

RTCA, Inc.  
1828 L Street, NW, Suite 805  
Washington, D.C. 20036-5133 USA

2200998

**Interoperability Requirements Standard for  
Aeronautical Telecommunication Network  
Baseline 1  
(ATN B1 Interop Standard)**

**Volume 1 of 2  
Sections 1 – 4**

RTCA DO-280B  
June 26, 2007

Prepared by: SC-189  
© 2007 RTCA, Inc.

Copies of this document may be obtained from:

RTCA, Inc.

Telephone: 202-833-9333

Facsimile: 202-833-9433

Internet: [www.rca.org](http://www.rca.org)

Please visit the RTCA Online Store for document pricing and ordering information.

## FOREWORD

This document was jointly prepared by Special Committee 189 (SC-189) and the European Organization for Civil Aviation Equipment (EUROCAE) Working Group 53 (WG-53) and approved by the RTCA Program Management Committee (PMC) on June 26, 2007.

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 on 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 Telecommunications Union and other appropriate international organizations can be based.

The organization's recommendations 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.

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.

This Page Intentionally Left Blank

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	PURPOSE.....	1
1.2	SCOPE.....	1
	1.2.1 ATN Communication Services .....	2
	1.2.2 ATN Applications.....	3
1.3	RELATIONSHIPS TO OTHER DOCUMENTS.....	3
1.4	DESCRIPTION OF THIS DOCUMENT .....	3
	1.4.1 Mandating and Recommending Phrases .....	3
	1.4.2 Document Organization .....	4
	1.4.3 Acronyms and Glossary of Terms .....	5
1.5	REFERENCES .....	10
<b>2</b>	<b>DESCRIPTION AND GENERAL REQUIREMENTS FOR ATN BASELINE 1 .....</b>	<b>13</b>
2.1	MAIN PHYSICAL COMPONENTS .....	13
	2.1.1 ATN End System (ATN ES) .....	14
	2.1.2 End System (ES).....	14
	2.1.3 Communications Subnetworks .....	15
2.2	FUNCTIONS OF THE ATN BASELINE 1 APPLICATION.....	15
	2.2.1 Context Management (CM).....	15
	2.2.2 Automatic Dependent Surveillance (ADS).....	16
	2.2.3 Controller Pilot Data Link Communication (CPDLC).....	21
	2.2.4 Flight Information Service (FIS).....	29
2.3	STANDARDS USED TO DEFINE ATN BASELINE 1.....	33
2.4	PDRS AFFECTING THE SUBSET OF DOC 9705 APPLICABLE TO ATN BASELINE 1 .....	34
2.5	GENERAL REQUIREMENTS FOR ATN BASELINE 1.....	37
	2.5.1 General Requirements.....	37
	2.5.2 Use of Extensibility .....	37
<b>3</b>	<b>REQUIREMENTS FOR ATN APPLICATIONS.....</b>	<b>39</b>
3.1	CM APPLICATION.....	39
	3.1.1 General Aircraft Requirements .....	39
	3.1.2 Service Specific Aircraft Requirements.....	39
	3.1.3 General Ground System Requirements.....	43
3.2	ADS APPLICATION.....	47
	3.2.1 Introduction.....	47
	3.2.2 Time.....	48
	3.2.3 Time Stamp Generation .....	48
	3.2.4 Use of the ADS Abstract Service .....	48
	3.2.5 Formal Definition of Messages.....	48
	3.2.6 User Requirements.....	49
	3.2.7 ADS Report Forwarding.....	51
3.3	CPDLC APPLICATION.....	52
	3.3.1 General Rules.....	52
	3.3.2 Time.....	54
	3.3.3 Timestamp Generation.....	54
	3.3.4 Message Latency.....	54

