NORTH ATLANTIC AIR NAVIGATION PLAN

VOLUME I, BASIC ANP

PROPOSED NEW LAYOUT AND CONTENT

09 MAY 2012

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NAT ANP, VOLUME I, BASIC ANP

INTRODUCTION

GENERAL

1. Air navigation plans (ANPs~~ANP~~) 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.

2. On 26 February 1997, the ICAO Council decided that the regional air navigation plans ~~(ANPs)~~ 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.

3. On 8 March 2011, the ICAO Council decided that the BORPC should be withdrawn from all regional air navigation plans and that an updated BORPC would be included in the Global Air Navigation Plan (Doc 9750). 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 basic operational requirements and planning criteria (BORPC), as approved by the Air Navigation Commission (ANC) for application in all regions; and~~

b~~e~~) 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~~regional air navigation (RAN) meetings~~.

4.~~3.~~ ~~It was agreed that the~~ The FASID sets~~would set~~ 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~~s~~ appropriate additional guidance, particularly with regard to implementation, to complement the material contained in the Basic ANP.

~~4. In geographical scope the NAT ANP is related to the North Atlantic ICAO 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.~~

Comment [p1]: Moved to Part I-GEN

INTRODUCTION OF PERFORMANCE BASED REQUIREMENTS~~CNS/ATM ELEMENTS~~ INTO THE PLAN

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~~CNS/ATM systems~~, with longer planning horizons, it is recognized that concepts such as Performance Based Navigation (PBN), Required Communication Performance (RCP)~~CNS/ATM planning~~ ~~and~~ as described in the developing

Performance Manual for Air Navigation Services~~implementation elements~~ will be introduced progressively into the NAT ANP. Introduction~~Such introduction~~ of performance based requirements~~CNS/ATM planning elements~~ is guided by the ICAO Global Air Navigation Plan (Doc 9750),~~for CNS/ATM Systems,~~ which has been developed so that it has a clear and functional relationship with the regional ANPs. The evolution and development of the NAT ANP will also be guided by the Global ATM Operational Concept (Doc 9854) as endorsed by the 11th Air Navigation Conference (Montreal, 22 September – 3 October 2003) and as amended from time to time.

RELATIONSHIP BETWEEN GLOBAL, REGIONAL AND NATIONAL PLANNING

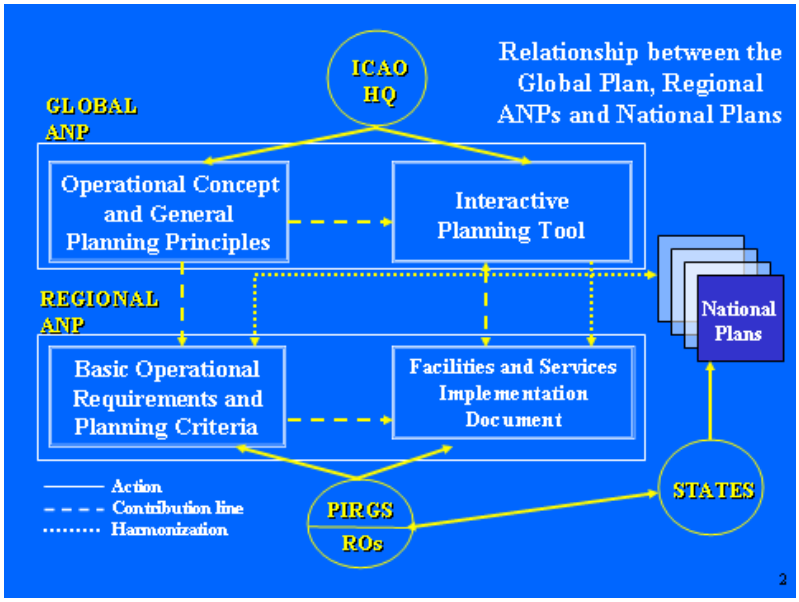

Figure 1. Relationship between global, regional and national plans.

~~7~~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, supported by guidance from the global level. The basis for effective planning is the Global ATM Operational Concept (Doc 9854), which should support the development of regional and national implementation plans that will support regional and global system architectures.

STATES' RESPONSIBILITIES

~~6~~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.

~~7~~8. Inclusion in air navigation plan documents of basic facilities and services provided by~~in~~ non-Contracting States and territories is simply ~~a~~ 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.

AIR NAVIGATION PLAN — NAT REGION

~~8~~9. This ~~basic air navigation plan document~~ Basic ANP presents in general terms the ICAO plan for the provision of facilities and services for international air navigation in the ICAO North Atlantic region. It has incorporated in an evolutionary manner requirements emanating from ~~introduction of~~ the ICAO Global Air Navigation Plan (Doc 9750). Doc 9750 spans current requirements whilst indicating the development path to reach the Global ~~for CNS/~~ATM Operational Concept. ~~Systems.~~ The companion element~~document~~ to this plan, the NAT ~~facilities and services implementation document (~~FASID, and in time an associated global database[1]~~,)~~ includes detailed information on States' facilities, services, and plans for implementation. The FASID and associated databases will be routinely updated to reflect the implementation of Regional Planning Initiatives (RPI) and programmes. Facilities and services outside of the prescribed regional boundaries may also be~~have been~~ included in order to maintain the integrity of "systems" and to ensure in so far as possible that all the facilities and services required for international air navigation in the ICAO NAT Region are listed in the document. The relationship between the Basic ANP and the FASID and associated electronic databases is shown in Figure 2 below.

