CAR/SAM AIR NAVIGATION PLAN

VOLUME I, BASIC ANP

PROPOSED NEW LAYOUT AND CONTENT

06 November 2012

FOREWORD

The principles that were adopted in the proposed layout of the Basic ANP and how this is foreseen to relate to the FASID and Supporting material are:

1. There should be a clear relationship between the Regional Plan (in this case, the CAR/SAM ANP - Doc 8733), the Global Air Navigation Plan (Doc 9750), the Global ATM Operational Concept (Doc 9854).

2. The Basic ANP should reflect the conceptual objectives for the region whilst including the current to medium term requirements. The material included should minimise the requirement for continual amendment. Dynamic lists such as descriptions of ATS routes are referenced to the FASID as appropriate or flagged as candidates for the proposed web-based air navigation planning tool.

3. The FASID should provide sufficient detail of current and emerging programmes to provide the reader with an overview and sufficient detail of the current to short-term environment.

4. Guidance material on the detail of programmes or Concepts should be contained in supplementary material referenced appropriately or adopted as CAR/SAM Documents.

TABLE OF CONTENTS

CAR/SAM ANP, VOLUME I, BASIC ANP

PART 0 – INTRODUCTION

GENERAL

0 Air navigation plans (ANPs) set forth in detail the facilities, services and procedures required for international air navigation within a specified area. Such plans contain recommendations that States can follow in programming the provision of their air navigation facilities and services, with the assurance that facilities and services furnished in accordance with the plan will form with those of other States an integrated system adequate for the foreseeable future.

0.1 On 26 February 1997, the ICAO Council decided that the regional air navigation plans should be published in two volumes: a Basic ANP and a Facilities and Services Implementation Document (FASID). It was agreed that the Basic ANP would contain stable plan material, including the Basic Operational Requirements and Planning Criteria (BORPC), as approved by the Air Navigation Commission (ANC) for application in all regions.

0.2 On 8 March 2011, the ICAO Council decided that the BORPC should be withdrawn from all regional air navigation plans and that an updated BORPC will be included in the Global Air Navigation Plan (Doc 9750).

0.3 The Basic ANP contains stable plan material such as:

a) the geographical area constituted by the flight information regions (FIRs) covered by the plan; and

b) the latest planning and implementation guidance formulated for the region through recommendations by the region's Planning and Implementation Regional Group (PIRG). The material included should minimise the requirement for continual amendment.

0.4 The FASID sets forth the dynamic material from the plan constituted by the facilities and services required for international air navigation within the specified area. The FASID would also include appropriate additional guidance, particularly with regard to implementation, to complement the material contained in the Basic ANP.

INTRODUCTION OF PERFORMANCE BASED REQUIREMENTS INTO THE PLAN

0.5 The traditional focus of a regional ANP has been to cover the facilities and services required for a period of five years. However, with the introduction of performance based requirements, with longer planning horizons, it is recognized that concepts such as Performance Based Navigation (PBN), Required Communication Performance (RCP) and the developing Performance Manual for Air Navigation Services will be introduced progressively into the Regional ANP. Introduction of such performance based requirements is guided by the ICAO Global Air Navigation Plan (Doc 9750), which has

been developed so that it has a clear and functional relationship with the regional ANPs. The evolution and development of the Regional ANP will also be guided by the ATM Operational Concept (Doc 9854) as well as further Global agreements and recommendations resulting from the Air Navigation Conferences and other ICAO global events and as amended from time to time,

RELATIONSHIP BETWEEN GLOBAL, REGIONAL AND NATIONAL PLANNING

0.6 Planning takes place at global, regional and national levels. Planning is accomplished with the help of planning tools and methodologies that are used primarily at the regional and national levels, conditioned by guidance from the global level. The basis for effective planning is the ATM operational concept, which should support the development of regional and national implementation plans that will guide/support system architectures under a cost-effective manner.

STATES' RESPONSIBILITIES

0.7 Each Contracting State is responsible for the provision of facilities and services in its territory under Article 28 of the Convention. The Council has recommended that these facilities and services include those specified in the air navigation plans.

0.8 Inclusion in air navigation plan documents of basic facilities and services provided by non-Contracting States and territories is simply recognition that they are needed by or likely to affect international civil aircraft operations of Contracting States or the facilities and services of these States.

Note. — Non-Contracting States in the CAR/SAM regions are: Dominica

CONTENTS OF AIR NAVIGATION PLAN — CAR/SAM REGION

0.9 This basic air navigation plan document presents in general terms the ICAO plan for the provision of facilities and services for international air navigation in the ICAO Caribbean and South American Regions. It has incorporated in an evolutionary manner requirements emanating from the ICAO Global Air Navigation Plan. In this respect the Plan spans current requirements whilst indicating the development path to reach the Global ATM Operational Concept. The companion element to this plan, the CAR/SAM FASID, and in time an associated global database[1], includes detailed information on States' facilities, services, and plans for implementation. The FASID and associated database will be routinely updated to reflect the implementation of Regional Planning Initiatives and Programmes. Facilities and services outside of the prescribed regional boundaries may also be included in order to maintain the integrity of "systems" and to ensure in so far as possible that all the facilities and services required are listed in the document.

0.10 It should also be noted that the CAR/SAM ANP, does not list all facilities in the region but only those required for international civil aviation operations. Documents from the

[1] Details of ATS routes, reporting points and other such data will be migrated to an Integrated Web-based Air navigation Tool and the reader will be provided with an electronic link to access the material.

Integrated Aeronautical Information Package, State documents and other publications should be consulted for information on additional facilities and for operational information in general.

ESTABLISHMENT AND PROVISION OF MULTINATIONAL ICAO CAR/SAM AIR NAVIGATION FACILITY/SERVICE

0.11 The operation of multinational air navigation services is well established within the CAR/SAM Regions. ICAO Doc 9082 details the ICAO policies on charges for air navigation services. ICAO Doc 9161 – *Manual on Air Navigation Services Economics* provides additional information on the various models adopted globally. The introduction of multi-national air navigation services does not dilute the principle that a State has the responsibility of overseeing the provision of air navigation services and that it shall maintain that responsibility within its sovereign airspace as well as within the airspace over the high seas for which it has accepted the responsibility for the provision of services. Where there is no intention to change or modify the flight information region (FIR) boundaries nor the facilities and services currently listed in the ANP there is not a requirement to amend the ANP. However, should changes to the FIR boundaries or to the facilities and services provided be required, such changes are likely to be subject to the ANP amendment procedure and should therefore be examined on a case-by-case basis[2]. Any multinational arrangements for the provision of air navigation services should be registered with ICAO (Article 83 of the Convention (Doc 7300) and Rules for Registration with ICAO of Aeronautical Agreements and Arrangements (Doc 6685).

PROCEDURE FOR THE AMENDMENT OF REGIONAL PLANS, INCLUDING FASID MATERIAL

0.12 The Basic ANP and FASID may be amended by a regional air navigation meeting or by following the amendment procedures below.

PROCEDURE FOR THE AMENDMENT OF APPROVED BASIC AIR NAVIGATION PLANS

Approved by Council on 25 February 1998

Introduction

0.13 The procedure outlined below has been evolved to provide a means of maintaining basic regional plans in a current condition by correspondence.

General criteria

0.14 The Assembly has resolved that regional plans shall be revised when it becomes apparent that they are no longer consistent with current and foreseen requirements of international civil aviation and that, when the nature of a required change permits, the associated

amendment of the regional plan shall be undertaken by correspondence between the Organization and the Contracting States and international organizations concerned.

0.15 When a State cannot immediately implement a particular part or a specific detail of a regional plan, although it intends to do so when practicable, this in itself should not cause the State to propose an amendment to the plan.

Procedure

0.16 If, in the light of the above criteria, any Contracting State (or group of States) of a region wishes to effect a change in the approved basic air navigation plan for that region it should propose to the Secretary General, through the regional office accredited to that State, an appropriate amendment to the plan, adequately documented; the proposal should include the facts that lead the State to the conclusion that the amendment is necessary. Such amendments may include additions, modifications or deletions. (This procedure does not preclude a State having previous consultation with other States before submitting an amendment proposal to the regional office.)

0.17 The Secretary General will circulate the proposal, adequately documented, with a request for comments to all providers and user States of the region considered affected as well as to user States outside the region and international organizations which may be invited to attend suitable ICAO meetings and which may be concerned with the proposal. If, however, the Secretary General considers that the proposed amendment conflicts with established ICAO policy, or that it raises questions which the Secretary General considers should be brought to the attention of the Air Navigation Commission, the proposal will be first presented, adequately documented, to the Commission. In such cases, the Commission will decide the action to be taken on the proposal.

0.18 If, in reply to the Secretary General's inquiry to States and selected international organizations, no objection is raised to the proposal by a date specified, the proposal shall be submitted to the President of the Council, who is authorized to approve the amendment on behalf of the Council.

0.19 If, in reply to the Secretary General's inquiry to States and selected international organizations any objection is raised, and if objection remains after further consultation, the matter will be documented for formal consideration by the Air Navigation Commission. If the Commission concludes that the amendment is acceptable in its original or other form, it will present appropriate recommendations to the Council.

0.20 Proposals for the amendment of regional plans submitted by international organizations directly concerned with the operation of aircraft, which may be invited to attend suitable ICAO meetings and which attended the meeting(s) where the relevant plan was prepared, will be dealt with in the same manner as those received from States, except that, before circulating a proposal to States and selected international organizations pursuant to 3.2 above, the Secretary General will ascertain whether it has adequate support from the State or States whose facilities will be affected. If such support is not forthcoming, the proposal will be presented to the Commission, and the Commission will decide on the action to be taken on the proposal.

0.21 Proposals for the amendment of regional plans may also be initiated by the Secretary General provided that the State or States whose facilities will be affected have expressed their concurrence with the proposal.

0.22 Amendment to regional plans which have been approved in accordance with the above procedure will be promulgated at convenient intervals.

PROCEDURE FOR THE AMENDMENT OF THE FACILITIES AND SERVICES IMPLEMENTATION DOCUMENT (FASID)

Approved by Council on 26 February 1997

0.23 Amendments to the FASID shall be effected on the basis of an adequately documented proposal submitted by a Contracting State (or a group of States) to the ICAO Regional Office; the proposal should include the facts that lead to the conclusion that the amendment is necessary. Such amendments may include additions, modifications or deletions to the FASID. (This procedure does not preclude a State having previous consultation with other States before submitting the amendment proposal to the ICAO Regional Office.)

0.24 The ICAO Regional Office will circulate the proposal, adequately documented, with a request for comments to the provider States in the region and to user States except those which obviously are not affected, and, for information and comments if necessary, to international organizations which may be invited to attend suitable ICAO meetings and which may be concerned with the proposal. If, however, it is considered that the proposed amendment conflicts with established ICAO policy, or that it raises questions which should be brought to the attention of the Air Navigation Commission, the proposal will be adequately documented and presented to the Air Navigation Commission. In such cases, the Commission will decide the action to be taken on the proposal.

0.25 If, in reply to the ICAO Regional Office's inquiry, no objection is raised to the proposal by a specified date, it will be deemed that a regional agreement on the subject has been reached and the proposal shall be incorporated into the FASID.

0.26 If, in reply to the ICAO Regional Office's inquiry, any State objects to the proposal, and if objection remains after further consultation, the matter will be documented for discussion by the respective planning and implementation regional group (PIRG) and, ultimately for formal consideration by the Air Navigation Commission, if necessary. If the Commission concludes that the amendment is acceptable in its original or other form, it will present appropriate recommendations to the Council.

0.27 Proposals for the amendment of the FASID submitted by international organizations directly concerned with the operation of aircraft in the region, which may be invited to attend suitable ICAO meetings where the FASID was prepared, will be dealt with in the same manner as those received from States, except that, before circulating the proposal to all interested States, it will be ascertained whether the proposal has adequate support from the State or States whose facilities or services will be affected. If such support is not forthcoming, the proposal will not be pursued.

0.28 Proposals for the amendment of the FASID may also be initiated by the ICAO Regional Office provided that the State or States whose facilities or services will be affected have expressed their concurrence with the proposal.

0.29 Amendments to the FASID which have been approved in accordance with the above procedure will be promulgated at convenient intervals.

Comment [R1]: Include the current electronic amendment system

ABBREVIATIONS

0.30 All abbreviations used in this document are contained in the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC)* (Doc 8400), with the exception of those used in the explanations of any tables appearing herein, which also give their meaning.

INDEX OF STATES AND TERRITORIES REFLECTING THE GEOGRAPHICAL SCOPE OF REGIONAL ANP, PIRG MEMBERSHIP AND REGIONAL OFFICE ACCREDITATION

0.31 This index is for the purpose of determining the geographical scope of the Regional Air Navigation Plan (ANP) and the associated Planning and Implementation Regional Group (PIRG) and Regional Office (R/O) that organize the planning and implementation of that Region.

0.32 Explanation of the List:

Regional Office (R/O)	APAC: Bangkok: Asia and Pacific (APAC) Office ESAF: Nairobi: Eastern and Southern African (ESAF) Office EUR/NAT: Paris: European and North Atlantic (EUR/NAT) Office MID: Cairo: Middle East (MID) Office NACC: Mexico: North American, Central American and Caribbean (NACC) SAM: Lima: South American (SAM) Office WACAF: Dakar: Western and Central African (WACAF) Office
Regional Air Navigation Plan (ANP)	AFI: *Air Navigation Plan – Africa-Indian Ocean Region* (Doc 7474) APAC: *Air Navigation Plan – Asia and Pacific Regions* (Doc 9673) CARSAM: *Air Navigation Plan – Caribbean and South American Regions* (Doc 8733) EUR: *Air Navigation Plan - European Region* (Doc 7754) MID: *Air Navigation Plan – Middle East Region* (Doc 9708) NAT: *Air Navigation Plan – North Atlantic Region* (Doc 9634 and 9635)
Planning and Implementation Regional Group (PIRG)	APIRG: AFI Planning and Implementation Regional Group (APIRG): APANPIRG: ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) EANPG: European Air Navigation Planning Group (EANPG) GREPECAS: CAR/SAM Regional Planning and Implementation Group Caribbean/South American (GREPECAS) MIDANPIRG: MID Air Navigation Planning and Implementation Regional Group (MIDANPIRG) NATSPG: North Atlantic Systems Planning Group (NAT SPG)
(NC)	Non-contracting State

State	R/O	ANP	PIRG(s)
Afghanistan	APAC	MID	
Albania	EUR/NAT	EUR	EANPG
Algeria	EUR/NAT	AFI	APIRG
Andorra	EUR/NAT	EUR	EANPG
Angola	ESAF	AFI	APIRG
Antigua and Barbuda	NACC	CARSAM	GREPECAS
Argentina	SAM	CARSAM	GREPECAS
Armenia	EUR/NAT	EUR	EANPG
Australia	APAC	APAC	APANPIRG
Austria	EUR/NAT	EUR	EANPG
Azerbaijan	EUR/NAT	EUR	EANPG
Bahamas	NACC	CARSAM	GREPECAS
Bahrain	MID	MID	MIDANPIRG
Bangladesh	APAC	APAC	APANPIRG
Barbados	NACC	CARSAM	GREPECAS
Belarus	EUR/NAT	EUR	EANPG
Belgium	EUR/NAT	EUR	EANPG
Belize	NACC	CARSAM	GREPECAS
Benin	WACAF	AFI	
Bhutan	APAC	APAC	
Bolivia	SAM	CARSAM	GREPECAS
Bosnia and Herzegovina	EUR/NAT	EUR	EANPG
Botswana	ESAF	AFI	
Brazil	SAM	CARSAM	GREPECAS
Brunei Darussalam	APAC	APAC	
Bulgaria	EUR/NAT	EUR	EANPG
Burkina Faso	WACAF	AFI	
Burundi	ESAF	AFI	
Cambodia	APAC	APAC	APANPIRG
Cameroon	WACAF	AFI	APIRG
Canada	NACC	NAT APAC	NATSPG
Cape Verde	WACAF	AFI	
Central African Republic	WACAF	AFI	
Chad	WACAF	AFI	
Chile	SAM	CARSAM	GREPECAS
China	APAC	APAC	APANPIRG
China (Hong Kong)	APAC	APAC	APANPIRG
China (Macao)	APAC	APAC	APANPIRG
Colombia	SAM	CARSAM	GREPECAS
Comoros	ESAF	AFI	
Congo	WACAF	AFI	APIRG
Cook Islands	APAC	APAC	
Costa Rica	NACC	CARSAM	GREPECAS
Cote d'Ivoire	WACAF	AFI	APIRG

State	R/O	ANP	PIRG(s)
Croatia	EUR/NAT	EUR	EANPG
Cuba	NACC	CARSAM	GREPECAS
Cyprus	EUR/NAT	EUR	EANPG
Czech Republic	EUR/NAT	EUR	EANPG
Democratic People's Rep. of Korea	APAC	APAC	APANPIRG
Democratic Republic of the Congo	WACAF	AFI	
Denmark	EUR/NAT	EUR NAT	EANPG NATSPG
Denmark (Faeroes)	EUR/NAT	NAT	NATSPG
Denmark (Greenland)	EUR/NAT	NAT	NATSPG
Djibouti	ESAF	AFI	
Dominica	NACC	(NC)	
Dominican Republic	NACC	CARSAM	GREPECAS
Ecuador	SAM	CARSAM	GREPECAS
Egypt	MID	AFI MID	MIDANPIRG APIRG
El Salvador	NACC	CARSAM	GREPECAS
Equatorial Guinea	WACAF	AFI	
Eritrea	ESAF	AFI	APIRG
Estonia	EUR/NAT	EUR	EANPG
Ethiopia	ESAF	AFI	APIRG
Fiji	APAC	APAC	APANPIRG
Finland	EUR/NAT	EUR	EANPG
France	EUR/NAT	EUR	GREPECAS NATSPG EANPG APANPIRG APIRG
France (French Antilles)	NACC	CARSAM	GREPECAS
France (French Guiana)	SAM	CARSAM	GREPECAS
France (French Polynesia)	APAC	APAC	
France (New Caledonia)	APAC	APAC	
France (Réunion)	ESAF	AFI	APIRG
France (Wallis and Futuna Island)	APAC	APAC	
Gabon	WACAF	AFI	APIRG
Gambia	WACAF	AFI	APIRG
Georgia	EUR/NAT	EUR	EANPG
Germany	EUR/NAT	EUR	EANPG
Ghana	WACAF	AFI	APIRG
Greece	EUR/NAT	EUR	EANPG
Grenada	NACC	CARSAM	GREPECAS
Guatemala	NACC	CARSAM	GREPECAS
Guinea	WACAF	AFI	APIRG
Guinea-Bissau	WACAF	AFI	
Guyana	SAM	CARSAM	GREPECAS

State	R/O	ANP	PIRG(s)
Haiti	NACC	CARSAM	GREPECAS
Holy See (the)	EUR/NAT	(NC)	-
Honduras	NACC	CARSAM	GREPECAS
Hungary	EUR/NAT	EUR	EANPG
Iceland	EUR/NAT	NAT	NATSPG
India	APAC	APAC	APANPIRG
Indonesia	APAC	APAC	APANPIRG
Iran (Islamic Republic of)	MID	MID	MIDANPIRG
Iraq	MID	MID	MIDANPIRG
Ireland	EUR/NAT	EUR	EANPG NATSPG
Israel	EUR/NAT	EUR	EANPG
Italy	EUR/NAT	EUR	EANPG
Jamaica	NACC	CARSAM	GREPECAS
Japan	APAC	APAC	APANPIRG
Jordan	MID	MID	MIDANPIRG
Kazakhstan	EUR/NAT	EUR	EANPG
Kenya	ESAF	AFI	APIRG
Kiribati	APAC	APAC	
Kuwait	MID	MID	
Kyrgyzstan	EUR/NAT	EUR	EANPG
Lao Peoples' Democratic Republic	APAC	APAC	
Latvia	EUR/NAT	EUR	EANPG
Lebanon	MID	MID	MIDANPIRG
Lesotho	ESAF	AFI	APIRG
Liberia	WACAF	AFI	
Libyan Arab Jamahiriya	MID	AFI	
Liechtenstein	EUR/NAT	(NC)	-
Lithuania	EUR/NAT	EUR	EANPG
Luxembourg	EUR/NAT	EUR	EANPG
Madagascar	ESAF	AFI	
Malawi	ESAF	AFI	APIRG
Malaysia	APAC	APAC	APANPIRG
Maldives	APAC	APAC	
Mali	WACAF	AFI	APIRG
Malta	EUR/NAT	EUR	EANPG
Marshall Islands	APAC	APAC	
Mauritania	WACAF	AFI	APIRG
Mauritius	ESAF	AFI	
Mexico	NACC	CARSAM	GREPECAS
Micronesia (Federated States of)	APAC	APAC	
Monaco	EUR/NAT	EUR	EANPG
Mongolia	APAC	APAC	
Montenegro	EUR/NAT	EUR	EANPG
Morocco	EUR/NAT	AFI	APIRG
Mozambique	ESAF	AFI	

State	R/O	ANP	PIRG(s)
Myanmar	APAC	APAC	
Namibia	ESAF	AFI	
Nauru	APAC	APAC	
Nepal	APAC	APAC	
Netherlands	EUR/NAT	EUR	EANPG
Aruba	NACC	CARSAM	GREPECAS
Curacao	NACC	CARSAM	GREPECAS
Netherlands (Bonaire, St. Eustatius and Saba)	NACC	CARSAM	GREPECAS
New Zealand	APAC	APAC	APANPIRG
New Zealand (Niue)	APAC	APAC	APANPIRG
Nicaragua	NACC	CARSAM	GREPECAS
Niger	WACAF	AFI	APIRG
Nigeria	WACAF	AFI	APIRG
Norway	EUR/NAT	EUR NAT	EANPG NATSPG
Oman	MID	MID	MIDANPIRG
Pakistan	APAC	APAC	APANPIRG
Palau	APAC	APAC	
Panama	SAM	CARSAM	GREPECAS
Papua New Guinea	APAC	APAC	
Paraguay	SAM	CARSAM	GREPECAS
Peru	SAM	CARSAM	GREPECAS
Philippines	APAC	APAC	
Poland	EUR/NAT	EUR	EANPG
Portugal	EUR/NAT	EUR NAT	EANPG NATSPG
Portugal (Açores)	EUR/NAT	NAT	NATSPG
Portugal (Madeira)	EUR/NAT		
Qatar	MID	MID	
Republic of Korea	APAC	APAC	APANPIRG
Republic of Moldova	EUR/NAT	EUR	EANPG
Romania	EUR/NAT	EUR	EANPG
Russian Federation	EUR/NAT	EUR	EANPG
Rwanda	ESAF	AFI	
Saint Kitts and Nevis	NACC	CARSAM	GREPECAS
Saint Lucia	NACC	CARSAM	GREPECAS
Saint Vincent & the Grenadines	NACC	CARSAM	GREPECAS
Saint Maarten	NACC	CARSAM	GREPECAS
San Marino	EUR/NAT	EUR	EANPG
Sao Tome And Principe	WACAF	AFI	
Saudi Arabia	MID	MID	MIDANPIRG
Senegal	WACAF	AFI	APIRG
Serbia	EUR/NAT	EUR	EANPG
Seychelles	ESAF	AFI	
Sierra Leone	WACAF	AFI	
Singapore	APAC	APAC	APANPIRG

