



Cuestión 3

del Orden del Día: **Desarrollos CNS**
 3.6 Actividades de intercambio de datos de vigilancia

INTERCAMBIO Y COMPARTICIÓN DE DATOS DE VIGILANCIA

(Presentada por la Secretaría)

RESUMEN	
Esta nota de estudio presenta un resumen de aspectos relacionados con la compartición e intercambio de datos de vigilancia, sus consideraciones operacionales, sistemas radar actuales, el uso de los datos ADS-B y otros aspectos relevantes al mismo.	
Referencias:	
• Informe Reunión CAR/WG/01 • Informes de las reuniones GREPECAS/11 y GREPECAS/12 • Plan regional de navegación aérea CAR/SAM (Doc 8733) • Manual de Aplicaciones de enlace de datos para los Servicios de Tránsito Aéreo (Doc 9694)	
Objetivos estratégicos:	<i>Esta nota de estudio se relaciona con los Objetivos estratégicos A y D.</i>

1. **Antecedentes**

1.1 Mediante Conclusión GREPECAS 11/47 se definió la directrices regionales iniciales para la compartición de datos radar en las regiones CAR/SAM en la cual se insta a los Estados/Territorios/Organizaciones Internacionales de las regiones CAR/SAM a que utilicen el protocolo ASTERIX como protocolo regional común para el intercambio de datos SSR; a tener en cuenta las directrices regionales revisadas sobre el intercambio de datos radar; y para establecer acuerdos bilaterales/multilaterales para el intercambio de datos radar.

1.2 Similarmente la Conclusión GREPECAS 12/49 instó a los Estados/Territorios/Organizaciones Internacionales CAR/SAM, a que cuando planifiquen el intercambio de datos SSR, tomen en consideración el uso extensivo de las facilidades de comunicaciones disponibles en las redes intra/interregionales, así como la coordinación de los aspectos técnico-institucionales en sus acuerdos bilaterales/ multilaterales.

1.3 En las anteriores reuniones del Grupo de Trabajo del Caribe Oriental, se ha identificado que la red Satelital MEVA II tiene la capacidad para la transmisión de datos radar, así como la propuesta de intercambio de datos radar entre Cuba, Jamaica, Islas Caimanes y COCESNA para sus centros ATS respectivos a través de acuerdos bilaterales/multilaterales. De igual forma se han identifica el intercambio de datos entre algunos estados/territorios en el Caribe Oriental. En Centroamérica se tiene conocimiento del intercambio de datos radar entre algunos países y COCESNA.

1.4 En la Reunión CAR/WG/1, se informó que Trinidad y Tabago ha firmado un acuerdo con Antillas Francesas y Barbados para utilizar remotamente sus datos radar; así como de las pruebas con Cuba y un próximo acuerdo con Jamaica.

2. Discusión

Sistemas Radar Actuales

2.1 La Tabla CNS 4A del FASID – Sistemas de Vigilancia ha sido actualizada de acuerdo con la información proporcionada mediante la NI/10 de esta Reunión. Basado en esta actualización y con el fin de ilustrar la cobertura radar estimada que los actuales sistemas radar ofrecen, en los **Apéndices A, B y C** se presentan:

Apéndice A: FL 200 para las áreas de Centroamérica, Caribe Central y Caribe Oriental
Apéndice B: FL 250 para las áreas de Centroamérica, Caribe Central y Caribe Oriental
Apéndice C: FL 300 para las áreas de Centroamérica, Caribe Central y Caribe Oriental

2.2 Recientemente México y COCESNA han suscrito un acuerdo de cooperación técnica para el intercambio de datos radar particularmente de sus sistemas radar de Belice y Cancún. De igual forma se ha informado sobre las coordinaciones que se han sostenido entre las Islas Caimanes y COCESNA sobre la compartición de datos radar como parte del acuerdo de cooperación existente entre ambas Administraciones. Teniendo en cuenta las directrices regionales, se espera que se implanten e informen sobre otras iniciativas similares.

Consideraciones Operacionales:

2.3 En el *Manual de aplicaciones de enlace de datos para los servicios de tránsito aéreo* (Doc 9694), Capítulo 4, Parte VII “Radiodifusión de la Vigilancia Dependiente Automática”, se describen las consideraciones y procedimientos en un entorno de vigilancia radar, vigilancia con ADS-B y mixto, así como el uso y requisitos del ADS-B para la vigilancia ATS en los entornos de ruta, de Terminal y de aeropuerto:

- a) Con la ADS-B se dispone de mayor precisión, la velocidad de actualización y de otros parámetros (informaciones), con lo cual se deberían aportar los siguientes beneficios:
 - o Servicios mejorados en el espacio aéreo que no dispone de cobertura radar;
 - o Mejor utilización del espacio aéreo;
 - o Mejor previsión y detección de conflictos;
 - o Mejor guía y control de los movimientos en la superficie de los aeropuertos;
 - o Mejor prevención de las incursiones en las pistas; y
 - o Mejor supervisión automatizada de la conformidad.

Algunas de estas ventajas podrán lograrse aun antes del pleno equipamiento de las aeronaves.

- b) Bajo un entorno operacional con la ADS-B, se aumentara la vigilancia ATC de las maneras siguientes:
 - o En un entorno mixto ADS-B/vigilancia radar, los datos ADS-B complementaran o suplementaran los datos radar; y

- o La ADS-B extenderá los servicios de vigilancia al espacio aéreo sin radar como el espacio aéreo de baja altitud, el espacio aéreo de zonas remotas y las aguas de las zonas costeras.

En el momento en que un espacio aéreo esta plenamente integrado de aeronaves dotadas de ADS-B, los proveedores ATS podrán evaluar la necesidad de reemplazar o mantener otros equipos de vigilancia basados en tierra. Los primeros resultados se podrán obtener en base a la estrategia de pruebas (trials) que se ha iniciado en la Región CAR.

Automatización de los Sistemas

2.4 Actualmente varios Estados/Territorios/Organizaciones Internacionales de la Región CAR disponen de un alto grado de avance en materia de automatización ATM, con capacidad de procesamiento considerable y con varias funcionalidades automatizadas disponibles, que complementariamente a la compartición de datos de vigilancia permitirían lograr los beneficios operacionales en cuanto a seguridad operacional y eficiencia, optimización del espacio aéreo y el respaldo mutuo de dependencias ATS adyacentes, mejorando significativamente la armonización de la gestión del espacio aéreo.

