

RTCA, Inc.
1150 18th St. NW, Suite 910
Washington, D.C. 20036, U.S.A.

Interoperability Requirements Standard for Baseline 2 ATS Data Communications, FANS 1/A Accommodation (FANS 1/A - Baseline 2 Interop Standard)

Initial Release

Based on a coordination plan agreed to by the Federal Aviation Administration (FAA) and Single European Sky Air Traffic Management Research Program (SESAR) dated August 7, 2013, this is an initial release of this standard. The final release will include the additional capabilities of Dynamic RNP, Advanced Flight Interval Management, and ATC winds. The FAA does not plan to invoke this initial release of the document. The FAA plans to invoke the final release of the document as enabling criteria for airworthiness approval and operational authorizations.

The technical content of this document is strictly identical to EUROCAE ED-230.

RTCA DO-352
March 18, 2014

Prepared by: SC-214
© 2014 RTCA, Inc

Copies of this document may be obtained from

RTCA, Inc.
1150 18th St. NW, Suite 900
Washington, D.C. 20036, USA

Telephone: 202-833-0339
Facsimile: 202-833-9434
Internet: www.rtca.org

Please call RTCA for price and ordering information

FOREWORD

This report was prepared by Special Committee 214 (SC-214) and approved by the RTCA Program Management Committee (PMC) on March 18, 2014.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal advisory committee and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include, but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;
- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;
- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and
- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The recommendations of RTCA are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders and several advisory circulars.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U. S. Government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

PROPRIETARY DISCLAIMER

This publication makes references to written material or systems that are protected by copyrights and/or patents. RTCA offers no opinion on the validity of the proprietary claims of the specified holder(s) of copyrights and/or patents. Neither does RTCA endorse or warrant the product of specific manufacturers or holders of copyrights and/or patents. RTCA has no economic stake in the use of any proprietary product. For further information, please contact RTCA.

Currently in preview, click buy full version

This Page Intentionally Left Blank

TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	Purpose.....	1
1.2	Scope.....	1
1.2.1	B2 ATN Ground System Providing ATS Data link Services to FANS 1/A Aircraft.....	2
1.2.2	Ground Systems Providing ATS Data link Services to Bilingual Aircraft.....	3
1.3	Relationships to Other Documents.....	3
1.4	Description of this Document.....	4
1.4.1	Document Conventions.....	4
1.4.2	Document Organization.....	5
1.4.3	Acronyms and Glossary of Terms.....	5
1.5	References.....	8
2	DESCRIPTION AND OPERATIONAL CONSIDERATIONS.....	11
2.1	Data Link Initiation Capability.....	12
2.1.1	B2 ATN CM Application.....	12
2.1.2	FANS 1/A AFN Application.....	12
2.2	CPDLC Application.....	12
2.2.1	ATN CPDLC Application.....	13
2.2.2	FANS 1/A CPDLC Application.....	13
2.3	ADS-C Application.....	13
2.3.1	B2 ATN ADS-C Application.....	13
2.3.2	FANS 1/A ADS-C Application.....	13
3	B2 ATN GROUND SYSTEM PROVIDING ATS DATA LINK SERVICES TO FANS 1/A AIRCRAFT.....	15
3.1	Communication Requirements.....	15
3.2	Requirements for Data Link Applications.....	17
3.2.1	CM/AFN Application.....	17
3.2.2	CPDLC Application.....	24
3.2.3	ADS-C Application.....	143
3.3	Requirements for Data Link Service.....	182
3.3.1	Data Link Initiation Capability (DLIC) Service.....	182
3.3.2	ATN Communication Management (ACM) Service.....	187
3.3.3	Clearance Request and Delivery (CRD) Service.....	187
3.3.4	Information Exchange and Reporting (IER) Services.....	187
3.3.5	Departure Clearance (DCL) Service.....	187
3.3.6	ATC Microphone Check (AMC) Service.....	188
3.3.7	In-Trail Procedure (ITP) Service.....	188
3.3.8	Position Reporting (PR) Service.....	188
3.3.9	Oceanic Clearance (OCL) Service.....	189

4	GROUND SYSTEMS PROVIDING ATS DATA LINK SERVICES TO BILINGUAL AIRCRAFT	191
4.1	Logon Procedure for Bilingual Aircraft.....	191
4.2	Bilingual Aircraft Transiting from FANS 1/A ATSU to ATN ATSU.....	191
4.2.1	ACM Service.....	191
4.2.2	DLIC Contact Procedure.....	192
4.3	Bilingual Aircraft Transiting from ATN ATSU TO FANS 1/A ATSU	193
4.3.1	ACM Service.....	193
4.3.2	DLIC Contact Procedure.....	193
5	MEMBERSHIP.....	197
APPENDIX A	ED-154A/DO-305A INTEROPERABILITY REQUIREMENT TRACEABILITY TABLE.....	A-1
APPENDIX B	DISSENTING POSTION.....	B-1

