INTERNATIONAL CIVIL AVIATION ORGANIZATION

INTERFACE CONTROL DOCUMENT
FOR
DATA COMMUNICATIONS BETWEEN ATS UNITS
IN THE
CARIBBEAN AND SOUTH AMERICAN REGIONS

(CAR/SAM ICD)

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FOREWORD

The *Interface Control Document (ICD) for Data Communications between ATS Units in the Caribbean and South American Regions (CAR/SAM ICD)* is published by the ATM/CNS Subgroup of the Caribbean/South American Regional Planning and Implementation Group (GREPECAS). It describes a process and protocols for exchanging data between multiple States/Territories/International Organizations within and across regions.

Copies of the *CAR/SAM ICD* can be obtained by contacting:

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AMENDMENTS TO THE DOCUMENT

The present edition (Draft Version 0.2) includes all revisions and modifications until November 2006. Subsequent amendments and corrigenda will be indicated in the Record of Amendment and Corrigenda Table.

Proposals for amendments to the document may be submitted to either of the ICAO Regional Offices for coordination and processing. The GREPECAS and its contributory bodies will issue revised editions of the Document as required.

The publication of amendments and corrigenda is regularly announced through correspondence with States, and the ICAO web site, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by

CORRIGENDA			
No.	Date applicable	Date entered	Entered by

Table of Contents

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INTRODUCTION

HISTORICAL

Air Traffic Services providers in several regions have identified the requirement to exchange flight plan and radar data information between adjacent ATC facilities utilizing automated methods. This requirement stems from the increasing traffic levels crossing FIR boundaries and the need to improve efficiency and accuracy for the ATC providers. Developing a harmonized process and protocols for exchanging data between multiple States/Territories/International Organizations within and across regions is critical to satisfying this requirement. As ATS providers develop their automation systems, consideration should be given to meeting the capabilities identified within this Interface Control Document (ICD).

The CAR/SAM ICD is based on the North American Common Coordination Interface Control Document used by Canada, the United States and Mexico. The NAM region has advanced to the level of initial implementation of flight plan data exchange. Experience gained by the NAM region during their development process is incorporated here.

The GREPECAS/12 meeting held in Cuba, 07 – 11 June 2004 concluded that the CAR/SAM States/Territories/International Organizations should define an action plan for the application of a regional strategy for the integration of ATM automated systems. This document provides the basis for interfacing those ATM automation systems in the CAR/SAM regions.

The Interface Control Document for Data Communications between ATS Units in the Caribbean and South American Regions (CAR/SAM ICD) content is as follows:

Part I- Purpose, Policy, and Units of Measurement

This section provides an overall philosophical view of the Interface Control Document (ICD) and general information concerning the measurement units that are used. It also describes the process by which changes to this document are to be managed.

Part II- ATS Coordination Messages

This section describes in detail all the messages that may be used to exchange ATS data between Air Traffic Services (ATS) Units. In this version of the document, flight plan and radar handover messages have been defined.

Part III- Communications and Support Mechanisms

This section describes the technical and other requirements needed to support ATS message exchange.

Appendices

Appendix A includes a list of error messages.
Appendix B contains Implementation Guidance Material for the message sets.
Appendix C is a model describing a specific Common Boundary Agreement to be followed by ATS providers, noting the level of the interface that is supported and any deviations from the core message definitions.

GLOSSARY

Active Flight	A flight that has departed but has not yet landed. Note: This ICD assumes any flight with an entered actual departure time in the flight plan is active.
Adapted Route	A route whose significant points are defined in an automation system and associated with a name for reference purposes. Adapted routes normally include all ATS routes, plus non-published routes applied to flights by the system or by controllers.
Adapted Route Segment	Two significant points and the name of the adapted route connecting them.
Aircraft ID	A group of letters, numerics or combination thereof which is either identical to, or the coded equivalent of, aircraft callsign to be used in air-ground communication, and which is used to identify the aircraft in a ground-ground ATS communication.
Air Traffic Services Provider	For the purposes of this ICD means the responsible to provide air traffic services in the jurisdiction of State/Territory, such as own State, Agency or International Organization.
Airway	A route that is defined and published for purposes of air navigation.
Altitude	The vertical distance of a level measured from mean sea level (MSL).
Area Control Center/ Centre	An Air Traffic Services unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.
Assigned SSR Code	A SSR code that has been assigned by an ATC facility to a flight. The flight may or may not be squawking this code. See Established SSR Code.
ATS Route	A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services.
Boundary Crossing Point	An intersection point between a route of flight and a control boundary.
Boundary Crossing Time	The time at which a flight is predicted to reach its Boundary Crossing Point.
Boundary Point	An agreed point on or near the control boundary at which time and altitude information is provided for purposes of coordination.
Character	A letter from A-Z or number from 0-9.
Control Boundary	The boundary of the Area Control Center (ACC) as defined in the local automation system. This is typically close to, but not the same as, the FIR boundary.
Direct Route Segment	A route segment defined solely by two significant points. The path between the points is implied, and depends on the navigation system used.

Element	Within a numbered field of an ICAO message there may be several sub-fields, called elements. These are referred to by sequential letters a, b, c, etc. For example Field 03 has elements a, b, and c.
Established SSR Code	The SSR code that a flight is now squawking.
Field	A numbered logical portion of a message. All references to fields in this document are to message fields defined in ICAO Doc 4444 unless otherwise specified.
Fix-radial-distance	A method of specifying a geographic point. It includes the name of a fix, followed by a direction from the fix in degrees and then a distance in nautical miles.
Flight ID	The combination of aircraft ID (from Field 07) and most recent message number (from ICAO Field 03(b)) which uniquely identify a flight.
Flight Level	A surface of constant atmospheric pressure which is related to a specific pressure datum of 1,013.2 hPa (29.92 inches of mercury), and is separated from other such surfaces by specific pressure intervals (see Annex 11). Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet with the altimeter set to 29.92.
Letter	A letter from A-Z.
Numeric	A number from 0-9.
Off-Block Time	The time at which an aircraft expects to push back or has pushed back from the gate.
Proposed Flight	A flight which has a flight plan but which has not departed.
Reject	When this term is used, it means that an incoming message is not to be processed further and should be output to a specified location (either the message source, or a local adapted device or position). The message must be re-entered in total (after correction) in order for it to be processed.
Reported Altitude	The latest valid Mode C altitude received from an aircraft, or the latest reported altitude received from a pilot.
Route	A defined path consisting of one or more ordered route segments with successive segments sharing a common end/start point. (See also Adapted Route, Direct Route, Flight Plan (or Filed) Route, Route Segment, Direct Route Segment, Adapted Route Segment).
Route Segment	Two significant points and the path between them, the order of the points indicating the direction of flight. (See adapted and direct route segments.)
Selective Calling System	Techniques, or procedures, applied to radio communications for calling only one of several receiving stations guarding the same frequency (SELCAL).

Service	In the context of this interface, a service refers to type of interface service provided: message transfer, file transfer, data base query, etc.
SSR Code	A transponder code consisting of four octal digits.
Standard Arrival Route	A published route from a designated significant point to an aerodrome.
Standard Departure Route	A published route from an aerodrome to the first significant point on a route.
Significant Point	A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.
Symbol	Any of the symbols used within messages, including space “ ” oblique stroke “/”, single hyphen “-”, plus “+”, open bracket “(” , closed bracket “)”.
Transaction	The exchange of a message and a response.

LIST OF ACRONYMS

ACC	Area Control Center/Centre
ACID	Aircraft ID - the three to seven character callsign or registration number of an aircraft (e.g. MEX123)
ACP	Acceptance Message
ADF	Automatic Direction Finder
AFTN	Aeronautical Fixed Telecommunications Network
AIFL	Air filed - substitutes for departure aerodrome in flight plan Field 13 when IFR clearance is granted to airborne VFR aircraft
ARTCC	Air Route Traffic Control Center (see Area Control Center)
ATM	Air Traffic Management
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
Bps	Bits Per Second
CAR	ICAO Caribbean Region
CHG	Modification message for **Proposed** Flight Plan
CNL	Flight Plan Cancellation message
CNS	Communications, Navigation and Surveillance
CPL	Current Flight Plan message
EST	Estimate message
FDP	Flight Data Processing
FIR	Flight Information Region
FPL	Filed Flight Plan message
FSAS	Flight Services Automation System
FSS	Flight Service Station
ICD	Interface Control Document
ICAO	International Civil Aviation Organization
ID	Identification
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IRQ	Initialization Request message
IRS	Initialization Response message
ISO	International Standards Organization
Kb	Kilobyte (= 1024 bytes)

LAM	Logical Acknowledgement message
LRM	Logical Rejection message
MIS	Miscellaneous Information message
MOD	Modification message for **Active** Flight Plan
MSN	Message Switched Network
NACC	ICAO North American, Central American and Caribbean Regional Office
NAM	ICAO North American Region (and Mexico)
NAT	ICAO North Atlantic Region
PAC	ICAO Pacific Region
PANS	Procedures for Air Navigation Services
PSN	Packet Switched Network (synonymous with PSDN)
PSDN	Packet Switched Data Network (synonymous with PSN)
RDP	Radar Data Processing
RLA	Radar Logical Acknowledgement
RNP	Required Navigation Performance
RTF	Radio Telephone
RTA	Radar Transfer Accept
RTI	Radar Transfer Initiate
RTU	Radar Track Update
RVSM	Reduced Vertical Separation Minimum
SAM	ICAO South American Region
SELCAL	Selective Calling System
SID	Standard Instrument Departure
SSR	Secondary Surveillance Radar
STAR	Standard Arrival Route
TBD	To Be Determined
TRQ	Termination Request message
TRS	Termination Response message
UTC	Universal Time Coordinated
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omnidirectional Range
VSP	Variable System Parameter

REFERENCES

Document ID	Document Name	Date/ Version
ICAO Doc 4444	Air Traffic Management, Doc 4444 PANS-ATM/501	Always use latest version
ICAO Annex 10, Volume II	Aeronautical Telecommunications. Communication, Procedures including those with PANS status.	Always use latest version
ICAO Annex 11	Air Traffic Services	Always use latest version
ICAO Doc 8643	Aircraft Type Designators	Always use latest version
ICAO Doc 7910	Location Indicators	Always use latest version
ICAO Doc 9705	Manual of Technical Provisions for Aeronautical Telecommunications Network	Always use latest version
ICAO Doc 9426	ATS Planning Manual	Always use latest version

1. PART I – PURPOSE, POLICY, AND UNITS OF MEASUREMENT

1.1 PURPOSE

The purpose of this document is to ensure that data interchange between ATS units providing Air Traffic Services in the CAR and SAM Regions conforms to a common standard, and to provide a means to centrally coordinate changes to the standard.