~~9. Most of the contents originated from recommendations of the following regional air navigation meetings:~~

~~LIM NAT (COM/MET/RAC) RAN (Cascais, Portugal, November 1992);~~
~~Special North Atlantic (Montreal, February-March 1965);~~
~~Fifth North Atlantic (Montreal, April 1970);~~
~~Sixth European-Mediterranean (Geneva, November 1971);~~
~~Special North Atlantic/Pacific (LORAN-A) (Montreal, November 1974);~~
~~Limited North Atlantic (1976) (Montreal, August-September 1976).~~

~~10. The statement of basic operational requirements and criteria for regional planning on which the plan is based is found in Part I — BORPC. In addition, planning in the North Atlantic Region is based on traffic forecasts which are compiled by the North Atlantic Traffic Forecasting Group (NAT/TFG). Part II — GEN of the FASID contains detailed information on traffic forecasting in the NAT Region.~~

1~~1~~0. It should also be noted that the NAT ANP~~,~~ does not list all facilities in the region but only those required for international civil aviation operations. Documents from the Integrated Aeronautical Information Package and other ~~information~~ publications~~, NOTAM and other State documents~~ should be consulted for information on additional facilities and for operational information in general.

[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. It is anticipated that in time more applications will be migrated to this global database. This tool has not yet been fully developed. (check status before publication)

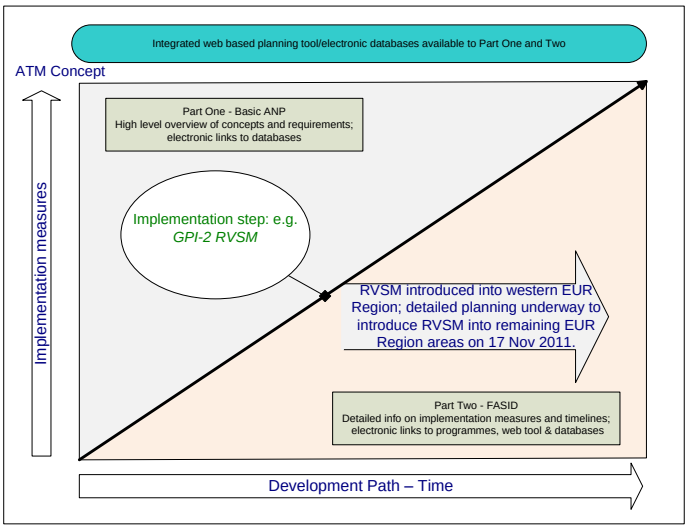

Figure 2. Relationship between Basic ANP – Part One and FASID – Part 2

1~~2~~1. Globally there are a number of air navigation services (ANS) development programmes underway that contribute to the Global ATM Operational Concept and Global Air Navigation Plan. These include NextGen (United States); China ATM Development; FIANS (India); SESAR (European Union States) and the Future ATM System of the Russian Federation. These developments will significantly contribute towards the Region achieving the Global ATM Operational Concept and Global ANP requirements. Whilst much of the content of this document reflects ANS developments over a number of years, developing programmes' implementation steps will be referenced to Global Planning Initiatives (GPIs) thus showing linkage to the Global Air Navigation Plan.

~~DEVELOPMENT~~ EVOLUTION ~~OF A~~ COMMUNICATIONS, NAVIGATION, SURVEILLANCE AND AIR TRAFFIC MANAGEMENT (CNS/ATM) SYSTEMS ~~FOR THE NORTH ATLANTIC REGION~~

12. The future NAT ~~ATS~~ CNS/ATM System should provide for improved regularity and efficiency of air traffic with ~~same~~ an equivalent or higher level of safety as that of the present system. Air traffic services in the NAT region must function as a single system. Any differences between ~~the~~ ground systems should be transparent to the user.

13. ~~The future NAT ATS System~~ CNS/ATM improvements should be developed on a system basis and in balance with other parts of the overall air navigation infrastructure. The required changes should be introduced in an evolutionary manner and be harmonized to enable future technologies to be introduced throughout the NAT Region in a consistent fashion. The overall infrastructure should be adaptable to the particular requirements in each FIR within the ICAO NAT Region and should be designed to minimize adverse effects on the environment.

~~14. The future NAT ATS System should be designed to minimise adverse effects on the environment.~~

~~15. The concept should be adaptable to the particular requirements in the various parts of the NAT Region and there should be no disparity in the level of service to a degree, which is detrimental to the~~

Comment [c2]: I believe we should not be speaking of a "concept" in this or later paragraphs, since "concept" is not mentioned in the title or leading text. I also suggest removing paragraphs which are "motherhood" statements.

~~expeditious flow of air traffic. System development must be harmonized to enable future technologies to be accommodated in a consistent fashion throughout the region. The system must also be compatible at the interfaces with the ATS Systems in adjacent Regions.~~

~~16~~14. All proposals to improve the NAT CNS/ATM System, including transition from HF to satellite communication, should be considered in the light of the likely financial implications for users and providers and due regard should be given to possible alternative solutions and operational cost/benefit considerations.

~~17. Orderly transition from the present system to the future concept, including adequate lead times, is of primary importance. However, the concept should allow for flexibility in implementation under the guidance of the NAT SPG and changes in user requirements.~~

~~18. The concept developed should be described in sufficient detail to provide the necessary guidance for detailed work in relation to planning for and implementation of facilities and services in the NAT Region.~~

1~~9~~5. The future NAT ~~ATS~~ CNS/ATM System should take into account the need to achieve maximum economy of flight operations and the need for compatibility between the air-borne and ground systems. It should also permit the optimum exploitation of the capabilities of advanced airborne equipment, whilst recognizing that ~~A~~aircraft with lower navigation performance and communications capability will continue to operate in some parts of the ~~NAT~~ Region. Due account should also be taken of foreseeable military requirements.