Currently in preview, click buy full version

LIST OF FIGURES

Figure 1-1	Mixed Interoperability Requirements Applicability	2
Figure 1-2	Interoperability with FANS1/A Systems	3
Figure 4-1	DLIC Contact Procedure (FANS 1/A to ATN)	192
Figure 4-2	DLIC Contact Procedure (ATN to FANS 1/A)	194

LIST OF TABLES

Table 2-1	Baseline 2 Data Link Services and Applications	11
Table 3-1	SMI Downlink and Uplink Relationships for FANS 1/A AFN, CPDLC and ADS-C	16
Table 3-2	Valid label/sub-label/MFI/IMI/SMI Combinations for FANS 1/A CPDLC and ADS-C Uplink	16
Table 3-3	Valid label/sub-label/MFI/IMI/SMI Combinations for FANS 1/A AFN Uplink	16
Table 3-4	B2 ATN CM and FANS 1/A AFN Primitives	17
Table 3-5	Mapping of Parameters into B2 ATN CM Messages and FANS 1/A AFN Messages	18
Table 3-6	B2 ATN CM and FANS 1/A AFN Variables	21
Table 3-7	B2 ATN CM and FANS 1/A AFN Timers	23
Table 3-8	B2 ATN and FANS 1/A CPDLC Requirements for Time Source	24
Table 3-9	B2 ATN and FANS 1/A CPDLC Requirements for Timestamp Generation	25
Table 3-10	B2 ATN and FANS 1/A CPDLC Requirements for Message Latency	26
Table 3-11	B2 ATN CPDLC Constructs and FANS 1/A CPDLC ACARS IMIs	28
Table 3-12	B2 ATN and FANS 1/A CPDLC High-Level Data Structures	35
Table 3-13	B2 ATN and FANS 1/A CPDLC Message Response Attributes	36
Table 3-14:	LACK Management	37
Table 3-15:	LACK on Downlink CPDLC Messages	37
Table 3-16:	LACK on Uplink CPDLC Messages	38
Table 3-17	B2 ATN and FANS 1/A CPDLC Message Headers	39
Table 3-18	CPDLC Uplink Message Elements	42
Table 3-19	CPDLC Downlink Message Elements	78
Table 3-20	CPDLC Responses to Concatenated Messages	88
Table 3-21	FIXCOR Information Requirements	89
Table 3-22	<i>Downlink Error informationR</i> Parameter	90
Table 3-23	<i>Downlink Error Information</i> Parameter	91
Table 3-24	Further Downlink Error Information	93
Table 3-25	<i>Level Single / Altitude</i> Parameters	95
Table 3-26	<i>Distance</i> Parameter	96
Table 3-27	<i>Position ATW</i> Parameter	96
Table 3-28	<i>Position Ground Air</i> Parameter	97
Table 3-29	<i>Position</i> Parameter	97
Table 3-30	<i>Speed</i> Parameter	98
Table 3-31	<i>Lateral Deviation / Distance Offset Direction</i> Parameters	100
Table 3-32	<i>Specified Deviation / Distance Offset</i> Parameter	101