1.2 POLICY

1.2.1 CONFIGURATION MANAGEMENT

The contents of this ICD must be approved by the GREPECAS. Proposed changes to this document will be submitted through the GREPECAS mechanism.

The ICAO secretariat will coordinate review through the GREPECAS mechanism. When all parties have agreed to a change, the document will be amended and distributed by the secretariat.

This document identifies the standards to be followed when the defined messages are implemented. A separate Common Boundary Agreement between each pair of ATS providers shall define which message sets are currently implemented.

1.2.2 SYSTEM PHILOSOPHY

The automation of flight data exchange between neighboring Air Traffic Services units will follow the standards set by ICAO Documents referenced above. In constructing the interface it is recognized that the ICAO standards address neither all required messages nor all required details of message content, and that existing ATS procedures and automation systems are not always fully compatible with parts of the ICAO standard. Therefore this document supplements ICAO Doc 4444 as needed to meet the requirements of the ATS providers in the CAR/SAM Regions.

This document addresses messages exchanged between Area Control Centers (ACCs) and any other applicable facilities (e.g. Terminal or ATFM Units). Note that a message (e.g. FPL) from a user or operator to an ACC may have different requirements than those sent from ACC to ACC or ACC to ATFM Unit. This document defines the ATM messages that are needed for complete flight plan coordination.

Each pair of ATS providers planning to implement data communications shall select the applicable message sets from those defined below. By implementing only those message sets necessary to meet the current needs and capabilities of the automation systems, the ATS providers can obtain benefits on an incremental basis.

1.2.2.1 FLIGHT PLAN DATA COORDINATION

The interface automates only the exchange of flight plan data agreed between the specific ATS providers involved. Additional to those messages contained in Doc 4444, the following messages defined in this document may be used:

- Active flight modification (MOD)
- Miscellaneous Information (MIS)
- Logical Rejection (LRM)
- Initialization Request (IRQ)
- Initialization Response (IRS)
- Termination Request (TRQ)
- Termination Response (TRS)

1.2.2.2 ATFM COORDINATION MESSAGES

As the requirement to coordinate ATFM information arises, specific messages may need to be developed and incorporated into this document.

1.2.2.3 RADAR HANDOVER

Transfer of Control includes the capability to perform a radar handover, using the messages defined in this ICD.

- Radar Transfer Initiate (RTI)
- Radar Track Update (RTU)
- Radar Transfer Accept (RTA)
- Radar Logical Acknowledgement (RLA)

The format of these messages is consistent with ICAO standards. The RLA message was introduced as a logical acknowledgement to an RTI, instead of LAM, because it needs to transmit information back to the sender.

1.2.2.4 ADS HANDOVER

As ADS surveillance is implemented and the requirement to perform ADS handovers arises, additional messages may need to be developed and incorporated into this document.

1.3 UNITS OF MEASUREMENT AND DATA CONVENTIONS

1.3.1 TIME AND DATE

All times shall normally be expressed in UTC as four digits, with midnight expressed as 0000. The first two digits must not exceed 23, and the last two digits must not exceed 59.

If higher precision is needed, then a field specification may designate additional digits representing seconds and then fractions of seconds (using decimal numbers) may be added.

For example, 092236 is 9 hours, 22 minutes, and 36 seconds.
11133678 is 11 hours, 13 minutes, and 36.78 seconds.

When used, dates shall be expressed in the form YYMMDD where YY are the last two digits of the year (e.g. 01 is 2001), MM is the month (e.g. 05 for May), and DD is the day of the month (e.g. 29).

1.3.2 GEOGRAPHIC POSITION INFORMATION

Geographic position information shall be expressed in one of the following forms.

- Items a) through d) are consistent with ICAO Doc 4444 PANS-ATM/501 Appendix 3, section 1.6.3; and,
- item e) was added because the standard ICAO definition of Latitude/Longitude did not provide enough precision for exchange of radar identification.

a) A two to five character significant point designator**.**

b) Four numerics describing latitude in degrees and minutes, followed by "N" (North) or "S" (South), followed by five numerics describing longitude in degrees and minutes, followed by "E" (East) or "W" (West). The correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. "4620N07805W".

c) Two numerics describing latitude in degrees, followed by "N" (North) or "S" (South), followed by three numerics describing longitude in degrees, followed by "E" (East) or "W" (West). Again, the correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. "46N078W".

d) Two to three characters being the coded identification of a navigation aid (normally a VOR), followed by three decimal numerics giving the bearing from the point in degrees magnetic followed by three decimal numerics giving the distance from the point in nautical miles. The correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. a point at 180° magnetic at a distance of 40 nautical miles from VOR "FOJ" would be expressed as "FOJ180040".

e) When surveillance information with higher precision is necessary, use six numerics describing latitude in degrees, minutes, and seconds, followed by "N" (North) or "S" (South), followed by seven numerics describing longitude in degrees, minutes, and seconds followed by "E" (East) or "W" (West). The correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. "462033N0780556W".

1.3.3 ROUTE INFORMATION

All published ATS routes shall be expressed as two to seven characters, being the coded designator assigned to the route to be flown.

1.3.4 ALTITUDE/LEVEL INFORMATION

All altitude information shall be specified as flight level(s) or altitude(s) in one of the following formats (per ICAO Doc 4444 PANS-ATM/501, Appendix 3, Section 1.6.2):

- F followed by three decimal numerics, indicating a Flight Level number.
- A followed by three decimal numerics, indicating altitude in hundreds of feet.

Each message description identifies which of these formats may be used.

Note: If adjacent FIRs have different transition altitudes, agreement may be reached between the ATS Units on specific use of F versus A with the agreed upon solution documented in their Common Boundary Agreement.

1.3.5 SPEED INFORMATION

Speed information shall be expressed as true airspeed or as a Mach number, in one of the following formats (ICAO Doc 4444 PANS-ATM/501 Appendix 3):

- N followed by four numerics indicating the true airspeed in knots (e.g. N0485).
- M followed by three numerics giving the Mach Number to the nearest hundredth of unit Mach (e.g. M082).

1.3.6 HEADING INFORMATION

Heading information shall be expressed as degrees and hundredths of degrees relative to true north using five digits, and inserting zeros as necessary to make up five digits, e.g. “00534” is 5.34 degrees relative to true north.

1.3.7 FUNCTIONAL ADDRESSES

A functional address, which refers to a function or position (e.g. Supervisor position) within an ATS Unit, may be substituted in the MIS message for the aircraft identification found in Field 07. The functional address shall contain between one and six characters and shall be preceded by an oblique stroke (/), for a total length of two through seven characters (e.g. /S1) .

1.3.8 FACILITY DESIGNATORS

Facility designators shall consist of four letters. The ICAO Doc 7910 location identifier for the facility shall be used. Any exceptions shall be incorporated into the Common Boundary Agreement between the two affected ATS Units.

2. PART II –ATS COORDINATION MESSAGES

2.1 INTRODUCTION

The following sections describe those messages used by ATS systems for exchange of information. Messages and fields conform generally to ICAO Doc 4444, and differences are noted.

2.2 MESSAGE FIELDS

Table 1 provides a summary of all fields used in messages described by this document. The remainder of this section describes the format of each field element. Section 3 describes which elements are to be included in each ATS message type, and Appendix B describes rules for the semantic content of each field.

Table 1. Summary of Message Fields

Field	Element (a)	Element (b)	Element (c)	Element (d)	Element (e)
03	Message Type Designator	Message Number	Reference Data		
07	Aircraft Identification	SSR Mode	SSR Code		
08	Flight Rules	Type of Flight			
09	Number of Aircraft	Type of Aircraft	Wake Turbulence Category		
10	Radio, Comm., Nav., and Approach Aid Equipment	Surveillance Equipment			
13	Departure Aerodrome	Time			
14	Boundary Point	Time at Boundary Point	Cleared Level	Supplementary Crossing Data	Crossing Condition
15	Cruising Speed or Mach Number	Requested Cruising Level	Route		
16	Destination Aerodrome	Total Estimated Elapsed Time	Alternate Aerodrome(s)		
18	Other Information				
22	Field Indicator	Amended Data			
31	Facility Designator	Sector Designator			
32	Time of Day	Position	Track Ground Speed	Track Heading	Reported Altitude

2.2.1 FIELD 03, MESSAGE TYPE, NUMBER AND REFERENCE DATA

Field 03(a) format shall be per ICAO Doc 4444 except that:

Only the message identifiers included in Table 2, Core Message Set, shall be permitted in element (a).

