

**Federal Aviation Administration (FAA)
En Route Automation Modernization Program
(ERAM) and HOST Automation/ Instituto De
Aeronautica Civil De Cuba (IACC) Automation**



**North American Interface Control Document
(NAM/ ICD) Integration Test Plan
ICAO 2012 Flight Plan Format Implementation**



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1 Purpose

This Integration Test Plan was prepared by the Federal Aviation Administration's (FAA's) En Route Second Level Support ERAM//ICAO Team Lead, Alfredo Costa. The test plan contains the detailed planning information for integration testing of the new ICAO 2012 flight plan format. The test will include both of FAA's en route automation systems, ERAM and HOST, and the Isaac's automation system, all of which will require processing changes.

Initial testing will be conducted using FAA's and IACC's test automation systems at the William J. Hughes Technical Center (WJHTC) and Havana (HAV) Area Control Center (ACC), respectively. After initial testing has been completed, further testing will then be conducted on operational automation systems at the Miami (ZMA) Air Route Traffic Control Center (ARTCC) and the Havana ACC. Class 1 messages, Current Flight Plan (CPL) and Logical Acknowledgement Message (LAM), will be tested in both directions for both initial and operational testing.

1.1 Introduction

This document is the test plan for integration testing for the new message format associated with the ICAO 2012 flight plan format. The implementation of ICAO's changes is scheduled for November of 2012 and could significantly impact the transfer of flight plan information between ZMA and HAV. This test plan covers the elements necessary to ensure proper testing and implementation of the FAA's ERAM and HOST software and adaptation changes and their interface to Havana's automation system. The reference documents are ICAO's AMENDMENT 1 TO PANS-ATM, DOC 4444, FIFTEENTH EDITION and the current version of the NAM ICD.

1.2 Objective

The main objectives of the test plan are to ensure that the FAA and the IACC have a coordinated plan to test the ICAO 2012 flight plan message changes prior to the ICAO's mandated implementation date of 15 November 2012 and that there is seamless transition, without any service interruption, when both Miami and Havana begin operations with the new format.

1.3 Planning

The intent of this document is to provide guidance and a test plan as the FAA and IACC incorporate all of the ICAO 2012 changes. Planning includes the following:

- Develop Initial DRAFT Test Plan and Implementation schedule
- Determine the amount of live Technical Center testing required between FAA and IACC test automation systems necessary to satisfy verification of all changes
- Determine scope for test on Miami's and Havana's operational automation systems

The implementation of these changes will need to verify the following:

- Checking and Acceptance of ICAO messages Class 1 (CPL and LAM)
- Flight plan data validation to the new ICAO message formats

2 Development

The following section contains an overview of the changes and updates necessary to perform and complete testing of changes to software and adaptation for ERAM and HOST automation systems.

2.1 Software

Testing will be conducted in the following stages:

- A. Delivery of Software Change Request SIG675 ERAM changes for ICAO 2012
- B. IACC to ERAM and HOST handshake for 2012 changes
- C. Low level IACC to ERAM and HOST 2012 format changes
- D. Regression tests.

2.2 Test Phases

- A. FAA Internal ERAM and HOST system tests for ICAO PANS-ATM 4444 changes.
- B. External interface testing with IACC.
- C. Develop Lab Logs and test case scenarios for internal and external testing.
- D. Develop schedule and lab resources.

2.3 Message and Format Tests

Parameter status 2012 Output Turn ON.
Present data = New output data New 2012.