3.3.5	Use of the CPDLC Abstract Service.....	55
3.3.6	Protected CPDLC Message Handling Requirements .....	59
3.3.7	CPDLC Message Handling Requirements.....	59
3.3.8	Dialogue Constraints.....	83
3.3.9	Allocation of Message Identification Numbers .....	85
3.3.10	Receipt of DM63 (Not CDA) .....	85
3.4	FIS APPLICATION.....	85
3.4.1	Supported Doc 9705 FIS Options.....	85
3.4.2	D-ATIS Message Handling Requirements .....	88
3.4.3	FIS Application Handling Requirements.....	90
3.4.4	Exception Handling Requirements .....	94
<b>4</b>	<b>DYNAMIC FUNCTIONS/OPERATIONS.....</b>	<b>95</b>
4.1	DATA LINK INITIATION CAPABILITY (DLIC) SERVICE .....	95
4.1.1	Timers in DLIC.....	95
4.1.2	Scope and Objective .....	96
4.1.3	Service Operational Context.....	96
4.1.4	Service Operational Conditions .....	97
4.1.5	Time Sequence Diagram.....	100
4.2	SERVICES USING CPDLC – GENERAL.....	102
4.2.1	Timers in ACM, ACL, AMC, DCL, and DSC .....	102
4.2.2	LACK .....	107
4.2.3	Commanded Termination Mode.....	107
4.3	ATC COMMUNICATIONS MANAGEMENT (ACM) SERVICE .....	108
4.3.1	Scope and Objective .....	108
4.3.2	Service Operational Context.....	109
4.3.3	Service Operating Conditions.....	109
4.3.4	Transfers between T-ATSU using CPDLC and R-ATSU using CPDLC .....	110
4.3.5	Transfers between T-ATSU not using CPDLC and R-ATSU using CPDLC.....	120
4.3.6	Transfers Between T-ATSU Using CPDLC and R-ATSU Not Using CPDLC.....	125
4.3.7	Transfers with Change of Frequency Using Air-Ground Data Link With No Change Of CPDLC Connection.....	132
4.3.8	Transfers with no change of CPDLC connection (T-sector using CPDLC and R-sector not using CPDLC) .....	139
4.3.9	Transfers with no change of CPDLC connection (T-sector not using CPDLC and R-sector using CPDLC).....	144
4.3.10	Transfers Between T-ATSU Using CPDLC and R-ATSU Using CPDLC Without Instruction to Change Frequency .....	149
4.3.11	C-ATSU Ends CPDLC Connection.....	156
4.3.12	Abnormal Mode (T-ATSU and R-ATSU Use Air Ground Data Link, But Controller Does Not Use Data Link For the Transfer Instruction).....	159
4.4	AIR TRAFFIC CLEARANCE (ACL) SERVICE .....	166
4.4.1	Scope and Objective .....	166
4.4.2	Service Operational Context.....	167
4.4.3	Service Operating Conditions.....	167
4.4.4	Time Sequence Diagrams .....	172

4.5	ATC MICROPHONE CHECK (AMC) SERVICE.....	176
4.5.1	Scope and Objective .....	177
4.5.2	Service Operational Context.....	177
4.5.3	Service Operating Conditions.....	177
4.5.4	Time Sequence Diagram.....	178
4.6	DEPARTURE CLEARANCE (DCL) SERVICE .....	178
4.6.1	Scope and Objective .....	178
4.6.2	Service Operational Context.....	178
4.6.3	Service Operating Conditions.....	178
4.6.4	Time Sequence Diagram.....	185
4.7	DOWNSTREAM CLEARANCE (DSC) SERVICE.....	186
4.7.1	Scope and Objective .....	187
4.7.2	Service Operational Context.....	187
4.7.3	Service Operating Conditions.....	187
4.7.4	Time Sequence Diagram.....	194
4.8	SERVICES USING FIS - GENERAL .....	196
4.8.1	Timers for D-ATIS .....	196
4.9	DATA LINK AUTOMATIC TERMINAL INFORMATION (D-ATIS) SERVICE.....	198
4.9.1	Scope and Objective .....	198
4.9.2	Service Operational Context.....	198
4.9.3	Service Operating Conditions.....	199
4.9.4	Time Sequence Diagram.....	202
4.10	SERVICES USING ADS - GENERAL .....	204
4.10.1	Timers in FLIPCY .....	204
4.11	FLIGHT PLAN CONSISTENCY (FLIPCY) SERVICE.....	206
4.11.1	Scope and Objective .....	206
4.11.2	Service Operational Context.....	207
4.11.3	Service Operating Conditions.....	207
4.11.4	Time Sequence Diagram.....	208

