SAM/IG/2
WP/10
30/10/08

International Civil Aviation Organization
South American Regional Office

SECOND WORKSHOP/MEETING OF THE SAM IMPLEMENTATION GROUP (SAM/IG/2)
REGIONAL PROJECT RLA/06/901

Lima, Peru, 3 to 7 November 2008

Agenda Item 6: Operational implementation of new ATM automated systems and integration of the existing systems

RESULT OF THE WORK CARRIED OUT BY PROJECT RLA/06/901 WITH REGARD TO AUTOMATION

(Presented by the Secretariat)

Summary

This working paper presents the results of the work carried out by Project RLA/06/901 with regard to activities of this project, and proposed some actions to initiate implementation of interconnection of automated systems in the SAM Region.

References:
- Report of the SAM/IG/1 Meeting

ICAO Strategic objective:
D: Efficiency

1 Introduction

1.1 Objective No. 3 of Regional Project RLA/06/901 establishes the tasks to be carried out for the operational implementation of new ATM automated systems and the interconnection of existing automation systems in the Region.

1.2 The activities related with operational implementation of new ATM automated systems and the integration of the existing ones, were initiated with Project RLA/98/003.

1.3 Automation activities carried out by Project RLA/98/003 basically consisted in the preparation of a questionnaire which permitted to know automated systems installed in ATS units and their interphases in the CAR/SAM Regions, the implementation of an interconnection trial between automated systems of the Manaus ACC (Amazonica FIR) in Brazil, and the Maiquetía ACC (Maiquetía FIR) in Venezuela, missions to States for data collection, in order to evaluate the current situation of automated systems in the ACCs of the CAR/SAM States, the preparation of an System Interphase Control Document (SICD) and the preparation of a CAR/SAM Initial Interconnection Plan of Automated Systems.

1.4 The First Workshop/Meeting of the SAM Implementation Group (SAM/IG/1) held in Lima, Peru, from 21 to 25 April 2008, analysed the automation activities carried out by Project RLA/98/003 and formulated an action plan for the interconnection of automated systems, which is presented as **Appendix A** to this working paper.

1.5 In order that States of the Region implement the activities described in the action plan SAM/IG/1 Meeting formulated Conclusion SAM/IG/1-7 *Adoption of the Action Plan for the regional interconnection of automated systems.*

1.6 SAM/IG/1 Meeting also considered that within the automation activities, a model document of requirements of the SAM Automation System, which contains the common basic functionalities and may be used as reference for the acquisition of new systems and modification of the existing systems.

2 Analysis

2.1 The interconnection of automated systems in the SAM Region is foreseen to be executed through the implementation of bilateral agreements between States having adjacent ACCs. The interconnection, as per the action plan (See **Appendix B** of this working paper) would be made in phases, taking into account the current degree of automation in the ACCs of the Region.

2.2 The interconnection of automated systems consists in the implementation of the exchange of information of flight plans and radar data between two States having adjacent ACCs in the Region.

Interconnection of information of flight plans between automated ACCs in the SAM Region

2.3 The action plan for the interconnection of automated systems contemplates for the exchange of flight plans between adjacent automated ACCs in the SAM Region, the implementation in a short term of the following existing applications: OLDI, automated messages of ICAO Doc 4444, and AIDC application.

Implementation of the interconnection of flight plans through OLDI

2.4 As per the information collected by Project RLA/98/003 as regards activities of automation, the ACCs of the Region presenting capacity for the OLDI are: Argentina, Chile, Colombia, Ecuador, Panama and Uruguay.

2.5 Most of the ACCs mentioned in the above paragraph present the basic characteristics of the OLDI, but the same is not used. The difficulty in using it mainly consists in configuration of the automation system as necessary, as well as the apparent differences in the implementation of the protocol by systems providers.

2.6 In order to implement the interconnection of the OLDI application, between States adjacent ACCs, mentioned above, as specified in the action plan, it is necessary that the indicated States express in first place their will to proceed to the implementation of the OLDI between adjacent ACCs of the Region.

2.7 Once it has been established which States wish to implement the interconnection of the OLDI application, it will first be necessary to proceed to a complete evaluation of the existing OLDI systems in each one of the interested States of the Region, determine the minimum configuration of OLDI messages to implement and verify consideration of local and regional communications for the interconnection of OLDI applications, prepare technical specifications that enable implementation of the interconnection of OLDI systems, proceed to a process of price consultation, analyse the approval of the acquisition and if feasible, proceed to the cancelation of necessary fees for each one of the States involved in the current project for its implementation.

2.8 The implementation of the interconnection of the OLDI application for more than 2 States should be more economical than implementing the OLDI interconnection between two States in an independent manner.

Implementation of interconnection of automated flight plans through messages specified in Doc 4444 PANS/ATM

2.9 Some ATC systems make use of the message coordination (CDN, LAM, ACP), as specified in Doc 4444 – PANS/ATM for the coordination of flight plans between adjacent ACCs, being this the specific case of Brazil.

2.10 Venezuela has also the capacity to coordinate through Doc 4444, PANS/ATM messages and even though it has not been used at an operational level, this characteristic has been subject to the demonstration of possibility during the trials of interconnection conducted between Amazonica FIR and Maiquetía FIR, carried out under Project RLA/98/003.

2.11 To this respect, it is necessary that the aeronautical Administrations of Brazil and Venezuela proceed to the operational implementation of interconnection of flight information through messages specified in Doc 4444.

Implementation of interconnection of automated systems through the application of AIDC

2.12 Currently, only Argentina counts with the application of AIDC. The same is installed in the Ezeiza and Cordoba ACCs. The interconnection of this application between the Ezeiza and Cordoba ACC is being tested. It is expected that by mid November 2008, such application is in operation between the ACCs mentioned. The application of AIDC will run over an AMHS message network implemented over an IP network. It is also expected that during the meeting, detailed information be presented on the works carried out on this respect.

Radar data interconnection between SAM Region adjacent automated ACCs

2.13 Based in radar surveillance systems installed in the SAM Region, the action plan contemplates for the radar data interconnection between automated adjacent ACC the following cases: inter-centres surveillance data interconnection using Asterix 62/63 protocol, surveillance data interconnection using Asterix ICD, and surveillance data interconnection using ICD owner.

2.14 To implement radar data interconnection proposed in the action plan it is suggested that this be executed once flight plans interconnection is implemented.

2.15 For the execution of radar data interconnection it is suggested that this is done bilaterally, such as indicated in the action plan. In order to initiate the implementation, it is important, as first step, that the Project elaborates a format of memorandum of understanding that contains technical, administrative and institutional requirements necessary to carry out the radar data interconnection between two States.

SAM Automation System Requirements Document

2.16 Following activities planned during SAM/IG/1 Meeting, the project elaborated a preliminary document on SAM Automation System Requirements for the SAM Region, which contains basic operations that are common to automated Systems of the SAM Region ACCs.

2.17 The elaborated document, which is being presented as **Appendix B** to this working paper, represents a preliminary document which once reviewed by the States of the Region could be used as reference for the purchase of new systems and for the modification of existing automated systems.

3 Conclusions

3.1 It is suggested that for the interconnection of SAM Regional automated systems works be initiated with the initial implementation of flight plans interconnection. To carry out the implementation of the OLDI interconnection, it is suggested to hire an expert to elaborate the necessary technical specifications.

3.2 The expert for the elaboration of technical specifications will analyse the SICD document (Interface Control System) prepared by project RLA/98/003 and will visit, if necessary, each State of the Region interested in the interconnection of the OLDI application in order to determine all technical and operative requirements necessary to complete the technical specifications document.

3.3 Having in consideration the positive results of the trials on automated messages exchange of Doc. 4444 carried out between the ACCs of Manaus and Maiquetia, it is necessary that the Aeronautical Administrations of Brazil and Venezuela proceed to put in operation this application.

3.4 Likewise, once completed the implementation of AIDC application in the ACCs of Ezeiza and Cordoba, as well as the interconnection between these two ACCs, that the Aeronautical Administration of Argentina prepares guidelines including the considerations to be followed when interconnecting the AIDC application between both ACCs.

3.5 It is suggested that the interconnection of radar data between adjacent ACCs of the SAM Region be implemented once the applications of flight plans information exchange is completed.

3.6 It is suggested that the radar data exchange of States involved be done bilaterally and, as first step, the project elaborates a format of memorandum of understanding containing technical, administrative and institutional elements necessary to implement the radar data interconnection.

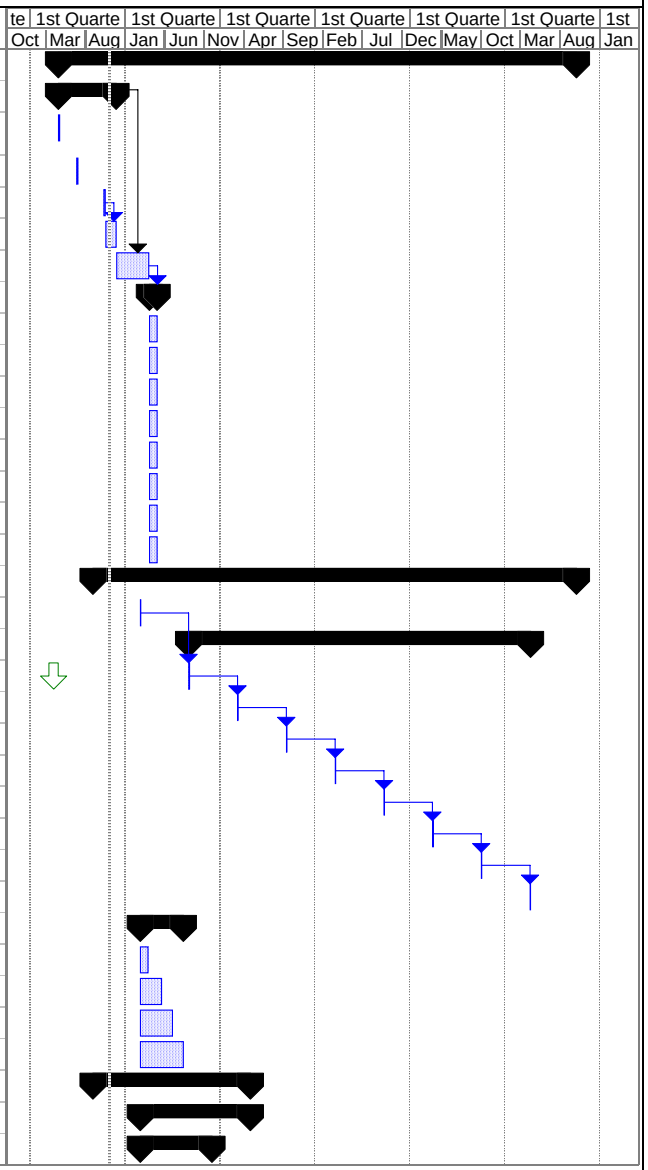
3.7 States should analyze the preliminary document of SAM Automation System Requirements in order to be able to use it in the Region as guiding material to implement new automation Systems in the Region ACCs.

4 Suggested actions

4.1 The Meeting is urged to:

a) take note of the information being presented
b) analyse automated systems interconnection implementation considerations for the flight plans exchange described in section 2 of paragraphs 2.3 to 2.12, and in section 3, from paragraph 3.1 to 3.4
c) analyse radar data interconnection considerations described in section 2 paragraphs 2.13 to 2.15, and in section 3, paragraphs 3.4 and 3.5
d) analyse the preliminary SAM automation system requirements document being presented as Appendix B to this working paper
e) analyse any other aspect related to this issue considered necessary by the Meeting.