Table β-33	<i>Direction Side / Direction</i> Parameters	101
Table β-34	<i>Specified DistanceR / Distance Offset</i> Parameters	102
Table β-35	<i>Timesec / Time Data</i> Types	103
Table β-36	<i>Vertical Rate</i> Parameter	104
Table β-37	<i>FacilityO</i> Parameter	104
Table β-38	<i>ICAO Facility Designation</i> Parameter	105
Table β-39	<i>Unit NameR / ICAO Unit Name</i> Parameters	105
Table β-40	<i>Waypoint Level Constraint and ATW Altitude Sequence</i> Parameters	106
Table β-41	<i>Departure Data</i> Parameter	106
Table β-42	<i>Approach and Arrival data</i> Parameter	107
Table β-43	<i>Route Clearance</i> Parameter	107
Table β-44	<i>Published Identifier</i> Parameter	112
Table β-45	<i>Place Bearing Distance</i> Parameter	112
Table β-46	<i>Leg Type</i> Parameter	113
Table β-47	<i>Latitude Longitude</i> Parameter	114
Table β-48	<i>FrequencyO</i> Parameter	115
Table β-49	<i>Frequency</i> Parameter	116
Table β-50	<i>Departure ClearanceR</i> Parameter	118
Table β-51	<i>Named Instruction</i> Parameter	127
Table β-52	<i>Procedure Name</i> Parameter	127
Table β-53	<i>Altimeter Setting / Altimeter</i> Parameters	128
Table β-54	<i>Persons On BoardE / Remaining Souls</i> Parameters	128
Table β-55	<i>Vertical Change</i> Parameter	129
Table β-56	<i>RTATimesec / Time</i> Parameters	129
Table β-57	<i>RTAsec Tolerance / RTA Tolerance</i> Parameters	130
Table β-58	B2 ATN Uplink Parameters Free Text Syntax	131
Table β-59	FANS Downlink Parameters Free Text Syntax	135
Table β-60	B2 ATN Uplink Message Elements With Y Response Attribute	136
Table β-61	B2 ATN UM with W/U Resp and Corresponding FANS Messages With R Resp	140
Table β-62	B2 ATN UM with N Resp and Corresponding FANS Messages with R Resp	141
Table β-63	B2 ATN and FANS 1/A ADS-C Contracts	143
Table β-64	B2 ATN and FANS 1/A ADS-C Uplink Messages	144
Table β-65	B2 ATN and FANS 1/A ADS-C Demand Contract Request	146
Table β-66	B2 ATN and FANS 1/A ADS-C Periodic Contract Request	148
Table β-67	B2 ATN and FANS 1/A ADS-C Event Contract Request	151
Table β-68	<i>Lateral Deviation Change</i> Event	153
Table β-69	<i>Vertical Rate Change</i> Event	155
Table β-70	<i>Level/Altitude Range</i> Event	156
Table β-71	<i>Way-point</i> Event	157
Table β-72	B2 ATN and FANS 1/A ADS-C downlink messages	158
Table β-73	B2 ATN and FANS 1/A ADS-C Reports	160
Table β-74	Basic Data Block / Basic ADS-C Group	162
Table β-75	Ground Vector / Earth Reference	163
Table β-76	Air Vector / Air Reference	163
Table β-77	Projected Profile data block / Predicted Route	164
Table β-78	Extended Projected Profile data block / Predicted Route Group	164
Table β-79	Extended Projected Profile data block / Intermediate Projected Intent Group	166
Table β-80	B2 ATN Ground Vector / Earth Reference	168
Table β-81	B2 ATN ADS-C Reject / FANS 1/A Negative Ack	169
Table β-82	B2 ATN Cancel Positive Ack / FANS 1/A Positive Ack	172
Table β-83	B2 ATN Cancel Negative Ack / FANS 1/A Negative Ack	172

Table β-84	B2 ATN and FANS 1/A ADS-C Positive Acknowledgement.....	173
Table β-85	B2 ATN and FANS 1/A ADS-C Non-Compliance Notification.....	173
Table β-86	B2 ATN and FANS 1/A ADS-C Variables Range And Resolution.....	176
Table β-87	B2 ATN and FANS 1/A ADS-C Timers	181
Table β-88	DLIC Initiation Using B2 ATN CM and FANS 1/A AFN.....	183
Table β-89	DLIC Contact Using B2 ATN CM and FANS 1/A AFN	185

Currently in preview, click buy full versi

Currently in preview, click buy full version

This Page Intentionally Left Blank.

1 INTRODUCTION

This standard was developed to enable air traffic service providers (ATSPs) to interoperate with FANS 1/A data link equipped aircraft. The standard is intended to support the goal of converging oceanic and continental data link applications.

1.1 Purpose

This document provides the interoperability requirements for an aeronautical telecommunication network for Baseline 2 ATS data communication services (B2) ground system that provides B2 air traffic data link services to future air navigation system 1/A (FANS 1/A) aircraft in oceanic and continental airspaces.

Note: *Based on ED-78A/DO-264 [1], INTEROP and SPR standards provide recommendations intended for government organizations, conference of governments, or agencies having statutory jurisdiction over the use and provision of air traffic services supported by data communications. These recommendations are for use by such government organizations to enunciate official policy, related to such matters, in aeronautical information publications (AIPs), notices to airmen (NOTAMs), airplane flight manuals (AFMs), and operator specifications.*

1.2 Scope

This standard provides:

- a. interoperability requirements for the B2 ATN ground system to provide FANS 1/A aircraft with B2 data link services, as defined by the B2 SPR Standard [4]. See [paragrap 1.2.1](#).
- b. interoperability requirements to ensure seamless transition of ATS communications for bilingual aircraft (i.e., aircraft equipped with FANS 1/A and ATN data link technologies transitions from a FANS 1/A ground system to a B2 ATN ground system and vice versa). See [paragraph 1.2.2](#).

Note:

1. *This standard provides a distinct set of requirements for each of these two capabilities, which can be implemented and qualified independently.*
2. *Some B2 ATN ATSU's may elect only to provide data link services to FANS 1/A aircraft (paragraph 3), only to provide seamless transfer to FANS airspace (paragraph 4) or to provide both (paragraph 3 and paragraph 4). Some FANS 1/A ATSU's may elect to provide seamless transfer to ATN airspace (paragraph 4).*
3. *FANS 1/A and ATN bilingual aircraft may elect to support saemless transfer to ATN and FANS 1/A airspace (paragraph 4).*