State	R/O	ANP	PIRG(s)
Slovakia	EUR/NAT	EUR	EANPG
Slovenia	EUR/NAT	EUR	EANPG
Solomon Islands	APAC	APAC	
Somalia	ESAF	AFI	
South Africa	ESAF	AFI	APIRG
Spain	EUR/NAT	EUR	EANPG APIRG
Spain (Canary Islands)	WACAF	AFI	
Sri Lanka	APAC	APAC	
Sudan	MID	AFI	
Suriname	SAM	CARSAM	GREPECAS
Swaziland	ESAF	AFI	
Sweden	EUR/NAT	EUR	EANPG
Switzerland	EUR/NAT	EUR	EANPG
Syrian Arab Republic	MID	MID	
Tajikistan	EUR/NAT	EUR	EANPG
Thailand	APAC	APAC	APANPIRG
The former Yugoslav Republic of Macedonia	EUR/NAT	EUR	EANPG
Timor-Leste	APAC		
Togo	WACAF	AFI	APIRG
Tonga	APAC	APAC	APANPIRG
Trinidad and Tobago	NACC	CARSAM	GREPECAS
Tunisia	EUR/NAT	AFI	APIRG
Turkey	EUR/NAT	EUR	EANPG
Turkmenistan	EUR/NAT	EUR	EANPG
Tuvalu	APAC	(NC)	
Uganda	ESAF	AFI	APIRG
Ukraine	EUR/NAT	EUR	EANPG
United Arab Emirates	MID	MID	MIDANPIRG
United Kingdom	EUR/NAT	EUR	EANPG NATSPG GREPECAS
United Kingdom (Anguilla)	NACC	CARSAM	GREPECAS
United Kingdom (Bermuda)	NACC	NAT	NATSPG
United Kingdom (British Indian Ocean Territory)	ESAF		
United Kingdom (British Virgin Islands)	NACC	CARSAM	GREPECAS
United Kingdom (Cayman Islands)	NACC	CARSAM	GREPECAS
United Kingdom (Falkland Islands *Malvinas)	SAM	(*Disputed)	
United Kingdom (Gibraltar)	EUR/NAT	CAR/SAM	
United Kingdom (Montserrat)	NACC	CARSAM	GREPECAS
United Kingdom (Pitcairn Island)	APAC		
United Kingdom (Saint Helena)	WACAF		

State	R/O	ANP	PIRG(s)
United Kingdom (Turks and Caicos Islands)	NACC	CARSAM	GREPECAS
United Republic of Tanzania	ESAF	AFI	APIRG
United States (Guam)	APAC	APAC	
United States (Johnston Island)	APAC	APAC	
United States (Kingman Reef)	APAC		
United States (Midway)	APAC		
United States (Northern Mariana Islands)	APAC	APAC	
United States (Palmyra)	APAC		
United States (Puerto Rico)	NACC	CARSAM	GREPECAS
United States (Samoa)	APAC	APAC	
United States (Virgin Islands)	NACC	CARSAM	
United States (Wake Island)	APAC		
United States of America	NACC	NAT APAC	NATSPG APANPIRG GREPECAS
Uruguay	SAM	CARSAM	GREPECAS
Uzbekistan	EUR/NAT	EUR	EANPG
Vanuatu	APAC	APAC	
Venezuela	SAM	CARSAM	GREPECAS
Viet Nam	APAC	APAC	APANPIRG
Western Sahara		AFI	
Yemen	MID	MID	
Zambia	ESAF	AFI	APIRG
Zimbabwe	ESAF	AFI	APIRG

Comment [R2]: It must be updated after ANC/12

CAR/SAM ANP, VOLUME I, BASIC ANP

PART I – CAR/SAM REGION GENERAL PLANNING ASPECTS (GEN)

GEOGRAPHICAL SCOPE

1 In geographical scope the CAR/SAM Region Air Navigation Plan is related to the ICAO Caribbean and South American air navigation region. The plan may call for the provision of basic facilities and services beyond the charted boundaries of a region where such facilities and services are necessary to meet the requirements of international air navigation within that region.

TECHNICAL SCOPE

1.1 In technical scope the plans comprise statements of required facilities and services under the AOP, AIM, ATM, CNS, MET and SAR fields, in sufficient detail to ensure proper functioning of the plan as a whole and its adequacy to meet present and foreseen operational requirements under a Performance based approach. Any special procedures or guidance material considered necessary to supplement the worldwide procedures contained in Annexes and PANS shall be reference to the supplementary GREPECAS material. As living documents, the format and content of the Basic ANP and FASID should be kept under review by the CAR/SAM Regional Planning and Implementation Group (GREPECAS).

SUB-REGIONAL GROUPINGS

1.2 The States/territories within the ICAO CAR Region are also members of the NAM/ CAR regional grouping which have development plans to improve air navigation services and are coordinated with the SAM region; such plans contribute to the regional implementation of the ICAO Global Planning Initiatives.

FLIGHT INFORMATION REGIONS

1.3 Flight Information Regions (FIR) and Upper Flight Information Regions (UIR) within the CAR/SAM Regions are listed below. (insert graphic)

AIR TRAFFIC FORECAST

1.4 Air traffic forecasts are produced in response to the needs of Contracting States of ICAO, air navigation service providers and regional planning groups, in particular the GREPECAS. Long-range forecasts of passenger traffic are produced for the CAR/SAM regions, encompassing the six major route groups to, from and within the Region. The forecasts cover passenger and aircraft movements' traffic. Passenger traffic forecasts are based on assumptions made for economic growth and passenger yields. Aircraft movement's traffic forecasts are based on assumptions for future trends in average load factors and average aircraft seating capacity. Additionally the projections of aircraft movements traffic for the top 25 city pairs in each of the major route groups was considered. To this end, flight data are collected from air traffic control centres/air navigation service providers. The Caribbean/South American (CAR/SAM) Region

Traffic Forecasting Group (TFG) forecasts are updated periodically in conjunction with TFG meetings, and their format and content will be modified progressively to respond to the requirements of primary users such as GREPECAS.

1.5 Doc 9940, Caribbean/South American Regional Traffic Forecasts 2009–2030 provides the forecasts for air passenger traffic and aircraft movements as well as peak period analysis, used to support the planning of air navigation services in the Region. The base year was 2009, and the forecasts were done for the periods 2010 to 2014 and target years 2019 and 2030.

PERFORMANCE BASED APPROACH

Global Approach

1.6 States have agreed that Global Air Navigation should be predicated on a performance based environment. The transition to such a performance based environment results in consideration of a number of differing expectations. These general expectations are relative to the effective operation of the ATM system and include access and equity; capacity; cost effectiveness; environmental impact; flexibility; flight efficiency; interoperability; participation and collaboration; predictability; safety; and security. These expectations often compete with each other. Some aviation community members (the *Global Air Traffic Management Operational Concept* (Doc 9854) refers) have explicit economic expectations, others favour efficiency and predictability, while some are concerned with access and equity; and all have safety expectations. For optimum air navigation system performance, each of these sometimes competing expectations needs to be balanced. In an integrated system, changes to one expectation area will likely have an effect on other areas. It is necessary, therefore, to assess the effect on the whole system when planning a change in a specific area. This may require, or lead to, trade-offs in performance. This is generally acceptable with the exception of safety, wherein acceptable levels of safety must be achieved. The ICAO planning objective is to achieve a performance based global air traffic management (ATM) system through the implementation of air navigation systems and procedures in a safe, progressive, cost-effective and cooperative manner.

CAR/SAM Region Planning

1.7 The regional planning and implementation process is the principal engine of ICAO's planning framework. It is here that the top-down approach comprising global guidance and regional harmonization measures converge with the bottom-up approach constituted by national planning by States. In an effort to assist planners in weighing outcomes and making appropriate decisions, the *Manual on Global Performance of the Air Navigation System* (Doc 9883) has been developed. In this respect ICAO has defined 11 Key Performance Areas (KPA), one for each of the *Global ATM Operational Concept* (Doc 9854) expectations outlined in Paragraph 4.1 above.

1.8 Within the CAR and SAM Region, performance objectives based on the ICAO KPA are respectively being developed by the NAM/CAR Air Navigation Implementation Working Group (NAM/CAR ANIWG) and SAM implementation Group (SAM/IG) Whilst these performance objectives will be common throughout the CAR and SAM Regions, it is envisaged that local performance targets and related key performance indicators (KPI)

with associated metrics and data collection requirements will be tailored to meet the specific needs within the respective NAM/CAR and SAM homogeneous areas.

1.9 The development of common CAR and SAM Regions performance objectives and associated KPI will be managed through the GREPECAS process. Initial objectives and associated indicators for safety; capacity; efficiency and environment; and cost-efficiency have been developed.

1.10 The introduction of performance objectives, local performance targets, associated KPI and data metrics is a dynamic process requiring routine review. Consequently, details of this performance material will be shown in the CAR/SAM FASID.

GLOBAL PLANNING INITIATIVES (GPI)

1.11 *The Global Air Navigation Plan* (Doc 9570) was developed in consideration of the operational concept and the Strategic Objectives of ICAO. Most significantly, the revised Global ANP was developed on the basis of an industry roadmap which was developed in follow up to the Eleventh Air Navigation Conference in an effort to facilitate implementation of the Recommendations of the Conference and ensure that focused efforts would lead to near- and medium-term benefits. The Global ANP, therefore, contains near- and medium-term guidance on air navigation system improvements necessary to support a uniform transition to the ATM system envisioned in the ATM operational concept (Doc 9854). Long-term initiatives will be added to the Global ANP as the technology matures and the supporting provisions are developed. In accordance with the Global ANP, planning will be focused on specific performance objectives, supported by a set of "Global Plan Initiatives" (GPI). These initiatives are options for air navigation system improvements that when implemented result in direct performance enhancements. States and regions will choose initiatives that meet performance objectives, identified through an analytical process, specific to the particular needs of a State, region, homogeneous ATM area or major traffic flow.

1.12 A full description of ICAO GPIs is provided in Chapter 1 of the Global Air Navigation Plan.

REGIONAL PLANNING INITIATIVES (RPI)

1.13 The adoption of the Global ATM Operational Concept (Doc 9854) and the Global Air Navigation Plan (Doc 9570) has resulted in a number of proposed CAR/SAM Region ATM/CNS improvement requirements, which stem from the Global GPIs described above. Within the CAR/SAM Region the GREPECAS is responsible for the management and review of the ICAO CAR/SAM Region Air Navigation Plan. Consequently the inclusion of air navigation service improvement programmes at regional and sub-regional level will be endorsed through the GREPECAS process. States concerned will, however, retain responsibility for the implementation of such programmes and plans.

REGIONAL PLANNING CONCEPT (RPC)

1.14 The Regional Implementation Concept defined by GREPECAS is linked to ATM improvements for the CAR/SAM region and the CNS requirements this generates. ATM

improvements have been defined on the basis of the major international traffic flows identified in the homogeneous areas as set out in Part II of the FASID.

1.15 The method of identifying homogeneous ATM areas involves consideration of the varying degrees of complexity and diversity of the worldwide air navigation infrastructure. Based on these considerations, it is considered that planning could best be achieved, at the global level, if it were organized based on ATM areas of common requirements and interest, taking into account traffic density and level of sophistication required.

1.16 Major international traffic flows consist of areas which include groupings of routes wherein it is specified a detailed plan for the implementation of CNS/ATM systems and procedures, where the objective is to attain a seamless system throughout the area concerned. These are defined by origin and destination geographic areas which could be States/Territories, specific portions of States/Territories, or groupings of smaller States/Territories. They may also include oceanic and continental en-route areas.

1.17 The basic planning parameter is the number of aircraft movements which must be provided with ATM services along a particular international flow. Estimates and forecasts of annual aircraft movements over the planning period are required for high-level planning. Forecasts of aircraft movements in peak periods, such as during a particularly busy hour, are needed for detailed planning. Additionally, the establishment of major international traffic flows will require appropriate civil/military coordination and consideration of special use airspace.

1.18 Considering the global guidelines described in the preceding paragraphs, the CAR/SAM regions should take into account the need to coordinate their regional plan with the adjacent regions, since air traffic density between these regions and the CAR/SAM regions is considerable.

STATES'/TERRITORIES' PLANS

1.19 States/Territories have the responsibility for implementation Air Navigation Services and Systems within their areas of responsibility. It will, however, be necessary for each State within the CAR/SAM regions to develop and publish its own Performance-based Air Navigation implementation plan following ICAO ASBU methodology. These State plans should be coordinated within the FIRs and with adjacent FIRs to ensure the optimum use is made of all aspects of Air Navigation.

HUMAN FACTORS CONSIDERATIONS

1.20 The high level of automation and interdependency of the CNS/ATM system raises several human factors issues. Lessons learned concerning human factors indicate that they should be considered as an integral part of any plan to implement the new technologies.

1.21 Human factors issues should be considered before CNS/ATM technologies are implemented, during the process of design and certification of the technology and associated standard operating procedures. States, Air Traffic Services providers and organizations in the CAR/SAM region which design and provide CNS/ATM systems should take into account ICAO guidelines (Human Factors Guidelines for Air Traffic Management (ATM) Systems (Doc 9758)) when developing national regulations and incorporate human factors Standards in the processes of design and certification of equipment and procedures.

TRAINING PLANNING

1.22 A major goal of the Global ATM Operational Concept is to create a seamless air navigation service/system. A seamless air navigation environment will require an international team prepared to perform their jobs in such an environment. At the same time, shortcomings in human resource planning and training are frequently cited as an important reason for the lack of implementation of regional ANPs. As the existing and emerging air navigation technologies will operate in parallel for a period of time, civil aviation personnel will need to learn new skills, as well as retain the skills needed to operate and maintain existing systems. To meet this challenge, a cooperative approach should be used in civil aviation training within the CAR/SAM regions. This approach should:

a) ensure that the training requirements of the CAR/SAM regions are available within the regions;

b) facilitate a training planning process that would help to determine the training capabilities needed within the region or sub-regions for specialized types of training that individual States cannot justify based on their national training needs alone;

c) ensure that an adequate market exists to support the development and on-going implementation of high-quality training within one or more training centres within the region or sub-regions; and

d) endeavour to distribute regional training activities among more training centres within the region or sub-regions.

1.23 Appropriate bodies should be established to facilitate regional and sub-regional training planning. A quantitative approach should be used to determine the training capabilities needed within a region or sub-region. Decisions concerning training capabilities required should be based on an aggregate of training demand for existing air navigation technologies, as well as emerging technologies. A State-to-State consultative process should be used to formulate a plan for the establishment of specific regional training centres.

1.24 GREPECAS should ensure that training offered within the CAR/SAM regions is sufficient to meet the implementation requirements of the regional ANP.

1.25 The ICAO Civil Aviation Training Policy is shown in full at Appendix 1to Part IX.

SAFETY CONSIDERATION

1.26 It is an ICAO Strategic Objective to enhance global aviation safety. Due account must be taken of the global Standards and Recommended Practices (SARPs) that have been established requiring the implementation of safety management. States are responsible for the implementation of national safety management systems. The safety management process should be embedded within CAR/SAM programmes at the pre-implementation, implementation and post-implementation phases. The GREPECAS should endorse safety plans associated with such pan or sub-regional CAR/SAM Programmes.

1.27 Consistent application of safety management throughout an ICAO Region is one of the Global Safety Initiatives (GSI) of the ICAO Global Aviation Safety Plan (GASP). Planners should ensure that safety considerations of air navigation services development programmes are consistent with the GASP and associated GSI.

1.28 An Air Navigation Deficiency is a situation where a facility, service or procedure does not comply with a regional air navigation plan approved by the Council, or with related ICAO Standards and Recommended Practices (SARPs), and which situation has a negative impact on safety, regularity and/or efficiency of international civil aviation. Air navigation deficiencies should be identified and reported to the Regional Office who will determine whether the reported deficiency is a case of non-compliance with the CAR/SAM ANP or SARPs. States are responsible for the prompt rectification of deficiencies to navigation services for which they are responsible for. The ICAO Regional Office would provide guidance and assistance to rectify such deficiencies as necessary. Detailed information on the process of identifying and managing navigation deficiencies is contained in the GREPECAS Handbook, CAR/SAM Supplement to the uniform methodology for the identification, assessment and reporting of air navigation deficiencies.

ENVIRONMENT

1.29 It is an ICAO Strategic Objective to minimize the adverse effect of global civil aviation on the environment. Regional planning groups should ensure environmental factors are taken into consideration when performance based systems implementation plans are developed. The results of environmental analysis can be useful in providing national decision-makers within the various sub-regions with information upon which to base airspace architecture decisions and in providing information on what the aviation industry is doing now to protect the environment in the future. Environmental considerations should, however, not compromise acceptable levels of safety and be balanced against operational and economic considerations.

HOMOGENEOUS AREAS AND MAJOR TRAFFIC FLOWS - CAR/SAM REGION

1.30 Major Traffic Flows in the CAR/SAM Region are contained in the Doc. 9750 The homogeneous areas of traffic flows are: (insert graphics)

AIR TRAFFIC FORECASTS, SYSTEM CAPACITY AND AIR TRAFFIC DEMAND

1.31 Regional traffic forecasting mainly supports regional ATM planning functions in the western part of the region and is made available to all States for which information is prepared. All States generally prepare individual forecasts, taking account of the regional information, for national planning purposes. This information should be shared through at least the sub-regional groupings to enable effective regional planning development.

1.32 The scope of Air Traffic Flow and Capacity Management (ATFM) is to balance the twin imperatives of Demand and Capacity. Within this scope, the goal is to enable flight punctuality and efficiency having regard to the available resources with the emphasis on optimising the ATS capacity. This should be achieved through a robust and

comprehensive collaborative decision-making process that will enable widespread dissemination of relevant and timely information to all airspace users.

IMPLEMENTATION STRATEGY

1.33 Doc 9570 – the Global Air Navigation Plan describes a planning methodology that enables the incorporation of Regions/States existing development plans to create an evolutionary path towards a global ATM system. The Global ANP is supported by planning tools which take various formats (e.g. software applications, planning documentation, web-based reporting forms, project management tools). As CAR/SAM States and sub-regions consider implementation of the initiatives, they should use common programmers templates such as those contained in the planning tools as the basis to establish performance objectives and implementation timelines as well as to develop a comprehensive schedule and programme of planning activities to accomplish the work associated with the initiatives. In addition, the planning tools will provide links to relevant guidance material and documentation in order to assist the planner throughout the planning process. This will ensure a uniform approach to implementation of the initiatives.

1.34 Plans should be underpinned by the safety management process.

PART II – AERODROMES / AERODROME OPERATIONS (AOP)

GENERAL

2 This part of the document presents the ICAO CAR/SAM regional provisions related to the Aerodrome Operation Planning of facilities and services required for international air navigation.

AERODROMES

2.1 For regular and alternate aerodromes, used for international operations, the general physical characteristics, visual aids and services should be in accordance with the relevant ICAO provisions.

Physical characteristics

2.2 The specific physical characteristics for each regular use international aerodrome should meet the requirements of the critical aircraft.

2.3 The specific physical characteristics for each alternate use international aerodrome should be based on the requirements of the diverted critical aircraft.

2.4 In those cases where the extension or development of an aerodrome in accordance with the provisions contained in paragraphs 3 and 4 above would only be required to meet infrequent operations of the critical aircraft but would entail disproportionate expenditures, specific arrangements should be made between operators and the State concerned regarding the reasonable practical development of the aerodrome in question. The results of such arrangements, together with relevant reasons, should be reflected in Table AOP of the FASID.

Aerodrome services

Rescue and fire fighting services

2.5 Rescue and fire fighting services at international aerodromes should be provided at the required level of protection, as expressed by means of required aerodrome category for rescue and fire fighting in accordance with Annex 14, Volume I and reflected in Table AOP of the FASID. Rescue and fire fighting services should keep abreast of latest techniques and should practice these through exercises at regular intervals. Such exercises should also be organized for any off-aerodrome rescue and fire fighting services which may be called upon to assist in an emergency occurring at the aerodrome.

[Annex 14, Volume I, Chapter 9]

2.6 Rescue and fire fighting services at international aerodromes should be capable of meeting the specified response time and be kept in a state of readiness throughout those times when the aerodrome is available for use. [Annex 14, Volume I, Chapter 9]

Runway surfaces

2.7 In amplification of relevant provisions in Annex 14, Volume I, runway surfaces should be constructed and/or treated so as to ensure continuous good friction characteristics when wet. Runway markings should consist of non-slip materials. [Annex 14, Volume I, Chapter 3 and 5]

Runway visual range

2.8 A secondary power supply should be provided for runway visual range (RVR) observing systems which use instrumental means.

Visual and non-visual aids for aerodrome operations

2.9 The provision of non-visual and visual aids for aerodrome operations should take into account:

a) aircraft performance characteristics of those aircraft likely to use the aerodrome in question;

b) prevailing meteorological conditions;

c) use of the aerodrome at night or during low visibility conditions;

d) aerodrome layout;

e) expected traffic density; and

f) other relevant local conditions.

2.10 The provision of approach, runway and taxiway lighting, should be in accordance with the Standards and Recommended Practices detailed in Annex 14, Volume I, for the appropriate runway type of approach or take-off operations.

2.11 In addition to the Standards of Annex 14, Chapter 5, visual approach slope indicator or precision approach path indicator systems should be provided for all runways to be used by aircraft engaged in commercial air transport operations.

2.12 During low visibility operations, the sensitive area associated with radio navigation aids required for the conduct of instrument approaches and take-offs should be kept clear from obstacles likely to interfere with their correct functioning and use.

2.13 The immediate vicinity of visual aids required for the conduct of instrument approaches and take-offs should be made accessible so that this area can be kept clear from snow, ice and obstructions likely to interfere with their correct functioning and use.

Non-precision approach aids

2.14 Where required by the topographic and/or environmental situation of an aerodrome, improved track guidance during departure and/or approach by specific non-visual and/or visual aids should be provided even if such aids would not normally be required in accordance with the above provisions.

