

RTCA, Inc.
1150 18th Street NW, Suite 910
Washington, DC 20036, USA

**GNSS-Based Precision Approach
Local Area Augmentation System (LAAS) Signal-
in-Space Interface Control Document (ICD)**

RTCA LO-246E
July 13, 2017

Prepared by: SC-159
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RTCA, Inc.
1150 18th Street, NW, Suite 910
Washington, DC 20036-1901 USA

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

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FOREWORD

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EXECUTIVE SUMMARY

RTCA/DO-246E was prepared by Special Committee 159 (SC-159). This document supersedes RTCA/DO-246D, but the content of the ICD was maintained to be backward compatible with all LAAS MOPS compliant equipment specified in DO-253 as amended by applicable FAA TSOs.

This Interface Control Document (ICD) defines the Signal-in-Space for the Global Navigation Satellite System (GNSS) based Local Area Augmentation System (LAAS). The LAAS has global application as a Ground-Based Augmentation System (GBAS) to GNSS. The GNSS/GBAS Signal-in-Space is composed of three signals:

1. the navigation signal transmitted from the GNSS satellites to the ground subsystem,
2. the navigation signal transmitted from the GNSS satellites to the airborne subsystem, and
3. the VHF Data Broadcast (VDB) transmitted from the GBAS ground subsystem to the airborne subsystem.

This document is complementary to the LAAS MOPS avionics standard defined in RTCA/DO-253D. It is also complementary to the International Civil Aviation Organization Annex 10 Volume I Ground Based Augmentation System (GBAS) standards and recommended practices (SARPs) for GBAS approach service types C (GAST C) and D (GAST D) as well as the differentially corrected positioning service (DCPS). Together, GAST C and GAST D support all categories of approach and landing operations with vertical and lateral guidance, as well as guided takeoff. DCPS supports horizontal positioning in a local airport and terminal area environment. This revision of DO-246 includes changes resulting from:

1. the final validation of GAST D and the promulgation of Annex 10 with GAST D by ICAO, and
2. maintenance updates for the other GBAS services including GAST C (previously referred to as “Category I precision approach”) and DCPS.

Additional broadcast features have been included in this ICD for LAAS to support operations that have been identified as beneficial by some operators, but these additional broadcast features have not yet been harmonized or standardized internationally. Such additional features include the optional broadcast of a subset of RTCA/DO 236()-compatible terminal area path (TAP) data within Type 4 Messages to provide additional support for terminal area operations. This initial TAP broadcast development was intended to be compatible with the GAST C, GAST D, and DCPS GBAS services, but further development may be needed.

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TABLE OF CONTENTS

1.0	PURPOSE AND SCOPE	1
1.1	Introduction	1
1.2	LAAS System Interface Description	2
1.3	GBAS Services	3
1.3.1	GBAS Positioning Service	3
1.3.2	GBAS Approach Services	3
2.0	DATA BROADCAST DEFINITION	5
2.1	RF Transmission Characteristics	5
2.1.1	Symbol Rate.....	5
2.1.2	Emission Designator	5
2.1.3	Field Strength.....	5
2.1.4	Spectral Characteristics	6
2.1.4.1	Carrier Frequencies	6
2.1.4.2	Unwanted Emissions.....	6
2.1.4.3	Adjacent Channel Emissions	7
2.1.4.4	Adjacent Temporal Interference	8
2.1.4.5	Carrier Frequency Stability.....	8
2.1.5	Modulation.....	8
2.1.5.1	Pulse Shaping Filters.....	10
2.1.5.2	Error Vector Magnitude	11
2.2	Broadcast Timing Structure.....	11
2.2.1	TDMA Timing Structure	11
2.2.2	Time Slot Initiation and Minimum Use.....	12
2.2.3	Timing Budget for VDR Bursts.....	12
2.3	Burst Data Content	13
2.3.1	Training Sequence	14
2.3.1.1	Power Spectral Density	14
2.3.1.2	Synchronization and Ambiguity Resolution	14
2.3.1.3	Station Slot Identifier	15
2.3.1.4	Transmission Length.....	15
2.3.1.5	Training Sequence FEC	15
2.3.2	Application Data	16
2.3.3	Application FEC	16
2.3.4	Bit Scrambling	17
2.3.5	Application Layer	18
2.3.6	Message Block Header	18
2.3.6.1	Test Mode	18
2.3.7	Cyclic Redundancy Check.....	19