Field 03(b) and Field 03(c) format shall be per ICAO Doc 4444 except that:

The ATS unit identifier in elements (b) and (c) shall be exactly 4 letters. The ATS unit identifier should correspond to the first four letters of the ICAO Doc 7910 location identifier for the ATS unit, e.g. SKBO for the Bogota ACC.

2.2.2 FIELD 07, AIRCRAFT IDENTIFICATION AND TRANSPONDER CODE

Field 07(a) format shall be per ICAO Doc 4444 except that:

The aircraft ID shall be at least two characters long.
Aircraft IDs that begin with “TEST” shall be used only for test flight plans.
In an MIS message, a functional address may be substituted for the flight ID.

Field 07(b) and Field 07(c) format shall be per ICAO Doc 4444, with the clarification that each number in Field 07(c) must be an octal digit (i.e. 0-7). Note that elements 07(b) and 07(c) are either both present or both absent.

2.2.3 FIELD 08, FLIGHT RULES AND TYPE OF FLIGHT

Field 08(a) format shall be per ICAO Doc 4444.

Field 08(b) format shall be per ICAO Doc 4444.

2.2.4 FIELD 09, NUMBER AND TYPE OF AIRCRAFT AND WAKE TURBULENCE CATEGORY

Field 09(a) format shall be per ICAO Doc 4444.

Field 09(b) format shall be per ICAO Doc 4444.

Field 09(c) format shall be per ICAO Doc 4444.

2.2.5 FIELD 10, EQUIPMENT

Field 10(a) format shall be per ICAO Doc 4444.

Field 10(b) format shall be per ICAO Doc 4444.

2.2.6 FIELD 13, DEPARTURE AERODROME AND TIME

Field 13(a) format shall be per ICAO Doc 4444.

Field 13(b) format shall be per ICAO Doc 4444.

2.2.7 FIELD 14, ESTIMATE DATA

Field 14(a) format shall be per ICAO Doc 4444.

Field 14(b) format shall be per ICAO Doc 4444.

Field 14(c) format shall be per ICAO Doc 4444.

Field 14(d) format shall be per ICAO Doc 4444.

Field 14(e) format shall be per ICAO Doc 4444.

2.2.8 FIELD 15, ROUTE

Field 15(a) format shall be per ICAO Doc 4444 except that:
The designator “K” used for kilometers per hour will not be permitted.

Field 15(b) format shall be per ICAO Doc 4444 except that:
The designators “S” and “M” used for metric altitude will not be permitted.

Field 15(c) format shall be per ICAO Doc 4444.
(Note that even though metric speed and altitude information is not permitted in other fields, it is permissible in elements (c4) and (c6).

2.2.9 FIELD 16, DESTINATION AERODROME AND TOTAL ESTIMATED ELAPSED TIME, ALTERNATE AERODROME(S)

Field 16(a) format shall be per ICAO Doc 4444.

Field 16(b) format shall be per ICAO Doc 4444.

Field 16(c) format shall be per ICAO Doc 4444.

2.2.10 FIELD 18, OTHER INFORMATION

Field 18(a) format shall be per ICAO Doc 4444, except that:
Indicators other than those shown in ICAO Doc 4444 may be used; however these indicators may not be processed correctly by all ATS units and/or may cause flight plans to reject.

This reflects the reality that flight plans are filed with indicators other than those defined by ICAO (e.g. DOF/000112 to identify date of flight is commonly filed) some of which may be mandated by other ICAO regions.

Multiple instances of the indicator RMK/ may be used. ICAO Doc 4444 does not address the validity/invalidity of this; however instances of filed plans which use the same indicator multiple times have been identified. For example, “RMK/AGCS EQUIPPED RMK/TCAS EQUIPPED RMK/RTE 506”. The same may be true for some other indicators (e.g. STS/, NAV/ or COM/).

It must be noted that certain other indicators, for example DEP/, must only be used once to ensure successful processing of the flight plan.

2.2.11 FIELD 22, AMENDMENT

Field 22(a) format shall be per ICAO Doc 4444.

Field 22(b) format shall be per ICAO Doc 4444.

2.2.12 FIELD 31—FACILITY AND SECTOR DESIGNATORS

Field 31(a) shall contain a four-letter designator of the destination facility that is to receive the handover.

Note that this facility ID can be for a terminal facility that the parent en route system provides routing for. The four-letter designator should be the location identifier for the facility (from ICAO Doc 7910) if one exists. If a location identifier does not exist, one should be assigned by mutual agreement between the implementing ATS providers and submitted to ICAO for inclusion in ICAO Doc 7910.

Field 31(b) shall contain a two-character designator of the sector that is to receive the handover.

If 00 is designated, or the field element is not included then the receiving system is to determine the appropriate sector.

Example: MDCS00

2.2.13 FIELD 32—AIRCRAFT POSITION AND VELOCITY VECTOR

Each element of field 32 is fixed length; there is no separator between elements.

Field 32(a) shall contain time of day that the position is valid for, expressed in eight digits: HHMMSSDD where HH is hours from 00 to 23; MM is minutes from 00 to 59; SS is seconds from 00 to 59 and DD is hundredths of seconds from 00 to 99.

Field 32(b) shall contain the position of the referent flight expressed in Latitude/Longitude to the nearest second, in ICAO Doc 4444 format extended to include seconds (e.g. 462034N0780521W).

Field 32(c) shall contain the ground speed of the flight expressed in knots, per ICAO Doc 4444 format (e.g. N0456).

Field 32(d) shall contain the heading of the flight expressed in degrees and hundredths of a degree using five digits, from 00000 to 35999 relative to true north.

Field 32(e) shall contain the reported altitude expressed in ICAO Doc 4444 format (e.g. A040, F330).

2.3 CORE MESSAGE SET

The core message set is summarized in Table 2 below.

Table 2. Core Message Set

Category	Msg.	Message Name	Description	Pri-ority	Source
Coordination of pre-departure flights	FPL	Filed Flight Plan	Flight plan as stored by the sending ATS unit at the time of transmission. Used only for proposed flights.	FF	ICAO Doc 4444
	CHG	Modification message for **Proposed** Flight Plan	Changes previously sent flight data (before estimate data has been sent).	FF	
	CNL	Cancellation	Cancels an FPL	FF	
Coordination of active flights	CPL	Current Flight Plan	Flight plan as stored by the sending ATS unit at the time of transmission, including boundary estimate data. Used only for active flights.	FF	ICAO Doc 4444
	EST	Estimate	Identifies expected flight position, time and altitude at boundary.	FF	
	CNL	Cancellation	Cancels a CPL.	FF	
	MOD	Modification message for **Active** Flight Plan	Changes previously sent flight data (after estimate data has been sent).	FF	New message, format per CHG.
General Information	MIS	Miscellaneous	Free-format text message with addressing options.	FF	NAT ICD
Interface Management	IRQ	Initialization Request	Initiates activation of the interface.	FF	Based on existing Canadian protocols.
	IRS	Initialization Response	Response to an IRQ.	FF	
	TRQ	Termination Request	Initiates termination of the interface.	FF	
	TRS	Termination Response	Response to a TRQ.	FF	
Radar Handover	RTI	Radar Transfer Initiate	Initiates a radar handover.	FF	New messages based on existing U.S. protocols and ICAO Doc 4444 format
	RTU	Radar Track Update	Provides periodic position updates for a track in handover status.	FF	
	RLA	Radar Logical Acknowledgement	Computer acceptance of an RTI message.	FF	
	RTA	Radar Transfer Accept	Accepts or retracts a handover.	FF	
Acknowledgements (included in each of the above services)	LAM	Logical Acknowledgement	Computer acceptance of a message.	FF	ICAO Doc 4444
	LRM	Logical Rejection	Computer rejection of an invalid message.	FF	NAT ICD

2.3.1 COORDINATION OF PRE-DEPARTURE FLIGHTS

2.3.1.1 FPL (FILED FLIGHT PLAN)

FPL Purpose
An FPL shall be addressed to the appropriate ATS Units according to the requested route as prescribed in ICAO Doc 4444.

In the case of near-border departures, an FPL may be sent from ATS unit to ATS unit under agreed conditions (e.g. for departures when the flight time to the boundary is less than the normal advance time for sending a CPL). In this case the FPL sent contains the latest flight plan information as entered by Air Traffic Control, and is not always the same as the original FPL filed by the user. This FPL may be used as advanced notification at the receiving ATS facility for planning purposes.

FPL Format

FPL Field	Required Elements	Optional Elements	Comments
03	a, b		
07	a	b, c	SSR code is only sent if one is (already) assigned and the aircraft is so equipped.
08	a	b	Element (b) is included per requirements of the boundary agreement.
09	b, c	a	
10	a, b		
13	a, b		
15	a, b, c		
16	a, b	c	
18		a, other info.	Element (a) is included only if no other information is included. Either element (a) OR other information (but not both) must be included.

FPL Examples

This flight plan was sent from Bogota ACC (SKED) to Maiquetia ACC (SVZM). The flight is from La Mina Airport in Maicao, Colombia to La Chinita International Airport in Maracaibo, Venezuela. Because the departure airport is at the border between Colombia and Venezuela, an FPL needed to be sent before departure.