Parameters control transition status:

ERAM status

- 1) IFFI 0 = present
- 2) IFFI 1 = new
- 3) IFFI 2 = Mixed

Interface status

- 1) EITS = present
- 2) EITS = new
- 3) EITS = mixed

DRAFT

Test Cases

Test #	Message types to be tested.	Field	Direction / ERAM & HOST / to Cuba IACC / IACC to ERAM & HOST / BOTH	Test	Expected results.
1	CPL	All fields	BOTH	Regression present prior 2012.	Messages are processed
1A	CPL	All fields	BOTH	Both – new and present 2012 (mixed mode)	Messages are processed
1B	CPL	All fields	BOTH	Transition second order messages from new to present.	Messages are processed according to ERAM FAA parameter status IFFI and EITS
1C	CPL	All fields	BOTH	Received new 2012 send Present	Messages are processed according to ERAM FAA parameter status IFFI and EITS
1D	CPL	All fields	BOTH	Received present UTM messages to controller do not send messages.	Messages are processed according to ERAM FAA parameter status IFFI and EITS
1E	CPL	All fields	BOTH	Transition second order messages from present to new.	Messages are processed according to ERAM FAA parameter status IFFI and EITS
2	CPL	Field 15c	BOTH	Change of flight rules in route.	Route processed.

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				VFR to IFR/ IFR to VFR	
3	CPL	Field 10a	BOTH	Test max up to 64 characters combination. A, B, C, D, E1, E2, E3, F, G, H, I, J1, J2, J3, J4, J5, J6, J7, K, L, M1, M2, M3, O, P1-P9, R, T, U, V, W, X, Y	Field 10a accepted.
4	CPL	Field 10a	BOTH	Field 10a = E, J, M, P, Q	Field 10a rejected.
5	CPL	Field 10a	BOTH	Field 10 a= N	Field 10a accepted
6	CPL	Field 10a	BOTH	24 optional letters = OLD format prior to 2012	Field 10a accepted.
7	CPL	Field 10a	BOTH	Field 10a= Repeated J1, J1	Field 10a rejected.
8	CPL	Field 10a	BOTH	Field 10a= Combination 2 characters and one character	Field 10. accepted.
9	CPL	Field 10a.	BOTH	Field 10a = Minimum one letter	Field 10a. accepted.
10	CPL	Field 10a.	BOTH	Field 10a = Minimum two characters.	Field 10a. accepted.
11	CPL	Field 10a	BOTH	Field 10a = Z letter only with COM/	Field 10a. accepted.
12	CPL	Field 10a	BOTH	Field 10a = Z letter only with DAT/	Field 10a. accepted.
13	CPL	Field 10a	BOTH	Field 10a = Z letter only with NAV/	Field 10a. accepted.
14	CPL	Field 10a	BOTH	Field 10a = Z letter with other equipment with 2 and one	Field 10a. accepted.

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				characters and COM/, DAT/ and NAV/ present	
15	CPL	Field 10a	BOTH	Field 10a = Z letter and no NAV/ present	Field 10a. is processed based on ICAO 2012.
16	CPL	Field 10a	BOTH	Field 10a = Z letter and no COM/, DAT/ and NAV/ present	Field 10a. rejected.
17	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/B1, B2, C1, D1, D2 , O1 or O2 and letter G present in field 10a	Field 10 a. accepted.
18	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/L1, O1, O2, O3, O4, S1, S2, T1, T2	Field 10 a. accepted.
19	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/more than 8 entries.	Field 10 a. rejected.
20	CPL	Field 10a	BOTH	Field 10a = G letter with NAV/GBAS SBAS (GNSS augmentation)	Field 10 a. accepted.
21	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/L1, O1, O2, O3, O4, S1, S2, T1, T2, NAV/RNP and RNAV data.	Field 10 a. accepted.
22	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/L1, O1, O2, O3, O4, S1, S2, T1, G, NAV/RNP and RNAV	Field 10 a. accepted.