2.15 At aerodromes used by international general aviation only, consideration should be taken of the location of existing navigation aids provided in relation to the aerodrome in question and their potential use for approach purposes. Specific approach and landing aids should only be provided if this is warranted from a cost effectiveness point of view.

2.16 When it has been determined that navigation guidance to an aerodrome without precision approach is required and this requirement cannot be met by use of a suitable ground based radio navigation aid or by Global Navigation Satellite System (GNSS), it should be covered by the provision of a VOR on or in the vicinity of that aerodrome and located so that it permits the establishment of a straight-in non-precision approach procedure for the aerodrome, based on that VOR.

Precision approach aids/Approach with vertical guidance

2.17 Regardless of prevailing weather conditions, aircraft engaged in commercial air transport operations have a need for precise approach path guidance during approach and landing. The type of approach aid and associated appropriate visual aids required are dependent on the operational needs. Depending on the Obstacle Clearance Altitude/Height (OCA/H) required, approach procedures with vertical guidance (APV) (baro-VNAV and/or augmented GNSS) shall make use of either non-precision approach or precision approach aids.

Note 1.— GBAS might be considered in the future as an alternative navigation aid for CAT I CAT II and III precision approach and landing.

2.18 At aerodromes where there is a requirement to conduct Low Visibility Take-offs, the appropriate visual and non-visual aids should be provided.

2.19 At aerodromes where auto-coupled approaches are conducted on a routine basis, the quality of the signal in space of the supporting precision approach aid should be suitable for auto-coupled approaches.

2.20 When an ILS auto-coupled approach to a runway is being conducted outside Low Visibility Conditions (Low Visibility Procedures (LVP) not in force), it is possible that some disturbance of the ILS signal may occur. Flight crew should inform ATC if they wish to conduct an autoland with protection of the localizer sensitive area (LSA). In this case, ATC should inform the flight crew if protection of the LSA cannot be provided.

Implementation strategy of DMEs associated to the approach and landing operations

Note.— Within the CAR/SAM Regions it is likely that various types of operations on the same runway are supported by different approach aids, such as ILS, MLS or augmented GNSS. For these conditions, specific requirements related to the use of the distance information supporting the approach and landing phase have been developed.

2.21 To avoid operational confusion in case of ILS/MLS simultaneous operations, and when a DME is associated with an MLS and a separate DME is associated with an ILS, both DMEs should provide the same distance indication along the approach.

2.22 For economic and operational reasons, where:

a) ILS and associated DME are implemented; or

b) ILS is implemented and associated DME is planned; or

c) both ILS and associated DME are planned;

d) triple frequency pairing with MLS should be implemented.

2.23 To avoid operational confusion in case of ILS/GNSS and/or MLS/GNSS simultaneous operations, the GNSS distance reading along the approach should be the same as the ILS/MLS DMEs.

OPERATIONS

General

2.24 Measures should be taken to reduce, to the extent possible, the risk of collision between aircraft and wildlife during all flight phases conducted on or in the vicinity of aerodromes. Such measures should include:

a) the reduction of wildlife concentrations at and near aerodromes, both by appropriate planning and practical measures;

b) the collection and dissemination, in appropriate form, of information on wildlife movements; and

c) the development of procedures permitting ATS to alert flight crews of potential wildlife hazards.

Runway visual range

Note 1.— Where RVR information is required for operations in both directions of the runway, the same sites would normally be used for both directions, e.g. RVR information representative of the stop-end of the runway would normally be provided from the site serving the touchdown zone of the opposite direction.

Note 2.— RVR requirements for take-off in low visibility are usually met by facilities provided to support landings under such conditions.

Low visibility operations

2.25 For departure operations in RVR conditions less than a value of 550 m, sufficient visual and non-visual guidance should be available to control the aircraft in the event of both a discontinued take-off in adverse circumstances and a continued take-off after failure of the critical engine.

2.26 Low visibility operations should also require the existence of appropriate runway incursion protection measures, surface movement guidance and control systems, and emergency procedures provided in conjunction with suitable Low Visibility Procedures.

Reduced runway declared distances for take-off

Note.— In the following operational requirements the term "intersection" is used to cover both intersection and junction concepts.

2.27 Paragraph 2.8 of Annex 14, Volume I, requires that the following full runway declared distances be calculated and promulgated for each runway intended to be used by aircraft operators engaged in international commercial air transport:

a) Take-off run available (TORA);

b) Take-off distance available (TODA);

c) Accelerate stop distance available (ASDA); and

d) Landing distance available (LDA).

2.28 The reduced runway declared distances for take-off should consist, as for full runway declared distances, of TORA, TODA and ASDA.

2.29 The datum-line from which the reduced runway declared distances for take-off should be determined is defined by the intersection of the downwind edge of the specific taxiway with the runway edge. The loss, if any, of runway length due to alignment of the aeroplane prior to take-off should be taken into account by the operators for the calculation of the aeroplane's take-off weight.

2.30 Intersections used as intermediate take-off positions should be identified by the "taxiway designator" to which the datum-line of the associated reduced runway declared distance for take-off refers.

2.31 At each international aerodrome, specific minimum visibility for take-off should be established, regulating the use of intersection take-off positions. These minima should permit the appropriate ATC unit to maintain a permanent surveillance of the ground movement operations, and the flight crews to constantly secure their position on the manoeuvring area, so as to exclude any potential risk of confusion as to the identification of the aircraft and intersections used for take-off. The minima should be consistent with the surface movement guidance and control system (SMGCS) provided at the aerodrome concerned.

2.32 The provision of marking and lighting aids together with signs should ensure the safe control and guidance of aircraft towards and at take-off intersections appropriate to the minimum visibility criteria retained. At the runway holding position of the associated intersection take-off position, such signs should indicate the runway heading and the remaining take-off run available (TORA) in metres.

Surface movement guidance and control systems (SMGCS)

2.33 Surface movement radar (SMR) should not be used for other than monitoring tasks unless identification procedures are implemented.

CAPACITY

Aerodrome capacity

2.34 States should ensure that adequate consultation and, where appropriate, cooperation between airport authorities and users/other involved parties is executed at all international aerodromes to satisfy the provisions in the Aerodrome capacity assessment and requirement section.

2.35 States should provide and coordinate communication and exchange of information between the States' international aerodromes and international organizations involved with aerodrome capacity issues.

2.36 Consultation procedures should be established between aerodrome authorities and users commensurate with local conditions and appropriate to the specific purpose the consultation process is intended to serve (capacity assessment/demand forecasting, etc.).

2.37 Regular consultation between airport authority and users should preferably be effected by local working groups composed of all parties involved, including ATS where applicable. Alternatively, a local group may be replaced by a national committee.

2.38 At aerodromes where environmental concerns prevail with a potential impact on aerodrome capacity, a dialogue-oriented activity with communities will be required in which users should actively participate.

Aerodrome capacity assessment and requirement

2.39 The declared capacity/demand condition at aerodromes should be periodically reviewed in terms of a qualitative analysis for each system component and, when applicable, the result of the qualitative assessment upon mutual agreement be used for information in Table AOP of the FASID.

2.40 The future capacity/demand, based on a forecast for the next seven years, should be agreed upon after close cooperation between airport authorities and affected users and the relevant capacity requirements reflected in Table AOP of the FASID.

2.41 Operators should consult with aerodrome authorities when future plans indicate a significant increased requirement for capacity resulting in one of the elements reaching a limiting condition. This forecast should then be shown as an updated requirement in Table AOP of the FASID for the appropriate element.

2.42 Each aerodrome in the region will have its own requirement in the mix of the above-mentioned elements. However, if there is a capacity limitation at an aerodrome this will have an impact on the surrounding links in the overall capacity chain and vice versa. Therefore, it is essential that the specific element that causes the limitation in the traffic flow be identified and adjusted.

2.43 Aerodrome capacity should be assessed and declared by aerodrome authorities in consultation with the parties involved for each component (terminal/apron/aircraft operations) using agreed methods and criteria for level of delays.

Note 1.— The result of the aerodrome capacity assessment, as required by and detailed in this Section, should be reflected in Table AOP of the FASID against each airport entry listed in this table.

Note 2.— The figures used to reflect this assessment, together with the updating process of these elements, are detailed in the explanation of Table AOP of the FASID.

2.44 Where restrictions in aerodrome capacity are identified, a full range of options for their reduction or removal should be evaluated by the aerodrome authority, in close cooperation with the operators and other involved parties. Such options should include technical/operational/procedural and environmental improvements and facility expansion.

2.45 At many aerodromes, airspace capacity has influence on the aerodrome capacity. If the declared capacity of a specified airspace has influence on airport operations, this should be indicated and action undertaken to reach a capacity in this airspace corresponding to the airport capacity.

2.46 In addition to airspace and runway capacity, the aerodrome capacity can also be affected by the apron and taxiway capacity. Therefore, the published aerodrome capacity should be the capacity of the most restrictive area.

2.47 Major research and development programmes should be undertaken in order to implement new initiatives for increasing airport capacity. Apron and taxiway optimization in existing airport should be considered before an expansion programme is proposed.

2.48 Due to lack of capacity at many international airports, a better and more efficient utilization of existing runways is required. Runway selection procedures and standard taxi routes at aerodromes should ensure an optimum flow of air traffic with a minimum of delay and a maximum use of available capacity. They should also, if possible, take account of the need to keep taxiing times for arriving and departing aircraft to a minimum.

2.49 Extreme traffic peaking at aerodromes generates congestion and severe economic penalties, such as under-utilization of costly aerodrome facilities and services, inefficient facility design criteria and delays to aircraft and passengers. Improvements should be obtained from effective consultation between the airlines, aerodrome and government authorities to achieve maximum capacity utilization.

2.50 The possibility of overcoming capacity limitations should also take the use of other aerodromes in the vicinity into consideration.

PLANNING CONSIDERATIONS

Alternate aerodromes

2.51 Requirements for alternate aerodromes should, if at all possible, be satisfied by existing regular aerodromes. However, where in specific cases the designation of another aerodrome in close proximity to a regular aerodrome would result in appreciable fuel conservation or other operational advantages, this aerodrome may be designated for use as an alternate aerodrome only.

2.52 Planning of alternate aerodromes should be made on the basis of the following objectives:

a) to ensure that at least one suitable alternate is available for each international operation;

b) to ensure that the facilities at the designated alternate aerodrome(s) are appropriate for the alternate operation.

Physical characteristics

2.53 Even though at specific aerodromes CAT II or III operations may not be a requirement during the period covered by the plan, account should nevertheless be taken in the planning for such aerodromes of possible future requirements in order to avoid costly and disruptive modifications at a later date. This applies in particular whenever replacement or improvement programmes are undertaken. However, investments needed to prepare for future CAT II or III operations at specific aerodromes should always be subject to cost-benefit analysis.

Non-visual aids for aerodrome operations

2.54 When developing implementation and/or decommissioning plans for all weather operations at international aerodromes, due consideration should be given to specific operations requirements of general aviation.

Non-precision approaches

2.55 At aerodromes used by international general aviation only, potential use of navigations aid(s) already required for other purposes should be considered to support instrument approach procedures at these aerodromes.

2.56 Approach procedures with vertical guidance (APV) may allow for a more safe and efficient operation. Moreover, they may provide an opportunity for the progressive rationalization of NDBs and VORs, while ensuring the provision of necessary backup. The impact of any reduction in the ground based navigation infrastructure, due to its replacement by new technology (e.g. GNSS), on the requirement for airborne equipment should be the subject of early assessment during the planning process.

OPERATIONS

General

2.57 Where noise abatement methods are applied to aircraft while on approach to land, the low power approach technique should be utilized, provided the necessary facilities and services are available at the aerodrome concerned. These comprise:

a) the availability of positive glide path information on the landing runway;

b) the use of ATC TMA procedures compatible with the low power approach technique;

c) the provision of significant range information along the approach path (distance from touchdown).

Note 1.— Such range information could be provided by different means, such as radar, DME or appropriate airborne navigation equipment.

Air traffic services

Note.— The following requirements relate to the provision of Air Traffic Services for all traffic on the manoeuvring area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.

Aerodrome flight information service (AFIS)

2.58 At aerodromes used by international general aviation, where the provision of aerodrome control service is not yet justified, AFIS should be provided by a unit located at the aerodrome.

Note.— The term AFIS is used to describe a service at international general aviation (IGA) aerodromes where an aerodrome control service is not provided (Annex 11 and guidance material on AFIS contained in ICAO Circular 211 refer).

2.59 In determining whether aerodrome control service or AFIS should be provided at a given IGA aerodrome, the appropriate ATS authority is expected to give due consideration to the type(s) of air traffic involved, the density of air traffic, the topographical and meteorological conditions, and such other factors as may be pertinent to safety and efficiency, including the language or languages to be used in air-ground communications.

2.60 Where an aerodrome control service is not clearly justified by the complexity, density of air traffic, topographic and prevailing meteorological conditions, an AFIS should be provided by a unit located at those aerodromes. An AFIS should also be provided as an intermediate step between no service at all and an aerodrome control service.

Aerodrome control service and surface movement guidance and control systems (SMGCS)

2.61 Low Visibility Procedures should be based on the provisions of the *Manual on All-Weather* Operations (Doc 9365) and *Guidance material on responsibility aspects can be found in ICAO Doc 9476, Manual of Surface Movement Guidance and Control Systems (SMGCS).*

2.62 Guidance material has been produced on surface movement radar (SMR) identification procedures. In order to harmonize the use of SMR in the region, it is recommended that these procedures be implemented to allow more effective use of SMR. Where SMR identification procedures are already in operation it is recommended that they be reviewed taking into account the guidance material now available.

Note.— Guidance material on SMR identification procedures is contained in ICAO Doc 9426, Air Traffic Services Planning Manual.

2.63 Due to the difficulty in maintaining aircraft and vehicle identification on primary SMR displays only, significant increases in ATS capacity can be achieved when identification labelling is made available.

2.64 In order to fully exploit capacity gains, the advanced surface movement guidance and control systems (SMGCS) should operate from runway to parking position and vice versa. The use of advanced SMGCS will require the controlling authority to accept an increasing responsibility for aircraft safety in low visibility conditions. The level of service provided should be maintained from the runway to the stand and should be provided by properly trained and/or licensed personnel.

2.65 Where an advanced SMGCS is used to provide guidance from one area of responsibility to another, coordination procedures should be implemented taking into account all the aspects of the changing division in responsibility for collision avoidance during low visibility conditions.

2.66 Where radar service is provided for approach control, the possibility to provide aerodrome control service with information from radar for the final approach segment, similar to the information provided to the approach control, should be considered. With appropriate regulations the coordination could be improved and the management of arrivals and departures more efficiently conducted.

Specific aeroplanes operations

Reduced runway declared distances for take-off

2.67 At aerodromes regularly used by international commercial air transport, take-offs from runway/taxiway intersections may be justified for the following reasons:

a) runway capacity improvement;

b) taxi routes distances reduction;

c) noise alleviation; and

d) air pollution reduction.

2.68 To this end, the appropriate authorities should, upon prior consultation with aircraft operators, agree on the selection of suitable intermediate intersection take-off positions along the runway(s). Accordingly, authorities should determine the reduced runway declared distances for take-off associated with each selected intersection take-off position and establish the specific ATC rules and operational procedures/limitations. Such provisions should be published in the State AIP.

CAR/SAM ANP, VOLUME I, BASIC ANP

PART III - COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

INTRODUCTION

3 This part of the Caribbean and South American Basic Air Navigation Plan contains material considered to be the minimum necessary for effective planning of CNS facilities and services in the Caribbean and South American regions.

3.1 Most of the material contained in this part has been developed by the CAR/SAM Regional Planning and Implementation Group (GREPECAS) based on the Statement of Basic Operational Requirements and Planning Criteria (BORPC) and finalized by the CAR/SAM/3 RAN Meeting. Background information of importance in the understanding and effective application of this part of the plan is contained in the *Report of the Third Caribbean/South American Regional Air Navigation Meeting* (Doc 9749, CAR/SAM/3 (1999)) on Agenda Items 9, 10 and 11.

3.2 The Standards, Recommended Practices and Procedures and related guidance material to be applied are contained in:

a) Annex 10 — *Aeronautical Telecommunications*, Volumes I, II, III, IV and V;

b) Annex 6 — *Operation of Aircraft*, Parts I (Chapter 7), II (Chapter 7) and III (Chapter 5);

c) Annex 11 — *Air Traffic Services*, Chapter 6;

d) Annex 3 –Meteorological Service for international air navigation (Chapter 11)

e) Annex 15 Aeronautical information service (Chapter 9)

f) *Regional Supplementary Procedures* (Doc 7030).

g) Global Air Traffic Management Operational Concept (Doc 9854)

h) Manual on Global Performance of the Air Navigation System (Doc 9883)

i) Performance Based Navigation (PBN) Manual (DOC9613)

3.3 The elements of material referred to above are presented in the following paragraphs with appropriate cross-references to CAR/SAM/3 RAN Meeting recommendations and/or conclusions.

COMMUNICATIONS

General

3.4 The main function of the communication systems is to provide for the exchange of aeronautical voice, text and/or data between users or automated systems (for data). The infrastructure used for communications can also be used in support of specific navigation and surveillance functions.

3.5 There are basically two categories of aeronautical communications:

a) safety-related communications requiring high integrity and rapid delivery:

1) air traffic services communications (ATSC) carried out between ATS units or an ATS unit and aircraft for ATC, flight information, alerting, etc.;

2) aeronautical operational control (AOC) communications carried out by aircraft operators on matters related to safety, regularity and efficiency of flights; and

b) non-safety related communications:

1) aeronautical administrative communications (AAC) carried out by aeronautical personnel and/or organizations on administrative and private matters; and

2) aeronautical passenger communications (APC).

3.6 In general, communication systems used in the communications, navigation and surveillance/air traffic management (CNS/ATM) systems are capable of carrying both of the above-mentioned categories. However, safety-related communications shall always have priority over non-safety ones.

Aeronautical fixed service (AFS)

3.7 The aeronautical fixed service comprises:

a) the aeronautical fixed telecommunication network (AFTN);

b) data communications sub networks and associated systems supporting the ground-ground applications of the aeronautical telecommunication network (ATN), namely the ATS message handling services (ATS MHS) the ATS Inter-facility Data Communication (AIDC) or the On Line Data Interchange OLDI applications

c) gateways enabling inter-operation (to the extent possible) between a), and b) above;

d) ATS voice communication circuits and networks; and

e) aeronautical broadcast systems (e.g. for dissemination of world area forecast (WAFS)).

Implementation of digital networks to improve the current AFS and to facilitate the introduction of the ATN
[CAR/SAM/3, Rec. 9/1]

3.8 In order to meet, in a reliable and cost-effective manner, current and future AFS requirements for voice/data communications and to facilitate the introduction of ATN, States in CAR/SAM regions should make an effort to proceed with the process of implementing modern digital communication networks in a coordinated manner .

Application of IPSprotocol for communications between AFTNAMHS COM Centres

3.9 In order to ensure data integrity and to improve data transmission rate, States in the CAR/SAM regions should :

a) Migrate from X.25 protocol to the Internet Protol Suite (IPS)

b) expedite the implementation of IPS protocol for communication between AFTN and/AMHS COM Centres based on provisions contained in Annex 10, Volume III and the appropriate Regional Interface Control Document (ICD).

Operational characteristics for main AFTN COM Centres
[CAR/SAM/3, Rec. 9/4]

3.10 States responsible for the operation of Main AFTN COM Centres ensure that those facilities satisfy operational characteristics presented in Attachment A.

AFTN/AMHS traffic statistics
[CAR/SAM/3, Rec. 9/5]

3.11 States using the guidance material presented in Attachment B should:

a) monitor AFTN/AMHS traffic;

b) maintain AFTN/AMHS occupancy factor of AFTN/AMHS circuits below 0.4; and

c) prepare monthly traffic statistics.

Operational availability of AFTN/AMHS circuits
[CAR/SAM/3, Conc. 9/6]

3.12 States in the CAR/SAM regions should:

a) take the necessary measures to ensure that end-to-end monthly operational availability of AFTN/AMHS circuits does not fall below 98 per cent and, therefore, reliability and efficiency requirements for the provision of communication services to AIS, ATS, MET and SAR are met; and

b) provide alternative measures to route AFTN /AMHS traffic during circuit outages.

3.13 ATN development should be introduced in an evolutionary and cost-effective manner based on available ICAO SARPs material. States can progress their implementation according to their own requirements and time-frame. The ground part of the ATN would be first developed.

ATS voice networks
[CAR/SAM/3, Conc. 9/10]

3.14 GREPECAS, based on the ICAO SARPs and guidance material on analogue and digital ATS voice networks, carry out the necessary studies to evaluate the application of digital voice switching and signalling systems in upgrading facilities shown in the CAR/SAM ATS Speech Circuits Plan.

AIDC/OLDI

3.15 The AIDC and OLDI applications can be used for automated exchange of flight data between ATS units

Planning and technical principles to be applied for ATS voice circuits networks
[CAR/SAM/3, Rec. 9/11]

3.16 States, for the planning, implementation and operation of ATS voice circuits networks, should follow the set of planning and technical principles shown in Attachment C.

Misuse of AM(R)S frequencies
[CAR/SAM/3, Rec. 9/12]

3.17 States should eliminate the use of AM(R)S frequencies for point-to-point communications by:

a) implementing reliable circuits according to the ATS Speech Circuits Plan; and

b) pending a) above, or during circuit outages, using IDD services as an alternative means of communication for AFS purposes with due regard to Annex 11 requirements.

Satellite broadcast
[CAR/SAM/3, Rec. 9/14]

3.18 World area forecast system (WAFS) products should be disseminated in the CAR/SAM region through the WAFS Internet File Services (WIFS)..

Aeronautical mobile service (AMS)

3.19 The AMS comprises:

a) air-ground voice and data communication systems;

b) air-to-air voice (and data as applicable) communication systems; and

c) ground-to-air broadcast systems.

Harmful interference to radio frequency bands allocated to the aeronautical services
[CAR/SAM/3 Concs. 9/17 and 9/18)

3.20 States should:

a) develop, in coordination with frequency spectrum management authorities and considering relevant ITU procedures, suitable mechanism for detection and elimination of unauthorized transmission causing interference to the aeronautical service; and

b) notify ITU of causes of serious and persistent harmful interference, and the ICAO Regional Offices accredited to them, for further coordination on this matter, using the form provided in Attachment D.

AM(R)S planning principles
[CAR/SAM/3, Rec. 9/19]

3.21 The principles outlined in Attachment E should be considered by States for the planning of the AM(R)S in the CAR/SAM regions.