(FPLSKED/SVZM381-HK2Z5-IG-C172/L-S/C-SKLM1235-N0110A080 DCT CJN G445 MAR DCT-SVMC0036-EET/SVZM0007)

This flight plan was filed by TACA International Airlines for a flight from Toncontin International Airport in Tegucigalpa, Honduras to Boa Vista International Airport in Boa Vista, Brazil.

(FPL-TAI128-IS-B752/M-DGIJLORVW/S-MHTG1735-N0447F290 DCT TNT UA552 NOL UW27 RONER UL304 BVI DCT-SBBV0403-EET/MPZL0039 SKSP0044 MPZL0054 ALPON0122 SKEC0135 SVZM0157 SBMU0344 SEL/CDHQ DAT/S)

2.3.1.2 CHG (MODIFICATION MESSAGE FOR PROPOSED FLIGHT PLAN)

CHG Purpose
A CHG is used to transmit a change to one or more fields of previously sent flight data for a flight that has not had boundary estimate data sent. When boundary estimate data has been sent (via CPL or FPL followed by EST), a MOD message must be used for flight data changes.

CHG Format

CHG Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) shall contain the reference number of the first message sent for this flight.
07	a	b, c	If a SSR code has been assigned and sent in a previous CHG, it should be included. Fields 07, 13, and 16 must contain the values of these fields before the flight data was changed.
13	a		
16	a		
22	a, b		

CHG Examples

This amendment changes the equipment in Field 10 adding a DME equipment.

(CHGSKED/SVZM395SKED/SVZM381-HK2Z5-SKLM-SVMC-10/SD/C)

This amendment changes the ACID of a flight from HK2Z5 to HK2X5. Note that when Field 07(a) is changed, it is the only change allowed in the message.

(CHGSKED/SVZM412SKED/SVZM381-HK2Z5-SKLM-SVMC-07/HK2X5)

2.3.1.3 CNL (CANCELLATION)

CNL Purpose
A CNL is used to notify the receiving ATS unit that a flight, for which an FPL or CPL was sent earlier, is no longer relevant to that ATS unit.

CNL Format

CNL Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) shall contain the reference number of the first message sent for this flight.
07	a		Elements (b) and (c) are not used in this context.
13	a		
16	a		

CNL Example

This message was sent from Bogota ACC (SKED) to Maiquetia ACC (SVZM) to indicate that flight HK2X5 from La Mina Airport in Maicao, Colombia to La Chinita International Airport in Maracaibo, Venezuela will no longer be entering Maiquetia ACC airspace.

(CNL SKED/SVZM452SKED/SVZM381-HK2X5-SKLM-SVMC)

2.3.2 COORDINATION OF ACTIVE FLIGHTS

2.3.2.1 CPL (CURRENT FLIGHT PLAN)

CPL Purpose
A CPL is used to inform the receiving center of the cleared flight plan and boundary estimate information for coordination purposes. This message may only be sent as the initial transmission of an active flight plan (i.e. a flight that has departed and for which a boundary estimate based on the actual departure time is available).

CPL Format

CPL Field	Required Elements	Optional Elements	Comments
03	a, b		
07	a	b, c	SSR code is only sent if one is (already) assigned and the aircraft is so equipped.
08	a	a	Element (b) is included per requirements of the boundary agreement.
09	b, c	a	
10	a, b		
13	a		
14	a, b, c	d, e	
15	a, b, c		
16	a		
18		a, other info.	Element (a) is included only if no other information is included. Either element (a) OR other information (but not both) must be included.

CPL Example

This flight plan was sent from Bogota ACC (SKED) to Maiquetia ACC (SVZM). It indicates that the flight is expected to cross the coordination fix ORTIZ at 1932UTC, that the assigned beacon code is 2617, and that the flight has been cleared to flight level 290.

(CPLSKED/SVZM172-TAI128/A2617-IS-B752/M-DGIJLORVW/S-MHTG-ORTIZ/1932F290-N0447F290 ORTIZ UA552 NOL UW27 RONER UL304 BVI DCT-SBBV0403-EET/MPZL0039 SKSP0044 MPZL0054 ALPON0122 SKEC0135 SVZM0157 SBMU0344 SEL/CDHQ DAT/S)

2.3.2.2 EST (ESTIMATE)

EST Purpose
An EST is used to provide boundary estimate information for a flight when the basic flight plan information was previously transmitted via an FPL (instead of a CPL). Note that the EST is sent only when a flight becomes active.

EST Format

EST Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) shall contain the reference number of the last message sent for this flight.
07	a	b, c	SSR code is only sent if one is (already) assigned and the aircraft is so equipped. Aircraft ID and beacon code sent in an EST message must match the values previously sent in the FPL or the last CHG that modified the FPL.
13	a		Departure aerodrome must match the value previously sent in the FPL or the last CHG that modified the FPL.
14	a, b, c	d, e	
16	a		Destination aerodrome must match the value previously sent in the FPL or the last CHG that modified the FPL.

EST Example

This message was sent from Bogota ACC (SKED) to Maiquetia ACC (SVZM) upon departure of HK2X5. It indicates that the flight is expected to cross the coordination fix OSOKA at 1245UTC, that the assigned beacon code is 4322 and that the flight has been cleared to an altitude of 8,000 feet.

(ESTSKED/SVZM452SKED/SVZM381-HK2X5/A4322-SKLM-OSOKA/1245A080-SVMC)

2.3.2.3 CNL (CANCELLATION)

CNL Purpose
A CNL is used to notify the receiving ATS unit that a flight, for which an FPL or CPL was sent earlier, is no longer relevant to that ATS unit.

CNL Format
The CNL message is used for both active and proposed flights.

2.3.2.4 MOD (MODIFY MESSAGE FOR ACTIVE FLIGHT PLAN)

MOD Purpose
A MOD is used to transmit a change to one or more fields of previously sent flight data after boundary estimate data has been sent. The MOD is therefore used for any flight data changes after a CPL or an EST has been sent.

MOD Format

MOD Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) shall contain the reference number of the first message sent for this flight.
07	a	b, c	SSR code is only sent if one is (already) assigned or the aircraft is so equipped. Fields 07, 13, and 16 must contain the values of these fields before the flight data was changed.
13	a		
16	a		
22	a, b		

MOD Example

This amendment removes the RVSM capability from field 10 and changes the assigned altitude to flight level 240.

(MODSKED/SVZM218SKED/SVZM172-TAI128-MHTG-SBBV-10/DGIJLORV/S-15/N0447F240 UA552 NOL UW27 RONER UL304 BVI DCT)

2.3.3 GENERAL INFORMATION MESSAGES

2.3.3.1 MIS (MISCELLANEOUS)

MIS Purpose
A MIS is used to transmit a free text message to a specific functional position, or to the position responsible for a specific flight, at another facility.

MIS Format

MIS Field	Required Elements	Optional Elements	Comments
03	a, b		
07	a		Note that element (a) in the MIS may contain a flight ID or a functional address
18	RMK/ followed by free text		

MIS Example

In this example, Bogota ACC (SKED) informs Maiquetia ACC (SVZM) that TACA flight 128 has lost its RVSM capability.

(MISSKED/SVZM221-TAI128-RMK/TACA128 HAS LOST RVSM CAPABILITY)

2.3.4 INTERFACE MANAGEMENT MESSAGES

2.3.4.1 IRQ (INITIALIZATION REQUEST)

IRQ Purpose
An IRQ is used to request transition of an interface from a non-operational to an operational state.

IRQ Format

IRQ Field	Required Elements	Optional Elements	Comments
03	a, b		

IRQ Example

In this example, Bogota ACC (SKED) has sent a request to Maiquetia ACC (SVZM) to initialize the interface.

(IRQSKED/SVZM266)

2.3.4.2 IRS (INITIALIZATION RESPONSE)

IRS Purpose
An IRS is used as a response to an IRQ message.

IRS Format

IRS Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) should contain the reference number of the previously sent IRQ.

IRS Example

In this example, Maiquetia ACC (SVZM) has responded to Bogota ACC's (SKED) request to initialize the interface.

(IRSSVZM/SKED817SKED/SVZM266)

2.3.4.3 TRQ (TERMINATION REQUEST)

TRQ Purpose
A TRQ is used to request transition of an interface from an operational to a non-operational state.

TRQ Format

TRQ Field	Required Elements	Optional Elements	Comments
03	a, b		
18		a, other info.	Element (a) is included only if no other information is included. Either element (a) OR other information (but not both) must be included. Other information, if included, must include RMK/ followed by free text.

TRQ Example

In this example, Bogota ACC (SKED) has sent a request to Maiquetia ACC (SVZM) to terminate the interface.

(TRQSKED/SVZM348)

2.3.4.4 TRS (TERMINATION RESPONSE)

TRS Purpose
TRS is used as a response to an TRQ message.

TRS Format

TRS Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) should contain the reference number of the previously sent TRQ.
18		a, other info.	Element (a) is included only if no other information is included. Either element (a) OR other information (but not both) must be included. Other information, if included, must include RMK/ followed by free text.

TRS Example

In this example, Maiquetia ACC (SVZM) has responded to Bogota ACC's (SKED) request to initialize the interface.

(TRSSVZM/SKED912SKED/SVZM348)

2.3.5 ACKNOWLEDGEMENTS

2.3.5.1 LAM (LOGICAL ACKNOWLEDGEMENT)

LAM Purpose
An LAM is sent from ACC to ACC to indicate that a message has been received and found free of syntactic and semantic errors. It does not indicate operational acceptance by a controller. Element (c) contains the reference number (i.e. element 3(b)) of the message being responded to.