~~20. All foreseeable civil and military requirements, should be taken into account when system capacity is defined.~~

~~21. Due account should be taken of new technology foreseeable in the air navigation field in the time-scale under consideration.~~

~~22. The costs of air navigation systems elements are to be included in the cost basis for air navigation services charges and, where relevant, airport charges, and recovered in accordance with the principles contained in the Convention on International Civil Aviation (Doc 7300) and in ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082).~~

PROVISION OF A MULTINATIONAL AIR NAVIGATION FACILITIES/SERVICES

16. The operation of multinational air navigation services is well established within the NAT Region. The implementation 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.

17. For future changes, 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).

[2] Advice will be available from the ICAO EUR/NAT Office.

PROCEDURE FOR THE AMENDMENT OF REGIONAL PLANS, INCLUDING FASID MATERIAL

1823. The Basic ANP and FASID may be amended by a regional air navigation meeting or by following the amendment procedures below. Changes to traffic forecasts in Part II — GEN of the FASID do not require formal amendment.

PROCEDURE FOR THE AMENDMENT OF APPROVED BASIC AIR NAVIGATION PLANS

Approved by Council on 25 February 1998

19. Introduction

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

20. General criteria

20.1 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.

20.2 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.

213. Procedure

213.1 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.)

213.2 The Secretary General will circulate the proposal, adequately documented, with a request for comments to all provider 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.

213.3 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.

213.4 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.

213.5 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.

213.6 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.

213.7 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

122. 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.)

23. 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.

243. 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.

425. 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.

265. 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.

276. 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.

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

ABBREVIATIONS

29. 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 *(checked and updated before publication)*

30. 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.

31. 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	
Bahrain	MID	MID	MIDANPIRG
Bangladesh	APAC	APAC	APANPIRG
Barbados	NACC	CARSAM	GREPECAS

State	R/O	ANP	PIRG(s)
Belarus	EUR/NAT	EUR	EANPG
Belgium	EUR/NAT	EUR	EANPG
Belize	NACC	CARSAM	
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
Chile (Easter Island)	APAC	APAC	
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
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	

State	R/O	ANP	PIRG(s)
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	EANPG NATSPG GREPECAS APANPIRG APIRG
France (French Antilles)	NACC	CARSAM	
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	
Guinea	WACAF	AFI	APIRG
Guinea-Bissau	WACAF	AFI	
Guyana	SAM	CARSAM	GREPECAS
Haiti	NACC	CARSAM	
Holy See (the)	EUR/NAT	(NC)	-
Honduras	NACC	CARSAM	
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	
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

State	R/O	ANP	PIRG(s)
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	
Myanmar	APAC	APAC	
Namibia	ESAF	AFI	
Nauru	APAC	APAC	
Nepal	APAC	APAC	
Netherlands	EUR/NAT	EUR	EANPG
Netherlands (Aruba)	NACC	CARSAM	
Netherlands Antilles	NACC	CARSAM	
New Zealand	APAC	APAC	APANPIRG
New Zealand (Niue)	APAC	APAC	APANPIRG
Nicaragua	NACC	CARSAM	
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	EANPG

State	R/O	ANP	PIRG(s)
Portugal (Açores)	EUR/NAT	NAT	NATSPG
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
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
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 NAT	EANPG NATSPG

State	R/O	ANP	PIRG(s)
			GREPECAS
United Kingdom (Anguilla)	NACC	CARSAM	
United Kingdom (Bermuda)	NACC	NAT	NATSPG
United Kingdom (British Indian Ocean Territory)	ESAF		
United Kingdom (British Virgin Islands)	NACC	CARSAM	
United Kingdom (Cayman Islands)	NACC	CARSAM	
United Kingdom (Falkland Islands *Malvinas)	SAM	(*Disputed)	
United Kingdom (Gibraltar)	EUR/NAT	EUR	
United Kingdom (Montserrat)	NACC	CARSAM	
United Kingdom (Pitcairn Island)	APAC		
United Kingdom (Saint Helena)	WACAF		
United Kingdom (Turks and Caicos Islands)	NACC	CARSAM	
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	
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

NAT ANP, VOLUME I, BASIC ANP

PART I~~I~~

GENERAL PLANNING ASPECTS (GEN)

~~INTRODUCTION~~

~~1. As traffic volumes grow worldwide, the demands on the ATS provider in a given airspace increase, as do the complexities of air traffic management. The number of flights unable to follow optimum flight paths and fly at optimum flight levels also increases with an increase in traffic density. This creates pressure to upgrade the level of ATS by, inter alia, reducing separation standards.~~

~~2. The objective of the Global Air Navigation Plan for CNS/ATM Systems (Doc 9750) is to guide a progressive and coordinated worldwide implementation of the elements of the future air navigation system in a timely and cost-beneficial manner. To this end, the plan fulfills two principal functions:~~

~~a) it provides guidelines for use by regional planning bodies, States, service providers and users, for transitions from the current air navigation system to the future system; and~~

~~b) it functions as a benchmark for the evaluation of implementation progress.~~

GEOGRAPHICAL SCOPE

1. In geographical scope the NAT ANP is related to the North Atlantic ICAO air navigation region. The plan may call for the provision of basic facilities and services beyond the charted boundaries of the region where such facilities and services are necessary to meet the requirements of international air navigation within that the NAT Region.

