol. Suggest the following definition: A protocol used to transmit information from the aircraft to the ground.
response	Not Accepted
	The ICAO Annex 10 Volume III defines Comm-B as a 112-bit reply used by GICB and broadcast protocols. GICB is the (sub)-protocol in which Comm B is the reply.
comment	230 comment by: <i>Garmin International</i>
	Regarding CS ACNS.GEN.1010: Definition of Track Angle Rate should be corrected. Suggest the following definition: The rate of change of the track angle.
response	Accepted

The text has been amended accordingly.

comment 344 comment by: *European Cockpit Association*

The term "FMS Selected Altitude" is possibly confusing or misleading in principle, as a "selection" comparable to "MCP selected" (as defined further below) is not done with the FMS.

As explained in AMC1 ACNS.EHS.2010 (c) (1) ii, the FMS will "manage the vertical profile" and uses either the intended (final) cruising ("CRZ") level or, if programmed, climb/descent constraints.

Unless the term "FMS Selected Altitude" needs to be used in order to maintain consistency and reference to source material, it would be much preferred to use a different term better reflecting the circumstances; a suggestion:

"FMS Programmed Level"

In any case (also respectively even if there is a compelling need to maintain the term "FMS Selected Altitude" based on a source document), it is recommended to keep the definition close if not identical to the explanation contained in AMC1 ACNS.EHS.2010 (c) (1) ii:

"The level used by the FMS to manage the vertical profile of the aircraft."

Note that even if the definition term itself uses "Altitude", the correct operational description should use the generic expression "level", covering "altitude" as well as "flight level" (or even "height").

response Partly Accepted

New definition to read 'The level/altitude used by the FMS to manage the vertical profile of the aircraft'.

The term Level is used when the aircraft is flying ISA and altitude when it is flying QNH. The name of the parameter 'FMS selected altitude' needs to be kept for consistency with international standards (transponder MOPS and ICAO Doc9871).

comment 345 comment by: *European Cockpit Association*

The statement "This corresponds to the altitude the auto-pilot will not transgress" is too strong and neglects any type of failure, be it technical or because of meteorological conditions. The following is suggested: **"This altitude constitutes the level-off target input to the auto-pilot."**

response Accepted

The definition is modified according to this comment and also in accordance with response to comment 350.

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p. 18

comment 179 comment by: *EUROCONTROL*

The referenced AMC is incorrect it should be read AMC1 ACNS.GEN.1020

response Accepted

The AMC reference has been corrected.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.AC.2000

p. 21

comment 81 comment by: Boeing

Page: 21
Paragraph: CS ACNS.AC.2000 Transponder characteristics
The proposed text states:
“(a) The transponder is **approved** and has Mode A and Mode C capability”.
REQUESTED CHANGE:
Revise this text to read as follows:
“(a) The transponder is ~~approved~~ **meets the requirements of AMC1 ACNS.AC.2000 ,Transponder characteristics,** and has Mode A and Mode C capability.”
JUSTIFICATION:
Although the word “approved” is used in the proposed text, the document does not give reference as to what it is approved to. The use of “approved” without giving a definition of what constitutes “approved” is used throughout the document. This needs to be corrected in a number of other places in the document, specifically:
CS ACNS.AC.2020 Altitude source
CS ACNS.ELS.2000 Transponder characteristics
CS ACNS.ELS.2020 Altitude source
CS ACNS.EHS.2000 Transponder characteristics
CS ACNS.ADS.2000 ADS-B Out system approval
CS ACNS.ADS.2008 Provision of Data
CS ACNS.ADS.2010 ADS-B Transmit Unit Approval
CS ACNS.ADS.2020 Horizontal Position and Velocity Data Sources

response Partially Accepted

In general the corresponding AMC is making reference to ETSO. It is proposed to reword the AMC as follows: ‘To be approved the equipment should hold an EASA equipment authorisation in accordance with ETSO XYZ’. Therefore, the AMC clarifies what has to be done to make sure the equipment is approved.

comment 195 comment by: Eurocopter

To be relevant, the requirement should not be limited to the power at the extremity of the coaxial cable. Either the objective concerns only the equipment (so output power of the equipment) or it deals with the complete chain. For the latter, the coaxial cable and the antennas have to be taken into account. An objective of EIRP would be more appropriate in this case.

response Noted

Although in theory an EIRP measurement should be performed, it may be difficult/expensive to perform such a test on an aircraft. Thus the proposed

statement is considered to provide an appropriate requirement to ensure correct operation of the system.

comment 276

comment by: AIRBUS

This comment is applicable to CS ACNS.AC.2000 (c) & (d) "Transponder Characteristics" and CS ACNS.ELS.2000 (c) & (d) "Transponder Characteristics":
*"(c) The peak pulse power available at the antenna end of the transmission line of the transponder is more than 21 dBW and not more than 27 dBW for aircraft that operate at altitudes exceeding 4 570m (15 000 ft) or with a maximum cruising speed exceeding 324 km/h (175 knots).
 (d) The peak pulse power available at the antenna end of the transmission line of the transponder is more than 18.5 dBW and not more than 27 dBW for aircraft operating at or below 4 570m (15 000 ft) with a maximum cruising airspeed of 324 km/h (175 knots) or less."*

Requirements expressed in CS ACNS.AC.2000 (c) & (d) "Transponder Characteristics" & CS ACNS. ELS.2000 (c) & (d) "Transponder Characteristics" are MOPS level requirements (see DO-181E 2.2.3.2).

response Noted

Although the requirements are expressed at MOPS (ED-73E or DO-181E) level they are guaranteed by the transponder manufacturer assuming the losses (cable, etc.) up to the antenna end are less than what he has specified, therefore a verification has to be performed on the installation to check that the actual losses between the transponder output and the antenna end are not greater than what is specified by the transponder manufacturer (cf. ED-73E § 3.1.3). There are many ways to perform this verification and the applicant is able to choose.

comment 305

comment by: UK CAA

Page No: 21 and 23

Paragraph No: CS ACNS.AC.2000 (c) and (d). CS ACNS.ELS.2000 (c) and (d).

Comment: In the interests of facilitating user readability and traceability of the requirement, it is recommended to add the absolute power values in brackets, in a similar way that the non metric units are provided in the same paragraphs for the altitude/speed metrics.

Justification: Better visibility to the reader on the extent of change or otherwise of the power requirements with respect to the former specifications.

Proposed Text: Add 70 Watts in brackets for 18.5 dBW, and similarly 125 Watts for 21dBW and 500W for 27dBW.

response Partially Accepted

A generic and consistent approach has to be adopted throughout the document (cf. (b) (4) on page 33 SI units followed by non-SI units between brackets). Therefore, in that particular case the correct text is "70 W (18.5 dBW)".

comment	82	comment by: Boeing
	<p>Page: 21 Paragraph: CS ACNS.ADS.2010 Data transmission The proposed text states: "The pressure altitude should range from minus 1 000 ft to the maximum certificated altitude of aircraft plus 5 000 ft." REQUESTED CHANGE: Revised the text to read as follows: "The pressure altitude should shall range from minus 1 000 ft to the maximum certificated altitude of aircraft plus 5 000 ft." JUSTIFICATION: This is the first reference in the document to a "should" requirement. It is not clear what requirements and statements are hard requirements ("shall" requirements) which are <u>mandatory</u> for compliance with the document and which requirements are <u>desired</u> by EASA ("should" requirements). We ask that this be clarified throughout the document.</p>	
response	<p>Partially Accepted</p> <p>Correct wording is 'The pressure altitude ranges from minus 1 000 ft to the maximum certificated altitude of aircraft plus 5 000 ft.' See also response to more general comment 76 above.</p>	
comment	162	comment by: EUROCONTROL
	<p>CS AC.2010 (c) specifies the duration of the announcement 'SPI for 15 to 30s' but the time reference is not mentioned. Proposal: Please add: "after an IDENT (SPI) command has been initiated by the pilot.</p>	
response	<p>Accepted</p> <p>the text has been amended accordingly.</p>	

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p. 21

comment	39	comment by: NATS National Air Traffic Services Limited
	<p>Altitude source resolution performance and integrity definitions are too loose and will lead to inconsistent levels of certification applied by different ANSP/NSA organisations across Europe. Suggest that the text is amended to correctly define the requirement, as the proposed text is not written in the form of testable requirements, which should be the function of a Certification Specification. Information is in the guidance material which we believe should be in the main body of the CS.</p>	
response	<p>Partially Accepted</p> <p>The text of in CS ACNS.AC.2020 will be modified to read:</p>	

a) The reported pressure altitude is obtained from an approved source.

b) The altitude resolution is equal to or less than 30.48 m (100 ft)

The text in the AMC will remain unchanged. The integrity is addressed by CS ACNS. AC.3000.

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Book 1 - Subpart D - CS ACNS.AC.2030**

p. 22

comment	27	comment by: <i>General Aviation Manufacturers Association / Hennig</i>
	<p>EASA proposes in section CS ACNS.AC.2030 titled "Flight deck interface" that "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." Additionally, in section CS ACNS.ELS.2030 also titled "Flight deck interface" the agency proposes that "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder. GAMA members are concerned that the agency intends to require that the flight deck interface include a means by which the flight crew can select the pressure altitude source independently. If this is what the agency proposes, it would be a significant departure from previous guidance such as Temporary Guidance Leaflet (TGL) 13 and Acceptable Means of Compliance (AMC) 20-13 which identifies acceptable means for pressure altitude sources but do not require a select feature on the flight deck.</p> <p>GAMA recommends that EASA remove the requirements in CS ACNS.AC.2030 (g) "select the pressure altitude source to be connected to the active transponder." and CS ACNS.ELS.2030 (a)(9) to select the pressure altitude source that is connected to the active transponder."</p> <p>Additionally, AMC1 ACNS.AC.2030 addresses this issue stating "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." GAMA recommends that EASA move this item to AMC1 ACNS.AC.2020 Altitude Source.</p> <p>Finally, AMC1 ACNS.EHS.2010 (d) "Sensor Selection" assumes that there is a sensor selection capability for the flight crew. Since this is not supported by any currently approved equipment, GAMA recommends that the AMC1 guidance return to that currently in AMC 20-13 by replacing the second and third paragraph with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile."</p>	
response	Accepted	<p>Point (g) in CS ACNS.AC.2030 has been deleted and a new point (c) is inserted in CS ACNS.AC.2020 to read 'The selected active transponder is connected to the source being used to fly the aircraft'.</p> <p>As a consequence the corresponding text in AMC1 ACNS.AC.2030 will be deleted</p> <p>New bullets will be included under AMC1 ACNS.AC.2020 to address the new bullet (c) of CS ACNS.AC.2020 and will indicate that selection of the source is one acceptable means of compliance (for example proposed by ARINC 718A) for aircraft which might be flown using different altitude sources. Other acceptable means of compliance include automatic selection.</p>

comment	<p>40</p> <p>comment by: <i>NATS National Air Traffic Services Limited</i></p> <p>Add a definition of emergency codes as 7500 - Hijack, 7600 - Radio Failure and 7700 – Emergency</p>
response	<p>Accepted</p> <p>A New definition is proposed in CS ACNS.GEN.1010 Definitions are consistent with Commission Regulation (EU) No 1207/2011 Annex I 1.2 (c):</p> <p>Emergency indicators mean specific Mode A Code values: 7500 unlawful interference, 7600 radio failure and 7700 general emergency.</p>
comment	<p>84</p> <p>comment by: <i>Boeing</i></p> <p>Page: 22 Paragraph: <i>CS ACNS.AC.2030 Flight deck interface, para. (g)</i> <u>The proposed text states:</u> "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." REQUESTED CHANGE: We recommend deleting this requirement. JUSTIFICATION: The reason for having external switching of the pressure altitude (i.e. air data) source is to be able to have the means to switch to another source in case the air data source being used is transmitting erroneous data. However, one specific Boeing airplane model has auto-source selection of triple redundant, voted air data. Since this voted air data is of high integrity (Design Assurance Level = Level A, erroneous data <10E-9/flight-hour), there is no need to have a requirement to have external switching to allow for selection of the air data source that feeds the transponders. If this requirement were to remain, it would require extensive design changes to the airplane with no benefit. The requirements that the entire ATC Transponder system (including the pressure altitude source): - meets a 'Major' level hazard category, - meets a minimum Design Assurance Level of Level C, and - the System Safety Assessment shows that the ATC Transponder System probability of transmitting erroneous altitude is < 10E-5/flight-hour , are the over-riding requirements to ensure that the required system integrity is met. Additionally, in the unlikely event that erroneous altitude is being transmitted by the ATC transponder, the flight crew can select "Altitude Reporting OFF," which inhibits the transmission of pressure altitude information. See CS ACNS.AC.2030, Flight deck interface, paragraph (c).</p>
response	<p>Not accepted</p> <p>The solution embodied by Boeing is an alternative means of compliance.</p>
comment	<p>116</p> <p>comment by: <i>Boeing</i></p> <p>Page: 22 Paragraph: <i>CS ACNS.AC.2030 Flight deck interface; para. (c)</i></p>

	<p>The proposed text states: "A means is provided to: ... (c) notify the flight crew when the transmission of pressure altitude information has been inhibited;"</p> <p>REQUESTED CHANGE: Revise paragraph (c) to read as follows: "A means is provided to: ... (c) notify the flight crew when inhibit the transmission of pressure altitude information has been inhibited;"</p> <p>JUSTIFICATION: Our suggested revision would more clearly state how the flight crew interface actually operates. If Air Traffic Control notifies the flight crew that their aircraft is transmitting erroneous altitude information and that they should turn off altitude reporting, the flight crew selects "Altitude Reporting OFF" on their ATC Control Panel. This changes the transponder mode from Mode C (i.e., Altitude Reporting) to Mode A (i.e., no Altitude Reporting).</p>
response	<p>Partially Accepted</p> <p>There is no general requirement to have a means to inhibit pressure altitude reporting. This is only required on aircraft equipped with Gillham altitude encoder (see AMC1 ACNS.AC.2020 (c)). It is proposed to reword bullet (c) to indicate that this means is only required if the aircraft installation provides a facility to inhibit the transmission of pressure altitude information. Bullet (c) now reads:</p> <p>(c) to notify the flight crew when the transmission of pressure altitude information has been inhibited, if a means to inhibit the transmission of pressure altitude is included in the aircraft installation.</p> <p>See response to comment 87 (similar comment on Mode S ELS transponder).</p>
comment	<p>163 comment by: EUROCONTROL</p> <p>CS ACNS.AC.2030 (e): It is not clear whether the pilot must perform an action to be aware of the status of the transponder. Proposal: Please specify whether it is acceptable to have an action to be aware of the status of the transponder</p>
response	<p>Accepted</p> <p>Point (e) will be supplemented: '... without undue delay and without the need for the Aircrew to perform any action.'</p>
comment	<p>231 comment by: Garmin International</p> <p>Regarding CS ACNS.AC.2030: Flight deck interface requirements for Mode A/C and Mode S elementary surveillance (CS ACNS.AC.2030 and CS ACNS.ELS.2030) include a means to "select the pressure altitude source to be connected to the active transponder". If it is the agency's intent to require a means for the flight crew to select the</p>

	<p>pressure altitude source independently, this represents a significant departure from previous guidance. No such interface requirement exists in TGL 13 or AMC 20-13, and this draft does not identify the addition as a difference from those documents. Furthermore, the direct and independent selection of altitude source to the transponder is not supported by the majority (perhaps any) of currently certified equipment.</p> <p>It is suggested that the item (g) requirement for a means to "select the pressure altitude source to be connected to the active transponder" be removed.</p>
response	<p>Accepted</p> <p>The text has been amended accordingly.</p>

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comment	<p>83</p> <p>comment by: <i>Boeing</i></p> <p>Page: 22</p> <p>Paragraph: <i>SYSTEM PERFORMANCE REQUIREMENTS</i></p> <p>In the proposed text, the CS ACNS SYSTEM PERFORMANCE REQUIREMENTS (CS ACNS.AC.3XXX) section currently has requirements for "Design assurance" and for "Continuity."</p> <p><u>REQUESTED CHANGE:</u></p> <p>The CS ACNS SYSTEM PERFORMANCE REQUIREMENTS (CS ACNS.AC.3XXX) section needs to be revised so that there are individual "3XXX" requirements for:</p> <ol style="list-style-type: none"> 1. Design Assurance Level, 2. Loss of Function probability, and 3. Erroneous/Misleading data probability. <p><u>JUSTIFICATION:</u></p> <p>The Design Assurance Level, Loss of Function probability, and Erroneous/Misleading data probability are important requirements that drive the system architecture and design, and impact the System Safety Assessment. They need to be clearly stated and must be consistent with the ETSO requirements. This also needs to be addressed in the following sections of the document:</p> <p>CS ACNS.ELS.3XXX for Elementary Surveillance</p> <p>CS ACNS.EHS.3XXX for Enhanced Surveillance</p> <p>CS ACNS.ADS.3XXX for ADS-B Out</p>
response	<p>Partially Accepted</p> <p>As a result of comments and review of these requirements, there are no more specific CS paragraphs on Design Assurance but only on system Integrity (provision of erroneous/misleading data) numbered 3000 and system Continuity (loss of data) numbered 3010. They both contribute to the Design Assurance. They are consistent with the corresponding ETSO which may be more demanding because it addresses only an element of the system and not the entire system as it is the case in this CS.</p>
comment	<p>117</p> <p>comment by: <i>Boeing</i></p> <p>Page: 22</p>

	<p>Paragraph: CS ACNS.AC.3000 Design assurance</p> <p><u>The proposed text states:</u></p> <p>"The Mode A/C only airborne surveillance system is designed commensurate with a minor failure condition (see AMC 25.1309 section 7)".</p> <p><u>REQUESTED CHANGE:</u></p> <p>Revise the text to read as follows:</p> <p>"The Mode A/C only airborne surveillance system is designed commensurate with a minor major failure condition (see AMC 25.1309 section 7)".</p> <p><u>JUSTIFICATION:</u></p> <p>This revision would make the CS-ACNS consistent with ATC Transponder ETSO C112d, section 3.2.1, which states the following:</p> <p><u>"3.2.1 Failure Condition Classification</u></p> <p>Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a major failure condition. The applicant must develop the system to at least the design assurance level commensurate with this failure condition."</p>
response	<p>Not Accepted</p> <p>The classification of the failure conditions in accordance with this section are those associated to the aircraft system level not equipment. The requirement of the corresponding ETSO may be more demanding as it addresses only an element of the system and may be used in more than one aircraft</p>

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comment	21	comment by: CAA-NL
	<p>CS ACNS.AC.3010 Continuity:</p> <p>The requirement that "The probability ...is better or equal to probable" in combination with the referenced definition of probable in AMC 25.1309 " ... an Average Probability Per Flight Hour greater than of the order of 1×10^{-5} " allows any probability: "probable" allows any arbitrary large probability, for instance 10 times per hour, so the proposed requirement would be complied with if the Mode A/C function would be lost several times per hour.</p> <p>Proposal: depending on the intention, either delete the requirement, or state that the loss of Mode A/C function is allowed to be probable (which still allows an arbitrary large probability of loss), or define an upper limit for the probability of loss such as in (number of 10^{-3} is used as example): "The Mode A/C only airborne surveillance system is designed to an allowable quantitative probability of loss of function of less than in the order of 10^{-3} per flight hour".</p>	
response	<p>Partially Accepted</p> <p>The text has been amended to be consistent with the recognised use of qualitative probability terms.</p>	
comment	85	comment by: Boeing
	<p>Page: 22</p> <p>Paragraph: CS ACNS.AC.3010 Continuity</p>	

	<p>The proposed text states: "The probability of the loss of Mode A/C only airborne surveillance system transponder function is better than or equal to probable (see AMC 25.1309 section 7)."</p> <p>REQUESTED CHANGE: Revise the text to read as follows: "The probability of the loss of Mode A/C only airborne surveillance system transponder function is better less than or equal to probable (see AMC 25.1309 section 7)."</p> <p>JUSTIFICATION: Our suggestion would more accurately state the requirement. The probability of loss is a number (e.g., "probable" is <u>less than</u> or equal to 1.0×10^{-3} per flight-hour).</p>
response	<p>Partially Accepted</p> <p>The text has been amended to be consistent with the recognised use of qualitative probabilities terms.</p>
comment	<p>125 comment by: USAF AFMC/LCMC/HBAI</p> <p>The proposed continuity requirements in the NPA (CS ACNS.AC.3010, CS ACNS.ELS.3010, CS ACNS.EHS.3010, and CS ACNS.ADS.3010) are confusing and inconsistent with in EU Regulation 1207/2011 requirements related to continuity (Annex II Part A.5 and B.16). The function of the Mode S transponder and ADS-B are expected to have an integrity probability equal to 10^{-5} or less per flight hour (remote), but this is not a continuity requirement. The continuity for both Mode S and ADS-B equipment should be equal to or less than 2×10^{-4} per flight hour as defined in EU Regulation 1207/2011.</p>
response	<p>Accepted</p> <p>See response to comments 191 and 83. The text has been amended to be consistent with the use of qualitative probabilities terms consistent with airworthiness application and comply with the objective of the regulation.</p>

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comment	<p>12 comment by: Hawker Beechcraft Corporation</p> <p>Hawker Beechcraft prefers that the performance specifications be tied to applicable industry documents such as RTCA DO-260B for ADS-B Out rather than mired in the CS. The order of specification precedence needs to be established.</p>
response	<p>Noted</p> <p>The objective of the CS is to provide the objective and prescriptive requirement required to ensure that safe and interoperability of the aircraft and to make the appropriate use do standards such as EUROCAE, RTCA etc. your comment this will be considered for further amendments.</p>

comment	86	comment by: Boeing
	<p>Page: 23 Paragraph: CS-ACNS.ELS.1000 Applicability The proposed text states: This section provides the standards for Mode S Elementary Surveillance installations. REQUESTED CHANGE: Revise the text to read as follows: This section provides standards for airborne Mode S Elementary Surveillance installations <u>that provide on request (through Mode S replies elicited by Mode S interrogations) airborne parameters in addition to parameters provided by Mode A/C installations compliant with Section 1.</u> JUSTIFICATION: The Mode S ELS standards are in addition to the Mode A/C standards just as the Mode EHS standards are in addition to the ELS standards.</p>	
response	<p>Partially Accepted</p> <p>The term airborne will be included for completeness This section 2 is not in addition to the Mode A/C requirements of section 1,A for a Mode S ELS installation the requirements of section 1 are not a prerequisite., whereas to certify a Mode S EHS installation the requirements of the Mode S ELS first (cf. CS ACNS.EHS.1000 (a)) are also applicable)</p>	

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comment	306	comment by: UK CAA
	<p>Page No: 21 and 23 Paragraph No: CS ACNS.AC.2000 (c) and (d). CS ACNS.ELS.2000 (c) and (d). Comment: In the interests of facilitating user readability and traceability of the requirement, it is recommended to add the absolute power values in brackets, in a similar way that the non-metric units are provided in the same paragraphs for the altitude/speed metrics. Justification: Better visibility to the reader on the extent of change or otherwise of the power requirements with respect to the former specifications. Proposed Text: Add 70 Watts in brackets for 18.5 dBW, and similarly 125 Watts for 21dBW and 500W for 27dBW.</p>	
response	<p>Partially Accepted</p> <p>A generic and consistent approach has to be adopted throughout the document (cf. (b) (4) on page 33 SI units followed by non-SI units between brackets). Therefore, in that particular case, the correct text is '70 W (18.5 dBW)'.</p>	

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p. 23-24

comment	196	comment by: Eurocopter
	<p>The meaning of GICB should be mentioned.</p>	

response	Accepted
	A definition of GICB has been added in CS ACNS.GEN.1010 Definitions as 'GICB means Ground Initiated Comm B.'
comment	277 comment by: AIRBUS
	This comment relates to paragraph (b): " <i>All other data transmitted is verified.</i> " and is in relation with Appendix D (d) and Appendix E (b). AIRBUS fully understand EASA concerns related to the verification of ELS parameters emitted by the transponder. However, AIRBUS would like to outline that the exhaustive verification of all parameters emitted by the transponder is an important activity, whose complete coverage is shared by test activities led at supplier & aircraft manufacturer levels. For any new development, verification strategy & related granularity will be defined according to the scope of the modifications. In particular, credit from previous certification will be claimed when appropriate.
Noted	Noted
	The Agency thanks you for your comment.

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comment	232 comment by: Garmin International
	Regarding CS ACNS.ELS.2018 (b): In item (b), Replace 'automatically' with 'automatic'.
response	Accepted
	The text has been amended.

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comment	41 comment by: NATS National Air Traffic Services Limited
	Altitude source resolution performance and integrity definitions are too loose and will lead to inconsistent levels of certification applied by different ANSP/NSA organisations across Europe. Suggest amending the text to correctly define the requirement, as the proposed text is not written in the form of testable requirements, which should be the function of a Certification Specification. Information is in the guidance material which we believe should be in the main body of the CS.
response	Accepted

The text of in CS ACNS.ELS.2020 will be modified to read:

- a) The reported pressure altitude is obtained from an approved source.
- b) The altitude resolution is equal to or less than 30.48 m (100 ft).

The text in the AMC will remain as it is. The integrity of altitude is addressed by (a), the source is approved.

comment

346

comment by: *European Cockpit Association*

ICAO states that "performance of the ACAS is significantly enhanced when an intruder aircraft is reporting pressure-altitude in 25 ft increments".

As any ELS function and operation is subject to a Mode S transponder capable of transmitting pressure altitude information with 25 ft quantisation, it is opined that only altimeter and encoder installations with the appropriate resolution are "commensurate" with the ELS environment and operation. In consequence, the following CS is recommended:

(a) The reported pressure altitude is obtained from an approved source.

(b) The altitude source provides a pressure altitude resolution lower than or equal to 25 ft.

(c) The altitude source integrity is commensurate with the intended operation.

In case it is found (contrary to our assumption) that current installations frequently involve the somehow inconsistent combination of 100-ft-altitude sources with a Mode S transponder, some transition arrangements might be appropriate, but the CS should clearly express the ultimate goal together with acceptable but definite time lines.

response

Not Accepted

It is recognised that ACAS performance is enhanced when using a pressure altitude resolution of 25ft or better. However, to meet the surveillance performance requirements a pressure altitude resolution of 100 ft is the minimum performance required..