LAM Format

LAM Field	Required Elements	Optional Elements	Comments
03	a, b, c		

LAM Example

In this example, Maiquetia ACC (SVZM) has accepted message number 739 from Bogota ACC (SKED).

(LAMSVZM/SKED629SKED/SVZM739)

2.3.5.2 LRM (LOGICAL REJECTION)

LRM Purpose
An LRM is used to indicate that a message sent from ATS system to ATS system contained an error and has been rejected by the receiving system.

LRM Format

LRM Field	Required Elements	Optional Elements	Comments
03	a, b, c		
18	text as shown in Comments		Describes the error code and the error per Appendix A guidelines: after RMK/, include two digits comprising the error code; (note that error code 57 will be used for any error that is not field specific and that is not identified in Appendix A - Error Codes) two digits comprising the field in error (or 00 if the error is not field-specific); and the erroneous text, i.e. the contents of the message that caused the error when the error is field specific. When the error is non-field specific, a descriptive error message shall be included. Separate the above items by an oblique stroke (/).

LRM Example

In this example, Maiquetia ACC (SVZM) has rejected message number 392 from Bogota ACC (SKED) because the aircraft identification in field 7 of message 392 was too long.

(LRMSVZM/SKED519SKED/SVZM392-RMK/06/07/TACA1745)

2.3.6 RADAR HANDOVER MESSAGES

2.3.6.1 RTI MESSAGE (RADAR TRANSFER INITIATE)

RTI Purpose
An RTI message is sent from one ATS unit to another to initiate the transfer of radar identification for a flight. Logical acknowledgement of an RTI is an RLA or LRM.

RTI Format

RTI Field	Required Elements	Optional Elements	Comments
03	a, b, c		
07	a, b, c		Must include ACID and established SSR code
13	a		
16	a		
31	a	a	If no sector designated or sector 00 is designated, then receiving system determines
32	a, b, c, d, e		

RTI Examples
This is an example of a handover initiated by Merida ACC to Cenamer ACC. No sector is designated, so Cenamer will determine who should receive it.

(RTIMMMD/MHTG812MMMD/MHTG801-TAC210/A3407-MMMX–MPTO–MHTG
-13242934162000N0912401WN043327629F349)

This is an example of a handover directed to sector 01 in Cenamer ACC, from Merida ACC.

(RTIMMMD/MHTG812MMMD/MHTG801-TAC210/A3407-MMMX–MPTO–MHTG01
-13242934162000N0912401WN043327629F349)

2.3.6.2 RLA MESSAGE (RADAR LOGICAL ACKNOWLEDGEMENT)

RLA Purpose
The Radar Logical Acknowledgment message is used to acknowledge computer receipt of an RTI message. The facility sending this message is indicating that the referenced message has been received and has no format or logic errors, and to indicate which sector the handover was routed to. The RLA is an acknowledgement message in response to RTI and therefore is not responded to.

RLA Format

RLA Field	Required Elements	Optional Elements	Comments
03	a, b, c		
31	a, b		

RLA Examples

In this example Cenamer ACC has indicated to Merida ACC that it has received a handover and routed it to sector 01.

(RLAMHTG/MMMD202MHTG/MMMD445-MHTG01)

In this example Cenamer ACC has indicated to Merida ACC that it has received a handover and routed it to the Guatemala Radar Approach Control

(RLAMHTG/MMMD202MMMD/MHTG445-MGGT)

2.3.6.3 RTU MESSAGE (RADAR TRACK UPDATE)

RTU Purpose
An RTU message may be sent from one ATS unit to another to update the radar position of a flight during transfer of radar identification. RTU messages are sent periodically after an RTI, until an RTA is received or the handover is retracted. There is no logical acknowledgement of an RTU.

RTU Format

RTU Field	**Required Elements**	**Optional Elements**	**Comments**
03	a, b, c		Element (c) shall refer to the message number of the RTI message that initiated the handover.
07	a ,b ,c		Include established SSR code.
13	a		
16	a		
32	a, b, c, d, e		

RTU Examples
This is an example of an RTU message initiated by Cenamer ACC to Merida ACC. The message MHTG/MMMD801 was the RTI message that initiated the handover.

(RTUMHTG/MMMD000MHTG/MMMD801-TAC211/A3407-MPTO-MMMX
-13242934154412N0905100WN043327629F341)

2.3.6.4 RTA MESSAGE (RADAR TRANSFER ACCEPT)

RTA Purpose
An RTA message may be sent from one ATS unit to another as an application response to an RTI. This message signifies that a controller has accepted radar identification of a flight. An RTA is also sent by the facility that initiated a handover to retract the handover. Logical (computer) acknowledgement of an RTA is an LAM or LRM.

RTA Format

RTA Field	Required Elements	Optional Elements	Comments
03	a, b, c		Element (c) refers to the message number of the RTI that is being responded to.
07	a, b, c		Include assigned SSR code (i.e. code assigned by the accepting center).
13	a		
16	a		
31	a, b		Note accepting facility may be a Radar Approach Control serviced by the sending ACC.

RTA Examples

This is an example of a handover accepted by Merida ACC. Handover was initiated by Cenamer ACC.

(RTAMMMD/MHTG438MHTG/MMMD812-TAC211/A4222-MPTO-MMMX-MMMD01)

This is an example of a retraction by Cenamer ACC:

(RTAMHTG/MMMD222MHTG/MMMD812-TAC211/A4222-MPTO-MMMX-MHTG01)

3. PART III – COMMUNICATIONS AND SUPPORT MECHANISMS

3.1 INTRODUCTION

The communications protocols and physical path are not dictated by this ICD. This ICD addresses only the application message content.

3.2 TELECOMMUNICATIONS REQUIREMENTS AND CONSTRAINTS

Telecommunication requirements and constraints should be carried out bilaterally or multilaterally and incorporated into applicable bilateral or multilateral agreements.

3.2.1 USE OF AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN)

AFTN may be used as a flight plan data interface, subject to verification of performance. Any interface exchanging radar position data, including radar handovers, shall not use AFTN.

When AFTN is used as the communications mechanism:

a) The AFTN IA-5 Header as described in ICAO Annex 10, vol. 2 will be used for exchange of messages.

b) ATS messages will be addressed to each ATS unit using an eight-character facility address where the first four characters are the appropriate location indicator from ICAO Doc 7910, and the last four characters are routing indicators defined by the ATS unit in accordance with ICAO Annex 10, vol. 2.

Each message shall be sent with the priority indicated in Table 2 of Part II.

3.2.2 USE OF A WIDE-AREA NETWORK

Use of existing wide-area networks (e.g. X.25 or Frame Relay packet-switched network) may be used if the speed, capacity, and security characteristics are verified as adequate to support the interface.

3.2.3 USE OF DIRECT LINES

In cases where speed, capacity, and/or security require it, a direct line interface may be used between facilities.

3.2.4 CHARACTER SET

The IA-5 character set shall be used for all application message content. Certain characters have special meaning and must only be used as indicated below:

Open parenthesis “(”and close parenthesis “)” shall be used only to begin and terminate the application message.

A single hyphen "-" shall be used only as a field separator and shall not be used within any field.

3.3 ENGINEERING CONSIDERATIONS

3.3.1 ASSOCIATED AUTOMATION FUNCTIONALITY

Each ATS service provider participating in this interface must have a supporting automation system. The supporting automation shall:

- Error check all inbound messages for proper format and logical consistency.
- Ensure only messages from authorized senders are accepted and processed.
- As required, alert the responsible controller(s) of flight data that has been received.
- Notify the responsible personnel when any message sent is rejected or not acknowledged within a variable system parameter (VSP) period of time (see 4.5.1 Response time).

3.3.2 FAILURE AND RECOVERY SOLUTIONS

Automation systems may have different failure avoidance and failure recovery mechanisms. Each participating system shall have the following characteristics:

- If the recovery process preserves the current message number in the sequence with each facility, no notification is necessary.
- If the recovery process requires reset of the sequence number to 000, a means of notifying the receiving facility that the message numbers have been reset is required. This may be procedural rather than automated.

The recovery process shall not automatically re-send any CPL for which an LAM had been received. This is relevant if the system was able to recover state information about which flight plans have been coordinated, and did not need to reset the message sequence numbers.

3.3.3 DATA REQUIREMENTS

Certain data must be defined and maintained to support all features of the interface. Depending on the data, it should be coordinated on a Regional, National, or Local (facility) basis. Data requirements are identified in Table 3 below.

Table 3. Summary of Data Definitions Needed to Support the Interface

Field	Data	Purpose	Source	Coordination
03	Facility Identifiers	Identify the sending/receiving facility.	ICAO Doc 7910 (first four characters) and local definition (second four characters)	Local
07	Functional Address	Agree on functional addresses to be used in MIS messages.	Local Data	Local
10	Equipment Codes	Identify ATS-specified equipment qualifiers that are not specified in ICAO Doc 4444.	ICAO Doc 7030 CAR and SAM Supplements	Regional
14	Boundary Point	Identify the coordination fixes to be sent for each airway.	Local Data	Local
15	Adapted Routes and Fixes	Identify airway and fix information that is adapted by both systems.	Local Data	Local
18	Requirements for other data to be included	Identify any requirements for data that must be included in Field 18.	ICAO Doc 7030 CAR and SAM Supplements	Regional

3.4 SECURITY CONSIDERATIONS

3.4.1 PRIVACY

This ICD does not define mechanisms that guarantee privacy. It should be assumed that any data sent over this interface may be seen by unintended third parties either through interception of the message or through disclosure at the receiving facility.