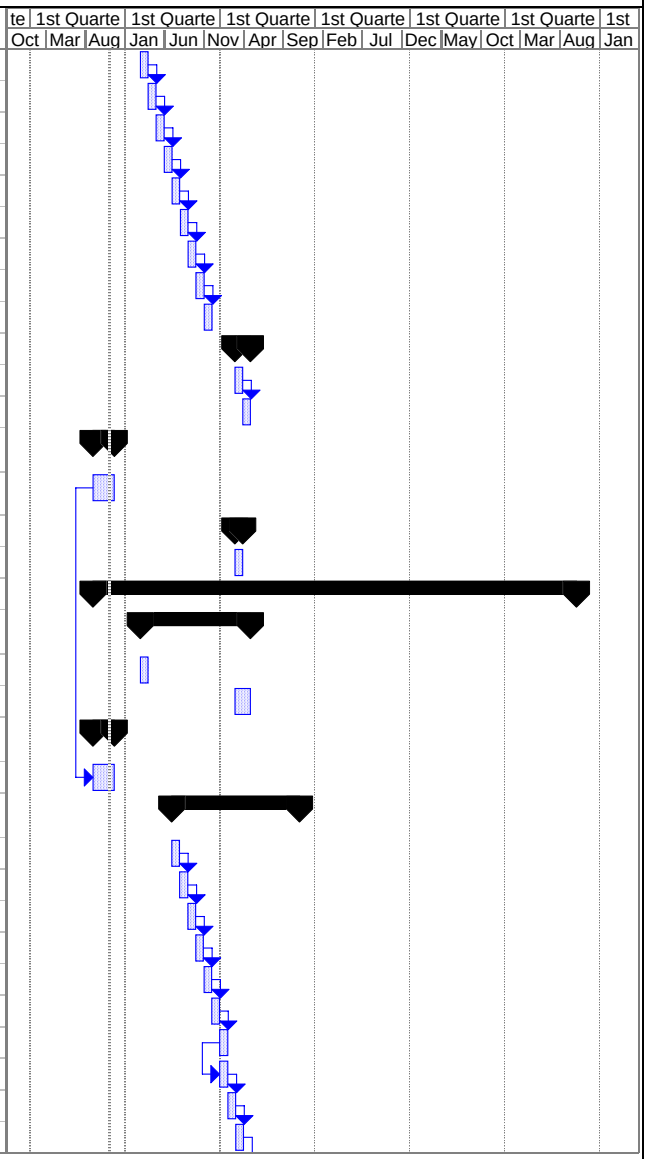
ID	Nome da tarefa	Duration	Start	Finish
1	**CAR/SAM Interconection Plan**	**1425 days**	**Mon 21/04/08**	**Fri 04/10/13**
2	**Plan Approval**	**160 days**	**Mon 21/04/08**	**Fri 28/11/08**
3	Plan Presentation in the 1ª GT CNS/ATM SAM-ATM/CNS/IG 1 Meeting	5 days	Mon 21/04/08	Fri 25/04/08
4	Plan Presentation ATM/CNS/SG/6	5 days	Mon 30/06/08	Fri 04/07/08
5	Plan presentation in the GREPECAS Meeting	5 days	Mon 13/10/08	Fri 17/10/08
6	CAR/SAM interconnection plan Approval	30 days	Mon 20/10/08	Fri 28/11/08
7	Project Managing Board Creation	90 days	Mon 01/12/08	Fri 03/04/09
8	**Project Organization**	**22 days**	**Mon 06/04/09**	**Tue 05/05/09**
9	Managing plan	22 days	Mon 06/04/09	Tue 05/05/09
10	Communication Plan	22 days	Mon 06/04/09	Tue 05/05/09
11	Human resources Plan	22 days	Mon 06/04/09	Tue 05/05/09
12	Cost Plan	22 days	Mon 06/04/09	Tue 05/05/09
13	Risk Assesment Plan	22 days	Mon 06/04/09	Tue 05/05/09
14	Escope Managing Plan	22 days	Mon 06/04/09	Tue 05/05/09
15	Quality plan	22 days	Mon 06/04/09	Tue 05/05/09
16	Procurement and Acquisition plan	22 days	Mon 06/04/09	Tue 05/05/09
17	**Plan execution**	**1330 days**	**Mon 01/09/08**	**Fri 04/10/13**
18	STARTUP MEETING	2 days	Mon 02/03/09	Tue 03/03/09
19	**Coordination Meetings**	**940 days**	**Fri 04/09/09**	**Thu 11/04/13**
20	1 Coordination Meeting	2 days	Fri 04/09/09	Mon 07/09/09
21	2 Coordination Meeting	2 days	Thu 11/03/10	Fri 12/03/10
22	3 Coordination Meeting	2 days	Wed 15/09/10	Thu 16/09/10
23	4 Coordination Meeting	2 days	Tue 22/03/11	Wed 23/03/11
24	5 Coordination Meeting	2 days	Mon 26/09/11	Tue 27/09/11
25	6 Coordination Meeting	2 days	Fri 30/03/12	Mon 02/04/12
26	7 Coordination Meeting	2 days	Thu 04/10/12	Fri 05/10/12
27	8 Coordination Meeting	2 days	Wed 10/04/13	Thu 11/04/13
28	**Institutional/Legal Documents Creation**	**120 days**	**Mon 02/03/09**	**Fri 14/08/09**
29	Responsability definition over Shared Resources	22 days	Mon 02/03/09	Tue 31/03/09
30	Operational Agreements Between States	60 days	Mon 02/03/09	Fri 22/05/09
31	Surveilance Area definition to be shared	90 days	Mon 02/03/09	Fri 03/07/09
32	Security Plan	120 days	Mon 02/03/09	Fri 14/08/09
33	**Flight Plan Interconection Implementation**	**434 days**	**Mon 01/09/08**	**Thu 29/04/10**
34	**Flight Plan interconnection using OLDI**	**304 days**	**Mon 02/03/09**	**Thu 29/04/10**
35	**First Phase**	**198 days**	**Mon 02/03/09**	**Wed 02/12/09**



Projeto: SAM1GNE19ApnC
Data: Thu 30/10/08

Tarefa
Divisão
Andamento
Etapa
Resumo
Resumo do projeto
Tarefas externas
Etapa externa
Prazo final

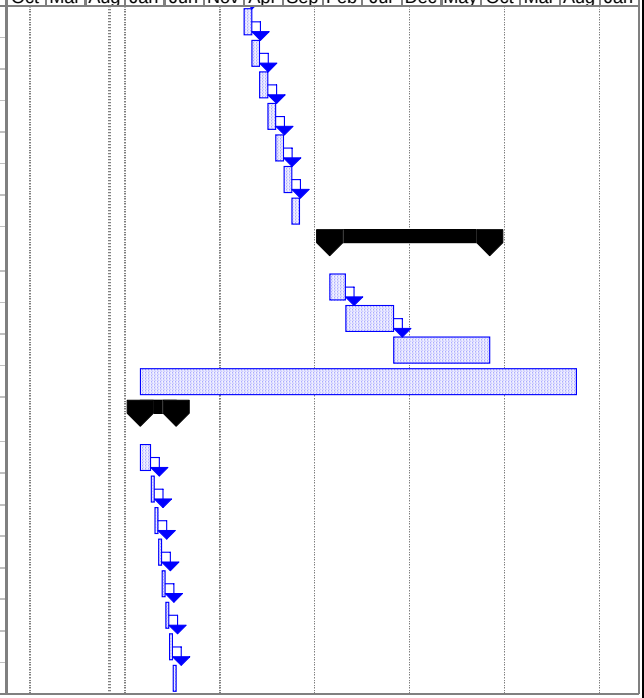
ID	Nome da tarefa	Duration	Start	Finish
36	EZEIZA-MONTEVIDEO	22 days	Mon 02/03/09	Tue 31/03/09
37	EZEIZA-CORDOBA	22 days	Wed 01/04/09	Thu 30/04/09
38	EZEIZA-SANTIAGO	22 days	Fri 01/05/09	Mon 01/06/09
39	BOGOTÁ-GUAYAQUIL	22 days	Tue 02/06/09	Wed 01/07/09
40	BOGOTÁ-PANAMÁ	22 days	Thu 02/07/09	Fri 31/07/09
41	BOGOTÁ-BARRANQUILHA	22 days	Mon 03/08/09	Tue 01/09/09
42	BARRANQUILHA-PANAMÁ	22 days	Wed 02/09/09	Thu 01/10/09
43	SANTIAGO-CORDOBA	22 days	Fri 02/10/09	Mon 02/11/09
44	PANAMÁ-CENAMER	22 days	Tue 03/11/09	Wed 02/12/09
45	**Second Phase (With Brazil)**	**44 days**	**Mon 01/03/10**	**Thu 29/04/10**
46	CURITIBA-URUGUAI	22 days	Mon 01/03/10	Tue 30/03/10
47	AMAZÔNICO-BOGOTÁ	22 days	Wed 31/03/10	Thu 29/04/10
48	**Flight Plan interconnection using Doc 4444 (CDN, LAM,ACP)**	**60 days**	**Mon 01/09/08**	**Fri 21/11/08**
49	MAIQUETIA - AMAZONICO Interconnection Comissioning	60 days	Mon 01/09/08	Fri 21/11/08
50	**Flight Plan interconnection using AIDC**	**22 days**	**Mon 01/03/10**	**Tue 30/03/10**
51	BRASIL-ARGENTINA	22 days	Mon 01/03/10	Tue 30/03/10
52	**Surveillance Data interconnection Implementation**	**1330 days**	**Mon 01/09/08**	**Fri 04/10/13**
53	**Surveillance Data interconnection Implementation using Intercenter ASTERIX 62/63**	**304 days**	**Mon 02/03/09**	**Thu 29/04/10**
54	EZEIZA-MONTEVIDEO	22 days	Mon 02/03/09	Tue 31/03/09
55	BRASIL- MONTEVIDEO	44 days	Mon 01/03/10	Thu 29/04/10
56	**Surveillance Data interconnection Implementation with Proprietary ICD**	**60 days**	**Mon 01/09/08**	**Fri 21/11/08**
57	AMAZONICO-MAIQUETIA	60 days	Mon 01/09/08	Fri 21/11/08
58	**Surveillance Data interconnection Implementation using ASTERIX Radar ICD**	**352 days**	**Wed 01/07/09**	**Thu 04/11/10**
59	EZEIZA-SANTIAGO	22 days	Wed 01/07/09	Thu 30/07/09
60	EZEIZA-CORDOBA	22 days	Fri 31/07/09	Mon 31/08/09
61	EZEIZA- MONTEVIDEO	22 days	Tue 01/09/09	Wed 30/09/09
62	AMAZÔNICO-BOGOTÁ	22 days	Thu 01/10/09	Fri 30/10/09
63	CURITIBA-MONTEVIDEO	22 days	Mon 02/11/09	Tue 01/12/09
64	SANTIAGO-CORDOBA	22 days	Wed 02/12/09	Thu 31/12/09
65	BOGOTÁ-GUAYAQUIL	22 days	Fri 01/01/10	Mon 01/02/10
66	BOGOTÁ-PANAMÁ	22 days	Fri 01/01/10	Mon 01/02/10
67	BOGOTÁ-BARRANQUILHA	22 days	Tue 02/02/10	Wed 03/03/10
68	BOGOTÁ-MAIQUETIA	22 days	Thu 04/03/10	Fri 02/04/10



Projeto: SAM1GNE19ApnC
Data: Thu 30/10/08

Tarefa
Divisão
Andamento
Etapa
Resumo
Resumo do projeto
Tarefas externas
Etapa externa
Prazo final

ID	Nome da tarefa	Duration	Start	Finish
69	BOGOTÁ-LIMA	22 days	Mon 05/04/10	Tue 04/05/10
70	PANAMÁ-CENAMER	22 days	Wed 05/05/10	Thu 03/06/10
71	CORDOBA-EZEIZA	22 days	Fri 04/06/10	Mon 05/07/10
72	MAIQUETIA-BARRANQUILHA	22 days	Tue 06/07/10	Wed 04/08/10
73	BARRANQUILHA-PANAMÁ	22 days	Thu 05/08/10	Fri 03/09/10
74	BARRANQUILLA-MAIQUETIA	22 days	Mon 06/09/10	Tue 05/10/10
75	MAIQUETIA-PIARCO	22 days	Wed 06/10/10	Thu 04/11/10
76	**Surveillance Data interconnection Implementation using RADNET for the CAR/SAM Region**	**440 days**	**Tue 01/03/11**	**Mon 05/11/12**
77	Specification	44 days	Tue 01/03/11	Fri 29/04/11
78	Acquisition	132 days	Mon 02/05/11	Tue 01/11/11
79	Installation	264 days	Wed 02/11/11	Mon 05/11/12
80	Telecommunication infrastructure Coordination	1200 days	Mon 02/03/09	Fri 04/10/13
81	**Surveillance Data interconnection Implementation using SISTRASAG**	**100 days**	**Mon 02/03/09**	**Fri 17/07/09**
82	BRASIL	30 days	Mon 02/03/09	Fri 10/04/09
83	LIMA	10 days	Mon 13/04/09	Fri 24/04/09
84	LA PAZ	10 days	Mon 27/04/09	Fri 08/05/09
85	ASSUNCION	10 days	Mon 11/05/09	Fri 22/05/09
86	GEORGETOWN	10 days	Mon 25/05/09	Fri 05/06/09
87	PARAMARIBO	10 days	Mon 08/06/09	Fri 19/06/09
88	ROCHAMBEAU	10 days	Mon 22/06/09	Fri 03/07/09
89	RESISTENCIA	10 days	Mon 06/07/09	Fri 17/07/09



Projeto: SAM1GNE19ApnC
Data: Thu 30/10/08

Tarefa | Etapa | Tarefas externas
Divisão | Resumo | Etapa externa
Andamento | Resumo do projeto | Prazo final

APENDICE B / APPENDIX B

Preliminary

Reference System/Subsystem Specification

for the

Air Traffic Control Automation System

Prepared by:
SAM Automation Team

SSS SIGNOFF SHEET

Responsible Person	**Signature**	**Date**
Onofrio Smarrelli OACI Program Manager	_____	_____
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Change Record

Rev	Description of Change	Page No's Affected	Date
-	Initial Release	All	22 Sept 2008
A	Preliminary Release	All	04 Oct 2008

Summary

TABLE LIST

FIGURE LIST

1. SCOPE

1.1 Identification

This document is based on the requirements identified in the OACI Project RLA/06/901 for Air Traffic Control Automation Systems. This System Specification is based on the pre-existing systems used in the SAM Region and it incorporates requirements from the ATM Group as required. SAM Automation Team will update this document to reflect the required refinement.

The main objective of this specification is to consolidate all the requirements, mainly the mandatory ones to be used as a reference for future implantations of new ATCAS Systems and upgrades as well.

These requirements originated in a survey in the States, where each country presented an abstract of all the functionalities available in their automation systems.

This effort is in line with the need of harmonization to provide interchange of flight plan and surveillance data, and establish a minimum common level ground among the several ACC installed in the SAM region and the new systems as well.

1.2 System Overview

1.2.1 Introduction

This specification includes detailed requirements for ATC Automation Systems.

The system's mission is to enhance the safety of air travel by providing controllers with information on flights from surveillance sensors and adjacent centers. The information is presented on different functional displays, including situation displays, flight data displays, supervisor positions and aeronautical information displays.

The system must follow the International Civil Aviation Organization (ICAO) standards to provide routine ATC services for aircraft operating in SAM airspace.

ATM is described in the ICAO Global ATM operational Concept (Doc 9854) as the dynamic, integrated management of air traffic and airspace in a safe, economical and efficient manner through the provision of facilities and seamless services in collaboration with all parties. The operational concept also describes a system that provides ATM through the collaborative integration of humans, information, technology, facilities and services, supported by air, ground and/or space-based communications, navigation and surveillance.

This operational concept identifies seven interdependent components of the future ATM system. They comprise:

a) Airspace organization and management;

b) Aerodrome operations;

c) Demand and capacity balancing;

d) Traffic synchronization;

e) Conflict management;

f) Airspace user operations;

g) ATM Service Delivery Management.