Aeronautical operational control (AOC) voice communication
[CAR/SAM/3, Rec. 9/20]

3.22 For aeronautical operational control purposes:

a) when an aircraft in flight is within the coverage of an appropriate VHF aeronautical station, channels from the relevant VHF sub-band should be used;

b) where communications cannot be established in accordance with a) and the flight lies wholly within an RDARA, an assigned HF frequency from the relevant RDARA allocation should be used; and

c) if the flight extends beyond RDARA limits and communications cannot be established in accordance with b) above, an appropriate worldwide HF frequency should be used.

Geographical separation criteria for VHF air-ground communications
[CAR/SAM/3 Rec. 9/22)

3.23 CAR/SAM States, to the extent possible, should use for VHF frequency assignments the geographical criteria outlined in Attachment F.

VHF frequency allocations for ATS functions in the CAR/SAM regions
[CAR/SAM/3, Rec. 9/23]

3.24 CAR/SAM States, to the extent possible, should select frequencies from the VHF sub-bands indicated in Attachment G for their AM(R)S allocations.

Maintenance of ICAO COM List 3 – "Frequency Assignments in the Band 117.975 – 137.000 kHz"
[CAR/SAM/3, Rec. 9/25]

3.25 States:

a) in order to support the frequency management functions of the ICAO Regional Offices (including the publication of the COM List No. 3), should expeditiously notify the appropriate ICAO Regional Office of any changes to their VHF AM(R)S frequency assignments; and

b) should release any assigned VHF AM(R)S frequency which is not intended for operational use in the near future and notify the appropriate ICAO Regional Office accordingly.

ATIS, OFIS and VOLMET
[CAR/SAM/3 Rec. 9/26]

3.26 States should use the sub-bands 127.600 – 127.900 MHz/132.050 – 132.950 MHz or available VOR frequencies for the provision of automatic terminal information service (ATIS), operational flight information service (OFIS), and meteorological broadcast (VOLMET).

Interpilot air-to-air communication channel

3.27 The ICAO Council, in March 1999, adopted Amendment 74 to Annex 10 which includes, among other things, the designation of VHF frequency 123.45 MHz as the worldwide air-to-air communication channel. States should make all efforts to avoid problems for the implementation of that frequency in the CAR/SAM region.

Communications systems implementation and regional timelines

3.28 It is intended to include regional timelines for communications systems implementation when planning material is sufficiently mature.

Air Ground Data Link Communication

3.29 Strategy for the harmonized implementation of the data link communications in the CAR/SAM Region based on the ICAO GOLD document

3.30 Controller Pilot Data Link Communications (CPDLC) based on ATN VDL2 implementation is an agreed strategy for the deployment of air ground data link communication in the CAR/SAM Region

NAVIGATION

General

3.31 The aeronautical radio navigation plan comprises all facilities that provide navigation support to en-route, terminal, approach, landing and surface movement operations.

3.32 The growing number of modern aircraft equipped with area navigation (RNAV) and the increasing emphasis on required navigation performance (RNP) result in more flexible route selection and less dependence on any particular type of navigation system. Nevertheless, every single radio navigation facility must operate in strict conformance with the applicable standards.

3.33 It is foreseen that the provision of radio navigation services will gradually change from a ground-based to a satellite-based system. The global navigation satellite system (GNSS) is the generic term used for the satellite-based aeronautical radio navigation system. Existing and/or emerging navigation satellite constellations and their associated satellite-

based, aircraft-based and ground-based augmentation systems (SBAS, ABAS and GBAS, respectively) all form elements of the GNSS.

3.34 The Global ATM Operational Concept, endorsed by ICAO 11th Air Navigation Conference (AN-Conf/11) and published as ICAO Doc 9854, provides the framework for the development of all regional ATM concepts. AN-Conf/11 also endorsed a number of technical recommendations affecting navigation, including the harmonization of air navigation systems between regions, frequency planning, the transition to satellite based air navigation, curved RNAV procedures, and the use of multiple GNSS signals and the rapid implementation of approaches with vertical guidance.

3.35 The ICAO Performance Based Navigation (PBN) Manual Document 9613 was developed in direct response to an AN-Conf/11 recommendation.

3.36 A PBN Road Map for the CAR/SAM Region was adopted para its application by the GREPECAS Conclusion 14/46.

3.37 The ICAO CAR7SAM Regions has developed a Strategy for the evolution of Air Navigation System approved by GREPECAS 16 meeting

Planning principles for radio navigation aids
[CAR/SAM/3, Rec. 10/1]

3.38 States, in planning the implementation of radio navigation services, should consider the principles shown in Attachment A.

Maintenance of ICAO COM List No. 1 "List of Facilities Operating on Frequencies in the LF/MF Band (190 – 1 750 kHz)" and ICAO COM List No. 2 "Record of VHF Frequencies Assignments to Caribbean and South American VOR and ILS Radio Navigation Aids"
[CAR/SAM/3, Rec. 10/3]

3.39 States:

a) in order to support the frequency management functions of the ICAO Regional Offices (including the publication of the COM Lists Nos. 1 and 2), should notify the relevant Regional Office of all changes to their frequency assignments; and

b) should release any assigned frequency which is not included in firm plans for operational use in the near future and notify accordingly the relevant ICAO Regional Office.

Flight testing of radio navigation aids
[CAR/SAM/3, Rec. 10/4]

3.40 States should:

a) make every effort to maintain their radio navigation aids operational at all times;

b) perform flight test of navigation aids periodically in accordance with Annex 10 requirements and at intervals indicated in ICAO Doc 8071; and

c) be encouraged to establish bilateral and/or multilateral agreements on sharing of flight test capabilities.

Termination of the use of the band 1 559 – 1 610 MHz (allocated to the RNSS) by fixed services
[CAR/SAM/3, Rec. 10/6]

3.41 Considering the incompatibility of sharing of the band 1 559 – 1 610 MHz allocated to the RNSS with the fixed services, States should coordinate with the corresponding national frequency management authority in order to:

a) determine if any fixed service stations operate in the band 1 559 – 1 610 MHz and, if so, either cease their operation or relocate them to other fixed-service bands before GNSS-based operations are approved; and

b) establish plans to avoid any future implementation of fixed service stations to operate in the band 1 559 – 1 610 MHz.

Navigation systems implementation and regional timelines

3.42 It is intended to include regional timelines for navigation systems implementation when planning material is sufficiently mature.

SURVEILLANCE

General

3.43 The aeronautical surveillance plan comprises all facilities, systems and procedures that support the provision of aircraft position information to air traffic services (ATS) units.

3.44 Traditionally, aeronautical surveillance has been performed by means of voice position reporting, primary surveillance radar (PSR) or secondary surveillance radar (SSR). SSR Mode S ground stations have been implemented in several parts of the world and their operation depends on properly equipped aircraft (i.e. Mode S transponder with assigned 24-bit address). An inherent feature of the SSR Mode S (for surveillance and/or data link) is the unique 24-bit aircraft address assigned to each aircraft; a worldwide scheme for allocation, assignment and operation of such addresses is already in place (Annex 10, Volume III, Part I, Chapter 9 refers).

3.45 However, advances in aeronautical data links and on-board navigation systems now allow for aircraft to transmit their position and other information to the appropriate ATS units, or even broadcast such information. These systems have been designated as the automatic dependent surveillance (ADS), which is based on a contract between the ATS unit and

the aircraft, and ADS-broadcast (ADS-B), which allows other aircraft and ground systems within its area of coverage to receive the information. Other surveillance applications the MLAT (Multilateration)a cooperative and independent surveillance system that make use of signals transmitted by an aircraft to calculate the aircraft position.

3.46 It is envisaged that the use of ADS/ADS-B and MLAT will gradually increase, especially in areas where the provision of radars is not practical or economical. It is also foreseen that the use of PSR for international civil aviation operations will diminish. PSR is considered to be used as Surface Movement Radar.

3.47 It is foreseen the use of ADS B and /or Multilaterationality, particulary for that Advanced Surface Movement Guidance AND Control System (A-SMGCS)

3.48 The ICAO CAR/SAM Regions had developed a Surveillance Strategy for the CAR/SAM Regions, which proposes the surveillance systems that are suitable to be applied in short and medium terms within CAR/SAM Region and to define an evolutionary path that will promote safety, interoperability and cost effectiveness of the required infrastructure to meet the future ATM.

Planning and implementation of surveillance radar systems
[CAR/SAM/3, Rec 11/1]

3.49 CAR/SAM States, during the planning and implementation of new surveillance radar systems or in improving existing facilities, should consider the GREPECAS Guidelines.

Planning and implementation of ADS
[CAR/SAM/3, Rec. 11/2]

3.50 CAR/SAM States, in coordination with airspace users, should consider the implementation of ADS for providing surveillance in areas in which the provision of radar is not feasible or economical.

Sharing of radar data

3.51 In order to facilitate the implementation of surveillance radar service in a safe, efficient and cost-beneficial manner, CAR/SAM States should consider the possibility of bilateral/multilateral arrangements for sharing of radar data between the ATC centres in neighbouring States and the use of a common radar data format and a common communication protocol for radar data exchange in the CAR/SAM regions to be adopted by GREPECAS.

Application of procedures for 24-bit aircraft address assignment
[CAR/SAM/3, Conc. 11/6]

3.52 Those CAR/SAM States which have not already done so should establish, as a matter of urgency, application of the ICAO procedures for the assignment of 24-bit aircraft addresses.

AERONAUTICAL RADIOFREQUENCY MANAGEMENT

General

3.53 The radio frequency spectrum is a scarce natural resource with finite capacity limits for which demand is constantly increasing. ICAO is just one of the entities competing for spectrum allocation on behalf of the aviation community it serves and, like its competitors, must continue to justify spectrum requirements.

3.54 The cornerstone of arguments to justify continued allocation of an adequate aeronautical spectrum is centred around safety-of-life issues, which are recognized internationally. On the other hand, there are increased demands for spectrum allocation from a growing number of competitors. Spectrum-efficient operation has thus become an obligation for all users and technological developments are helping in that regard.

3.55 However, the rules of the International Telecommunication Union (ITU) mechanism for spectrum allocation are such that safety-of-life and other justifying arguments need to be presented with force and States and international organizations have thus been invited by ICAO Assembly Resolution to support ICAO's position at World Radio communication Conferences (WRCs) and in regional and other international activities conducted in preparation for WRCs by a number of means.

Policy statements

3.56 Given the quasi-triennial pattern of WRC meetings recently adopted by the ITU and the importance of keeping up with the rapid developments in telecommunications, ICAO decided to develop and maintain an ICAO radio frequency (RF) document in the form of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718) which contains ICAO policy statements relevant to the aviation requirements for radio frequency spectrum. The handbook is intended to assist States and ICAO in preparing for ITU conferences.

Regional planning criteria

Geographical separation criteria for VHF air-ground communications
[CAR/SAM/3, Rec. 9/22]

3.57 Geographical separation criteria as shown in Part IV, Attachment F should be used for international VHF frequency assignment in the CAR/SAM regions.

Radiofrequency interference issues

3.58 The subject of harmful interference to aeronautical communication, navigation and surveillance services has always been of paramount concern to the international civil aviation community. In particular, any interference to the aeronautical services in the band 108 – 137 MHz has usually been, and needs to be, treated by aviation administrations in an urgent and serious manner.

Measures to reduce harmful interference to aviation from VHF broadcast services
[CAR/SAM/3, Rec. 9/18]

3.59 States should:

a) take action to develop with the appropriate national bodies, and assist in the development by the appropriate ITU bodies, technical criteria to avoid harmful interference to the aeronautical services operating in the frequency band 108 – 137 MHz from broadcast services operating in the adjacent frequency band 100 – 108 MHz; and

b) establish national regulations to protect aeronautical communication and radio navigation services operating in the VHF bands from harmful interference emanating from broadcast services in adjacent VHF bands.

CAR/SAM ANP, VOLUME I, BASIC ANP

PART IV - AIR TRAFFIC MANAGEMENT (ATM)

INTRODUCTION

4 This part of the CAR/SAM Region Basic Air Navigation Plan introduces the long-term CAR/SAM Region ATM requirements based on the Global ATM Operational Concept. While the operational concept is visionary and even challenging, many of the current practices and processes detailed in the BORPC will continue to exist throughout the planning horizon. In this sense, the introduction of the new concepts should be seen as evolutionary. Following the description of the Concept, this Part provides detail on the ATM requirements during the transition to the ATM Concept's Operational Components. Description of specific delivery programmes and associated electronic links are contained in the ATM element of the FASID.

4.1 The Standards, Recommended Practices and Procedures and related guidance material to be applied are contained in:

a) Annex 2 — Rules of the Air;

b) Annex 3 — Meteorological Services for International Air Navigation;

c) Annex 6 — Operation of Aircraft;

d) Annex 11 — Air Traffic Services;

e) Annex 15 — Aeronautical Information Services;

f) Procedures for Air Navigation Services — Air Traffic Management (Doc 4444);

g) Procedures for Air Navigation Services — Aircraft Operations (Doc 8168); and

h) Regional Supplementary *Procedures* (Doc 7030) – CAR and SAM Region

i) Global Air Traffic Management Operational Concept (Doc 9854)

j) Manual on Global Performance of the Air Navigation System (Doc 9883)

k) Performance Based Navigation (PBN) Manual (DOC9613)

ATM OPERATIONAL CONCEPT COMPONENTS

General

4.2 To achieve the Global ATM Operational Concept, improvements to the ATM system should be based on the provision of integrated services by means of the concept components described below. The separate components form one system. Figure 1, depicts the interrelationship of the system components and the convergence into a single system.

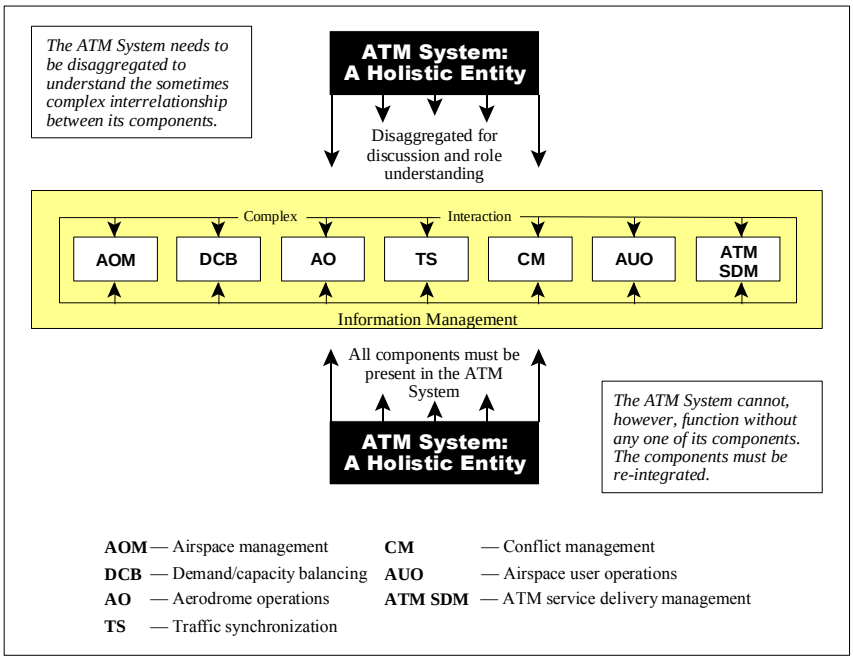


Figure 1.

4.3 The transition to adoption of the new concepts should be an iterative process underpinned by satisfactory cost benefit analysis. ATM improvements planned prior to the adoption of the Global ATM Operational Concept should not necessarily be abandoned as they should provide short to medium term system wide improvements; they should, however, be assessed for compatibility with the Global ATM Operational Concept to avoid nugatory expense.

4.4 The ATM concept components introduced above are described in more detail as follows:

Airspace Organisation and Management

4.5 Airspace organisation will establish airspace structures in order to accommodate the different types of air activity, volume of traffic and differing levels of service. Airspace

management is the process by which airspace options are selected and applied to meet the needs of the ATM community. Key conceptual changes include:

a) all airspace will be the concern of ATM and will be a usable resource;

b) airspace management will be dynamic and flexible;

c) any restriction on the use of any particular volume of airspace will be considered transitory; and

d) all airspace will be managed flexibly. Airspace boundaries will be adjusted to particular traffic flows and should not be constrained by national or facility boundaries.

Aerodrome operations

4.6 7. As an integral part of the ATM system, the aerodrome should provide the needed ground infrastructure including, *inter alia*, lighting; taxiways; runway, including exits; and precise surface guidance to improve safety and to maximize aerodrome capacity in all weather conditions. The ATM system will enable the efficient use of the capacity of the aerodrome airside infrastructure. The key conceptual changes include:

a) runway occupancy time will be reduced;

b) the capability to safely manoeuvre in all weather conditions whilst maintaining capacity;

c) precise surface guidance to and from a runway will be required in all conditions; and

d) the position (to an appropriate level of accuracy) and intent of all vehicles and aircraft operating on the movement area will be known and available to the appropriate ATM community members.

Demand and capacity balancing

4.7 8. Demand and capacity balancing will strategically evaluate system-wide traffic flows and aerodrome capacities to allow the airspace users to determine when, where and how they operate, while mitigating conflicting needs for airspace and aerodrome capacity. This collaborative process will allow for the efficient management of the air traffic flow through the use of information on system-wide air traffic flow, weather and assets. The key conceptual changes include:

a) through collaborative decision-making at the strategic stage, assets will be optimized to maximize throughput thus providing a basis for predictable allocation and scheduling;

b) through collaborative decision-making, at the pre-tactical stage when possible, adjustments will be made to assets, resource allocations, projected trajectories, airspace organization, and allocation of entry/exit times for aerodromes and airspace volumes to mitigate any imbalance; and

c) at the tactical stage, actions will include dynamic adjustments to the organization of airspace to balance capacity; dynamic changes to the entry/exit times for aerodromes and airspace volumes; and adjustments to the schedule by the users.

Traffic synchronization

4.8 Traffic synchronization refers to the tactical establishment and maintenance of a safe, orderly and efficient flow of air traffic. The key conceptual changes include:

a) (where traffic density/complexity allows) there will be dynamic full 4-D trajectory control and negotiated conflict-free trajectories;

b) Choke points will be eliminated; and

c) optimization of traffic sequencing will achieve maximization of runway throughput.

Conflict management

4.9 Conflict management will consist of three layers: strategic conflict management through airspace organization and management, demand and capacity balancing and traffic synchronization; separation provision; and collision avoidance.

4.10 Conflict management will limit, to an acceptable level, the risk of collision between aircraft and hazards. Hazards that an aircraft will be separated from are: another aircraft, terrain, weather, wake turbulence, incompatible airspace activity and when the aircraft is on the ground, surface vehicles and other obstructions on apron and manoeuvring area. The key conceptual changes include:

a) strategic conflict management will reduce the need for separation provision to a designed level;

b) the ATM system will minimize restrictions to user operations; therefore, the pre-determined separator will be the airspace user, unless safety or ATM system design requires a separation provision service;

c) the role of separator may be delegated, but such delegations will be temporary;

Note. The separator is the agent responsible for separation provision for a conflict and can be either the airspace user or a separation provision service provider.

a) in the development of separation modes, separation provision intervention capability must be considered;

b) the conflict horizon will be extended as far as procedures and information permit; and

c) collision avoidance systems are part of ATM safety management, but will not be included in determining the calculated level of safety required for separation provision.

Airspace user operations

1.2 Airspace user operations refer to the ATM-related aspect of flight operations. The key conceptual changes include:

a) accommodation of mixed capabilities and worldwide implementation needs will be addressed to enhance safety and efficiency;

b) relevant ATM data will be used for an airspace user's general, tactical and strategic situational awareness and conflict management;

c) relevant airspace user operational information will be made available to the ATM system;

d) individual aircraft performance, flight conditions, and available ATM resources will allow dynamically-optimised full 4-D trajectory planning;

e) collaborative decision-making will ensure that aircraft and airspace user system design impacts on ATM are taken into account in a timely manner; and

f) aircraft will be designed with the ATM system as a key consideration.

ATM service delivery management

1.3 ATM service delivery management will operate seamlessly from gate-to-gate for all phases of flight and across all service providers. The ATM service delivery management component will address the balance and consolidation of the decisions of the various other processes/services, as well as the time horizon at which, and the conditions under which these decisions are made. Flight trajectories, intent and agreements will be important components to delivering a balance of decisions. The key conceptual changes include:

a) services to be delivered by the ATM service delivery management component will be established on an as-required basis subject to ATM system design. Where services are established they will be provided on an on-request basis;

b) ATM system design will be determined by collaborative decision-making and system-wide safety and business cases;

c) services will be delivered by the ATM service delivery management component through collaborative decision-making, balance and optimise user-requested trajectories to achieve the ATM community's expectation; and

d) management by trajectory will involve the development of an agreement that extends through all the physical phases of the flight.

INFORMATION MANAGEMENT

1.4 The global ATM system foreseen in the operational concept was based on a collaborative decision-making environment where the timely availability of high-quality and reliable electronic aeronautical, meteorological, airspace and flow management information would be necessary. Thus a key enabler to ensure the effectiveness of the ATM System is the provision of information services through the concept of Information Management. Information management will provide accredited, quality assured and timely information used to support ATM operations.

1.5 The exchange and management of information used by the different processes and services must ensure the cohesion and linkage between the seven ATM system concept components shown in Figure 1 above and should be available through a system wide information management (SWIM) system.

ATM IN THE TRANSITION TO THE CONCEPT

1.6 During the transition to achieving the ATM Concept the following ATM elements should be provided:

Airspace Organization and Management

1.7 The airspace organization should provide the strategies, rules and procedures by which the airspace will be structured to accommodate the different types of air activity, volume of traffic, and differing levels of service and rules of conduct. The principles of organization should be applicable in all complexities of airspace. Airspace management is the process by which the airspace options are selected and applied to meet the needs of the ATM community. The following organizational principles underlying these strategies, rules and procedures should be adopted:

a) all airspace should be managed flexibly. Airspace boundaries should be adjusted to particular traffic flows and should not be constrained by national or facility boundaries;

a) airspace management processes should, subject to system capability, safety and capacity, accommodate dynamic flight trajectories and provide optimum system solutions;

b) when conditions require that different types of traffic be segregated by airspace organization, the size, shape and time regulation of that airspace should be set to minimize the impact on operations. However, aircraft neither operating in that particular mode, nor equipped accordingly for such airspace, should be accommodated by the system where deemed safe and appropriate. Accommodation should be made without constraining the primary use of that airspace;

c) priority for the use of specific airspace should not be constrained by the primary usage or equipage on a routine basis. While it is recognized that airspace

designation is useful, it should not be organized in a manner that permanently precludes the possibility of mixed usage/mixed equipage operations;

d) airspace use should be coordinated and monitored in order to accommodate the conflicting legitimate requirements of all users and to minimize any constraints on operations;

e) airspace reservations should be planned in advance with changes made dynamically whenever possible. The system should also accommodate unplanned requirements;

f) structured route systems should be applied only where required to enhance capacity or to avoid areas where access has been limited or where hazardous conditions exist; and

g) airspace structures and division levels should be harmonised.