FLIGHT INFORMATION REGIONS*(to be checked and updated before publication)*

2. The table below shows the ICAO approved NAT Region FIR status in 2011. It is anticipated that up to date information will be available from the ICAO EUR/NAT Office. Details of Flight Information Regions within the NAT air navigation region are contained in a centralised data base and can be accessed at <www.xxxxxxx >.

STATE	FIR/UIRs	Comments
Canada	Gander Oceanic	
Denmark	Sondrestrom	
Iceland	Reykjavik	
Norway	Bodo Oceanic	
Portugal	Santa Maria Oceanic	
United Kingdom	Shanwick Oceanic	
United States	New York Oceanic	

Note: Insert chart (possibly diagrammatic as opposed to definitive co-ordinates. Co-ordinates will, however, have to be listed in an authoritative document as they provide the legal basis for the FIR boundary definition).

~~**AIR TRAFFIC FORECASTS**~~

~~3. Air traffic forecasts are produced by the North Atlantic Traffic Forecasting Group (NAT TFG) in response to the needs of Contracting States of ICAO, air navigation service providers and the North Atlantic Systems Planning Group (NAT SPG), for which detailed yearly forecasts for peak and off-peak movements are produced.~~

~~4. The main purpose of the NAT TFG is to support the planning of air navigation services in the NAT region. Traffic forecasts and peak period planning parameters are important in anticipating where and when airspace congestion occurs. It is then possible to plan for the required expansion of capacity. These forecasts also have an important role in planning the implementation of CNS/ATM systems components. The primary users for the forecasts developed by the NAT TFG are expected to be Contracting States of ICAO, ATS service providers in the region, the ICAO planning group for the NAT region (NAT SPG).~~

~~5. Implementation of CNS/ATM systems is expected to be able to provide sufficient capacity to meet the increasing demand, while producing additional benefits in the way of more efficient flight profiles and increased levels of safety. The potential of new technologies to significantly reduce service costs, however, will require new arrangements in the provision of services and changes in air traffic management procedures.~~

~~6. Chapter 3 of the Global Air Navigation Plan for CNS/ATM Systems (Doc 9750) provides the means to begin the process of identification of ATM requirements, on the basis of identified homogeneous ATM areas and major international traffic flows, followed by the determination of the regional and global CNS system elements needed to meet the ATM requirements.~~

Comment [p3]: Moved to end of Part I-GEN

PERFORMANCE BASED APPROACH

3. Global Approach

3.1 States have agreed that global air navigation should be predicated on a performance based environment. The transition to such a performance based environment requires consideration of a number of differing expectations (the *Global Air Traffic Management Operational Concept* (Doc 9854) refers). These general expectations relate 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 have explicit economic expectations, others favour efficiency and predictability, while some are concerned with access and equity. All have safety expectations. For optimum air navigation system performance, each of these expectations needs to be balanced. In an integrated system, changes to one 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 ATM system through the implementation of air navigation systems and procedures in a safe, progressive, cost-effective and cooperative manner.

~~**PLANNING PROCESS**~~

4. NAT Region Planning

~~7~~4.1 The regional planning and implementation process is the principal engine of ICAO's planning framework.~~and implementation work.~~ It is here that the top-down approach, comprising global guidance and regional ~~harmonization measures~~planning, converges with the bottom-up approach constituted by national planning by States, Air Traffic Services providers and aircraft operators and their proposals for implementation options. 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), related to the *Global ATM Operational Concept* (Doc 9854) expectations discussed in Paragraph 3.1 above.

4.2 Within the NAT Region, performance objectives based on the ICAO KPA are being developed by the NAT SPG.

4.3. The introduction of performance objectives, local performance targets, associated KPI and data metrics will be a dynamic process requiring routine review. Consequently, once developed, performance material will be shown in the NAT FASID.

~~8. In its most basic form, the output from the regional planning process should be a listing of air navigation facilities and a description of services together with their achievable time frames, necessary for CNS/ATM systems implementation. These will be included in the NAT regional air navigation plan (ANP) and updated by the ICAO NAT Systems Planning Group (NAT SPG) with the assistance of ICAO's Regional Offices.~~

~~9. The implementation of the CNS/ATM systems has been a regional responsibility, i.e. States and Air Traffic Services providers or groups of States and Air Traffic Services providers working together within the framework of the concept and implementation strategy developed for the respective region by the corresponding regional planning group. ICAO air navigation planning should continue to be conducted through the established regional planning process but taking due account of the global ATM Operational Concept.~~

~~**PERFORMANCE BASED REQUIREMENTS**~~

~~10. The transition to performance based operations is a critical aspect of evolving to a safe and efficient global air traffic management (ATM) environment. As ATM evolves, it will be necessary to ensure acceptable operational performance, taking into account the changing technologies and a changing environment. In concert with navigation, surveillance, ATM, and flight management, communication and its associated performance are essential to creating a global seamless and performance based ATM system.~~

GLOBAL PLANNING INITIATIVES (GPI)

6. The *Global Air Navigation Plan* (Doc 9750) 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 11th 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 Global *ATM Operational Concept* (Doc 9854). Long-term initiatives will be added to the Global ANP as technology matures and 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.

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

REGIONAL PLANNING INITIATIVES (RPI)

8. 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 NAT Region ATM/CNS improvement requirements, which stem from the Global GPIs described above. Within the NAT Region the NAT SPG is responsible for the management and review of the ICAO NAT Region Air Navigation Plan. Consequently the inclusion of air navigation service improvement programmes at the regional level will be endorsed through the NAT SPG processes. States concerned will, however, retain responsibility for the implementation of such programmes and plans. The details and associated timelines of NAT RPI will be detailed in the FASID.