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				data and GBAS SBAS (GNSS augmentation)	
23	CPL	Field 10a	BOTH	Field 10a = R letter with PBN/L1, O1, O2, O3, O4, S1, S2, T1, G, NAV/RNP and RNAV data and GBAS SBAS (GNSS augmentation) and Z COM/ and DAT/	Field 10 a. accepted.
24	CPL	Field 10b	BOTH	Field 10b = maximum of 20 characters.	Field 10 b. accepted.
25	CPL	Field 10b	BOTH	Field 10b = E	Field 10 b. accepted.
26	CPL	Field 10b	BOTH	Field 10b = H	Field 10 b. accepted.
27	CPL	Field 10b	BOTH	Field 10b = L	Field 10 b. accepted.
28	CPL	Field 10b	BOTH	Field 10b = B1	Field 10 b. accepted.
29	CPL	Field 10b	BOTH	Field 10b = B2	Field 10 b. accepted.
30	CPL	Field 10b	BOTH	Field 10b = U1	Field 10 b. accepted.
31	CPL	Field 10b	BOTH	Field 10b = U2	Field 10 b. accepted.
32	CPL	Field 10b	BOTH	Field 10b = V1	Field 10 b. accepted.
33	CPL	Field 10b	BOTH	Field 10b = V2	Field 10 b. accepted.
34	CPL	Field 10b	BOTH	Field 10b = D1	Field 10 b. accepted.
35	CPL	Field 10b	BOTH	Field 10b = G1	Field 10 b. accepted.
36	CPL	Field 10b	BOTH	Field 10b = B1 and field 18 with SUR/282B	Field 10 b. accepted.
37	CPL	Field 13a	BOTH	Field 13a = ZZZZ DEP/ field 18.	Field 13 a. accepted.
38	CPL	Field 16a	BOTH	Field 16a = ZZZZ DEST/ field 18.	Field 16 a. accepted.
39	CPL	Field 18a	BOTH	Field 18a = Non valid indicator	Field 18 a. is processed according to 4444 document.
40	CPL	Field 18a	BOTH	Field 18a = sequential	Field 18 a. is

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				testing of field 18 indicators.	processed according to 4444 document.
41	CPL	Field 18a	BOTH	Field 18a = STS/ = ALTRV	Field 18 a. accepted.
42	CPL	Field 18a	BOTH	Field 18a = STS/ = ATFMX	Field 18 a. accepted.
43	CPL	Field 18a	BOTH	Field 18a = STS/ = FFR	Field 18 a. accepted.
44	CPL	Field 18a	BOTH	Field 18a = STS/ = FLTCK	Field 18 a. accepted.
45	CPL	Field 18a	BOTH	Field 18a = STS/ = HAZMAT	Field 18 a. accepted.
46	CPL	Field 18a	BOTH	Field 18a = STS/ = HEAD	Field 18 a. accepted.
47	CPL	Field 18a	BOTH	Field 18a = STS/ = HOSP	Field 18 a. accepted.
48	CPL	Field 18a	BOTH	Field 18a = STS/ = HUM	Field 18 a. accepted.
49	CPL	Field 18a	BOTH	Field 18a = STS/ = MARSA	Field 18 a. accepted.
50	CPL	Field 18a	BOTH	Field 18a = STS/ = MEDEVAC	Field 18 a. accepted.
51	CPL	Field 18a	BOTH	Field 18a = STS/ = NONRVSM	Field 18 a. accepted.
52	CPL	Field 18a	BOTH	Field 18a = STS/ = NONRVSM, Field 10a = no W, field 14c = 290.	Field 18 a. accepted.
53	CPL	Field 18a	BOTH	Field 18a = STS/ = SAR	Field 18 a. accepted.
53A	CPL	Field 18a	BOTH	Field 18a = STS/ = STATE	Field 18 a. accepted.
53B	CPL	Field 18a	BOTH	Field 18a = STS/ = Non standard.	Field 18a. rejected.