Any communications requiring privacy must be identified and appropriate communications and procedures defined.

3.4.2 AUTHENTICATION

Each system shall authenticate that messages received are from the source that is identified in Field 03.

3.4.3 ACCESS CONTROL

Each system participating in the interface shall implement eligibility checks to ensure that the source of the message is eligible to send the message type and is the appropriate authority for the referenced flight.

3.5 TEST CONSIDERATIONS

Before an automated flight data interface becomes operational between any two facilities, the following set of tests shall be completed:

Test of the telecommunications system and addressing:

Off-line tests using development or test (i.e. non-operational) systems. These may include test systems at non-operational facilities, and/or operational systems that are in an off-line mode. Note: If off-line testing is not possible, extreme care should be used when conducting first round testing on operational systems.

Test of non-operational message sets:

Tests using the operational systems in off-line (recommended) or operational mode in which TEST messages are exchanged. (Note: If off-line testing is not possible, extreme care should be used when conducting second round testing on operational systems.)

Test of operational message sets:

Tests using the operational systems in operational mode in which manual coordination verifies each flight data message sent.

Before each test, a document specifying purpose, procedures and data to be collected, must be agreed to by both/all facilities. To ensure success/failure is clearly defined, specific criteria should be included in the document.

Data transmitted during test phases should include both correct and incorrect formats/data fields to verify that correct data is processed correctly and incorrect data is rejected.

For diagnostic purposes, each side of the interface should be able to isolate the source of interface problems.

3.6 PERFORMANCE CONSIDERATIONS

3.6.1 RESPONSE TIME

For flight planning messages, controllers require indication of an unsuccessful message transmission within 60 seconds of the message being sent. Therefore, the response time from the time a message is sent until an LAM (or LRM) is received shall be under 60 seconds at least 99% of the time under normal operations. A faster response time is desirable, and will result in operations that are more efficient.

For messages involving transfer of control and surveillance data (e.g. RTI, RTA, and RTU) the data must be transmitted in time for the receiving system to display the track position with acceptable accuracy. Communication across the interface shall be less than six seconds maximum.

3.6.2 AVAILABILITY / RELIABILITY

The hardware and software resources required for providing service on the CAR/SAM interfaces should be developed such that the inherent reliability will support interface availability which is at least equal to the end systems of that interface (e.g. 99.7% availability for end systems that both operate with 99.7% reliability).

3.6.3 CAPACITY AND GROWTH

Before implementing this interface between two ACCs, an analysis of the traffic expected between the centers shall be performed and the proposed communications links verified for appropriate capacity. Traffic estimates should consider current and future expected traffic levels.

For initial planning purposes the following estimates of message size and messages per flight are provided.

Table 4. Expected Message Rates and Sizes

Message	Avg. per Flight	Avg. Size	Max Size	Comments
Messages per near-border departure flight:				
FPL	1	275	2,000	
CHG	0.5	160	1,000	Assumed 1 of 2 flights amended after coordination, before departure.
EST	1	120	200	
MOD	2	120	1,000	Assumed each flight has an average of one change after coordination due to amendment and two time updates.
Messages per non near-border departure flight:				
CPL	1	275	2,000	
MOD	2	120	1,000	Assumed each flight has an average of one change after coordination due to amendment and two time updates.
Messages per every flight:				
CNL	0.01	100	150	Assumed 1 in 100 flight plans are cancelled.
RTI	1	150	200	
RTU	5	140	200	Assumed 1 RTU every 6 seconds for 30 seconds.
RTA	1	110	160	
MIS	0.1	130	625	
Responses (not per flight):				
LAM/RLA	Sum of all above except RTU	80	130	
LRM		100	230	

The hardware and software developed for the interfaces shall be capable of asynchronously exchanging the messages defined in Part III, Table 2 simultaneously with all adjacent automated systems.

APPENDIX A – ERROR CODES

The error codes for use with LRM messages are defined in Table A-1 below.

Table A-1. LRM Error Codes and Explanations

Error Code	Field Number	Supporting Text
1	Header	INVALID SENDING UNIT (e.g., AFTN address)
2	Header	INVALID RECEIVING UNIT (e.g., AFTN address)
3	Header	INVALID TIME STAMP
4	Header	INVALID MESSAGE ID
5	Header	INVALID REFERENCE ID
6	07	INVALID ACID
7	07	DUPLICATE ACID
8	07	UKNOWN FUNCTIONAL ADDRESS
9	07	INVALID SSR MODE
10	07	INVALID SSR CODE
11	08	INVALID FLIGHT RULES
12	08	INVALID FLIGHT TYPE
13	09	INVALID AIRCRAFT MODEL
14	09	INVALID WAKE TURBULENCE CATEGORY
15	10	INVALID CNA EQUIPMENT DESIGNATOR
16	10	INVALID SSR EQUIPMENT DESIGNATOR
17	13, 16	INVALID AERODROME DESIGNATOR
18	13	INVALID DEPARTURE AERODROME
19	16	INVALID DESTINATION AERODROME
20	17	INVALID ARRIVAL AERODROME
21	13, 16	EXPECTED TIME DESIGNATOR NOT FOUND
22	13, 16	TIME DESIGNATOR PRESENT WHEN NOT EXPECTED
23	13, 14, 16	INVALID TIME DESIGNATOR
24	13, 14, 16	MISSING TIME DESIGNATOR
25	14	INVALID BOUNDARY POINT DESIGNATOR
26	14, 15	INVALID ENROUTE POINT
27	14, 15	INVALID LAT/LON DESIGNATOR
28	14, 15	INVALID NAVAID FIX
29	14, 15	INVALID LEVEL DESIGNATOR
30	14, 15	MISSING LEVEL DESIGNATOR
31	14	INVALID SUPPLEMENTARY CROSSING DATA
32	14	INVALID SUPPLEMENTARY CROSSING LEVEL
33	14	MISSING SUPPLEMENTARY CROSSING LEVEL
34	14	INVALID CROSSING CONDITION
35	14	MISSING CROSSING CONDITION
36	15	INVALID SPEED/LEVEL DESIGNATOR
37	15	MISSING SPEED/LEVEL DESIGNATOR
38	15	INVALID SPEED DESIGNATOR
39	15	MISSING SPEED DESIGNATOR
40	15	INVALID ROUTE ELEMENT DESIGNATOR
41	15	INVALID ATS ROUTE/SIGNIFICANT POINT DESIGNATOR

Error Code	Field Number	Supporting Text
42	15	INVALID ATS ROUTE DESIGNATOR
43	15	INVALID SIGNFICANT POINT DESIGNATOR
44	15	FLIGHT RULES INDICATOR DOES NOT FOLLOW SIGNIFICANT POINT
45	15	ADDITIONAL DATA FOLLOWS TRUNCATION INDICATOR
46	15	INCORRECT CRUISE CLIMB FORMAT
47	15	CONFLICTING DIRECTION
48	18	INVALID OTHER INFORMATION ELEMENT
49	19	INVALID SUPPLEMENTARY INFORMATION ELEMENT
50	22	INVALID AMENDMENT FIELD DATA
51		MISSING FIELD nn
52		MORE THAN ONE FIELD MISSING
53		MESSAGE LOGICALLY TOO LONG
54		SYNTAX ERROR IN FIELD nn
55		INVALID MESSAGE LENGTH
56		NAT ERRORS
57		INVALID MESSAGE
58		MISSING PARENTHESIS
59		MESSAGE NOT APPLICABLE TO zzzz ACC
60		INVALID MESSAGE MNEMONIC (i.e., 3 LETTER IDENTIFIER)
61	Header	INVALID CRC
62		MESSAGE REJECTED, MANUAL COORDINATION REQUIRED
63-255		Reserved for future use.

Error Code 57 shall be used for any error that is not field-specific and is not identified in the table.
Each ATS provider may propose additional error codes as needed and submit them through the GREPECAS mechanism for approval and inclusion in this Table.

APPENDIX B – IMPLEMENTATION GUIDANCE MATERIAL

B.1 USE OF THE CORE MESSAGE SET

B.1.1 FILED FLIGHT PLAN (FPL) MESSAGES

A user must file a filed flight plan message (FPL) with the initial ATS unit that will service the flight as well as with the ATS unit for each FIR that the flight will cross. The format and content of this FPL is subject to the rules of the receiving country and is not defined by this ICD.

It is expected that an FPL will be filed by an airspace user, and a subsequent CPL will be received from an adjacent ATS unit. It is the responsibility of each country to design their automation to ensure that an FPL or CPL from an adjacent ATS unit always takes precedence over a user-filed FPL for the flight so that second-order flight data messages are applied to the ATS unit-supplied flight plan and not the user-filed flight plan.

B.1.2 COORDINATION OF ACTIVE FLIGHTS (CPL)

Normally, an agreed upon number of minutes before a flight reaches a control boundary the sending ATS unit will send a CPL message to the receiving ATS unit.

The normal computer response to a CPL is an LAM sent by the receiving automation system to signify that the plan was found to be free of syntactic or semantic errors. Controller acceptance is implied (i.e. the ACP message defined in ICAO Doc 4444 is not implemented). This is permitted per ICAO Doc 4444, Part IX, section 4.2.3.5.1 and Part VIII, section 3.2.5. If the receiving computer cannot process a CPL then an LRM will be returned if that message has been implemented. Alternatively, no response will be generated.
ICAO Doc 4444 states, in Part IX, section 4.2.3.2.5 “A CPL message shall include only information concerning the flight from the point of entry into the next control area or advisory airspace to the destination aerodrome”. However ICAO Doc 4444 provides no guidelines for choosing the exact point at which the CPL should start.