HUMAN FACTORS CONSIDERATIONS

~~11~~9. The high level of automation and interdependency of ~~the~~ NAT CNS/ATM systems raise~~s~~ 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.

10~~2~~. 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 NAT 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.

SAFETY MANAGEMENT

~~13.~~11. 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. ~~Although~~ States are responsible for the implementation of ~~national~~ State Safety Programmes (SSP) which include a responsibility to oversee the development, implementation and operational performance of service providers' ~~s~~Safety ~~m~~Management ~~s~~Systems (SMS)~~.~~. ~~T~~The NAT SPG ~~would~~ oversees the development of the regional safety management requirements that ~~would~~ complement ~~the~~ national ~~implementations~~requirements.

12. 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.

13. 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 NAT ANP or SARPs. States are responsible for the prompt rectification of deficiencies to navigation services for which they are responsible. The ICAO Regional Office will provide guidance and assistance to rectify such deficiencies as necessary.

ENVIRONMENT

14. It is an ICAO Strategic Objective to minimize the adverse effect of global civil aviation on the environment. The NAT SPG should ensure environmental factors are taken into consideration when performance based systems implementation plans are developed. The results of environmental analyses can be useful in providing national decision-makers 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 must also be balanced against operational and economic considerations.

HOMOGENEOUS AREAS AND MAJOR TRAFFIC FLOWS (check before publication)

MAJOR TRAFFIC FLOWS - NAT REGION

Note: Chart to be included.

North Atlantic (NAT) Region				
AR1	North America — Western/ Central Europe	Bodø, Gander, New York, Reykjavik, Santa Maria, Shanwick, Søndrestrøm	Oceanic high density/continental high density	Major traffic flow EUR/NAM/NAT MNPS airspace
AR2	North America — Caribbean	New York	Oceanic high density	Major traffic flow West Atlantic route system

AIR TRAFFIC FORECASTS, SYSTEM CAPACITY AND AIR TRAFFIC DEMAND

153. Air traffic forecasts are produced by the North Atlantic Traffic Forecasting Group (NAT TFG) in response to the needs of Contracting States of ICAO, air navigation service providers and the North Atlantic Systems Planning Group (NAT SPG), for which detailed yearly forecasts for peak and off-peak movements are produced.

164. The main purpose of the NAT TFG is to support the planning of air navigation services in the NAT rRegion. Traffic forecasts and peak-period planning parameters are important in anticipating where and when airspace congestion occurs. It is then possible to plan for the required expansion of capacity. These

forecasts also have an important role in planning the implementation of CNS/ATM systems components. The primary users for the forecasts developed by the NAT TFG are expected to be Contracting States of ICAO, ATS service providers in the region, and the ICAO planning group for the NAT region (NAT SPG).

5. Implementation of CNS/ATM systems is expected to be able to provide sufficient capacity to meet the increasing demand, while producing additional benefits in the way of more efficient flight profiles and increased levels of safety. The potential of new technologies to significantly reduce service costs, however, will require new arrangements in the provision of services and changes in air traffic management procedures.

6. Chapter 3 of the Global Air Navigation Plan for CNS/ATM Systems (Doc 9750) provides the means to begin the process of identification of ATM requirements, on the basis of identified homogeneous ATM areas and major international traffic flows, followed by the determination of the regional and global CNS system elements needed to meet the ATM requirements.

IMPLEMENTATION STRATEGY

17. The Global Air Navigation Plan (Doc 9750) describes a planning methodology that enables the incorporation of existing regional and national 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). 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 support a uniform approach to implementation of the initiatives.

18. Plans should be underpinned by the safety management process.

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PART II

AERODROME OPERATIONS (AOP)

INTRODUCTION

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

a) Annex 14 - Aerodromes;

b) Annex 10 - Aeronautical Telecommunications, Volume I;

c) Aerodrome Design Manual (Doc 9157);

d) Airport Services Manual (Doc 9137);

e) Airport Planning Manual (Doc 9184).

AERODROME OPERATIONAL PLANNING

2. Appendix A contains a list of regular and alternate aerodromes required for international scheduled air transport, non-scheduled air transport and general aviation operations in the NAT Region. Table AOP-1 of the FASID contains further details of the characteristics of each aerodrome.

APPENDIX

INTERNATIONAL AERODROMES REQUIRED IN THE NORTH ATLANTIC REGION

EXPLANATION OF THE LIST

Identification

CITY/AERODROME Name of the city and aerodrome, preceded by the location indicator

USE Designation of the aerodrome as:

RS — international scheduled air transport, regular use;
RNS — international non-scheduled air transport, regular use;
RG — international general aviation, regular use;
AS — international scheduled air transport, alternate use.

Note. - When an aerodrome is needed for more than one form of use, normally only the highest form of use on the above list is shown. An exception is that AS aerodromes are identified even when they are required for regular use by international non-scheduled air transport or international general aviation, as some specifications in Annex 14, Volume 1, place special requirements on these aerodromes.

Example 1: An aerodrome required for both RS and RG use would only be shown as RS in the list.

Example 2: An aerodrome required for both RS and AS use would only be shown as RS in the list. However, this table may still show specific requirements for AS use.