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comment

27 ❖

comment by: *General Aviation Manufacturers Association / Hennig*

EASA proposes in section CS ACNS.AC.2030 titled "Flight deck interface" that "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." Additionally, in section CS ACNS.ELS.2030 also titled "Flight deck interface" the agency proposes that "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder. GAMA members are concerned that the agency intends to require that the flight deck interface include a means by which the flight crew can select the pressure altitude source independently. If this is what the agency proposes, it would be a significant departure from previous guidance such as Temporary Guidance Leaflet (TGL) 13 and Acceptable Means of Compliance (AMC) 20-13 which identifies

	<p>acceptable means for pressure altitude sources but do not require a select feature on the flight deck.</p> <p>GAMA recommends that EASA remove the requirements in CS ACNS.AC.2030 (g) "select the pressure altitude source to be connected to the active transponder." and CS ACNS.ELS.2030 (a)(9) to select the pressure altitude source that is connected to the active transponder."</p> <p>Additionally, AMC1 ACNS.AC.2030 addresses this issue stating "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." GAMA recommends that EASA move this item to AMC1 ACNS.AC.2020 Altitude Source.</p> <p>Finally, AMC1 ACNS.EHS.2010 (d) "Sensor Selection" assumes that there is a sensor selection capability for the flight crew. Since this is not supported by any currently approved equipment, GAMA recommends that the AMC1 guidance return to that currently in AMC 20-13 by replacing the second and third paragraph with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile."</p>
response	<p>Accepted</p> <p>CS ACNS.ELS.2030 (a) (9) is deleted and a new CS ACNS.ELS.2020.(c) introduced that states 'The selected active transponder is connected to the crew selected sensor relevant to the aircraft flight profile'. As a result the corresponding text of AMC1 ACNS.ELS.2030 is deleted.</p> <p>New bullets included under AMC1 ACNS.ELS.2020 to address the new CS ACNS.ELS.2020 (c).</p>
comment	<p>65 comment by: IATA</p> <p>For upgrade to DO260B (radar environment) it is required that the Flight ID shall be modifiable during the flight (retrofit mandate).</p> <p>There is a possibility that a wrong flight ID has been assigned to the aircraft which would be a trigger for ATC to ask the pilot to change the flight ID during flight. That is the reason that the requirement has been taken up in the regulation and it is essential that this can be changed during the flight when discovered by ATC.</p> <p>Actually on Boeing and CRJ aircraft it is easy to change direct and on Airbus aircraft it is necessary to go via secondary flight plan to make any change. But a number of existing aircraft flying today have no means to change the Flight ID during flight, therefor alternative means to handle this issue are required. A modification for these aircraft is cost prohibitive.</p>
response	<p>Accepted</p> <p>The Agency thanks you for your comment, however as stated the requirement to be able to change the flight ID when airborne as specified Regulation (EU) No 1206/2011 is only applicable to those capable to does and that it sholdm be change in flight unless instructed..Thus the CS has been amended only to require the capability to insert flight ID .</p>
comment	<p>87 comment by: Boeing</p> <p>Page: 24</p>

	<p>Paragraph: <i>CS ACNS.ELS.2030 Flight deck interface, para. (a)(4)</i> <u>The proposed text states:</u> "(a) A means is provided: ... (4) to notify the flight crew when the transmission of pressure altitude information has been inhibited;"</p> <p><u>REQUESTED CHANGE:</u> Revive the text to read as follows: "(a) A means is provided: ... (4) to notify the flight crew when <u>inhibit</u> the transmission of pressure altitude information has been inhibited;"</p> <p><u>JUSTIFICATION:</u> Our suggested revision would more clearly state how the flight crew interface actually operates. If Air Traffic Control notifies the flight crew that their aircraft is transmitting erroneous altitude information and that they should turn off altitude reporting, the flight crew selects "Altitude Reporting OFF" on their ATC Control Panel. This changes the transponder mode from Mode C (i.e. Altitude Reporting) to Mode A (i.e. non-Altitude Reporting).</p>
response	<p>Partially Accepted</p> <p>There is no general requirement to have a means to deselect Altitude reporting. This is only required on aircraft equipped with Gillham altitude encoder (see AMC1 ACNS.ELS.2020 (c) (4)). Bullet (a) (4) is therefore reworded to indicate that this notification is only required if the aircraft installation provides a facility to inhibit the transmission of pressure altitude information:</p>
comment	<p>88</p> <p>comment by: <i>Boeing</i></p> <p>Page: 24 Paragraph: <i>CS ACNS.ELS.2030 Flight deck interface, para. (a)(9)</i> <u>The proposed text states:</u> "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder."</p> <p><u>REQUESTED CHANGE:</u> Delete this requirement.</p> <p><u>JUSTIFICATION:</u> The reason for having external switching of the pressure altitude (i.e. air data) source is to be able to have the means to switch to another source in case the air data source being used is transmitting erroneous data. However, one specific Boeing airplane model has auto-source selection of triple redundant, voted air data. Since this voted air data is of high integrity (Design Assurance Level = Level A, erroneous data <10E-9/flight-hour), there is no need to have a requirement to have external switching to allow for selection of the air data source that feeds the transponders. If this requirement were to remain, it would require extensive design changes to the airplane with no benefit. The requirements that the entire ATC Transponder system (including the pressure altitude source): -- meets a 'Major' level hazard category -- meets a minimum Design Assurance Level of Level C, and -- the System Safety Assessment shows that the ATC Transponder System probability of transmitting erroneous altitude is < 10E-5/flight-hour,</p>

	are the over-riding requirements to ensure that the required system integrity is met. Additionally, in the unlikely event that erroneous altitude is being transmitted by the ATC transponder, the flight crew can select "Altitude Reporting OFF," which inhibits the transmission of pressure altitude information. See CS ACNS.AC.2030 Flight deck interface, paragraph (c).
response	Accepted The text has been deleted. See also the response to comment 27.
comment	164 comment by: EUROCONTROL CS ACNS.ELS.2030 (a) (6) It is not clear whether the pilot must perform an action to be aware of the status of the transponder. Proposal: Please specify whether it is acceptable to have an action to be aware of the status of the transponder
response	Accepted bullet (a) (6) will be supplemented: '... without undue delay and without the need for flight crew action.'
comment	233 comment by: Garmin International Regarding CS ACNS.ELS.2030: Flight deck interface requirements for Mode A/C and Mode S elementary surveillance (CS ACNS.AC.2030 and CS ACNS.ELS.2030) include a means to "select the pressure altitude source to be connected to the active transponder". If it is the agency's intent to require a means for the flight crew to select the pressure altitude source independently, this represents a significant departure from previous guidance. No such interface requirement exists in TGL 13 or AMC 20-13, and this draft does not identify the addition as a difference from those documents. Furthermore, the direct and independent selection of altitude source to the transponder is not supported by the majority (perhaps any) of currently certified equipment. It is suggested that the item (a)(9) requirement for a means to "select the pressure altitude source to be connected to the active transponder" be removed.
response	Accepted The text has been deleted. See also the response to comment 27

comment	90 comment by: Boeing Page: 25 Paragraph: CS ACNS.ELS.300 Design assurance
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response	<p><u>EDITORIAL COMMENT ONLY</u> <u>The proposed title of this paragraph reads as:</u> "CS ACNS.ELS.300 Design assurance" <u>REQUESTED CHANGE:</u> Correct the title to read as follows: "CS ACNS.ELS.3003000 Design assurance" <u>JUSTIFICATION:</u> Correction of a typographical error is needed.</p>	
	<p>Accepted</p> <p>The text has been amended.</p>	
comment	197	comment by: Eurocopter
response	<p>CS ACNS.ELS.300 probably stands for CS ACNS.ELS.3000</p>	
	<p>Accepted</p> <p>The text has been amended.</p>	
comment	318	comment by: AIRBUS MILITARY
response	<p>Add: Minimum Design assurance level for ACAS interface (if supported) should be specified, if different than ELS DAL</p>	
	<p>Not Accepted</p> <p>The requirements all airborne devices contributing to the ACAS II function is defined in AMC 20-15.</p>	

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comment	22	comment by: CAA-NL
response	<p>CS ACNS.ELS.3010 Continuity: The proposed requirement does not state what the probability should apply to (it is presumed it applies to loss of function but this is not stated) and does not provide a meaningful unit of measurement. Also, use of the qualifier "qualitative" is not in line with stating a quantitative (numerical) requirement. Proposal: Replace this by: "The Mode S ELS airborne surveillance system is designed to an allowable quantitative probability of loss of function of less than 2×10^{-4} per flight hour".</p>	
	<p>Partially Accepted</p> <p>The requirements that were numbered 3010 are expressed for the system in terms of qualitative probability.</p>	

comment	89	comment by: Boeing
	<p>Page: 25 Paragraph: CS ACNS.ELS.3010 Continuity <u>The proposed text states:</u> "The Mode S ELS airborne surveillance system is designed to an allowable qualitative probability of 2×10^{-4}."</p> <p><u>REQUESTED CHANGE:</u> Revise the text as follows: "The Mode S ELS airborne surveillance system is designed to an allowable qualitative probability of 2×10^{-4} <u>probable</u>."</p> <p><u>JUSTIFICATION:</u> Although the continuity requirement is consistent with the one listed in the Implementing Regulation (EU) No. 1207/2011, dated 22 November 2011, the continuity requirement in this document is stated as a qualitative probability in paragraphs CS ACNS.AC.3010, CS ACNS.EHS.3010, and CS ACNS.ADS.3010. Our suggested revision will also promote consistency with Figure 2 in AMC 25.1309 (CS Book 2).</p>	
response	<p>Partially Accepted</p> <p>The text has been amended to use a qualitative probability terms that meet the objective of the regulation. See also response to comments 191 and 83.</p>	
comment	173	comment by: EUROCONTROL
	<p>This CS ACSNS.ELS.3010 should be expressed in the same consistent way as in the corresponding AC, EHS and ADS sections. I.e. based on an allowable qualitative probability and refer to AMC 25.1309 section 7 It should be clarified in CS ACNS.XXX.3010 that continuity relates to the loss of function (like it is currently the case in CS ACNS.AC.3010)</p>	
response	<p>Partially Accepted</p> <p>The text has been amended to be consistent for AC, ELS, EHS and ADS without reference to AMC 25.1309.</p>	

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comment	91	comment by: Boeing
	<p>Page: 25 Paragraph: CS ACNS.ELS.4020 Antenna installation, para. (b) <u>The proposed text states:</u> "(b) Antenna(s) is/are located such that the resulting far field radiation is not obscured by the aircraft structure."</p> <p><u>REQUESTED CHANGE:</u> Revise the text to read as follows: "(b) Antenna(s) is/are located such that the resulting <u>effects on the</u> far field radiation <u>pattern(s) by</u> is not obscured by the aircraft structure <u>are minimized</u>."</p> <p><u>JUSTIFICATION:</u></p>	

response	<p>Aircraft structure does have an impact on antenna patterns. The key is to install the antenna(s) at locations that minimize the effects on the antenna patterns.</p> <p>Accepted</p> <p>The text has been amended.</p>
comment	<p>198 comment by: Eurocopter</p> <p>Subparagraph (b) requires that antenna(s) be "<i>located such that the resulting far field radiation is not obscured by the aircraft structure</i>".</p> <p>Such condition (lack of interference with the aircraft structure) cannot be reached on helicopters, because the helicopter structure always interferes with the antenna and so degrades the antenna radiation pattern.</p> <p>Also, the sentence is lacking consistency because what can be obscured is the originally radiated field, not the far field radiation. The far field radiation is the result of the original radiation and the interference with the aircraft structure and it is only meaningful characteristic.</p> <p>We suggest stating that the antenna has to be installed so that required performances can be reached in flight, considering the far field resulting radiation.</p>
response	<p>Accepted</p> <p>The text has been amended as proposed by comment 91.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ELS.4030

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comment	<p>42 comment by: NATS National Air Traffic Services Limited</p> <p>We note that there is no definition of the term ISA used in CS ACNS.ELS.4030 Antenna diversity, we suggest that this definition is added.</p>
response	<p>Partially Accepted</p> <p>ISA is written in full as International Standard Atmosphere the definition for which can be found in CS DEF.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.1000

p. 26

comment	<p>13 comment by: Hawker Beechcraft Corporation</p> <p>Hawker Beechcraft prefers that the performance specifications be tied to applicable industry documents such as RTCA DO-260B for ADS-B Out rather than mired in the CS. The order of specification precedence needs to be established.</p>
response	<p>Noted</p> <p>The objective of the CS is to provide the objective and prescriptive requirement</p>

required to ensure that safe and interoperability of the aircraft and to make the appropriate use do standards such as EUROCAE, RTCA etc. your comment this will be considered for further amendments.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.2000

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comment	43	comment by: <i>NATS National Air Traffic Services Limited</i>
	Transponder with EHS capability is defined as a Level 2 transponder under the ICAO transponder definition schema. This is the same level as defined within the Mode S ELS section and hence suggest referencing the ELS section, as this additional definition adds no value to the document	
response	<p>Not Accepted</p> <p>ELS and EHS transponders are both Level 2 transponders with registers. However, a Mode S transponder able to support EHS shall be capable to fill registers with the EHS parameters. This is defined in transponder MOPS ED-73E in which there is a specific label defined for these transponders that support this EHS capability.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.2010

p. 26

comment	199	comment by: <i>Eurocopter</i>
	<p><u>Item (f)</u></p> <p>In the past, we had the choice between transmitting Indicated Airspeed or Mach No, then both parameters were required, and finally this NPA comes back to the initial requirements.</p> <p>Eurocopter would like to have the assurance that this requirement will now be stabilized.</p>	
response	<p>Noted</p> <p>Requirements have not changed compare to AMC 20-13. Mach Number and IAS are considered as a single parameter. The provision of one of the two is required in EU Regulation No 1207/2011 Annex II Part C. However, it is recommended to provide both where available. This is proposed as additional material in AMC1 ACNS.EHS.2010.</p>	
comment	200	comment by: <i>Eurocopter</i>
	<p><u>Item (h)</u></p> <p>This NPA introduces a new parameter: "Barometric Pressure Setting in use minus 800 hectopascal".</p> <p>We do not agree with the addition of this parameter, which may lead to complicate existing architectures on some aircrafts.</p>	

response

Noted

This requirement is specified in Regulation (EU) No 1207/2011 Annex II Part C. However, please note that EHS parameters are not mandatory for rotorcraft, EHS is only applicable to fixed wing aircraft (cf. EU No 1207/2011 Article 5 (4.(c) and 5.(c))

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.3000

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comment

44

comment by: NATS National Air Traffic Services Limited

CS.ACNS.EHS.3000 What is meant by the phrase "Minor Failure Condition"? Does this have a formal definition somewhere

response

Noted

The definition is provided in relevant AMC and Guidance Material for the applicable type of aircraft.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.EHS.3010

p. 26

comment

23

comment by: CAA-NL

CS ACNS.EHS.3010 Continuity:

The proposed requirement does not state what the probability should apply to (it is presumed it applies to loss of function but this is not stated), and in combination with the definition of probable in AMC 25.1309 " ... an Average Probability Per Flight Hour greater than of the order of 1×10^{-5} " it allows any probability: "probable" allows any arbitrary large probability, for instance 10 times per hour, so the proposed requirement would be complied with if the S EHS function would be lost several times per hour. Also, use of the qualifier "qualitative" is not in line with stating a quantitative requirement.

Proposal: depending on the intention, either delete the requirement, or define an upper limit for the probability of loss such as in (number of 10^{-3} is used as example): "The Mode S EHS airborne surveillance system is designed to an allowable quantitative probability of loss of function of less than in the order of 10^{-3} per flight hour".

response

Not Accepted

The nominal numerical value is dependent upon the type of aircraft.

comment

45

comment by: NATS National Air Traffic Services Limited

CS ACNS.EHS.3010 Appears to be incomplete as it is currently an unfinished statement

response	Not Accepted
	The text is consistent with the AC, ELS, and ADSB sections and standard practice.
comment	<p>307 comment by: UK CAA</p> <p>Page No: 26 Paragraph No: CS ACNS.EHS.3010 Comment: This paragraph does not include an appropriate AMC reference, as provided for the continuity paragraph on page 22. For example for CS.ACNS.EHS.3010 "The Mode S EHS airborne surveillance system is designed to an allowable qualitative probability of probable", It is unclear what requirement is being referenced. Justification: Clarity. Proposed Text: Add appropriate AMC reference.</p>
response	Accepted
	The definitions have been amended to include a reference to the applicable continuity standards for each aircraft type. This being applicable to all sections.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.1000

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comment	<p>14 comment by: Hawker Beechcraft Corporation</p> <p>Hawker Beechcraft prefers that the performance specifications be tied to applicable industry documents such as RTCA DO-260B for ADS-B Out rather than mired in the CS. The order of specification precedence needs to be established.</p>
response	<p>Noted</p> <p>The objective of the CS is to provide the objective and prescriptive requirement required to ensure that safe and interoperability of the aircraft and to make the appropriate use do standards such as EUROCAE, RTCA etc. your comment this will be considered for further amendments.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2000

p. 27

comment	<p>47 comment by: NATS National Air Traffic Services Limited</p> <p>CS ACNS.ADS.2000 Suggest deletion as it contains no testable requirements and hence adds no value to this CS and is inconsistent with Mode S sections</p>
response	<p>Not Accepted</p> <p>ADS.2000 is a necessary placeholder at Book 1 level to embrace the approval of the entire ADS-B Out system, in addition to just the 'transponder' level (in particular relevant for the ADS-B Out horizontal position source). The relevant</p>

testable requirements are detailed in Book 2.

The inconsistency with the Mode S sections stems from the legacy approach to specifying Mode S certification requirements (i.e. TGL 13 and AMC 20-13)).

comment

63

comment by: IATA

With the fundamental change to DO260B transponders, the ADS-B out has to be recertified from scratch with no credit for previous ADS-B out certification. In order to avoid considerable technical and economic burdens to comply with NPA 2012-19 it is recommended to recertify the change introduced by the DO260B, i.e. the delta defined for ELS & EHS approval.

response

Not Accepted

The differences between CS ACNS.ELS and. TGL-13 or between CS ACNS.EHS and. AMC 20-13 are rather limited and well contained. In contrast, the differences between CS ACNS.ADS and AMC 20-24 are more numerous, also with respect to detailed aspects spanning across the whole of the CS ACNS.ADS provisions. For that reason, a similar approach as for Mode S ELS/EHS is not appropriate.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2005

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comment

18

comment by: General Aviation Manufacturers Association / Hennig

EASA proposes in CS ACNS.ADS-2005 ADS-B Out Data Parameters (a) that "(16) GPS Antenna Offset" be included among the minimum set of data parameters.

GAMA notes that while the FAA proposed the inclusion of GPS Antenna Offset among required parameters in its original Notice of Proposed Rulemaking (NPRM), the FAA in its final rule (14 CFR 91.227) did not require GPS Antenna Offset among the ADS-B parameters.

GAMA notes that EASA requires data quality indicators (that is, NIC, NACp, SIL and Navigation Accuracy Category for Velocity NACv) per Appendix H, Part 3, Table 20 which are based on 3NM and 5NM airborne separation requirements (such as, NACp \geq 7 for both 3NM and 5NM as well as NIC \geq 6 as the constraint for 3NM airborne separation).

The primary use of the GPS Antenna Offset is for surface applications such as ATSA-SURF. However, it should be noted that when the FAA made its shift from NACp \geq 9 to NACp \geq 8, the FAA made that decision with consideration that the ATSA-SURF would not be among near-term applications deployed. Additionally, for most aircraft, the GPS Antenna Offset parameter is not relevant to determining the aircraft location in context of other position and integrity information.

Since EASA is requiring lower position accuracy and integrity (see, Appendix H, Part 3, Table 20 and is silent on the deployment of surface applications), GAMA recommends that the agency remove the (16) GPS Antenna Offset parameter from the list of minimum data parameters in CS ACNS.ADS-2005.

As an aside, GAMA notes that when ARINC 718A-5 was negotiated for DO-260B compliance, there were significant discussions about there being no additional pins to provide the lateral offset in a legacy installation. As a result, it is GAMA's

response	<p>view that requiring antenna offset would have a significant impact for transport category business jets as well as air transport aircraft. The ARINC 718A-5 was voted on and accepted in November 2011.</p> <p>Not Accepted</p> <p>GPS Antenna Offset is a requirement stemming from (EU) Regulation No 1207/2011 To delete this requirement is outside of the scope of this task.</p>
comment	<p>28 <i>comment by: General Aviation Manufacturers Association / Hennig</i></p> <p>EASA identifies in CS ACNS.ADS.2005 the minimum set of ADS-B Out system data parameters. The description of several data parameters does not align with the commonly accepted description including:</p> <p>(4b) EASA NPA 2012-19 (Airborne Horizontal Position Quality: NIC). FAA 14 CFR 91.227 ("Navigation Integrity Category (NIC)" which specifies an integrity containment radius around an aircraft's reported position, as defined in TSO-C166b...)</p> <p>(4c) EASA (Horizontal Position Quality: NACp). FAA ("Navigation Accuracy Category for Position (NACp)" which specifies the accuracy of a reported aircraft's position, as defined in TSO-C166b...)</p> <p>(4d) EASA (Horizontal Position Quality: SIL). FAA ("Source Integrity Level (SIL)" which indicates the probability of the reported horizontal position exceeding the containment radius defined by the NIC on a per sample or per hour basis, as defined in TSO-C166b...)</p> <p>(4a) EASA (Horizontal Position Quality: SDA). FAA ("System Design Assurance (SDA)" which indicates the probability of an aircraft malfunction causing false or misleading information to be transmitted, as defined in TSO-C166b...)</p> <p>(9b) EASA (Horizontal Velocity Quality: NACv). FAA ("Navigation Accuracy Category for Velocity (NACv)" which specifies the accuracy of a reported aircraft's velocity, as defined in TSO-C166b...)</p> <p>GAMA recommends that EASA harmonize the ADS-B Out data parameters in CS ACNS.ADS.2005 and also ensure that the data parameter description be corrected throughout the CS document.</p>
response	<p>Accepted</p> <p>The purpose of ADS.2005 is to define the minimum set of parameters to be transmitted by the ADS-B Out system. Guidance on each of the data items (incl. definitions) are provided in Part 1 of Appendix H. These agree with respective FAA regulations and the underlying industry standards.</p> <p>The generic terms will be replaced by the defined terms associated with the acronyms as proposed.</p>
comment	<p>29 <i>comment by: General Aviation Manufacturers Association / Hennig</i></p> <p>EASA identifies in CS ACNS.ADS-2005 (b) that (1) Selected Altitude and (2) Barometric Pressure Setting be provided by the ADS-B Out system "where available".</p> <p>GAMA notes that implementation of Enhanced Surveillance require ACNS.EHS.2010 (a) Selected Altitude and (h) Barometric Pressure Setting. And, as a result, when ADS-B equipment also implements Enhanced Surveillance these</p>

response	<p>parameters are required. However, Selected Altitude and Barometric Pressure are optional per ED-102A / ETSO-C166b which is not acknowledged in this guidance (or in Regulation (EU) No 1207/2011).</p> <p>GAMA recommends that for clarity this Certification Specification acknowledge that broadcast of Selected Altitude and Barometric Pressure Setting is optional for equipment meeting ETSO-C166b, but required to be compliant with Commission Regulation (EU) No 1207/2011.</p> <p>Accepted</p> <p>A note has been added to AMC1.ACNS ADS.2010.</p>
comment	<p>46 comment by: NATS National Air Traffic Services Limited</p> <p>CS ACNS.EHS.3010 Appears to be incomplete as it is currently an unfinished statement</p>
response	<p>Noted</p> <p>The text is consistent with the AC, ELS, and EHS sections and standard practise.</p>
comment	<p>48 comment by: NATS National Air Traffic Services Limited</p> <ul style="list-style-type: none"> We note that there is no definition of Pressure Altitude within ADS-B section; should reference Section CS ACNS.ELS.2010(a)(2) & .2020 to ensure common Mode S and ADS-B altitude performance CS ACNS.ADS.2005; why is there a need for sections a) and b). All of the data specified within this section is required under DO-260B and hence is required within this CS CS ACNS.ADS.2005 ADS-B Out Data Parameters -Include Selected Altitude and Barometric Pressure Setting in the minimum set of data parameters and make the required changes throughout the document for consistency. The rationale being: <p>These data items are included in:</p> <p>"COMMISSION IMPLEMENTING REGULATION (EU) No 1207/2011 of 22 November 2011</p> <p>Part B</p> <p>3. The following data items shall be made available to the transponder and be transmitted</p> <p>(r) mode control panel/flight control unit (MCP/FCU) selected altitude using the same source as for the same parameter specified in Part C when the aircraft is required and capable to transmit this data item via the Mode S protocol;</p> <p>(s) barometric pressure setting (minus 800 hectoPascals) using the same source as for the same parameter specified in Part C when the aircraft is required and capable to transmit this data item via the Mode S protocol;</p> <p>and</p> <p>Part C</p> <p>2. The following data items shall be made available to the transponder</p> <p>(a) MCP/FCU selected altitude;</p> <p>(h) barometric pressure setting (minus 800 hectoPascals);" and shall therefore be considered as the minimum set for ADS-B Out.</p>

response	<p>Not Accepted</p> <p>First bullet: Pressure Altitude is part of the ADS-B Out provisions (listed in ...ADS.2005, respective data source requirements are defined in ...ADS.2030.</p> <p>second bullet: ED102A / DO260B provide a harmonised standard for the data parameters that could be made available to download, they do not specify which data parameters are to be provided in certain. Regulation (EU) No 1207/2011 defines the specific set of parameters that are required for operations within European Airspace, as such CS.ACNS.ADS.2005 implements this requirements.</p> <p>Third bullet: The regulation is clear that Selected Altitude and Barometric Pressure Setting are not mandatory parameter to be include in ADS-B massage and are only to be provided if the data is available.</p> <p><i>The following data items shall be made available to the transponder and be transmitted</i></p> <p><i>(r) mode control panel/flight control unit (MCP/FCU) selected altitude using the same source as for the same parameter specified in Part C when the aircraft is required and capable to transmit this data item via the Mode S protocol;</i></p> <p><i>(s) barometric pressure setting (minus 800 hectoPascals) using the same source as for the same parameter specified in Part C when the aircraft is required and capable to transmit this data item via the Mode S protocol;</i></p> <p><i>and</i></p>
comment	<p>92</p> <p>comment by: Boeing</p> <p>Page: 28</p> <p>Paragraph: CS ACNS.ADS.2005 ADS-B Out Data Parameters; para. (b)</p> <p><u>The proposed text states:</u></p> <p>"(b) Where applicable in a suitable format, the ADS-B Out system provides the following data parameters:</p> <p>(1) Selected Altitude;</p> <p>(2) Barometric Pressure Setting;</p> <p>(3a) ACAS Operational; and</p> <p>(3b) ACAS Resolution Advisory."</p> <p><u>REQUESTED CHANGE:</u></p> <p>Revise this section as follows:</p> <p>(b) Where applicable in a suitable format, the ADS-B Out system provides the following data parameters:</p> <p>(1) Selected Altitude;</p> <p>(2) Barometric Pressure Setting; <u>and</u></p> <p>(3a) ACAS Operational; and</p> <p>(3b) ACAS Resolution Advisory.</p> <p><u>JUSTIFICATION:</u></p> <p>"ACAS Operational" is not explicitly stated as a requirement in the Implementing Regulation (EU) No. 1207/2011, dated 22 November 2011. Only "ACAS Resolution Advisory" is required.</p>
response	<p>Accepted</p> <p>The text has been amended accordinally.</p>

comment	<p>93</p> <p>comment by: <i>Boeing</i></p> <p>Page: 28 Paragraph: <i>CS ACNS.ADS.2005 ADS-B Out Data Parameters, para. (a)(16)</i> <u>The proposed text states:</u> “(a) The ADS-B Out system provides the following minimum set of data parameters: ... (16) GPS Antenna Offset;” <u>REQUESTED CHANGE:</u> Revise the text as follows: “(a) The ADS-B Out system provides the following minimum set of data parameters: ... (16) GPS Antenna <u>Longitudinal</u> Offset;” <u>JUSTIFICATION:</u> The ARINC 718A-4 standard for ATC transponders currently only supports a GPS antenna <u>longitudinal</u> offset. There are no program pins assigned to implement a GPS antenna <u>lateral</u> offset. All Boeing aircraft have the GPS antennas installed within 1 meter of the aircraft centerline. Therefore, the GPS Antenna lateral offset is always 0. Additionally, a review of GPS antenna locations on a number of other commercial aircraft reveals that the GPS antennas are also installed within 1 meter of the aircraft centerline.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>146</p> <p>comment by: <i>EUROCONTROL</i></p> <p>Currently, only with Appendix H it is clarified that in addition to the stated Surface Horizontal Position Quality: NIC, the NACp, SIL, SDA parameters as required for Airborne Horizontal Position apply to Surface Horizontal Position as well. Proposal: In order to avoid misunderstandings, add clarification at an earlier point within document (e.g. under AMC1 ACNS.ADS.2005), or add additional quality indicators directly under CS ACNS.ADS.2005.</p>
response	<p>Accepted</p> <p>Propose to include ‘airborne/surface’ as appropriate (i.e. except for NIC for which there are 2 distinct parameters 4b and 12b).</p>
comment	<p>201</p> <p>comment by: <i>Eurocopter</i></p> <p>As compared to AMC 20-24, a number of ADS-B Out data parameters is added (e.g. velocity over ground (which was optional), vertical rate ...). Addition of those parameters may have strong impacts on existing systems or on systems presently under development, especially lead to complicate the system architecture.</p>
response	<p>Noted</p>

Thank you for your comment. The requirements proposed are in accordance with Commission Regulation (EU) No 1207/2011 and its not within the scope of this task to amend the requirements imposed by the regulation.

comment 234 comment by: *Garmin International*

Regarding CS ACNS.ADS.2005 (a):
In item (a), the following data parameter descriptions should be corrected here and throughout the document:
(4b) Navigation Integrity Category: NIC;
(4c) Navigation Accuracy Category for Position: NACp;
(4d) Source Integrity Level: SIL;
(4e) System Design Assurance: SDA;
(9b) Navigation Accuracy Category for Velocity: NACv;

response Accepted

The text has been amended accordingly.

comment 235 comment by: *Garmin International*

Regarding CS ACNS.ADS.2005 (b):
Per item (b), the Selected Altitude and Barometric Pressure Setting parameters are required to be transmitted when the data is available. These parameters are required for enhanced surveillance (ref. CS ACNS.EHS.2010). Therefore, the parameters are required for ADS-B when the equipment also implements Enhanced Surveillance. This is consistent with Commission Regulation (EU) No 1207/2011.