## ANNEXES

<b>Annex A</b>	ICAO Doc. 9705 Modifications for ATN Baseline 1
<b>Annex B</b>	P/OICS for ATN Baseline 1
<b>Annex C</b>	D-ATIS Template

## APPENDICES

<b>Appendix A</b>	Committee Membership
<b>Appendix B</b>	History and Terms of Reference SC-189/WG-53
<b>Appendix C</b>	Improvement Suggestion Form

## TABLE OF TABLES

Table 2-1	Event types supporting Event Contracts .....	17
Table 2-2	ADS Report Information by Type of Contract .....	19
Table 2-3	ADS Contract Response Information by Type of Contract .....	21
Table 2-4	ATN Baseline 1 Uplink Message Elements.....	22
Table 2-5	ATN Baseline 1 Downlink Message Elements.....	27
Table 2-6	ATN Baseline 1 ATIS Elements.....	31
Table 2-7	Doc 9705 sub-volumes supporting ATN Baseline 1 .....	33
Table 2-8	PDRs for ATN Baseline 1 .....	34
Table 3-1	Message elements used for a vertical clearance and crossing constraints within an oceanic clearance .....	30
Table 4-1	Logon Response.....	97
Table 4-2	CM Logon/Contact .....	98
Table 4-3	Transfers between T-ATSU using CPDLC and R-ATSU using CPDLC.....	111
Table 4-4	Transfers between T-ATSU not using CPDLC and R-ATSU using CPDLC .....	120
Table 4-5	Transfers between T-ATSU using CPDLC and R-ATSU not using CPDLC .....	126
Table 4-6	Transfers or change of frequency using CPDLC with no change of CPDLC connection.....	133
Table 4-7	Transfers with no change of CPDLC connection (T-sector using CPDLC and R-sector not using CPDLC) .....	140
Table 4-8	Transfers with no change of CPDLC connection (T-sector not using CPDLC and R-sector using CPDLC) .....	145
Table 4-9	Transfers Between T-ATSU Using CPDLC and R-ATSU Using CPDLC Without Instruction to Change Frequency.....	150
Table 4-10	C-ATSU ends CPDLC connection .....	156
Table 4-11	Transfers Between T-ATSU Using Air-Ground Data Link, But Controller Does Not Use Data Link For The Transfer Instruction, and R- ATSU Using CPDLC.....	160
Table 4-12	Aircrew Initiated Exchange .....	167
Table 4-13	Controller Initiated Exchange.....	170
Table 4-14	AMC Service .....	177
Table 4-15	Aircrew initiated DCL exchange .....	179
Table 4-16	Ground initiated DCL exchange .....	183
Table 4-17	DSC operating method.....	188
Table 4-18	D-ATIS in the Demand Contract Mode.....	199
Table 4-19	D-ATIS Service in the Update Contract Mode .....	200
Table 4-20	FLYCY Service.....	207