2.5 La Conclusión GREPECAS 12/31 – *Estrategia regional para la integración de los sistemas automatizados ATM*, insta a los Estados, Territorios y Organizaciones Internacionales a que definan un plan de acción para la integración de los sistemas automatizados ATM tomando en cuenta las orientaciones referidas en la misma, en la cual la compartición de datos radar es una actividad destacada para el logro de esta integración de sistemas automatizados.

Compartición de datos ADS-B

2.6 En otras regiones, se ha tenido la experiencia de la compartición de datos de vigilancia no solo de datos radar sino de datos de ADS-B, tal y como se esta realizando en Australia y Singapur, en la cual se ha elaborado una muestra de carta acuerdo (**Apéndice D** a esta nota), basado en un documento similar de EUROCONTROL, que contiene:

- o Compromisos para la compartición de datos ADS-B;
- o Plan de implementación de estaciones ADS-B;
- o Métodos de cooperación;
- o Calendario de implementación;
- o Requisitos de performance;
- o Responsabilidades de los Estados; y
- o Monitoreo del Performance

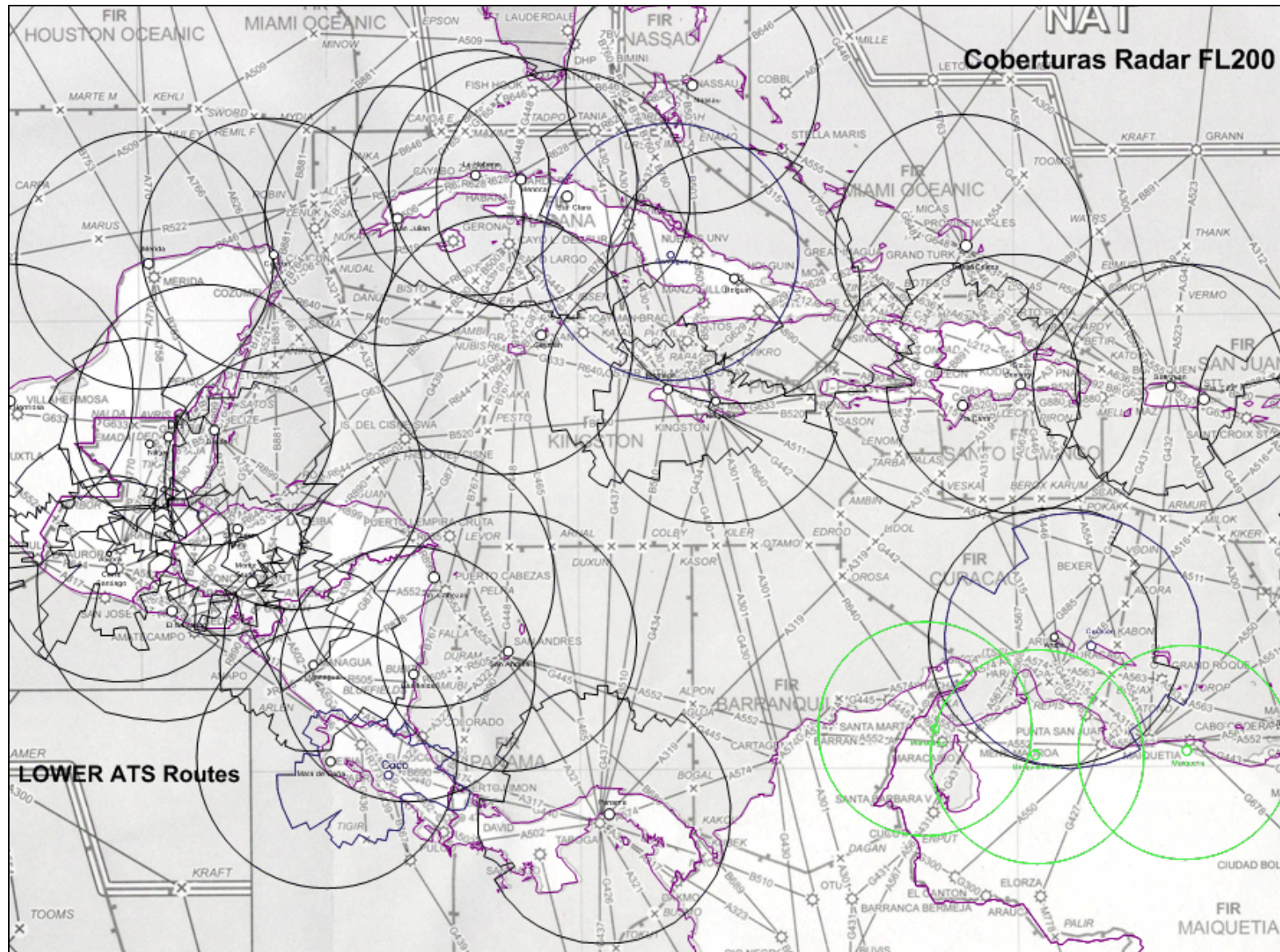
3. Acciones sugeridas

3.1 Se invita a la Reunión a:

- a) tomar nota de la información contenida en esta nota de estudio;
- b) considerar las orientaciones y directrices expuestas en GREPECAS así como de las actividades identificadas en reuniones anteriores sobre la compartición de datos radar, presentadas en los párrafos 1.1 al 1.4;

- c) tomar nota de las coberturas radar estimadas ilustradas en los apéndices A, B y C según los sistemas radar disponibles y registrados en la Tabla CNS 4A;
- d) tomar nota de las consideraciones operacionales indicadas en el párrafo 2.3;
- e) que, conjuntamente con la información suministrada en el inciso c), la capacidad de automatización de sus sistemas (párrafos 2.4 y 2.5) y la experiencia de otros Estados en otras Regiones (párrafo 2.6), consideren emprender actividades en sus planes de automatización, mejoras a sus servicios y ampliación de pruebas con ADS-B;
- f) que insten a sus administraciones a informar sobre sus actividades para el intercambio/compartición de datos de vigilancia, tal y como se describe en el párrafo 2.2; y
- g) revisar y proponer otras acciones que estime apropiadas.