Civil/Military Coordination

Note 1 - Annex 11 contains provisions on civil- military coordination and Annex 15 contains provisions for the promulgation of the relevant AIS by the competent authority responsible for the provision of ATS in the area within which the operations will take place.

Note 2 - The application of the FUA over the high seas is without prejudice to the rights and duties of States regarding access to high seas airspace under the Chicago Convention. Articles 3 a) and d) to the Chicago Convention apply.

Note 3 - The FUA provisions are not mandatory for application by States. They are intended to be a method to ensure maximum harmonisation of the application of the FUA in the CAR/SAM Region.

1.8 States should aim at the creation of one single integrated system catering to both civil and military requirements. The related organization of the airspace should satisfy the requirements of all users in an optimum way.

1.9 States should establish civil/military coordination committee to ensure, at all levels, the coordination of decisions relating to civil and military problems and airspace and traffic management.

1.10 States should arrange for close liaison and coordination between civil ATS units and relevant military air defence units in order to ensure integration of civil and military air traffic or its segregation, if required. Such arrangements would also contribute to the reduction or elimination of the need for interception of strayed or unidentified aircraft.

1.11 Military exercises likely to affect civil flight operations should be scheduled, whenever possible, so as not to coincide with peak periods of civil air traffic and/or not to affect areas where a high density of civil air traffic occurs.

Flexible Use of Airspace (FUA)

1.12 Airspace should not be designated as either purely civil or purely military airspace, but should rather be considered as one continuum in which all users' requirements have to be accommodated to the maximum extent possible.

1.13 States should apply the flexible use of airspace concept whenever:

a) activities require the reservation of a volume of airspace for their exclusive or specific use for determined periods due to the characteristics of their flight profile or their potential hazards and the need to ensure effective and safe separation from non-participating air traffic;

b) different types of aviation activities occur in the same airspace but with different requirements. Their coordination should seek to achieve both the safe conduct of flights and the optimum use of available airspace;

c) accuracy of information on airspace status and on specific air traffic situations, and timely distribution of this information to civil and military controllers and controlling military units has a direct impact on the safety and efficiency of operations; and

d) timely access to up-to-date information on airspace status is essential for all parties wishing to take advantage of airspace structures made available when planning their flights.

Flexible Use of Airspace Over The High Seas

1.14 The flexible use of airspace concept also covers airspace over the high seas. Its application should therefore be without prejudice to the rights and duties of States under the Convention on International Civil Aviation (Chicago Convention) and its annexes, or the 1982 UN Convention on the Law of the Sea (UNCLOS).

1.15 Regulations governing flights of State aircraft over the high seas should, to the maximum extent practicable, comply with the relevant provisions of Annex 2. Where this is not possible due to the nature of the operations involved, measures should be taken to ensure that other aircraft are not endangered by such operations. These should preferably be established in coordination with the State responsible for the provision of air traffic services over that part of the high seas affected by such operations.

Airspace Structure

1.16 The CAR/SAM airspace infrastructure should evolve to meet the changing demands of the aviation community. Provider States should coordinate their airspace planning to balance the conflicting but legitimate requirements of all users in order to efficiently provide sufficient capacity to meet traffic demands, to ensure optimum utilisation, to

ensure compatibility with their respective neighbours and to guarantee the safety of flight.

1.17 Flight Information Regions (FIR) of CAR/SAM Region FIRs is detailed in the CAR/SAM Basic ANP. A State may delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, over the territories of the former or make arrangements for the provision of services within high seas airspace for which it has responsibility. Such arrangements should be considered when safety or capacity benefits can be achieved.

1.18 ATS provided in various airspace volumes should be based on the ICAO classification of airspace as defined in Annex 11 – *Air Traffic Services*. The classification of airspace should be implemented on the basis of a safety assessment taking into account the volume and nature of the air traffic. Where implemented, airspace classifications A, B, C, D and E should be established to encompass the climb to cruising level of departing aircraft, the cruising levels on ATS routes normally used by IFR flights, and the descent of arriving aircraft, except where safety assessment clearly does not justify the establishment of such airspace.

1.19 Details of airspace parameters within FIRs should be shown in respective national Aeronautical Information Publications.

1.20 Controlled airspace should be established so as to encompass the climb to cruising level of departing aircraft, the cruising levels on ATS routes normally used by IFR flights and the descent from such levels of arriving aircraft, except in those cases where the type and density of traffic clearly do not justify the establishment of controlled airspace.

1.21 States should adopt a common division level between upper and lower airspace; airspace classifications above the division level should be harmonised.

1.22 ATS routes and organised track structures should be provided to meet ATM requirements. States should to the extent possible coordinate with the ICAO Regional Office any changes to the airspace structure, the assignment of or changes to compulsory reporting points and ATS routes; route and reporting point designators should be obtained from the ICARD Global Database. Details of ATS Routes and designators within the CAR/SAM Region are contained in the CAR/SAM Regional Basic ANP. [CAR/SAM/3, Rec. 5/14] The proposed additions, deletions and changes to the requirements for the ATS routes network should be coordinated through the ICAO Regional Office concerned.

1.23 Dynamic and flexible ATS route management should be provided when ATM and aircraft capabilities can safely accommodate such arrangements.

1.24 Airspace restrictions and/or temporary airspace reservations for specific users or purposes should only be imposed when the intended purpose cannot be met by other arrangements. If established, such restrictions and/or reservations should be kept to the minimum, both in extent and duration consistent with the purpose they serve and should be withdrawn as soon as possible. In addition, any restricted and/or reserved airspace should be made available for general use whenever the activities having led to their establishment are temporarily suspended, e.g. during weekends, at night, etc.

1.25 Where users have specific requirements in portions of the airspace extending over the territory of a number of States and/or over the high seas, arrangements should be made between States concerned for the coordinated use of airspace, facilities and procedures in order to ensure maximum uniformity.

Separation

1.26 Reduced vertical separation minima above FL285 is used throughout the CAR/SAM Region airspace.

1.27 The introduction of Performance Based Navigation RNAV/RNP equipped aircraft is expected to enable reductions in lateral route spacing. The extent of this improvement has yet to be assessed.

Air Traffic Flow Management (ATFM)

1.28 Efforts should be made to provide sufficient capacity to cater to both normal and peak traffic levels, without jeopardizing safety levels. ATFM should aim for capacity management and the optimization of the efficiency of the global ATM system, by ensuring that capacity is utilized to the maximum extent possible.

1.29 ATFM should be applied for periods when it is expected that the air traffic demand will be close to or will exceed the ATC capacities in the areas concerned.

1.30 Detailed information concerning the provision of ATFM services applicable in the CAR/SAM region are contained in the CAR/SAM FASID, the Regional Supplementary Procedures (Doc 7030) — CAR/SAM and in the ICAO Manual on Collaborative Air traffic Flow Management.

AIR TRAFFIC SERVICES

Air traffic control service

1.31 The ATC Service should maintain a safe, orderly and expeditious flow of air traffic by applying separation between aircraft and by issuing clearances to individual flights as close as possible to their preferred profiles, taking into account the actual state of airspace utilization and within the general framework of ATFM measures when applicable. Air traffic control service should be provided on a 24-hour basis in all controlled airspace used by international operations both during the en-route and the terminal phases of their flight.

Flight information service

1.32 Flight information service should be provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

1.33 The requirements for flight information services are not expected to change significantly in the near term and the provision of VOLMET would be required. It is, however, expected that data link messages will gradually reduce the requirement for voice VOLMET. The delivery of critical information such as SIGMET messages and other information equally pertinent to the safety of flight should be improved by the existence of data links.

Alerting Service

1.34 Alerting service should be provided for the notification of appropriate organizations regarding aircraft in need of Search and Rescue (SAR) aid and assisting such organizations as required. In addition, data links should be established, where appropriate, between the ATS units and Rescue Coordination Centres to support the SAR function (Part VI — SAR also refers).

SSR CODE MANAGEMENT

Operational agreements to maintain the SSR codes over several FIRs

[CAR/SAM/3, Rec. 5/21]

1.35 Within the context of ATM and the provision of ATS, SSR code management is a key element of ATM to ensure continuous and unambiguous aircraft identification. SSR codes have a finite limit and without management results in capacity constraints and aircraft delays.

1.36 States should enter into operational agreements so that aircraft can retain the assigned SSR code beyond the participating area, particularly in regions with high traffic density.

MONITORING

(See also Part VIII – Safety)

Lateral Plane

1.37 Monitoring of navigation performance is required for two reasons:

a) **demonstrated** "typical" navigation accuracy provides a basis for determining whether the performance of the ensemble of aircraft operating on the RNAV/RNP routes meets the required performance; and

b) **the lateral** route spacing and separation minima necessary for traffic operating on a given route are determined both by the core performance and upon normally rare system failures.

1.38 Both lateral performance and failures need to be monitored in order to establish the overall system safety and to confirm that the ATS system meets the required target level of safety.

1.39 Radar observations of each aircraft's proximity to track and altitude are typically noted by ATS facilities and aircraft track-keeping capabilities are analysed.

1.40 A process should be established allowing pilots and controllers to report incidents where navigation errors are observed. If an observation/analysis indicates that a loss of separation or obstacle clearance has occurred, the reason for the apparent deviation from track or altitude should be determined and steps taken to prevent a recurrence.

1.41 States should investigate navigation errors which are brought to the attention of operators and/or where necessary the State of Registry of the aircraft concerned with the least possible delay.

Vertical Plane

1.42 RVSM. System performance monitoring should be undertaken to ensure that the continued operation of RVSM meet the safety objectives. (ICAO Doc 9574 – *Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive, Chapter 6*).

PERFORMANCE MEASURING

1.43 The GREPECAS has developed initial performance objectives and associated indicators relating to capacity; efficiency and the environment; and cost effectiveness. Performance objectives and indicators will continue to be developed with details provided in the FASID. The initial objectives and indicators are shown below:

Capacity

1.44 The indicators identified to monitor the achievement of this objective are:

1) En-route ATFM delays a) Average ATFM delay per flight generated by the airspace volume (en-route)

2) Airport ATFM delays a) Average ATFM delay per flight in the main airports (to be identified by States in advance and based on the regional relevance)

Efficiency and Environment

1.45 The Efficiency and Environment KPAs have been considered together because in this context they are strictly interlinked.

1.46 The objective for Efficiency is: ensure that users use the most efficient routes – focussing on the horizontal flight-efficiency. The indicator identified to monitor the achievement of this objective is:

1) Average horizontal en route flight efficiency, defined as the difference between the length of the en route part of the actual trajectory (where available) or last flight planned route and the great circle. The use of ICAO fuel savings estimation tool - IFSET is recommended.

1.47 In this context specificities shall be considered for flights longer than 1000 nm where the optimum could differ from the great circle (wind optimal routes, etc.).

1.48 The objective for Environment is: contribute to the protection of environment – focussing on fuel savings/CO_2 emission reductions. The indicator identified for the achievement of this objective is:

1) CO_2 emissions deriving from inefficiencies in flight efficiency (conversion of additional distance into CO_2 emissions based on standard values formula).

Cost-effectiveness

1.49 The objective for cost-effectiveness is: contribute to optimise the costs for air navigation services – focussing on productivity. The indicators identified to monitor the achievement of this objective are:

1) IFR flights (en-route) per ATCO hour on duty;
2) IFR flight hours per ATCO hour on duty; and
3) IFR movements (airport) per ATCO hour on duty.

CAR/SAM ANP, VOLUME I, BASIC ANP

PART V — METEOROLOGY (MET)

INTRODUCTION

2 This part of the CAR/SAM Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to Meteorological Service for International Air Navigation (MET) as developed for the CAR/SAM Region.

2.1 As a complement to the Statement of Basic Operational Requirements and Planning Criteria (BORPC) set out in Part I, Part VI constitutes the stable regional provisions considered to be the minimum necessary for effective planning of MET facilities and services. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the Basic ANP is contained in the CAR/SAM Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future CNS/ATM systems, it is expected that the existing requirements will gradually be supplemented and/or replaced by the new CNS/ATM related requirements. Further, it is expected that some elements of the CNS/ATM systems will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

2.2 The Standards, Recommended Practices and Procedures to be applied are contained in the following ICAO documents:

a) Annex 3 — Meteorological Service for International Air Navigation, and

b) *Regional Supplementary Procedures (Doc 7030), CAR/SAM Regions Part 4 – Meteorology.*

METEOROLOGICAL SERVICE REQUIRED AT AERODROMES AND REQUIREMENTS FOR METEOROLOGICAL WATCH OFFICES
(FASID Tables MET 1A and MET 1B)
[EANPG conclusion 46/26, 49/14]

2.3 The service to be provided at the international aerodromes listed in the Appendix to Part III of the Basic ANP is set out in FASID Table MET 1A.

2.4 The service to be provided for flight information regions (FIR), upper flight information regions (UIR), control areas (CTA) and search and rescue regions (SRRs) is set out in FASID Table MET 1B.

2.5 Meteorological service should be provided on a 24-hour basis, except as otherwise agreed between the meteorological authorities, the air traffic service authorities and the operators concerned.

Note. Details of the service provided should be indicated in Aeronautical Information Publications, in accordance with the provisions in Annex 15.

METEOROLOGICAL OBSERVATIONS AND REPORTS
(FASID Table MET 1C)

2.6 Hourly routine observations should be made at all RS (international scheduled air transport, regular use) and AS (international scheduled air transport, alternate use) aerodromes, as required in respect of operational needs, and reports issued as METAR/SPECI and local reports together with local special reports. Hourly METAR should also be issued for any additional aerodromes, which are included in the CAR/SAM VHF VOLMET broadcast system.

Note: - Provisions for the CAR/SAM VHF VOLMET broadcast system are detailed in FASID Part VII - ATS.

2.7 At aerodromes with limited hours of operation, the issuance of METAR should commence at least two hours prior to the aerodrome resuming operations, or as agreed between the meteorological authority and the operators concerned, to meet pre-flight and in-flight planning requirements for flights due to arrive at the aerodrome as soon as it is opened for use.

2.8 When required, information on the state of the runway should be included as supplementary information in all METAR and SPECI.

2.9 States under whose jurisdiction off-shore structure or other points of significance in support of off-shore helicopter operations are located should, in consultation with the appropriate operators, establish or arrange for the establishment of aeronautical meteorological observing stations at suitable locations. Information of the state of the sea and sea surface temperature should be included as supplementary information in all METAR and SPECI from those stations. The offshore structures providing information on the state of the sea and/or sea surface temperature in METAR and SPECI are listed in FASID Table MET 1C.

FORECASTS

2.10 Routine TAF should be issued as required in respect of operational needs for designated aerodromes as specified in FASID Table MET 1A.

2.11 The period of validity of the routine TAF should be either 9 hours or 24 or 30 hours. The period of validity is specified in FASID Table MET 1A.

2.12 The periods of validity for 9-hour TAF should commence at 00, 03, 06, 09, 12, 15, 18 and 21 UTC and for 24 and 30-hour TAF at 00, 06, 12 and 18 UTC. The periods of validity should be determined based on the types of operations (e.g., regional or inter-regional (long-haul) flights) and taking into account the hours of operation of the aerodrome, as agreed between the meteorological authorities and the operators concerned.

2.13 The scheduled international exchange of TAF should be completed two hours before commencement of the period of validity.

2.14 The forecast maximum and minimum temperature expected to occur during the period of validity together with their respective dates and times should be included in the TAF at aerodromes indicated in FASID Table MET 1A.

2.15 Trend forecasts should be issued for designated aerodromes specified in FASID Table MET-1A.

SIGMET AND AIRMET INFORMATION
(FASID Tables MET 1B, MET 3B and MET 3C)

2.16 Volcanic ash advisory centres (VAACs) Buenos Aires, Washington and Wellington and the MWOs have been designated to prepare advisory information. FASID Table MET 3B set out the areas of responsibility of the VAACs and, the MWOs and ACCs/FICs to which the advisory information should be sent.
[IAVWOPSG Conclusion 3/2]

2.17 In order for the VAACs to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs should notify the relevant VAAC immediately on receipt of information that a volcanic eruption has occurred or volcanic ash has been observed in the FIR for which they are responsible. In particular, any special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, received by MWOs should be transmitted without delay to the VAAC concerned. [IAVWOPSG Conclusion 1/1]

2.18 Selected State volcano observatories have been designated for direct notification of significant pre-eruption volcanic activity, a volcanic eruption and/or volcanic ash in the atmosphere to their corresponding ACC/FIC, MWO and VAAC. FASID Table MET 3C sets out the selected State volcano observatories and the VAACs, MWOs and ACCs to which the notification should be sent by the observatories. [IAVWOPSG Conclusion 2/2]

2.19 AIRMET information should be issued by a MWO if agreed on between users and the meteorological authority concerned. FASID Table MET 1B sets out the responsible MWOs and the areas for which AIRMET information should be provided.

INFORMATION FOR OPERATORS AND FLIGHT CREW MEMBERS

2.20 As far as possible, English should be among the languages used in meteorological briefing and consultation.

EXCHANGE OF OPERATIONAL METEOROLOGICAL INFORMATION

(FASID Tables MET 2A)

2.21 The international OPMET data banks at Brasilia and Washington have been designated to serve States in the CAR/SAM Region.

WORLD AREA FORECAST SYSTEM (WAFS)
(FASID Table MET 5)

2.22 FASID Table MET 5 sets out the CAR/SAM Region requirements for WAFS forecasts to be provided by WAFC Washington.
[WAFSOPSG Conclusion 1/2]

2.23 For back-up purposes, each WAFC should have the capability to produce WAFS forecasts for all the required areas of coverage.
[WAFSOPSG Conclusion5/2]

2.24 WAFS forecasts should be made available by WAFC Washington using the WAFS Internet File Service (WIFS).

2.25 Each State should make the necessary arrangements to receive and make full use of operational WAFS forecasts made available by WAFC Washington. The lists of the authorized users of the SADIS services in the CAR/SAM Region and location of the operational VSATs and Internet-based services are available from the following website:

www/icao.int/anb/sadisopsg (click: "Status of implementation") for SADIS

CAR/SAM ANP, VOLUME I, BASIC ANP

PART VI - SEARCH AND RESCUE (SAR)

INTRODUCTION

3 ICAO standards require that Contracting States shall, individually or in cooperation with other States, arrange, on a 24-hour basis, for the establishment and prompt provision of search and rescue (SAR) services within their territories to ensure that assistance is rendered to aircraft in distress and to survivors of aircraft accidents, irrespective of nationality, status or the circumstances in which they are found. It also requires that those portions of the high seas or areas of undetermined sovereignty for which search and rescue services will be established shall be determined on the basis of regional air navigation agreements.

3.1 The Standards, Recommended Practices and Procedures to be applied are contained in:

a) Annex 10 – Aeronautical Communications;
b) Annex 12 – Search and Rescue;
c) Procedures for Air Navigation Services — Air Traffic Management (Doc 4444);
d) Regional Supplementary Procedures (Doc 7030) - CAR/SAM Region; and
e) International Aeronautical and Maritime Search and Rescue Manual (Doc 9731-AN/958).

CAR/SAM REGION RESPONSIBILITIES

3.2 The ICAO Regional Office will, through the GREPECAS:

i) Specify the minimum units and facilities necessary for the provision of search and rescue operations within the CAR/SAM Region. Search and Rescue facilities for the CAR/SAM Region are listed in Table SAR-1 of the CAR/SAM FASID;

ii) Co-ordinate aeronautical frequencies specified for SAR; and

iii) Manage proposed amendments to ICAO SAR documentation.

STATE RESPONSIBILITIES

3.3 States are encouraged to develop and improve their SAR services, co-operate with neighbouring States and to consider their SAR services to be part of a global system. For example, States should conclude agreements regarding co-operation of their SAR services in border areas and, more especially, over the high seas and in inhospitable areas (deserts, mountainous areas) where speediest possible action is essential to the success of SAR operations.

3.4 To ensure compatibility between aeronautical and maritime search and rescue regions (SRRs), aeronautical SAR authorities in States should maintain close liaison with their maritime counterparts and the International Maritime Organization (IMO) and consider

the possibility of establishing joint aeronautical/maritime rescue coordination centres or equivalent arrangements. Details of such arrangements and any subsequent changes should be notified to the ICAO Regional Office for incorporation into Table SAR-1 of the CAR/SAM FASID.

3.5 In order to provide a more efficient SAR service and to reduce the costs associated with providing SAR facilities, States should consider establishing joint facilities where possible. Planning for search and rescue services should be based to the maximum practicable extent on existing services and facilities, even if these are not provided primarily for search and rescue purposes, in order to obtain a reasonable cost-effectiveness relationship in maintaining these services and facilities in the required state of readiness

3.6 States should take the steps necessary and practicable to ensure the availability of effective aeronautical SAR services throughout the CAR/SAM region by:

a) identifying aeronautical search and rescue authorities in legislation and high-level national SAR plans and committees, and make provisions to support those authorities as necessary;

b) adopting and implementing, to the fullest extent practicable, the guidance material contained in the three-volume IAMSAR Manual (ICAO Doc 9731) for establishing effective domestic and regional services for aeronautical search and rescue;

c) establishing domestic and international SAR agreements where such agreements may improve SAR services and to coordinate efforts among entities that provide or support SAR services;

d) ensuring that a robust communications network, which takes into account any technologies commonly used by aircraft and RCCs, is in place to receive a voice or data distress alert from aircraft via terrestrial and satellite systems that may commonly be used for that purpose, and to enable acknowledgement of that alert and coordination of the SAR response;

e) ensuring that RCCs know how to obtain data, as appropriate, from the AMVER ship reporting system to identify ships at sea that can provide assistance to aircraft and persons in distress;

f) ensuring that civil aviation authorities arrange with the appropriate national maritime authorities in order to encourage ships to voluntarily participate in the AMVER system; and

g) ensuring that all RCC personnel have an effective working knowledge of the English language.

h) Each State should designate a single SAR Point of Contact (SPOC) to facilitate cooperation with the associated mission control centre (MCC) of the COSPAS/SARSAT system in order to ensure the timely distribution of distress data.

Note 1.— A SPOC may be an aeronautical or a maritime Rescue Co-ordination Centre (RCC).

Note 2.— COSPAS = Space System for Search of Vessels in Distress; SARSAT = Search and Rescue Satellite-aided Tracking.