2.4	LAAS Messages	19
2.4.1	Message Types and Broadcast Rates	19
2.4.2	Data Format	22
2.4.3	Message Type 1 - Differential Corrections – 100 Second Smoothed Pseudoranges	23
2.4.3.1	Message Description	23
2.4.3.2	Message Type 1 Parameters.....	25
2.4.4	Message Type 2 - GBAS Related Data	29
2.4.4.1	Message Description	29
2.4.4.2	Message Type 2 Parameters.....	33
2.4.5	Message Type 3 – Null Message	33
2.4.5.1	Message Description	33
2.4.5.2	Message Type 3 Parameters.....	34
2.4.6	Message Type 4 - Final Approach Segment and Terminal Area Path Construction Data	34
2.4.6.1	Message Description	34
2.4.6.2	Message Type 4 Parameters.....	35
2.4.6.3	Final Approach Segment (FAS) and Terminal Area Path (TAP) Data Block	36
2.4.6.4	Final Approach Segment and Terminal Area Path Parameters.....	44
2.4.7	Message Type 5 - Ranging Source Availability (optional)	50
2.4.7.1	Message Description	50
2.4.7.2	Message Type 5 Parameters.....	50
2.4.8	Message Type 6 - (Reserved) Differential Carrier Corrections.....	51
2.4.9	Message Type 7 – (Reserved) for Military	51
2.4.10	Message Type 8 – (Reserved) for Test.....	51
2.4.11	Message Type 11 - Differential Correction – 30 Second Smoothed Pseudoranges	51
2.4.11.1	Message Description	51
2.4.11.2	Message Type 11 Parameters.....	52
3.0	REFERENCES	55
4.0	MEMBERSHIP MARCH 2017	57
	APPENDIX A: CYCLIC REDUNDANCY CHECKS (CRC).....	A-1
	APPENDIX B: MESSAGE AND FAS EXAMPLE.....	B-1
	APPENDIX C: PRELIMINARY CARRIER CORRECTIONS MESSAGE DEFINITIONS (INFORMATIVE)	C-1
	C.1 Carrier Correction.....	C-1
	C.1.1 Definition of Parameters.....	C-1
	C.2 Message Table - Carrier Corrections	C-2
	APPENDIX D: RESERVED.....	D-1
	APPENDIX E: GLOSSARY, ABBREVIATIONS, AND ACRONYMS.....	E-1

TABLE OF TABLES

Table 2-1: Unwanted Emissions	6
Table 2-2: Power Transmitted in Adjacent Channels.....	8
Table 2-3: Data Encoding.....	9
Table 2-4: Burst Timing	13
Table 2-5: Burst Data Content.....	13
Table 2-6: Training Sequence Format	14
Table 2-7: Format of a LAAS Message Block	17
Table 2-8: Format of Message Block Header	18
Table 2-9: GBAS Message Types for Supported Service Types	20
Table 2-10: LAAS VHF Data Broadcast (VDB) Messages and Broadcast Rates	21
Table 2-11: Subset of International Alphabet No. 5.....	22
Table 2-12: Format of Message Type 1.....	23
Table 2-13: GPS Satellite Ephemeris Mask	27
Table 2-14: Format of Message Type 2.....	30
Table 2-15: Additional Data Block 3, GFC D Ephemeris Kmd and Ionospheric Parameters	30
Table 2-16: Additional Data Block 4, VDB Authentication Parameters.....	31
Table 2-17: Format of Message Type 3.....	34
Table 2-18: Format of Message Type 4.....	35
Table 2-19: Final Approach Segment (FAS) Data Block.....	38
Table 2-20: TAP Data Block	39
Table 2-21: TAP Missed Approach Data Block.....	40
Table 2-22: TAP IF Leg Data, Type 0 (Initial Fix).....	41
Table 2-23: TAP TF Leg Data, Type 1 (Track to Fix).....	41
Table 2-24: TAP RF Leg Data, Type 2 (Radius to Fix).....	42
Table 2-25: TAP DD/TF Leg Data, Type 3 (Dynamic Downwind-Track to Fix)	42
Table 2-26: Format of Message Type 5.....	50
Table 2-27: Format of Message Type 11.....	52
Table A-1: Examples of 16-bit Ephemeris CRC.....	A-3
Table A-2: Examples of 32-bit LAAS Message or FAS Data Block CRC.....	A-4
Table B-1: Example of Type 1 Message	B-2
Table B-2: Example of Type 1 and Type 2 Messages in One Burst	B-4
Table B-3: Example of Type 2 Message Containing Data Blocks 1, 3, and 4	B-7
Table B-4: Example of Type 4 Message	B-11
Table B-5: Example of Type 4 FAS and TAP Message.....	B-14
Table B-6: Example of Type 5 Message	B-19
Table B-7: Example of Type 11 Message	B-21
Table B-8: Example of Type 1 Message Block with Non-zero Ephemeris CRC Value.....	B-23
Table C-1: Preliminary Format of Message Type 6	C-2