Panorama Coberturas Radar en la Región CAR parte Centroamérica y Caribe Central
Nivel de vuelo 200 y rutas ATS Inferiores



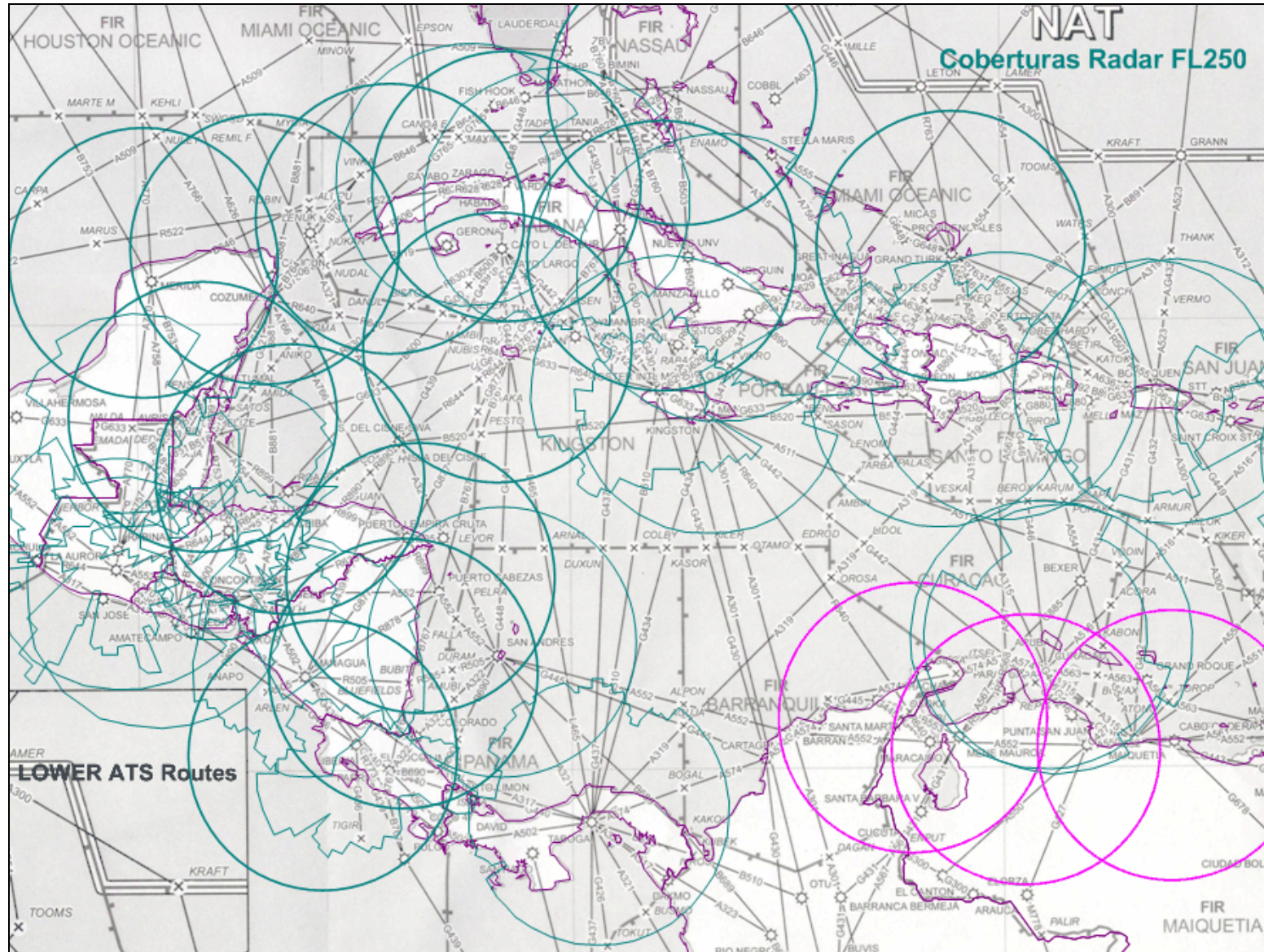
NACC/WG/2 - NE/17



Panorama Coberturas Radar en la Región CAR parte Caribe Oriental
Nivel de vuelo 200 y rutas ATS Inferiores y Superiores



Panorama Coberturas Radar en la Región CAR parte Centroamérica y Caribe Central
Nivel de vuelo 250 y rutas ATS Inferiores