What is not acknowledged by Commission Regulation (EU) No 1207/2011 nor by this guidance is that the ADS-B broadcast of Selected Altitude and Barometric Pressure Setting is contained in an ADS-B message that is optional per ED-102A and hence optional for equipment meeting ETSO-C166b.

It is suggested that this guidance acknowledge that the broadcast of Selected Altitude and Barometric Pressure Setting is optional for equipment meeting ETSO-C166b and equipment must implement this optional functionality to be compliant with Commission Regulation (EU) No 1207/2011.

response Accepted

AMC1.ACNS ADS.2010 has been amended accordingly.

comment 264 comment by: *Eurocopter*

One of the additional ADS-B Out data parameters is the aircraft vertical rate. However, unlike for CS ACNS.EHS.2010 (which states that the vertical rate can be the barometric altitude rate or the inertial vertical velocity, even with further details), there is no precise indication for the vertical rate in CS ACNS.ADS.2005. Precisions can be found through multiple indirections through AMC1 ACNS.ADS.2005(a-b), referring to Appendix H Part 1, then through table 5 to definition 14.
This raises 2 issues:

	<ul style="list-style-type: none"> • Misleading heterogeneity of approaches consisting in providing details either in the certification specification (book 1) or in the AMC (book 2), • Complexity of some indirections.
response	<p>Partially Accepted</p> <p>The CS-ACNS recognises the differences between the ADS-B and EHS provisions. Further guidance with respect to vertical rate has been introduced in response to comment 154</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2008

p. 28

comment 49 comment by: *NATS National Air Traffic Services Limited*

CS ACNS.ADS.2008; delete a) as it adds no value to document and is inconsistent with Mode S sections

response Not Accepted

ADS.2008(a) is a necessary Book 1 to embrace the approval of all data sources of the ADS-B Out system. The relevant testable requirements are detailed in Book 2.

comment 309 comment by: *UK CAA*

Page No: 28

Paragraph No: CS ACNS.ADS.2008

Comment: See AMC1 ACNS.ADS.2008(a)(c). '(a) All data provided by the ADS-B Out system comes from approved sources.' There is no further guidance on what constitutes suitable approved sources in the NPA.

Justification: Clarity.

Proposed Text: Provision of guidance on what is considered as suitable approved sources.

response Noted

Requested guidance is provided in AMC1 ACNS.ADS.2020-2040.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2010

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comment 50 comment by: *NATS National Air Traffic Services Limited*

CS ACNS.ADS.2010; recommend deleting this as it adds no value to document and is not testable

response Not Accepted

ADS.2010 is a necessary in Book 1 to embrace the approval of the ADS-B Transmit unit. The relevant testable requirements are detailed in Book 2 (AMC provisions).

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2012

p. 28

comment 52 comment by: *NATS National Air Traffic Services Limited*

ADS.2012 Antenna Diversity. Does this mean all ADS-B installations must have antenna diversity, including GA?

response Noted

Antenna diversity requirement applies in the same way as for CS ACNS.ELS.4030 i.e. Aircraft with a maximum certified take-off mass in excess of 5 700 kg or a maximum cruising true airspeed capability, under ISA conditions, in excess of 463 km/h (250 knots) operates with an antenna diversity installation. If the aircraft does not meet those criteria (e.g. GA aircraft) it does not need to implement antenna diversity.

comment 202 comment by: *Eurocopter*

Whereas AMC1 ACNS.ADS.2012 specifies how to indicate whether antenna diversity is implemented or not, requirement CS ACNS.ADS.2012 gives the impression that deploying antenna diversity is mandatory for all aircrafts. Suggestion is to rephrase the requirement, for example like "*The ADS-B transmit unit deploys antenna diversity in the same conditions as specified in CS ACNS.ELS.4030*".

response Accepted

For the aircraft affected by Commission Regulation(EU) No 1207/2011 article 5(6), antenna diversity is mandatory. In order to enhance the readability of AMC1 ACNS.ADS.2012, the proposed amendment is accepted.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2013

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comment 203 comment by: *Eurocopter*

CS ACNS.ELS.2013 should be CS ACNS.ADS.2013.

response Accepted

The text has been amended.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2018

p. 28-29

comment	51	comment by: <i>NATS National Air Traffic Services Limited</i>
	CS ACNS.ADS.2018; On ground definition is different from that defined for Mode S installations and includes 'validated by the ADS-B OUT system' which has no testable requirements associated with it. Suggest deleting the validated part and make common with Mode S definition	
response	<p>Not Accepted</p> <p>CS ACNS.ADS.2018 recognises the differences between the respective Mode S and ADS-B Out transponder provisions (i.e. ED73E / DO181E and ED102A / DO260B, respectively) and the corresponding need for separate aircraft installation requirements.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2020

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comment	53	comment by: <i>NATS National Air Traffic Services Limited</i>
	ADS.2020 Horizontal Position and Velocity Data Sources. This states that GNSS is the only valid source of position data. NATS would wish to seek clarification as to the accuracy of this statement; it is our understanding that other sources can be used where the appropriate NIC, NAC & SIL values are valid. Or is this text stating that only units with GNSS position are considered valid for the purpose of this regulation?	
response	<p>Noted</p> <p>Currently (and for the foreseeable future), only GNSS-based position sources are able to comply with the respective NIC and SIL requirements. As a consequence, only GNSS-based units are indeed considered valid for the purpose of this standard.</p>	
comment	55	comment by: <i>NATS National Air Traffic Services Limited</i>
	Horizontal performance requirements on ADS-B horizontal position and Figure of Merit are completely missing from this section. These testable requirements are the major issue with current ADS-B installations and one of the core elements that this CERTIFICATION SPECIFICATION shall address! They need to be added to the document; otherwise this section has no more value than the current AMS 20-24. Information is in the guidance material, but should be in the main body of the CS.	
response	<p>Partially Accepted</p> <p>Related guidance can be found in Book 2 (AMC) and related Appendices. Please note that further testing guidance has been added in Book 2 in response to related comments.</p>	

See also response to comment 153.

comment	204	comment by: Eurocopter
	<p>Requirement in subparagraph (c) is too restrictive. It should be written that if several sources are used, they shall be coherent.</p> <p><u>NOTE:</u> More generally, the CS should consider objectives, like consistency of data. Means to reach the objective through system architecture choices, i.e. using one or several sources, cross-checking sources ... should be kept as design decisions.</p>	
response	<p>Not Accepted</p> <p>For reasons such as ensuring the same time of applicability, it is important that the velocity data stems from the same source as the position data. Please note that this is also an ETSO-C166b (ED102A) requirement.</p>	
comment	278	comment by: AIRBUS
	<p>Requirements for ADS-B Out position source are defined in term of technical solution (GNSS source), and not in term of required performance level. Some other aircraft solutions exist where the GPIRS solution is used as the ADS-B Out position source.</p> <p>Appendix H Part 5 "GNSS Position and Velocity Source Qualification" identifies the FAA AC 20-138B as applicable. FAA AC 20-138C was published on May 8th, 2012. Existing GNSS installations are not qualified against AC 20-138 ().</p> <p>Applicable requirements for the ADS-B Out position source shall be specify in term of performance.</p> <p>ADS-B Out position sources other than the GNSS shall be recognized as acceptable, as done in FAA AC 20-165 ().</p> <p>Then compliance means is depending on the position source. As an example, a GPIRS position source does not implement RAIM algorithm.</p> <p>GNSS installations qualified against previous qualification & certification standards shall be recognized as acceptable, provided compliance demonstration with applicable performance requirements are demonstrated. Note that the cost of these additional compliance demonstrations shall be take into account in the economic impact analysis.</p>	
response	<p>Partially Accepted</p> <p>GNSS-based horizontal position sources are the only sources that are considered to meet the respective NIC and SIL requirements (see Appendix H, Part 3). Closely coupled GNSS / IRS solutions are considered as (higher-end) GNSS-based sources that can provide a position source performance that is equivalent to the minimum required ETSO 129a performance. Previous qualification & certification standards will be recognised, if compliance demonstration with applicable performance requirements can indeed be demonstrated.</p> <p><u>With respect to Appendix H Part 5 reference has been changed to AC 20-138C:</u></p>	

comment	126	comment by: <i>USAF AFMC/LCMC/HBAI</i>
	In section AMC1 ACNS.ADS.2030 (e) of the NPA, no guidance is given as to how to populate the Selected Altitude field of ADS-B register 62 ₁₆ . According to EU Regulation 1207/2011 Annex II Part B.3.(r), MCP/FCU selected altitude must be provided in the ADS-B messages if required and capable to transmit MCP/FCU via the Mode S protocol. Since the Selected Altitude field could contain either MCP/FCU Selected Altitude or FMS Selected Altitude, guidance should be given in the NPA as to the preferred source of the ADS-B register 62 ₁₆ Selected Altitude field.	
response	<p>Noted</p> <p>As required in Regulation (EU) No 1207/2011 Annex II Part B.3.(r) if MCP/FCU selected altitude is provided through the Mode S Enhanced Surveillance replies (in register 4016) the same information shall also be provided in the ADS-B 1090 MHz Extended Squitter (in register 6216 with selected altitude type = 0). If the SSR transponder does not transmit MCP/FCU selected altitude in register 4016 in Mode S replies it is not required to transmit MCP/FCU selected altitude in register 6216 in Extended Squitter. In that case it may transmit FMS selected altitude in register 6216 in Extended Squitter (with selected altitude type = 1) and it may transmit FMS selected altitude in register 4016 in Mode S replies. To summarise if MCP/FCU selected altitude is available it must be provided by the aircraft in Mode S replies and in Extended Squitters as it is mandated by Commission Regulation (EU) No 1207/2011 otherwise FMS selected altitude may be provided in Mode S replies and in Extended Squitters. This is further confirmed in § 2.2.3.3.7.1.3.3 of EUROCAE ED-102A.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.2034

p. 29

comment	205	comment by: <i>Eurocopter</i>
	Requirement in subparagraph (a), that the geometric altitude is provided by the same source as horizontal position, is too restrictive (see previous comment for CS ACNS.ADS.2020).	
response	<p>Not Accepted</p> <p>see response to comment 204.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3000

p. 29-30

comment	54	comment by: <i>NATS National Air Traffic Services Limited</i>
	Section CS ACNS.ADS.3000; replace (17) & (18) with Pressure Altitude and NIC _{BARO} respectively, as Geometric Altitude is not used in the majority of ATM operations but Flight Levels are.	
response	Not Accepted	

Geometric Altitude (and GVA) are ADS-B Out data parameters that are to be transmitted in addition to Pressure Altitude. The requirement to transmit Geometric Altitude (and GVA) is in accordance with Commission Regulation (EU) No 1207/2011.

Note that NIC_{BARO} is already listed in ADS.2005.

comment 94

comment by: Boeing

Page: 30

Paragraph: CS ACNS.ADS.3000 Design assurance, para. (a)(16)

The proposed text states:

"(a) The ADS-B Out system is designed commensurate with a major failure condition for the transmission of the following parameters:

...

(16) GPS Antenna Offset;"

REQUESTED CHANGE

Revise the text as follows:

"(a) The ADS-B Out system is designed commensurate with a major failure condition for the transmission of the following parameters:

...

(16) GPS Antenna **Longitudinal** Offset;"

JUSTIFICATION:

The ARINC 718A-4 standard for ATC transponders currently only supports a GPS antenna longitudinal offset. There are no program pins assigned to implement a GPS antenna lateral offset. All Boeing aircraft have the GPS antennas installed within 1 meter of the aircraft centerline. Therefore, the GPS Antenna lateral offset is always 0. Additionally, a review of GPS antenna locations on a number of other commercial aircraft reveals that the GPS antennas are also installed within 1 meter of the aircraft centerline.

response Not Accepted

See response to Boeing comment 93.

comment 147

comment by: EUROCONTROL

In order to enhance traceability and readability, ADS.3000 should refer to the list of parameters in ADS.2005.

Proposal:

Express bullet (a) and its sub-bullets as follows:

(a) With respect to misleading information, the ADS-B Out system shall be designed commensurate with a 'major' failure condition for the transmission of the following subset of parameters listed in CS ACNS.ADS.2005:

- (1) Airborne Horizontal Position, including its quality indicators
- (2) Airborne Velocity over Ground, including its quality indicator
- (3) Surface Horizontal Position, including its quality indicators
- (4) Surface Velocity (Ground Track and Movement), including its quality indicator
- (5) Geometric Altitude, including its quality indicator
- (6) ICAO 24 bit aircraft address, 1090 ES Version Number and Emitter Category
- (7) Length/width of Aircraft and GPS Antenna Offset

response Partially Accepted

The parameters are named consistently with the list in CS ADSB.2005 (a).

comment 148

comment by: EUROCONTROL

Bullet (b): Guidance should be added that "other" parameters refers to any other parameters being broadcast by the ADS-B transmit unit / function, i.e. also data parameters that are not listed in CS ACNS.ADS.2005 and not referred to in CS ACNS.ADS.3000(a).

Proposal:

Bullet (b) to be expressed as follows:

(b) With respect to misleading information, the ADS-B Out system shall be designed commensurate with a 'minor' failure condition for the transmission of the other parameters listed in AMC1 ACNS.ADS.2005(a-b) and any additional parameters the ADS-B Out system might transmit.

In addition, respective guidance should be added under AMC1 ACNS.ADS.3000 (currently missing altogether)

response Partially Accepted

The text has been amended to incorporate the intent of this comment.

comment 206

comment by: Eurocopter

A major failure condition may be hard to fulfil. We propose to maintain a severity of "minor".

response Not Accepted

The 'major' requirement is in accordance with Commission Regulation (EU) No 1207/2011 (and the underlying ADS-B-RAD requirements).

comment 319

comment by: AIRBUS MILITARY

CS ACNS.ADS.3000 (b): Clarification: Please confirm that Pressure altitude provided through ADS-B out system is to be designed under MINOR failure condition

response Noted

As the pressure altitude is not listed under CS ACNS.ADS.3000 (a), pressure altitude provided through ADS-B out system is to be designed under minor failure condition.

comment 8

comment by: Federal Aviation Administration

response	<p>Comment:</p> <p>CS ACNS.ADS.3010 requires an ADS-B Out system to be designed to an allowable qualitative probability of remote. As per AMC 25-1309, a remote failure is defined to be a failure condition that has an average probability per flight hour of 10^{-5} or less, but greater than 10^{-7}. This contradicts the current system continuity requirement in EU No 1207/2011 of 10^{-4} per flight hour. The more stringent requirement in ACNS.ADS.3010 requires an upgrade to avionics equipment.</p> <p>Suggested Resolution:</p> <p>Refer to Loss of function of the ADS-B Out System in CS ACNS.ADS.3010. Also describe Loss of function to be designed to a probability of probable for the parameters listed in ACNS.ADS.3000 subparagraph a.</p> <p>Accepted</p> <p>The text has been amended to be consistent with the ELS and EHS sections.</p>
comment	<p>24 comment by: CAA-NL</p> <p>CS ACNS.ADS.3010 Continuity:</p> <p>The proposed requirement does not state what the probability should apply to (it is presumed it applies to loss of function but this is not stated). Also, use of the qualifier "qualitative" is not in line with stating a quantitative requirement.</p> <p>Proposal: Replace this by: "The ADS-B Out system is designed to an allowable quantitative probability of loss of function of remote (see AMC 25.1309 section 7)".</p>
response	<p>Partially Accepted</p> <p>The text has been amend to be consistent with the ELS and EHS sections and clarifies the intent</p>
comment	<p>64 comment by: IATA</p> <p>Commission Regulation (EU) No 1207/2011 regarding the ADS-B Out 1090 MHz Extended Squitter requires a system continuity of $2 * 10^{-4}$ per flight-hour (or 5000 hr Minimum Time Between Failure (MTBF)) (ANNEX II, Part B, §16)</p> <p>The NPA 2012-19 however, requires an allowable qualitative probability of remote failure that has an average probability per flight hour of the order of $1 * 10^{-5}$ (i.e. 100.000h MTBF) or less, but greater than $1 * 10^{-7}$" (Appendix H, Part 1, Definition 8 & Part 3).</p> <p>This requirement is a factor 20 more demanding than the original requirement. IATA/AEA raises their concern whether the certification of avionics against this requirement is justified and feasible and as a consequence will lead to increase costs to an unacceptable level with no tandem increase in benefits</p> <p>Today none of the equipment (e.g. Mode S transponder, GPS sensor,...) available on the market comply with such stringent MTBF requirements, which is equivalent to a complete life cycle overhaul of an aircraft.</p> <p>IATA/AEA strongly request the retention of system requirement of 5000 hr MBTF.</p>
response	<p>Accepted</p> <p>The text has been amended to incorporate the intent of this comment.</p>

comment	<p>95</p> <p>comment by: <i>Boeing</i></p> <p>Page:30 Paragraph: CS ACNS.ADS.3010...Continuity The proposed text states: "The ADS-B Out system is designed to an allowable qualitative probability of remote." REQUESTED CHANGE: Revise the text as follows: "The ADS-B Out system is designed to an allowable qualitative probability of remote probable." JUSTIFICATION: A "remote" probability for Continuity requires a $<1.0 \times 10E-5$ per flight-hour failure rate for loss of function. Certain ADS-B Out parameters have only a single data source (e.g., Mode A code and the SPI/IDENT indication comes from a single ATC Control Panel) and would not be able to meet a remote (i.e. $<1.0 \times 10E-5$ per flight-hour) probability requirement for continuity. Even if the Mode A code and SPI/IDENT were excluded from the list of required continuity parameters, a remote ($<1.0 \times 10E-5$ per flight-hour) requirement would force operators to have two ATC transponders to be operational for aircraft dispatch. This would be an impact to operators, and would be inconsistent with the current ATC transponder continuity requirement of <u>probable</u> ($<1.0 \times 10E-3$ per flight-hour).</p>
response	<p>Partially Accepted</p> <p>The text has been amended for qualitative probability term used in aircraft certification that meet the objective of Commission Regulation (EU) No 1207/2011.</p>
comment	<p>149</p> <p>comment by: <i>EUROCONTROL</i></p> <p>1/ Commission Regulation (EU) No 1207/2011 requires a System Continuity of 2×10^{-4}/flight-hour (or 5000h MTBF) [Part B, paragraph 15). In contrast, CS ACNS.ADS.3010 requires an "allowable qualitative probability of remote". In line with AMC 25-1309, 'remote' failure conditions "are those having an average probability per flight hour of the order of 1×10^{-5} or less, but greater than of the order of 1×10^{-7}".</p> <p>As a consequence, ACNS.ADS.3010 establishes a requirement that is in the order of a factor of 20 more stringent than (EU) No 1207/2011. This raises the question of requirement traceability as well as of certifiability (or high operator cost implications due to an unsubstantiated equipage upgrade of at least the horizontal position source, transponder and interconnecting avionics).</p> <p>2/ Does the CS requirement refer to any data parameter transmitted by ADS-B, the list in CS ADS.2005 or the one in CS ADS.3000 ? In effect, it should be CS ACNS.ADS.3000(a).</p> <p>3/ The CS requirement should refer to "loss of function" to clarify that Continuity failures are distinct from System Integrity (Design Assurance) failures.</p> <p>Proposal: CS ACNS.ADS.3010 Continuity should be expressed as follows: (a) With respect to loss of function, the ADS-B Out system shall be designed to an allowable qualitative probability of 'probable', however with a minimum mean time between failure in the order of 5000 flight hours, for the transmission of the parameters as specified in CS ACNS.ADS.3000(a).</p>

	<p>In addition, respective guidance should be added under AMC1 ACNS.ADS.3010 (currently missing altogether). Requirement for "other" parameters is missing.</p> <p>Proposal:</p> <p>A bullet (b) should be added, as follows:</p> <p>(b) With respect to loss of function, the ADS-B Out system shall be designed to an allowable qualitative probability of 'probable' for the transmission of the other parameters listed in AMC1 ACNS.ADS.2005(a-b) and any additional parameters the ADS-B Out system might transmit.</p>
response	<p>Partially Accepted</p> <p>The text has been amended to incorporate the intent of this comment and to be consistent with the ELS and EHS sections.</p>

comment	<p>207</p> <p>comment by: Eurocopter</p> <p>According to the definition in AMC 25.1309 (which, as already stated, is only valid for large aeroplanes), "remote" means "of the order of 1×10^{-5} or less, but greater than of the order of 1×10^{-7}".</p> <p>The requirement is therefore adding severity as compared to the previous requirement in AMC 20-24 (2×10^{-4}/flight hour) and is likely to induce the installation of a second transponder, which would be very difficult on some helicopters.</p> <p>We suggest considering that the severity of the loss of this function is minor.</p>
response	<p>Partially Accepted</p> <p>The text has been amend for qualitative probability used within aircraft certification that meet the objective with Commission Regulation (EU) No 1207/2011.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3022

p. 30

comment	<p>308</p> <p>comment by: UK CAA</p> <p>Page No: 30</p> <p>Paragraph No: CS ACNS.ADS.3022</p> <p>Comment: The latency requirement quoted here is a blanket requirement of 1.5 seconds. AMC 20-24 (section 8.2.3) on the other hand takes a probabilistic approach "The latency of the horizontal position data, including any uncompensated latency, introduced by the (overall) ADS-B System does not exceed 1.5 second in 95% and 3 seconds in 99.9% of all ADS-B message transmission cases"</p> <p>Justification: This section may be confusing for readers familiar with AMC 20-24.</p> <p>Proposed Text: Add justification on whether AMC 20-24 figures apply or not, and clarify whether the total latency requirement is 1.5 seconds 100% of the time.</p>
response	<p>Noted</p>

The CS ACNS ADS Out provisions for ADS-B-RAD) operations exceed the requirements in AMC 20-24 (ADS-B-NRA) in some parts. As detailed in Book 2, compliance with the CS ACNS ADS-B Out latency requirements is expected to be performed by design analysis, i.e. the total of all of the individual component latencies should be established as the sum of their maximum latencies. (Note that these provisions are also in line with FAA AC 20-165A.)

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 1 - Subpart D - CS ACNS.ADS.3024

p. 30

comment

96

comment by: Boeing

Page: 30

Paragraph: *CS ACNS.ADS.3024 Horizontal Position Uncompensated Latency*The proposed text states:

"The uncompensated latency of the horizontal position data introduced by the ADS-B Out System does not exceed 0.6 second."

REQUESTED CHANGE:

Revise the text as follows:

"The uncompensated latency of the horizontal position data introduced by the ADS-B Out System does not exceed 0.6 second. **The aircraft must compensate for any latency greater than 0.6 seconds, but must not overcompensate by more 0.2 seconds (i.e., lead the aircraft position).**"

JUSTIFICATION:

We suggest capturing leading and lagging latency requirements under one heading to avoid confusion. This suggested change makes the uncompensated latency requirement the same as in FAA AC 20-165A, published on 7 Nov 2012.

This also makes CS ACNS.ADS.3024 consistent with AMC1 ACNS.ADS.3022 and 3024, Horizontal Position and Velocity Total and Uncompensated Latency b) Compliance Demonstration, which calls out a transmitted position limit not further ahead than 200 ms.

response

Not Accepted

Allowing the latency to be greater than a not exceeded value within the same requirement is not acceptable practice. However, the requested information is contained in AMC1 ACNS.ADS.3024.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2

p. 32

comment

97

comment by: Boeing

Page: 32

Paragraph: *Book 2 Guidance Material*The proposed title reads as:

"CS-ACNS Book 2 Guidance Material"

REQUESTED CHANGE:

We suggest revising the title to:

"CS-ACNS Book 2 **Acceptable Means of Compliance (AMC) and** Guidance Material (GM)"

JUSTIFICATION:

	As identified in "(a) General" at the top of Page 33 of the NPA, the primary information in Book 2 is the Acceptable Means of Compliance (AMC) requirements. Therefore, this should be noted on the title page of Book 2 in order to be consistent.
response	Accepted The title has been amended.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - (b) Presentation

p. 33

comment	<p>98</p> <p>comment by: Boeing</p> <p>Page: 33 Paragraph: (b)(2) PRESENTATION The proposed text states: "(2) A numbering system has been used in which the Acceptable Means of Compliance and Guidance Material use the same number as the paragraph in Book 1 to which they are related. The number is introduced by the letters AMC (Acceptable Means of Compliance) or GM (Guidance Material) to distinguish the material from Book 1. Reference to the Acceptable Means of Compliance is included in the heading of each Book 1 paragraph." <u>REQUESTED CHANGE:</u> Not all of the Book 1 CS requirements have a reference to an AMC or GM paragraph (e.g., CS ACNS.AC.2010 Data transmission). We suggest either modifying the sentence to make it more accurate, or including all missing the AMC and GM references to Book 1. <u>JUSTIFICATION:</u> The proposed text is incorrect as stated.</p>
response	<p>Accepted</p> <p>The text has been amended to read:</p> <p>'.... Reference to the Acceptable Means of Compliance and/or Guidance Material, when applicable, is included in the heading of each Book 1 paragraph.'</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart A - AMC1 ACNS.GEN.102

p. 34

comment	<p>56</p> <p>comment by: NATS National Air Traffic Services Limited</p> <p>Subpart A – General AMC1 ACNS.GEN.102 Instructions for Continued Airworthiness: Set the Mode A code to 7776 (or other Mode A code agreed with Air Traffic Control Unit). Note: The Mode A code 7776 is assigned as a test code by the ORCAM Users Group, specifically for the testing of transponders. Suggest modifying the note to read Note: The Mode A code of 7776 is reserved for SSR ground transponder monitoring. This code may be used for transponder testing after having received</p>
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response	agreement from the Air Traffic Control Unit. Rationale EUR DOC 023 EUROPEAN SECONDARY SURVEILLANCE RADAR (SSR) CODE MANAGEMENT PLAN AMENDMENT 1 MARCH 2012 defines: Code 7776 and Code 7777 are reserved for SSR ground transponder monitoring.	
	Accepted The text has been amended.	
comment	99	comment by: Boeing
response	Page: 34 Paragraph: <i>AMC1 ACNS.GEN.102 Instructions for Continued Airworthiness, para. (a)(2)</i> <u>The proposed text states:</u> The last sentence of proposed paragraph (a)(2) states: "... See §6.4.2.2c and d". <u>REQUESTED CHANGE:</u> Delete or correct this reference. We are unable to find a §6.4.2.2c or d in the proposed document. <u>JUSTIFICATION:</u> A correction or other revision is needed to clarify the intent of the text.	
	Accepted The text has been deleted.	
comment	180	comment by: EUROCONTROL
response	AMC number is incorrect it should be 1020 to be consistent with corresponding CS.	
	Accepted Typographical error has been amended.	
comment	320	comment by: AIRBUS MILITARY
response	Errata: requirement GEN.1020 (missing last "0") Errata: ref "§6.4.2.2.c" does not exist on the document	
	Accepted Typographical error has been amended.	

GAMA notes that "Subpart B - Communications (COM)" is identified as "Reserved" in NPA 2012-19 which according to its title proposes "Certification Specifications, Acceptable means [sic] of Compliance, and Guidance Material on Airborne Communications Navigation and Surveillance". This Notice of Proposed Amendment (NPA) is based on rulemaking task 20.016 (RMT.0559) which is titled "Approval requirements for **Air-Ground Data Link** [emphasis added] and ADS-B in support of Interoperability requirements"

It is with great disappointment that GAMA notes that EASA has yet to publish required guidance for compliance with communications requirements including data link (such as, Link 2000). As the agency knows, the Single European Sky Data Link Service Implementing Rule (DLS IR) legislation was published in January 2009 (EC Regulation 29/2009) which specifies European implementation dates. The Regulation requires that all new aircraft operating above FL285 shall be delivered with a compliant system after 1 January 2011. This is now over two years ago. Additionally, all aircraft operating above FL285 shall be retrofitted with a compliant system by 5 February 2015.