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54	CPL	Field 18a	BOTH	Field 18a = PBN/ = 8 entries, i.e. no more than 16 characters, field 10a = "R".	Field 18 a. accepted.
55	CPL	Field 18a	BOTH	Field 18a = PBN/ = 8 entries, RNAV Specifications, field 10a = "R".	Field 18 a. accepted.
56	CPL	Field 18a	BOTH	Field 18a = PBN/ = 8 entries, RNP Specifications, field 10a = "R".	Field 18 a. accepted.
57	Refer to Test Case 13.	Field 18a	BOTH	Field 18a = NAV/GBAS SBAS RNVD1E2A1 RNP10	Field 18 a. accepted.
58	Refer to Test Case 11.	Field 18a	BOTH	Field 18a = COM/GPS	Field 18 a. accepted.
59	Refer to Test Case 12.	Field 18a	BOTH	Field 18a = DAT/HF	Field 18 a. accepted.
60	CPL	Field 18a	BOTH	Field 18a = SUR/260B	Field 18 a. accepted.
61	CPL	Field 18a	BOTH	Field 18a = DOF/YMMDD	Field 18 a. accepted.
62	CPL	Field 18a	BOTH	Field 18a = DLE/MDG0030	Field 18 a. accepted.
63	CPL	Field 18a	BOTH	Field 18a = CODE/F00001	Field 18 a. accepted.
64	CPL	Field 18a	BOTH	Field 18a = ORGN/ MUFHZQZX or MUFHZQZH or MUHAYFYX	Field 18 a. accepted.
65	CPL	Field 18a	BOTH	Field 18a = PER/ A	Field 18 a. accepted.
66	CPL	Field 18a	BOTH	Field 18a = PER/ B	Field 18 a. accepted.

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67	CPL	Field 18a	BOTH	Field 18a = PER/ C	Field 18 a. accepted.
68	CPL	Field 18a	BOTH	Field 18a = PER/ D	Field 18 a. accepted.
69	CPL	Field 18a	BOTH	Field 18a = PER/ E	Field 18 a. accepted.
70	CPL	Field 18a	BOTH	Field 18a = PER/ H	Field 18 a. accepted.
71	CPL	Field 18a	BOTH	Field 18a = TALT/KGGW, TALT/4620N07805W TALT/GGW123456	Field 18 a. accepted.
72	CPL	Field 18a	BOTH	EUROCONTROL field 18 indicators. Field 18a = RVR/ , RFP/ , SRC/ , IFP/ , AWR/ , EUR/ ,	Processed as per NAM/ICD.
73	CPL	Field 18a	BOTH	Field 19 search and rescue. E/ , P/ , R/ , S/ , J/ , D/ , A/ , N/ , C/ ,	Processed as per NAM/ICD

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Table 2-1 Conversion Item 10a EQP from New to Present Format

NEW data in Item 10a & Item 18		Converts to PRESENT data in Item 10a & Item 18			
Item 10a	Item 18	Item 10a	Item 18 COM/	Item 18 DAT/	Item 18 NAV/
N		N			
S		S			
A		Z			NAV/GBAS
B		Z			NAV/LPV
C		C			
D		D			
E1		Z	COM/FMC WPR ACARS E1		
E2		Z	COM/DFIS ACARS E2		
E3		Z	COM/PDC ACARS E3		
F		F			
G		G			
H		H			
I		I			
J1		J	COM/J1	DAT/V	
J2		J	COM/J2	DAT/H	
J3		J	COM/J3	DAT/V	
J4		J	COM/J4	DAT/V	

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NEW data in Item 10a & Item 18		Converts to PRESENT data in Item 10a & Item 18			
Item 10a	Item 18	Item 10a	Item 18 COM/	Item 18 DAT/	Item 18 NAV/
J5		J	COM/J5	DAT/S	
J6		J	COM/J6	DAT/S	
J7		J	COM/J7	DAT/S	
K		K			
L		L			
M1		Z	COM/INMARSAT M1		
M2		Z	COM/MTSAT M2		
M3		Z	COM/IRIDIUM M3		
O		O			
P1 – P9		<i>Do not make part of PRESENT format; no data</i>			
R	PBN/A1	RZ			NAV/RNP10 RNP10A1
R	PBN/B1	RZ			NAV/RNAV5 B1
R	PBN/B2	RZ			NAV/RNAV5 B2
R	PBN/B3	RZ			NAV/RNAV5 B3
R	PBN/B4	RZ			NAV/RNAV5 B4
R	PBN/B5	RZ			NAV/RNAV5 B5
R	PBN/B6	RZ			NAV/RNAV5 B6