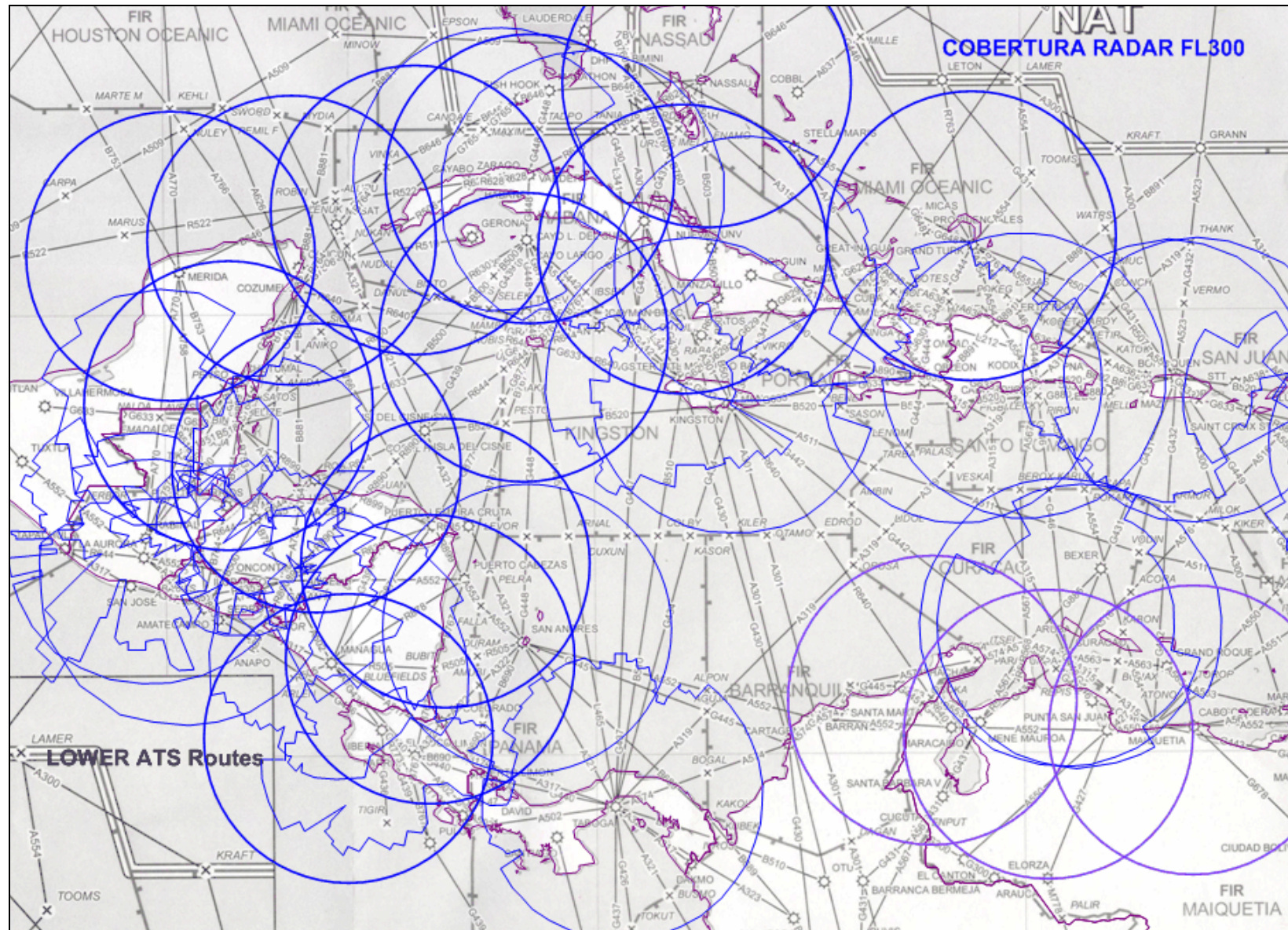
Panorama Coberturas Radar en la Región CAR parte Centroamérica y Caribe Central
Nivel de vuelo 250 y rutas ATS Superiores



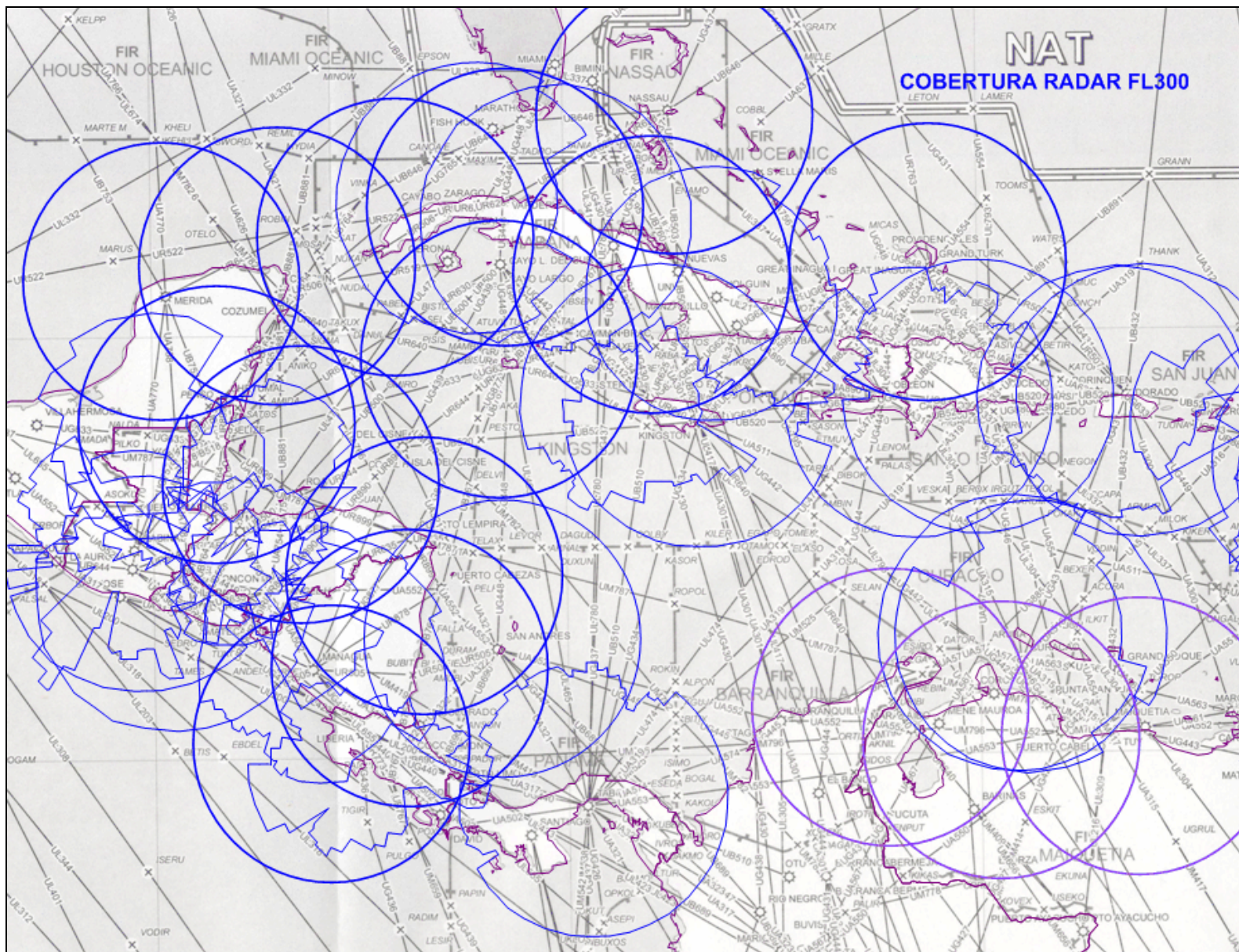
Panorama Coberturas Radar en la Región CAR parte Caribe Oriental
Nivel de vuelo 250 y rutas ATS Inferiores y Superiores