The lack of certification guidance from EASA is one of several key reasons why manufacturers are unable to deliver aircraft with compliant systems to meet the DLS IR requirements.

GAMA invites EASA to consider the timeline for Link 2000/CPDLC:

- 26 December 2007, AMC 20-11 was published
- 16 January 2009, DLS IR was published in the Official Journal
- 28 March 2010, a generic Certification Review Item (CRI) was created that would supersede AMC 20-11. (The CRI process generally lengthens the certification process by several months.)
- 1 January 2011, the Link 2000/CPDLC/DLS IR forward fit mandate took effect.
- 16 November 2012, EASA publishes NPA 2012-19 which is intended to also cover data link guidance, but that section is "reserved".

GAMA members have numerous concerns primarily focused on the lack of stable certification guidance and criteria. Generally, the agency must recognize that:

- The Minimum Operating Performance Standards (MOPS) and European Technical Standards Order (ETSO) must be defined and stabilized before avionics manufacturers can build products. A minimum of 36 months must be allowed before a mandate becomes effective.
- The Certification Specifications (CS) and Acceptable Means of Compliance (AMC) must be defined and stabilized before the OEM can certify the avionics in the aircraft. At least 24 months must be provided from the CS/AMC and any associated CRI to the earliest effective mandate for production aircraft.
- Finally, placing the burden of interoperability on the suppliers and the OEM is not practical, especially when the ground systems have not been fully deployed.

The one part of Regulation (EC) 29/2009 that has worked is the establishment of a process for manufacturers and operators to file for exemptions under Article 14. Finally, GAMA members remain concerned about the lack of benefits from the Link 2000 programme and the manner in which the Regulation introduces costs. Two specific cost drivers are:

1. For practical purposes driving operators / aircraft to be "dual stack" equipped to meet the NAT FANS 1/A requirement in combination with Link

	<p>2000 ATN-B1 in Europe.</p> <p>2. Not recognizing within the Link 2000 Programme that for most operators the goal will be to converge on a future ATN B2 equipage that will be harmonized with the FAA.</p> <p>In closing, GAMA recommends that EASA move quickly to establish the needed guidance for those manufacturers / operators that are working toward compliance with Regulation (EC) 29/2009. Additionally, the agency must ensure that minimum appropriate timeline are available between the publication of CS/AMC material and compliance deadlines. GAMA recommends that a minimum of 24-36 months be provided for new aircraft deliveries.</p>
response	<p>Noted</p> <p>The Agency has taken note of GAMA's comments. The NPA 2013-06 addressing DLS was published on 15 April 2013.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.AC.2000

p. 37-38

comment	<p>100</p> <p>comment by: <i>Boeing</i></p> <p>Page: 37 Paragraph: <i>Subpart D — Surveillance (SUR)</i> There are no statements on what ground tests or flight tests need to be conducted, or which requirements for which analysis, simulation demonstration, or lab tests are acceptable means of compliance. <u>REQUESTED CHANGE:</u> We suggest that information be provided on what ground tests or flight tests need to be conducted, and which requirements can be demonstrated using analysis, simulation, or lab tests for means of compliance. <u>JUSTIFICATION:</u> As the title suggests, the "Acceptable Means of Compliance (AMC)" section should clearly identify what the acceptable means of compliance are for demonstrating compliance with the Certification Specifications. The AMCs should clearly identify which requirements require flight testing, which can be met by aircraft ground testing, which can be met by lab testing, which can be met by simulation, and which can be met by analysis. These AMCs should be consistent and harmonized with FAA Advisory Circular 20-165A, so that unnecessary aircraft testing is minimized, and testing credit can be taken for both the FAA AC and the EASA AMC.</p>
response	<p>Noted</p> <p>The applicant is free to demonstrate compliance using its preferred solution (flight or ground tests).</p>
comment	<p>165</p> <p>comment by: <i>EUROCONTROL</i></p> <p>NPA 2012-16 is proposing to withdraw ETSO-C74d. Please remove reference to ETSO-C74d</p>

response	<p>Not Accepted</p> <p>Although ETSO-C74d is cancelled, transponder holding an EASA equipment authorisation can still be manufactured, therefore, the statement is still valid. The use of ETSO C74d is an acceptable means of compliance the applicant may choose another as appropriate.</p>
comment	<p>209 comment by: Eurocopter</p> <p>So as to lighten compliance substantiation, it should be clearly indicated which requirements are de-facto fulfilled if the transponder equipment has an ETSO-C74 authorization or is compliant to that ETSO.</p> <p>We suggest adding an appendix for cross-reference between CS ACNS.AC and ETSO-C74.</p> <p>NOTE: The requirement for transponders to hold an EASA equipment authorisation to ETSO-C74d is a constraint, knowing that some transponders are still currently manufactured as per TSO-C74c.</p>
response	<p>Not Accepted</p> <p>EASA equipment authorisation in accordance with ETSO-C74d gives compliance with CS ACNS.AC.2000 only. The other requirements are related to the installation of the transponder on board the aircraft (e.g. ACNS.AC.2020 specified the altitude source to be connected to the transponder) and therefore cannot be covered by ETSO-C74d.</p> <p>With respect to referencing TSO C74c, the ETSO is the recognised European standard. Part qualified to TSO C74c will need further justification by applicant that they are suitable for use.</p>
comment	<p>280 comment by: AIRBUS</p> <p><i>"(a)(1) The Mode A/C only transponder should hold an EASA equipment authorisation in accordance with European Technical Standard Order ETSO-C74d, or an equivalent standard that is consistent with applicable ICAO SARPS, and which is acceptable to EASA."</i></p> <p>EASA should clarify what is <i>"an equivalent standard that is consistent with applicable ICAO SARPS, and which is acceptable to EASA"</i>. Applicable ICAO SARPS shall be defined. This is not identified in Appendix A. RTCA DO-144A is a MOPS. EUROCAE document 1/WG9 (1971) is not identified in Appendix A.</p> <p>FAA TSO and/or aircraft approval shall be recognized as an equivalent acceptable standard.</p>
response	<p>Partially Accepted,</p> <p>Reference to the applicable SARPS has been introduced for ease of understanding. It should also be noted that the SARPS Annex 10 Volume IV is identified in appendix A. EUROCAE document 1/WG9 (1971) will be added in the list of documents provided in Appendix A for completeness. FAA TSO or aircraft approval will have to be demonstrated by the applicant to be equivalent to the ETSO or to be supplemented by appropriate demonstrations as necessary .</p>

comment	<p>321</p> <p>comment by: <i>AIRBUS MILITARY</i></p> <p>Clarification: "Class 2" definition may be confused with those for Mode S. Please indicate Class 2A/Class2B to avoid any possible confusion</p> <p>Clarification: indicate that Class A, Class B classification for Minimum Output Power Level refers also to ESTO-C74d definition</p>
response	<p>Accepted</p> <p>The text has been amended.</p>

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comment	<p>27 ❖</p> <p>comment by: <i>General Aviation Manufacturers Association / Hennig</i></p> <p>EASA proposes in section CS ACNS.AC.2030 titled "Flight deck interface" that "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." Additionally, in section CS ACNS.ELS.2030 also titled "Flight deck interface" the agency proposes that "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder. GAMA members are concerned that the agency intends to require that the flight deck interface include a means by which the flight crew can select the pressure altitude source independently. If this is what the agency proposes, it would be a significant departure from previous guidance such as Temporary Guidance Leaflet (TGL) 13 and Acceptable Means of Compliance (AMC) 20-13 which identifies acceptable means for pressure altitude sources but do not require a select feature on the flight deck.</p> <p>GAMA recommends that EASA remove the requirements in CS ACNS.AC.2030 (g) "select the pressure altitude source to be connected to the active transponder." and CS ACNS.ELS.2030 (a)(9) to select the pressure altitude source that is connected to the active transponder."</p> <p>Additionally, AMC1 ACNS.AC.2030 addresses this issue stating "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." GAMA recommends that EASA move this item to AMC1 ACNS.AC.2020 Altitude Source.</p> <p>Finally, AMC1 ACNS.EHS.2010 (d) "Sensor Selection" assumes that there is a sensor selection capability for the flight crew. Since this is not supported by any currently approved equipment, GAMA recommends that the AMC1 guidance return to that currently in AMC 20-13 by replacing the second and third paragraph with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile."</p>
response	<p>Partially Accepted</p> <p>AMC1 ACNS.AC.2030 has been transposed in CS ACNS.AC.2020 (see response to comment 27 linked to CS ACNS.AC.2030).</p>
comment	<p>166</p> <p>comment by: <i>EUROCONTROL</i></p> <p>What are the acceptable means of compliance to verify that data listed in CS.ACNS.AC2010 are verified?</p>

	<p>Proposal:</p> <p>AMC1 ACNS.AC.2010 should be added indicating what should be verified to ensure that end to end data transmission is working and acceptable.</p>
response	<p>Accepted</p> <p>New AMC ACNS.AC.2010 proposed below :</p> <p>(a) Mode A Code verifications.</p> <p>(1) Set the Mode A code to 7776 (or other Mode A code agreed with the local Air Traffic Control Unit) through the dedicated flight crew interface. Confirm receipt of correct code by using ground test equipment.</p> <p>(2) For dual transponder installation with a common control panel, set the Mode A code to 7776 (or other Mode A code agreed with the local Air Traffic Control Unit) and verify that the correct code is received by the ground test equipment. Switch to transponder 2 and verify that the correct Mode A code is received by the ground test equipment.</p> <p>Note: Agreement of Mode A code values is to be agreed with the local ATC if the transponder is in the visibility of an ATC cooperative surveillance system.</p> <p>(b) Pressure Altitude verifications</p> <p>(1) Verify that all Mode A/C transponders report the pressure-altitude encoded in the information pulses in Mode C replies.</p> <p>Note: more details on the encoding of the altitude can be found in ICAO Annex 10, Vol IV, para 3.1.2.6.5.4.</p> <p>(2) Select the altitude switch to the ON position and verify that the transponder provides the current aircraft altitude in response to Mode C interrogations.</p> <p>(3) A sufficient number of test points should be checked to ensure that the altitude reporting equipment and transponder perform their intended function through their entire range while ascending or descending. Where a Gillham altitude encoder is used, tests of each altitude code segment of the encoder (2300, 2500, 3800, 4300, 4800, 6800, 14800 30800, 70800, 90800, 110800 and 126700 if available) should be sufficient to ensure proper operation of each altitude code segment of the encoder.</p>
comment	<p>236</p> <p>comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.AC.2020:</p> <p>As noted in comments for CS ACNS.AC.2030 item g, a flight deck interface requirement for the means to "select the pressure altitude source to be connected to the active transponder" is not consistent with previous guidance and not identified as a difference from previous guidance. But, the statement currently contained in AMC1 ACNS.AC.2030 is still applicable, and should be moved to AMC1 ACNS.AC.2020.</p> <p>It is suggested that the following item be moved from AMC1 ACNS.AC.2030 to AMC1 ACNS.AC.2020:</p> <p>"Where available the pressure altitude source connected to the active</p>

response	<p>transponder should be the one which is being used to control the aircraft."</p> <p>Partially Accepted</p> <p>See response to comment 27 linked to CS ACNS.AC.2030, the item has been converted as a bullet of CS ACNS.AC.2020.</p>
comment	<p>347 comment by: <i>European Cockpit Association</i></p> <p>1) ICAO Annex 10 emphasises the issues related to Gillham altitude encoders in various places. Proposed (c) accepts Gillham encoding based on the mitigation of providing a manual (pilot) inhibit of Mode C transmission. It is unclear under which circumstances this pilot action would be expected as a necessary complementary requirement for a dual installation to detect errors (as foreseen in ICAO Annex 10 Vol IV paragraph 4.3.9.3.2 for ACAS installations). In addition, contrary to the implicit acceptance of Gillham encoders, the "Note" following (c) states that such encoders are "not recommended".</p> <p>The following is suggested:</p> <p>(c) An altimeter with a pressure altitude resolution lower than or equal to 100 ft and greater than 25 ft is an acceptable means of compliance provided that no Gillham altitude encoder interface is used.</p> <p>2) JAA TGL No 6 specifies altimetry accuracy requirements but does not address resolution / quantisation details. It is therefore recommended to add the following half sentence to existing (a):</p> <p>(a) ... provided that they also meet the conditions of either b) or c) below.</p>
response	<p>Not Accepted</p> <p>(c) is not accepted. The note recommends not installing Gillham encoders. However, they are not yet forbidden by regulation except for commercial air transport aircraft as specified in ICAO Annex 6 part I 6.1.19. (a) is not necessary as there is a specific statement in CS ACNS.AC.2020 for altitude resolution.</p>

comment	<p>27 ❖ comment by: <i>General Aviation Manufacturers Association / Hennig</i></p> <p>EASA proposes in section CS ACNS.AC.2030 titled "Flight deck interface" that "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." Additionally, in section CS ACNS.ELS.2030 also titled "Flight deck interface" the agency proposes that "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder. GAMA members are concerned that the agency intends to require that the flight deck interface include a means by which the flight crew can select the pressure altitude source independently. If this is what the agency proposes, it would be a significant departure from previous guidance such as Temporary Guidance Leaflet (TGL) 13 and Acceptable Means of Compliance (AMC) 20-13 which identifies acceptable means for pressure altitude sources but do not require a select feature on the flight deck.</p> <p>GAMA recommends that EASA remove the requirements in CS ACNS.AC.2030 (g)</p>
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response	<p>"select the pressure altitude source to be connected to the active transponder." and CS ACNS.ELS.2030 (a)(9) to select the pressure altitude source that is connected to the active transponder."</p> <p>Additionally, AMC1 ACNS.AC.2030 addresses this issue stating "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." GAMA recommends that EASA move this item to AMC1 ACNS.AC.2020 Altitude Source.</p> <p>Finally, AMC1 ACNS.EHS.2010 (d) "Sensor Selection" assumes that there is a sensor selection capability for the flight crew. Since this is not supported by any currently approved equipment, GAMA recommends that the AMC1 guidance return to that currently in AMC 20-13 by replacing the second and third paragraph with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile."</p> <p>Partially Accepted</p> <p>AMC1 ACNS.AC.2030 has been transposed in CS ACNS.AC.2020.</p>
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comment	<p>101 comment by: Boeing</p> <p>Page: 38 Paragraph: <i>AMC1 ACNS.AC.2030 Flight deck interface</i> <u>The proposed text states:</u> "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." <u>REQUESTED CHANGE:</u> We recommend deleting this requirement, since it is neither practical nor feasible to source select the altitude sources feeding the transponder, based on who is flying the aircraft. <u>JUSTIFICATION:</u> The altitude source used to "control the aircraft" depends on a number of factors, including whether the aircraft is coupled to the autopilot, or whether the aircraft is being manually flown, and which pilot is flying the airplane, which can be VERY dynamic. No Boeing Commercial aircraft currently meets this requirement, and it would be onerous (from a cost and pilot workload perspective) to try to meet this proposed requirement.</p>
response	<p>Partially Accepted</p> <p>AMC1 ACNS.AC.2030 has been transposed in CS ACNS.AC.2020 (see response to comment 27 linked to CS ACNS.AC.2030).</p>

comment	<p>219 comment by: Embraer - Indústria Brasileira de Aeronáutica - S.A.</p> <p>In light of its correspondent requirement (CS.ACNS.AC.2030 Flight Deck Interface) on Book 1, this acceptable means of compliance should be expanded.</p> <p>AMC1-ACNS.AC.2030 does not cover CS.ACNS.AC.2030 (c) [<i>A means is provided to notify the flight crew when the transmission of pressure altitude information has been inhibited</i>]. The transmission/inhibition of pressure altitude information is acknowledged by the flight crew when the correspondent transponder mode is selected and displayed.</p>
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	<p>The proposed text, which was adapted from FAA AC 20-151A (items 4.2(a) and Appendix B-1(a)), should be added to the AMC1-ACNS.AC.2030:</p> <p><i>"Modes of operation should be identified (Modes A and/or C). Attention should be closely paid to line select keys, touch screens or cursor controlled trackballs as these can be susceptible to unintended mode selection resulting from their location in the flight deck."</i></p>
response	<p>Partially Accepted</p> <p>New GM added to read</p> <p>'Modes of operation should be identified. Attention should be closely paid to line select keys, touch screens or cursor controlled trackballs as these can be susceptible to unintended mode selection resulting from their location in the flight deck.'</p>
comment	<p>238 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.AC.2030: As noted in comments for AMC1 ACNS.AC.2020, it is suggested that the statement about pressure altitude source should be moved from AMC1 ACNS.AC.2030 to AMC1 ACNS.AC.2020.</p>
response	<p>Partially Accepted</p> <p>AMC1 ACNS.AC.2030 has been transposed in CS ACNS.AC.2020 (see response to comment 27 linked to CS ACNS.AC.2030).</p>
comment	<p>322 comment by: <i>AIRBUS MILITARY</i></p> <p>MOC: This requirement could be covered through operational procedure (manual selection of the adequate transponder sys)</p>
response	<p>Not accepted</p> <p>AMC1 ACNS.AC.2030 has been transposed in CS ACNS.AC.2020 (see response to comment 27 linked to CS ACNS.AC.2030).</p>
comment	<p>348 comment by: <i>European Cockpit Association</i></p> <p>Delete the "Note". It is accepted that current ICAO and industry material and the proposed EASA CS emphasise a simple operational interface which ensures Mode C activation while the transponder is operated.</p>
response	<p>Accepted</p> <p>The note has been deleted. See also response to comment 116 on the same subject.</p>

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comment	240	comment by: <i>Garmin International</i>
	Regarding AMC1 ACNS.ELS.1000: Reference is incorrect. Replace 'subsection D Section 2' with 'Subpart D Section 2'.	
response	Accepted The text has been amended.	

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Book 2 - Subpart D - AMC1 ACNS.ELS.2000**

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comment	167	comment by: <i>EUROCONTROL</i>
	CS-ACNS does not preclude to install transponder with known deficiencies. Is it foreseen to withdraw ETSO to transponder version with known deficiency and not meeting EU No 1207/2011 requirements? If it will not be the case please indicate how CS-ACNS ensure that transponder with known deficiency cannot be installed. Indication in background information is not sufficient. Proposal: Please indicate that transponder with known deficiency are not acceptable and corrective SB must have been applied. In AMC1 ACNS.ELS.2000, bold characters are used in general to highlight but not consistently: - bullet (a) (5) 'a' is not in bold (see (a) (3) and (4)) - bullet (b) (2) Class 1 or Class 2 is not in bold whereas in (b) (1) Class 1 is in bold	
response	Not Accepted The CS_ACNS provides the requirements that an aircraft has to obtain in order to be suitable for ELS operations. Transponders qualification is an acceptable means of compliance and therefore if used the transponders need to comply with the standards as specified in this AMC.	
comment	265	comment by: <i>Eurocopter</i>
	ETSO-C112d being not yet published, there is little chance that transponders holding an EASA authorisation to ETSO-C112d could be found in the short or mid-term. Also, FAA TSO-C112c is still active.	
response	Noted Use of an ETSO approved transponder is a means to comply with the requirement but not the only means and other means can be used.	

comment	281	comment by: AIRBUS
	<p><i>"(a)Transponders capabilities</i> <i>(1) The Mode S transponder should hold an EASA equipment authorisation in accordance with European Technical Standard Order ETSO-C112d, or an equivalent standard that is consistent with applicable ICAO SARPS and which is acceptable to the responsible certification authority."</i> EASA should clarify what is "an equivalent standard that is consistent with applicable ICAO SARPS, and which is acceptable to the responsible certification authority". Applicable ICAO SARPS shall be defined. This is not identified in Appendix B EUROCAE ED-73E & RTCA DO-181E are MOPS and not SARPS. FAA TSO and/or aircraft approval shall be recognized as an equivalent acceptable standard.</p>	
response	<p>Partially Accepted</p> <p>Reference to the applicable SARPS has been introduced for ease of understanding. It should also be noted that the SARPS Annex 10 Volume IV is identified in appendix B. FAA TSO or aircraft approval will have to be demonstrated by the applicant to be equivalent to the ETSO or to be supplemented by appropriate demonstrations as necessary.</p>	

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comment

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57

comment by: NATS National Air Traffic Services Limited

AMC1 ACNS.ELS.2010; Table 1states 'See 0' in the remark but no further information. Suggest clarification and adding additional text to support '0'

response

Accepted

text amended as follows

Table 1 — List of parameters to be verified on an ELS installation

Item	Parameters	Message/register	Remark
1	Mode A code and Emergency status	DF5 and DF21	
2	Pressure altitude	DF4 and DF20	See (b) and (c)
3	On-the-ground status	DF4/5/20/21	
4	Aircraft Identification	Register 20 ₁₆	See (d)
5	SPI	DF4/5/20/21	See (e)
6	Data-link and common usage GICB capability reports	CA field in DF11Register 10 ₁₆ Register 17 ₁₆	
7	24 bit aircraft address	DF11	
8	RA report	Register 30 ₁₆ + announcement in DF4/5/20/21	Only for ACAS installation see (f)

comment	58	comment by: NATS National Air Traffic Services Limited
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response	<p>AMC1 ACNS.ELS.2010; Table 1: ICAO 24 bit address is also in DF 4/5/20/21 in-addition to DF11</p> <p>Noted</p> <p>ICAO 24-bit aircraft address is not directly present in DF 4/5/20/21 it is overlaid and, therefore, less easy to test. Furthermore, the fact that consistent ICAO 24-bit aircraft address is reported in DF 11, 4, 5, 20 and 21 is tested in the frame of the testing to obtain the EASA equipment authorisation in accordance with European Technical Standard Order ETSO-C112d or equivalent.</p>
comment	<p>59 comment by: NATS National Air Traffic Services Limited</p> <p>AMC1 ACNS.ELS.2010 (b) (2), text register 0516 should read 05₁₆</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>66 comment by: NATS National Air Traffic Services Limited</p> <p>AMC1 ACNS.ELS.2010 Data transmission <i>Note 2: The implementation of registers E316 and E416 is recommended</i> Change to read <i>Note 2: The implementation of registers E3₁₆ and E4₁₆ is recommended</i></p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>102 comment by: Boeing</p> <p>Page: 40 Paragraph: <i>AMC1 ACNS.ELS.2010 Data Transmission</i> <u>EDITORIAL COMMENT ONLY</u> <u>The proposed text states:</u> “(b) Pressure Altitude ... (2) For aircraft transmitting parameters via the Extended Squitter, for which compliance with Subpart D section 4 is not required, the pressure altitude data should be checked in the Extended Squitter register for airborne position (register 0516).” <u>REQUESTED CHANGE:</u> Revise the reference in paragraph (b)(2) as follows; “(b) Pressure Altitude ... (2) For aircraft transmitting parameters via the Extended Squitter, for which compliance with Subpart D section 4 is not required, the pressure altitude data should be checked in the Extended Squitter register for airborne position (register 0516 05₁₆). <u>JUSTIFICATION:</u> Editorial correction needed. The register number is expressed in base 16 and</p>

response	<p>should be shown in subscript form.</p> <p>Accepted</p> <p>The text has been amended.</p>
comment	<p>118 comment by: Boeing</p> <p>Page: 40 Paragraph: <i>Table 1 — List of parameters to be verified on an ELS installation</i> <u>EDITORIAL COMMENT ONLY</u> The "Remark" column states: "See 0." However, there is no "0" (but clicking on the text takes you to another AMC paragraph). It appears that the correct paragraph numbers need to be inserted. <u>JUSTIFICATION:</u> Editorial correction needed.</p>
response	<p>Accepted</p> <p>The text amended to refer to the correct paragraphs.</p>
comment	<p>168 comment by: EUROCONTROL</p> <p>In "Table 1 — List of parameters to be verified on an ELS installation" the information in the Remark column is either incorrect or missing Proposal: The correct reference should be: For item 2 "See (b) and (c)" For item 4 "See (d)" For item 5 "See (e)" For item 8 "Only for ACAS installation see (f)" There is no AMC and/or guidance on how items 1, 3, 9 and 7 should be tested on aircraft installation Proposal Specific bullets should be added to address AMC and/or guidance to ensure end to end chain is tested in all types of installation for items 1, 3, 9 and 7. These bullets should be referenced in the last column of the corresponding item row of Table 1. Note 3 is particularly relevant for Mode A code data item to avoid having different Mode A when there are two transponders installed. For item 6 it should be clarified if BDS 17 all zero is an acceptable means of compliance? The content of BDS 17 is depending on aircraft installation. Bullet (b) (2) 16 should be subscripted to read "register 05₁₆" Other similar cases needs to be corrected as well.</p>
response	<p>Partially Accepted</p> <p>The text amended to refer tom the correct paragraph.</p> <p>No need for further AMC for items 1, 3, 6 and 7 are proposed as these aspects are tested in the frame of transponder testing and certification (ETSO-C112d) and of AMC ACNS.ELS.2018 (item 3).</p>

Link to note 3 has been added in the remark column of Mode A.

New item (g) to indicate that BDS 17₁₆ = 0 is an acceptable means of compliance for ELS transponder added.

comment 169

comment by: EUROCONTROL

Bullet (d) Aircraft Identification:

Aircraft identification is critical for the identification of flights. The full end to end chain shall be verified to demonstrate compliance

Proposal:

Please add AMC and/or guidance to ensure end to end chain is tested in all types of installation

Aircraft Identification transmitted through ES squitter is stored in register 08₁₆. Aircraft Identification transmitted through Mode S is stored in register 20₁₆. It is more important to check that Aircraft identification transmitted through ES is the same as the Aircraft Identification transmitted through Mode S reply using register 20.

Bullet (e) Special Position Indication (SPI)

The sentence could read as SPI is manually activated in replies DF4,...

Proposal:

Please correct the order of word as follows:
The FS field should report SPI (FS = 4 or 5) for 18 seconds (+/-1 second) in replies DF4, DF5, DF20 or DF21 after the IDENT (SPI) has been manually activated.

Bullet (f) ACAS active Resolution Advisory report

There should be no undue RA report whatever if it is before or after

Proposal

Please remove "Post a resolution Advisory report"

response

Partially Accepted.

Bullet (d) Not accepted. There is only 1 input of flight ID to a single transponder. The intent of the AMC is not to retest the transponder but to test the integration of the transponder in the aircraft. Since there is only 1 input, the proposed test is considered superfluous.

Bullet (e) accepted.

Bullet (f) accepted.

comment 241

comment by: Garmin International

Regarding AMC1 ACNS.ELS.2010:

In Table 1, the 'Remark' column contains references 'See 0'. 0 does not exist. The references should be corrected.

response

Accepted

text amended to refer to the correct paragraph

comment 242

comment by: Garmin International

response	<p>Regarding AMC1 ACNS.ELS.2010: In Table 1, item 3, the on-the-ground status is also reported in DF 0/11/16/17. Update the 'Message/register' column entry for item 3 as follows: CA field in DF11/17, VS field in DF0/16, FS field in DF4/5/20/21</p> <p>Partially Accepted</p> <p>The test has to be done for CA in DF11 (DF 17 is not a tested part of ADS-B ES) or FS in DF4/5/20:21. Consistent reporting is tested in the frame of the testing to obtain the EASA equipment authorisation in accordance with European Technical Standard Order ETSO-C112d or equivalent. DF 0, 16 and 17 are not part of Mode S ELS protocol (either ACAS or ADS-B out ES).</p>
comment	<p>243 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ELS.2010: In Table 1, item 6 is confusing because it describes two separate items. The item should be split into two items. One for Data-link Capability report (CA field in DF11/17), and one for Common Usage GICB capability report (BDS Registers 1016 and 1716).</p>
response	<p>Accepted</p> <p>The text has been amended to 6a for capability report in CA field in DF11 (DF 17 is not tested part of ADS-B ES) and 6b for Datalink capability report and Common usage GICB capability report in registers 10₁₆ and 17₁₆ respectively.</p>
comment	<p>244 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ELS.2010: In Table 1, item 7 Parameter description should be clarified to 'ICAO 24 bit aircraft address'.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>245 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ELS.2010: Subscript '16' should be used consistently for BDS register references.</p>
response	<p>Accepted</p> <p>The text has been amended accordingly.</p>
comment	<p>323 comment by: <i>AIRBUS MILITARY</i></p> <p>Errata: remarks on Table 1 are not correctly indexed</p>

response Accepted

See response to comment 57 above.

text amended as follows

Table 2 — List of parameters to be verified on an ELS installation

Item	Parameters	Message/register	Remark
1	Mode A code and Emergency status	DF5 and DF21	
2	Pressure altitude	DF4 and DF20	See (b) and (c)
3	On-the-ground status	DF4/5/20/21	
4	Aircraft Identification	Register 20 ₁₆	See (d)
5	SPI	DF4/5/20/21	See (e)
6	Data-link and common usage GICB capability reports	CA field in DF11Register 10 ₁₆ Register 17 ₁₆	
7	24 bit aircraft address	DF11	
8	RA report	Register 30 ₁₆ + announcement in DF4/5/20/21	Only for ACAS installation see (f)

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comment 246 comment by: *Garmin International*

Regarding AMC1 ACNS.ELS.2018 (a):
In item (a), the wording of the note is confusing and the meaning is unclear. Suggest revising as 'Note: Care should be taken to ensure the wiring of the WOW to the correct transponder pins.'

response Accepted

The text has been amended.

comment 247 comment by: *Garmin International*

Regarding AMC1 ACNS.ELS.2018 (b):
In Note 2 of item (b), suggest changing the phrase 'that able to support' to 'that support'.

response Accepted

The text has been amended.

comment 282 comment by: *AIRBUS*

"The automatic determination of the on-the-ground status should be obtained from:
(a) *Weight On Wheel (WOW) sensor: When the aircraft is equipped with an automatic sensor to determine if the aircraft is on the ground (i.e. Weight On*

Wheel sensor), this sensor should be used as the on-the-ground status source of the transponder; **or**

Note: Attention is drawn on the wiring of the WOW to the right pins of the transponder.