1.2.2 Context Diagram

The following Figure 1.1 illustrates the relationship of the ATCAS with its externals entities:

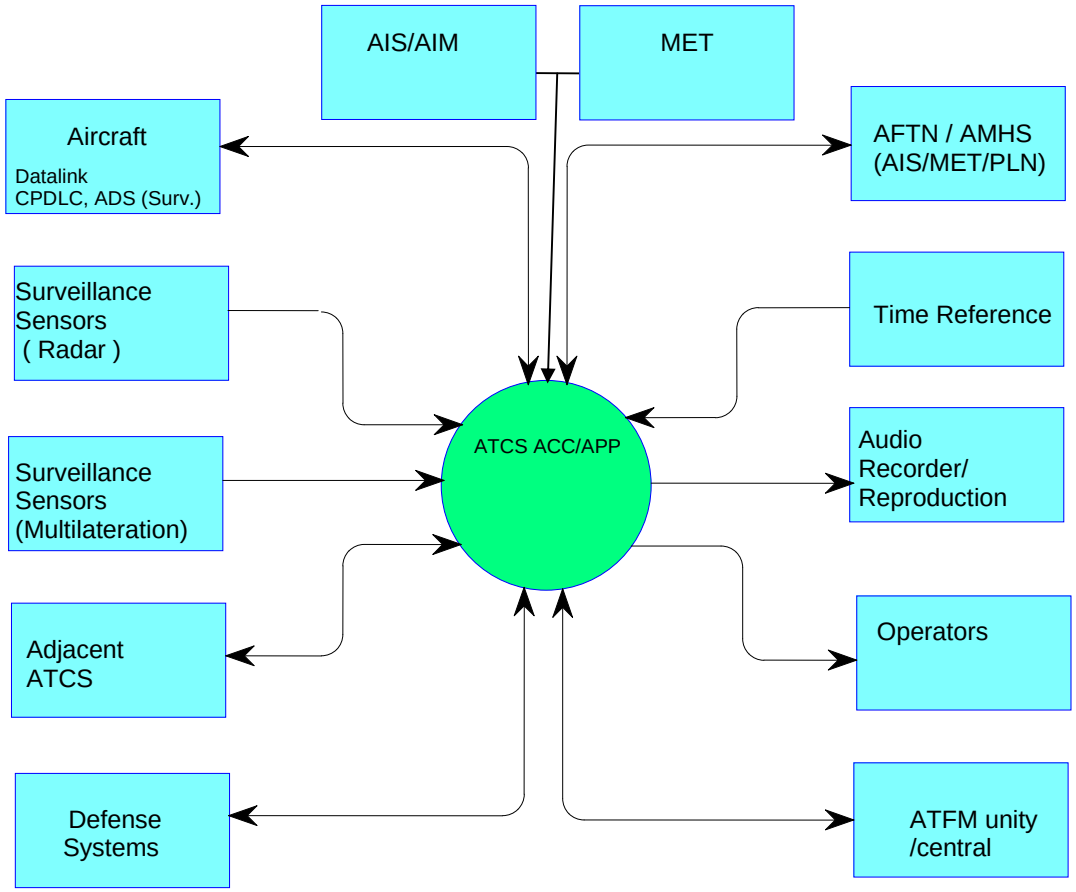

FIGURE 1.1 – CONTEXT DIAGRAM FOR ATCAS

1.2.3 Component and External Interfaces

The main components and External interfaces of the ATCAS are:

1.2.3.1 Components

Operational System

The Operational System takes the information from surveillances systems such as Radar and ADS, and integrates them with other information. Then, all the information is put together to form a representation of the airspace traffic environment.

Simulation and Training

This system is capable to provide a realistic simulation of the Air Traffic environment in order to serve as a training platform for the operational and maintenance personnel. It uses Pilot Workstations to provide the training personnel with skills necessary to operate the ATCAS.

1.2.3.2 External Interfaces

The external interfaces to the ATCAS are:

a) Surveillance Sensors:

- PSR/MSSR surveillance;
- MSSR surveillance;
- ADS-B and ADS-C datalink;
- Multilateration;

The system receives surveillance data, processes the information and presents a synthetic image of the Air Situation to the controller.

b) Aircraft:

The controller uses a communication with the pilot through a specific protocol called CPDLC (Controller Pilot Data Link Communications).

The system receives track and flight plan information and sends commands to the pilot.

c) Adjacent ATCAS

The adjacent Centers represent the Area control centers and Approach control. This interface sends and receives mainly flight plan coordination messages, using the standard ICAO 4444 messages or OLDI and AIDC protocols.

The system will share surveillance data with adjacent centers.

d) Time Reference System

Time Reference System receives the UTC Time from the GPS and sends this information to synchronize the ATCAS Workstations time.

e) Audio Recorder

This interface is used to synchronize the recording and the playback system activities with the audio recording and playback.

f) Operators

They are represented by the main controllers, assistant, Flight data Operators and Technical/ Operational supervisors.

g) AFTN Interface

It represents the interface with the AFTN to receive and transmit ATS messages, when the AMHS system is not available.

h) AMHS Interface

It represents the new interface for sending and receiving ATS messages. This system has a gateway to the AFTN.

i) ATFM Unity

This link is used to transmit the flight plan and traffic information and coordinate measures to diminish problems associated with the flow management.

j) Defense Systems

This interface is used to exchange surveillance information and coordination information with defense systems.

k) AIS and MET

This interface is designed for Web interfaces (HTTP) to access AIS and MET database using a Web Browser with a LAN connection.

1.2.3.3 System Features

The system includes the following features: Dual Surveillance Data Processing Servers- SDPS; Dual Flight Data Processing Servers- FDPS; Dual Data Recording Servers – DRS; Dual System Monitoring and Control – SMC; Multiple ASTERIX-format surveillance interfaces; Multiple Surveillance input formats; Surveillance Displays with 2048 x 2048 high resolution color monitors; Flight Data Displays; Supervisor Displays with printers; Flight Progress Strip Printers; Dual LAN; Database Management System for site adaptation and map generation; Interface for Time Synchronization with Audio Recorders; Electronic Flight Strip Displays; Direct Surveillance Access; Kalman-filter based Surveillance Tracker; Dual-redundant surveillance input lines; Physical Integration with Voice Control System; Interface with adjacent ACCs; Simulation/Training and Test System; Aeronautical Information System; Datalink interface; Air Defense interface to exchange surveillance data and other coordination information.

1.3 Document Overview

This document is identified as the System Subsystem Specification (SSS) for the ATC Automation Systems in the SAM region.

The document is organized as follows:

Chapter 1 Scope: This chapter contains the identification and a overview of the system

Chapter 2 Referenced Documents: contains the list of documents referenced in this document.

Chapter 3 Requirements: contains the list of characteristics and functionalities available in the system.

Chapter 4 Qualification Methods: defines the way that each requirement is tested.

Chapter 5 Requirements Traceability: contains the list of requirements with specific identifiers that will follow till the formal acceptance Test and documentation.

Chapter 6 Notes: Contains the glossary and abbreviations used in this document.

The following diagram shows the hierarchical structure of the documents and identifies the relative position of this document.

1.3.1 Document Conventions

These operational requirements and specifications use the words "shall", "will", "should", and "option (ally") with definite meanings. These are defined below:

1. "Shall" indicates that the requirement or specification it refers to is mandatory.

2. "Will", "should", or "option (ally)" indicates intent to realize the functionality within the system (unless it concerns functionality within the scope of external systems) but such statements are not testable.

Note that "will" is also used to introduce requirements that are more precisely stated elsewhere in the document.

2. REFERENCED DOCUMENTS

INTERNATIONAL ATC DOCUMENTS AND OTHER STANDARDS:

AIDC	*International Civil Aviation Organization – Asia and Pacific Office - Asia/Pacific Regional Interface Control Document (ICD) for ATS Interfacility Data Communications (AIDC) – Version 3.0 – September 2007*
OLDI	*Eurocontrol standard document for On-Line Data Interchange (OLDI) - edition: 3.00, edition date: 31/10/2003.*
ICAO Doc 4444 ATM/501	*Air Traffic Management - Procedures for Air Navigation Services* *15ª edition – 2007 and Amendment 1 (Jan 2008)*
ICAO ANNEX 10	*Volume I - Aeronautical Telecommunications;, Communication Procedures Volume III, Communication Systems*
ICAO ANNEX 15	*Aeronautical Information Services*
ASTERIX	*Eurocontrol Standard for Surveillance Data Exchange Issue 0.1, September 1991*
ICAO Doc 9705 AN956	*Manual of Technical Provisions for the Aeronautical Telecommunication Network – ATN.*
ICAO Doc 9578	*Manual of the Aeronautical Telecommunication Network (ATN)*
ICAO Doc 9694 AN/955	*Manual of Air Traffic Services Data Link Applications*
ICAO Doc 9854	*Global Ait Traffic Operational Concept - ATM*
ICAO Doc 9880 AN/466	*MANUAL ON DETAILED TECHNICAL SPECIFICATIONS FOR - Aeronautical Telecommunication Network – ATN - 5 April 2007*
ICAO Doc 9896	*Aeronautical Telecommunication Network - ATN IPS*
ICD for AIDC	*Asia/Pacific Regional Interface Control Document version 2*

ICAO Doc 9613	*Performance Based Navigation Manual – PBN* *Volume I - concept and implementation guidance*
SGN2-8 IP 10	*Aeronautical Communication Panel ATN – CPDLC, ADS, FIS – June 2006*
(MLAT)	*Multilateration Concept of use Edition 1.0 – September 2007*
(Doc 9688)	*Manual on Mode S Specific Services - 2nd edition, 2004*
ICAO Doc 9377 AN/915	*Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical* *Meteorological Services. 3rd edition, 2007. 142 pp.*
ICAO Doc 9873	*Manual on the Quality Management System for the Provision of Meteorological Service to International Air* *Navigation. 1st edition, 2007. 62 pp*
ARINC 622	*ATS Datalink Applications over ACARS Air-Ground Network (end-to-end).*
RTCA DO-258/EUROCAE ED-100	*Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications.*
ARINC 620	*Datalink Ground System Standard and Interface Specification (ground-to-ground)*
ICAO Guidance Material	*GUIDANCE MATERIAL OR THE ASIA/PACIFIC REGION FOR ADS/CPDLC/AIDC GROUND SYSTEMS PROCUREMENT AND IMPLEMENTATION Version 1 - September 2007*
	Preliminary System Interface Control Document for the Interconnection of ACC Centers of the CARSAM Region
	CAR/SAM Automated ACC Interconnection Plan

3. REQUIREMENTS

These requirements represent a database of functionalities that can be shaped accordingly in the system. The States are responsible for the decision of implementation involved in the installation or in the modernization process.

3.1 Required States and Modes

SSS 1 - The system shall have the capability to operate in Operational partition or in Simulator Partition.

SSS 2 - The surveillance and Flight display consoles shall have the capability to operate in Operational Mode, Direct Radar Access Mode, Simulator Mode, and Playback Mode.

SSS 3 - The servers shall have the capability to operate in Mode Active, Hot Stand-by and Maintenance Mode.

3.2 System Capability Requirements

3.2.1 Man-Machine Interface

The surveillance positions will be able to provide surveillance tracks without interruption.

Data will be displayed in a clear way avoiding confusion and/or misunderstanding, and taking into consideration its contents, meaning, or the importance of the data displayed.

3.2.1.1 Graphic Interface

3.2.1.1.1 Predicted Position Indicator

SSS 4 - The Main Controller Display shall be able to designate a track vector and to define the predicted ahead in time (minutes) what those vectors represent.

SSS 5 - The system shall have a command to designate a track for display and define a specific time ahead.

SSS 6 - The graphic representation of a velocity will be displayed as an extended velocity vector and the length of the vector shall be a function of the controller selected time for predicted positions.

3.2.1.1.2 Functional Controls

SSS 7 - The system shall have the capability to cancel or delete any input action that has been initiated, before the completion or confirmation of execution of the command.

SSS 8 - The system shall have functional controls using dedicated function keys and a trackball.

3.2.1.1.3 Radar Coverage Diagrams and Color Assignment

SSS 9 - The supervisor position shall have the capability to select colors to be applied to various display elements, in a manner not to degrade or affect the processing of operational functions.

SSS 10 - Selection of color brightness and intensity shall be available as an operational function in the individual workstation.

SSS 11 - The main controller position shall have capability to display coverage diagrams for each surveillance sensor and resultant coverage diagram for all ground based surveillance sensors presented in a specific color.

SSS 12 - These coverage diagrams shall be customized to emulate the theoretical coverage for the heights 5,000 feet, 10,000 feet, and 20,000 feet for each azimuth. Areas with no surveillance coverage shall have a special color.

3.2.1.1.4 Screen Annotation

SSS 13 - The surveillance workstations shall have the capability for entering up to TBD annotations for display. Each annotation will have a specific text and color.

SSS 14 - The surveillance workstation shall have the capability to route the screen annotation to other surveillance workstations and to suppress displayed annotations as well.

3.2.1.1.5 Windows Presentation

SSS 15 - The surveillance workstation shall organize all the information presented in windows to present surveillance data, flight plan data, alerts, status, commands, where each window shall be selected, resized or moved by the controller.

SSS 16 - The system shall have the capability to notify any critical information shown in a minimized or inactive window.

3.2.1.1.5.1 Main Surveillance Window

SSS 17 - The main surveillance window shall present the surveillance data with the capability to zoom and pan.

3.2.1.1.5.2 Secondary Surveillance Window

SSS 18 - The secondary surveillance windows shall provide the same capability than the main surveillance window with independent resize, zoom and pan.

3.2.1.1.5.3 System Status Window

SSS 19 - The System Status Window shall display the following information:

- Time and Date;
- Selected display range;
- Altitude filter bounds;
- SSR block code selections;
- CJS Designation;
- Presentation mode;
- Magnetic Variation;
- Label line selections.

3.2.1.1.5.4 General Information Window

SSS 20 - The system shall provide the capability to display the following information on the Flight Data Display:

- Flight Plan
- MET data
- Aeronautical/Meteorological Information: Notice to Airmen (NOTAM) and Meteorological Report (METAR), and other meteorological messages (SIGMET, AIRMET, GAMET, SPECI and TAF);
- General Purpose Information;
- QNH values for aerodromes and regions.

3.2.1.1.5.5 Messages Windows

SSS 21 - The system shall have the capability to display pending coordination messages between centers, sectors or tracks (via Datalink).

SSS 22 - The system shall have the capability to register all the coordination actions even when the interface between the systems is not working.

SSS 23 - The system shall have the capability to display an alert when a response to a coordination message is not received.

SSS 24 - The system shall have the capability to display the coordination messages received till the operator send the answer correctly.

SSS 25 - The system shall have the capability to display the history of coordination messages.

3.2.1.1.6 Images

SSS 26 - The main surveillance window shall have the capability to display georeferenced images representing meteorological information as an overlay under operator control.

3.2.1.1.7 Surveillance Data Display Elements

SSS 27 - ADS-B, ADS-C, PSR, SSR, and PSR/SSR plot presentation shall be available as a selectable function.

SSS 28 - Surveillance workstations shall have the capability of manually enable or disable the presentation of plot data besides the presentation of tracked targets.

SSS 29 - The Track information shall indicate:

- Aircraft position;
- Track history information.

SSS 30 - The system shall have the capability to process and display:

- SSR code or callsign when correlated with a flight plan;
- Flight level/altitude based on Mode C or barometric corrected altitude (below the transition level) surveillance information;
- Heading and ground speed (as a speed vector);
- Attitude indicator, i.e., climb, descent, or level flight.