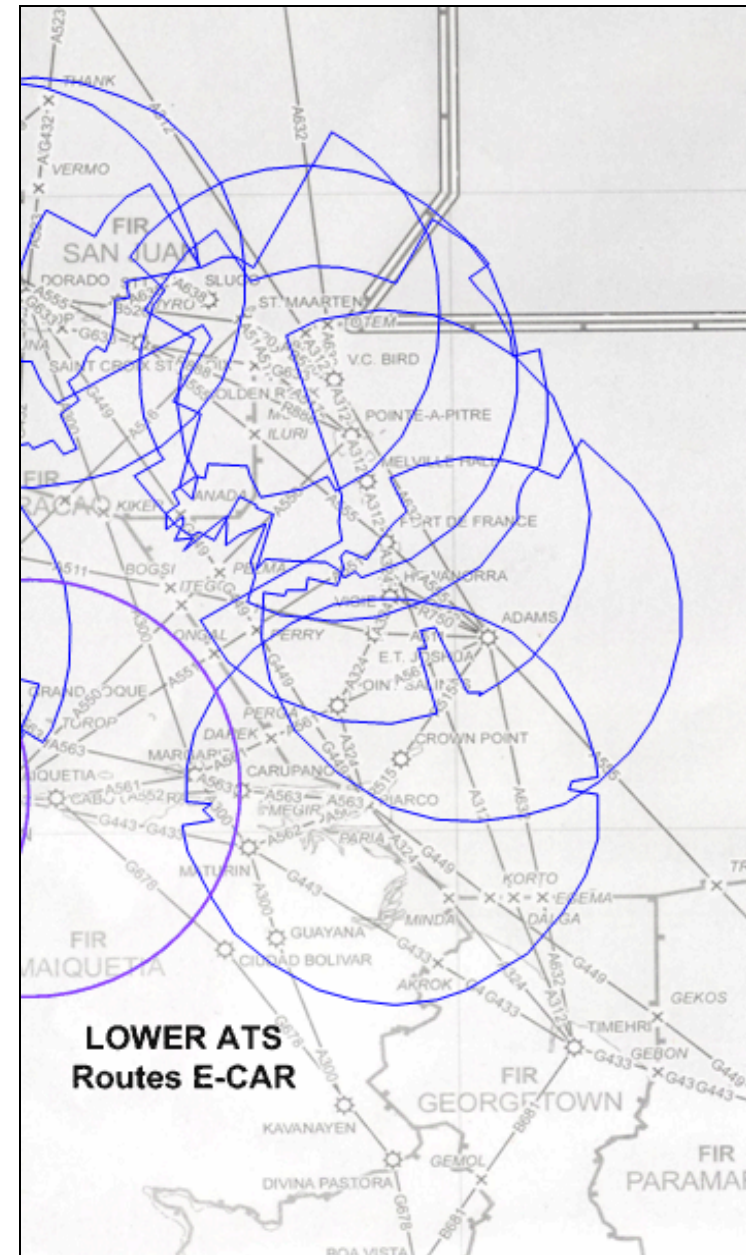
Panorama Coberturas Radar en la Región CAR parte Centroamérica y Caribe Central
Nivel de vuelo 300 y rutas ATS Inferiores



Panorama Coberturas Radar en la Región CAR parte Centroamérica y Caribe Central
Nivel de vuelo 300 y rutas ATS Superiores



Panorama Coberturas Radar en la Región CAR parte Caribe Oriental
Nivel de vuelo 300 y rutas ATS Inferiores y Superiores



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Proposed Sample ADS-B Data Sharing Agreement

INTERNATIONAL CIVIL AVIATION ORGANISATION
ASIA AND PACIFIC OFFICE



**SAMPLE AGREEMENT
FOR THE SHARED USE OF
ADS-B DATA**

Edition	:	1.0
Edition Date	:	2008
Status	:	Draft

**SOUTH EAST ASIA SUB-REGIONAL AUTOMATIC DEPENDENT
SURVEILLANCE-BROADCAST (ADS-B) IMPLEMENTATION
WORKING GROUP**

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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
1.0	February 2008		

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1. FOREWORD

1.1 The present document concerns the guidelines for the drafting of agreements for the shared use of ADS-B data.

1.2 This document is related to the SEA ADS-B WG.

1.3 These guidelines were constituted from:
the Guidelines for an Agreement for the shared use of radar sensor data used by
Eurocontrol.

1.4 Notes containing extra information on the use of the proposed contract text are printed in light face, the status being indicated by the prefix **NOTE**.

1.5 The original version of this document is in the English language.

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2. SCOPE

2.1 This document constitutes the SEA ADS-B WG guideline concerning the drafting of an agreement for the shared use of ADS-B data between ATS Organisations in the SEA ADS-B WG and the provision of ADS-B data by service providers. This document contains the proposed text for a bilateral sharing agreement for ADS-B data. The changes required to make it a multilateral sharing agreement for ADS-B data are put in as suggestions.

2.2 The agreement consists of the proposed text for twelve numbered articles and nine annexes, named Annex A up to Annex I. These annexes contain information which is likely to change from time to time. Deviations from the proposed text in the agreement as well as in the annexes, can be necessary due to legal, organisational or technical reasons. Examples of such changes are:

- The starting date could be set to the date the radar data has been delivered for the first time;
- The notice period to end the contract could be chosen differently;
- When installation at the providers' premises requires, i.e. additional staff, the cost could be charged to the user.

The clauses enclosed in brackets ([]) should be replaced by the information described in these clauses.

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3. REFERENCE DOCUMENTS

The following documents and standards contain provision which, through reference in this text, constitute provisions of the document. At the time of publication of this document the editions indicated for the referenced documents were valid.

Revisions of the referenced documents shall not form part of the provisions of this document until they are formally reviewed and incorporated into this document.

In case of conflict between this document and the contents of these other referenced documents, this document shall take precedence.

1 [To list the relevant documents]

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4. ABBREVIATIONS AND ACRONYMS

For the purposes of these guidelines the following are used:
--

ADS-B Automatic Dependent Surveillance - Broadcast
--

ASTERIX All Purpose Structured Eurocontrol Radar Information Exchange

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5. PROPOSED TEXT FOR THE AGREEMENT

The [name of the State’s responsible Organisation or name of the (privatised) ATC Organisation] represented by [function],

hereinafter called “the *Provider*”,

And

The [name of the State’s responsible Organisation or name of the (privatised) ATC Organisation] represented by [function],

hereinafter called “the *User*”;

Suggestion: If there are more than one Provider or more than one User, the above lines are to be repeated for each Provider or User.