The nature of ATC automation systems is that they have differing requirements for the starting point of a route relative to the facility boundary, necessitating some agreement on allowable route tailoring. The relationship between the start of the route in Field 15 and the coordination fix in Field 14 must also be established so that the receiving center can accurately process the route. Agreements on these points are provided in the attached boundary agreements for each ATS provider.

B.1.3 CHANGES AFTER COORDINATION

Any change to a flight plan after initial coordination requires a message that can be mapped to the correct flight plan. Every message sent after an initial CPL should have the same Aircraft ID, departure point, and destination point. The message reference data should point to the previous message in the sequence for this flight. For example, if the CPL is message number KZMP/CZWG035 then the reference data for the first MOD sent after the CPL should be KZMP/CZWG035. The second MOD sent for that flight should refer to the message number of the original CPL.. The messages that represent valid changes to the original flight plan include CHG, EST, MOD, RTI, and RTA (when used for retraction; see Section B.1.8).

If a flight for which a CPL has been sent will no longer enter the recipient's airspace, a CNL message should be sent.

After acceptance of a CNL message, the receiving system should not accept any changes regarding the subject flight.

Any change to flight data for a flight that has been coordinated (i.e. a CPL or EST has been sent) must be forwarded via a MOD message. The MOD message is identical to the ICAO CDN message in format and content, but does not require an ACP response (only LAM or LRM).

The expected computer response to a CNL, CHG, EST, or MOD is an LAM or LRM (if the latter has been implemented).

Each system should implement rules as to whether an amendment on a particular flight should be accepted from a neighboring ACC. For example, an amendment from the sending ACC typically is not accepted once transfer of control has been initiated.

It is expected that the content of a field sent in a flight data change message (e.g. CHG or MOD) will completely replace the content of the field currently stored in the receiving center. So, for example, if Field 18 is amended the entire contents of the field should be sent and not only the changed elements.

An aircraft placed into a hold should result in a MOD message being sent with new Field 14 Estimate Data (boundary time) based on the Expect Further Clearance (EFC) time. If no EFC time is established by ATC, an agreed upon default EFC time may be used (e.g. 2 hours) to ensure the flight plan data is maintained by the receiving facility. If necessary, a second MOD message should be sent with the revised Estimate Data time once it is known.

Upon acceptance of an RTI message the receiving system should accept only an RTA, RTU, or MIS message for the flight. If an RTA signifying retraction is accepted, then the system may once again accept a MOD message.

Upon receipt of a logical acknowledgement to an RTA message signifying handover acceptance, the sender of the RTA should not accept any messages regarding the subject flight.

B.1.4 NEAR-BORDER DEPARTURES

ATS units implementing automated coordination for near-border departures may also exchange FPLs to coordinate flights pre-departure when the flight time from the departure point to the boundary point is less than the normal CPL notification time.

ATS units will send an FPL message pre-departure followed by an EST message upon departure. Additional coordination procedures may be defined in an inter-facility Letter of Agreement.

If an FPL has been sent and changes are subsequently made, then a CHG message should be used to modify the changed fields. Only the ATS unit that sent an FPL message may send a CHG message (i.e. the receiving unit cannot send a CHG back to the sending unit). Once an EST message is sent, a MOD must be used instead of a CHG for transmission of flight data changes.

The expected computer response to an FPL is an LAM or LRM.

If a previously sent FPL is to be cancelled, a CNL message should be sent.

B.1.5 INTERFACE MANAGEMENT

ATS units implementing a data communications interface will nominally be expected to accept messages at any time when the system is available. Each system is responsible for providing the capability of inhibiting received messages, if needed. Each system is expected to be able to inhibit outgoing messages. Manual coordination between facilities may be needed for one facility to request the other to inhibit messages.

ATS units which implement data communication interfaces may exchange messages to request initialization or termination of the interface via automated messages. Only when an initialization request has been sent and responded to affirmatively will each system be expected to accept messages.

Any message received when the interface is not initialized shall be ignored (i.e. not processed and not responded to), except for IRQ.

To request initialization one system shall send an IRQ message to the other. The IRQ may be repeated a predetermined number of times if no response is received, with each repeated IRQ receiving the same message number.

If the receiving system is ready to communicate (i.e. it has already sent an IRQ) when it receives an IRQ, it shall send an IRS in response. There is no LAM or LRM response to an IRQ. The reference number in Field 03 should refer to the message number of the IRQ being responded to. Each system becomes active when it receives an IRS from the other system. There is no response to an IRS.

If no response to an IRQ is received and the maximum number of retries exceeded, the interface is considered failed by the initiating system.

A system requests orderly termination of the interface by sending a TRQ message. After sending a TRQ, a system shall accept only a TRS or TRQ message. There is no LAM or LRM response to a TRQ. Upon receipt of a TRS the interface shall be deactivated. There is no response to a TRS. Upon receipt of a TRQ the system shall respond with a TRS and deactivate the interface immediately (even if a TRQ is outstanding). When messages are exchanged between two ATS units that cause successful termination of the interface, the two systems shall not send or accept any messages on the interface until a successful initialization transaction has been completed.

B.1.7 ERROR CHECKING, RESPONSES, AND RESENDS

Upon receiving a message, the receiving system shall check that the format and content of each field are in accordance with this ICD. Other logic checks may be performed per the rules defined by the ATS provider.

Whenever a message is received and passes all syntactic and semantic checks an LAM (or RLA for handover initiation) shall be returned to the sender for those messages designated for LAM/LRM responses.

ATS units implementing only LAM acknowledgement messages will not send any response to the sender when a message fails a syntactic or semantic check. The sending ATS Unit must infer message rejection by failure to receive an LAM. Agreement on one minute as a maximum operationally acceptable time-out value (from the time a message is sent to receipt of an LAM) is recommended.

ATS units implementing only LAM acknowledgement messages cannot productively use message resend as a technique, since the lack of an LAM may infer a lost message or message rejection. Therefore use of message resends after timeout of an LAM receipt is <u>not</u> recommended.

ATS units implementing both LAM and LRM acknowledgement messages will send an LRM when a received message fails a syntactic or semantic check, using the error codes in Appendix A. In the case of a radar handover initiation (see B.1.8) an RLA is used instead of an LAM.

When no response to a message is received within a VSP period of time a unit may optionally choose to resend the original message—using the same message number—a VSP number of times before declaring failure. The same message number should be used so that the receiving station can easily distinguish exact duplicates should the same message be received more than once.

B.1.8 RADAR HANDOVERS

- RTI Message

An RTI shall be used to initiate a transfer of radar identification from a controller in one ACC to a controller in another ACC. An RLA or LRM shall be returned in response to an RTI, based on acceptance checks by the receiving computer.

If no logical response (RLA or LRM) to an RTI is received after a specified number of retries, the handover should be marked as failed to the initiating controller.

Upon acceptance of an RTI message the receiving system should not accept any flight data messages regarding the subject flight except for an RTA, RTU, or MIS.

- RTU Message

The transferring center shall begin sending RTU messages once an RLA is received for an RTI.
RTU messages shall be sent once every tracking cycle. The expected track update rate must be coordinated between the implementing countries.

An RTU message should not be sent when current track data is not available for a flight, e.g. if the flight enters a coast mode.

Upon retraction of the transfer or receipt of an RTA from the receiving center the sending of RTUs shall stop. There will be no response to an RTU (i.e. no LAM, RLA, or LRM).

- RTA Message

An RTA message shall be sent by the receiving center in response to an RTI when the receiving controller has accepted the transfer. An RTA message shall be sent by the sending center when the initiating controller retracts a previously issued RTI. An LAM or LRM shall be returned in response to an RTA, based on acceptance checks by the receiving computer.

If no response is received within a VSP period of time (e.g. 6 seconds), the transfer shall be considered failed and the accepting controller notified.

If the sending center receives an RTA after retracting a handover, it shall reject the RTA by returning an LRM.

If the receiving center receives an RTA after accepting a handover, it shall reject the RTA by returning an LRM.

After an RTA is rejected, the controller that attempted to accept or retract control shall be notified that the handover failed. Note that it is possible for an accept and retract to be entered simultaneously, resulting in both RTA messages being rejected.

B.1.9 MIS MESSAGE

The MIS message can be addressed to either a functional address, or to an aircraft ID. The functional addresses to use will be exchanged between adjacent centers. Each functional address will map to a workstation or set of workstations, and the types of information that should be sent to each address should accompany the exchange of addresses.

When an MIS message is addressed to a flight ID, the receiving system shall route the message to the sector that currently controls the flight. If no sector controls the flight the message shall be rejected. The intent is that an MIS message does not modify the flight record for the subject flight (i.e. it is not treated as an amendment to Field 18 for that flight).

B.2 DEVELOPMENT OF FIELD CONTENT

The following sections provide implementation notes on the expected semantic content of each field, how to generate the fields and how to interpret the fields.

B.2.1 FIELD 03

Each message sent to each interface should receive an incrementally higher number. Thus, a system must maintain a separate sequence for each facility with which it interfaces.

The message following number 999 will be 000, and then the number sequence repeats.

The message number in Field 03 and the Aircraft ID in Field 07 combined, must be unique for any CPL or FPL. A flight plan received that has the same message number and ACID as a previously received plan shall be rejected. Note that it is possible to have duplicate message numbers if the sending computer system fails and is restarted in a cold start mode (i.e. no previous state data is retained). In this case the message numbers would restart and may repeat.