City / Aerodrome / Use		
BERMUDA (United Kingdom)		
TXKF	BERMUDA	RS
GREENLAND (Denmark)		
BGSF	KANGERLUSSUAQ	RS
BGQQ	QAANAAQ/ Qaanaaq	RG
BGUK	UPERNAVIK/Upernavik	RG
BGJN	ILULISSAT/Ilulissat	RG
BGAA	AASIAAT/Aasiaat	RG
BGSS	SISIMIUT/Sisimiut	RG
BGMQ	MANITSOQ/Manitsoq	RG
BGGH	NUUK/Nuuk	RG
BGBW	NARSARSUAQ/Narsarsuaq	RG+RNS
BGUQ	UUMMANNAQ/QAARSUT/ Uummannaq/ Qaarsut	RG

City / Aerodrome / Use		
BGKK	KULUSUK/Kulusuk	RG+RNS
BGCO	NERLERIT INAAT/Nerlerit Inaat	RG+RNS
FAEROES (Denmark)		
EKVG	VAGAR/Vagar	RS
ICELAND		
BIAR	AKUREYRI/Akureyri	AS
BIEG	EGILSSTADIR/Egilsstadir	AS
BIKF	KEFLAVIK/Keflavik	RS
BIRK	REYKJAVIK/Reykjavik	RS
NORWAY		
ENSB	SVALBARD/Longyear	RNS
AÇORES (Portugal)		
LPPD	PONTA DELGADA/Sao Miguel I.	RS
LPAZ	SANTA MARIA/Santa Maria I.	RS

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PART IV

COMMUNICATIONS - NAVIGATION - SURVEILLANCE (CNS)

INTRODUCTION

1. The Standards, Recommended Practices and Procedures 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) PANS-ATM – (Doc 4444); and

e) Regional Supplementary Procedures (Doc 7030).

2. This part of the North Atlantic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to the Communications, Navigation, and Surveillance (CNS) part of the CNS/ATM System as developed for the NAT Region by the North Atlantic Systems Planning Group (NAT SPG) and considered to be the minimum necessary for effective planning of CNS facilities and services in the North Atlantic Region.

3. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the ANP is contained in the North Atlantic Facilities and Services Implementation Document (NAT FASID), as agreed between the provider and user States concerned. During the transition and pending full implementation of the future system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM related requirements. Furthermore, it is expected that some elements of the CNS/ATM System will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

4. 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.

5. The cornerstone of arguments to justify continued allocation of an adequate aeronautical spectrum are 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.

6. States' attention is drawn to 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.

7. The subject of harmful interference to aeronautical communication, navigation and surveillance services has always been of paramount concern to the international civil aviation community.

COMMUNICATIONS

General

8. The existing aeronautical communication plan comprises all facilities required with respect to communications for international air navigation in the NAT Region.

9. 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.

10. There are basically two categories of aeronautical communications:

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

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

ii) 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:

i) aeronautical administrative communications (AAC) carried out by aeronautical personnel and/or organiz-ations on administrative and private matters; and

ii) aeronautical passenger communications (APC).

11. The communications system should provide for the integrity and continuity of service so as to ensure that data communications-based air traffic control is not compromised.

12. The inter-networking of fixed ground-based and mobile aircraft-based computer systems will, in the future, be supported by the global data network.

13. The design and integration of the voice and data communication infrastructure should be such that failure in any one network element will, at worst, cause performance degradation and will permit the timely introduction of safe fall-back procedures.

Aeronautical Fixed Service (AFS)

14. The aeronautical fixed service comprises:

a) the aeronautical fixed telecommunication network (AFTN);

b) data communications subnetworks and associated systems supporting the ground-ground 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)); and

f) Air Traffic Services (ATS) Inter-Facility Data Communication (AIDC).

15. Pending the full implementation of the systems described in a) to c) above, point to point data links will be used in certain instances for ground-ground data interchange.

16. Ground/ground data interchange should be in accordance with the procedures specified in a common interface control document (ICD). The purpose of this document would be to ensure that data interchange between units providing air traffic management (ATM) in the NAT Region is harmonized to a common base standard, and that the evolutionary development is co-ordinated and implemented centrally through the NAT SPG. ICAO data interchange standards will be applied, but the common ICD will identify and detail any regional differences considered necessary.

17. World area forecast system (WAFS) products should be disseminated in the NAT region by satellite broadcast as part of the aeronautical fixed service (AFS).

Aeronautical mobile service (AMS)

18. 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.

19. While current voice communication links such as HF and VHF will continue to be used where necessary and appropriate, satellite data links are ultimately expected to provide high quality near real-time information interchange in the major part of the NAT Region. In some parts of the region, terrestrial data links will be used. Thus, where a choice of alternative air/ground delivery systems exists, the system should be designed to dynamically select the most economic data link routing consistent with efficiency and operational requirements. Planning principles for the implementation of AMS are contained in Attachment A.

Controller Pilot Data Link Communications (CPDLC)

20. Where practicable, voice communications should be replaced by Controller Pilot Data Link Communications (CPDLC).

HF en-route communications

21. As the Aeronautical Mobile-Satellite Service (AMSS) develops, the need for HF voice communications should decline within the AMSS coverage area. Overall system design should take into account the need for an orderly withdrawal of HF voice services in the NAT region.

Satellite voice communications (SATCOM voice)

22. Satellite voice communications should be available for emergency and non-routine use. States should plan for the possible use of satellite voice for routine communications as an alternative to HF services.

Aeronautical broadcasting service

23. The plan for radiotelephony broadcasts of meteorological information (VOLMET) from designated locations on a time planned basis is contained in FASID Table ATS 2.