In case the Providers are also Users (e.g. each party supplies information from an Automatic Dependent Surveillance – Broadcast (ADS-B) to the other party), one can replace the words Provider and User with the names of the Organisations and indicate in Annex A who is Provider and who is User for each source of the ADS-B data.

- Having regard to the South East Asia Sub-regional Automatic Dependent Surveillance – Broadcast (ADS-B) Implementation Working Group (SEA ADS-B WG) objectives, including the optimisation of the provision and use of the ADS-B surveillance function through the installation of new facilities or the sharing of ADS-B data;

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- With a view to the establishment of the categories of services through the airspace of the regions specified in Annex A and I;

NOTE- More reasoning and motivations for the contract can be inserted here

- Have agreed as follows:

ARTICLE 1 - Objective of the Agreement

1 The objective of this Agreement is to improve safety and operations efficiency of civil air traffic by enhancing ADS-B coverage and ADS-B data availability in the Flight Information Regions for which the *User* is responsible and the areas within 150Nm from the boundaries of these Flight Information Regions

2 For this purpose, the *Provider* shall provide its ADS-B data to the *User* with effect from [date] and in accordance with the implementation schedule in Annex G.

3 The ADS-B data to be provided are specified in Annex B, H and I.

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ARTICLE 2 - Limitations

1 The *User* shall use the ADS-B data provided only to ensure the safe, proper and continuous operation of civil Air Traffic Services or activities in support of his Air Traffic Services and for technical demonstration, evaluation and test purposes related to his operational tasks, unless otherwise specified in Annex A.

2 The *User* shall not communicate to any party not specified in this Agreement in any matter of form whatsoever any information supplied pursuant to this Agreement. The said information shall not be used for any purpose other than those specified in paragraph 1 hereof, without the prior written consent of the *Provider*.

[NOTE : To include a definition: Air Traffic Services shall mean Civil Air Traffic Services.]

ARTICLE 3 - Installation

1 The *Provider* and the *User* shall install all required equipment at their respective premises.

2 Both the *Provider* and the *User* shall arrange for the provision, installation and commissioning of private circuits and other associated equipment as specified in Annex B and F, required for the transmission of the ADS-B data from the *Provider* to the *User*.

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3 Initial testing of the equipment and private circuits for the provision of the ADS-B data shall be carried out in conjunction with the *Provider* and the *User*.

4 The provision of the present article shall also apply in the event of modifications to the equipment or private circuits.

ARTICLE 4 - Maintenance

1 Unless otherwise specified in Annex C, the routine maintenance, repair and replacement service for the equipment and the private circuits installed for the provision of ADS-B data under this Agreement shall be executed by technical staff available at the *Provider's* and at the *User's* premises.

2 Unless otherwise specified in Annex D, the routine maintenance, repair and replacement at the *Provider's* premises referred to in paragraph 1 hereof shall be carried out free of charge by the *Provider* to the standards of maintenance commonly adopted by the *Provider*.

3 The routine maintenance, repair and replacement at the *User's* premises shall be done by and at the expense of the *User* to the standard of maintenance commonly adopted by the *User*.

ARTICLE 5 - Modifications

1 Both the *Provider* and the *User* shall implement any modification in the equipment and the private circuits for the provision of ADS-B data at their respective premises due to any decision of the *Provider*. The modification shall be carried out in accordance with Article 3.

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2 The *User* may propose technical modifications of the specifications for the provision of ADS-B data to the *Provider*. The *Provider* shall decide on the implementation of it.

3 The modifications to be implemented shall be specified by the *Provider* in writing to the *User* not less than six months before the date the modification shall be implemented.

ARTICLE 6 - Cost

1 The cost apportionment for the use of ADS-B data as specified in Annex A, B and I shall be in accordance with Annex D.

ARTICLE 7 - Integrity

1 The *Provider* shall take all reasonable steps, in accordance with the standards commonly adopted by him, to monitor and maintain the quality and continuity of the provision of ADS-B data of the facilities specified in Annex B and F.

2 Where this is reasonably practicable the *Provider* shall give the *User* such notice in respect to any planned periodic break in service as soon as such information is available and a minimum of 24 hours notice in case of any other planned break in service.

3 The *Provider* shall report immediately or at the earliest reasonable opportunity any failure in the provision of the ADS-B data or any abnormality of ADS-B data provided, to the *User's* technical supervisor centre.

4 The *User* shall, in accordance with the standards commonly adopted by him, monitor the ADS-B data received from the *Provider* and report immediately or at the earliest

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reasonable opportunity any failure in the reception or any abnormality of the ADS-B data, to the <i>Provider's</i> technical supervisor centre.
ARTICLE 8 - Liability <i>[The requirements on this Article should be agreed bilaterally between States]</i>
ARTICLE 9a - Legal Aspects
ARTICLE 9b - Settlement of Dispute

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ARTICLE 10 - Correspondence
1 Correspondence to be applied in the framework of this Agreement is specified in Annex E.
ARTICLE 11 - Annexes
1 Annex A, B, C, D, E, F, G, H and I are attachments to this Agreement. The <i>Provider</i> and <i>User</i> , in mutual consent and formal acceptance, are allowed to amend and up-date, as circumstances deem necessary, the contents of the Annexes, in so far as the amendments are not in contradiction to or out of scope with the text in this Agreement.
ARTICLE 12 - Duration
1 The present Agreement shall enter into force on the day on which it is signed by the last of the contracting Parties, for a period of [duration to be decided by the Parties].
2 Thereafter, that period shall be automatically prolonged unless any of the contracting Parties has, by giving written notice at least [duration to be decided by the Parties] before the expiry of the contract period or the termination date of prolonged period, terminated the Agreement.
3 The Agreement can early terminate in the event the provision of ADS-B data as specified in Annex A hereof is to be permanently withdrawn from service. The <i>Provider</i> shall give to the <i>User</i> not less than [duration to be decided by Parties] notice in writing in advance thereof.
4 The Agreement can early terminate on request of the <i>User</i> in the event of modifications

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to be implemented. The *User* shall give to the *Provider* not less than [duration to be decided by Parties] notice in writing in advance thereof.

In witness whereof, the undersigned having been duly authorized, sign the present Agreement.

Done at [place] on [date] in the English language in [number] originals.

NOTE-If the Agreement is in more than one language the following text can be used to replace the previous paragraph.