(b) automatic algorithm: If ground speed, radio altitude, or airspeed parameters are being used in the algorithm and the 'on-the-ground' condition is being reported or if the on-the-ground status has been commanded via the TCS subfield, the on-the-ground status is to be overridden and changed to 'airborne' if :

Ground Speed OR Airspeed > X or Radio height > 50 ft."

AMC1 ACNS.ELS.2018 (a) and (b) requirements for "On-ground status determination" are not in line with DO-181E/ED-73E & DO-260B.

As recommended by MOPS DO-181E §2.2.18.2.7/ ED-73E & DO-260B, the two means (WoW sensor & automatic algorithm) will be used by Airbus:

- Section b requires the WOW as a basis to determine the on-ground status, and
- Section c recommends to use the automatic algorithm as a mean for the validation of the 'on-the-ground' status.

AMC1 ACNS.ELS.2018 recommends the choice between WOW and an automatic algorithm.

AIRBUS recommends to modify AMC1 ACNS.ELS.2018 requirement to let the automatic algorithm be a validation means of the WOW sensor as per DO-181E/ED-73E & DO-260B.

response Accepted

The following text has been added to paragraph (a):

'For Aircraft with transponders that have access to at least one of the following parameters (ground speed, radio altitude, airspeed) the following validation check should be performed when detected on the ground the air/ground status should be overridden and changed to —airborne if Ground speed >100 knots OR airspeed > 100 knots OR radio altitude> 50 feet'.

comment 283

comment by: AIRBUS

Requirements for "On-ground status determination" are not in line with DO-181E. A fixed value of 100 knots, as per DO-181E, shall be used. The validation against typical rotating speed should be a recommendation, but not a requirement.

response Accepted

100 kt for validation is now covered in (a) see response to comment 282, the second means of compliance is to use an algorithm in which it might be acceptable to use other value for the speed criteria linked to the type of aircraft (e.g. small aircraft).

comment 103

comment by: Boeing

	<p>Page: 42</p> <p>Paragraph: <i>AMC1 ACNS.ELS.2020 Altitude source; para. (b), Note</i></p> <p><u>The proposed text states:</u></p> <p>"(b) Altimeters with a pressure altitude resolution lower than or equal to 25 ft are an Acceptable Means of Compliance.</p> <p><i>Note: Altitude source resolution of 25 ft or better is required for aeroplanes intended to be used for international air transport as defined in ICAO Annex 6 Part 1 — 6.19."</i></p> <p>REQUESTED CHANGE:</p> <p>Revise the "Note" to read as follows:</p> <p>"(b) Altimeters with a pressure altitude resolution lower than or equal to 25 ft are an Acceptable Means of Compliance.</p> <p><i>Note: Altitude source resolution of <u>lower than or equal to</u> 25 ft or better is required for aeroplanes intended to be used for international air transport as defined in ICAO Annex 6 Part 1 — 6.19."</i></p> <p>JUSTIFICATION:</p> <p>Our suggested revision would more accurately state the requirement.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>237 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ELS.2020:</p> <p>As noted in comments for CS ACNS.ELS.2030, a flight deck interface requirement for the means to "select the pressure altitude source to be connected to the active transponder" is not consistent with previous guidance and not identified as a difference from previous guidance. But, the statement currently contained in AMC1 ACNS.ELS.2030 is still applicable, and should be moved to AMC1 ACNS.ELS.2020.</p> <p>It is suggested that the following item be moved from AMC1.ELS.2030 to AMC1 ACNS.ELS.2020:</p> <p>"Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft."</p>
response	<p>Partially Accepted</p> <p>See response to comment 27 related to CS ACNS.ELS.2030, the item has been converted as a bullet of CS ACNS.ELS.2020.</p>
comment	<p>248 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ELS.2020 (c):</p> <p>In item (c), it is unclear how items (2) and (3) differ. Perhaps (3) is meant to clarify (2). If so, it should be changed to an italicized Note indented from (2).</p>
response	<p>Accepted</p> <p>Bullet (3) deleted, the text is now part of bullet (2).</p>
comment	<p>349 comment by: <i>European Cockpit Association</i></p>

response	<p>1) This AMC will need to be made consistent with the agreed version of root CS ACNS.ELS.2020.</p> <p>2) In any case, similar amendments as proposed to AMC1 ACNS.AC.2020 should be made with regard to a) the prohibition of Gillham altitude encoders, and b) the expansion of the TGL 6 reference to maintain consistency between AMC AC and AMC ELS.</p> <p>Not Accepted</p> <p>There is requirement prohibiting Gilham encoder except indirectly for commercial aircraft see ICAO Annex 6 Part I (resolution equal to or lower than 25 ft). This is acknowledged in the corresponding AMC's (ACNS.AC/ELS.2020 (b) Note).</p>
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comment	<p>104</p> <p>comment by: Boeing</p> <p>Page: 42 Paragraph: <i>AMC1 ACNS.ELS.2030 Flight deck interface</i> <u>The proposed text states:</u> "The pressure altitude source connected to the active transponder should be, by default, the one which is being used to control the aircraft." <u>REQUESTED CHANGE:</u> We recommend deleting this requirement, since it is neither practical, nor feasible, to source-select the altitude sources feeding the transponder based on who is flying the aircraft. <u>JUSTIFICATION:</u> The altitude source used to "control the aircraft" depends on a number of factors, including whether the aircraft is coupled to the autopilot, or whether the aircraft is being manually flown, and which pilot is flying the airplane, which can be VERY dynamic. No Boeing Commercial aircraft currently meets this requirement, and it would be onerous (from a cost and pilot workload perspective) to try to meet this proposed requirement.</p>
response	<p>Partially Accepted</p> <p>AMC1 ACNS.ELS.2030 has been transposed in CS ACNS.ELS.2020 (see response to comment 27 linked to CS ACNS.ELS.2030).</p>
comment	<p>220</p> <p>comment by: Embraer - Indústria Brasileira de Aeronáutica - S.A.</p> <p>In light of its correspondent requirement (CS.ACNS.ELS.2030 Flight Deck Interface) on Book 1, this acceptable means of compliance should be expanded.</p> <p>AMC1-ACNS.ELS.2030 does not cover CS.ACNS.ELS.2030 (a) (4) [<i>A means is provided to notify the flight crew when the transmission of pressure altitude information has been inhibited</i>]. The transmission/inhibition of pressure altitude information is acknowledged by the flight crew when the correspondent transponder mode is selected and displayed.</p> <p>The proposed text, which was adapted from FAA AC 20-151A (items 4.2(a) and</p>

	Appendix B-1(a)), should be added to the AMC1-ACNS.ELS.2030: <i>"Modes of operation should be identified (Modes A, C and S). Attention should be closely paid to line select keys, touch screens or cursor controlled trackballs as these can be susceptible to unintended mode selection resulting from their location in the flight deck."</i>
response	Partially Accepted new text added to address the comments as follows 'Modes of operation should be identified. Attention should be closely paid to line select keys, touch screens or cursor controlled trackballs as these can be susceptible to unintended mode selection resulting from their location in the flight deck.'
comment	239 comment by: <i>Garmin International</i> Regarding AMC1 ACNS.ELS.2030: As noted in comments for AMC1 ACNS.ELS.2020, it is suggested that the statement about pressure altitude be moved from AMC1 ACNS.ELS.2030 to AMC1 ACNS.ELS.2020.
response	Partially Accepted AMC1 ACNS.ELS.2030 has been transposed in CS ACNS.ELS.2020 (see response to comment 27 linked to CS ACNS.ELS.2030).
comment	325 comment by: <i>AIRBUS MILITARY</i> MOC: This requirement could be covered through operational procedure (manual selection of the adequate transponder sys)
response	Not Accepted AMC1 ACNS.ELS.2030 has been transposed in CS ACNS.ELS.2020 (see response to comment 27 linked to CS ACNS.ELS.2030).

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comment	221 comment by: <i>Embraer - Indústria Brasileira de Aeronáutica - S.A.</i> There are other means of compliance, rather than installing a common control interface/panel, in order to meet the correspondent requirement (CS.ACNS.ELS.4000 Dual / multiple Transponder Installation), from Book 1. There are designs with dual/multiple transponders, and, respectively, dual/multiple control interface/panels, in which interface communication between/amongst the transponders prevents their simultaneous operation, meeting the CS ACNS.ELS.4000 requirement [<i>If more than one transponder is</i>
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installed, simultaneous operation of transponders is prevented].

Modify AMC1 ACNS.ELS.4000 as follows:

"When dual or multiple transponders are installed on an aircraft, a common control interface/panel **may** be provided to ensure that only one transponder is active at a given time, and to ensure that the Mode A code and Aircraft Identification changes are applied to the active transponder."

response Not Accepted

AMC1 ACNS.ELS.4000 is an acceptable means of compliance to ensure that, if more than one transponder is installed, simultaneous operation of transponders is prevented (CS ACNS.ELS.4000). Should the applicant propose another solution he will have to demonstrate to the Agency that it meets the intent of CS ACNS.ELS.4000.

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comment 105

comment by: Boeing

Page: 43

Paragraph: AMC1 ACNS.ELS.4020 Antenna Installation; para. (c)

The proposed text states:

"(c) The distance between **L-band antennas** should be at least 40 cm and the distance between other antennas (e.g. ACAS, DME) should satisfy the appropriate isolation and longitudinal separation limits."

REQUESTED CHANGE:

Revise the text to read as follows:

"(c) The distance between ~~L-band~~ **ATC Transponder** antennas should be at least 40 cm, and the distance between **ATC Transponder antennas and** other antennas (e.g. ACAS, DME) should satisfy the appropriate isolation and longitudinal separation limits."

JUSTIFICATION:

Technically, DME and TCAS also operate in the L-band. We believe the intent of this paragraph was to specify separation between the ATC Transponder antennas.

response Accepted

The text has been amended.

comment 210

comment by: Eurocopter

Subparagraph (c) requires a separation of at least 40 cm between L-band antennas.

However, there is usually a blanking function between those L-band systems (only one equipment is used at the same time). Therefore, in this case, there is no interest to specify a minimum distance.

response Partially Accepted

Please also see the response to comment 105. Blanking is not required, but, even

when implemented, the blanking does not always apply at the very beginning of the reception chain therefore isolation and separation should be implemented to ensure this protection in all cases.

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comment	67	comment by: <i>NATS National Air Traffic Services Limited</i>
	We would suggest should not be titled "Antenna Diversity" but "Max True Airspeed".	
response	Not Accepted	
	The title of the corresponding CS (CS ACNS.ELS.4030) is antenna diversity, the whole AMC is related to antenna diversity; only item (a) is related to how to determine the maximum true airspeed as it is one of the criteria to require or not antenna diversity.	

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comment	106	comment by: <i>Boeing</i>
	Page: 44 Paragraph: <i>AMC1 ACNS.EHS.1000 Applicability</i> <u>The proposed text states:</u> "Previous compliance declarations with EASA AMC 20-13 (Certification of Mode S Transponder Systems for Enhanced Surveillance) is another Acceptable Means of Compliance for existing installations, provided that differences listed in Appendix E have been addressed. <u>REQUESTED CHANGE:</u> The proposed text does not appear to be consistent with following statement found in Paragraph A. IV. #25 (page 6 of NPA): "Aircraft previously compliant with AMC 20-13 are also not considered compliant with the requirements as specified in Commission Regulation (EU) No 1207/2011 for the Modes S Enhanced Surveillance; ..." <u>JUSTIFICATION:</u> Please clarify if AMC 20-13 will still be an acceptable means of compliance.	
response	Noted The text has been amended for clarity to read: 'Provided that the differences listed in Appendix E have also been addressed, then previous compliance declarations with EASA AMC 20-13 (Certification of Mode S Transponder Systems for Enhanced Surveillance) supplemented with the additional assessments is another Acceptable Means of Compliance.'	

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comment	<p>27 ❖ comment by: <i>General Aviation Manufacturers Association / Hennig</i></p> <p>EASA proposes in section CS ACNS.AC.2030 titled "Flight deck interface" that "A means is provided to: ... (g) select the pressure altitude source to be connected to the active transponder." Additionally, in section CS ACNS.ELS.2030 also titled "Flight deck interface" the agency proposes that "(a) A means is provided: ... (9) to select the pressure altitude source that is connected to the active transponder. GAMA members are concerned that the agency intends to require that the flight deck interface include a means by which the flight crew can select the pressure altitude source independently. If this is what the agency proposes, it would be a significant departure from previous guidance such as Temporary Guidance Leaflet (TGL) 13 and Acceptable Means of Compliance (AMC) 20-13 which identifies acceptable means for pressure altitude sources but do not require a select feature on the flight deck.</p> <p>GAMA recommends that EASA remove the requirements in CS ACNS.AC.2030 (g) "select the pressure altitude source to be connected to the active transponder." and CS ACNS.ELS.2030 (a)(9) to select the pressure altitude source that is connected to the active transponder."</p> <p>Additionally, AMC1 ACNS.AC.2030 addresses this issue stating "Where available the pressure altitude source connected to the active transponder should be the one which is being used to control the aircraft." GAMA recommends that EASA move this item to AMC1 ACNS.AC.2020 Altitude Source.</p> <p>Finally, AMC1 ACNS.EHS.2010 (d) "Sensor Selection" assumes that there is a sensor selection capability for the flight crew. Since this is not supported by any currently approved equipment, GAMA recommends that the AMC1 guidance return to that currently in AMC 20-13 by replacing the second and third paragraph with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile."</p>
response	<p>Partially Accepted</p> <p>The comments pertaining to CS ACNS.AC.2030 and CS ACNS.ELS.2030 regarding transponder selection has been addressed previously.</p> <p>With respect to the comment on AMC1 ACNS.EHS.2010 (d) A new bullet point (b) is inserted in CS ACNS.EHS.2010 to read: The sensor sources connected to the active transponder are the sensors relevant to the aircraft flight profile.</p> <p>The 2nd and 3rd paragraphs are reduced to: the crew should be aware, at all times, which sensors are providing information to the active transponder.</p> <p>There is no more AMC on how it is performed, either through manual selection by the flight crew or automatically, provided that CS ACNS.EHS.2010 is fulfilled.</p> <p>See also comments 108 and 251.</p>
comment	<p>30 comment by: <i>General Aviation Manufacturers Association / Hennig</i></p> <p>EASA states in AMC1 ACNS.EHS.2010 Data transmission under item (b)(2) in Note 2 that "Due to the limitation of the static test, it is recommended to perform a flight and record the content of the different transponder registers to verify that all parameters listed in (a) are changing in accordance with pilot input and</p>

	<p>aircraft attitude and maneuver."</p> <p>GAMA is unaware of any test equipment that could be used to conduct a test to "record the content of different transponder registers" during a flight test.</p> <p>GAMA recommends that EASA remove this requirement or -- alternatively -- make it clear that this type of flight test and recording is optional.</p>
response	<p>Partially Accepted</p> <p>This is a recommendation not a requirement. The text will be made clear to indicate that it is an option.</p>
comment	<p>107 comment by: Boeing</p> <p>Page: 45 Paragraph: <i>AMC1 ACNS.EHS.2010 Data Transmission; para (c) -- Aircraft Parameters</i> In paragraph (c), data transmission of the following aircraft parameters are addressed: (1) Selected Altitude (2) Vertical Rate (3) Barometric Pressure Setting (4) Track Angle Rate or True Airspeed" <u>REQUESTED CHANGE:</u> It is not clear why data transmission of the following EHS parameters are not also addressed: -- Roll Angle -- True Track Angle -- Ground Speed -- Magnetic Heading -- Indicated Airspeed or Mach No <u>JUSTIFICATION:</u> We recommend that the NPA be revised to include discussion of the other listed EHS parameters.</p>
response	<p>Accepted</p> <p>the following information has been added:</p> <p style="padding-left: 40px;">Roll Angle</p> <p>It is difficult to test different values of Roll Angle when the aircraft is on the ground. To ensure that this parameter is correctly received from the sensor and transmitted by the transponder, it is acceptable to test that the Roll Angle field in register 5016 contains a credible value, consistent with aircraft roll angle on the ground, and the Roll Angle Status bit indicates valid data.</p> <p style="padding-left: 40px;">True Track Angle</p> <p>It is difficult to test different values of True Track Angle when the aircraft is on the ground. To ensure that this parameter is correctly received from the sensor and transmitted by the transponder, it is acceptable to test that the True Track Angle field in register 5016 contains a value and the True Track Angle Status bit indicates valid data.</p>

Ground Speed

It is difficult to test different values of Ground Speed when the aircraft is on the ground. To ensure that this parameter is correctly received from the sensor and transmitted by the transponder, it is acceptable to test that the Ground Speed field in register 5016 contains a value, consistent with the speed of the aircraft on the ground (close to zero if the aircraft is not moving) and the Ground Speed Status bit indicates valid data.

Magnetic Heading

To ensure that this parameter is correctly received from the sensor and transmitted by the transponder, it is acceptable to test that the Magnetic Heading field in register 6016 contains a value, consistent with the magnetic heading of the aircraft, and the Magnetic Heading Status bit indicates valid data.

Indicated Airspeed or Mach No

Indicated Airspeed and Mach No are considered as a single parameter. Both should be provided where available.

To ensure that these parameters are correctly received from the sensor and transmitted by the transponder, it is acceptable to test that the Indicated Airspeed or Mach fields in register 6016 contain a value, consistent with the indicated airspeed or Mach No generated via a test set, and the Indicated Airspeed or Mach Status bits indicate valid data.

comment 108

comment by: Boeing

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Paragraph: *AMC1 ACNS.EHS.2010 Data transmission*The proposed text states:

"In an installation, where sensor selection for the active transponder is **not** provided, the captain's side transponder should utilise the captain's side sensors, and the co-pilot's side transponder should utilise the co-pilot's side sensors."

REQUESTED CHANGE:

We recommend that this paragraph be deleted.

JUSTIFICATION:

In the case where sensor source selection is NOT made by the flight crew, current source select logic used on some Boeing airplanes has each transponder source select sensor #1; then if sensor #1 becomes invalid, select sensor #2. This simplifies the source select logic of the transponder, and negates the need to involve Source/Destination Identifier (SDI) program pin settings into the source select logic.

There is no reason or benefit to modifying the existing source select logic of current ATC transponder installations. Doing so would require extensive and costly design changes.

response Partially accepted

The text has been amended to acknowledge the use of automatic selection.

comment 189

comment by: EUROCONTROL

response	<p>Currently the aircraft parameters listed in AMC1 ACNS.EHS.2010 (c) are not matching all the aircraft parameters listed in CS ACNS.EHS.2010. It is suggested to develop AMC/Guidances to test all these aircraft parameters.</p> <p>Accepted</p> <p>See response to comment 107.</p>
comment	<p>250 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.EHS.2010 (b) (2): In item (b)(2) Note 2, it is recommended to "to perform a flight and record the content of the different transponder registers to verify that all parameters listed in (a) are changing in accordance with pilot input and aircraft attitude and manoeuvre." This commenter is not aware of any commercially available equipment that can be used to 'record the content of different transponder registers' during a test flight. It is recommended that the Note make clear such data recording is optional.</p>
response	<p>Partially Accepted</p> <p>See response to comment 30.</p>
comment	<p>251 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.EHS.2010 (d): In item (d), Sensor Selection, the guidance assumes that sensor selection capability by the crew for the active transponder is provided. As noted in other comments (ref. comment for CS ACNS.ELS.2030), such selection capability is not supported by the majority (perhaps any) of currently certified equipment. It is recommended that the wording of AMC 20-13 be restored. The second and third paragraph of this item should be replaced with: "The selected active transponder should use the crew selected sensor relevant to the aircraft flight profile".</p>
response	<p>Partially Accepted</p> <p>See response to comment 27 associated to AMC1 ACNS.EHS.2010 and response to comment 108.</p>
comment	<p>284 comment by: <i>AIRBUS</i></p> <p>Verification of EHS data. AIRBUS fully understand EASA concerns related to the verification of EHS parameters emitted by the transponder. However, AIRBUS would like to outline that the exhaustive verification of all parameters emitted by the transponder is an important activity, whose complete coverage is shared by test activities led at supplier & aircraft manufacturer levels. For any new development, verification strategy & related granularity will be defined according to the scope of the modifications. In particular, credit from previous certification will be claimed when appropriate.</p>

response	Noted The Agency thanks you for your comment.
comment	300 comment by: <i>Laurent BARRAS</i> Paragraph (b)(2) note 3 could be modified as follows: "Note 3: To minimise the certification effort for transponder follow-on installations, the applicant may claim from the responsible authority credit for applicable certification and flight-test data obtained from equivalent aircraft installations. This is acceptable <u>for a parameter</u> only if all <u>related</u> equipment connected to the transponders are of the same type and same software revision number."
response	Accepted The text has been amended.
comment	301 comment by: <i>Laurent BARRAS</i> paragraph (b)(2) note 1: the following could be added: "Alternatively, for such parameters which remain invalid in static condition, ground test may use simulation if simulated data bus signal meets sensor data bus specifications, the same data bus provides at least one other valid parameter which is tested and sensor specifications clearly establish availability conditions and format of the simulated parameterd data."
response	Accepted The text has been amended.
comment	326 comment by: <i>AIRBUS MILITARY</i> AMC1 ACNS.EHS.2010 (c.2.3) Clarification: When STD pressure setting is selected, as the register resolution is only of 0,1 mb, is there any round preference (213,2 mb or 213,3 mb)?
response	Noted The clarifications are provided in ICAO Document 9871 Edition 2 § C.2.3.9.5 (c).
comment	350 comment by: <i>European Cockpit Association</i> Book 2 Subpart D – Surveillance AMC1 ACNS.EHS.2010 Data transmission (c) Aircraft parameters (1) Selected Altitude i. MCP/FCU Sel. Alt. The proposed wording may not correctly reflect the normal operational environment. As discussed already in the definitions section, the distinction between the technical term "MCP/FCU selected altitude" and the generic meaning

of "level" in operations (height, altitude, or flight level) should be observed. The following is suggested:
The "MCP/FCU Selected Altitude" provided corresponds to the level selected by the flight crew on a MCP or FCU, reflecting the ATC cleared level in many cases. However, as operational practices differ between aircraft types and aircraft operators, "MCP/FCU Selected Altitude" and cleared level are not always identical.
In case the aircraft installation does not include a "MCP/FCU Selected Altitude" function, the use of the information provided by an altitude alerter is an acceptable means of compliance.

response Partially Accepted

The definition of 'MCP/FCU selected altitude' has been added in CS ACNS.GEN.1010 in response to comment 345; the definition provided in AMC1 ACNS.EHS.2010 (c) (1) has been deleted.

comment 351 comment by: *European Cockpit Association*

Book 2 Subpart D – Surveillance
 AMC1 ACNS.EHS.2010 Data transmission
 (c) Aircraft parameters
 (1) Selected Altitude
 ii. FMS Selected Altitude
 The reference (ii.) will need to be aligned with the agreement found for the term in Book 1 Subpart A – General, CS ACNS.GEN.1010, Definitions.
 Assuming agreement on "FMS Programmed Level", some additional minor amendments are suggested. In addition, in the "Note", the reference to RNAV1 as an example for vertical navigation application appears confusing, as RNAV1 predominantly is a horizontal RNAV "specification". Also, "FMS managed" operations may not be identical to "flying using FMS".
 The following is suggested:
 ii. **FMS Programmed Level**
 When available, it is recommended that the **FMS Programmed Level** field is provided. The **FMS Programmed Level** is the **level** used by the FMS to manage the vertical profile of the aircraft.
*Note: This will allow the reporting of the intermediate selected altitudes during applications (e.g. **Continuous Descent Operations**) when **the FMS provides the guidance input to the auto-pilot.***

response Partially Accepted

The definition of 'FMS selected altitude' has been added in CS ACNS.GEN.1010 in response to comment 344. The proposed amendment to the note is accepted.

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comment 109 comment by: *Boeing*

Page: 47
 Paragraph: *GM1 ACNS.ADS.1000 Applicability*

	<p>The proposed text states: "With respect to 1090 MHz ES ADS-B Out installations, the material in this section is to a large degree in line with the corresponding FAA AC 20-165 material. ..."</p> <p>REQUESTED CHANGE: Revise the text to read as follows: "With respect to 1090 MHz ES ADS-B Out installations, the material in this section is to a large degree in line with the corresponding FAA AC <u>20-165()</u> material. ..."</p> <p>JUSTIFICATION: The latest version of the FAA ADS-B Out AC is 20-165A. The guidance material provided in this document should be consistent with the latest version of the AC and be indicated so, in order to ensure harmonization.</p>
response	<p>Partially Accepted</p> <p>Reference will be made to FAA AC 20-165A.</p>
comment	<p>182 comment by: EUROCONTROL</p> <p>Provided that AMC 20-24 is kept see comment No 144 it is suggested to include the following text to clarify applicability vis-à-vis AMC 20-24: The requirements of CS ACNS.ADS fully cover (and exceed) the requirements of AMC 20-24 (Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHz Extended Squitter). Therefore, aircraft that comply with CS ACNS.ADS also comply with AMC 20-24 but not vice versa.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>252 comment by: Garmin International</p> <p>Regarding GM1 ACNS.ADS.1000: The title should be corrected to AMC1 ACNS.ADS.1000.</p>
response	<p>Not Accepted</p> <p>The paragraph is worded as GM and does not demonstrate compliance.</p>
comment	<p>253 comment by: Garmin International</p> <p>Regarding GM1 ACNS.ADS.1000: The current FAA guidance is FAA AC 20-165A. The reference should be corrected.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>327 comment by: AIRBUS MILITARY</p>

response

Update: FAA AC 20-165A is now available; reference to last issue needs to be provided

Accepted

The text has been amended.

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comment

6

comment by: *NetJets Europe*

Comment:

UAT not considered as data link.

Justification:

May cause interoperability issues with US aircraft (UAT equipped).

response

Noted

Commission Regulation (EU) No 1207/2011 mandates the internationally agreed 1090 ES data link. UAT is a regional standard applicable to airspace classes within the US airspace and is not used in Europe. This standard is to enable demonstration with ADS-B Out on the 1090 MHz ES.

comment

150

comment by: *EUROCONTROL*

Missing guidance with respect to testing of the ADS-B Out function.

Proposal:

Following testing should be added:

(1) Ground Test

The ADS-B Out functionality should be demonstrated by ground testing, using ramp test equipment where appropriate, that verifies during nominal system operation, the correctness of the aircraft derived surveillance data contained in the ADS-B messages, and the functioning of system monitoring tools/fault detectors including any ADS-B self-test features.

EMI/EMC testing should ensure that the ADS-B equipment does not provide an interference source to other installed systems on the aircraft. Additionally, the testing should ensure that equipment already installed in the aircraft does not interfere with the ADS-B system.