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NEW data in Item 10a & Item 18		Converts to PRESENT data in Item 10a & Item 18			
Item 10a	Item 18	Item 10a	Item 18 COM/	Item 18 DAT/	Item 18 NAV/
R	PBN/C1	RZ			NAV/RNAV2 C1
R	PBN/C2	RZ			NAV/RNAV2 C2
R	PBN/C3	RZ			NAV/RNAV2 C3
R	PBN/C4	RZ			NAV/RNAV2 C4
R	PBN/D1	PRZ			NAV/RNAV1 D1
R	PBN/D2	PRZ			NAV/RNAV1 D2
R	PBN/D3	PRZ			NAV/RNAV1 D3
R	PBN/D4	PRZ			NAV/RNAV1 D4
R	PBN/L1	RZ			NAV/RNP4 L1
R	PBN/O1	PRZ			NAV/RNP1 O1
R	PBN/O2	PRZ			NAV/RNP1 O2
R	PBN/O3	PRZ			NAV/RNP1 O3
R	PBN/O4	PRZ			NAV/RNP1 O4
R	PBN/S1	RZ			NAV/RNP APCH S1
R	PBN/S2	RZ			NAV/RNP APCH BARO VNAV S2
R	PBN/T1	RZ			NAV/RNP AR APCH RF T1

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NEW data in Item 10a & Item 18		Converts to PRESENT data in Item 10a & Item 18			
Item 10a	Item 18	Item 10a	Item 18 COM/	Item 18 DAT/	Item 18 NAV/
R	PBN/T2	RZ			NAV/RNP AR APCH T2
T		T			
U		U			
V		V			
W		W			
X		X			
Y		Y			
Z	COM/nnnn	Z	COM/nnnn		
Z	NAV/nnnn	Z			NAV/nnnn
Z	DAT/nnnn	Z	COM/nnnn		

Note: Entries in Table 2-1 containing the notation “nnnn” mean that this may be any string following the indicator.

Table 2-2 Conversion Item 10b SRV from New to Present Format

NEW data in Item 10b & Item 18		Converts to PRESENT data in Item 10b & Item 18	
Item 10b	Item 18	Item 10b	Item 18
N		N	
A		A	
C		C	

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NEW data in Item 10b & Item 18		Converts to PRESENT data in Item 10b & Item 18	
Item 10b	Item 18	Item 10b	Item 18
E		SD	COM/E
H		S	COM/H
I		I	
L		SD	COM/L
P		P	
S		S	
X		X	
B1		D	COM/B1
B2		D	COM/B2
U1		D	COM/U1
U2		D	COM/U2
V1		D	COM/V1
V2		D	COM/V2
D1		D	COM/D1
G1		D	COM/G1

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Table 2-3 Conversion Item 18 OTH from New to Present for Output

NEW data in Item 18	Converts to PRESENT data in Item 18
STS/ <i>text</i>	STS/ <i>copy text over, except</i> <ul style="list-style-type: none"> • Change: ATFMX • To: ATFMEXEMPTAPPROVED
PBN/ <i>text</i>	In RMK/, append: PBN <i>copy text over</i>
SUR/ <i>text</i>	In RMK/, append: SUR <i>copy text over</i>
DOF/ <i>text</i>	In RMK/, append: DOF <i>copy text over</i>
DAT/ <i>text</i>	COM/ <i>copy text over</i>
DLE/ <i>text</i>	In RMK/, append: DLE <i>copy text over</i>
ORGN/ <i>text</i>	In RMK/, append: ORGN <i>copy text over</i>
TALT/ <i>text</i>	In RMK/, append: TALT <i>copy text over</i>
All other indicators	All other indicators are copied over directly

Adaptation

An adaptation update is required in ERAM. Miami adaptation will include new IACC address for ADJFR record. It is expected that the Miami to Havana adaptation for the NAM ICD interface will be used.