Done at [place] on [date] in the English, [other language(s)] languages in [number] originals. In the event of any inconsistency, the text in the [language] language will prevail.

For [State's Organization/name of the (privatized) ATC Organisation, Provider] :
[name]
[function]

For [State's Organization/name of the (privatized) ATC Organisation, User] :
[name]
[function]

ANNEX A. PARTIES

A.1 In the Framework of this Agreement the providers and users are :

Provider 1 :

Provider 2:

User 1:

User 2:

(NB: In a many cases, each ANSP is likely to be both a Provider and user. Ie ANSP sends & receives

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ADS-B data))

☐ Having regard to Article 2 : Limitations,

the *Provider* authorises the *User* to communicate the provided ADS-B ground station data to the following parties :

insert the name of the 3rd parties (if any)

USER 1 :

- List of 3rd parties (if any)

USER 2 :

- List of 3rd parties (if any)

A.2 For this purpose, the *User* to this Agreement shall arrange for (an) identical ADS-B ground station Sharing Agreement(s) acting as *Provider*, with the specified parties.

NOTES -

Whenever the user wants to supply the ADS-B ground station data or a processed version thereof to a third party, the name of the third party has to be added to the list in this annex. The sharing agreement made between the user and the third party must be approved by the Provider in writing. The Provider decides whether it is necessary to update this agreement between Provider and user(s). The User could become a Provider of data to another specified party

ANNEX B. INTERFACE SPECIFICATION

B.1 This Annex describes the Interface Specification, needed for the interfacing between the *Provider* and the *User* to share ADS-B ground station data.

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B.2 ADS-B Data sharing interface

B.2.1 Data Elements

ADS-B messages shall comprise the data elements defined in Eurocontrol Asterix Category 21 version 0.23.

[NOTE : To include a definition: Asterix Category 21 shall mean Eurocontrol Asterix Category 21 Version 0.23.]

ADS-B Data received from each aircraft from each ADS-B ground station shall be transmitted at a rate of
<Rate to be agreed between *User & Provider*>

The Asterix Category 21 version 0.23 standard allows packaging of multiple ADS-B records into a single data block, or alternatively to place a single ADS-B record per data block. Record packaging shall be performed to the extent possible to minimise communication bandwidth requirements without delaying transmission of any given record.

B.2.2 Message Description

The message format shall be in accord with the Asia Pacific ADS-B data interface sharing standard :
Namely Asterix Cat 21 version 0.23.

<Not required>

B.2.4 Communication Protocol

NOTE : The communication protocol should be decided by the Parties. Relevant aspects of the communication protocol should be specified in this Annex such as ;

- name of the communication protocol including version of the protocol;
- options used of the protocol, if any;
- parameter setting;
- addressing issue;
- link speed; etc

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{eg The network layer is to be implemented using the Internet Protocol (IP). The network shall support Internet Group Management Protocol (IGMP) level 0, 1 and 2 as defined in RFC3300.

Note: IGMP level 1 supports transmission of Multicast datagrams, level 2 supports transmission and reception of multicast datagrams, while level 0 corresponds to IP unicast.

For Asterix messages, the Network Layer shall use the Internet Protocol (IP) for the delivery of packets using MULTICAST broadcast techniques. A multicast addressing scheme, as agreed, shall be used. }

B.2.5 Physical Aspects

Add appropriate details as available.

Eg DDS circuit using service from <Company>

Eg: Satellite datalink service using <Company> and Modems...

ANNEX C. MAINTENANCE

C.1 The maintenance, repair and replacement service for equipment installed at the *Provider's* and the *User's* premises shall include the following activities during normal working hours:

☐ routine maintenance, repair and replacement service for the equipment installed at the *Provider's* and the *User's* premises;

☐ support by staff for testing the equipment and modifications.

C.2 During as well as outside normal working hours, the maintenance service at their premises shall be carried out by the *Provider* and the *User* in accordance with the standards of maintenance commonly adopted by the *Provider* and the *User*.

C.3 The *User* shall collect and replace any faulty equipment or spare part, subject of this Agreement, at the *Provider's* and the *User's* premises.

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The *User* shall procure at its own expense the following maintenance and repair support service contracts:

☐ [equipment] with [maintenance and repair support agency]

.....

☐ [equipment] with [maintenance and repair support agency]

The *Provider* shall procure at its own expense the following maintenance and repair support service contracts:

☐ [equipment] with [maintenance and repair support agency]

<In some cases it may be appropriate for the Provider to procure or provide the maintenance of equipment located at the Provider premises>

C.4 For routine co-ordination and report the following technical supervisor centres shall be responsible:

At the *Provider's* premises : [telephone and fax number]

At the *User's* premises : [telephone and fax number]

ANNEX D. COST

<the details of cost issues will be agreed bi-laterally>

D.1 General

Costs borne by parties will based on a mutually-agreed basis between ANSPs of adjoining member States and/or ADS-B data service providers.

Costs considered include equipment costs, installation costs, maintenance costs, line or equipment

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lease costs, costs of performance reporting and costs of related services.

Cost apportionment is based upon the user-pays principle, elaborated as follows:

- (a) If an ADS-B ground station serves solely (or significantly) the need of the Provider, as far as possible the cost of installation and maintenance should be borne by the Provider.
- (b) If an ADS-B ground station provides surveillance data to the *Provider* as well as the *User*, the Provider may, if it desires to do so, work out the cost apportionment with the User. Cost apportionment should be on a mutually-agreed basis between the User & Provider, and could cover three cost components: (i) installation of the ADS-B ground station; (ii) maintenance of the ADS-B ground station; and (iii) costs of sharing of ADS-B surveillance data.
- (c) If it is necessary for an ADS-B ground station to be installed to serve solely (or significantly) the need of the *User*, the cost of installation and maintenance should, as far as possible be borne by the *User*.

D.2 Data Cost

The cost for providing ADS-B ground station data itself, as agreed between *provider(s)* and *User(s)* should be specified here. When the data is supplied free of charge it should be mentioned here too.

D.3 Installation Cost

The cost of installing communication circuits and the equipment for the provision of ADS-B ground station data as agreed between *provider(s)* and *User(s)* should be specified here.

D.4 Maintenance Cost

The routine maintenance, repair and replacement service for the equipment installed for the provision of ADS-B ground station data as agreed between *provider(s)* and *User(s)* should be specified here..