(2) Flight Test

A flight test may need to be performed to show that the installed system interfaces correctly with a ground system. The functional test will verify that the ground system properly receives the aircraft's ADS-B broadcast messages that the aircraft's transmitted data is correct, and that there are no dropouts of data items.

The test is intended to evaluate design interface issues between the horizontal position (and other) data sources and the ADS-B transmit unit. Particular areas for verifying proper system functioning in-flight, relate to airborne/surface status determination, meeting position and velocity accuracy and integrity performance requirements under all foreseen conditions (also with respect to standard rate turns and climb/descents) and the exercising of all user inputs (for comparison with the information contained in Mode S replies).

response	<p>If flight test data from a previous approval can be provided which established the compatibility for a specific set of avionics component part numbers, there should be no need to re-accomplish the flight test.</p> <p>The standard process for requesting flight test authorisation should be followed</p>
	<p>Partially Accepted</p> <p>The text has been incorporated to meet the intent of the comment without the need for flight test and to align with existing instructions. The absence of validated ground stations that may be used for certification credit is problematic.</p>

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comment	7	comment by: <i>NetJets Europe</i>
	<p>Comment 1: Parameters required by CS, optional for AC: Vertical Rate, GPS Antenna Offset and Selected Altitude. Parameters required by CS, not addressed by AC: Barometric Pressure Setting. Parameters not required by CS, required by AC: ADS-B In Capability. Parameters not addressed by CS, optional for AC: Selected Heading Justification 1: Interoperability issues - US aircraft approved in accordance with FAA AC 20-165 cannot be directly approved via EASA CS ACNS.ADS. This would require a retrofit to ADS components. Comment 2: ADS-B In not required. Justification 2: Interoperability issues – benefits of ADS-B In not realised in EASA aircraft. Operator investment is not optimized.</p>	
response	<p>Noted</p> <p>Comment 1: This NPA introduces the requirements with respect to aircraft certification in response to the requirements as stipulated in Regulation (EU) No 1207/2011. It is outside the scope of this task to define the minimum parameters to be transmitted.</p> <p>Comment 2: ADS-B IN requirements are outside the scope of this rulemaking task. As mention in response to comment 1 this NPA introduces the requirements for ADS-B OUT as required to support Regulation (EU) No 1207/2011. An additional rulemaking task (RMT.0002) will commence shortly to the initial ADS-B IN applications. Any mandated application of ADS-B IN capability will be subject to further review.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2008(a)

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comment	285	comment by: <i>AIRBUS</i>
	Provision of data - Approved sources	

	GNSS ground track will be used as a third source. The following priority is implemented as per AC 20-165A: true heading from IRS, magnetic heading from IRS, GNSS ground track. The requirement shall be modified to be consistent with AC 20-165A.
response	<p>Not Accepted</p> <p>ADS.2008 address the (optional) heading interface as such (as it is introduced in AC 20.165A).</p> <p>Specific guidance on the population of either heading or ground track within the surface squitter format (as discussed in the comment) is addressed in Definition 16 of Part 1 to Appendix H.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Subpart D - AMC1 ACNS.ADS.2008(c)

p. 48

comment	<p>110</p> <p>comment by: Boeing</p> <p>Page: 48 Paragraph: <i>AMC ACNS.ADS.2008(c) Provision of data</i> <u>The proposed text states:</u> "... Data quality indications for the horizontal position source integrity level (SIL) and system design assurance level (SDA) may be preset at installation. Systems that utilise multiple position sources with different design assurance levels, should be capable of adjusting the SDA and SIL quality indications to match the position source that is employed at the time of transmission. ..." <u>REQUESTED CHANGE:</u> We note that on page 29 of the NPA, at "<i>CS ACNS.ADS.2020 Horizontal Position and Velocity Data Sources</i>," proposed paragraph (a) states: "(a) The horizontal position is derived from GNSS data." This appears to indicate that only GNSS is allowed as a position source. Does proposed <i>AMC ACNS.ADS.2008 Provision of data</i> mean that a non-GNSS position source can be used? <u>JUSTIFICATION:</u> We request more clarity in order to understand what horizontal position sources are deemed acceptable. If GNSS is the only acceptable position and velocity data source, then the text in paragraph <i>AMC ACNS.ADS.2008</i> needs to be amended.</p>
response	<p>Accepted</p> <p>The text has been amended to reflect GNSS based position source is the accepted means of compliance.</p>
comment	<p>254</p> <p>comment by: Garmin International</p> <p>Regarding AMC1 ACNS.ADS.2008(c): In the second paragraph, it is implied that design assurance level affects SIL. It does not. The second sentence should be modified to state, "Systems that utilise multiple position sources with different design assurance levels or source integrity levels, should be capable of adjusting the SDA and SIL quality indications to match the position source that is employed at the time of</p>

transmission.”

response Accepted.

The text has been amended.

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p. 48

comment 266 comment by: Eurocopter

ETSO-C112d is not yet published (see comment N° 265 related to AMC1 ACNS.ELS.2000).
Also, it should be substantiated how a "*positive deviation of compliance to previous versions of EUROCAE ED-73*", as suggested, could result in compliance to ED-73E.

response Noted

Use of an ETSO approved transponder is a means to comply with the requirement but not the only means and other means can be used.

Positive deviation of compliance can be demonstrated by demonstrating that the deviation, resulting from a difference between the equipment capability and a previous version of ED-73, is now covered by ED-73E.

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comment 255 comment by: Garmin International

Regarding AMC1 ACNS.ADS.2012:
The first sentence states, "The 1090 ES data protocol includes a bit to indicate if antenna diversity has been installed or not." This statement is incorrect as the bit does not always indicate installation antenna diversity. Rather, per RTCA DO-260B 2.2.3.2.7.2.4.5, "at any time that the diversity configuration cannot guarantee that both antenna channels are functional, then the Single Antenna subfield shall be set to ONE." Therefore, even if antenna diversity is installed, if the equipment does not perform functional monitoring of both channels, it must set this bit to indicate non-diversity. This bit cannot be used, by itself, to identify aircraft installations with antenna diversity. This section should be clarified to acknowledge that the bit should be set per the MOPS, and that some diversity antenna installations will continue to report 'single antenna' in this bit.

response Accepted

Change sentence to 'The 1090 ES data protocol includes a bit to indicate, at any time, if only one or both antennas (if installed) are functional.'

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2 - Subpart D - AMC1 ACNS.ADS.2018

comment	151	comment by: EUROCONTROL
	<p>Missing guidance with respect to testing of the ADS-B Out function. Proposal: The following text should be added: The ADS-B Out system installer should verify that the air-ground status inputs (or algorithms) are functioning properly and that the ADS-B Out system transmits the appropriate airborne messages or surface messages based on the On-the-ground status. This can be accomplished with simulated inputs to the appropriate sensors or accomplished in conjunction with the flight test.</p>	
response	<p>Partially Accepted</p> <p>The comment is not accepted as proposed as it is the designer responsibility to ensure the design is functionally correct and to provide the required installation tests. However, the proposed text has been added in Appendix I.</p>	
comment	283 ❖	comment by: AIRBUS
	<p>Requirements for "On-ground status determination" are not in line with DO-181E. A fixed value of 100 knots, as per DO-181E, shall be used. The validation against typical rotating speed should be a recommendation, but not a requirement.</p>	
response	<p>Not Accepted</p> <p>This AMC provides guidance on how to improve the function. This one acceptable means to meet the requirement of on ground determination other methods can be employed.</p>	
comment	328	comment by: AIRBUS MILITARY
	<p>Update: The validation against typical rotation speed should be a recommendation, not a requirement.</p>	
response	<p>Not Accepted.</p> <p>This AMC provides guidance on how to improve the function. This one acceptable means to meet the requirement of on ground determination other methods can be employed.</p>	

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comment	31	comment by: General Aviation Manufacturers Association / Hennig
	<p>In AMC1 ACNS.ADS.2020 EASA states in (a)(3)(i) that "If the horizontal position source outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'"</p>	

	<p>This is inconsistent with FAA AC 20-165A. FAA AC 20-165A states in 3-3 (Position Source) c. (Configuration of associated parameters.) (5) that:</p> <p>"You should review the position source design data to determine if all error sources are taking into consideration, or if the position source limits the HPL output when computing an un-augmented Receiver Autonomous Integrity Monitoring (RAIM) based on HPL. This applies to all TSO-C129 and TSO-C196 position sources, and to TSO-C145 and TSO-C146 position sources when operating in un-augmented modes where the HPL is based on RAIM. ... If the position source does not account for all errors or accomplish the appropriate HPL limiting, you must ensure you interface the position source to ADS-B equipment which limits the NIC [\leq] 8."</p> <p>In short, FAA AC 20-165A the applicability of limiting NIC to "eight" refers to non-SBAS position sources, SBAS position sources operating in non-SBAS mode, or some SBAS sources operating in non approach modes.</p> <p>GAMA recommends that EASA harmonize guidance in AMC1 ACNS.ADS.2020 for use of SBAS position sources with FAA AC 20-165A including limiting only be applicable to the conditions defined in FAA AC 20-165A Appendix 2. Additionally, Appendix H, Part 5 - GNSS Position and Velocity Source Qualification (a) "Mode Output - AMC1 ACNS.ADS.2020(a).1.3 should be modified.</p>
response	<p>Accepted</p> <p>New text:</p> <p>"Some approved horizontal position sources might incorrectly output horizontal position integrity containment bounds of less than 75 meters. In such cases, it is accepted that the transmit unit limits the NIC value to 'eight'"</p> <p>Replacing old text:</p> <p>"If the horizontal position sources outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'"</p>
comment	<p>68 comment by: NATS National Air Traffic Services Limited</p> <p>(3) (i) Text if the horizontal position sources outputs" change ~sources" to "source"</p>
response	<p>Accepted</p> <p>Implemented in the frame of response to comment 31.</p>
comment	<p>152 comment by: EUROCONTROL</p> <p>Bullet (a)(2)(i) Additional GNSS Receiver Qualification Requirements - horizontal position integrity containment</p> <p>Missing guidance with respect to non-compliance of HUL.</p> <p>Proposal:</p> <p>The following note should be added below :</p> <p>It is noted that Horizontal Uncertainty Level (HUL) information does not fulfil CS ACNS.ADS.2020.</p> <p>AMC1 ACNS.ADS.2020 Horizontal Position and Velocity Data Sources (a) GNSS</p>

response	<p>Standards (2) Additional GNSS Receiver Qualification Requirements Add new first bullet 'I' to explicitly require that the GNSS system must provide a latitude and longitude output. [Note that ETSO-129a does not cater for full compliance with this requirement]</p> <p>Accepted</p> <p>The text has been amended as proposed.</p>
comment	<p>153 comment by: EUROCONTROL</p> <p>AMC1 ACNS.ADS.2020 Horizontal Position and Velocity Data Sources (a)(3)(i) Interface Interoperability Aspects The text in the first paragraph does not meet the intention to only prevent incorrect encodings of a NIC of eight (correct $R_c < 75\text{m}$ encodings should not be limited). Proposed to change from: "Some approved horizontal position sources might incorrectly output horizontal position integrity containment bounds of less than 75 meters. In such cases, it is accepted that the transmit unit limits the NIC value to 'eight'" To "If the horizontal position sources outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'"</p> <p>AMC1 ACNS.ADS.2020 Horizontal Position and Velocity Data Sources (a)(4) Data Quality Indicator Testing Missing guidance with respect to testing of ADS-B quality indicators.. Proposed to add: This should be verified through appropriate tests, as follows. With respect to NIC and NACp testing, the ADS-B Out system installer should check for satellite shielding and masking effects if the stated performance is not achieved.</p> <p>i. Airborne & Surface NIC: • During testing under nominal GNSS satellite constellation and visibility conditions, the transmitted NIC value should be a minimum of 'six'.</p> <p>ii. NACp: • During testing under nominal GNSS satellite constellation and visibility conditions, the transmitted NACp value should be a minimum of 'eight' • In order to validate the correctness of the transmitted horizontal position, the aircraft should be positioned on a known location.</p> <p>iii. SIL: • SIL is typically a static (unchanging) value and may be set at the time of installation if a single type of position source is integrated with the ADS-B transmit unit. SIL should be set based on design data from the position source equipment manufacturer. Installations which derive SIL from GNSS position sources compliant with CS ACNS.ADS.2020 should set the SIL to 'three'. • ADS-B transmit units interfaced with a GNSS position source that is compliant with CS ACNS.ADS.2020 (and the related AMC guidance) should pre-set the SIL Supplement to 'zero'.</p> <p>iv. NACv: • If set as fixed value, NACv should be always 'one'. For quality indications that are dynamically provided by the velocity source, NACv should be 'one' or 'two'. • It is noted that there is currently no established guidance on establishing a NACv performance of 'three' or better.</p>

response	<p>Partially Accepted</p> <p>First comment on AMC1 ACNS.ADS.2020 Horizontal Position and Velocity Data Sources (a)(3)(i) is accepted understanding that the proposed text and the new text are to be swapped (see also response to comment 31).</p> <p>The remaining comments are not accepted, as proposed, as it is the designer's responsibility to ensure the design is functionally correct and to provide the required installation tests. However the proposed text is added in Appendix H Part 3 (see also comment 55).</p>
comment	<p>256 comment by: <i>Garmin International</i></p> <p>Regarding AMC1 ACNS.ADS.2020 (a) (3): Item (a)(3)(i) states, "If the horizontal position sources outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'." This is inconsistent with FAA AC 20-165A and the difference is not listed in Appendix J. Per FAA AC 20-165A, limiting of NIC to 'eight' is applicable to non-SBAS position sources, SBAS sources operating in non-SBAS or some SBAS sources operating in non approach modes. It is suggested that this information be made consistent with FAA AC 20-165A and limiting be applicable only under the same conditions as defined in FAA AC 20-165A Appendix 2.</p>
response	<p>Accepted</p> <p>See response to comment 31.</p>
comment	<p>278 ❖ comment by: <i>AIRBUS</i></p> <p>Requirements for ADS-B Out position source are defined in term of technical solution (GNSS source), <u>and not in term of required performance level</u>. Some other aircraft solutions exist where the GPIRS solution is used as the ADS-B Out position source.</p> <p>Appendix H Part 5 "GNSS Position and Velocity Source Qualification" identifies the FAA AC 20-138B as applicable. FAA AC 20-138C was published on May 8th, 2012. Existing GNSS installations are not qualified against AC 20-138 ().</p> <p>Applicable requirements for the ADS-B Out position source shall be specify in term of performance.</p> <p>ADS-B Out position sources other than the GNSS shall be recognized as acceptable, as done in FAA AC 20-165 ().</p> <p>Then compliance means is depending on the position source. As an example, a GPIRS position source does not implement RAIM algorithm.</p> <p>GNSS installations qualified against previous qualification & certification standards shall be recognized as acceptable, provided compliance demonstration with applicable performance requirements are demonstrated. Note that the cost of these additional compliance demonstrations shall be take into account in the economic impact analysis.</p>
response	<p>Partially Accepted</p>

GNSS-based horizontal position sources are the only sources that are considered to meet the respective NIC and SIL requirements (see Appendix H, Part 3). Closely coupled GNSS / IRS solutions are considered as higher-end GNSS-based sources that can provide a position source performance that is equivalent, and thus meet the requirement of CS ACNS.ADS.2020(a) The horizontal position is derived from GNSS data

comment

286

comment by: AIRBUS

EASA is mandating for GNSS equipment installation compliance with FAA AC 20-138B (or later). Compliance will only be demonstrated for new GNSS equipment development & installation.
For legacy installation, compliance with previous FAA standard AC 20-130() should be acceptable.

response

Noted

The AMC is a means of compliance but not the only means, Other means of compliance are permitted.

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comment

154

comment by: EUROCONTROL

AMC1 ACNS.ADS.2030 Data Sources as defined by Mode S Elementary and Enhanced Surveillance

(a)(6) Vertical rate: AMC1 ACNS.EHS.2010

The ADS-B provisions include dedicated Vertical Rate provisions in themselves (for the reasons explained in AMC1 ACNS.ADS.2030 (d)). That reference to AMC1 ACNS.EHS.2010 might lead to misunderstandings and ambiguity. Therefore it is proposed to remove this reference.

(d) Vertical Rate

Missing guidance on source selection prioritisation.

Proposed to add as 2nd paragraph:

In order to ensure that minimum performance requirements are met for Vertical Rate information, the following source prioritisation should be applied:

* Hybrid Vertical Rate Source: the information may be taken from a hybrid system which filters barometric vertical rate with an inertial reference unit (IRU) vertical rate and GNSS vertical rate, provided the hybrid system was tested and approved to provide a vertical rate output with an accuracy that is at least as good as barometric vertical rate sources (e.g. ETSO-C106). Hybrid vertical rate could come from a flight management system (FMS), air data and inertial reference system (ADIRS), or an inertial reference unit (IRU). The ADS-B transmit unit encodes the information as barometric vertical rate.

* Blended Vertical Rate Source: the information may be taken from a blended system which filters IRU vertical rate and barometric vertical rate, provided the blended system was tested and approved to provide a vertical rate output with an accuracy that is at least as good as barometric vertical rate sources (e.g. ETSO-C106). Blended vertical rate could come from an FMS, air data and inertial reference system ADIRS, or an IRU. The ADS-B transmit unit encodes the information as barometric vertical rate.

* Barometric Vertical Rate Source: the information may be taken from an air data

	computer (ADC) meeting the minimum performance requirements of ETSO-C106 (preferred) or a vertical velocity instrument meeting the minimum performance requirements of applicable revisions of ETSO-C8() . * GNSS Vertical Rate Source: GNSS vertical velocity equipment which have not been qualified in accordance with CS-ACNS.ADS.2020 should not be interfaced with the ADS-B transmit unit.
response	Partially Accepted The text has been amended to include source prioritisation.
comment	329 comment by: AIRBUS MILITARY Errata: The linked ELS/EHS requirements do not fully match with the parameters listed here. Please review the cross-references.
response	Accepted Text amended to match ELS/EHS listing as follows. (a) General Requirements For the requirements and general guidance on the data sources providing the Mode S Elementary and Enhanced surveillance parameters, the following references to CS ACNS.ELS and CS ACNS.EHS apply: (1) Aircraft Identification: CS ACNS.ELS.2030(a)(3) and (8); (2) Mode A Code: CS ACNS.ELS.2030(a)(1) and (7) ; (3) SPI: CS ACNS.ELS.2030(a)(2); (4) Emergency Mode/Status: CS ACNS.ELS.2030(a)(1) and (7); (5) Pressure Altitude: CS ACNS.ELS.2020, CS ACNS.ELS.2030(a)(4) and (9); (6) Vertical Rate: AMC1 ACNS.EHS.2010 (c) (2); (7) MCP/FCU Selected Altitude: : AMC1 ACNS.EHS.2010 (c)(1); (8) Barometric Pressure Setting:AMC1 ACNS.EHS.2010 (c) (3); (9) ACAS Operational/Resolution Advisory: AMC1 ACNS.ELS.2010 (f); and (10) ICAO 24 bit Address: CS ACNS.ELS.4010.

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comment	155 comment by: EUROCONTROL AMC1 ACNS.ADS.2034 Geometric Altitude (a) Geometric Altitude data source In line with equivalent guidance in e.g. AMC1 ACNS.ADS.2020 compliance demonstration guidance, reference to DDP approach should be mentioned here as well. Proposed to add as 2nd paragraph: In order to ensure that minimum performance requirements are met for Vertical Rate information, the following source prioritisation should be applied: * Hybrid Vertical Rate Source: the information may be taken from a hybrid
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	<p>system which filters barometric vertical rate with an inertial reference unit (IRU) vertical rate and GNSS vertical rate, provided the hybrid system was tested and approved to provide a vertical rate output with an accuracy that is at least as good as barometric vertical rate sources (e.g. ETSO-C106). Hybrid vertical rate could come from a flight management system (FMS), air data and inertial reference system (ADIRS), or an inertial reference unit (IRU). The ADS-B transmit unit encodes the information as barometric vertical rate.</p> <p>* Blended Vertical Rate Source: the information may be taken from a blended system which filters IRU vertical rate and barometric vertical rate, provided the blended system was tested and approved to provide a vertical rate output with an accuracy that is at least as good as barometric vertical rate sources (e.g. ETSO-C106). Blended vertical rate could come from an FMS, air data and inertial reference system ADIRS, or an IRU. The ADS-B transmit unit encodes the information as barometric vertical rate.</p> <p>* Barometric Vertical Rate Source: the information may be taken from an air data computer (ADC) meeting the minimum performance requirements of ETSO-C106 (preferred) or a vertical velocity instrument meeting the minimum performance requirements of applicable revisions of ETSO-C8() .</p> <p>* GNSS Vertical Rate Source: GNSS vertical velocity equipment which have not been qualified in accordance with CS-ACNS.ADS.2020 should not be interfaced with the ADS-B transmit unit.</p> <p>AMC1 ACNS.ADS.2034 Geometric Altitude</p> <p>(b) Geometric Altitude Reference</p> <p>Testing guidance is missing.</p> <p>Proposed to add at end of section:</p> <p>During integration testing (on the ground), the geometric altitude information should be verified to be the same order of magnitude as the local height above ellipsoid plus the height of the aircraft's GNSS antennas.</p>
response	<p>Not Accepted</p> <p>The proposed text is related to equipment qualification as addresses by AMC1 ACNS.ADS.2020, it is not relevant to the altitude data source Proposed 2nd paragraph not accepted as the proposed text relates to vertical rate determination not geometric data which is supplied by GNSS systems.</p> <p>(b) It is the designer responsibility to ensure the design is functional correct and to provide the required installation tests.</p>

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comment	<p>156</p> <p>comment by: EUROCONTROL</p> <p>AMC1 ACNS.ADS.2040(a) Flight Deck Interface</p> <p>(b) ADS-B Off Switch</p> <p>Guidance on undesired ADS-B Off switch is missing.</p> <p>Proposed to add as first paragraph:</p> <p>Operational requirements dictate that the ADS-B transmit unit (and the respective data sources) must be turned on at all times (including on the surface). Consequently, there are no requirements to provide a function to disable the ADS-B transmit unit, nor is such a function encouraged.</p>
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response Not Accepted

The text is considered to be clear, the application of a means to enable/disable ADS-B transmission is an option and if used clear indication to the flight crew is required. The requirement for ADS-B to be operational at all times in Europe is addressed in Regulation (EU) No 1207/2011.

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comment 32 comment by: General Aviation Manufacturers Association / Hennig

In AMC1 ACNS.ADS.2040(b) Flight Deck Interface, EASA states that "ADS-B Out system failures should be indicated in **amber** [emphasis added] without undue delay; i.e. a response time within the order of one second."

It is GAMA's view that specifying the color of the failure indication in AMC material is an inappropriate degree of specificity. While new aircraft installations may be capable of complying with amber, specifying the color will require new / different displays or a deviation for many legacy aircraft. The general "fail" indication for this equipment has been implemented for a long time using the color available on the monochrome display. EASA proposing to specify the color for this new annunciation adds a requirement that will require a deviation request and unnecessary cost.

Additionally, GAMA notes that the MOPS do not include a requirement for failure annunciation color. Similarly, FAA AC 20-165A does not specify a requirement for the failure annunciation. And, the failure annunciation color for the transponder itself does not specify a color in the draft guidance. (It is GAMA's view that the failure annunciation of the transponder should be consistent with the requirements for ADS-B.)

GAMA recommends that EASA change this sentence to make it clear that "amber" is not required (or inferred) by excluding the color reference: "ADS-B out system failure should be indicated without undue delay, i.e. a response time within the order of one second."

response Partially Accepted

The Agency recommends the use of amber as this is considered a cautionary alert that immediate flight crew awareness and possible subsequent flight crew response. However, it is recognised that this may not be possible with some aircraft installation thus the annunciation should be in accordance with the flight deck philosophy. The text has been amended to this effect.

comment 111 comment by: Boeing

Page: 53

Paragraph: CS ACNS.ADS.2040(b) Flight Deck Interface

The proposed text states:

"In case the ADS-B Out system function failure is linked to the unavailability of horizontal position information, it is expected that the transponder should continue to support the ACAS and Mode S functions."

REQUESTED CHANGE:

Revise the text to read as follows:

response	<p>"In the case of an ADS-B Function Failure (reference CS ACNS.GEN.1010 Definitions), it is expected that the transponder should continue to support the ACAS, Mode A/C, and Mode S functions".</p> <p>"In case the ADS-B Out system Function Failure (<u>reference CS ACNS.GEN.1010 Definitions</u>) is linked to the unavailability of horizontal position information, it is expected that the transponder should continue to support the ACAS, <u>Mode A/C</u>, and Mode S functions."</p> <p>JUSTIFICATION:</p> <p>ADS-B Function Failure is a specifically defined failure case. In this specific failure case, the ACAS, Mode A/C, and Mode S functions should not be affected.</p> <p>Accepted</p> <p>The text has been amended.</p>
comment	<p>157 comment by: EUROCONTROL</p> <p>AMC1 ACNS.ADS.2040(b) Flight Deck Interface Same title as AMC1 ACNS.ADS.2040(a) Proposed to add in the title: "- ADS-B Out System Failures" ED-102A makes the difference between "ADS-B device failure" and "ADS-B function failure" it is deemed important to clarify that ADS-B Out system failure encompasses both types: device and function failures. Proposal: 1st paragraph: after "ADS-B Out system failures" add ", i.e. ADS-B device or function failures," It then makes clear that the third paragraph is only related to function failure (as opposed to device failure).</p>
response	<p>Partially Accepted</p> <p>The text has been amended to refer only to ADS-B device and function failure.</p>
comment	<p>223 comment by: Embraer - Indústria Brasileira de Aeronáutica - S.A.</p> <p>On this item, the document states that "ADS-B Out system failures should be indicated in amber without undue delay, i.e. a response time within the order of one second."</p> <p>On Appendix J (Comparison between EASA CS ACNS.ADS and FAA AC 20-165 Requirements) page 105, it is stated that there are no differences between CS ACNS.ADS.2040 and AC 20-165. However, AC 20-165 only requires an ADS-B failure to be properly annunciated to the flight crew. It does not determine the criticality, color or the time delay between the event and the annunciation.</p> <p>The cockpit philosophy of some aircraft may not be compatible with an amber message for an ADS-B failure. The characteristics of this annunciation should be evaluated by the certification authorities according to the aspects of each aircraft.</p> <p>Proposed text:</p> <p>'ADS-B Out system failures should be timely and properly indicated to the flight crew'.</p>

response Partially Accepted

The Agency recommends the use of amber as this is considered a cautionary alert that immediate flight crew awareness and possible subsequent flight crew response. However, it is recognised that this may not be possible with some aircraft installation thus the annunciation should be in accordance with the flight deck philosophy. The text has been amended to this effect.

comment 257

comment by: *Garmin International*

Regarding AMC1 ACNS.ADS.2040(b):

The first sentence states, "ADS-B Out system failures should be indicated in amber without undue delay, i.e. a response time within the order of one second." The color of the failure indication should not be specified in this guidance for the following reasons:

1. The general 'fail' indication for Mode A/C/S equipment has been implemented for a long time using the color available on a monochrome display. Specifying the color will require new/different displays or a deviation for many legacy installations
2. There is no ETSO requirement for the ADS-B function failure annunciation color
3. AC 20-165A does not specify a color for this failure annunciation, and a difference from AC 20-165A has not been noted in Appendix J of Subpart D Book 2

It is suggested that the sentence be changed to, "ADS-B Out system failures should be indicated without undue delay, i.e. a response time within the order of one second."

response Partially Accepted

The Agency recommends the use of amber, as required by CS XX.1322, as this is considered a cautionary alert that immediate flight crew awareness and possible subsequent flight crew response. However, it is recognised that this may not be possible with some aircraft installation thus the annunciation should be in accordance with the flight deck philosophy. The text has been amended to this effect.

comment 330

comment by: *AIRBUS MILITARY*

Clarification/MOC: For "unavailability of horizontal position information" it is understood no horizontal data received by the ADS-B System. In case of reception of quality parameters lower than those required to support ADS-B-RAD functionality no system failure will be triggered

response Noted

Your understanding of this is correct.

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comment 158

comment by: *EUROCONTROL*

New AMC1 ACNS.ADS.3000 Design Assurance

Guidance on this very important aspect is entirely missing.