NAVIGATION

24. The aeronautical radio navigation plan comprises all facilities that provide navigation support to en-route, terminal, approach, landing.

25. Part of the NAT Region has been operated for many years based on Minimum Navigation Performance Specifications (MNPS). Navigational performance should evolve to meet to specific Required Navigation Performance (RNP) levels.

26. It is foreseen that, despite aircraft with lower navigation performance capability continuing to operate in some parts of the NAT Region, 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.

27. The following principles apply to the transition to satellite navigation systems:

1) The GNSS should be introduced in an evolutionary manner.

2) The ground infrastructure for current navigation systems must be available during the transition period.

3) Consideration may be given to segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance.

4) In planning the transition to GNSS, the following issues must be considered:

   — schedule for availability and approval of GNSS-based service;
   — extent of existing ground-based radio navigation service;
   — level of user equipage;
   — provision of other systems required for air traffic services (i.e. surveillance and communication);

— density of traffic/frequency of operations; and
— mitigation of risks associated with radio frequency interference.

SURVEILLANCE

General

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

29. Traditionally, aeronautical surveillance has been performed by means of voice position reporting, supplemented by secondary surveillance radar (SSR) in certain parts of the region.

30. Radar coverage is, and will remain, available in a portion of the region. The quality of radar surveillance service should be enhanced whenever technological improvements become available.

31. 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 automatic dependent surveillance (ADS).

32. The method of monitoring the progress of flight through pilot position reports by voice will likely continue for some time to come due to the following reasons:

a) existence of aircraft without long-range data communications (SATCOM or HFDL) capabilities;

b) malfunctions of the ground, space or airborne data communications systems;

c) non-vailability of satellite communications in areas close to the Pole; and

d) existence of aircraft without ADS capabilities.

ADS-contract (ADS-C)

33. ADS-C, which is based on a contract between the ATS unit and the aircraft, and uses VHF, HF or SATCOM as the communications media, is the preferred method of surveillance in the NAT Region where ground based surveillance is not available.

ADS-broadcast (ADS-B)

34. ADS-broadcast is based on the aircraft constantly broadcasting its position and intentions which allows other aircraft and ground systems to receive the information. Being based on the use of VHF and UHF, ADS-B is limited to line of sight applications. Initially, ADS-B will improve ground based surveillance and will eventually sustain the implementation of Airborne Separation Assurance Systems (ASAS).

Attachment A

AMS PLANNING PRINCIPLES

In the planning of the AMS the following principles should be taken into account:

a) based on the ATS providers' and aircraft operators' plans, the implementation of air-ground data link communications in the NAT region should be carried out in a progressive manner taking into account cost-benefit considerations;

b) communications data links, when implemented, should be used for routine air-ground communications. Voice communications capability should be maintained for emergency purposes at the ATM units;

c) VHF communications, supported by extended range facilities where required, should be used to the maximum extent possible;

d) in coordination with States, VHF frequency channel assignment for planned and operational air-to-ground communications should be recorded and published by the ICAO Regional Offices;

e) where full VHF RTF coverage is not practicable, or cannot be guaranteed at all times, HF RTF communications should be provided;

f) satellite voice communications must be capable of providing a quality equivalent to that of VHF voice and priority must be available for both ground-initiated and air-initiated satellite ATS voice communications;

g) the security arrangements for satellite voice communications need to be adequately addressed prior to adoption of SATCOM voice as an alternative to HF RTF communications;

h) for the remote and oceanic areas without VHF coverage, satellite air-ground data links of the AMSS should be planned and complemented as appropriate with HFDL services.

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PART IV

AIR TRAFFIC MANAGEMENT (ATM)

INTRODUCTION

1. This part of the North Atlantic Region Basic Air Navigation Plan introduces the long-term NAT 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 will continue to exist throughout the planning horizon. In this sense, the introduction of the new concepts should be seen as evolutionary. Improvements to the ATM system will be based on the provision of integrated services by means of the seven concept components described below. Following the description of the Concept, this Part provides detail on the ATM requirements during the transition to the ATM Concept's Operational Components. The separate components form one system. The NAT Region ATM Concept of Operations is detailed in NAT Doc 005.

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

a) Annex 2 — Rules of the Air;

b) Annex 6 — Operation of Aircraft;

c) Annex 11 — Air Traffic Services;

d) *Procedures for Air Navigation Services — ~~Rules of the Air and Air Traffic Services~~ Air Traffic Management* (PANS-ATM, Doc 4444);

e) *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168); and

f) *Regional Supplementary Procedures* (Doc 7030), ~~Part 1 — Rules of the Air, Air Traffic Services and Search and Rescue.~~NAT Region (NAT SUPPs).

~~2. Planning for ATM improvements in the NAT Region will be guided by the Global ATM Operational Concept developed at the 11th Air Navigation Conference. Improvements to the ATM system will be based on the provision of integrated services by means of the seven concept components described below. The separate components form one system. Figure 1, shown in paragraph 11, depicts the interrelationship of the system components and the convergence into a single system. Details of the NAT Region ATM Concept of Operations are contained in NAT Doc 005.~~

Comment [p4]: Moved to para 1.

ATM OPERATIONAL CONCEPT COMPONENTS

General

3. 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 below depicts the interrelationship of the system components and the convergence into a single system.