## TABLE OF FIGURES

Figure 2-1	Overview of ATN Baseline 1 .....	14
Figure 4-1	DLIC Time Sequence Diagram .....	101
Figure 4-2	Transfers between T-ATSU using CPDLC and R-ATSU using CPDLC; Sample 1 .....	119
Figure 4-3	Transfers between T-ATSU using CPDLC and R-ATSU using CPDLC; Sample 2 .....	120
Figure 4-4	Transfers between T-ATSU not using CPDLC and R-ATSU using CPDLC; Sample 1 .....	124
Figure 4-5	Transfers between T-ATSU not using CPDLC and R-ATSU using CPDLC; Sample 2 .....	125
Figure 4-6	Transfers between T-ATSU using CPDLC and R-ATSU not using CPDLC; Sample 1 .....	131
Figure 4-7	Transfers between T-ATSU using CPDLC and R-ATSU not using CPDLC; Sample 2 .....	132
Figure 4-8	Transfers or change of frequency using CPDLC with no change of CPDLC connection; Sample 1 .....	138
Figure 4-9	Transfers or change of frequency using CPDLC with no change of CPDLC connection; Sample 2 .....	139
Figure 4-10	Transfers with no change of CPDLC connection (T-sector using CPDLC and R-sector not using CPDLC); Sample 1 .....	143
Figure 4-11	Transfers with no change of CPDLC connection (T-sector using CPDLC and R-sector not using CPDLC); Sample 2 .....	144
Figure 4-12	Transfers with no change of CPDLC connection (T-sector not using CPDLC and R-sector using CPDLC); Sample 1 .....	148
Figure 4-13	Transfers with no change of CPDLC connection (T-sector not using CPDLC and R-sector using CPDLC); Sample 2 .....	149
Figure 4-14	Transfers between T-ATSU using CPDLC and R-ATSU using CPDLC without instruction to change frequency; Sample 1 .....	155
Figure 4-15	Transfers between T-ATSU using air-ground data link and R-ATSU using air-ground data link without instruction to change frequency; Sample 2 .....	156
Figure 4-16	C-ATSU ends CPDLC connection .....	159
Figure 4-17	Transfers Between T-ATSU Using CPDLC and R-ATSU Using CPDLC but the T-ATSU Controller Does Not Use CPDLC for the Transfer Instruction; Sample 1 .....	165
Figure 4-18	Transfers Between T-ATSU Using CPDLC and R-ATSU Using CPDLC but the T-ATSU Controller Does Not Use CPDLC for the Transfer Instruction; Sample 2 .....	166
Figure 4-19	Aircrew Initiated Exchange; Sample 1 .....	173
Figure 4-20	Aircrew Initiated Exchange; Sample 2 .....	174
Figure 4-21	Controller Initiated Exchange; Sample 1 .....	175
Figure 4-22	Controller Initiated Exchange; Sample 2 .....	176
Figure 4-23	Aircrew initiated DCL - Time Sequence Diagram .....	185
Figure 4-24	Ground initiated DCL – Time Sequence Diagram.....	186
Figure 4-25	DSC service time sequence diagram.....	196
Figure 4-26	D-ATIS Demand Contract Request Sequence Diagram .....	203
Figure 4-27	D-ATIS Update Contract Request Sequence Diagram .....	204
Figure 4-28	FLIPCY Service Using Demand Contract .....	209

This Page Intentionally Left Blank

## 1 INTRODUCTION

This document provides the interoperability requirements (INTEROP) standard for the initial implementation of the aeronautical telecommunication network (ATN), henceforth referred to as ATN Baseline 1. These interoperability requirements are based on a subset of the International Civil Aviation Organization (ICAO) Manual of Technical Provisions for the ATN (ICAO Doc 9705-AN/956). In this document, this ICAO manual is referred to as Doc 9705.

This document was developed in accordance with the criteria for INTEROP standards set forth in RTCA DO-264/EUROCAE ED-78A, “Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications”. This document represents the minimum set of interoperability requirements and allocations necessary to provide adequate assurance that the elements of the communication, navigation, and surveillance/ air traffic management (CNS/ATM) system are compatible with each other and when operating together will perform their intended function. These elements comprise the aircraft system, the air traffic service provider (ATSP) system, and the operator’s provisions to use the air traffic services. The ATSP system and the operator’s provisions may include third party or contracted communication services. The communications services include ATN-compliant subnetworks and the ATN internet communications service.

### 1.1 Purpose

The purpose of this document is to define the set of requirements for the interoperability aspects of ATN Baseline 1 systems. It is intended for use in conjunction with a consistent safety and performance requirement standard, other INTEROP standards, and the guidelines described in DO-264/ED-78A for each approval type associated with the elements of the CNS/ATM system.

*Note: Based on ED-78A/DO-264, 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

The scope of this document is ATN Baseline 1. ATN Baseline 1 includes a subset of ATN applications that support the following air traffic services (ATS):

- Data Link Initiation Capability (DLIC);
- ATC Communication Management (ACM);
- ATC Clearance (ACL);