Proposed to add the following:

AMC1 ACNS.ADS.3000 Design Assurance
The ADS-B Out system should be designed such that the probability of transmitting misleading information is commensurate with the levels defined in Table t1 and t2.

Table t1 - Design Assurance per Data Parameter [i.e. "remote" or "probable" per CS ACNS.ADS.2005(a) data parameter]

Table t2 - ADS-B Out Integrity per Data Parameter [i.e. "remote" or "probable" per CS ACNS.ADS.2005(b+D16) data parameter]

The Integrity Levels as listed in the above tables refer to the allowable qualitative failure probabilities as defined in AMC 25.1309. It is noted that these integrity requirements also apply to the correct use of the ADS-B transmit unit data formats.

The ADS-B Horizontal Position System Design Assurance (SDA) parameter indicates the probability of an ADS-B Out system malfunction causing false or misleading position information or position quality metrics to be transmitted.

SDA may be pre-set at installation for systems that do not utilise multiple position sources with different design assurance levels, otherwise the system should be capable of adjusting the SDA broadcast parameter to match the position source being employed at the time of transmission. ADS-B transmit equipment that is compliant with AMC1 ACNS.ADS.2010 and that is directly connected to a position source compliant with AMC1 ACNS.ADS.2020 may set the SDA to 'two' without further analysis.

For more complex ADS-B installations, a system safety assessment is required to set the SDA. Basically, the lowest design assurance level of one system in the horizontal position data transmission chain should define the SDA value.

If an ADS-B Out system transmits data parameters in addition to those defined in CS ACNS.ADS.2005, the system should be designed such that the probability of transmitting misleading information for these additional data parameters is better than or equal to 'Probable'.

If an ADS-B Out system transmits data parameters in addition to those defined in CS ACNS.ADS.2005, the system should be designed such that the inability to transmit a parameter is better than or equal to 'Probable'.

New AMC1 ACNS.ADS.3010 Continuity

Guidance on this important aspect is entirely missing.

Proposed to add the following:

AMC1 ACNS.ADS.3010 Continuity

With respect to Continuity (loss of function), the ADS-B Out system should be designed such that its loss of function resulting in the inability to transmit a parameter is commensurate with the levels or approximate mean time between failures (MTBF) in flight hours (fh), as defined in the following tables 7 and 8.

Table 7 – Continuity per Data Parameter (CS-ACNS.ADS.2005(a)) [i.e. either "approx. 5000h MTBF" or "probable"]

Table 8 – Continuity per Data Parameter (CS-ACNS.ADS.2005(b)) [i.e. either "approx. 5000h MTBF" or "probable"]

The Continuity Levels as indicated in the above tables refer to the allowable qualitative failure probabilities as defined in AMC 25.1309.

The installation of redundant system components is encouraged, also in anticipation of further increased reliance on aircraft provided surveillance data in the future.

If an ADS-B Out system transmits data parameters in addition to those defined in CS-ACNS.ADS.2005, the system should be designed such that the inability to transmit a parameter is better than or equal to 'Probable'.

New GM1 ACNS.ADS.3020 Horizontal Position and Velocity Data Refresh

	<p>Guidance on this important aspect is entirely missing. Proposed to add the following: GM1 ACNS.ADS.3020 Horizontal Position and Velocity Data Refresh Faster position update rates reduce the latency of the transmitted position and velocity information and are therefore encouraged. For systems with a 1 Hertz computation rate, the output of position and velocity data can vary between 0.8 seconds and 1.2 seconds.</p>
response	<p>Partially Accepted</p> <p>The requirements as specified in CS ACNS.ADS.3000 and 3010, as modified, are considered to be explicate and do not require a mean of compliance to be established.</p> <p>With respect to the text regarding the possibility to pre-set the SDA value, this text is valid and has been incorporated into AMC1 ADS.2005.</p> <p>With respect to the proposed new GM1 ACNS.ADS.3020 text. The intent of this text has been incorporated as an AMC.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix C

p. 62-66

comment	<p>170</p> <p>comment by: EUROCONTROL</p> <p>Registers E3₁₆ and E4₁₆ are missing in table 3. Proposal: Please add registers E3 and E4 in table 3 and add a note below the table to indicate they are recommended.</p>
response	<p>Accepted</p> <p>The text has been amended.</p>
comment	<p>174</p> <p>comment by: EUROCONTROL</p> <p>On the figure the central box should be named "EHS Mode S transponder" In the figure the dashed line is not well aligned with "= optional" This figure and the previous in Appendix B are not referenced and numbered as figure as Figure 1 on page 54 is. It is suggested to reference them as Figure 2 and Figure 3 respectively.</p>
response	<p>Accepted</p> <p>The text has been amended accordingly.</p>
comment	<p>211</p> <p>comment by: Eurocopter</p> <p>In the figure page 63, "ELS" should be replaced by "EHS".</p>
response	<p>Accepted</p>

The text has been amended.

comment 331 comment by: AIRBUS MILITARY

Pag 63 - Clarification: It is understood that implementation of reg BDS 1,8 to 1,D is optional
 Pag 65 - Errata: Aircraft Type register should be BDS 2,5
 Pag 66 - Clarification: Please confirms that registers BDS E.5 & E,6 implementation is not mandatory even in order to comply with EU 1332/2011 (TCAS Change 7.1)

response Accepted

Re comment pertaining to page 63, these registers are optional, for clarity the text has been amended to state: 'Ground systems could also use register 18₁₆ to 1C₁₆, if available, to determine which registers are ...'

Re comment pertaining to page 65, indeed correct register is 25₁₆. Text amended accordingly.

Re comment pertaining to page 66: These registers are not mandatory for compliance with Regulation (EU) No 1207/2011 nor Regulation (EU) No 1332/2011, but their provision is recommended.

comment 352 comment by: European Cockpit Association

This appendix addresses EHS, but the sketch on page 163 shows an "ELS Mode S Transponder".

response Accepted

The text has been amended.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix D

p. 67

comment 112 comment by: Boeing

Page: 67
 Paragraph: Appendix D — Differences between CS ACNS.ELS and JAA TGL 13 Rev1; para. (b)

The proposed text states:

"(b) **Verification of consistency** between the pressure altitude provided in Extended Squitter messages and in Mode S replies if the installation sends Extended Squitter but it is not compliant with Subpart D section 4 (See CS ACNS.ELS.2010 (b)) "

REQUESTED CHANGE:

The term "verification of consistency" is vague and needs to be quantified.

JUSTIFICATION:

There is no measurable pass/fail criteria stated for how close the pressure altitude values in the ADS-B transmit messages and Mode S replies must be. This

response	<p>needs to be known in order to be able to comply with this requirement. We request additional information be added for clarity.</p> <p>Accepted</p> <p>In CS ACNS.ELS.2010 (b) (2) it is stated that they are verified to be identical, the text has been amended to reflect this requirement.).</p>
comment	<p>113 comment by: Boeing</p> <p>Page: 67 Paragraph: <i>Appendix D – Differences between CS ACNS.ELS and JAA TGL 13 Rev1; para. (d)</i> <u>The proposed text states:</u> “(d) Other parameters provided by the airborne surveillance system are verified. (See CS ACNS.ELS.2010 (b)). ” <u>REQUESTED CHANGE:</u> The term “...are verified” is vague and needs to be clarified. <u>JUSTIFICATION:</u> This phrase needs to be clearly understood in order for applicants to be able to comply with this requirement. We request additional information be added for clarity.</p>
response	<p>Partially Accepted</p> <p>The same statement ('verified') is already provided in CS ACNS.ELS.2010 (b). The text has been amended to indicate that the parameters are correct and available.</p>
comment	<p>212 comment by: Eurocopter</p> <p>In item (a), reference should be more precisely to CS ACNS.ELS.2010 (b) or even CS ACNS.ELS.2010 (b) (2).</p>
response	<p>Accepted</p> <p>The text has been amended.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix E

p. 68

comment	<p>15 comment by: Hawker Beechcraft Corporation</p> <p>Hawker Beechcraft asserts the testing of all possible squitter outputs associated with EHS seems unnecessary since the ground systems get a EHS equipped flag and should be able to exclude other data. Generally, OEMs only tested the minimum data set for EHS.</p>
response	<p>Not Accepted</p> <p>The comment is already addressed by existing text in- AMC1 ACNS.EHS.2010 (a) (2). This already indicates that certain ES registers are excluded from EHS</p>

testing.

comment 33 comment by: *General Aviation Manufacturers Association / Hennig*

EASA states in Appendix E - Differences between CS-ACNS.EHS and EASA AMC 20-13 states in (b) that "All parameters/registers are tested to ensure correct data is transmitted by the Mode S transponder (See CS ACNS.ELS.2020(b)(3); and".

GAMA requests that EASA clarify why this additional testing is needed. It is GAMA's understanding that the ground system receives an EHS equipped flag and should be able to exclude other data.

GAMA recommends that EASA remove requirement (b) unless there is a specific safety benefit to conducting a test on all aircraft previously compliant with EASA AMC 20-13 to ensure that parameters/registers transmit correct data at this point in time.

response Not Accepted

There is an operational benefit to test all parameters transmitted are correct. Even if not formally required in EU Regulation No 1207/2011, some other parameters might be used by ATC when available therefore these parameters must be tested. (A past example is the BPS which was transmitted but not tested; future example will be FMS selected altitude). It be recognised that An EHS flag does not exist. Bit 25 of register 10 indicates that some mode S specific services are supported. Register 17 or 18 to 1c are used to know if a specific register is supported. If indicated as supported and if necessary the register will be extracted. In such case there is no means on the ground to know whether the data has been correctly verified therefore all data provided must be verified. Furthermore, AMC1 ACNS.EHS.2010 (a) (2), already indicates that certain ES registers are excluded from EHS testing.

comment 114 comment by: *Boeing*

Page: 68

Paragraph: *Appendix E — Differences between CS ACNS.EHS and EASA AMC 20-13*

The proposed text states:

"To demonstrate compliance with CS-ACNS Enhanced Surveillance requirements, the following additional points need to be addressed for aircraft previously compliant with EASA AMC 20-13:

(a) A list of all registers and parameters transmitted by the system is provided (See AMC1 ACNS.EHS.2010 (a)) with a confirmation of good operation;

(b) All parameters/registers are tested to ensure correct data is transmitted by the Mode S transponder (See CS ACNS.ELS.2010 (b) (3)); and

(c) Barometric pressure setting is provided and corresponds to 1013.25 "

REQUESTED CHANGE:

We have several questions concerning this proposed text:

(a) What is meant by "...with a confirmation of good operation"? How is compliance shown for this requirement?

(b) What does "tested to ensure" mean? Is avionics manufacturers' data acceptable for compliance, or is a ground test required?

(c) What is the means of compliance for the barometric pressure setting? Is avionics manufacturers' data acceptable for compliance, or is a ground test

	required? Additionally, please explain why "1013.25" shown as the value? JUSTIFICATION: We request that this information be clearly explained and defined in order to ensure appropriate compliance with this requirement.
response	Partially Accepted The Agency concurs that the proposed text does not provide sufficient clarity. The text has there for been amended as follows: bullet (a) now reflect the requirement of CS ACNS.EHS.2010(c) Bullet (b) has been deleted Bullet (c) reference to 1013.25 has been deleted.
comment	213 comment by: Eurocopter References to CS ACNS.ELS.2010 (b) (3) and CS ACNS.ELS.2010 (c) (3) are incorrect.
response	Accepted Text amended with the correct references .

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix G p. 71-72

comment	134 comment by: Luftfahrt-Bundesamt Page 71, typo: Headline: „Appendix G...ADS-B...”
response	Accepted The text has been amended.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 1 p. 73-76
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comment	71 comment by: NATS National Air Traffic Services Limited Para 2: Is the use of Downlink Format 18 outside the scope of this guidance or is the guidance to be interpreted as DF18 would not be an acceptable means of compliance, for example when used in applications of transmit only / non-transponding equipment, we would appreciate clarification?
response	Noted The scope of this task is to provide a means of compliance in support of Regulation (EU) No 1207/2011, thus it is associated with ADS-B Out function that is integrated in the Mode S transponder. As DF 18 is intended for non-

transponder based ADS-B Out systems, it is outside the scope of this task. Should a need arise to define the requirements for non transponder based ADS-B Out systems, CS ACNS could be updated accordingly.

comment 115

comment by: Boeing

Page: 74

Paragraph: Table 4: BDS Register Overview

In Table 4, for BDS Register 08, under Type Code, only "1" is indicated.

We recommend that the Type Code entry be changed to "1, 2, 3, or 4." All commercial aircraft will transmit Type Code 4.

JUSTIFICATION:

Our suggested change is commensurate with RTCA DO-260B, Figure A-4.

response Accepted

The text has been amended.

comment 135

comment by: Luftfahrt-Bundesamt

Page 73, section 6, first sentence: "A number of service... „, typo: missing „." at the end of the sentence

response Accepted

The text has been amended.

comment 181

comment by: EUROCONTROL

Columns are are not aligned to the header columns in the second part of the table.

response Accepted

Tables have been reformatted and aligned accordingly.

comment 332

comment by: AIRBUS MILITARY

Errata: Type Code for BDS 08 "Aircraft Identification and Category Message" should be 1-4 depending on the ADS-B Emitter category (which will be A = type 4 for general Aircrafts)

response Accepted

The text has been amended.

comment	287	comment by: AIRBUS
	<p>Others sources for Aircraft Identification exist, for example the maintenance system.</p> <p>Other source for Aircraft Id should be recognised as acceptable. Definition 1 should be modified accordingly.</p>	
response	<p>Accepted</p> <p>The second sentence has been amended to read: 'This information may be provided from, amongst others:'</p>	
comment	333	comment by: AIRBUS MILITARY
	<p>Clarification/MOC: Different Aircraft Identification BDS 0,8 & 2,0 implementation between Flight-ID & Aircraft Registration Number parameters are defined within the Transponder literature.</p> <p>The preferred implementation is understood to be the one that takes ARN first (when F-ID is not available) and then replace it by F-ID as soon this data is available. In case of lost of F-ID, register will be zeroized (thus no reversion to ARN is performed once F-ID have been used).</p> <p>Under this definition, it should be notice that some FMS system will automatic erase the Flight Plan (and consequently the Flight-ID) once the A/C is landed. This means that F-ID will be lost under this condition and BDS 0,8 & 2,0 (AC ID) will be zeroized (A/C ID lost after landing).</p> <p>If a different implementation is required, please specify it on this document</p>	
response	<p>Not Accepted</p> <p>At any time of the flight the correct aircraft identification (F-ID above) must be transmitted. Therefore, the implementation described above will not be acceptable.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 1 - Definition 2

p. 77

comment	334	comment by: AIRBUS MILITARY
	<p>Clarification: Clarification is needed when changing from conspicuity code (1000) to other different to the emergency codes: would the broadcast of Mode A Code still be disabled? As it is not possible to simultaneously enter 1000 code & emergency codes (7700, 7600, 7500)</p>	
response	<p>Accepted</p> <p>The broadcast of Mode A code information is stopped when the received Mode A code is equal to 1000. If the Mode A code is an emergency code (7500, 7600 or 7700) it is not equal to 1000 and has to be transmitted, the text has been amended for clarity.</p>	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS -

p. 77-78

Book 2 - Appendix H - Part 1 - Definition 5

comment	175	comment by: EUROCONTROL
	As Definition 15 is for "Surface NIC value" it is suggested to name this Definition 5: Airborne NIC Value	
response	Accepted	
	The text has been amended.	

B. Draft Decision - I. Draft Decision on CS AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 1 - Definition 7 p. 79-80

comment	25	comment by: CAA-NL
	Appendix H, Part 1, Definition 7: SIL: The number of ADS-B transmissions is likely to be several orders of magnitude larger than once per hour, so the guidance of less than xxx "per flight hour or per sample" in Table 8 is confusing. Proposal: Delete "or sample" (4 instances in Table 8).	
response	Not Accepted The 'per sample' reference applies to position sources the data integrity of which has been certified on a 'per sample' basis (rather than on a 'per flight hour' basis). The particular example within the scope of CS ACNS are closely coupled GNSS/IRS systems which, in case of a GNSS failure/outage, will continue to provide IRS derived data on a 'per sample' basis. This must be accordingly reported to the end user.	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 1 - Definition 8 p. 80

comment	26	comment by: CAA-NL						
	Appendix H, Part 1, Definition 8: SDA: Table 9 appears to be a copy of Table 8, but design assurance levels are fundamentally different from probabilities. Proposal: replace the current Table 9 by guidance for SDA that is relevant in terms of assurance levels as defined in EUROCAE ED-12C (RTCA DO-178C) and EUROCAE ED-80 (RTCA DO-254).							
response	Accepted The existing table has been deleted and a new table has been added as follows:							
	<table border="1"> <thead> <tr> <th>SDA value</th><th>Software & Hardware Design Assurance Level (see Note 1)</th><th>Corresponding System Integrity Level (see Note 2)</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td></tr> </tbody> </table>		SDA value	Software & Hardware Design Assurance Level (see Note 1)	Corresponding System Integrity Level (see Note 2)			
SDA value	Software & Hardware Design Assurance Level (see Note 1)	Corresponding System Integrity Level (see Note 2)						

0	N/A	$> 1 \times 10^{-3}$ per flight hour or unknown (No Safety Effect)
1	D	$\leq 1 \times 10^{-3}$ per flight hour (Probable)
2	C	$\leq 1 \times 10^{-5}$ per flight hour (Remote)
3	B	$\leq 1 \times 10^{-7}$ per flight hour (Extremely Remote)

comment 136 comment by: *Luftfahrt-Bundesamt*

Page 80, Note 2: typo: missing „:“

response Accepted

The text has been amended.

comment 140 comment by: *Luftfahrt-Bundesamt*

Content:

Page 80, Note 1: actual guidance is provided in ED-12C/DO-178C

response Accepted

The text has been amended.

comment 160 comment by: *EUROCONTROL*

The table inserted is incorrect (SIL table instead of SDA table)

Proposal:

Should be replaced with SDA table as in Table C-32 of ICAO Doc 9871 Edition 2 2012

There is a reference to AMC ACNS.ADS.3000 which does not exist. Should an AMC ACNS.ADS.3000 be included (see comment 158) this reference should be revisited.

response Partially Accepted

The table has been replaced with assurance levels as defined in EUROCAE ED-12C and EUROCAE ED-80 and reference to AMC ACNS.ADS.3000 deleted.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 1 - Definition 11

p. 81

comment 137 comment by: *Luftfahrt-Bundesamt*

Page 81, last sentence: bad wording: a unit does not „attempt to“ => it transmits !

response Accepted

The text has been amended.

**B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS -
Book 2 - Appendix H - Part 1 - Definition 13**

p. 82-83

comment 185 comment by: EUROCONTROL

In the first table there are alignments problems which make the table unreadable.
In the first table weights are expressed in lbs which is not a recognised unit, it should be expressed in kilogrammes and/or in tonnes.

response Accepted

SI Units and Derived SI Units will be applied by default, in addition value in non-SI units maybe provided between brackets as per Book 2 Presentation (4).

**B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS -
Book 2 - Appendix H - part 1 - Definition 18**

p. 86-87

comment 186 comment by: EUROCONTROL

In Table 17: in fifth row - first column it should be "0" instead of "10".

response Accepted

The text has been amended.

comment 288 comment by: AIRBUS

Some aircraft installation have the GPS antenna always positionned on the longitudinal axis (i.e. 0 meter from the centerline).
In that case, there is no need to encode the lateral position.
EASA should modify the requirement indicating that in the quoted case, no encoding is necessary.
Moreover the ARINC standard does not permit today to code these values on the transponder.

response Partially Accepted

The text has been amended to only the coding of the longitudinal offset as specified in the ARINC standard .

comment 335 comment by: AIRBUS MILITARY

Clarification: In order to ensure accuracy better than 2 meters for GPS antenna offset, guidance on rounding sense should be provided

response	Accepted
	<p>The text has been amended to include:</p> <p>The rounding should be performed to half of the resolution of the GPS antenna offset information, i.e. +/- 1 meter.</p>
comment	<p>336 comment by: AIRBUS MILITARY</p> <p>Clarification/MOC: Some modern A/C Position Systems compensated the antenna location (position provided is referred to the A/C center of inertial which does not correspond necessarily to the center of the rectangle stated under definition 17) In that case, GPS antenna Offset will provide information about this "A/C center of inertial"</p>
response	<p>Not Accepted</p> <p>ED102A / DO260B encoding provisions apply (as in Definition 17). Hence, in order to correctly encode the ED102A / DO260B data fields, "A/C center of inertial" would need to be mapped to GPS antenna Offset information.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 2

p. 89

comment	<p>337 comment by: AIRBUS MILITARY</p> <p>Errata: Items numbering does not follow previous table 5</p>
response	<p>Not Accepted</p> <p>Reset of numbering is intentional.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 2 - Definition 21

p. 89

comment	<p>187 comment by: EUROCONTROL</p> <p>In AMC1 ACNS.EHS.2010 there is no paragraph 2.5.1 therefore this reference should read: "Refere to AMC1 ACNS.EHS.2010 for detailed guidance".</p>
response	<p>Accepted</p> <p>Correct references are:</p> <ul style="list-style-type: none"> selected altitude see AMC1 ACNS.EHS.2010 (c) (1) barometric pressure setting see AMC1 ACNS.EHS.2010 (c) (3).
comment	<p>214 comment by: Eurocopter</p>

	<p>Definition 21 refers for detailed guidance to AMC1 ACNS.EHS.2010.2.5.1. However, there is no such paragraph breakdown (2.5.1) in AMC1 ACNS.EHS.2010.</p> <p>Same problem is found for definition 22, referencing AMC1 ACNS.EHS.2010.2.5.8 and another case has been identified in Appendix E (see comment 213).</p> <p>Suggestion is to systematically review the document for consistency of cross-references.</p>
response	<p>Accepted</p> <p>The text has been amended accordingly and the document has been checked for consistency.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 2 - Definition 22

p. 89

comment	<p>188</p> <p>comment by: EUROCONTROL</p> <p>The correct reference is AMC1 ACNS.<u>ELS</u>.2010 and there is no § 2.5.8 in this AMC. Therefore this reference should read: "Refer to AMC1 ACNS.<u>ELS</u>.2010 for detailed guidance".</p>
response	<p>Accepted</p> <p>The correct reference is AMC1 ACNS.ELS.2010 (f)</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 3

p. 90

comment	<p>289</p> <p>comment by: AIRBUS</p> <p>Last line. Replace "<i>Velocity Accuracy (NACp)</i>" by "<i>Velocity Accuracy (NACv)</i>".</p>
response	<p>Accepted</p> <p>The table has been amended.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 4

p. 91

comment	<p>183</p> <p>comment by: EUROCONTROL</p> <p>At the beginning of this part 4 references are made to AMC1 ACNS.ADS.3000 and 3010 which currently do not exist. Should such AMC be added these references should be revisited.</p>
response	<p>Accepted</p> <p>The text has been amended to the correct references.</p>

comment	298	comment by: <i>Laurent BARRAS</i>
	AMCs to ACNS.ADS.3000 and 3010 are missing or not identified.	
response	Accepted	
	Text has been amended to the correct references.	

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5

p. 92

comment	259	comment by: <i>Garmin International</i>
	Regarding Appendix H - Part 5 - 1st paragraph, 3rd bullet: FAA AC 20-138B has been replaced by AC 20-138C.	
response	Accepted	
	The text has been amended.	

comment	260	comment by: <i>Garmin International</i>
	<p>Regarding Appendix H - Part 5:</p> <p>There is no discussion or requirements regarding the Position integrity probability associated with ETSO-C145()/C146() equipment while operating in LNAV/VNAV(SBAS), LPV, or LP mode.</p> <p>When operating in these modes, the HPL/VPL metrics used for navigation are scaled to be a $1-2 \times 10^{-7}$ bound per 150 second approach, rather than on a per flight-hour basis.</p> <p>GNSS equipment may or may not scale these HPL/VPL metrics to a per flight/hour basis when operating in LNAV/VNAV(SBAS), LPV, or LP mode. The GNSS equipment manufacturer should provide guidance to allow the ADS-B out equipment to correctly encode the NIC value.</p> <p>See FAA AC 20-165, Appendix 2, sections 4.e and 4.q for details. Also refer to DO-229D appendix U.</p>	
response	<p>Partially Accepted:</p> <p>The following text has been added to (a) 'Horizontal Position Integrity — AMC1 ACNS.ADS.2020(a).1.2(a)'</p> <p>Applicability: ETSO-C145()/146()</p> <p>SBAS equipment certified under any revision of ETSO-C145 or ETSO-C146 is required to have several modes of operation depending on the availability of augmentation. For example, when operating in an augmented mode intended for LPV approach guidance, the position source may determine HPL based on a lateral error versus a horizontal error and an exposure time based on the duration of the approach versus flight hour (refer to Appendix J to RTCA DO229D for details).</p> <p>If the position source outputs the HPL on lateral error and approach exposure</p>	

time, it is possible that the ADS-B transmit function would need to inflate the HPL by 3 % in approach modes to ensure the integrity is appropriately bounded.

GNSS equipment manufacturers should provide information data to determine if the integrity output needs to be scaled (i.e., by applying an inflation factor). The same considerations apply to GBAS differentially-corrected position sources when in approach mode.

comment 261 comment by: Garmin International

Regarding Appendix H - Part 5:

While there is discussion of additional requirements to substantiate the Geometric Altitude Accuracy (VFOM) output of the GNSS position source, there is no similar discussion of the geometric altitude output (HAE) itself. Some GNSS equipment TSOs do not require an HAE output.

These additional requirements are explicitly stated in FAA AC 20-165, Appendix 2, section 4.i. Recommend that similar requirements be included in this document.

response Partially Accepted

The following text has been added at the end of Part 5(e) for clarity:

'For GPS equipment that outputs altitude references other than HAE whilst the overall ADS-B Out System meets AMC1 ACNS.ADS.2034(b), an equivalent data accuracy should be demonstrated.'

comment 262 comment by: Garmin International

Regarding Appendix H - Part 5:

While there is discussion of the Horizontal Velocity Accuracy Metric, there is no similar discussion of the horizontal velocity output itself. Some GNSS equipment TSOs do not require a horizontal velocity output.

These requirements are explicitly stated in FAA AC 20-165, Appendix 2, section 4.k. Recommend that similar requirements be included in this document.

response Noted

In line with the general approach within Appendix H, the basic guidance on determining velocity accuracy is provided in (d).

comment 290 comment by: AIRBUS

Appendix H sets applicable requirements & Acceptable Means of Compliance for a GNSS sensor used as position source for ADS-B Out.

It is technology oriented & not performance oriented. Other sources of ADS-B Out position are eligible.

Proposed Guidance material shall be complete accordingly.

response Noted

Appendix H is not intended to provide the applicable requirements. The intent of

the Appendix H (as well as the other Appendices) is to provide additional material to enable a better understanding of the systems and how to comply with the requirements provided in Book 1.

With respect to use of GNSS sensor, GNSS-based horizontal position sources are the only sources that are considered to meet the respective NIC and SIL requirements (see Appendix H, Part 3). Closely coupled GNSS/IRS solutions are considered as (higher-end) GNSS-based sources that can provide an equivalent position source performance.

comment

291

comment by: AIRBUS

This comment relates to:

"Note: ETSO-C145 refers to RTCA DO-229A, ETSO-C146 refers to RTCA DO-229B, ETSO-C145c/146c refers to RTCA DO-229D, and ETSO-C145()/146() refers to any of those revisions."

In RTCA terminology, the brackets after the TSO reference number usually refer to the latest version in force.

response

Noted

This is the normal convention.

comment

340

comment by: General Aviation Manufacturers Association / Hennig

Draft CS-ACNS, Appendix H, Part 5 - GNSS Position and Velocity Source Qualification discusses the requirement to substantiate the Geometric Altitude Accuracy (VFOM) output of the GNSS position source and has a discussion about the Horizontal Velocity Accuracy Metric. However, there is no discussion a requirement for either the geometric altitude output (HAE) itself or the horizontal velocity output itself. GAMA notes that some GNSS equipment TSOs do not require either output.

These two requirements are, however, identified in FAA AC 20-165A, appendix 2, section 4.i. and 4.k. respectively.