3.7 States which rely on military authorities and/or other sources for the provision of SAR facilities should ensure that adequate arrangements are in place for coordination of SAR activities between all entities involved.

3.8 In addition, arrangements should be made to permit a call on any national services likely to be able to render assistance on an ad hoc basis, in those cases when the scope of SAR operations requires such assistance.

3.9 States should:

a) take appropriate action to reduce the number of false alarms on emergency frequencies caused by inadvertent activation of emergency locator transmitters and eliminate unauthorized use of those frequencies;
b) make available information as to how ELT registration information can be obtained rapidly by rescue coordination centres (RCCs) of other States;
c) when considered feasible, make arrangements for joint SAR exercises between their SAR units and those of other States and with operators, at regular intervals and, if possible, at least once a year;
d) invite observers from other interested States and organizations to participate in such exercises; and
e) enable SAR personnel to attend training courses in this field, after provision of adequate information from interested States to ICAO concerning the type of training to be received.

PART VII - AERONAUTICAL INFORMATION MANAGEMENT (AIM)

CAR/SAM ANP, VOLUME I, BASIC ANP

INTRODUCTION

Regional AIS/AIM Planning

4 This part of the CAR/SAM Region Basic Air Navigation Plan contains basic planning principles, operational requirements, planning criteria and implementation guidelines related to Aeronautical Information Management and Aeronautical Charts considered being the minimum necessary for effective planning of AIM and Aeronautical Charts facilities and services in the CAR/SAM Region. It contains also the developing transition path to achieve CAR/SAM Region Aeronautical Information Management (AIM) based on the *ATM Operational Concept (Doc 9854)* and the *Global Air Navigation Plan (Doc 9750)*.

4.1 The dynamic material constituted by the AIM facilities and services required for international air navigation is contained in the CAR/SAM ANP Volume 2 - Facilities and Services Implementation Document (FASID). The FASID includes appropriate additional guidance, particularly with regard to implementation, to complement the material contained in the Basic ANP.

4.2 During the transition from AIS to and pending full implementation of AIM, it is expected that the existing requirements will be gradually replaced/complemented by new AIM related requirements. Subsequently, it is expected that the ANP will be subject to regular review and amendment, to reflect progression in the transition towards full implementation of AIM.

Standards, Recommended Practices and Procedures

4.3 The Standards, Recommended Practices and Procedures and related guidance material applicable to the current provision of AIS and AIM Operational Concept are contained in the following ICAO documentation:

a) Annex 4 – Aeronautical Charts;
b) Annex 15 – Aeronautical Information Services;
c) Doc 7030 – Regional Supplementary Procedures, CAR/SAM Region;
d) Doc 7383 – Aeronautical Information Services Provided by States;
e) Doc 7910 – Location Indicators;
f) Doc 8126 – Aeronautical Information Services Manual;
g) Doc 8168 – Aircraft Operations Volume 2 – Construction of Visual and Instrument Flight Procedures;
h) Doc 8400 – ICAO Abbreviations and Codes (PANS-ABC);
i) Doc 8697 – Aeronautical Charts Manual;
j) Doc 9377 – Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services;

k) Doc 9674 – World Geodetic System (1984) Manual;
l) Doc 9855 – Guidelines on the Use of the Public Internet for Aeronautical Applications; and
m) Doc 9881– Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information.
n) Doc 9906 (Volume I) – Flight Procedure Design Quality Assurance System.

GENERAL PROCEDURES/REQUIREMENTS

CAR/SAM Region Responsibilities

4.4 The ICAO Regional Office will, through the GREPECAS:

i) process endorsed proposals for amendment to ICAO AIM related documents;
ii) support the AIM Implementation Committee of the NAM/CAR ANIWG, which is responsible for the monitoring of AIS/AIM activities in the CAR Region; and

State Responsibilities

4.5 Each Contracting State is responsible for the aeronautical information and data published by its aeronautical information service or by another State or a non-governmental agency on its behalf.

4.6 Aeronautical information published for and on behalf of a State should clearly indicate that it is published under the authority of that State.

4.7 Each Contracting State should take all necessary measures to ensure that the aeronautical information and data it provides relating to its own territory, as well as areas in which the State is responsible for providing air traffic services outside its territory, is adequate, of required quality and timely. This should include arrangements for the timely provision of required information and data to the aeronautical information management by each of the State services associated with aircraft operations.

4.8 International NOTAM Offices (NOF) and their areas of responsibility should be established so as to ensure maximum efficiency in the provision of AIS and in the dissemination of aeronautical information.

4.9 The designated International NOTAM Offices for the CAR/SAM Region are listed in the CAR/SAM ANP Volume 2 - FASID Table AIS-3.

4.10 Coordination/liaison on a permanent basis should be established between AIM and other technical services responsible for planning and operating air navigation facilities and services.

4.11 Technical services responsible for origination of the raw aeronautical information should be acquainted with the requirements for promulgation and advance notification of changes that are operationally significant as established in Annexes 11 and 14 and other

relevant ICAO documentation. They should take due account of the time needed by AIM for the preparation, production and issue of the relevant material.

4.12 Appropriate AIM personnel should be included in the air navigation planning processes. This should ensure the timely preparation of appropriate AIM documentation and that the effective dates for changes to the air navigation system and procedures are satisfied.

4.13 Whilst Annex 4 and Annex 15 detail the SARPs for the provision of aeronautical charts and AIM respectively, the following State responsibilities are highlighted:

4.14 Each Contracting State should:

a) Arrange for the implementation of a quality management system for aeronautical information and aeronautical chart services. The quality management system should include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable throughout the aeronautical information data chain from origin to distribution to the next intended user. As part of the quality management system, arrangements should be made for the signature of letters of agreement with data originators to manage the aeronautical information data chain;
b) Ensure Human Factors are considered;
c) Ensure adherence to the AIRAC System;
d) Ensure that the aeronautical information/data to be exchanged with States is published as an Integrated Aeronautical Information Package (i.e. Aeronautical Information Publication (AIP), including amendment service, AIP Supplements, NOTAM, pre-flight information bulletins (PIB), Aeronautical Information Circulars (AIC), checklists and list of valid NOTAM) in accordance with the current requirements of Annex 15 and Doc 8126;
e) Arrange for the provision of an electronic AIP (eAIP) in accordance with the requirements of Annex 15;
f) Comply with WGS 84 requirements and Doc 9674;
g) Introduce automation enabling digital data exchange with the objective of improving the speed, accuracy, efficiency and cost-effectiveness of aeronautical information services;
h) Ensure that pre-flight information is provided at all aerodromes/heliports normally used for international air operation, in accordance with the current requirements of Annex 15, using Automated pre-flight information systems for the supply of aeronautical information and data for self-briefing, flight planning and flight information service;
i) Arrange for the provision of post-flight information;
j) Arrange for the provision of required electronic Terrain and Obstacle Data (eTOD), in accordance with the requirements of Annex 15 and Doc 9881; and
k) Arrange for the production and publication of necessary aeronautical charts in accordance with Annex 4 and Doc 8697 provisions and regional agreements.

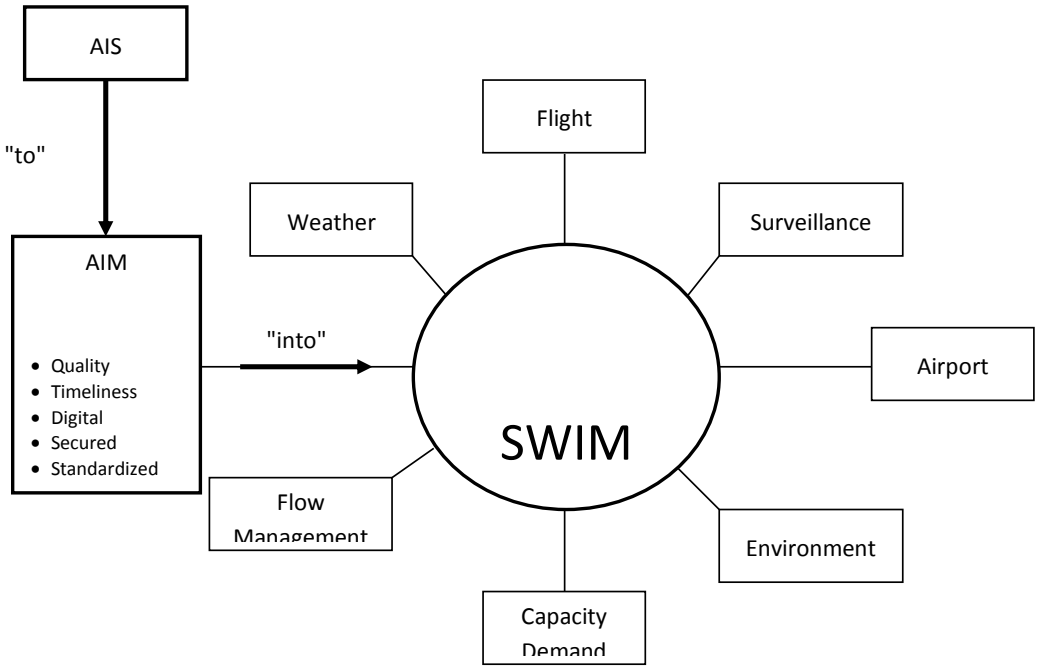
AERONAUTICAL INFORMATION MANAGEMENT

4.15 The Global Air Traffic Management Operational Concept presented in ICAO Doc 9854 depends upon a system wide information management (SWIM). The management,

utilization and transmission of data and information are vital to the proper functioning of the ATM system and are at the core of air navigation services.

4.16 As part of SWIM, AIM is required to support evolving requirements for, inter alia, collaborative decision making (CDM), performance-based navigation (PBN), ATM system interoperability, network-centred information exchange, and to take advantage of improved aircraft capabilities.

4.17 The scope of information management includes all types of information and in particular aeronautical information. The relationship diagram below shows a number of the core elements of SWIM:



Aeronautical Information Management (AIM) is considered to be the dynamic, integrated management of aeronautical information services — safely, economically and efficiently — through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

TRANSITION TO AIM

4.18 The transition to AIM requires that all aeronautical information, including that currently held in AIP be stored as individual digital standardized data sets to be accessed by user applications. The distribution of these data sets will both enhance the quality of output and ultimately provide a platform for new applications. This will constitute the future integrated aeronautical information package that will contain the minimum regulatory

requirement to ensure the flow of information necessary for the safety, regularity and efficiency of international air navigation.

Guiding Principles for the Transition to AIM

4.19 The transition from AIS to AIM will have to:

a) support or facilitate the generation and distribution of aeronautical information which serves to improve the safe and cost-effective accessibility of air traffic services in the world;

b) provide a foundation for measuring performance and outcomes linked to the distribution of quality assured aeronautical information and a better understanding of the determinants of ATM, safety and effectiveness not related to the distribution of the information;

c) assist States in making informed choices about their aeronautical information services and the future of AIM;

d) build upon developments in States, international organizations and industry and acknowledge that the transition to AIM is a natural evolution rather than a revolution;

e) provide over-arching and mature Standards that apply to a wide range of aeronautical information products, services and technologies;

f) be guided by the *Global Air Navigation Plan* (Doc 9750) and ensure that all development is aimed at achieving the ATM system envisaged in the *Global Air Traffic Management Operational Concept* (Doc 9854); and

g) ensure to the greatest extent possible, that solutions are internationally harmonized and integrated and do not unnecessarily impose multiple equipment carriage requirements for aircraft or multiple systems on the ground.

The Roadmap to AIM

Source Document: ICAO Road Map for the Transition from AIS to AIM

4.20 The purpose of the roadmap is to develop the AIM concept and associated performance requirements by providing a basis upon which to manage and facilitate, on a worldwide basis, the transition from AIS to AIM. The roadmap is based on what is known today and has been developed with sufficient flexibility to facilitate the new concepts that will emerge from future research.

4.21 Three phases of action are envisaged for States and ICAO to complete the transition to AIM:

Phase 1 — Consolidation

4.22 During Phase 1, steps will be taken to establish a solid base by enhancing the quality of the existing products and improving the status of implementation of current Annex 4 and Annex 15 provisions. This is a pre-requisite before Phase 2 can be achieved.

Phase 2 — Going digital

4.23 Phase 2 of the transition to AIM will mainly focus on the establishment of data-driven processes for the production of the current products in all States. States that have not yet done so will be encouraged "to go digital" by using computer technology or digital communications and through introducing structured digital data from databases into their production processes. The emphasis will, therefore, not be on the introduction of new products or services but will be on the introduction of highly structured databases and tools such as geographic information systems.

Phase 3 — Information management

4.24 Phase 3 will introduce steps to enable future AIM functions in States to address the new requirements that will be needed to implement the Global Air Traffic Management Operational Concept in a net centric information environment. The digital databases introduced in Phase 2 will be used for the transfer of information in the form of digital data. This will require the adoption of a Standard for an aeronautical information exchange model to ensure interoperability between all systems not only for the exchange of full aeronautical data sets, but also for short-term notification of changes.

National Plans for the transition to AIM

4.25 States should be planning for the transition from AIS to AIM. The national plans for the transition from AIS to AIM should be based on the ICAO Roadmap for the transition from AIS to AIM, identifying clearly the associated performance goals and achievable milestones with a view to satisfy the requirements arising from the Global ATM Operational Concept, in particular the management of a seamless information flow ensuring interoperability between the different CNS/ATM systems.

AIM Implementation

4.26 The following provisions and regulatory requirements complement those contained in ICAO Annex 4 and Annex 15 with a view to expedite AIM implementation in the CAR/SAM (CAR/SAM) Region in a harmonized manner. They represent the basis for a number of provisions contained in the FASID tables.

Integrated Aeronautical Information Database (IAID)
(FASID Table AIM-2)

4.27 FASID Table AIM-2 sets out the requirements for the Provision of AIM products and services based on the Integrated Aeronautical Information Database (IAID).

4.28 States should designate and implement an authoritative Integrated Aeronautical Information Database (IAID). The designation of authoritative geo-referenced relational databases should be clearly stated in States' electronic AIPs.

Electronic Terrain and Obstacle Data and Aerodrome Mapping Data Bases (AMDB)

(FASID Table AIM-3)

4.29 FASID Table AIM-3 sets out the requirements for the provision of Terrain and Obstacles Datasets and Aerodrome Mapping Data Bases (AMDB).

4.30 States should take the necessary measures for the provision of required electronic Terrain and Obstacle Data (e-TOD), in accordance with Annex 15 provisions.

4.31 States should manage the e-TOD implementation as a national programme supported by the necessary resources and detailed planning including priorities and timelines for implementation.

4.32 The implementation of e-TOD should involve different Administrations within and outside of the Civil Aviation Authority i.e.: AIM, Aerodromes, Military, National Geographic and Topographic Administrations/Agencies, procedure design services, etc.

4.33 States, while maintaining the responsibility for data quality and availability, should consider to which extent the provision of electronic terrain and obstacle data could be delegated to other approved data providers.

4.34 States should establish formal arrangements to address cross-border issues, to ensure harmonization and more efficient implementation of e-TOD.

4.35 States should take the necessary measures to ensure that the obstacle dataset is maintained up-to-date.

4.36 States should endeavour to integrate the acquisition of e-TOD and AMDB data to realize efficiency gains and to take into account the complementary nature of AMDB and e-TOD datasets.

Aeronautical Data Quality
(FASID Table AIM-4)

4.37 FASID Table AIM-4 sets out the requirements for aeronautical data quality.

4.38 States should take the necessary measures to ensure that aeronautical information and data it provides meet the regulatory Aeronautical Data quality requirements.

4.39 The Quality Management System (QMS) in AIM should define procedures to meet the safety and security management objectives.

40. Recognizing the need to maintain or enhance existing safety levels of operations, States should ensure that any changes to the existing systems or the introduction of new systems used for processing aeronautical data/information are preceded by a safety assessment including hazard identification, risk assessment and mitigation.

41. States should ensure that the Critical, Essential and Routine aeronautical data and information, as specified in Annexes 4 and 15, is transferred by the data originators to the AIM service provider through direct electronic connection, in accordance with the agreed aeronautical information exchange model format.

AIM Certification
(FASID Table AIM-9)

4.40 FASID Table AIM-9 sets out the requirements for AIM Certification.

4.41 States should take necessary measures to ensure that AIM Services are provided by Certified AIM Service Provider(s).

4.42 The Certification of AIM Service Provider(s) should be based on the compliance with all regulatory and ICAO requirements related to the provision of AIM services.

PART VIII - SAFETY (SAF)

INTRODUCTION

8 This Part has been provided to show the overarching link with safety in the planning and delivery processes associated with air navigation services and associated CNS/ATM systems. This air navigation safety related material is a component element of the wider aviation safety and its associated requirements that aviation stakeholders (includes States, regulators, aircraft and airport operators, air traffic service providers, aircraft manufacturers, approved maintenance organisations, international organizations and safety organizations) should consider when planning and delivering aviation services. It reflects ICAO safety targets and details the CAR/SAM Region Air Navigation Plan related Safety Objective that will contribute to achieving the ICAO Strategic Safety Objectives. Finally, it highlights the significant safety requirements States should adopt, which will contribute to the safe delivery of air navigation services.

8.1 ICAO Doc 9859 - *Safety Management Manual* describes safety as a state in which the possibility of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

ICAO Strategic Safety Objective

8.2 ICAO's first Strategic Objective is to '*enhance global civil aviation safety'*. To contribute to this ICAO has committed to enhance global civil aviation safety through the following measures:

i) Identify and monitor existing types of safety risks to civil aviation and develop and implement an effective and relevant global response to emerging risks;
ii) Ensure the timely implementation of ICAO provisions by continuously monitoring the progress toward compliance by States;
iii) Conduct aviation safety oversight audits to identify deficiencies and encourage their resolution by States;
iv) Develop global remedial plans that target the root causes of deficiencies.
v) Assist States to resolve deficiencies through regional remedial plans and the establishment of safety oversight organizations at the regional or sub-regional level;
vi) Encourage the exchange of information between States to promote mutual confidence in the level of aviation safety between States and accelerate the improvement of safety oversight;
vii) Promote the timely resolution of safety-critical items identified by regional Planning and Implementation Groups (PIRGs);
viii) Support the implementation of safety management systems across all safety-related disciplines in all States; and
ix) Assist States to improve safety through technical cooperation programmes and by making critical needs known to donors and financial organizations.

Global Aviation Safety Plan

8.3 Global Safety Initiatives (GSI), targeted at stakeholders, have been developed to support the implementation of the ICAO Strategic Safety Objective and other safety objectives that might be established by regions. The GSI and their main target groups are as follows:

Comment [R3]: This section shall be review and updated when the New GASP is approved at ANC/12

GSI	Initiative	Main Stakeholders	Comments
GSI-1	Consistent implementation of international standards and industry best practices	States	
GSI-2	Consistent regulatory oversight	States	
GSI-3	Effective errors and incidents reporting	States	
GSI-4	Effective incident and accident investigation	States	
GSI-5	Consistent coordination of regional programmes	ICAO Regional Office States	
GSI-6	Effective errors and incidents reporting and analysis in the industry	Industry	
GSI-7	Consistent use of Safety Management Systems (SMS)	Industry	
GSI-8	Consistent compliance with regulatory requirements	Industry	
GSI-9	Consistent adoption of industry best practices	Industry	
GSI-10	Alignment of industry safety strategies	Industry	
GSI-11	Sufficient number of qualified personnel	Industry	
GSI-12	Use of technology to enhance safety	Industry	

8.4 Stakeholders should incorporate GSI into their relevant planning processes. The GREPECAS will monitor the implementation progress of all navigation related GSI.

A Global Strategy for Aviation Safety

8.5 The attainment of a safe system is the highest priority in aviation. However, safety actions are not only driven by facts and data but also by the perception of safety needs by the public. Acceptable safety risk is related to the trust attributed to the aviation safety system, which is undermined every time an accident occurs. Therefore the challenge is to drive an already low accident rate even lower. To guide its work, ICAO has established the following safety target.

ICAO Safety Target for 2008-2011

1) Reduce the number of fatal accidents and fatalities worldwide irrespective of the volume of air traffic.
2) Achieve a significant decrease in accident rates, particularly in regions where these remain high.
3) No single ICAO region shall have an accident rate* more than twice the worldwide rate by the end of 2011.

* *Based on a five-year sliding average*

8.6 To achieve this safety target, aviation stakeholders should be proactive in ensuring that safety considerations are an inherent element of the development of policies, plans, practices and procedures. Moreover, whilst in the past, Authorities have concentrated on analysing accidents to identify future preventative measures; it is now considered that both regulators and industry must similarly manage safety critical information to both identify gaps in compliance and to develop strategies to rectify these as a means of preventing future accidents.

8.7 To support ICAO Safety targets, the GREPECAS will develop Regional Safety Objectives in respect of air navigation related deficiencies.

CAR/SAM Region Safety Objectives

8.8 The GREPECAS will continue in according its highest priority to the identification, reporting and resolution of the safety related air navigation deficiencies based on the Uniform Methodology adopted by the ICAO Council. The GREPECAS List of Deficiencies should not be regarded as a "name and blame" list, but as an important mechanism aimed at assisting States to resolve deficiencies through a collaborative effort of the GREPECAS, the ICAO Regional Office, States and the users' organizations. In order to expedite the resolution of safety related deficiencies, the GREPECAS, in accordance with its terms of reference, will endeavour to develop further efficient and transparent procedures related to the identification and reporting of deficiencies, in consultation with all stakeholders concerned, and to provide effective assistance to States in developing corrective actions. The process for GREPECAS management of safety related deficiencies is detailed in the *GREPECAS Handbook*.

8.9 Analysis of the ICAO Universal Safety Oversight Audit Program (USOAP) reports of States of the ICAO CAR/SAM Region, and safety related deficiencies identified through the GREPECAS process, provides a sound basis for identifying the main areas where action is required to reduce the potential contributory factors that could lead to accidents. These could also include initiatives to support States in the implementation of new requirements such as the State Safety Programme.

8.10 The GREPECAS will continue to provide oversight of CAR/SAM Region deficiencies and will provide assistance on a case-by-case basis. The ICAO Regional Office will continue to provide courses and workshops on safety related topics such as safety management, state safety programme development and language proficiency.

Performance Management

8.11 GREPECAS has developed performance indicators, initially aiming to ensure the improvement of safety through the reduction of ATM related safety occurrences and the implementation of uniform safety standards.

8.12 The indicators identified to monitor the achievement of those objectives are:

a) Effectiveness of Safety Management (measured by a methodology based on ATM safety framework maturity survey);

b) Level of State Safety/Just Culture (safety culture survey); and

c) Adoption of a harmonized occurrences severity classification methodology.

