



INTERNATIONAL CIVIL AVIATION ORGANIZATION
Western and Central African Office
Workshop on the Interconnection of Aeronautical Surveillance Systems
(Dakar, 14 – 16 April 2014)

**Agenda Item 4: Trials and implementation actions on aeronautical surveillance systems
interconnection in other ICAO Regions**

(Presented by the Secretariat)

Summary

This Working Paper presents the brief review of trials and implementation actions on aeronautical surveillance systems interconnection in other ICAO Regions.

Action by the meeting is at Paragraph 3.

Reference

Report on the nineteenth of APIRG 18 & 19 meetings.

Related ICAO Strategic Objectives: A: Safety; B: Air Navigation Capacity and Efficiency

Related ASBU Bloc 0 Modules, Performance Improvement Area:

PIA 2 - Globally Interoperable Systems and Data: BO FICE

PIA 3 - Optimum Capacity and Flexible Flights: BO ASEP; BO ASUR; BO OPFL; BO SNET

PIA4 - Efficient Flight Path: BO TBO

1. INTRODUCTION

The strategy of Implementation of Aeronautical Surveillance systems in the AFI region considers the need of intra-regional and interregional interconnection of aeronautical surveillance systems in order to provide a seamless level of surveillance service to support the implementation of the global ATM concept.

Therefore the awareness on the status of implementation of the interconnection of the current and planned aeronautical surveillance systems in the AFI neighbouring regions (APAC, MID, EUR, SAM) is of high importance to ensure the establishment of an integrated surveillance service. The AFI neighbouring regions have conducted trials to interconnect aeronautical surveillance systems together with ATM automated systems.

2. DISCUSSION

2.1 Example of the EUR Region

2.1.1 In the EUR region the high density of SSR Modes S stations conducted to define the All Purpose **ST**Structured **E**urocontrol **Su**Rveillance **I**nformation **EX**change (**ASTERIX**) an ATM Surveillance Data Binary Messaging Format which allows transmission of harmonised information between any surveillance and automation system.

2.1.2 The ASTERIX system developed to ease the exchange of surveillance information between and within countries defines the structure of the data to be exchanged over a communication medium, from the encoding of every bit of information up to the organisation of the data within a block of data - without any loss of information during the whole process.

2.1.3 As this standard has been being used worldwide one of the basic requirements for the implementation of ASTERIX is the identification code. Transmission of ASTERIX coded

surveillance information can make use of any available communication medium, for instance Wide Area Network (WAN), Local Area Network (LAN), Internet Protocols (IP), etc.

2.1.4 Two categories of ASTERIX codes have been developed:

- a) **SAC (System Area Code)** identifying the State where surveillance system (radar sensor, ADS-B system, multilateration system, track server, etc...) is located;
- b) **SIC (System Identification Code)** identifying uniquely the surveillance system itself. Actually, in the end, each surveillance system is identified with a pair of SAC and SIC (usually called SAC/SIC).

2.1.5 In order to avoid conflicts with SAC codes used by different States and in cooperation with the ICAO Regional Offices, Eurocontrol assigns the SAC codes for the States. The list of SAC codes for the AFI Region is presented at **Appendix A** to this Paper.

2.2 Example of the SAM Region

2.2.1 The SAM Region Office of Lima is coordinating various activities on the interconnection of aeronautical surveillance systems.

The interconnection process in the SAM Region is based on the conclusion of Memoranda of Understanding (**MoUs**) between ATCs and technically relies on the EUR ASTERIX format.

2.2.2 For the Aeronautical surveillance systems interconnection in the SAM Region the following actions were conducted:

- a) Preparation of a questionnaire on requirements for the interconnection of automated systems;
- b) Circulation of the questionnaire to all the States of the Region that have established a MoU for the interconnection of automated systems, for its completion;
- c) Conduct of missions by two experts (ATM and CNS) of the ICAO South American Regional Office accompanied by the industry to the States that have signed MoUs for the interconnection of automated systems in order to identify obstacles to the completion of interconnection tasks.