The system will have the capability to calculate and display the predicted position of any track as designated by a controller input action.

SSS 31 - The surveillance position shall have the capability to process and display alphanumerically the ground speed and heading (track) of any track designated.

SSS 32 - The following elements shall be available for display:

- Map information;
- Range rings;
- Time;
- Selected Surveillance Display range;
- Selected height filter;
- Controller jurisdiction indicator;
- Handoff indication;
- Range/bearing line (cursor);
- Indication when the Air Situation Display is not being updated;
- Selected track presentation mode/surveillance sensor;
- Special codes;
- STCA (Short Term Conflict Alert);

- MSAW (Minimum Safe Altitude Warning);
- MTCD (Medium Term Conflict Detection);
- CLAM (Cleared Level Adherence Monitoring);
- AIW (Area Infringing Warning);
- RAM (Route Adherence Monitoring);
- Track information, including:
    - Position symbols;
    - Track history information.
- Label information.

SSS 33 - Critical information related to the display of special codes, STCA, MSAW, MTCD, CLAM, AIW Data or information considered to be critical for the operation shall always be displayed in a clear and unambiguous manner.

3.2.1.1.8 Surveillance Data Position Symbols

SSS 34 - Different symbols shall be used for indicating a PSR plot, SSR plot, PSR track, SSR track, PSR/SSR track, ADS-B Track, ADS-C Track, Multilateration Surveillance track, Flight Plan navigated track.

3.2.1.1.9 Track History Information

SSS 35 - The surveillance workstation shall have the capability to enable or disable track history information in each position.

SSS 36 - The surveillance workstation shall have a capability to select the number of track history positions, using a specific symbol.

3.2.1.1.10 Display Range

SSS 37 - The Surveillance Display shall have the capability to select a specific range for each surveillance workstation.

3.2.1.1.11 Range Rings

SSS 38 - The system shall have the capability to display Range rings individually selectable at each surveillance workstation as circles centered on the selected ground based surveillance sensor in monoradar mode and multiradar mode.

3.2.1.1.12 Quick Look

SSS 39 - The system shall have a capability to display all tracks and labels through an individual quick look function.

SSS 40 - The quick look function shall enable display of label track data bypassing all local filters.

3.2.1.2 Range Bearing Line

SSS 41 - Each Surveillance Display shall have the capability to display a minimum of 3 range/bearing lines, displayed at the end of the line, as the following types:

- Between any two operator selectable points;
- Between any two moving targets, including a time field,
- Between a operator selectable point and a moving target, including a time field;

3.2.1.3 Smart Labels

The smart label will be the main way to interact with the system.

SSS 42 - The system shall have a capability to display three types of label:

- Standard Label – with the minimal track/flight plan information.
- Extended Label – activated when the cursor pass over the label.
- Selected Label- similar to the extended label but with interaction in the fields.

3.2.1.3.1 Controller Jurisdiction Indicator (CJI)

SSS 43 - The system shall have a capability to display an indication an indication of which sector has jurisdiction over the track in question.

SSS 44 - The system shall allocate a separate jurisdiction indicator as defined in adaptation data.

SSS 45 - This CJI shall be shown in conjunction with the handoff function.

SSS 46 - The system shall display involved in a handoff through a distinct presentation.

3.2.1.3.2 Special Position Indicator (SPI)

SSS 47 - The system shall display activation of SPI using a unique indication.

SSS 48 - The system shall have the capability to re-position any label relative to the position symbol, manually or using an automatic algorithm.

SSS 49 - The following data shall be displayed in a label, if available:

- SSR code or call sign when correlated with a flight plan or entered manually from a surveillance workstation;

- Mode C flight level/altitude;
- Attitude indicator, i.e., climb, descent, or level flight;
- Controller jurisdiction indicator;
- Calculated ground speed, expressed in tens of knots;
- Cleared flight level;
- Quality Factor;
- ADS Data:
- Coordination Data;
- Free text, entered manually.

SSS 50 - The calculated vertical speed shall be displayed after an appropriate controller input action.

3.2.1.4 Filters

SSS 51 - The system shall have a capability to select an upper and lower limit for the level filter, at each surveillance workstation.

SSS 52 - The following conditions shall override the filters:

- Tracks which are under the jurisdiction of this workstation;
- Special condition tracks;
- Tracks that are quick-looked at the display;
- Active handoff tracks;
- Targets that do not currently have valid Mode C data;
- Tracks which are individually selected for display by the controller;
- Unsuppressed tracks in MSAW, STCA, MTCD, CLAM, RAM, AIW alerts.

SSS 53 - The surveillance shall have a capability to display the height filter limits selected.

SSS 54 - The system shall have the capability enable/disable adapted areas within which detected tracks will not be displayed.

SSS 55 - The system shall have a capability to designate specific codes or code groups to filter the track label presentation.

3.2.1.5 Maps

SSS 56 - The system shall have a capability to select and present map data in each surveillance workstation.

SSS 57 - The map presented shall have specific graphic representation for the following entities:

- FIR/UIR borders;
- Lateral limits of sectors;
- Terminal control areas;
- Control zones;
- Traffic information zones;
- Airways and ATS routes;
- Restricted areas.

3.2.1.5.1 Weather Surveillance Data

SSS 58 - The system shall have the capability to display weather surveillance data from PSR radars or Meteorological radars.

SSS 59 - The system shall have a capability to select the display of high intensity, both high and low intensity, or no weather, if this information is available.

3.2.1.5.2 Private Maps

SSS 60 - The surveillance workstation shall provide the capability to define and to display private maps created on-line with different attributes of lines.

SSS 61 - Presentation of each private map shall be individually selectable.

3.2.1.6 Flight Plan

3.2.1.6.1 Flight Strip Window

SSS 62 - The system shall provide the capability to display up to TBD pages of flight strip information in this window on the ESD.

3.2.1.6.2 Flight Data Displays

SSS 63 - The system shall provide functional controls to enter, modify, cancel and display flight plan data.

SSS 64 - The system shall have the capability to insert a change in a flight plan route through graphical point selection.

SSS 65 - The flight plan functions shall include:

- flight plan data entry;
- flight plan update data update;
- Display of flight plan data;

- Edition of stored/displayed information;
- Printing of Flight Progress Strips:
- Edition of departure clearance for inactive and pre-active flight plans;
- Manual edition of ATS messages;

SSS 66 - The system shall have the capability to edit a flight plan using a graphic tool over a specific thematic map.

SSS 67 - The system shall have a capability to display a flight plan history, with all the actions and message updates received or transmitted related to that flight plan.

3.2.1.6.3 Flight List Presentation

SSS 68 - The system shall have the capability to display traffic lists, based on the flight plan status, including coast and hold information.

3.2.1.6.4 Flight Strip Presentation

SSS 69 - The system shall have the capability to display Electronic Flight Strip and to print Paper Flight Progress Strip.

3.2.1.6.4.1 Paper flight progress strip

SSS 70 - The system shall have the capability to define a flight Strip format and layout in adaptation data.

SSS 71 - The system shall distribute flight strips in accordance with the route system and the Strips distribution plan as defined in adaptation, and the capability to print flight strips at any time.

3.2.1.6.4.2 Electronic Flight Strips

3.2.1.6.5 General

SSS 72 - The system shall have the capability to display electronic flight strips.

SSS 73 - The system shall have the capability to allow the operator to select pre-defined flight level using smart labels.

SSS 74 - The system shall display electronic flight strips associated with the flight under control or prior to control of the associated jurisdiction sector at the position associated to the sector.

SSS 75 - The system shall have the capability to display at least the following sub-states for a flight plan:

- active not controlled;

- active controlled;
- in transfer (donor, receptor and proposed);
- announced;
- holding;
- transferred;

SSS 76 - There shall be specific presentations for the following conditions:

- correlated;
- multicorrelation (two or more tracks having identical SSR code associated to the same flight plan);
- non-conformance route/track position indication;

SSS 77 - There shall be a unique presentation for the first display of the flight plan.

3.2.1.6.6 Flight Plan Data Retrieval

SSS 78 - The system shall have the capability to retrieve flight Plans, repetitive flight plans, and flight plan history from the database.

SSS 79 - The system shall have the capability to retrieve flight plan data available on the basis of: Flight identification, in combination with departure aerodrome, and/or EOBT/ETA (validity times).

3.2.1.6.7 Repetitive Flight Plan Retrieval

SSS 80 - The Flight plan workstations shall have access to RPL data in the RPL file, and to retrieve RPL data available on the basis of: Flight identification, in combination with departure aerodrome and/or EOBT/ETA.

3.2.1.6.8 Flight Plan History

SSS 81 - The system shall have a capability to display and print all messages concerning a flight plan, including associated update messages, for at least adaptable hours after termination of flight plan.

3.2.1.6.9 Free Text Input and Distribution

SSS 82 - The system shall have the capability to perform "free text" input, and to be able to route this information for output to other designated workstations or any AFTN/AMHS address.

3.2.1.6.10 RVSM

SSS 83 - The system shall have the capability to process and display RVSM status according with the associated flight plan, the operator input data and coordination messages as well, considering the RVSM airspace;

3.2.1.6.11 PBN

SSS 84 - The system shall have the capability to process and display the PBN status associated to the flight plan according with the Amendment 1 of Doc 4444, considering the operator input data and coordination messages as well;

3.2.2 Datalink Communication

SSS 85 - The system shall be linked to aircraft by a datalink service provider (DSP).

SSS 86 - The system shall be capable of transmitting and receiving AFN, ADS and CPDLC messages complying with RTCA/DO258A-EUROCAE/ED-100 and AIDC messages complying with the Asia/Pacific Regional Interface Control Document for AIDC (ICD).

SSS 87 - The system shall include the ACARS Convergence Function (ACF) to convert messages between the character-oriented data of ACARS and the bit-oriented data used in ADS and CPDLC.

SSS 88 - The system shall provide air traffic controllers with:

- Display of message exchanges;
- Display of updated aircraft positions and maps;
- Tools for measuring separation in distance or time;
- Tools for measuring angles between aircraft flight paths;
- Information on aircraft flight status;
- HMI tools for composing ADS and CPDLC messages;
- Alerts for exception conditions;
- Conflict probe capability;
- Electronic flight progress strips, and paper strips if required;
- Presentation of emergency status;
- Other information pertinent to ATS operations.

3.2.2.1 CPDLC

SSS 89 - The system shall have the capability to communicate using the protocol CPDLC (“Controller- Pilot Datalink Communication”).

SSS 90 - The system shall be capable of processing the specified number of message exchanged with each of the aircraft.

SSS 91 - Down-linked CPDLC messages shall be displayed to controllers. Tools shall be provided to allow simple and intuitive initiation of, or response to, CPDLC messages.

SSS 92 - CPDLC position reports shall be used to display aircraft positions when no ADS report is available.

SSS 93 - The system shall have the capability of terminating CPDLC connection with the aircraft.

SSS 94 - The system shall allow transfer of CPDLC between sectors of an ATCAS without changing the data authority and with the same CPDLC link.

SSS 95 - The system shall be capable of handling the message set and the standardized free text messages defined in the FOM, as well as free text.

SSS 96 - The system shall allow controllers to review uplink messages prior to sending.

SSS 97 - Messages shall be handled in order of priority.

SSS 98 - Messages with the same priority shall be processed in the time order of receipt.

SSS 99 - The controller shall be alerted to unsuccessful receipt of the required response in the specified time or receipt of Message Assurance Failure (MAF).

SSS 100 - The system shall allow controllers to send any response messages linking with the reference number of the message received.

SSS 101 - A CPDLC dialogue shall not be closed until an appropriate closure response for that message with same reference number is received.

SSS 102 - When the closure response message is sent, the dialogue is closed and the system shall reject any further attempt to send a response message.

SSS 103 - The capability of closing a CPDLC dialogue, independent of CPDLC closure message receipt, shall be provided.

SSS 104 - The system shall have the capability to send the more frequent CPDLC messages through an interface using the associated track label.

SSS 105 - The system shall have the capability to display aircraft data, received by ADS, in the standard or extended track label.

SSS 106 - The system shall have the capability to display different shapes or symbols to differentiate that the aircraft is ADS/CPDLC capable and it is in contact with the Center.

SSS 107 - The system shall have the capability to allow the operator to differentiate information of course, speed and vertical speed received automatically by ADS.

SSS 108 - The system shall have the capability to uplink messages to the aircraft regarding the controller actions that the pilot need to know.

SSS 109 - The system shall have the capability to display in the outbox message list all the uplink CPDLC messages that are pending for an answer from the pilot.

SSS 110 - The system shall have the capability to display in a unique way the field associated to a change made by the controller till a downlink message is received from a pilot saying the change was made.

SSS 111 - The system shall have the capability to display a communication failure message, when an expected downlink message is not received during a time-out (adaptable).

3.2.2.2 ADS

SSS 112 - The capacity of the ADS function shall be determined from the operational policy and procedures and the airspace characteristics, including number of FANS capable aircraft, periodic reporting rate, airspace size, waypoint event report frequency, usage of event and demand contracts, and projected traffic growth.

SSS 113 - The system shall be capable of initiating periodic, event and demand contracts.

SSS 114 - The system shall be able to support a demand, an event and a periodic contract simultaneously with each aircraft.

SSS 115 - The system shall apply validation checks to incoming data by reference to flight plan data in relation to time, altitude, direction and position.

SSS 116 - The system shall be capable of processing ADS reports to display aircraft positions, tracks and altitude. Between ADS reports, aircraft positions shall be extrapolated and displayed automatically at specified intervals.

SSS 117 - Air and earth reference data of ADS reports shall be provided to controllers if required.

The types of ADS contract are described at ICAO 9694 and 9880 documents.

SSS 118 - ADS messages shall be processed by the system in the following order:

1. ADS emergency mode.
2. Demand/event reports.
3. Periodic report.

SSS 119 - Within these categories, messages shall be handled in the order received.

SSS 120 - The following errors shall be notified to controllers:

- Message validation error.
- Message sequence error detected with time stamp.
- Time-out of ADS report in response to request.
- Periodic and waypoint event report failure.

3.2.2.3 Notification of Error Messages

SSS 121 - The system shall be capable of performing the cyclic redundancy check (CRC) on each message.

SSS 122 - The system shall be capable of verifying the format and validity checks appropriate to each message.