Havana 8 letter address = MUFHZQZH

ERAM release = 3.0

IACC release = xxx

3 Personnel

The following personnel will participate in the testing efforts:

1. FAA ERAM/ICAO team support
2. IACC System Engineering support.
3. FAA Technical Center lab support.
4. National Airspace Data Interchange Network (NADIN) support

4 Test Schedule

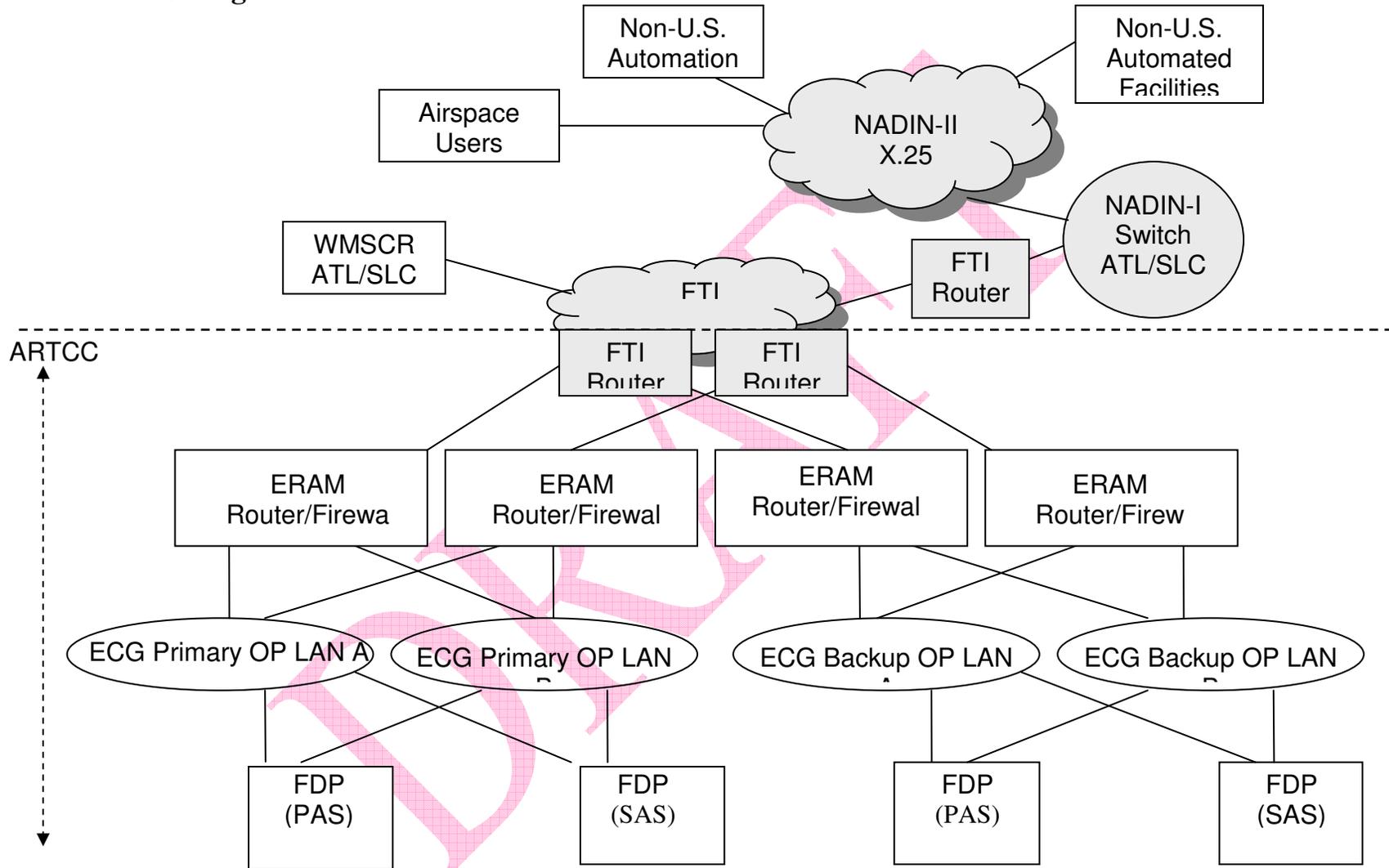
It is expected that testing will be robust based on the potential impact and extensive changes due to the new ICAO 2012 format. Lab resources and NADIN support will be very important to cover the external interface testing with the IACC. Expected start time is in April 2012 for HOST and June 2012 for ERAM. The expected duration is through November 2012.