TABLE OF FIGURES

Figure 1-1: Ground Based Augmentation System (GBAS)	2
Figure 1-2: LAAS Signal-in-Space Interface Diagram	3
Figure 2-1: D8PSK Data Modulator Example.....	10
Figure 2-2: TDMA Timing Structure	12
Figure 2-3: Message Encoding	14
Figure 2-4: Bit Scrambler/Descrambler.....	17
Figure 2-5: Low Frequency Correction Transmission (Ephemeris CRC).....	21
Figure 2-6: Illustration of Error Estimate (B) Parameters	26
Figure 2-7: Pseudorange Correction Computation	28
Figure 2-8: Final Approach Segment Diagram	36
Figure 2-9: Curved Segment TAP Example	37
Figure 2-10: DD/TF Illustration	43
Figure 2-11: Message Type 4 Structure Extended to Accommodate TAP Data Sets	44
Figure A-1: Example of Ephemeris CRC Generator Circuit.....	A-2
Figure A-2: Example of LAAS Message or FAS Data Block CRC Generator Circuit.....	A-2

1.0 Purpose and Scope

1.1 INTRODUCTION

This Interface Control Document (ICD) defines the Signal-in-Space for the Global Navigation Satellite System (GNSS) based Local Area Augmentation System (LAAS). The LAAS has global application as a Ground-Based Augmentation System (GBAS) to the GNSS.

The content of this ICD that supports Category I Precision Approach and the differential positioning service is intended to be consistent with standards developed by the International Civil Aviation Organization (ICAO) and The European Organization for Civil Aviation Equipment (EUROCAE).

Within this document, the terms “LAAS” and “GBAS” are not synonymous. “LAAS” refers to the system being proposed by the RTCA to meet the operational objectives for the United States (US) National Air Space (NAS) as documented in RTCA/DO-245(). This system may also be suitable for implementation in other areas. “GBAS” refers to any system compliant with the ICAO standards (through and including Amendment 91 to ICAO Annex 10).

LAAS may implement the GBAS approach service and/or the positioning service based on GPS and, optionally, visible SBAS/WAAS geostationary satellites. The GBAS approach service has an optional broadcast of ephemeris error bound parameters. LAAS requires the broadcast of the ephemeris bound parameters. LAAS requires the broadcasting of additional information when supporting GBAS Approach Service Type (GAST) D (see Section 1.3.2).

Additional broadcast features have been included in this ICD for LAAS to support operations that have been identified as beneficial by some operators but they have not yet been harmonized or standardized internationally.

- Format definitions for the optional broadcast of a subset of RTCA/DO-236()-compatible terminal area path (TAP) data to provide additional support for terminal area operations have been included. This initial TAP broadcast development was intended to be compatible with the GBAS CAT I approach and positioning services and CAT II/III services, but further development may be needed.
- RTCA has developed requirements to support multiple Approach Service Types intended to support precision approach operations in all-weather minimums. Consequently, there are now two basic classes of ground stations and airborne user equipment: equipment that is single Approach Service Type capable and equipment that is multiple Approach Service Type capable.

The requirements and the corresponding ICD modifications necessary to support TAP have not been harmonized internationally. This version of the ICD includes no new changes to TAP related signal format definitions.

This document should be useful to equipment designers, installers, manufacturers, service providers, and LAAS users.

Figure 1-1 shows the three required components of GBAS including the GNSS satellite subsystem, the airborne subsystem, and the GBAS ground subsystem. Figure 1-2 shows similar subsystem components for LAAS. The GNSS satellite subsystem satellite constellation for LAAS differs from GBAS in that it only includes GPS and SBAS satellites with provisions to add other core satellite constellations in the future. In addition to these three subsystems, additional components are required to maintain the operations of GBAS or LAAS (e.g., the GPS control segment); however, these additional GNSS components are not considered to be part of the LAAS for the purpose of this ICD.