GAMA recommends that similar output requirements be included in Appendix H.

response

Partially Accepted

The following text has been add at the end of Part 5(e) for clarity:

'For GPS equipment that outputs altitude references other than HAE whilst the overall ADS-B Out System meets AMC1 ACNS.ADS.2034(b), an equivalent data accuracy should be demonstrated.'

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.2(a)

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comment

159

comment by: EUROCONTROL

Add new first bullet 'a' to substantiate latitude and longitude output requirement. Proposal:

(a)	Latitude	and	Longitude	Output
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response	<p>Applicability: ETSO-C129a (JTSO-C129a) GNSS equipment manufacturers should provide substantiation data showing that the equipment outputs latitude and longitude information that is referenced to the WGS-84 coordinate system.</p> <p>Accepted</p> <p>The text has been amended.</p>
comment	<p>292 comment by: AIRBUS</p> <p>This requirement is only applicable to GNSS sensor as a position source to ADS-B Out. The hybrid GPIRS solution is not using RAIM, but implements Horizontal Protection Limit or equivalent, based on DO-229D Appendix R. The requirement has to be refined to specify the required performance of the Horizontal Position Integrity of the ADS-B Out Position Source. As far as the hybrid GPIRS solution is concerned, an equivalent requirement, including an acceptable Means of Compliance, can be set as follows: "Coupled GPS/IRS systems/equipment manufacturers must provide substantiation data showing that the equipment outputs a 1e-7/hr Horizontal Protection Limit (HPL, or equivalent) based on DO-229D appendix R."</p>
response	<p>Not Accepted</p> <p>The of the AMC material provided is a means to comply with the requirement but not the only means possible and other means can be used. With respect to use of GNSS sensors, GNSS-based horizontal position sources are the only sources that are considered to meet the respective NIC and SIL requirements (see Appendix H, Part 3). Closely coupled GNSS / IRS solutions are considered as (higher-end) GNSS-based sources that can provide an equivalent position source performance.</p>
comment	<p>312 comment by: Garmin International</p> <p>Regarding Appendix H - Part 5 - (a), 1st item (Horizontal Position Integrity): There is no specification of an output rate for HPL. AC 20-165A, appendix 2, section 4.d.(1) specifies a 1-Hz update. Recommend that an update rate of at least 1-Hz be substantiated.</p>
response	<p>Not Accepted</p> <p>This requirement is already expressed through CS ACNS.ADSB.2008 & CS ACNS.ADSB.3022.</p>

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2020(a).1.3

p. 93

comment	<p>31 ❖ comment by: General Aviation Manufacturers Association / Hennig</p> <p>In AMC1 ACNS.ADS.2020 EASA states in (a)(3)(i) that "If the horizontal position source outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'"</p>
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	<p>This is inconsistent with FAA AC 20-165A. FAA AC 20-165A states in 3-3 (Position Source) c. (Configuration of associated parameters.) (5) that:</p> <p>"You should review the position source design data to determine if all error sources are taking into consideration, or if the position source limits the HPL output when computing an un-augmented Receiver Autonomous Integrity Monitoring (RAIM) based on HPL. This applies to all TSO-C129 and TSO-C196 position sources, and to TSO-C145 and TSO-C146 position sources when operating in un-augmented modes where the HPL is based on RAIM. ... If the position source does not account for all errors or accomplish the appropriate HPL limiting, you must ensure you interface the position source to ADS-B equipment which limits the NIC [\leq] 8."</p> <p>In short, FAA AC 20-165A the applicability of limiting NIC to "eight" refers to non-SBAS position sources, SBAS position sources operating in non-SBAS mode, or some SBAS sources operating in non approach modes.</p> <p>GAMA recommends that EASA harmonize guidance in AMC1 ACNS.ADS.2020 for use of SBAS position sources with FAA AC 20-165A including limiting only be applicable to the conditions defined in FAA AC 20-165A Appendix 2. Additionally, Appendix H, Part 5 - GNSS Position and Velocity Source Qualification (a) "Mode Output - AMC1 ACNS.ADS.2020(a).1.3 should be modified.</p>
response	<p>Accepted</p> <p>New text:</p> <p>'Some approved horizontal position sources might incorrectly output horizontal position integrity containment bounds of less than 75 meters. In such cases, it is accepted that the transmit unit limits the NIC value to 'eight''</p> <p>Replacing old text:</p> <p>"If the horizontal position sources outputs a horizontal position integrity containment bounds of less than 75 meters the transmit unit should limit the NIC value to 'eight'"</p>
comment	<p>258</p> <p>comment by: <i>Garmin International</i></p> <p>Regarding Appendix H - Part 5 - (a):</p> <p>In the item titled "Mode Output — AMC1 ACNS.ADS.2020(a).1.3", it is stated that, "If the GNSS source equipment does not limit the HPL, the ADS-B transmit unit limits the encoded NIC value to be equal to or less than 'eight'." As noted in comment for AMC1 ACNS.ADS.2020, this is inconsistent with FAA AC 20-165A. It is suggested that this information be made consistent with FAA AC 20-165A and limiting be applicable only under the same conditions as defined in FAA AC 20-165A Appendix 2.</p>
response	<p>Accepted</p> <p>Sentence amended to state: 'If the GNSS source equipment does not limit the HPL, although it should do so by design, the ADS-B transmit unit ...'</p>

comment	293	comment by: AIRBUS
	<p>The proposed text sets applicable requirement for a GNSS sensor used as position source for ADS-B Out. The proposed text is a copy of requirements formalized in DO-229D & AC 20-138C.</p> <p>In case this text is maintained, references to equivalent sections in DO-316 shall be added.</p> <p>Each time DO-229D is quoted, a cross reference with DO-316 shall be added. DO-229 & DO-316 are equivalent, one dealing with systems with SBAS and the second without SBAS.</p> <p>For point (1), EASA should change the proposed sentence as follows: Replace "<i>The horizontal position output should be calculated using the general least squares position solution of DO-229D Appendix J.1</i>" with "The horizontal position output should be calculated using the general least squares position solution of DO-229D Appendix J.1 or DO-316 Appendix E and J.1"</p> <p>For point (2), EASA should change the proposed sentence as follows: Replace "<i>The horizontal position accuracy should be tested using the procedure of DO-229D Section 2.5.8.3</i>" with "The horizontal position accuracy should be tested using the procedure of DO-229D Section 2.5.8.3. or DO-316 Section 2.3.6.3".</p>	
response	<p>Partially Accepted</p> <p>The spirit of the comment is accepted however it is not implemented as suggested above and the comment is therefore partially accepted: A 2nd note is added in Part 5 (b) Horizontal Position Accuracy (HFOM) — AMC ACNS.ADSB.2020(a).1.2(d) to say that: "if in the following, reference is made in the qualification tests described in DO-229D, the equivalent material in DO-316 applies as well."</p>	

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comment	138	comment by: Luftfahrt-Bundesamt
	Page 94, (c), last section: wording „must“ used in AMC section	
response	<p>Accepted</p> <p>The text has been amended to read 'should'.</p>	
comment	313	comment by: Garmin International
	<p>Regarding Appendix H - Part 5 - (c), 1st item (Time of Measurement to Time of Applicability):</p> <p>There is no explicit requirement given that the position source should output a time-of-applicability.</p> <p>AC 20-165A, appendix 2, section 4.m states that "The GNSS equipment must output a time of applicability."</p> <p>Recommend adding the same statement to this item.</p>	
response	Not Accepted	

The AC 20-165A requirement quoted is applicable to UAT application, as there is no such requirement for the 1090 ES, this has not been incorporated as part of this task. However, should a need arise to define the requirements for UAT these will be addressed by an additional task amending CS-ACNS.

comment 314

comment by: *Garmin International*

Regarding Appendix H - Part 5 - (c), 2nd item (Time of Applicability to Time of Output):

The 0.4 second requirement here is more stringent than what is specified in AC 20-165A because it ties the output latency to the time applicability rather than the time of measurement.

If a position source does not propagate its position measurement (i.e. time of applicability equals time of measurement) then the equipment only has 0.4 seconds to output the position. This is not consistent with AC 20-165A.

AC 20-165A, appendix 2, section 4.b(1) specifies a latency of 0.9 seconds from the position time of measurement to the time of output.

Recommend changing the title of the section to "Time of Measurement to Time of Output" and specifying the output latency to be within 0.9 seconds of the time of measurement.

response Not Accepted

In line with Regulation (EU) No 1207/2011 (Annex II, Part B, 8), the starting reference point for the total latency and uncompensated latency requirements is the time of applicability of the position (or velocity) fix. Hence, the proposed change of the section name is not appropriate.

It is to be noted that the provisions of AC 20-165A between time of measurement to time of output (less than 2.0 s) is equivalent to the provisions of CS ACNS between time of measurement and time of applicability (0.5 s) on the one hand, and between time of applicability and time of output (1.5 s) on the other (see also Appendix J row CS ACNS.ADSB.3022).

It is also noted that total latency and uncompensated latency are closely related to each other and that there would be little freedom in enlarging the total latency requirement, as applicable to the position source, without violating the uncompensated one (0.6 s, taking into account the transponder uncompensated latency budget of up to 0.1 second plus any uncompensated latency between position source and transponder). This applies with respect to the time of applicability (as applicable to uncompensated latency by definition).

comment 339

comment by: *General Aviation Manufacturers Association / Hennig*

GAMA notes that significant efforts were undertaken as DO-260B was finalized with regard to appropriate latency consideration and the timing of its measurement. These were further identified in FAA AC 20-165 (A - current).

It is important to harmonization that EASA guidance to the greatest extent possible align requirements with relevant FAA guidance such as FAA AC 20-165A including that the position source output time-of-applicability (see, FAA AC 20-165A, appendix 2, section 4.m) and a latency of 0.9 seconds from the position time of measurement to the time of output (see, FAA AC 20-165A, appendix 2, section 4.b(1)).

response

GAMA recommends that EASA harmonize the latency requirements with FAA AC 20-165A.

Not Accepted

The CS ACNS latency provisions are in line with the Regulation (EU) No 1207/2011 requirements. In addition, they are also in line with ED102A/DO260B. Furthermore, in practical terms, the CS ACNS and FAA requirements amount to the same.

Requirements are harmonised with FAA AC 20-165A, taking into account that the time reference is not the same (time of applicability for CS-ACNS, time of measurement for AC 20-165A). See also response to comment 314

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p. 94-95

comment

294

comment by: AIRBUS

This comment relates to:

"1) The equipment does not output misleading velocity information at or after the onset of the triggering interference levels. Note: a method to accomplish this is first running the test at the higher noise level to ensure there is no misleading velocity information at loss of function before running the complete test at the lower noise level. 2) The equipment manufacturer documents the interference levels that cause the equipment to lose function."

This requirement is only applicable to GNSS sensor as a position source to ADS-B Out.

While the point 1) rationale is understandable, the point 2) appears not reasonable and not commensurate with the intent of this requirement not to output misleading information. Indeed, GNSS environment evolves with the advent of new GNSS signals and RTCA is the key body able to identify which environmental noise conditions receivers have or will have to sustain. The point 2) appears not practical because it might require additional heavy testing without any pass/fail criteria. In addition, it seems not to bring any value since the GNSS noise might evolve and decrease, even if unlikely, or increase and never reach the maximum acceptable levels for a given GNSS receiver.

Airbus requests to remove point 2) for the guidance Material to avoid any open requirement leading to test cases without realistic assumptions, validated by a consensus within the GNSS community and that are not commensurate with the objectives of this draft CS-ACNS.

response

Partially Accepted

Bullet 2) amended to read 'The equipment manufacturer should state that the equipment meets the noise requirements in DO-235B.'

comment

315

comment by: Garmin International

Regarding Appendix H - Part 5 - (d):

There are multiple references to FAA AC 20-138B, which has been replaced by AC

response	20-138C. Update these references.
	Accepted The text has been amended.
comment	<p>316 comment by: <i>Garmin International</i></p> <p>Regarding Appendix H - Part 5 - (d), 3rd item (ADS-B Out system installations intending to support NACv = 2): FAA AC 20-165A appendix 2, section 4.n(2) also specifies that the GNSS manufacturer must provide substantiation data that the equipment dynamically outputs HFOMv and VFOMv if it is intended to support NACV = 2. It is not sufficient for the position source to output hardcoded HFOMv and VFOMv if it intends to support NACV = 2. Recommend replacing the first sentence with text similar to the following: "The GNSS equipment manufacturer should substantiate that the equipment dynamically outputs HFOMv and VFOMv and perform the velocity tests in AC 20-138C Appendix 4 associated with NACv = 1 and NACv = 2 to substantiate the equipment's velocity output."</p>
response	Accepted The text has been amended.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 5 - AMC1 ACNS.ADS.2034

p. 95-96

comment	<p>317 comment by: <i>Garmin International</i></p> <p>Regarding Appendix H - Part 5 - (e), Note: The text of the note states: "Note: The Notes 1 and 2 in Section 3 above apply to the guidance in this section as well (by replacing horizontal with vertical)." It is not clear which Note 1 and Note 2 are being referenced in this note. Perhaps this is a reference to Appendix H, Part 5, item(b)(3) Notes 1 and 2. However, in this case, Note 2 would not be applicable to the VFOM metric because VFOM only applies to a single distribution, whereas HFOM is a joint distribution.</p>
response	Accepted Notes 1 and 2 added to this section for clarity.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix H - Part 6

p. 97-102

comment	<p>139 comment by: <i>Luftfahrt-Bundesamt</i></p> <p>Page 97, first sentence: „1090 ES ADS-B transmit unit“ ; what does „ES“ mean ?</p>
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response	Noted ES stands for 'Extended Squitter' as defined in CS ACNS.ADS.1000 Applicability.
comment	176 comment by: EUROCONTROL The last row of the second table is missing, it should be the same as the last row of the first table: CPR encoded Longitude
response	Accepted The text has been amended.
comment	177 comment by: EUROCONTROL The last row of the second table is missing, it should be the same as the last row of the third table (actually on next page): Difference from Barometric Altitude
response	Partially Accepted In fact it is the last row 4th table which is missing and which should be identical to the last row of the 5th table.
comment	178 comment by: EUROCONTROL Attachment #4 This table is a copy of the previous one and is not correct, see attached file.
response	Accepted The table has been replaced with correct version.
comment	222 comment by: Embraer - Indústria Brasileira de Aeronáutica - S.A. On Appendix J (Comparison between EASA CS ACNS.ADS and FAA AC 20-165 Requirements), it is stated that the "Selected Altitude" parameter is required by CS-ACNS even though they are optional for AC 20-165. The detailment for "Selected Altitude" can be found on AMC1 ACNS.EHS.2010 (c), page 45, and it defines that "MCP/FCU mode bits" is an optional parameter that should be transmitted when the data is available. On Appendix H – Part 6, page 101, the "Status of MCP/FCU Mode Bits" parameter is classified as mandatory. The document seems to present conflicting information regarding the need to transmit the "Status of MCP/FCU Mode Bits" on an ADS-B Out operation.
response	Partially accepted A new category 'C' for Conditional requirements has been introduced in this table

of Appendix H for these requirements which are mandatory when the condition specified in the 'remark' column is met.

comment 295 comment by: AIRBUS
Register 06₁₆ "Surface Postion Message" is incomplete.
CPR Encoded Longitude bit 40-56 is missing.

response Accepted
The text has been amended accordingly.

comment 296 comment by: AIRBUS
The reference of the register for "Aircraft Operational Status Message - while Airborne" is incorrect. The correct reference should be 65₁₅.

response Not Accepted
The reference to register 65₁₆ is correct, however, the wrong table was reproduced in error. The correct table has been incorporated.

comment 338 comment by: AIRBUS MILITARY
Pag 97 - Clarification/MOC: ICAO Doc.9871 ed.2 also define register allocation for BDS 0,7 & 0,A as part of Extended squitters version 2. Please clarify the need to implement those registers to comply with (EU) Regulation No 1207/2011
Pag 101 - Errata: Review register 6,5 Airborne definition (it seems not to match doc 9871)
Pag 102 - Errata: Review register 6,5 Surface definition (it seems not to match doc 9871)

response Partially Accepted
Page 97: Addition of the following note below table 4:
Note: Although BDS registers 0716 and 0A16 are not conveying ADS-B data items their implementation is needed to complement the ADS-B protocol.
Page 101: the wrong table was reproduced in error. The correct table has been incorporated.
Page 102: information is correct and provides more details on Capability class codes and operational mode codes explaining the apparent differences.

comment 311 comment by: UK CAA

Page No: 103

Paragraph No: Appendix I, Last Paragraph

Comment: The requirement specified in AMC1 ACNS.ADS.2018, first paragraph is not always consistent with the recommendations set forth in Appendix I on page 103 in relation to determination of on-the-ground status for light aircraft. The text in question is "For aircraft that have fixed-gear, the ADS-B Out system should be able to determine the air-ground status of the aircraft using other means."

Furthermore, "Installations that provide a means to automatically determine on-the-ground status based on input from other aircraft sensors are acceptable if they are demonstrated to accurately detect the status. Otherwise, ground status validation algorithms should be implemented, using speed thresholds that match the typical aircraft's rotation speed as closely as possible."

The "otherwise" clause is potentially confusing and inconsistent with the guidance in Annex I which suggests that some categories of aircraft (helicopters, lighter-than-air and fixed undercarriage aircraft) need to set the parameter to "airborne" at all times "unless an automatic means of determining On-the-ground status is available."

Justification: The guidance offered by the NPA on the implementation of this requirement should be unambiguous as to whether any category of aircraft licensed by the CAA is exempt from providing either a ground status validation algorithm, or an automatic means of determining on-the-ground status.

Proposed Text: "For installations intended for this category that are unable to provide a compliant automatic ground status detection function, the status of the parameter should be set to "airborne".

response

Partially Accepted

The intent of the comment to be unambiguous has been recognised and had been implemented as follows : "Installations intended for this category that are unable to provide a compliant direct or indirect ground status detection function, should only broadcast the Airborne Position Message'. In addition, the 'CA' capability field in downlink format DF 17 should be set accordingly.". The CA field allows the user of the data to understand that the installation cannot differentiate between the airborne and on-ground status.

Therefore, the following is added in Part 6 to Appendix H, before Register 0516 – Airborne Position Message:

In addition to the 1090 ES data fields (as specified by the respective 'ME' Bits conveyed within the downlink format DF 17), the 3-bit "Capability (CA)" field, also conveyed within downlink format DF 17, should be populated for all below registers as follows:

DF 17 bits	Field	Req't	Remark
6-8	Capability	M	Refer to ICAO Annex 10, Volume IV, section 3.1.2.5.2.2.1.

B. Draft Decision - I. Draft Decision on CS, AMC and GM for CS ACNS - CS - Book 2 - Appendix J

p. 104-105

comment

61

comment by: IATA

EASA and FAA requirements shall be aligned.

	<p>To avoid equipment as well as operational procedures proliferation, one set of global CNS requirements shall be defined for the use in a global and harmonized airspace</p> <p>As it stand right now, operators need to first modify to comply with the European mandate and 3 years later again to comply with the more stringent FAA rule. Harmonized and standardized regulatory requirements for ADS-B out (DO 260B) in the various regions is strongly recommended</p>
response	<p>Noted</p> <p>EASA and FAA requirements are largely aligned, however, because of some differences in the concept of operations, there are some differences with respect to the minimum requirements on the technical solution, i.e. in particular with respect to the minimum GNSS receiver solution (ADS-B Out position source).</p>
comment	<p>128 comment by: SVFB/SAMA</p> <p>Page 104/128 we do not understand, why FAA and EASA have differences as listed on page 104-105 and think there should be no differences at all. EASA should make every effort to come to common grounds, even if this means, EASA has to adapt.</p>
response	<p>Noted</p> <p>The CS ACNS recommends a means of compliance to the legally binding Regulation (EU) No 1207/2011 requirements. The harmonisation and alignment of these requirements are outside the scope of this task.</p>
comment	<p>143 comment by: Bombardier Aerospace</p> <p>The FAA has published FAA AC 20-165A while Appendix J appears to refer to the original revision. The comparison should be updated to reflect the latest document by the time the Decision is published.</p>
response	<p>Accepted</p> <p>The text has been amended to reflect latest FAA AC</p>
comment	<p>161 comment by: EUROCONTROL</p> <p>In the mean time FAA has issued AC 20-165A, therefore all references to FAA document AC 20-165 should be made to AC 20-165A. This table should be revisited.</p>
response	<p>Accepted</p> <p>The text has been amended to reflect latest FAA AC.</p>
comment	<p>215 comment by: Eurocopter</p> <p>The comparison shows some differences between CS ACNS.ADS and FAA AC 20-</p>

response	165. At first glance, there does not seem to be incompatibilities between both standards. However, a system compliant to AC 20-165 will not be de-facto compliant to CS ACNS.ADS, and vice-versa. This needs referring to both standards if one wants to implement systems acceptable in both regulations. A coordinated approach between EASA and FAA is strongly expected.
	Noted The respective requirements in CS ACNS and AC 20-165A have been harmonised to a large degree of commonality between Europe and the USA throughout the last decennium, including the definition of common application (SPR) and system (MOPS) requirements. The few differences that do exist are documented in Appendix J. These differences are largely due to the different scopes of the Commission Regulation (EU) No 1207/2011 and (14 CFR) 91.227 requirements.
comment	216 comment by: Eurocopter Formally, as AC 20-165 is now in revision A since July 2012, comparison should be made to AC 20-165A.
response	Accepted The text has been amended to reflect latest FAA AC.
comment	297 comment by: AIRBUS AMC ACNS.ADS.2000.4.2 does not exist, this is probably just AMC ACNS.ADS.2000.
response	Accepted Taking into account changes due to other comment the reference is AMC1 ACNS.ADSB.2000 (b).

B. Draft Decision - II. Draft Decision on AMC-20 - Contents

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comment	1 comment by: ADS-B project leader It is noted that it is intended to cancel AMC 20-24 CERTIFICATION CONSIDERATIONS FOR THE ENHANCED ATS IN NON-RADAR AREAS USING ADS-B SURVEILLANCE (ADS-B-NRA) APPLICATION VIA 1090 MHZ EXTENDED SQUITTER CASA Australia requests EASA to reconsider the intention to cancel AMC 20-24 cancellation as proposed in EASA's NPA 2012-19. CASA Australia's rule for ADS-B OUT equipment fitment is in Civil Aviation Order 20.18 Appendix XI where ADS-B installations meeting AMC20-24 are specified as an alternative means of compliance. The retention of AMC 20-24 will continue to support aircraft fitment mandates for the early implementation of ADS-B for Air Traffic Management in Australia and in the Asia-Pacific Region. The availability of AMC 20-24 as an aircraft certification
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response	<p>standard for ADS-B OUT has been of significance in that most of the passenger transport aircraft operating in and to Australia have ADS-B installations that are certified to AMC 20-24 standard (attested by AFM citation to that standard.) Retention of AMC 20-24 would provide the on-going reference to those standards under which the certification has been issued.</p> <p>Accepted</p> <p>AMC 20-24 will not be withdrawn.</p>
comment	<p>62 comment by: IATA</p> <p>The requirements of CS-ACNS.ADS are for operations equivalent to a radar environment (RAD), whereas the requirements of AMC 20-24 are for operations in Non radar environment (NRA)</p> <p>Aircraft that comply with CS-ACNS.ADS also comply with AMC 20-24 but not vice versa."</p> <p>AMC 20-24 is the global ADS-B-NRA certification standard and is still required to support ADS-B-NRA operations for our member airlines in parts of Europe, Canada (Hudson Bay), South China Sea, Bay of Bengal, Mongolia, Western China and Australia.</p> <p>AMC20-24 has been widely used as guidance by both States and ICAO for implementation plans and avionics approvals already.</p> <p>It must be realized that AMC20-24 has become extremely important for airlines and regulators in particularly non-radar environments like Canada, Australia, Mongolia, India and China where ADS-B has become crucial for providing adequate surveillance services that is significantly contributing to safe and economic flight operations.</p> <p>Cancellation/removal of AMC20-24 will create significant difficulties as many airlines flying in the above mentioned regions that are approved to this standard for operations.</p> <p>IATA / AEA strongly recommend that AMC 20-24 be retained for any <u>new</u> approvals (even beyond 2017/2020 for operators that may not need to comply to EU requirements.</p> <p>Treat future updates on the ED129 and 141 as an amendment to the AMC 20-24 document.</p>
response	<p>Accepted</p> <p>AMC 20-24 will not be withdrawn.</p>
comment	<p>144 comment by: EUROCONTROL</p> <p>As stated in paragraph 26 of Section IV of the Explanatory Note, in line with Commission Regulation (EU) No 1207/2011 regarding the ADS-B Out 1090 MHz Extended Squitter capability of aircraft flying IFR GAT and having a maximum take-off mass exceeding 5700 kg or having a maximum cruising true airspeed capability greater than 250 knots, the requirements of CS-ACNS.ADS are for operations equivalent to a radar environment.</p> <p>In contrast, AMC 20-24 aims at the certification of ADS-B Out installations for enhancing Air Traffic Services in non-radar areas. At least until the time that all IFR aircraft flying in European airspace will be mandated to comply with the requirements CS-ACNS.ADS, AMC 20-24 is still required to support ADS-B-NRA</p>

	<p>operations in Europe for the foreseeable future (such as Avinor's operations in the Ekofisk area).</p> <p>In addition, it is emphasised that AMC 20-24 has become the de-facto global ADS-B-NRA certification standard, applicable to a range of large scale implementations across the world. For example, the Australian ADS-B Out airspace regulation heavily relies on AMC 20-24 based certifications as part of the operator's approval process (refer to Civil Aviation Order 20.18 Appendix XI paragraph 8). A similar case is Transport Canada's AC 700-009. Furthermore, ICAO's APANPIRG has adopted AMC20-24 as an accepted compliance method supporting all the countries of Asia Pac.</p> <p>Proposal:</p> <p>Subject to continued international coordination, it is proposed to keep AMC 20-24 until either:</p> <p>1) a specific section of the CS-ACNS is developed to address those aircraft which are not covered by EU No 1207/2011 (Article 5 (4.b & 5.b)) but which are flying in an area where there is a local / regional mandate to equip at the level of AMC 20-24</p> <p>or</p> <p>2) the scope of EU No 1207/2011 Article 5 (4.b & 5.b) is enlarged to cover all IFR/GAT aircraft.</p>
response	<p>Accepted</p> <p>AMC 20-24 will not be withdrawn.</p>

C. Cross reference with interoperability Regulation

p. 108-128

comment	<p>129</p> <p>page 119/128 article 4 exemptions</p> <p>Depending on the efficiency of the exemptions, and/or the NAA's willingness to apply exemptions we propose that:</p> <ul style="list-style-type: none"> • there is to be a clear transition plan • with timeline • with specific applicability. <p>Exemptions must take account of aircraft which are specifically designed on an</p> <ul style="list-style-type: none"> • analogue platform, • which do not have any digital capability, <p>In such cases these aircraft should be clearly defined as legacy aircraft and they should be exempted.</p> <p>For aircraft where there is some practical limitations with the capability of their digital systems, there should be a risk assessment undertaken to determine whether any change is practical for the scale of operation.</p>	comment by: SVFB/SAMA
response	<p>Noted</p> <p>Exemption policy is specified in Commission Regulation (EU) No 1207/2011</p>	

Article 14, the point has to be addressed with the European Commission. Aircraft Operators who have concerns that their aircraft may not be able to fully comply with the requirements detailed in the Regulation should contact their member state. Changes to this exemption policy are outside the scope of this task.

comment 130 comment by: SVFB/SAMA

This concludes our comments on NPA 2012-19
On behalf of ECOGAS
130121/fm

response Noted

Thank you for your comments.


comment 302 comment by: Laurent BARRAS


EC1207/2011 annex II part B point 16 cross-reference: AMC ACNS.ADS.3010 is missing or not identified.

response Noted

Taking into account responses to other comments there is now an AMC ACNS.ADSB.3010.

4. Appendix A - Attachments

 Cessna Comments E390-13-0005.pdf
Attachment #1 to comment [#3](#)

 [IATA AEA comments on EASA NPA CS ACNS on ADS-B OUT_Final wo.pdf](#)
Attachment #2 to comment [#60](#)

 [GAMA13-01 Concerns about Commission Regulation No 1207 2011 for Surveillance - Joint with ASD 13001.pdf](#)
Attachment #3 to comment [#124](#)