SSS 123 - Controllers shall be notified when the system detects:

- A message error;
- A message sequence error;
- A duplicate message identification number;
- Message non-delivery;
- An expected response not received.

SSS 124 - The system shall have a capability to display ADS or CPDLC emergency message received from an ADS/CPDLC equipped aircraft.

3.2.2.4 Timestamps and Timers

SSS 125 - CPDLC and AIDC messages shall be timestamped; however, the form of some timestamps is actually set differently from that specified in Doc 9694.

SSS 126 - By setting and/or deactivating various timer values for the messages received in response to transmitted messages, the system shall monitor whether or not aircraft responses arrive within a specified time limit.

Timers are generally based on the operational requirements of each ATCAS.

SSS 127 - The timers for sending messages relating to the automatic transfer of CPDLC connection and to AIDC shall be set according to bilateral agreements with adjacent ATCAS concerned.

SSS 128 - A timer file shall be provided in the system for:

- Timeout settings for delayed response.
- Timing to initiate actions in ADS/CPDLC operations for:
    - Connection request (CR);
    - ADS periodic, event and demand requests;
    - Automated transfer of connection to the next ATCS;
    - Sending Next Data Authority (NDA) message;
    - Sending AFN Contact Advisory (FN_CAD): at least 30 minutes prior to FIR boundary message;
    - Sending End Service message prior to the aircraft crossing the FIR boundary (e.g. 5 minutes before);
    - Timer to trigger actions for sending AIDC messages;
    - Timer for re-transmission of the message when no response is received within a specified time.

3.2.2.5 AFN Logon Functions

The AFN logon functions provide the necessary information to enable ADS and CPDLC communications between the system and aircraft avionics systems for:

- Logon;
- Forwarding logon information to the next ATCAS.

Note: Details of Datalink Initiation Capability (DLIC) functional capabilities are provided in Doc 9694 Part 2.

The required capacity for AFN logons will be determined from the operational requirements, such as estimated number of FANS aircraft at the peak hours and anticipated growth of FANS traffic.

SSS 129 - The system shall be capable of accepting or rejecting AFN logon requests.

SSS 130 - The system shall have the capability to correlate the AFN logon data automatically with the aircraft flight plan.

SSS 131 - The controller's workstation shall be capable of displaying the following data:

- Address and version number of the aircraft applications, if required;
- Response from the aircraft with timestamp;
- Status of correlation of the aircraft with its stored flight plan;
- Indication of 'Acceptance' or 'Rejection' to the logon request from aircraft.

SSS 132 - When an aircraft downlinks its supported applications and their version numbers in an FN-CON message, the ATCAS system response shall indicate whether or not it supports those version numbers.

SSS 133 - The system shall be capable of sending the Acceptance message or the Rejection message with reason, as appropriate.

3.2.3 Surveillance Data Processing

Ideally, surveillance systems shall incorporate all available data to provide a coherent picture that improves both the amount and utility of surveillance data to the user. The choice of the optimal mix of data sources shall be defined on the basis of operational demands, available technology, safety and cost-benefit considerations.

3.2.3.1 Air Situation establishment

SSS 134 - The system shall make available a plot position presentation as a selectable function.

SSS 135 - The system shall have the capability to receive, process and integrate all the messages (plots and tracks) to create and update a dynamic Air Situation received form the following surveillance sources:

- ADS-B: Eurocontrol Asterix Protocol Standard including Categories 10, 11, 21 e 23;
- ADS-C: ACARS Protocol;
- Multilateration: Eurocontrol Asterix Protocol Standard including Categories 10, 11, 19 e 20;
- Mode S: Eurocontrol Asterix Protocol Standard including Categories 10, 11, 34 e 48;
- Adjacent Centers: Eurocontrol Asterix Protocol Standard including Categories 62, 63 e TVT2;
- Radars: Eurocontrol ASTERIX protocols including categories 1, 2, 8, 34, 48 with UAP from Raytheon, Thales, SELEX, Lockheed Martin, INDRA, INVAP;
- Radars: CD2, AIRCAT500, TVT2 legacy Protocols.

SSS 136 - The system shall have the capability to create and update track information based on the flight plan information and controller data input (Flight Plan Navigated tracks);

SSS 137 - All the messages shall be submitted to a process to validate the message format before the surveillance integration, discarding erroneous messages and logging all errors found.

SSS 138 - The system shall have the capability to create a timestamp for all the messages using an UTC Time reference sent by the sensor, or using the local relative time.

SSS 139 - The system shall have the capability to integrate all the meteorological information from the primary radars (cat 8 messages) to display at the surveillance display.

SSS 140 - The system shall have a capability to tracking all the surveillance reports using a Surveillance Multisensor Tracking, improving accuracy and smoothing of the resulting system tracks through adaptative Kalman filters.

SSS 141 - The system shall have the capability to manage the status of all sensors, to determine which of the sensors are available to participate of the data fusion.

SSS 142 - The system shall have the capability to manage the surveillance report aging from all the sensors, and to verify the eventual interruption of message flow.

SSS 143 - The system shall have the capability to manage the surveillance track update and the track suppression for both the system track file and the local track file.

SSS 144 - The system shall have the capability to evaluate in real-time the highest quality information, and use the highest quality component information to update the system tracks, establishing priorities for the sensor types as defined in adaptation.

At the current stage of development of ADS-B systems, radar is generally accepted as the best surveillance data, followed by ADS-B and then by ADS-C. Flight plan tracks have the lowest quality.

3.2.3.2 Surveillance Data Output

SSS 145 - The system shall have the capability to forward surveillance track and flight plan information associated to the Adjacent ATCAS, using an ASTERIX interface categories 62, 63, and following a geographical filter previously defined in adaptation.

3.2.3.3 Surveillance Data Processing Capabilities

SSS 146 - The SDPS shall support the updating of system tracks with a Surveillance Tracking (ST) method which uses data from multiple sensors when overlapping surveillance coverage exists. The ST capability includes a track filtering algorithm capable of processing data from different surveillances. The data will be received at irregular times and each surveillance data will have unique position error variances.

SSS 147 - The SDPS shall maintain a system track and shall have the capability to display smooth system tracks which are updated based on surveillance data from multiple sensors.

3.2.3.4 Surveillance Presentation

SSS 148 - The SDPS will have the capability to present surveillance data in two modes:

- System Track Presentation Mode: A surveillance mosaic (the system mosaic) based on an integration of all surveillance sensors.
- Local Track Presentation Mode: Any single sensor connected to the SDPS.

SSS 149 - Each Surveillance Controller workstation shall individually be able to select a presentation mode, with a clear indication of the mode of presentation selected.

SSS 150 - When switching from one track presentation mode to another, there shall be no noticeable disruption in the presentation of data, except that some targets may not be detected anymore and others will be repositioned.

SSS 151 - When Local Track Presentation Mode has been selected, data processed at system track level shall be maintained for display and cinematic surveillance data presented shall be derived from the designated single sensor.

3.2.3.5 Surveillance Data Processing Functions

SSS 152 - The system shall provide the following functions:

- SSR reflection suppression;
- Processing and displaying of aircraft ground speeds, headings, predicted positions, SSR Mode C data, ADS Data;
- Display of position symbols (radar and ADS symbols) and specified track and label data;
- Processing and displaying of SPI and special codes;

- Provision for filtering;
- Display of coasting tracks;
- Surveillance data recording.

3.2.3.6 Direct Surveillance Access (DSA) Back-up Mode

SSS 153 - The DSA server shall provide surveillance sensor data onto the DSA LAN for selection by controller surveillance workstations in the DSA Back-up mode.

SSS 154 - The Direct Surveillance Access server shall process all surveillance data formats specified for the SDP.

SSS 155 - The controller specified DSA surveillance information shall be available upon selection of the DSA Back-up mode.

SSS 156 - Each surveillance workstation shall receive and process data from the Direct Surveillance Access server.

SSS 157 - The back-up mode shall provide map selection, range selection, off-centering, and manual code/callsign association, as well as display management functions in each surveillance workstation.

3.2.3.7 Real-Time Quality Control (RTQC) of Surveillance Data

3.2.3.7.1 Automatic Test Target Monitoring

In accordance with ICAO recommendations, fixed SSR Test Transponders will be installed within the surveillance coverage for each of the SSR sources integrated to the system.

SSS 158 - Test Targets shall be available for presentation in any surveillance position.

SSS 159 - The system shall have the capability to monitor the geographical position of the Test Transponders. If a Test Transponders position falls out of tolerance (adaptation), the SDPS shall notify and log at the Technical and Operational Supervisor Position.

3.2.3.7.2 Status Message Monitoring

SSS 160 - The system shall monitor the status messages to detect a change in the status of the surveillance sensor link or an increase in the error rate status message to declare a surveillance link down or up.

3.2.3.7.3 Surveillance Data Counts Monitoring

SSS 161 - The system shall maintain a count of the various types of surveillance messages in the system, including SSR and PSR messages. All anomalies in these controls shall be reported to the Technical and Operational Supervisor.

3.2.3.7.4 Registration Analysis

SSS 162 - The system shall provide the RTQC capability for ground based radars to perform range deviation and azimuth deviation computations on targets of opportunity. The capability will be continuously active and will monitor target reports received from surveillance pairs identified in adaptation.

SSS 163 - The system shall have the capability to calculate range and azimuth bias errors, and if these errors exceed adapted tolerance standards, an alert message shall be reported to the Technical and Operational Supervisor.

SSS 164 - The system shall have the capability to print a report of the most recent registration analysis on request.

3.2.3.7.5 Registration Correction

SSS 165 - The system shall provide the capability to manually update the surveillance registration corrections.

3.2.3.7.6 SSR Reflections

SSS 166 - The system shall have the capability to suppress SSR reflections, using the following conditions:

- The plot/track report has an SSR code that is one of the adapted discrete codes;
- The range and azimuth of the report lie within one of the reporting surveillance's adaptable reflection areas;
- Another report from the same radar that has the same code (duplicate) from the same surveillance scan, and its range is less than the range of the current plot/track report minus a design parameter range delta.

3.2.3.7.7 Altitude Processing

SSS 167 - The system shall have the capability to process QNH values for a minimum of TBD airports for the calculation of Transition Levels and conversion of Mode C derived data.

SSS 168 - The system shall have the capability to convert Mode C derived flight levels into altitudes for all aircraft in a QNH area below the relevant Transition Level.

SSS 169 - The system shall have the capability to process area QNH values for a minimum of TBD areas for the calculation of minimum usable flight levels on airways and other ATS routes.

3.2.4 Flight Plan Data Processing

3.2.4.1 Flight Data Processing Functions

SSS 170 - The system shall have the capability to receive, store, process, update, and display, repetitive flight plans (RPL), flight plans, and other ATS messages.

SSS 171 - The system shall have the capability to receive ATS messages from several sources, including AFTN/AMHS and adjacent centers.

3.2.4.2 Flight Data Processing Capabilities

SSS 172 - The system shall include the following capabilities:

- Flight plan routes analysis and flight trajectory and times calculation;
- Flight plan status determination based on inputs and timed events;
- Displaying and/or printing of flight plan data to relevant sectors;
- Automatic and manual Secondary Surveillance (SSR) code allocation;
- MET data processing;
- Flight plan / track association;
- Intersector and interunit coordination;
- Automated updating of flight plans based on Estimated Time Over (ETO) through correlation of flight plan data and surveillance data;
- AFTN Message processing.

SSS 173 - The system shall make available fully automatic processing of the standard ICAO flight plan messages, including the coordination message as foresee in the OLDI (used only to exchange data with pre-existent ACC/APP that use this interface) and AIDC specification.

SSS 174 - The system shall support the current and new flight plan format, as in the Amendment 1 to the Procedures for Air Navigation Services — Air Traffic Management, Fifteenth Edition (PANS-ATM, Doc 4444) for applicability on 15 November 2012.

SSS 175 - The system shall generate and maintain a system flight plan which will be kept until it is terminated.

SSS 176 - The system shall ensure that equipment or communication unavailability in a sector will not cause any disturbances to the data interchange between other sectors/ centers.

SSS 177 - The system shall process VFR flights in the same manner as IFR flights unless otherwise specified.

3.2.4.3 Flight Data Database

SSS 178 - The system shall have the capability to establish and maintain a database of flight plans and to activate these flight plans for further processing, permitting modification, addition, and deletion of previously entered flight plans.

3.2.4.3.1 Repetitive Flight Plan (RPL) Data

SSS 179 - The system shall have the capability to receive RPL data via media, download or manually entered and store them in the RPL file.

SSS 180 - The system shall have a capability to transfer a RPL automatically to a flight plan database at a stipulated (adaptable) time prior to the time of entry into the area of responsibility.

SSS 181 - The FDPS shall provide the operator with the capability to create, modify and delete flight plans from the RPL file.

3.2.4.3.2 AFTN/AMHS Flight Plan Data

SSS 182 - The system shall have the capability to receive and process the following ATS messages received from AFTN/AMHS: FPL, DEP, ARR, RQP, ALR, RCF, RQS, AFP, SPL, CPL, DLA, CNL, EST, CHG, CDN, LAM, ACP and AIREP as foresee in the ICAO 4444 Document and include other coordination messages.

SSS 183 - The system shall have a capability to enable or disable via a VSP the automatic processing of ATS messages for each message type. When it is enabled, ATS messages shall be processed for display to specific Flight Plan positions in the following conditions:

1. Whenever the message contains an error, discrepancy or other invalid data.
2. Whenever the flight plan contains data in field 18, except when the data are prefixed by "REG/", "SEL/", "OPR/", "ALTN/", or "EET/".

SSS 184 - In the cases where a message is not identified, or contains data that are not valid, or cannot be paired with previously stored data, an "invalid" response as well as the message itself shall be displayed to the specific flight plan positions. The message shall in such cases be displayed in the format in which it was received and with an indication of the "invalid" data.

SSS 185 - The system shall have the capability to check all ATS messages for:

- Format errors;
- Syntax errors;
- Previous receipt of the same message;
- Validity, with respect to whether the flight plan or flight update message will affect the area of responsibility;
- Compatibility, with respect to conformance between aircraft type, True Airspeed (TAS), flight level/altitude, EET, departure aerodrome, route within the defined route system, and destination;
- Validity time;
- Channel sequence number.

3.2.4.3.3 Operator Flight Data Input

SSS 186 - The system shall have the capability to display at the Surveillance Display and Flight Data display and input the following types of flight plan messages:

- FPL and CPL;
- Flight updates messages;
- Departure state transition messages;
- Fix estimate updates;
- Cleared level updates.