2.2.3 The regional schedule of interconnection automated systems including aeronautical surveillance systems in the SAM Region is presented at **Appendix B** to this paper.

3. ACTION TO BE TAKEN BY THE MEETING

The meeting is invited to:

- a) Take note of the above information.
- b) Recommend the appropriate actions aiming to ensuring an interregional implementation of an integrated surveillance system and seamless ATM operation within and at the boundaries of the areas of routing identified in the region.

Appendix A

ASTERIX SAC CODE ASSIGNMENT PLAN TO THE AFI REGION

State/Territory	SAC Code Format								Hexadecimal SAC Code
	B7	B6	B5	B4	B3	B2	B1	B0	
Angola	1	0	1	0	0	0	0	0	A0
Benin	1	0	1	0	0	0	0	1	A1
Botswana	1	0	1	0	0	0	1	0	A2
Burkina Faso	1	0	1	0	0	0	1	1	A3
Burundi	1	0	1	0	0	1	0	0	A4
Cameroon	1	0	1	0	0	1	0	1	A5
Cape Verde	1	0	1	0	0	1	1	0	A6
Central African Republic	1	0	1	0	0	1	1	1	A7
Chad	1	0	1	0	1	0	0	0	A8
Comoros	1	0	1	0	1	0	0	1	A9
Congo	1	0	1	0	1	0	1	0	AA
Côte d'Ivoire	1	0	1	0	1	0	1	1	AB
Democratic Republic of the Congo	1	0	1	0	1	1	0	0	AC
Djibouti	1	0	1	0	1	1	0	1	AD
Equatorial Guinea	1	0	1	0	1	1	1	0	AE
Eritrea	1	0	1	0	1	1	1	1	AF
Ethiopia	1	0	1	1	0	0	0	0	B0
Gabon	1	0	1	1	0	0	0	1	B1
Gambia	1	0	1	1	0	0	1	0	B2
Ghana	1	0	1	1	0	0	1	1	B3
Guinea	1	0	1	1	0	1	0	0	B4
Guinea-Bissau	1	0	1	1	0	1	0	1	B5
Kenya	1	0	1	1	0	1	1	0	B6
Lesotho	1	0	1	1	0	1	1	1	B7
Liberia	1	0	1	1	1	0	0	0	B8
Madagascar	1	0	1	1	1	0	0	1	B9
Malawi	1	0	1	1	1	0	1	0	BA
Mali	1	0	1	1	1	0	1	1	BB
Mauritania	1	0	1	1	1	1	0	0	BC
Mauritius	1	0	1	1	1	1	0	1	BD
Mozambique	1	0	1	1	1	1	1	0	BE
Namibia	1	0	1	1	1	1	1	1	BF
Niger	1	1	0	0	0	0	0	0	C0
Nigeria	1	1	0	0	0	0	0	1	C1
Rwanda	1	1	0	0	0	0	1	0	C2
Sao Tome and Principe	1	1	0	0	0	0	1	1	C3
Senegal	1	1	0	0	0	1	0	0	C4
Seychelles	1	1	0	0	0	1	0	1	C5
Sierra Leone	1	1	0	0	0	1	1	0	C6
Somalia	1	1	0	0	0	1	1	1	C7
South Africa	1	1	0	0	1	0	0	0	C8
Swaziland	1	1	0	0	1	0	0	1	C9
Togo	1	1	0	0	1	0	1	0	CA
Uganda	1	1	0	0	1	0	1	1	CB
United Republic of Tanzania	1	1	0	0	1	1	0	0	CC
Zambia	1	1	0	0	1	1	0	1	CD
Zimbabwe	1	1	0	0	1	1	1	0	CE