D.5 Periodical Cost

Periodic cost of rental of private circuits, private circuit line checks, service contracts or any other

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periodic rent or fee as agreed between *provider(s)* and *User(s)* should be specified here.

The use at the *Provider's* premises and the *User's* premises of any installation space and the use of the power supply as agreed between *provider(s)* and *User(s)* should be specified here.

D.6 System technical and operational support Cost

The cost of any technical or operational support provided by one party to the other to establish an operational and sustainable *Provider* ADS-B system as agreed between *provider(s)* and *User(s)* should be specified here..

D.7 Termination costs

The pre-agreed cost of termination of the *Provider* ADS-B system as agreed between *provider(s)* and *User(s)* should be specified here..

D.8 Modification costs

If the *User* require and *Provider* may agree to modify the service. In such cases, the costs of any modification shall be negotiated in good faith taking into account the principles of cost sharing as described above,.

ANNEX E. CORRESPONDENCE

All correspondence in connection with this agreement shall be mail as follows:

[*Provider* State's Organisation or name of ATC Organisation, mail address, email address, telephone and fax number]

[*User* State's Organisation or name of ATC Organisation, mail address, email address, telephone and fax number]

ANNEX F. EQUIPMENT PROVIDED BY ONE PARTY to the OTHER.

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(only required if necessary – which is unlikely)

ANNEX G. IMPLEMENTATION SCHEDULE

Define Milestones :

FIR1 to FIR2

- a) Inter FIR datalink installed for testing :<Dates>
- b) Completion of data link testing :<Dates>
- c) Ground station installation : <Dates>
- d) Availability of ADS-B data for testing :<Dates>
- e) Use of ADS-B data for situational awareness by ATC :<Date>
- f) Use of ADS-B data for delivery of separation services: :<Date>

FIR2 to FIR1

- g) Inter FIR datalink installed for testing :<Dates>
- h) Completion of data link testing :<Dates>
- i) Ground station installation : <Dates>
- j) Availability of ADS-B data for testing :<Dates>
- k) Use of ADS-B data for situational awareness by ATC :<Date>
- l) Use of ADS-B data for delivery of separation services: :<Date>

ANNEX H. FUNCTIONAL PERFORMANCE REQUIREMENT

Capacity : The *Provider* ADS-B system shall be able to support no less than <to be agreed between Parties> aircraft from every site at one time.

Accuracy : Accuracy is provided by the airborne avionics and no accuracy requirement is imposed on the *Provider* ground system.

Update Rate : The *Provider* ADS-B system shall provide positional and information updates at a rate of <To be agreed> times per second.

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The *Provider* ADS-B system may collect received ADS-B messages between updates and then transmit a composite message to the ATC centre using the most up to date positional data. This allows collection of velocity and positional data into a single Asterix package and lowers the processing load of the ATC system. When data is received from an aircraft, the *Provider* ADS-B system track data is updated.

Network latency : The ADS-B network shall deliver reports to the User interface within 2 seconds of their output from the ADS-B ground station for 95% of the time. (Tier 1)

Network latency : The ADS-B network shall deliver reports to the User interface within 15 seconds of their output from the ADS-B ground station for 95% of the time. (Tier 2)

The *Provider* ADS-B system shall provide a MTBF (loss of ADS-B Service) to the User interface exceeding 50,000 hours. (Tier 1)

This requirement will typically require

= the communications infrastructure to be completely duplicated without a single point of failure.

= Two ADS-B ground stations shall be installed at each site. There shall be no common point single point of failure . Each ground station shall provide ADS-B data to the ATC centre.

The *Provider* ADS-B system shall provide a MTBF (loss of ADS-B Service) to the User interface exceeding 400 hours. (Tier 2)

Availability : The service shall be provided with a service availability from each ground station site of better than 99.9%. In calculation of availability, planned outages shall be included. (Tier 1)

Availability : The service shall be provided with a service availability from each ground station site of better than 95%. In calculation of availability, planned outages shall be included. (Tier 2)

Integrity

Integrity of ADS-B data is critical to system safety. The ADS-B ground station, the data communication system, and any processing before the interface shall not introduce errors (compared to the received ADS-

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B messages) more frequent than 1 in every million messages (1×10^{-6}).

The provided service shall not deliver any received data to the interface which has not satisfied ADS-B downlink message cyclic redundancy checks (CRC)

Ground Station Receiver & Processing functionality requirements

The *Provider* ADS-B system shall be based upon Mode S extended squitter technology.

The *Provider* ADS-B system shall receive and decode all Mode S DF17, DF18 and DF19 messages defined in the RTCA standards DO-260 and DO-260A.

The *Provider* ADS-B system shall receive and decode Mode S DF17, DF18 and DF19 messages using the Lincoln Laboratory error detection and decoding techniques specified in RTCA DO-260 or demonstrate equivalent performance using other techniques

The *Provider* ADS-B system shall be configurable to transmit or not to the interface

- ◆ Messages for aircraft indicating they are “on ground”
- ◆ Messages resulting from aircraft equipped with DO260 compliant avionics
- ◆ Messages resulting from aircraft equipped with DO260A compliant avionics

The *Provider* ADS-B system shall be designed so that when DO260A messages are received, the *Provider* ADS-B system must calculate a Asterix FOM field. The FOM value for each combination of NIC, NAC and SIL shall be configurable and agreed

Site Monitor

The concept of the ADS-B Site Monitor is to independently test the end to end functional performance of the ADS-B System. The position, geometric altitude, FOM value, other asterix data and presence of the site monitor is tested by the ATC automation system

Site monitor Asterix messages including GPS determined position and GPS geometric altitude from each

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ADS-B ground station shall be transmitted to the interfaces to provide an independent system integrity verification function.

The FOM value that is transmitted to the ATC centre shall be based upon the HPL value of the GPS receiver

A failure of the site monitor shall not adversely affect the operation of the *Provider* ADS-B system equipment.

ANNEX I. COVERAGE or GROUND STATION DETAILS

- The category of service and coverage of each source of ADS-B data provided;
- Which party is the provider for each source

Describe either the coverage volume or ground station supporting the shared service:

Eg:

Coverage volume : Above FL180 within the geographical region defined in the attached diagram.>

Or

Within line of sight coverage from ADS-B ground station at <lat-Long>