3.2.4.3.4 MET Data

SSS 187 - The wind direction and speed, referenced as MET Data shall be able to be received through the AFTN/AMHS interface, as defined in the SICD.

SSS 188 - The MET data shall be processed for multiple height layers and areas for use in trajectory and times calculation, employing the data valid for the route (area).

SSS 189 - The Flight Data Display shall have the capability to display and change the MET data.

3.2.4.3.5 Input Message Processing

SSS 190 - The FDPS data base shall have the capability to identify, classify, and process the message types received, as well as identify the originator (source) of the message.

SSS 191 - Received CNL-messages with respect to pre-active and active flight plans shall be processed for display to the sectors concerned.

SSS 192 - Flight update messages shall automatically change the parent flight, causing, if necessary, the re-processing of the flight plan.

SSS 193 - The system shall have a capability to do the following actions, as required, when a flight update message is received:

1. New calculation of flight trajectory/flight times;
2. New analysis of flight plan route;
3. New analysis of flight strip distribution plan;
4. New distribution of flight data for display update.

3.2.4.4 Flight Progress Processing

SSS 194 - The system shall have a capability to determine the status for each flight plan, reflecting the current state of the flight.

SSS 195 - During a flight plan lifetime, the system shall have a capability to attribute a flight plan the following states and its transitions:

- Inactive - when a new flight plan is created;
- Pre-active – VSP time before the effective realization of the flight;
- Active - corresponds to the effective realization of the flight;

- Terminated - corresponds to the period when the flight plan is ended by operator action or automatically, staying in the system only for consulting features.

3.2.4.5 Route Processing

SSS 196 - The system shall have the capability to produce and maintain a continuous flight profile/trajectory for every valid flight plan received.

SSS 197 - The system route system shall include:

- The defined airspace, airways, and ATS route structure;
- Navigational aids/significant positions and Aerodromes;
- Sector boundaries;
- SID/STAR procedures.

SSS 198 - The route processing function shall accept input data based on:

- Route as indicated in the flight plan or, if applicable, as subsequently indicated by an update message;
- Entry of significant positions defining the route by significant points/positions, latitude/longitude positions.

SSS 199 - The system shall have a capability to do a Route analysis/conversion automatically.

SSS 200 - Trajectory estimation shall be based on route, flight planned level/altitude, available wind data, and aircraft performance characteristics.

SSS 201 - The route processing function shall determine significant positions and calculate ETOs for those positions.

SSS 202 - The system shall have the capability to integrate an AMAN (Arrival Management) and/or a DMAN (Departure Management) and/or SMAN (Surface Manager) tools for Tactical Local Planning.

3.2.4.6 Secondary Surveillance (SSR) Code Allocation

SSS 203 - The system shall have the capability to process both manual and automatic SSR code allocation.

SSS 204 - The system shall have the capability to maintain lists of codes to be used for automatic code allocation.

SSS 205 - The system shall have the capability to maintain lists of codes to be retained for flights from another ATC Center.

SSS 206 - The system shall have the capability to automatically allocate non-duplicated codes to flight plans for flights generated within the FIR and equipped with a 4096 SSR code transponder.

SSS 207 - The system shall have the capability to assign non-duplicated adapted discrete codes and adapted non-discrete codes to designated flights as specified by controller input action.

SSS 208 - The system shall have the capability to release previously assigned codes for re-allocation.

3.2.4.7 Flight Plan/Track Association Function

SSS 209 - The system shall have the capability to automatically associate flight plans with the appropriate surveillance system tracks.

SSS 210 - The system shall have a capability to allow the operator to initiate an association.

SSS 211 - The system shall have the capability to terminate the association (also called disassociation) between a track and a flight plan either automatically or manually.

SSS 212 - The system shall have the capability to do an automatic association only with discrete SSR codes.

SSS 213 - The system shall have the capability to allow the operator to do a manual association with discrete and nondiscrete SSR codes and tracks without an SSR code (primary tracks).

SSS 214 - The system shall allow the manual association only if the track and flight have the same CALLSIGN.

SSS 215 - The system shall have the capability to monitor periodically each controlled flight for conformance with its planned route, using the associated surveillance system track's position to compute the ETO for each fix in the route, and to determine when each fix has been passed.

3.2.4.8 Sectorization

The airspace of interest is described geographically in the adaptation data in terms of nonoverlapping volumes of airspace known as geographic sectors.

These volumes are polygons in the horizontal plane and have an up to TBD different levels dividing the airspace that can be controlled by a controller. This unit of airspace is usually called a controlled sector.

SSS 216 - The system shall have the capability to declare up to TBD different levels to define the control sectors.

3.2.4.8.1 Sector Reconfiguration Function

SSS 217 - The system shall have the capability to change the definition of control positions and the assignment of control sectors to positions through the consolidation input.

SSS 218 - The system shall check if the new position has the capacity for all the flights affected by the requested consolidation and to automatically change the ownership to this new position.

3.2.4.9 ATFM Functions

SSS 219 - The system shall have the capability to analyze the air traffic with anticipation for Air Traffic Flow Management purposes.

SSS 220 - The system shall have the capability to display a graphic of flight plans associated to a predicted period of time , using a filter for a specific:

- Airport: classified by flights in ETA or ETD;
- Coordination point: classified for ETO;
- Sector: classified for time of arrival in the sector;

3.2.4.10 FDPS Output

SSS 221 - The system shall have the capability to provide all controller workstations with an up-to-date presentation of the state of all individual flights assigned to, or otherwise of significance to (i.e., to be assigned to) each workstation.

SSS 222 - The system shall have the capability to transmit flight update messages to all ATC workstations and adjacent ATC centers.

3.2.4.10.1 Output of Messages to AFTN/AMHS Network

SSS 223 - The system shall have the capability to support a protocol for communication with interactive ACCs, where adapted, and the transmission of the FPL, DEP, ARR, RQP, ALR, RCF, RQS, AFP, SPL, CPL, DLA, CNL, EST, CHG, CDN, LAM, ACP and AIREP messages.

3.2.4.10.2 Flight plan Handoff

SSS 224 - The system shall have the capability to determine automatically when a surveillance track associated with a flight plan is about to cross sector or FIR boundaries, in order to transfer the flight plan from one controller to another or from one controller to another ATC system sector.

SSS 225 - The system shall have the capability to allow the controller do a handoff between the involved sectors or Adjacent ATCAS involving the main phases:

- handoff warning: it is generated at a time (adaptable) before the ETO of the coordination point to the current owner of the flight to indicate that the handoff to the next sector is due;
- handoff initiation: the owning controller requests the hand-off function to validate and initiate the control transfer to the next sector on the flight's planned route;

- handoff acceptation: the receiving controller can accept and conclude the control transfer processing.

SSS 226 - The system shall have the capability to output flight plan data to the Adjacent ATCAS as specified in the SICD.

SSS 227 - The system shall have the capability to exchange coordination messages, with the following protocols:

- Messages ICAO 4444 standard, using the AFTN/AMHS;
- Messages AIDC as specified in the Asia-Pacific ICD, using the AFTN/AMHS;
- Messages OLDI as specified by EUROCONTROL, using dedicated links.

SSS 228 - For AIDC protocol, the system shall have the capability to exchange the minimum set of messages (ABI, CPL, EST, PAC, ACP, MAC, LAM, LRM, TOC, AOC) for the Notification, Coordination and Handoff phases defined in the referenced AIDC ICD.

SSS 229 - For OLDI protocol, the system shall have the capability to exchange the minimum set of messages (ABI, ACT, REV, PAC, MAC e LAM) for the Basic Procedure, Dialogue Procedure – Coordination Phase and Dialogue Procedure – Transfers Phase as defined in the referenced OLDI ICD.

SSS 230 - The actual protocol used to Exchange flight plan messages with adjacent ATCAS shall be defined in adaptation data.

3.2.4.10.3 ATFM unity

SSS 231 - The system shall have a capability to send coordination information, slot information, predicted and current traffic load and flight plan updates to an ATFM unity.

SSS 232 - The system shall have the capability to send to the ATFM unity the go/no-go status on the major ATCAS subsystems and sensors.

3.2.5 Alerts

SSS 233 - The system shall provide a window dedicated to display all the conflicts detected during the flight plan life.

SSS 234 - The system shall display all the alerts detected during the flight plan route visualization.

SSS 235 - The system shall display all the flights involved in a conflict.

3.2.5.1 Special Codes and Emergency Messages

SSS 236 - The system shall display codes reserved for special purposes, such as A7500, A7600, A7700, using also a time-limited (VSP) audio signal, of individual activation's of special codes.

SSS 237 - The system shall have a capability to display ADS or CPDLC emergency message received from an ADS/CPDLC equipped aircraft.

SSS 238 - The system shall have the capability to display the last detected position of a special code squawk and the associated track history as well, till the controller acknowledges the alert at the supervisor position. The capability to print all the data associated shall be provided.

3.2.5.2 Short Term Conflict Alert (STCA)

SSS 239 - The system shall have the capability to generate a Short Term Conflict Alert (STCA) with respect to tracks, taking into account the CFL and considering the PBN status information. If the system determines that a violation of vertical separation minima (adaptable) and horizontal separation minima (adaptable) is calculated within a pre-determined (adaptable) time period.

SSS 240 - The system shall have the capability to define adapted areas where the STCA feature will be applicable.

SSS 241 - The system shall have the capability to process tracks in respect to heading, speed, altitude/flight level, vertical speed, when available for a pre-determined (adaptable) time ahead.

SSS 242 - The alert STCA generated shall include a visual and aural (time-limited) indication to the workstation(s) that are responsible for the tracks concerned, which will be extinguishable upon acknowledgment by the controller.

3.2.5.3 Minimum Safe Altitude Warning (MSAW)

SSS 243 - The system shall have the capability to generate MSAW with respect to tracks providing SSR Mode C information. A minimum safe altitude warning will be generated when SSR Mode C information indicates that an aircraft:

- In level flight is inside or within (adaptable) NM of an area where the minimum safe flight level is greater than the aircraft flight level.
- Has a rate of descent (adaptable time) indicating that a minimum safe altitude will be penetrated.
- Has a rate of climb (adaptable time) insufficient to obtain a minimum safe altitude.

SSS 244 - The system shall have the capability to define adapted areas where the MSAW feature will be applicable.

SSS 245 - The alert MSAW generated shall include a visual and aural (time-limited) indication to the workstation that has the track, which will be extinguishable upon acknowledgment by the controller.

3.2.5.4 Medium Term Conflict Detection (MTCD)

SSS 246 - The system shall have the capability to generate a MTCD when a new or modified flight plan create a conflict in any point of its route with other active flight plan, taking into consideration the PBN status, airspace RVSM and the APP airspace as well.

SSS 247 - The MTCD shall be generated only to the Controller and Assistant that has a sector jurisdiction over the flight plan. This alert will be displayed at the operational supervisor as well.

SSS 248 - When any events or changes in the route, level or estimated time occur the system shall have the capability to recalculate the conflict prediction automatically taking into consideration all others flight plans.

3.2.5.5 Cleared Level Adherence Monitoring (CLAM)

SSS 249 - The system shall have the capability to display at the track label an alert when an aircraft is deviating from its Cleared Flight level by a value greater than a threshold.

3.2.5.6 Route Adherence Monitoring (RAM)

SSS 250 - The system shall be able to monitor if a trajectory flight is in conformance with its flight route, and to alert when an aircraft is deviating from its planned route, considering the PBN status information.

3.2.5.7 Area Infringement Warning (AIW)

SSS 251 - The system shall be able to alert in situations when an aircraft is, or is predicted to be, crossing the border of a reserved area (restricted or dangerous) on-line predefined or off-line adapted.

3.2.5.8 Conflict Probe

SSS 252 - The system shall have a tool (Conflict Probe) initiated by the controller for a particular aircraft, to determine whether a proposed flight plan will come into conflict with another during a specified period.

SSS 253 - The system shall compare the proposed trajectory with the current planned trajectories of other aircraft information and displays the position and time of calculated conflicts to the controller, considering the PBN status information.

3.2.5.9 Approach Funnel Deviation Alert

SSS 254 - The Approach Funnel Deviation Alert (sometimes also known as Approach Monitoring Aid) is the Safety Net function responsible to alert in situations when an aircraft deviates from the approach funnel, either laterally or vertically.

3.2.6 Recording and Playback

SSS 255 - The operational system shall include a data recording facility to record and replay data.

SSS 256 - The recording function shall be able to operate concurrently with the playback function.

3.2.6.1 Recording

SSS 257 - It shall be possible to record data continuously for 48 hours without operator intervention. The replacement of the non-volatile removable storage medium shall be limited to a maximum of once every 48 hours.

SSS 258 - It shall be possible to record all displayed targets, weather information, maps, lists, images, filter limits, display control settings, and all Surveillance Display operator actions performed shall be date/time stamped and recorded.

SSS 259 - The system shall record all operational actions and system messages at the Surveillance Display, Flight Data Display and Electronic Flight Display and the Technical/Operational Supervisor.

SSS 260 - The system shall have the capability to record online all the surveillance and flight plan data in a commercial database, in order to execute queries to generate reports.

SSS 261 - The system shall record each system flight plan record whenever its flight state or holding state changes or whenever an item changes as a result of operator input or an external message.

SSS 262 - The system shall record the data while still meeting its response time requirements.

SSS 263 - For archival purposes, recorded data shall also be copied to a non-volatile removable storage medium for permanent storage. The recording computer may use internal hard disks as temporary storage medium.

3.2.6.2 Playback

SSS 264 - The system shall have a capability to record data and playback to be used in the following activities:

- to create the air situation display at the surveillance display with all the flight plan events associated;
- to obtain a log of operator actions and system messages;

- to perform data analysis and statistics;

SSS 265 - The recorded information shall be capable of being played back at selected working positions without interrupting the operational system.

SSS 266 - It shall be possible to playback data archived on removable storage medium loaded.

SSS 267 - The system shall be capable of performing a high speed search of the recording medium in relation to time of day.

SSS 268 - It shall be possible to select a specific time to the nearest minute from which the data playback is to commence.

SSS 269 - The system shall be capable of replaying data that has been recorded up to 60 days prior in a slow, normal or fast mode.

SSS 270 - The system shall provide an interface to synchronize the playback with the Audio Recorder.

3.2.6.3 Surveillance Display Playback

SSS 271 - The system shall have the capability to change the playback mode to an interactive playback mode in which it is possible to change the Surveillance Display presentation.