Implementers of the data communications interface should consider a check for out-of-sequence messages (i.e. a message received has a message number that is not one greater than the previous message number). Since messages may be resent if a response is not received within a VSP period of time, it may also be possible to receive a message more than once. Therefore implementers should consider a check for duplicate messages based on the message number. Any such checks should also consider the behavior after a system failure/restart.

B.2.2 FIELD 07

If the aircraft does not have Mode A capability, omit elements (b) and (c) and the preceding oblique stroke. Also omit these elements if the aircraft has Mode A capability but the SSR code is unknown (or not assigned).

B.2.3 FIELD 09

When the aircraft type is "ZZZZ", there may be no certificated maximum take-off weight. In this case the pilot and/or controller are expected to determine what the value should be per the ICAO guidelines and the estimated weight of the aircraft.

Allowable values for the aircraft type should include any type designator in ICAO Doc 8643.

Note that implementers may choose to validate the wake turbulence category based on the aircraft type, since these are published in ICAO Doc 8643.

B.2.4 FIELD 10

Agreement on ATS-prescribed indicators is to be specified in the ICAO Doc 7030 CAR and SAM Supplements.

B.2.5 FIELD 13

The aerodrome in Field 13 must match a location indicator in ICAO Doc 7910, or must match one that is agreed to per the relevant boundary agreement, or agreed to by the implementing facilities. (Note: Some States permit International flights to depart from other than international aerodromes. These aerodromes may not have location indicators in ICAO Doc 7910.)

If ZZZZ or AFIL is used, then additional information should be present in Field 18 per ICAO Doc 4444. This ICD imposes no specific requirements on the content of DEP/.

B.2.6 FIELD 14

Field 14(a) contains a Boundary Point, which is an agreed point on or near the control boundary. The boundary agreement between implementing ATS providers identifies any specific requirements governing the choice of boundary point.

B.2.7 FIELD 15

A CPL, per ICAO Doc 4444 Part IX, Section 4.2.3.2.5 "shall include only information concerning the flight from the point of entry into the next control area or advisory airspace to the destination aerodrome". In practical terms, each automation system generally has restrictions on the starting point of the route.

Each boundary agreement will define where the route of flight shall begin so as to meet the above requirement. After the initial point, Field 15(c) should contain the remainder of the route of flight.

B.2.8 FIELD 18

In an FPL or CPL, all Field 18 content must be delimited by elements constructed as shown in ICAO Doc 4444, each of which is a three to four-letter identifier followed by an oblique stroke.

Field 18 shall not contain the character "-", which is used to delineate fields in the message.

When used in an LRM, only the RMK/ element should be identified; only the text of the rejection message shall be included.

B.3 SUMMARY OF EXPECTED RESPONSES TO MESSAGES

Table B-1 identifies the expected responses to each message. The computer logical responses represent acceptance or rejection based on computer checks for message validity. An application response is a response that is initiated by a person or the application software to provide semantic response to a message. Note that an LRM can be sent in response to a message with no computer response identified if the message ID (e.g. RTU) cannot be determined by the receiving computer.

Table B-1. Summary of Expected Message Responses

Msg	Computer Logical Response		Application Response
	Accept	Reject	
FPL	LAM	LRM	None
CHG	LAM	LRM	None
EST	LAM	LRM	None
CPL	LAM	LRM	None
CNL	LAM	LRM	None
MOD	LAM	LRM	None
MIS	LAM	LRM	None
IRQ	None	None	IRS
IRS	None	None	None
TRQ	None	None	TRS
TRS	None	None	None

Msg	Computer Logical Response		Application Response
	Accept	Reject	
RTI	RLA	LRM	RTA
RTU	None	None	None
RLA	None	None	None
RTA	LAM	LRM	None
LAM	None	None	None
LRM	None	None	None

APPENDIX C – MODEL OF COMMON BOUNDARY AGREEMENT

C.1 INTRODUCTION

This section documents the data communications interface planned between (…XXX and XXX...) automation systems. The initial interface may have limited message capability. Future evolutions may include additional messages.

C.2 MESSAGE IMPLEMENTATION AND USE

C.2.1 MESSAGES IMPLEMENTED

The data communications interface between the (…XXX and XXX...) automation systems will include CPL and LAM. A CPL will be sent when a flight departs, or when it is within a VSP flying time from the boundary, whichever occurs later. Each CPL that is received and successfully checked for syntactic and semantic correctness will be responded to with an LAM.

C.2.2 ERROR HANDLING

An LAM will be sent in response to each CPL unless the receiving automation system detects an error. The automation system that sent the CPL will wait a VSP period of time for an LAM, and if none is received within the time parameter, it will notify the appropriate position that a failure occurred. Automatic retransmission of the message will not be attempted.

C.2.3 CHANGES TO A CPL

All changes to a previously sent CPL will be coordinated manually between the sending and receiving sectors.

C.2.4 FIELD 08, FLIGHT RULES AND TYPE OF FLIGHT

Regardless of the value in Field 08(a), all CPLs sent on this interface will be assumed to be IFR at the boundary between (…XXX and XXX...) airspace. Each center is only to send flight plans for flights that are IFR at the boundary.

C.2.5 FIELD 09, NUMBER AND TYPE OF AIRCRAFT AND WAKE TURBULENCE CATEGORY

When a specific aircraft type is used, the wake turbulence indicator sent to (XXX) must match the value stored for the aircraft type in the (XXX) database. When “ZZZZ” is used as the aircraft type, the wake turbulence category may be H, M, or L as appropriate.

C.2.6 FIELD 13, DEPARTURE AERODROME AND TIME

Field 13(b), normally only present in FPLs, will be allowed as an optional element for CPLs on this interface. (XXX) expects to include this element in messages; the (XXX) does not.

C.2.7 FIELD 14, ESTIMATE DATA

If a flight is on an adapted route segment when it crosses the control boundary, Field 14(a) will reference the last significant point in the sending center's airspace.

If a flight is on a direct route segment when it crosses the control boundary Field 14(a) will reference the last significant point in the sending center's airspace.

If there is no significant point between the departure aerodrome and the boundary, the departure aerodrome will appear in Field 14(a).

All flights are expected to cross the boundary in level flight, at the altitude in Field 14(c). Elements (d) and (e) will not be used, and manual coordination will be required for any flight not in level flight at the boundary.

For flights from ….. to …..:

If a flight is on an adapted route segment when it crosses the control boundary, Field 14(a) will reference the first significant point in the receiving center's airspace.

If a flight is on a non-adapted direct route segment when it crosses the control boundary Field 14(a) will reference the intersection of the route with the control boundary.

C.2.8 FIELD 15, ROUTE

Element type (c6) will not be used on this interface.

Element 15(c) will be constructed the same way whether the flight is from ….or from …..:

If a flight is on an adapted route segment when it crosses the control boundary then Field 15(c) will begin with the same significant point as is in Field 14(a).

If a flight is on a direct route segment when it crosses the control boundary then Field 15(c) will begin with the last significant point in the sending center's airspace, if one exists.

If there is no significant point between the departure aerodrome and the boundary then Field 15(c) will begin with "DCT".

After the initial point, Field 15(c) will contain the remainder of the route of flight.

C.2.9 FIELD 16, DESTINATION AERODROME AND TOTAL ESTIMATED ELAPSED TIME, ALTERNATE AERODROME(S)

Fields 16(b) and (c), normally only present in FPLs, will be allowed as optional elements on this interface.

C.3 PHYSICAL INTERFACE

Messages will be exchanged across this interface between the following facilities:
…Center to …
…Center to ….

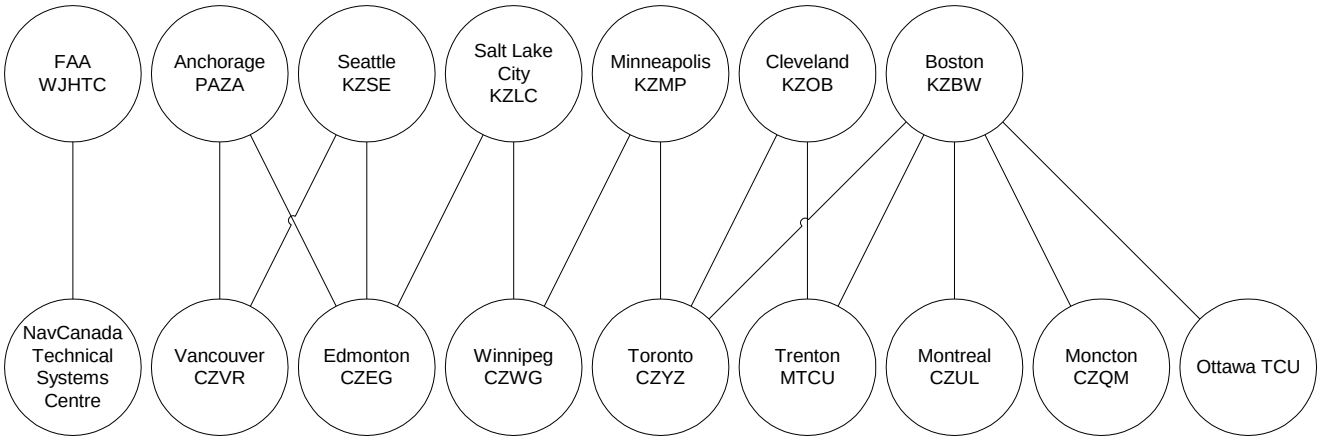

Figure 1. Expected FAA/NAV CANADA Interfaces Governed by this ICD

- END/FIN -