8.13 Performance objectives will continue to be developed with details provided in the FASID.

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c) Adoption of a harmonized occurrences severity classification methodology.

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State Responsibilities

Safety Oversight

8.17 States should ensure they meet their duties and responsibilities in respect of aviation safety oversight. Detailed description and guidance is contained in ICAO Doc 9734 - Safety Oversight Manual.

Standards and Recommended Practices

8.18 Adherence to ICAO Standards and Recommended Practices (SARPS) will significantly contribute to aviation safety. States should therefore ensure that they have the necessary regulatory framework in place to underpin the adoption of ICAO SARPS within their State and its national airspace. States should ensure that any differences to SARPS have been assessed in respect of safety and are notified in accordance with ICAO requirements.

State Safety Programme

8.19 ICAO Standards require States to establish a State Safety Programme (SSP) in order to achieve an Acceptable Level of Safety (ALoS). They also explicitly require States to establish an ALoS to be achieved as a means to verify satisfactory performance of the SSP and service providers' Safety Management Systems (SMS).

8.20 The requirement for an SSP recognizes that States as well as service providers have safety responsibilities and provides a framework within which service providers are required to establish an SMS.

8.21 Detailed guidance on SSP requirements and methodology are contained in ICAO Doc 9859 – Safety Management Manual.

8.22 States are requested to notify the ICAO Regional Office when they publish their national SSP.

Safety Management System

8.23 ICAO Standards require States to establish a Safety Management System (SMS). The GREPECAS thus encourages States to:

a) develop and implement, if they have not already done so, safety programmes requiring air operators, aerodrome operators and air traffic service providers to implement safety management systems;
b) use relevant ICAO safety management system (SMS) implementation documentation (global or regional);
c) undertake aggregated safety analysis at a national level;
d) if appropriate, use applicable certification process to verify if safety management systems met the established requirements and criteria; and
e) expedite the safety management training of their staff at the regulatory and regulated entities' levels, taking advantage of the SMS training offered by ICAO.

Safety Reporting

8.24 ICAO Standards require States to establish a mandatory accident reporting system and an incident reporting system to facilitate collection of information on actual or potential safety deficiencies. ICAO further recommends that States should establish a voluntary incident reporting system to facilitate the collection of information that may not be captured by a mandatory incident reporting system; this latter system should be non-punitive and afford protection to the sources of the information. Guidance related to both mandatory and voluntary incident reporting systems is contained in the Safety Management Manual (SMM) (Doc 9859).

8.25 The GREPECAS thus encourages States to:

a) develop and implement non-punitive reporting mechanisms as part of their safety programme;
b) adopt the following enabler elements, to make best use of existing mandatory and voluntary data flows whilst, strengthening the "safety culture" within their legal and organizational environments:
c) a unique aviation taxonomy such as the ICAO ADREP 2000 model, and the CAR/SAMOCONTROL HEIDI model (Harmonisation of CAR/SAM Incident Definition Initiative for ATM);
d) a harmonised safety reporting and investigation process; and
e) software tools capable to support a systemic analysis and to allow the sharing of safety intelligence.
f) provide required airspace safety monitoring data to the CAR/SAM Regional Monitoring Agency (CARSAMMA).

8.25.2 Reported material will contribute to the future development of CAR/SAM Region safety objectives.

CAR/SAM ANP, VOLUME I, BASIC ANP

PART IX – HUMAN RESOURCES AND TRAINING (HR&TNG)

Introduction

9 This part of the CAR/SAM Region Basic Air Navigation Plan reflects the planning and training elements that need to be considered by all those responsible for the regulation, supervision and provision of air navigation services within the wider context of planning for future aviation sector personnel.

9.1 State regulators, supervisory authorities, air transport operators, and air navigation service providers should be aware of the importance of Human Factors considerations when delivering a safe aviation environment. In this respect human resource planning should be cognisant of the varying aptitude and skill sets needed to meet the demands of the increasingly technical environment comprised by the aviation sector.

9.2 Human resources development and management must strive to continuously improve the competency levels of safety critical personnel, while taking into account the interdependencies for supply and demand of qualified personnel at national, regional and global levels. Estimating current and future requirements for civil aviation personnel and training capacity in each region is essential for human resource planning, institutional capacity building, and related funding and policy measures.

Next Generation of Aviation Professionals

9.3 Doc 9956 - *Global and Regional 20-year Forecasts* has been developed to provide the aviation sector with an informed forecast for the period 2010-2030 relating to: air transport development – traffic, movement and fleet growth; pilot; maintenance; and air traffic controller personnel requirements. The forecast shows both global and regional requirements. This study is ICAO's initial response to the market demand and is the first in a series that will provide data, analyses, and forecasts to all key players of the aviation industry.

9.4 Air Transport is forecast to grow globally by 4.7% during the period 2010-2030. Within the CAR/SAM Region the average growth is forecast to be 4.1%. Doc 9956 provides significantly more detail, however, analyses indicates that the most likely scenario of training needs against training capacity within the ICAO CAR/SAM Region results in an annual shortage of over 7000 pilots, 8000 maintenance personnel and 300 air traffic controllers.

9.5 It has been recognised that as the aviation industry emerges from a difficult economic situation, changing demographics and new technologies with far reaching potential will intensify human resource challenges. In this context it becomes urgent to review existing regulations and propose a new regulatory environment for the recruitment, education, training, and retention of the next generation of aviation professionals who must be appropriately educated and suitably qualified to staff an increasingly technical aviation environment.

ICAO CIVIL AVIATION TRAINING POLICY

Scope

9.6 ICAO, recognizing its role in ensuring that the civil aviation community has access to an adequate pool of qualified professionals to support the safe, secure and sustainable development of air transport, has committed to the development of the necessary Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS), air transport policies, advice and guidance material. The framework for this is elaborated in the ICAO Civil Aviation Training Policy.

9.7 The training policy is applicable to all training provided by ICAO Bureaus, Regional Offices and training organizations issuing a certificate of completion or a certificate of achievement with an ICAO logo.

9.8 Seminars and workshops aimed at informing States and other stakeholders of ICAO SARPs, PANS, air transport policies and guidance material and at facilitating their implementation are not considered as aviation training, education or testing for the purpose of this policy.

9.9 All ICAO training and testing activities shall be designed, developed and offered in accordance with set standards and best practices for that discipline.

ICAO TRAINAIR Plus

9.10 The ICAO TRAINAIR Programme was established to ensure higher training standards for aviation professionals. The civil aviation training needs are evolving rapidly and ICAO is responding by enhancing the TRAINAIR programme into TRAINAIR *PLUS*.

9.11 TRAINAIR *PLUS* is an ICAO programme that provides support for new and existing aviation training centers via technical expertise, resources, and quality oversight. This results in a network of ICAO TRAINAIR *PLUS* Centres meeting the standards of the programme.

9.12 The TRAINAIR *PLUS* programme's objectives are:

i) Streamline, and facilitate the implementation and the development of the TRAINAIR methodology used in Standardized Training Packages (STP) courses;
ii) Coordinate and supply technical support for STP development courses;
iii) Provide quality control throughout the STP development stage;
iv) Operate an international STP sharing system and cooperative training network;
v) Oversee the certification of endorsed training centres.

9.13 The TRAINAIR *PLUS* Programme is based on rebuilding three interrelated tools:

i) The use of standardized training material.
ii) The development of an international pool of training courses.
iii) The creation of an international sharing network between public and private Civil Aviation Training Centres.

9.14 TRAINAIR PLUS addresses all fields of civil aviation activities: from basic equipment and systems training supporting new implementation projects up to graduate level courses for a variety of civil aviation professionals.

9.15 Details of ICAO accredited training institutions and courses can be found in the Aviation Training Directory of ICAO accessible at http://www.icao.int/anb/peltrg/td/listall.cfm.

ICAO CAR/SAM Region Support

9.16 The ICAO NACC and SAM Regional Office provides support to States through provision of workshops and seminars on a range of topical aviation subjects including, *inter alia*, State Safety Implementation Programmes; Safety Management System Implementation; Performance Based Navigation; and States' Action Plans on CO_2 Emissions Reduction Activities. Additionally, ICAO familiarisation courses and English Language training workshops are routinely provided to CAR/SAM Region States.

9.17 ICAO also offers internship positions established to support young aviation professionals to obtain experience with ICAO.

State Support

9.18 States, aviation carriers, maintenance organisations and ANSPs are requested to regularly provide statistical data on human resources and training requirements as shown in Doc 9956 - *Global and Regional 20-year Forecasts* Appendices 1-3.

9.19 States should:

i) Adequately resource regulatory bodies (particularly following separation between regulation and service provision). In this respect States may wish to consider secondment arrangements with airlines and ANSPs to provide current operational expertise to inform policy and regulatory development;
ii) Provide appropriately experienced representatives to GREPECAS and associated working groups/task forces;
iii) Encourage aviation providers to develop links with higher education providers to foster interest in careers in aviation;
iv) Develop regulatory frameworks that will enable free movement of aviation professionals;
v) Provide or facilitate aviation training resources.

Appendix 1

PART IX – HUMAN RESOURCES AND TRAINING (HR&TNG)

ICAO CIVIL AVIATION TRAINING POLICY

Scope

1. ICAO has an important role to play in ensuring that the civil aviation community, and especially States, have access to the pool of qualified professionals they need to support the safe, secure and sustainable development of air transport.

2. ICAO's role shall essentially be achieved through the facilitation, support and harmonization of efforts made by States and industry; the development of Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS), and air transport policies; and the provision of advice and guidance material.

3. The training policy is applicable to all training provided by ICAO Bureaus, Regional Offices and training organizations issuing a certificate of completion or a certificate of achievement with an ICAO logo.

4. Seminars and workshops aimed at informing States and other stakeholders of ICAO SARPs, PANS, air transport policies and guidance material and at facilitating their implementation are not considered as aviation training, education or testing for the purpose of this policy.

5. All ICAO training and testing activities shall be designed, developed and offered in accordance with set standards and best practices for that discipline.

Basic principles

6. The training policy shall be in compliance with Assembly Resolution A36-13 Appendix H and all other Assembly Resolutions dealing with training, recognizing that aviation training is the responsibility of the States and that ICAO should not participate in the operation of training facilities but should encourage and advise operators of such facilities.

7. Training delivery is considered as a support function and not as a core function of ICAO. It shall only be undertaken when it is determined that:

   a) it is necessary to support States in the implementation of ICAO SARPs, PANS, air transport policies and guidance, the rectification of identified deficiencies, or another ICAO activity; or
   b) it can promote and foster ICAO's strategic objectives and produce adequate revenue to ensure self-sustainability without affecting ICAO's capability to carry out its core functions.

8. Aviation training activities provided by a third party using the ICAO name or logo shall meet the following requirements:

   a) be in direct support of the strategic objectives of ICAO;

b) be in full compliance with ICAO SARPs, PANS, air transport policies and guidance;
c) use of the ICAO logo will be in full conformity with the policies concerning the use of the logo; and
d) be subjected to an appropriate ICAO endorsement mechanism.

9. The intellectual property of ICAO shall be protected.

10. No harm to ICAO's reputation shall result from training activities provided by a third party using the ICAO name or logo.

11. Training activities provided by ICAO may be charged in accordance with paragraph 7.7 of The *ICAO Financial Regulations* (Doc 7515). This charge, together with interest earnings or earnings from investments thereon, shall be used to fund training activities or reimburse all, or part, of the costs incurred by ICAO in the generation, promotion and administration of these training and testing services.

12. Training activities provided by ICAO may be funded using either funds provided by Member States or organizations or funds generated by ICAO's own activities.

Implementing policy

13. Aviation training mentioned in the basic principles above includes any training or related testing activities undertaken directly by ICAO or by a third party using the ICAO name or logo.

14. The use of the ICAO name or logo for training or testing activities undertaken by a training institution shall be subject to an ICAO endorsement mechanism.

Endorsement

15. ICAO may endorse any training activity and/or facility which meet established requirements.

16. ICAO also reserves the right to withdraw endorsement of any training activity and/or facility which fails to meet those established requirements.

17. An ICAO endorsement indicates that the delivered training programmes, facilities and instructors meet the criteria of quality and relevance needed to ensure that the skills and knowledge necessary to implement SARPs are provided.

18. The endorsement indicates that training programmes, facilities and instructors are managed in such a way as to effectively support learning for performance improvement.

19. Endorsement is used to extend ICAO's ability to implement key activities derived from strategic objectives involving training and testing. Institutions endorsed for a training activity remain responsible for fully meeting ICAO requirements.

20. Endorsement will be granted only after an assessment conducted by ICAO confirms that established requirements are met.

21. The full costs related to endorsement will be borne by the State or institution.

PART X - CONTINGENCY PLANNING (CPLN)

INTRODUCTION

10 ICAO Annex 11 states that "Air traffic services authorities shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of air traffic services and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed with the assistance of ICAO as necessary, in close coordination with the air traffic services authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned."

10.1 ICAO Annex 17 states that "Each Contracting State shall ensure that contingency plans are developed and resources made available to safeguard civil aviation against acts of unlawful interference. The contingency plans shall be tested on a regular basis."

Note. State Aviation Security (AVSEC) planning is outside of the scope of the Air Navigation Plan. Detailed security contingency arrangements should be undertaken through a State's AVSEC arrangements and appropriately coordinated where such plans have an impact on the provision of air navigation service or availability of airspace.

10.2 This Part provides an overview of the main ICAO requirements and guidance that States and air navigation service providers (ANSP) should consider in preparing contingency plans to maintain the provision of services in airspaces for which they are responsible.

10.3 The Standards, Recommended Practices and Procedures to be applied are contained in:

a) Annex 11 — *Air Traffic Services*;
b) Annex 17 – *Security;*
c) *Air Traffic Management (PANS-ATM)* – ICAO Doc 4444;
d) *Regional Supplementary Procedures* – ICAO Doc 7030;
e) *Air Traffic Services Planning Manual* – ICAO Doc 9426;
f) *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* – ICAO Doc 9691;
g) *International Airways Volcano Watch* - ICAO Doc 9766;
h) *Flight Safety and Volcanic Ash* – ICAO Doc 9974
i) *Regional Caribbean Contingency Procedures for Volcanic Ash*
j) *Regional Caribbean Contingency Procedures for Hurricanes*
k) *Regional South American Contingency Procedures for Volcanic Ash*
l) *ICAO Assembly Resolution A37-13, Appendix M - Delimitation of Air Traffic Services (ATS) Airspaces* – ICAO Doc 9958.

Note. GREPECAS had developed comprehensive guidance and reference material in respect of Contingency Planning. The guidelines will aim to provide information and processes to help States and ANSPs identify and decide on the contingency strategies and concept of operation best suited to meet their needs in certain circumstances.

10.4 Contingency plans may constitute a temporary deviation from the approved regional air navigation plans; such deviations are approved, as necessary, by the President of the ICAO Council on behalf of the Council.

10.5 The effects of disruption of services in particular portions of airspace are likely to affect significantly the services in adjacent airspace. In this respect States should co-ordinate with neighbouring States in the development and implementation of contingency plans, which in some cases may be developed on a sub-regional basis.

10.6 Examples of events of disruption, or potential disruption, of air traffic services and related supporting services or unavailability of airspace for civil air operations, that should be covered in general contingency plans or initial development of special contingency plans are:

a) Natural disasters such as earthquakes resulting in loss of support facilities;
b) Volcanic ash events requiring closure or restrictions to airspace;
c) Industrial action necessitating accommodation of international traffic or humanitarian access to airports;
d) Armed conflict or acts of unlawful interference with civil aviation resulting in closure of national airspace; and
e) Catastrophic loss of air traffic services or supporting services.

CAR/SAM REGION RESPONSIBILITIES

10.7 ICAO will initiate and coordinate appropriate contingency action in the event of disruption of air traffic services and related supporting services affecting international civil aviation operations provided by a State in the event that the authorities cannot adequately discharge their responsibility for the provision of such services to ensure the safety of international civil aviation operations. In such circumstances, ICAO will work in coordination with States responsible for airspace adjacent to that affected by the disruption and in close consultation with international organizations concerned.

10.8 Regional contingency plans (e.g. Volcanic Ash Contingency Plan) will be developed, approved and maintained by GREPECAS with the support of ICAO.

10.9 ICAO will initiate and coordinate appropriate guidance to contingency action at the request of States.

10.10 ICAO is available to assist States in the development and co-ordination of State or sub-regional contingency plans affecting adjacent CAR/SAM and other region airspaces.

10.11 ICAO will be available for monitoring developments that might lead to events requiring contingency arrangements to be developed and applied and will, as necessary, assist in the development and application of such arrangements.

10.12 During the emergence of a potential crisis, a coordinating team will be established in the Regional Office(s) concerned and at ICAO Headquarters in Montreal, and arrangements will be made for competent staff to be available or reachable 24 hours a day.

GENERAL CONSIDERATIONS

10.13 Safety. Contingency Plans should be developed using the same safety management system approach utilised for normal operations.

10.14 ATFM. Within the CAR/SAM Region ATFM organisations will play an important role in any contingency arrangements and it is recommended they are involved as appropriate in the development of national contingency plans.

10.15 Human Resources. Contingency planning may require the relocation of personnel or disruption to established working patterns. Human Resource personnel should be involved in Contingency Planning throughout the process.

10.16 Training, testing and exercising. By their very nature it is not expected that contingency plans will be activated on a routine basis. In this respect, the strict adherence to the safety management system process during the development of a contingency plan should ensure that ATS contingency procedures are inherently safe to activate. State Authorities and ANSPs are recommended to ensure that relevant staffs are familiar with contingency plan procedures. Whilst large scale exercises of such plans may be impractical, States/ANSPs should consider running desk-top exercises to ensure that the management of a contingency activation can be effectively conducted. Testing of equipment that is planned to be used should be undertaken on a planned basis to ensure that it meets the envisaged operational requirement.

STATE RESPONSIBILITIES

10.17 States should establish a contingency plan covering all possible situations that would cause disruption to air traffic flow in the airspace of its responsibility. It is the State's responsibility to coordinate with other States who are expected to provide the support services in the event of a contingency situation.

10.18 The Contingency Plan should be prepared in advance and submitted to ICAO Headquarters as necessary through the corresponding NACC and SAM Regional Office for review and approval by the President of the ICAO Council on behalf of the Council. In this respect contingency plans that affect regional arrangements detailed in the CAR/SAM ANP or adjacent States should be submitted for approval. Contingency plans developed to cater for a local outage such as a failure of facilities causing localised disruption not affecting the Regional ANP need not be submitted for ICAO Approval; States may, however, provide details of such plans to the corresponding NACC and SAM Regional Office.

10.19 The contingency plan should be updated at regular intervals as required.

10.20 It is recognized that in some cases the short time required for approval of implementation of a contingency plan may be insufficient, e.g. in case of natural disasters. Implementation of a contingency plan (without changes) prior to approval of that implementation may be necessary. However, in such cases ICAO should be informed immediately.

10.21 States should register with ICAO any aeronautical agreements between a Contracting State and any other State.

PART XI - ENVIRONMENT (ENV)

Introduction

11 The need to minimise the environmental impact of aviation in CAR/SAM is well recognized. Environmental challenges are present in every aspect of civil aviation and they need to be tackled in order to mitigate adverse impacts that can limit aviation growth.

11.1 Each State should have an appropriate basis for the development of an aviation *environmental policy and strategy* and the environmental issues which have to be considered in any planning activities. The environment related material provided in this chapter, and its associated requirements, should be considered by aviation stakeholders (including States, regulators, aircraft and airport operators, air traffic service providers, aircraft manufacturers, approved maintenance organisations, international organizations and environment organizations) when planning and delivering aviation services. This chapter is intended as a useful tool for States. It reflects the ICAO environment goals and targets elaborated in the ICAO Action Programme on climate protection and details the CAR/SAM Region Air Navigation Plan related environment initiatives that will contribute to achieving the ICAO Strategic *Environmental Protection and Sustainable Development* Objective. Finally, it highlights the significant environment requirements States should adopt in their delivery of navigation services.

ICAO Strategic Objective *Environmental Protection and Sustainable Development*

11.2 ICAO's third Strategic Objective is related to ***Environmental Protection and Sustainable*** Development ***of Air Transport.*** Thus, ICAO *fosters harmonized and economically viable development of international civil aviation that does not unduly harm the environment.*

11.3 To contribute to this vision ICAO has committed to minimize the adverse environmental effects of global civil aviation activity, notably aircraft noise and aircraft engine emissions, through the following means:

a. Providing measures to:

i) limit or reduce the number of people affected by significant aircraft noise;
ii) limit or reduce the impact of aircraft engine emissions on local air quality; and
iii) limit or reduce the impact of aviation greenhouse gas emissions on the global climate.

b. Working with other international bodies, in particular the UN Framework Convention on Climate Change (UNFCCC) to address aviation's contribution to global climate change.

ICAO: Environmental Mandate and Activities

11.4 In matters of environmental protection, ICAO establishes Standards and Recommended Practices (SARPS), and policies and guidance for international civil aviation.

11.5 The **CAEP (Committee on Aviation Environmental Protection**), a technical committee of ICAO, is charged with developing and establishing rules and recommending measures to reduce the environmental impact of aviation. CAEP supports ICAO in the development of environmental standards for the certification of aircraft as well as guidance material on airport planning and management, operational procedures and market-based measures to reduce aviation's impact on the environment. The existing state of scientific knowledge and realistic approaches on noise, air quality and climate impacts of aviation may be used to facilitate informed policy decisions. Actions to address environmental impact may also take account of the interdependency between aircraft noise and emissions. CAEP also promotes the use and further development of harmonised tools and best practices. The practical information provided by CAEP can be used by States to estimate the environmental impact of aviation and identify measures to mitigate it. The ICAO Secretariat which supervises CAEP work also coordinates environmental activities with other UN bodies such as the United Nations Environment Programme (UNEP), UNFCCC and the World Meteorological Organisation (WMO).

ICAO related Environmental Fields and Activities:

a) **Certification:** SARPs development related to aircraft noise certification and aircraft engine emissions certification.
b) **Noise:** Noise abatement operational procedures; Land-use planning and management; Operation restrictions to minimize aircraft noise; Aircraft noise scenarios; Aircraft noise modelling: Aircraft noise charges policies.
c) **Fuel:** Fuel efficiency; Alternative fuels.
d) **Air quality:** Local air quality; Local air quality emissions charges.
e) **Emissions /Climate change:** Aircraft emissions scenarios; Aircraft emissions modelling; Market-based measures to reduce emissions; Emissions trading; Voluntary agreements; Aviation's impact on the upper atmosphere; Climate change; Ozone depletion.