SSS 272 - The system shall have the capability to display recorded data at any surveillance display working position configured for playback.

3.2.6.4 Non-interactive Playback Mode

SSS 273 - During non-interactive replay, the replayed data shall be presented in a manner that emulates the display presentation at the time of recording including the result of controller display input actions and all functions executed using all input devices.

3.2.6.5 Interactive Playback Mode

SSS 274 - In the interactive mode, the selected working position receives all of the recorded data and the user can change the display of this data as if in an operational environment, without interference with the operational system.

SSS 275 - A working position configured to operate in playback mode shall be able to enter interactive mode at any time during the playback.

3.2.6.6 Flight Data Display Replay

SSS 276 - The system shall have the capability to provide a log of all previously recorded controller and assistant actions to a printer.

3.2.7 Architecture and Supervision

3.2.7.1 Functional Redundancy

SSS 277 - Critical functions shall be dualized to provide redundancy ensuring continued full system operation in the event of single failures, such as:

- The Flight Plan Data Processing Servers;
- The Surveillance Data Processing Servers;
- The Data recording servers;
- The Control and Monitoring Servers and Displays;
- The Aeronautical and Meteorological Servers.

3.2.7.2 System Requirements

SSS 278 - The system shall have the capability to ensure that the failure of any single functional unit will not cause the total failure of the system.

SSS 279 - The system shall have the capability to distribute a time Reference to all positions in accordance with the mode of operation (on-line, playback or simulation).

SSS 280 - The system shall have the capability to automatically restore itself to normal operation after interruptions due to power failure.

SSS 281 - In case of power return after complete power outage, the ATCAS shall automatically restart and go into operation in the same configuration as before the outage.

SSS 282 - The system shall have the capability to provide the following functions.

- Monitor the status of all system elements;
- Perform manual and automatic system reconfigurations;
- Supply status information for display;

SSS 283 - All events shall be stored on disk and classified depending on its relevance.

SSS 284 - The system shall have the capability to filter and display all the events and system error reports recorded based on its type, relevance and time, as an interactive data base.

SSS 285 - The system shall have the capability to switch over its critical function servers with no loss of information.

SSS 286 - The system shall have the capability to restart any nodes and perform reconfiguration of all servers.

SSS 287 - The system shall have the capability to display and print out the actual operational configuration and status, including the monitored external sources.

SSS 288 - The system shall have the capability to use dual LAN (Local area network) and meet all functional and performance requirements with one of the dual LANs out of service.

SSS 289 - The system shall have the capability to supervise and display the status of the dual LANs and perform automatic reconfiguration to the standby LAN if necessary.

SSS 290 - The system shall have the capability to monitor continuously all the local and remote net nodes using the SNMP protocol.

SSS 291 - The system shall monitor, using the SNMP protocol the following hardware devices status:

- CPU load and temperature;
- RAM memory use;
- Disk partition use;
- Network traffic.

SSS 292 - The system shall monitor, using the SNMP protocol, the availability of UPS and generators used to supply Power to all equipments.

SSS 293 - The system shall have the capability to display the status of all equipments and network in a synoptic view of the system.

SSS 294 - The system shall have the capability to detect and display alerts and alarms at the Supervisor Positions, and all the critical and non critical errors generated by the system.

SSS 295 - The system shall have the capability to configure the acceptable limits, frequency and Time-out values for the events of the system monitored using the SNMP protocol.

SSS 296 - The system shall have the capability to operate each Supervisor position in the Technical, Operational and Read-only (only Display) defined by the login, including also others backup positions. Each mode shall have a specific authorization to execute determined commands in accordance with their role.

SSS 297 - The system shall have the capability to define a regional operational supervisor responsible for a subset of sectors, used for centers with a big number of sectors.

3.2.7.3 Online Test

SSS 298 - Online tests of the hardware as well as the software shall be provided to verify the operation of the computer systems.

SSS 299 - The online test functions shall periodically check the subsystem and display alerts for fault situations.

SSS 300 - The online test functions shall periodically verify the communication availability of all nodes in the local network and all the external interfaces.

3.2.7.4 ATCAS System Control and Reconfiguration

SSS 301 - The system shall have the capability to execute the following action from the Supervisor Position:

- System Startups;
- Disable/Enable of automatic equipment switchover;
- Reconfigurations;
- Variable System Parameter updates.

3.2.7.5 ATCAS Sector Reconfiguration

SSS 302 - The system shall have the capability to provide a graphical display of the ATCAS sector configuration.

SSS 303 - The system shall have the capability to use preset sector configurations defined in the adaptation data.

SSS 304 - Sector reconfigurations shall be performed at the Operational Supervisor.

SSS 305 - The Operational Supervisor shall have the capability to print a consolidation report.

SSS 306 - The system shall have the capability to display and print a current sector load and a predict sector load, based on a specific time ahead.

3.2.8 Aeronautical and Meteorological Information

SSS 307 - The system shall have a capability to receive aeronautical and meteorological information from the AFTN/AMHS:

- Meteorological information: MET data as defined in section 3.2.4.3.4 and METAR, according to ICAO Annex 3 and other meteorological messages, such as SIGMET, AIRMET, GAMET, SPECI and TAF, according to Annex 15;
- Aeronautical information: NOTAM, according to ICAO Annex 15.

SSS 308 - The MET data will be received every 6 hours from the AFTN/AMHS; in case of absence or a delay greater than 30 minutes (adaptable), the system shall have the capability to send a message to the Operational Supervisor and it shall use the latest data stored.

SSS 309 - The system shall have the capability to receive aeronautical and meteorological information for display via a Web Browser.

SSS 310 - The system shall have the capability to input and display QNH values.

SSS 311 - The system shall have the capability to check the MET data for format and syntax errors.

SSS 312 - The system shall have the capability to display and modify aeronautical information.

SSS 313 - The system shall have the capability to display and modify the MET data.

SSS 314 - The system shall have the capability to identify and classify MET data messages with respect to type of data and area of validity.

SSS 315 - The system shall have the capability to compose and display a web browser window with general purpose information to be used internally by the controllers.

SSS 316 - The system shall have the capability to compose free text input (no pre-defined format, up to 1800 characters) to be routed to AFTN/AMHS addresses.

3.2.9 Management, Operational and Technical Information Report Tool

SSS 317 - The system shall have the capability to produce monthly statistics of end-to-end system datalink performance in daily operations. The system shall have appropriate tools for monitoring and analyzing the performance data for reporting.

SSS 318 - The system shall have the capability to generate reports, using predefined queries or ones defined by the operator, such as: total number of flight plans in a sector during a specific period of time, with filters defined by the user (aircraft type, level, airway, VFR or IFR rules, ATCAS origin, and airport).

SSS 319 - The system shall have a capability to generate reports with a list of all strips updates during a specific flight plan lifetime.

SSS 320 - The system shall have a capability to generate reports with a list of working hours for each operator during a specific time and their respective totals consolidation, based in the logon/logoff records.

SSS 321 - The system shall have a capability to generate reports with a list of sectors allocation hours, taking into account all the sector consolidation/deconsolidation.

SSS 322 - The system shall have a capability to generate reports with a list of all alerts distributed per type, criticality, sector and time.

SSS 323 - The system shall have a capability to execute scheduled (E.g.: annually, monthly, daily, hourly) pre-defined reports.

SSS 324 - The system shall have a capability to provide commercial tools to create user-defined reports.

SSS 325 - The system shall have the capability to define different Access levels for data and reports.

SSS 326 - The system shall have a capability to generate graphical and textual reports and print.

3.3 System External Interface Requirements

The network shall conform to the protocol suite defined as part of the ATN concept. For messages from controller to pilot, the ground ATN routers must choose the most suitable data link device available and route the messages to that transmitting station.

It is intended that the ADS and CPDLC functions shall eventually be carried by the ATN. The purpose of the ATN is to “provide data communication services and application entities in support of the delivery of air traffic services (ATS) to aircraft; the exchange of ATS

information between ATS units; and other applications such as aeronautical operational control (AOC) and aeronautical administrative communication (AAC).” [Annex 10, Vol III, 3.3]

It is important, therefore, that any new system should either include provisions for, or have a defined upgrade path to provide, interfacing with the ATN. ICAO Doc 9705 - Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) is the appropriate source of interface data for the ATN.

At present, the ATN is under development and trials are being carried out in several ICAO Regions.

3.3.1 Datalink and Surveillance sensors interfaces

3.3.1.1 Datalink Service Provider

In the current FANS 1/A environment, ADS and CPDLC messages are passed between aircraft and the System using the ACARS data messaging system. ACARS was developed by the DSPs to pass information between the airline operating centre (AOC) and the aircraft. ADS and CPDLC required an air-ground datalink and, in the absence of the Aeronautical Telecommunication Network (ATN), the ACARS system was used.

It is essential therefore to specify the appropriate interface port(s) to connect to the chosen DSP. This is typically an RS232 serial port, but the exact requirement needs to be confirmed with the DSP.

3.3.1.2 Radar Data

Data imported from a separate radar system will take the form of track data or possibly plot data, using a standardized interface ASTERIX.

3.3.1.3 Multilateration (MLAT)

MLAT is an enabling technology that will enhance the provision of ATM in a variety of applications, from “radar-like” air traffic control purposes to enhanced situational awareness of surface movements. MLAT offers most advantages in situations where other surveillance systems (e.g. radar) are not available. It can also be combined with other surveillance systems, such as radar and ADS-B, to improve the total surveillance picture.

MLAT is dependent on the aircraft having at least a Mode A/C transponder. It can receive identity through correlation of a code with the flight plan, or the flight identification transmitted by ADS-B or Mode S transponder.

3.3.2 AFTN/AMHS

The AFTN is currently the carrier for ground-ground messaging between ATC units and carries AIDC messages in the FANS 1/A environment. The AMHS (Aeronautical Message Handling System) is the ground-ground messaging application of the ATN.

Any new system AMHS shall include at least one AFTN gateway. AIDC messages generated in AMHS structure can then be transmitted via the AFTN and incoming messages from the AFTN shall be transposed to AMHS structure.

After the ATN becomes operational and the AFTN is no longer used, the gateway can be removed.

The AMHS specification, as defined in ICAO Document 9705 Edition 3 and ICAO Doc 9880, includes only two levels of service which correspond to a different level of functionality for the AMHS. They are the Basic ATS Message Handling Service and the Extended ATS Message Handling Service.

SSS 327 - The system shall accept and transmit ICAO flight plan data messages via the AMHS or AFTN, as defined in ICAO documents Doc 4444 15ª Ed and 9705.

3.3.3 Adjacent ATCAS interface

Direct Connection between ATCAS Systems – It is necessary when a full system must be connected directly to an existing system for flight plan coordination and surveillance data sharing.

3.3.3.1 Flight Plan Coordination

SSS 328 - The Flight plan data shall be exchanged with adjacent ATC centers (Others ACC). The system shall provide the capability to exchange flight plan data with these ATC centers, using OLDI or AIDC messages.

The OLDI application, which is implemented in the EUR Region, consists of the exchange of messages (a subset of AIDC messages), using a dedicated OLDI protocol operating directly over X.25. This is going to evolve in the short- to mid-term towards FMTP (Flight Message Transfer Protocol), which is a specific protocol operating over TCP/IP.

SSS 329 - For flight plan coordination, the interface shall be AIDC over AMHS/AFTN or the future ATN, but for compatibility with pre-existent legacy systems OLDI may be implemented over X-25 with direct links or over TCP/IP (using a X.25 to TCP/IP converter).

AIDC messages will be passed via the AFTN until the ATN is operational. However, AFTN/AMHS gateways shall increasingly be used to provide a transition between the AFTN and ATN. These gateways transpose AFTN messages into AMHS format and vice versa.

This consists in the exchange of AIDC messages over AFTN, using the "Optional Data Field" included in the header of AFTN messages. This application is governed by the document named "Asia/Pacific Regional Interface Control Document (ICD) for ATS Interfacility Data Communications (AIDC)".

3.3.3.2 Surveillance Data Sharing

SSS 330 - The system shall provide an interface to exchange track data with adjacent ATC centers. This can be implemented by sharing the radar sensor using ASTERIX or exchanging system surveillance data between surveillance servers using ASTERIX format cat 62, 63.

3.3.4 Defense systems interfaces

This interface will be used to surveillance data sharing, since there will be sensors used in Air Defense Systems that can be useful for Air traffic Control.

This also can be implemented by sharing the radar sensor using ASTERIX or exchanging system surveillance data between surveillance servers using ASTERIX format cat 62, 63.

3.3.5 Operator interface

3.3.5.1 Human Factors

Human factors play a major part in the success or failure of a system to meet its operational objectives. A system that is uncomfortable to use will lead to controller dissatisfaction. As controllers are an essential part of the overall system, it can only degrade the overall system performance.

Displays and keyboards that are poorly designed from a human factors aspect will be inefficient and may cause actual harm to the users. Bad display design can affect the eyes and bad keyboard design may result in occupational overuse syndrome (repetitive strain injury). The human factors implications of the system specification should be considered very carefully.

3.3.5.2 Displays

One or more displays are required to handle the Surveillance, Flight plan interface with ADS, CPDLC and AIDC messages. Many systems incorporate message handling in the situation display.

Modern displays use LCD technology and may be as large as 600 x 600mm, with typical resolution of 2048 x 2048 pixels. Smaller displays may be more appropriate for some uses, particularly if there are 2 displays at a controller position: a second display is often used for flight data handling. However, the arrangement of displays will largely depend on the extent to which the new system is to be integrated with existing systems.

While color displays offer great advantages in differentiating between different categories of data, the choice of colors for the various categories can be very contentious. It is essential that color allocation is not arbitrarily decided, but is based upon sound human factors principles. Inappropriate color choices can contribute to fatigue, confusion and errors.

Different symbols will be used for radar tracks, ADS-B tracks, ADS-C tracks and tracks generated from flight plan information. The track symbol shall be that of the source of the

highest quality information. At the current stage of development of ADS-B systems, radar is generally accepted as the best surveillance data, followed by ADS-B and then by ADS-C. Flight plan tracks are the lowest quality.

The status of the CPDLC connection is an important information for the controller and is best displayed in the track label.

3.3.5.3 Message Handling

Message handling for ADS, CPDLC and AIDC messages is usually achieved by some form of menu access for generating messages and by pop-up windows for replying to incoming messages. Most systems now offer access via the track label.