Phases	Date Proposed	Date Actual	Notes
Phase 1	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 2	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 3	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 4	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 5	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 6	Xx/xx/xx	<u>Xx/xx/xx</u>	
Phase 7	Xx/xx/xx	<u>Xx/xx/xx</u>	

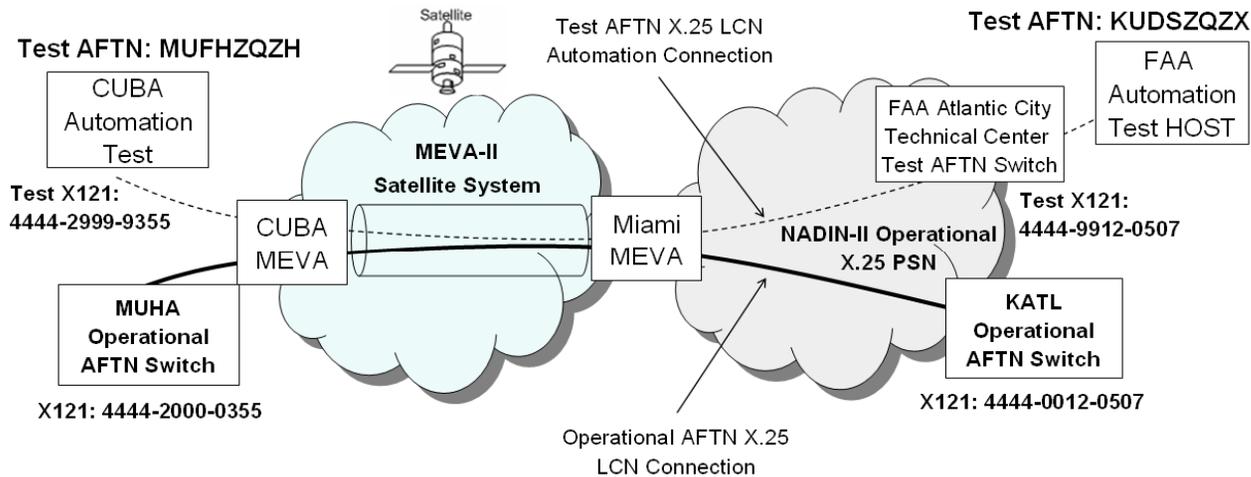
5 Test Configuration

The test configuration for ERAM and the interface to non-U.S. Automation systems (Havana) is depicted below, as well as the telecommunication path to be used for testing between FAA and Havana test and operational systems.

ERAM Test Configuration



Telecommunications Path for Testing



6 Test Summary

This document will serve as the plan to guide this effort through the test phase and will continue to be updated accordingly as new information is made available.

6.1 Test Objectives

Listed below are the objectives for this Test Plan:

- To evaluate how the ERAM and HOST systems will perform in conjunction with the IACC automation system when the flight plan messages are upgraded to the ICAO 2012 format
- To ensure all critical issues found during the initial test phase are fixed prior to live (site)/ operational testing.
- To test the impact of the ICAO 2012 changes on the functionality of both ERAM and HOST automation systems both internally and then externally with the IACC
- To identify and fix all problems prior to site implementation
- To mitigate any identified risks prior to implementation