ICAO Global Strategy for Aviation Environment/Targets

11.6 The global strategy of the aviation industry is focused on reducing the contribution of aviation to climate change; this strategy is translated as fuel management and emissions cuts. Industry's ambitious goals can only be achieved through collective efforts. Accordingly, the global aviation strategy to reduce carbon emissions was confirmed by the 37th ICAO Assembly. This historic agreement formalized strategy targets to continuously improve CO_2 efficiency by an average of 2 % per annum from 2009 until 2020, to achieve carbon neutral growth from 2020 and reduce its carbon emissions by 50% by 2050 compared to 2005 levels.

The Environment Roadmap

11.7 The ICAO Environmental Roadmap provides a framework to better understand aviation environmental priorities, including performance indicators and long-term targets. Steps to achieve the emissions reduction target(s) are related to investments in new technology, the building and use of an efficient infrastructure; operating aircraft effectively and economic measures (i.e. Emissions Trading Scheme; voluntary measures).

11.8 The ICAO Council was asked to regularly assess the present and future impact of aircraft noise and aircraft engine emissions and to continue the development of tools for this purpose. Knowledge of the interdependencies and trade-offs related to measures to mitigate the impact of aviation on the environment are continuously maintained and updated. In 2009, an ICAO Global Framework for Aviation Alternative Fuels (GFAAF) was established.

States and International Organisations Involvement

11.9 States and international organizations are invited to provide the necessary scientific information and data to enable ICAO to validate its work related to environment.

11.10 The Global Framework on International Aviation and Climate Change and ICAO Assembly Resolution A37-19: *Consolidated statement of continuing ICAO policies and practices related to environmental protection - Climate Change* specify that addressing greenhouse gas (GHG) emissions from international aviation requires the active engagement and cooperation of States and industry. States are requested to support ICAO on measuring progress through the reporting of annual data on traffic and fuel consumption.

11.11 States are advised to refrain from environmental measures that would adversely affect the orderly and sustainable development of international civil aviation.

Action Plans on CO_2 Emissions Reduction

11.12 According to the ICAO Assembly Resolution A37-19, States are encouraged to submit to ICAO their Action Plans outlining their respective policies and actions, and annual reporting on international aviation CO2 emissions. Those States that choose to prepare their Action Plans are invited to submit them as soon as possible, preferably by the end of June 2012, in order that ICAO can compile information related to achieving the global aspirational goals. The Action Plans should include information on measures considered by States and information on any specific assistance needs. Where emissions reductions are achieved through Market Based Measures (MBMs), they should be identified in States' emissions reporting. ICAO Regional offices can provide additional assistance on this matter.

11.13 In order to achieve the goals related to climate change, States should put an emphasis on increasing fuel efficiency through all aspects of the ICAO Global Air Navigation Plan (Doc 9574), and all stakeholders are encouraged to develop an air traffic management system that maximises environmental benefits. States are also encouraged to promote and share best practices applied at airports to reduce the adverse effects of GHG emissions produced by civil aviation operations.

ICAO CAR/SAM Region Environmental Objectives/Goals

11.14 The CAR/SAM Air Navigation Planning Group (GREPECAS) expects States to ensure environmental factors are taken into consideration when developing CNS/ATM systems implementation plans.

11.15 States in the CAR/SAM region are encouraged to *adopt best practices* from other States and international organisations (UNFCCC; WMO; IATA, ACI).

11.16 The GREPECAS will promote implementation measures for CO_2 reduction, with a focus on fuel efficiency and new operational practices. Appropriate Performance Indicators will be developed.

11.17 States are urged to adopt a balanced approach to noise management, taking full account of ICAO guidance (Doc 9829 – *Guidance on the Balanced Approach to Aircraft Noise Management*), relevant legal obligations, existing agreements, current laws and established policies, when addressing noise problems at their international airports.

Current Practices

11.18 Current practices include the development and implementation of fuel efficient routings and procedures to reduce aviation emissions. Investments in research and development should be accelerated to bring to market more efficient technology by 2020. Aviation stakeholders should accelerate their efforts to achieve environmental benefits through the implementation of performance based navigation that would improve the efficiency of air navigation.

Performance Based Navigation (PBN) Implementation

11.19 PBN environmental benefits are significant, and can be quantified case-by case. Airlines that take full advantage of PBN routinely accumulate benefits from reduced fuel burn and greenhouse gas emissions, improved schedule reliability and increased safety. It should be noted that 3.15 kg of CO_2 emissions are eliminated for every 1 kg of fuel saved through shorter and vertically optimized flight paths. IATA estimates that globally, shorter PBN routes could cut CO_2 emissions by 13 million tonnes per year.

11.20 In the approach phase, obstacle clearance and environmental constraints can be better accommodated by creating optimized tracks based on PBN. PBN also offers environmental benefits by saving fuel and reducing CO_2 emissions. Flying down the middle of a defined flight path means less throttle activity and better avoidance of noise-sensitive areas.

11.21 The 37th ICAO Assembly (Resolution 37-11 refers) urged States to complete a PBN implementation plan as a matter of urgency. GREPECAS agreed that a reminder to the CAR/SAM States to continue their PBN planning and implementation activities in accordance with the ICAO PBN concept as detailed ICAO Doc 9613 and provides information on the status of implementation to the ICAO Regional Offices (NACC and SAM) would be timely and helpful to foster implementation. Implementation of PBN is considered a significant enabler to deliver environmental benefits.

11.22 For the CAR/SAM Regions a regional PBN roadmap was formulated by GREPECAS and a PBN Airspace Concept was developed, establishing the milestones and target performance goals. States should continue to develop civil/military co-ordination to

enhance the Flexible Use of Airspace, which will contribute to more direct routing with a commensurate saving in fuel and associated emissions.

NextGen

11.23

Comment [R4]: References to individual - national plans in a regional document as the ANP may not be so appropriate.

ALTERNATIVE AVIATION FUEL

11.24 One means to accelerate the reduction of aviation CO_2 emissions is the development of sustainable aviation alternative fuels. This sector is supported by research and development, followed by investments in new feedstock cultivations and production facilities, as well as incentives to stimulate commercialisation and use of sustainable alternative fuels for aviation. Therefore, the use of alternative fuels is also one aspect to be considered in planning activities.

Environment Guidance and Existing Tools

11.25 The ICAO Council was tasked to establish a set of aviation environmental tools which States could use to implement their policies and evaluate the performance of aviation operations and the effectiveness of standards, policies and measures to mitigate aviation's impacts on the environment. This work progresses and a number of tools and models have been introduced. Additionally, some States and international organisations have developed their own environmental tools and models. Consequently, several options are available for States and their aviation stakeholders to assess or predict the environmental impact due to aircraft operations. Some examples are described below:

- Noise: AEDT/MAGENTA; AEDT/NIRS; STAPES; SONDEO.
- Air Quality: ADMS; AEDT/EDMS;ALAQS; LASPORT; PEGAS.
- Climate Change: AEDT/SAGE; AEM III; AERO2K; FAST; ICAO carbon calculator; IFSET.
- Cost benefit analysis (economics): APMT Economics; NOx-CSM.
- Performance: BADA.
- Forecasting air traffic growth: FOM; FESG traffic forecast.

11.26 A list of available and developing tools and models with a short explanation of their purpose/capability is shown at Appendix 1 to this Chapter.

11.27 Market-Based Measures are among the elements of a comprehensive mitigation strategy to address greenhouse gas emissions from international aviation that are being considered by ICAO. Market-Based Measures include: *emissions trading*, emission related levies - charges and taxes, and emissions offsetting; all of which aim to contribute to the achievement of specific environmental goals, at a lower cost, and in a more flexible manner, than traditional command and control regulatory measures. States are invited to use the *Guidance on the Use of Emissions Trading for Aviation* (Doc 9885). This material supports the incorporation of international aviation emissions into States emissions trading schemes, consistent with the United Nations Framework Convention on Climate Change process. It focuses on aviation-specific issues, identifies options and offers potential solutions. A global CO_2 Standard for aircraft (aiming for 2013) is under development at present.

11.28 On the noise side, the *Balanced Approach to Aircraft Noise Management* (Doc 9829) aims to provide States with advice and practical information on managing the noise impact and achieve maximum environmental benefit in the most cost-effective manner. Its implementation relies on four principle elements: reduction of noise at source, land-use planning and management, noise abatement operational procedures and operating restrictions on aircraft. They are linked to tools and procedures useful to assess the noise situation: noise contours, noise index, baseline, management plans, etc.

11.29 Assembly Resolutions A37-18 – "*Consolidated statement of continuing ICAO policies and practices related to environmental protection — General provisions, noise and local air quality*" and A37-19 – "Consolidated *statement of continuing ICAO policies and practices related to environmental protection - Climate change"* constitute the consolidated statement of continuing ICAO policies and practices related to environmental protection and illustrate, *inter-alia*, new guidance on operational measures to reduce international aviation emissions.

11.30 Other relevant ICAO Documents:

- *Report of the Seventh Meeting of the Committee on Aviation Environmental Protection (CAEP) (Doc 9886);*
- *Report of the Independent Experts on the LTTG NOx Review and Medium and Long Term Technology Goals for NOx (Doc 9887);*
- *Noise Abatement Procedures: Review of Research, Development and Implementation Projects - Discussion of Survey Results* (Doc 9888);
- *Airport Air Quality Guidance Manual* (Doc 9889)*;*
- *Recommended Method for Computing Noise Contours Around Airports* (Doc 9911);
- *Report of the ICAO Conference on Aviation and Alternative Fuels*, Rio de Janeiro, Brazil, 16-18 November 2009 (Doc 9933);
- *Report of the Independent Experts on the Medium and Long Term Goals for Aviation Fuel Burn Reduction from Technology* (Doc 9963); and
- *Global Air Navigation Plan* (Doc 9750), Attachment H – "Environmental Benefits Associated with CNS/ATM Systems Implementation".

Measuring Performance through Environmental Performance Indicators

11.31 Aviation stakeholders will measure their performance through environmental key performance indicators (EPI). EPIs are linked to safety and capacity key performance indicators (KPI) and most of them are under development. Three types of EPI are recognised at present:

- Management Performance Indicators (MPI), which provide management information on how efforts to improve environmental performance are working;
- Operational Performance Indicators (OPI), which provide information about operational performance; and
- Environmental Condition Indicators (ECI), which provide information on environmental impact, and can be used to help an organisation understand its actual or potential environmental impacts (ISO 2000).

11.32 Co-ordinated action at an industry level is required to develop consistent interpretations of agreed KPIs and EPIs. Information on KPIs can be found in the *Global Air Traffic Management Operational Concept* (Doc9854)..

11.33 The 37th Assembly, Resolution A37-19 called upon States to develop and implement procedures to reduce aviation emissions. The implementation of operational improvements will generally have benefits in areas such as improved airport and airspace capacity, shorter cruise, climb and descend times through the use of more optimized routes, and an increase of unimpeded taxi times. The importance of such information on the savings, which reflects the efforts made by the whole aviation industry in reducing fuel consumption, flight time, mileage and its impact on the environment (CO_2 emissions), have been already identified by States at various regional meetings.

11.34 The GREPECAS has endorsed ICAO's request that all States/ANSPs in the CAR/SAM Region start reporting the benefits to ICAO as they plan or implement any type of operational improvement. States will be notified by ICAO of the mechanism of reporting fuel savings benefits.

11.35 Whilst ICAO has developed the ICAO Fuel Savings Estimation Tool (IFSET) Tool to provide a means of capturing fuel savings stemming from operational improvements, States may use other advanced model or measurement capabilities to fulfil the reporting requirement.

11.36 The GREPECAS has developed initial performance objectives and associated indicators relating to efficiency and the environment. Performance objectives and indicators will continue to be developed with details provided in the FASID. The initial objectives and indicators are shown below:

Efficiency and Environment

11.37 The Efficiency and Environment KPAs have been considered together because in this context they are strictly interlinked.

11.38 The objective for Efficiency is: ensure that users use the most efficient routes – focussing on the horizontal flight-efficiency.

11.39 The indicator identified to monitor the achievement of this objective is:

1) Average horizontal en route flight efficiency, defined as the difference between the length of the en route part of the actual trajectory (where available) or last flight planned route and the great circle.

11.40 In this context specificities shall be considered for flights longer than 1000 nm where the optimum could differ from the great circle (wind optimal routes, etc).

11.41 The objective for Environment is: contribute to the protection of environment – focussing on fuel savings/CO_2 emission reductions.

11.42 The indicator identified for the achievement of this objective is:

1) CO_2 emissions deriving from inefficiencies in flight efficiency (conversion of additional distance into CO2 emissions based on standard values formula).

11.43 Future developments of the framework will have to consider the impact of aviation noise on environment.

Appendix 1 to Part XI - ENVIRONMENT (ENV)

TABLE OF ENVIRONMENTAL TOOLS AND MODELLING TECHNIQUES

ICAO Tools/Models

	Tool/Model	**Source**	**Modelling Area**	**Implementation status**	**Comments _recommendation**
1	**Balanced Approach to Aircraft Noise Management**	ICAO	Noise	Ready and in use globally	This guidance (Doc 9829) relates to a concept involving several inter-related tools comprising 4 pillars: technological development; operational practices; operating restrictions; & land use planning. Helps assess the management of noise impact using noise contours, noise index, and management plans. Implemented gradually at airport(s) level; States may already have noise regulations and policies in place.
2	**FESG Traffic Forecast**	ICAO	Forecasting	Used globally	This provides traffic and fleet forecasts developed for passenger and cargo services over the period 2006 to 2036. It also outlines the methodology, the assumptions and the inputs used to develop the forecasts. Develops the aircraft retirement curves and conducts the sensitivity analyses around the forecasts.
3	**ICAO carbon emissions calculator**	ICAO	Climate Change	Ready & in use globally	ICAO has developed a methodology to calculate the carbon dioxide emissions from air travel for use in offset programmes. The ICAO Carbon Emissions Calculator allows passengers to estimate the emissions attributed to their air travel. It is simple to use and requires only a limited amount of information from the user. The methodology applies the best publicly available industry data to account for various factors such as aircraft types, route specific data, passenger load factors and cargo carried.
4	**IFSET**	ICAO	Climate Change	Ready and in use globally	ICAO Fuel Savings Estimation Tool (IFSET) has been developed to measure the benefits from operational improvements. It is applicable globally with the ability to capture the differences in flight trajectory performance in terms of fuel consumption before and after implementation of operational improvements at local, regional or global level.
5	**NOx –CSM**	ICAO	Economics	Used by experts	This is a Cost Spreadsheet Model (CSM) and is the principal tool used for calculating costs for selected scenarios based on NOx stringency analysis.

State/International Organisation Tools/Model

	Tool	Source	Modelling Area	Implementation status	Comments _recommendation
6	**ADMS - Airport**	UK DfT	Air Quality	Ready, in use	ADMS-Airport is a comprehensive tool for managing air quality at airports. It is an extension of the ADMS-Urban model, designed to model the concentration of pollutants at airports in rural or complex urban environments. ADMS-Airport is also one of the participating models in the ICAO CAEP (Committee on Aviation Environmental Protection) model exercises.
7	**AEDT - NIRS**	US FAA	Noise	Ready, in use	Aviation Environment Design Tool -Noise Integrated Routing System (NIRS) – regional noise analysis; based on US data. Use of this model is by request to the US FAA.
8	**AEDT - EDMS**	US FAA	Air Quality	Partially used; Under development for public release	AEDT is a software system that dynamically models aircraft performance in space and time to produce fuel burn, emissions and noise. *Full flight gate-to-gate analyses are possible for study sizes ranging from a single flight at an airport to scenarios at the regional, national, and global levels.* AEDT is currently used by the U.S. government to consider the interdependencies between aircraft-related fuel burn, noise and emissions. AEDT is being developed for public release, and will become the next generation aviation environmental consequence tool, replacing the current public-use aviation air quality and noise analysis tools such as the Integrated Noise Model (INM – single airport noise analysis), the Emissions and Dispersion Modelling System (EDMS) – single airport emissions analysis), and the Noise Integrated Routing System (NIRS – regional noise analysis).
9	**AEDT - MAGENTA**	US FAA	Noise	Ready, in use at global level	MAGENTA is a computer based Aviation Environmental Design Tool used to estimate the number of people exposed to significant aircraft noise worldwide. The original MAGENTA model was developed with ICAO - CAEP to assess the worldwide aviation noise climate. The computational core of MAGENTA is FAA's Integrated Noise Model (INM) and is the most widely used computer program to calculate aircraft noise around airports.

	Tool	Source	Modelling Area	Implementation status	Comments _recommendation
10	**AEDT - SAGE**	US FAA	Climate Change	Partially ready and in use (fuel burn)	System for Assessing Aviation's Global Emissions (SAGE) is a high fidelity model incorporated into the Aviation Environmental Design Tool (AEDT). It is used to predict aircraft fuel burn and emissions for all commercial (civil) flights globally. The model is used to analyze scenarios from a single flight to airport, country, regional, and global levels. In addition, SAGE dynamically models aircraft performance, fuel burn and emissions. Its purpose is to provide the FAA, and indirectly the international aviation community, with a tool to evaluate the effects of various policies, technology, and operational scenarios on aircraft fuel use and emissions. SAGE is also used to develop *global inventories of fuel burn and emissions*.
11	**AERO 2K**	UK DfT	Climate change	Ready & in use	This is a global aircraft emissions data project for the evaluation of climate change impacts and airport local air quality; AERO2K establishes a new inventory of aircraft emissions of pollutants (CO2, NOx, HCs, CO) important for assessing aviation impacts on climate change. Contributes to the global aviation emissions inventory study.
12	**ANCON2**	UK DfT	Noise	Ready and in use	ANCON-2 calculates noise exposure. The tool determines the sound exposure level from an aircraft flight segment derived from Noise-Power-Distance tables as a function of engine thrust rather than from wholly empirical Reference Noise Levels (RNLs). Use via application to the UK DfT.
13	**ANP**	CAR/SAMOCONTROL	Noise	Ready and in use	The Aircraft Noise and Performance Database (ANP) is an international data resource for aircraft noise modellers. This database is an online data resource accompanying the ECAC Doc 29 3rd Edition and ICAO Doc 9911 guidance documents on airport noise contour modelling.
14	APMT	US FAA	Interdependencies & Economics	Economics & Operations modules are available for use	The Aviation Environmental Portfolio Management Tool (APMT) computes the environmental impacts of aircraft operations, their interrelationships and economic consequences using the following elements: APMT-Impacts, APMT-Cost Benefit, and APMT-Economics. Cost benefit analyses with the APMT-Cost Benefit combines output from multiple Tools Suite elements to facilitate weighing total expected costs against total expected benefits for aviation's environmental effects under different policy, technology, operational and market scenarios.

	Tool	Source	Modelling Area	Implementation status	Comments _recommendation
					Access to this tool is by request to the FAA.
15	**BADA**	CAR/SAMOCONTROL	Aircraft Performance Model	Ready and in use	Base of Aircraft Data (BADA) is an Aircraft Performance Model (APM) with corresponding database. The main application of BADA is trajectory simulation and prediction within the domain of ATM (Air Traffic Management).
16	**FAST**	UK DfT	Climate Change	Ready and in use	Future Aviation Scenario Tool (FAST) is a model for climate change/GHG emission calculation.
17	**FOM**	US FAA	Forecasting	Ready and in use	Forecasting and Operations Module (FOM) is a fleet and operation model. This provides access to historical traffic counts, forecasts of aviation activity, and delay statistics: mainly fleet & operations activity. Access on request to the FAA.
18	**LASPORT**	German Ministry of Transport (BMVBS) Swiss Federal Office for Civil Aviation (FOCA)	Air Quality	Ready and in use	LASPORT is a programme system for the calculation of airport-induced pollutant emissions and concentrations in the atmosphere. Calculations can be carried out in conformance with the ICAO Airport Air Quality Guidance Manual (ICAO Document 9889). Aircraft movements are accounted for either individually based on a movement journal or in a more generalized form based on aircraft groups. Other source groups explicitly accounted for are: auxiliary power units (APU), ground power units (GPU), ground support equipment (GSE), engine start emissions, motor traffic (airside and landside).

Data Sources:

- Airports Database; US FAA,
- ICAO/CAEP: WG1 noise & WG3 emissions
- Population Database
- ICAO aircraft engine emissions databank (EDB)

List of Acronyms

Comment [R5]:

Acronym	
ACI	Airport Council International
ADMS	Atmospheric Dispersion Modelling System
AEDT	Aviation Environment Design Tool
AEM III	Advanced Emission Model
AERO2K	Model Name
AIRE	Atlantic Interoperability Initiative to Reduce Emissions
ALAQS	Airport Local Air Quality Studies
ANCON	Aircraft Noise Control Model
ANP	Aircraft Noise and Performance
APM	Aircraft Performance Model
APMT	Aviation Environnemental Portfolio Management Tool
APU	Auxiliary Power Unit
BADA	Base of Aircraft Data
CAEP	ICAO Committee on Aviation Environmental Protection
CO	Carbon Oxide
CO2	Carbon Dioxide
DfT	Department for Transport
ECAC	CAR/SAM Civil Aviation Conference
ECI	Environmental Condition Indicator
EDMS	Emissions and Dispersion Modelling System
EPI	Environmental Key Performance Indicator
CAR/SAMOCONTROL	The CAR/SAM Organisation for the Safety of Air Navigation
FAST	Future Aviation Scenario Tool
FESG	ICAO Forecasting and Economic Support Group
FOCA	Federal Office of Civil Aviation
FOM	Forecasting and Operations Module
GFAAF	Global Framework for Aviation Alternative Fuels
GHG	Green House Gas (emissions)
GIS	Geographic Information System
GPU	Ground Power Unit
GSE	Ground Support Equipment
IATA	International Air Transport Association
IFSET	ICAO Fuel Savings Estimation Tool
KPI	Key Performance Indicator
LAQ	Local Air Quality
LASPORT	Tool for assessment of LAQ at Airports
Lden	Index; is A-weighted average sound level used to assess disturbance over day-evening-night period (24 hr)
Lnight	Index; is A-weighted average sound level used to assess sleep disturbance over an 8 hour night time period
MAGENTA	Model for Assessing Global Exposure to the Noise of Transport Aircraft

Acronym	
MBM	Market Based Measures
MPI	Management Performance Indicator
NIRS	Noise Integrated Routing System
NOx	Nitrogen Oxides
NOx-CSM	Nitrogen Oxides Cost Spreadsheet Model
OPI	Operational Performance Indicator
PBN	Performance Based Navigation
RNL	Reference Noise Levels
SAGE	System for Assessing Aviation's Global Emissions
SESAR	Single European Sky ATM Research
STAPES	System for Airport Noise Exposure Studies
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WG	Working Group
WMO	World Meteorological Organisation

Comment [R6]: To be review with final version of the document

– END –