For CPDLC, there are two elements to generating most messages: selection of the specific message and entry of necessary data. The message selection shall be simple: there are about 180 uplink messages available. Some systems present a selection of appropriate messages – for example, by offering only height-related messages if the height field in the track label is selected. ADS contract messages are more simple and infrequently required, so that a simple menu-type operation is normally adequate. AIDC messages can usually be generated automatically to form flight plan data.

3.3.5.4 Input Devices

The controller input devices include the text input device and the pointing device.

The text input device is normally a keyboard and there are various types of keyboard (standard, ergonomic, etc).

3.3.6 Time Reference System and Audio Recorder interface

The system contains a Time Reference System which will establish a common time source for all subsystems. In addition, outputs will exist to synchronize external systems with the common time source, such as the Audio Recorder for Playback activities.

The Time Reference System will be used to keep time synchronization in the Operational and Simulator Partition.

The TRS will be synchronized to GPS signals received by the antenna, and it will be distributed to all net nodes by ntp protocol.

SSS 331 - The system shall have the capability to synchronize all subsystems to a common time source with a maximum deviation of 100 milliseconds.

SSS 332 - Time reference outputs shall be provided to synchronize other clocks with the common time source, typically Audio Recorder Systems.

3.3.7 ATFM Unity Interface

SSS 333 - The system shall provide an interface with a central ATFM for flight plan information and coordination.

SSS 334 - An air traffic flow management (ATFM) service shall be implemented for airspace where traffic demand at times exceeds the defined ATC capacity.

ATFM will be implemented on the basis of a national/regional air navigation agreement or, when appropriate, as a multilateral agreement.

The ATFM service within a region or other defined area, will be developed and implemented as a centralized ATFM organization, supported by flow management positions established at each area control centre (ACC) within the region or area of applicability.

SSS 335 - The responsible ATFM unit shall receive the traffic demand continuously from the responsible ATC unit, allowing the ATFM unit to monitor if this demand exceeds, or is foreseen to exceed, the capacity of a particular sector or aerodrome in order to coordinate ATFM measures.

3.3.8 AIS and MET

This interface is used for Web interfaces (HTTP) to access AIS and MET data using a Web Browser with a LAN connection. It represents a new tendency to access data information using the future ATN.

3.4 System Internal Interface Requirements

The system usually will use a LAN 100/1000 Mbps as specified in the IEEE 802.3x with protocol TCP/IP.

3.5 System internal data Requirements

Not applicable.

3.6 Adaptation requirements

3.6.1.1 Database Management

SSS 336 - It shall be possible at the Database Management position, to print-out for visual presentation maps entered into the system via the DMS, including graphic presentation.

SSS 337 - The system shall have a capability to edit a database with the following data sets:

- Airways;
- Airports and Runways;
- Restricted areas;
- NAVAIDS;

- SID/STAR Procedures;
- AFTN/AMHS Directions;
- Sectors;
- Adjacent ATCAS;
- Coordination points;
- Adaptable System Parameter;
- Default values for Variable System Parameter;
- FIR/UIR borders;
- Terminal control areas;
- Control zones;
- Traffic information zones;
- Airways and ATS routes;
- Radars sensors information and protocol;
- Configuration files;
- Time Parameters;
- Alerts Parameters;
- Flight Plan parameters;
- Coordination Protocols;
- Aircraft Types and performance;
- Significant points;
- ATS routes;
- TMA Areas;
- PBN data;
- Alerts data;
- Adaptable System Parameters;
- Variable System Parameters;
- Etc.

SSS 338 - The system shall verify the data validation and consistency before the generation of a set of adaptation data.

SSS 339 - The system shall have a capability to download a new set of adaptation data to all positions or a group of positions without interfering with the operation.

3.7 Safety requirements

Safety assessments are described in detail in ICAO Doc 9859, Safety Management Manual.

Safety nets are described in the item 3.2.5.

3.8 Security and Privacy Requirements

SSS 340 - The system shall have the capability to control users and password and display the list of users logged at the operational supervisor and record all the actions with the responsible user information based in the logon/logoff control.

3.9 System environment requirements

SSS 341 - The acoustic noise level shall be no greater then 50 dBA at 1 meter for servers and peripherals normally located in an equipment room.

SSS 342 - The acoustic noise level shall be no greater than 50 dBA from the front surface of fully enclosed consoles normally located at the ATC operations room.

3.10 Computer Resource Requirements

SSS 343 - The maximum load admitted in any condition for any processor shall be 50% of maximum capacity.

SSS 344 - The maximum memory occupation admitted in any condition shall be 50 % of the maximum available memory.

3.11 System Quality Factors

3.11.1 System Reliability

Reliability predictions will be made for all equipment through observation or calculated using a specific standard. The system reliability will be maximized through use of redundant equipment configurations where a single failure would impact system operation. All single point failures will be identified.

3.11.2 System Maintainability

The system design will employ system fault detection and fault isolation.

SSS 345 - The system shall have the capability to detect 90% of all system failures.

SSS 346 - The system shall provide the mean time to repair to be less than 30 minutes.

3.11.3 System Availability

The system will provide operational availability through use of redundant/fault tolerant system architecture, system fault coverage and fault detection, and preventative and corrective maintenance.

SSS 347 - The system availability of the ATCAS shall exceed 99.999%.

3.12 Design and Construction constraints

SSS 348 - The system shall be built using open systems technology, using an operating system like UNIX or similar.

SSS 349 - The system shall make full use of help files and hints for button options to improve the usability.

3.13 Personnel-related requirements

Not applicable.

3.14 Training-related requirements

Training must involve:

- Controller Training;
- System Operator Training;
- Maintenance Training;
- Simulator Based Training.

3.15 Logistics-related requirements

SSS 350 - The system shall have the capability to restore the operating system software on the workstation using the network or the peripheral device required to transfer the operating system from standard distribution media.

3.16 Other requirements

3.16.1 Time Requirements

SSS 351 - The system shall have a capability to display a track at a maximum time of 500 milliseconds, since the track message reception (95 percentile).

SSS 352 - The system shall have a capability to display all remote status and all external alarms at the Supervisor Position within 3 seconds after the detection of the event.

SSS 353 - The system shall have a capability to execute a switch-over to the stand-by server with the following time requirements:

- Surveillance Server : maximum 2 sec

- Flight Plan Server: maximum 10 sec
- Data recording Server: maximum 2 sec

SSS 354 - The system shall have a capability to restart and become fully operational at up to ten minutes (cold start).

3.16.2 Capacity Requirements

The system shall meet the following operational capacities:

SSS 355 - Size of system plane : 2048 x 2048 NM

SSS 356 - Point of tangency (latitude/longitude) : 1

SSS 357 - Surveillance data sources : TBD simultaneous

SSS 358 - Weather data sources : TBD primary surveillances

SSS 359 - Maximum single surveillance data rate : 64 Kbps

SSS 360 - Display update rate : continuous (based on inputs)

SSS 361 - Maximum surveillance reports per second from all surveillances : TBD

SSS 362 - Minimum system track display capability : TBD

SSS 363 - Adjacent ACC interfaces : TBD

SSS 364 - AMHS interfaces : TBD

SSS 365 - AFTN interface: TBD

SSS 366 - Stored flight plans (RPL's) : TBD

SSS 367 - Inactive Flight Plans (stored FPL's) : TBD

SSS 368 - Active flight plans (at any one time) : TBD

SSS 369 - Aircraft classes : TBD

SSS 370 - Wind/temperature layers (MET data) : 8

SSS 371 - Wind/temperature areas (MET data) : 10

SSS 372 - Maps (fully digital – labels and vectors) : TBD

SSS 373 - SID/STAR Procedure: TBD

SSS 374 - Hold Procedures: TBD

The datalink system capacity will be determined from:

- Traffic density at the peak hours.
- Frequency and size of messages per aircraft.
- Airspace size and number of waypoints.
- Number of FANS capable aircraft operating in the airspace.
- Anticipated growth of FANS operation.

- Number of displays.
- Number of connections for terminal systems.

3.17 Packaging requirements

Not applicable.

3.18 Precedence and criticality of requirements.

Each requirement can be classified as a mandatory for Regional Harmonization or optional, for example:

REQUIREMENT PRECEDENCE TABLE

Requirement	Mandatory	Optional	Notes
011		X	
017	X		

4. QUALIFICATION PROVISIONS

Special attention must be given to Quality assurance, in all implementation phases such as: design review, manufacture, factory testing, documentation, training, delivery, installation, site acceptance testing and handover.

The main phases include:

_ IMPLEMENTATION SCHEDULE

_ CONTRACT SUPERVISION

_ SYSTEM DESIGN REVIEW

_ FACTORY ACCEPTANCE TEST

_ PREPARATION FOR OPERATION

- Operational Procedures
- System Management Procedures
- Preparation of System Data
- Establishment of System Parameters
- Development of Training Courses
- Operational Transfer Plan
- Safety Assessment

_ TRAINING

- Controller Training
- System Operator Training
- Maintenance Training
- Simulator Based Training

_ SITE ACCEPTANCE TEST

- Physical Checks
- Technical Tests
- Operational Tests
- Results

_ OPERATIONAL TRANSFER

- Parallel Operation Transfer
- Phased Transfer
- Preparation for Transfer

For further details look for *GUIDANCE MATERIAL OR THE ASIA/PACIFIC REGION FOR ADS/CPDLC/AIDC GROUND SYSTEMS PROCUREMENT AND IMPLEMENTATION.*

5. REQUIREMENTS TRACEABILITY

TBD.

6. NOTES

6.1 Abbreviations

ACARS	*Aircraft Communication Addressing and Reporting System*
ACC	*Area Center Control*
ADS	*Automatic Dependent Surveillance*
ADS-B	*Automatic Dependent Surveillance - Broadcast*
ADS-C	*Automatic Dependent Surveillance Contract*
AFN	*ATS Facilities Notification*
AFTN	*Aeronautical Fixed Telecommunications Network*
AIDC	*ATS Interfacility Data Communication*
AIS	*Aeronautical Information Service*
AIW	*Area Infringement Warning*
AMAN	*Arrival Manager*
AMHS	*Aeronautical Message Handling System*
AOC	*Airline Operating Centre*
APP	*Approach Center*
ASTERIX	*All-purpose Structured EUROCONTROL Radar Information Exchange Protocol*
ATC	*Air Traffic Control*
ATCAS	*Air Traffic Control Automation System*
ATFM	*Air Traffic Flow Management*
ATM	*Air Traffic Management*
ATN	*Aeronautical Telecommunication Network*
ATS	*Air Traffic Services*
CDM	*Collaborative Decision Making*
CFL	*Cleared Flight Level*
CJI	*Controller Jurisdiction Indicator*
CLAM	*Cleared Level Adherence Monitoring*
CPDLC	*Controller-Pilot Data Link Communications*
CR	*Connection Request*
CRC	*Cyclic Redundancy Check*
DMAN	*Departure Manager*
DMS	*Data Management System*
DSA	*Direct Surveillance Access*

DSP	*Datalink Service Provider*
EET	*Estimated Elapsed Time*
EOBT	*Estimated Off Blocks Time*
ESD	*Electronic Strip Display*
ETA	*Estimated Time of Arrival*
ETD	*Estimated Time of Departure*
ETO	*Estimated Time Over*
FANS	*Future Air Navigation Systems*
FDPS	*Flight Data Processing Server*
FIR	*Flight Information Region*
FN_CAD	*AFN Contact Advisor*
FN_CON	*AFN CONTACT message*
FOM	*FANS 1/A Operations Manual*
FT	*Feet*
GPS	*Global Positioning System*
HTTP	*HyperText Transfer Protocol*
IAL	*Instrument Approach and Landing chart*
ICAO	*International Civil Aviation Organization*
ICD	*Interface Control Document*
IFR	*Instrument Flight Rules*
IMM	*Interactive Multiple Models*
LAM	*Logical Acknowledge Message*
LAN	*Local Area Network*
MAF	*Message Assurance Failure*
METAR	*Meteorological Report*
MET	*Meteorological*
MLAT	*Multilateration*
MRT	*Multi-Radar Tracking*
MSAW	*Minimum Safe Altitude Warning*
msec	*Milliseconds*
MSSR	*Monopulse Secondary Surveillance Radar*
MTCD	*Medium Term Conflict Detection*
NAVAIDS	*Navigational Aids*
NDA	*Next Data Authority*
NOTAM	*Notice to Airmen*
OLDI	*Online Data Interchange*

OST	*Off-line System Parameter*
PBN	*Performance Based Navigation*
PEL	*Planned Entry Level*
PSR	*Primary Surveillance Radar*
QNH	*Regional Pressure Setting*
RAM	*Route Adherence Monitoring*
RPL	*Repetitive Flight Plan*
RTQC	*Real-Time Quality Control*
RVSM	*Reduced Vertical Separation Minimum*
SID	*Standard Instrument of Departure*
SDP	*Surveillance Data Processing*
SDPS	*Surveillance Data Processing Server*
SICD	*System Interface Control Document*
SMAN	*Surface Manager*
SMC	*System Monitoring and Control*
SNMP	*Simple Network Management Protocol*
SPI	*Special Psosition Indicator*
SSR	*Secondary Surveillance Radar*
SSS	*System/Subsystem Specification*
ST	*Surveillance Tracking*
STAR	*Standard instrument Arrival*
STCA	*Short Term Conflict Alert*
TAF	*Terminal Aerodrome Forecast*
TBD	*To Be Defined*
TFL	*Transfer Flight Level*
TMA	*Traffic Management Area*
UIR	*Upper Information Region*
UTC	*Universal Time Coordinated*
VFR	*Visual Flight Rules*
VSP	*Variable System Parameter*

6.2 Glossary

- **Air traffic services interfacility data communication (AIDC):** A data link application that provides the capability to exchange data between air traffic service units during the notification, coordination and transfer of aircraft between flight information regions.
- **Automatic dependent surveillance (ADS-C):** A surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, fourdimensional position, and additional data as appropriate. ADS-C is a data link application.
- **Automatic dependent surveillance-broadcast (ADS-B):** ADS-B is a surveillance application transmitting parameters, such as position, track and ground speed, via a broadcast mode data link, at specified intervals, for utilization by any air and/or ground users requiring it. ADS-B is a data link application.
- **Controller-pilot data link communications (CPDLC):** A data link application that provides a means of communication between controller and pilot, using data link for ATC communications.

ANNEX A - Requirements Map Table