APPENDIX B

INTERCONNECTION OF AUTOMATED SYSTEMS IN THE SAM REGION

State/ Estado	AIDC and Radar Data Interconnection Requirements/ Requerimientos de Interconexión AIDC y Datos Radar	MoU Date of Implementation/ Fecha Implantación MoU	AIDC and Radar Data Interconnection Date/ Fecha Interconexión AIDC y Datos Radar	Remarks/ Observaciones
Argentina	Bolivia	TBD	TBD	Bolivia has no automated systems/ Bolivia no cuenta con sistemas automatizados
	Brasil	2009	Aug 2014	MoU implemented/ MoU implantado
	Chile	2010	Jul 2014	MoU implemented/ MoU implantado
	Paraguay	May 2014	Dec 2014	
	Uruguay	2009	Jun 2014	MoU implemented/ MoU implantado
Bolivia	Argentina	TBD	TBD	Bolivia has no automated systems/ Bolivia no cuenta con sistemas automatizados
	Brasil	TBD	TBD	
	Chile	TBD	TBD	
	Paraguay	TBD	TBD	
	Peru	TBD	TBD	
Brazil/Brasil	Argentina	2009	Aug 2014	MoU implemented/ MoU implantado
	Bolivia	TBD	TBD	Bolivia has no automated systems/ Bolivia no cuenta con sistemas automatizados
	Colombia	Oct 2014	Jul 2015	
	Guyana	TBD	TBD	Define requirement/ Definir requerimiento
	French Guiana (France)	TBD	TBD	Define requirement/ Definir requerimiento
	Paraguay	Oct 2014	Mar 2015	
	Peru	2012	Sep 2014	MoU implemented/ MoU implantado
	Suriname	TBD	TBD	Definir requerimiento
	Uruguay	2009	Aug 2014	MoU implemented/ MoU implantado
	Venezuela	2011	Dic 2013	MoU implemented/ MoU implantado
Chile	Argentina	2010	Jul 2014	MoU implemented/ MoU implantado
	Peru	Jun 2014	Mar 2015	
Colombia	Brazil	Oct 2014	Jul 2015	
	Ecuador	May 2014	Dic 2014	
	Panamá	May 2014	Dic 2014	
	Peru	Oct 2014	Jul 2015	
	Venezuela	Dec 2014	Dic 2015	
Ecuador	Colombia	May 2014	Dic 2014	

State/ Estado	AIDC and Radar Data Interconnection Requirements/ Requerimientos de Interconexión AIDC y Datos Radar	MoU Date of Implementation/ Fecha Implantación MoU	AIDC and Radar Data Interconnection Date/ Fecha Interconexión AIDC y Datos Radar	Remarks/ Observaciones
	Peru	Oct 2013	Jun 2014	
French Guiana (France)/ Guyana Francesa (Francia)	Brasil	TBD	TBD	Define requirement/ Definir requerimiento
	Surinam	TBD	TBD	Define requirement/ Definir requerimiento
Guyana	Brazil	TBD	TBD	Define requirement/ Definir requerimiento
	Surinam	TBD	TBD	Define requirement/ Definir requerimiento
	Venezuela	TBD	TBD	Define requirement/ Definir requerimiento
Panama	Colombia	May 2014	Dec 2014	
Paraguay	Argentina	May 2014	Dec 2014	
	Bolivia	TBD	TBD	Bolivia has no automated systems/ Bolivia no cuenta con sistemas automatizados
	Brasil	Oct 2014	Mar 2015	
Peru	Bolivia	TBD	TBD	Bolivia has no automated systems/ Bolivia no cuenta con sistemas automatizados
	Colombia	Oct 2014	Jul 2015	
	Chile	Jun 2014	Mar 2015	
	Ecuador	Oct 2013	Jun 2014	
Surinam	Brasil	TBD	TBD	
	French Guiana (France)	TBD	TBD	
	Guyana	TBD	TBD	
Uruguay	Argentina	2009	Jun 2014	
	Brasil	2009	Aug 2014	MoU implemented/ MoU implantado
Venezuela	Brasil	2011	Dec 2013	MoU implemented/ MoU implantado
	Colombia	Dec 2014	Dec 2015	