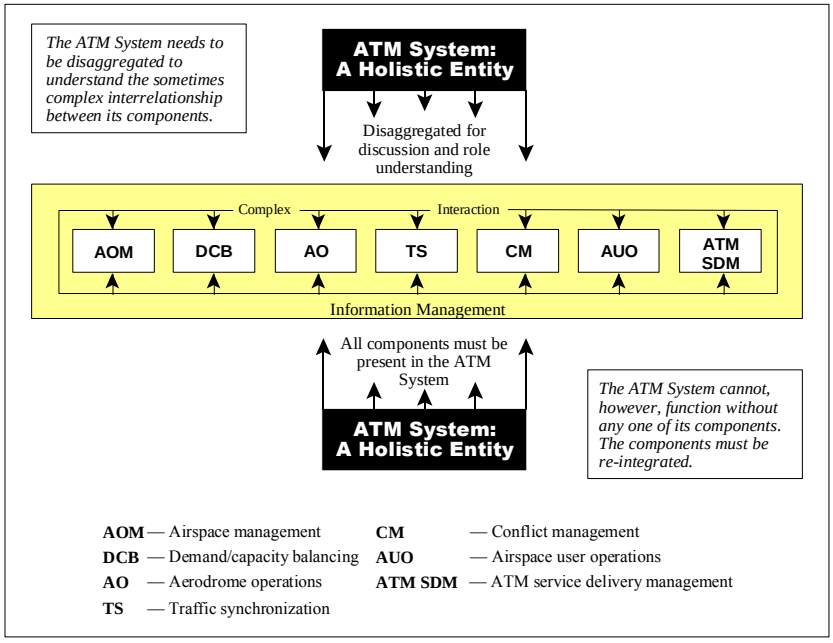


Figure 1.

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

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

Airspace organization and management

6~~3~~. Airspace organization 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 the airspace options are selected and applied to meet the needs of the ATM community. The key conceptual changes are:

a) all airspace will be the concern of ATM and will be a useable 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

74. As an integral part of the ATM system, the aerodrome must provide the needed ground infrastructure including, *inter alia*, lighting, taxiways, runway and runway exits, 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 are:

a) runway occupancy time will be reduced;

b) the ability 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 manoeuvring and movement areas will be known and available to the appropriate ATM community members.

Demand and capacity balancing

85. 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 are:

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, when possible, at the pre-tactical stage, 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

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

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

b) chokepoints will be eliminated; and

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

Conflict management

10. 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.

11. 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.

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

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

f) 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

12~~7~~. Airspace user operations refer to the ATM-related aspect of flight operations. The key conceptual changes are:

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

b) relevant ATM data will be fused 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 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 should be designed with the ATM system as a key consideration.

~~**Conflict management**~~

Comment [p5]: Moved to before Airspace user operations

~~8. 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.~~

~~9. Conflict management limits, 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 are:~~

~~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;~~

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

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

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

ATM service delivery management

1~~3~~0. 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 are:

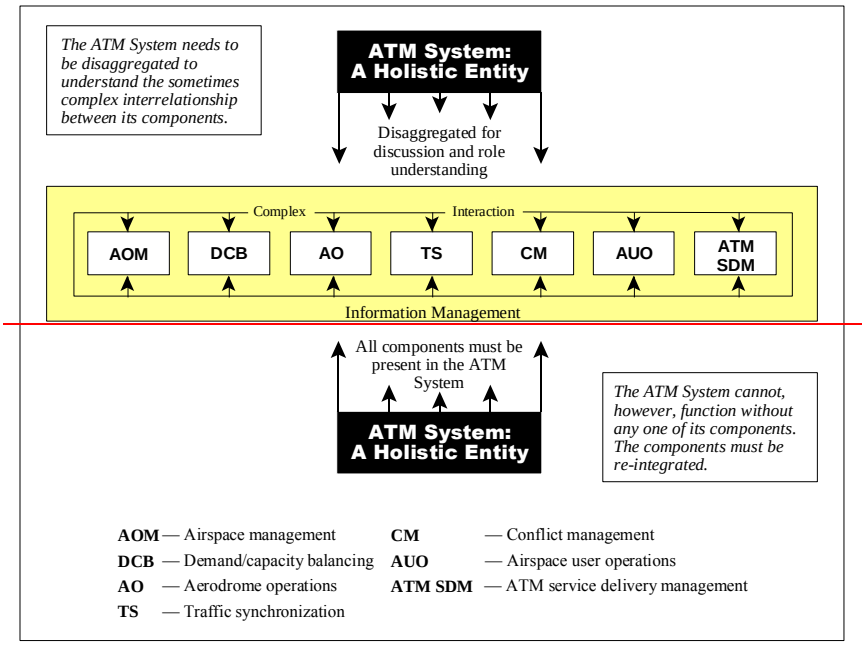
a) services to be delivered by the ATM service delivery management component will be established on an as-required basis subject to ATM system design. Where services are established they will be provided on an on-request basis;

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.

~~11. The seven ATM concept components introduced above are described in more detail as follows:~~



~~Figure 1.~~

INFORMATION MANAGEMENT

14. 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.

15. 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

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

Airspace Organization and Management

17. 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;

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

c) 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;

d) 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;

e) 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;

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

g) 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

h) airspace structures and division levels should be harmonised.

Civil/Military Coordination

18. 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.

19. States should establish civil/military coordination bodies to ensure, at all levels, the coordination of decisions relating to civil and military problems and airspace and traffic management (paragraph xx above refers).

20. States should arrange for close liaison and coordination between civil ATS units and relevant military operational control and/or 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.

21. 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)

(GPI-1 Refers)

22. 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.

23. 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

24. 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).

25. 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
(Chart ATS 1)

~~12~~26. The NAT 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. ~~States should to the extent possible coordinate with the ICAO Regional Office concerned any changes to the airspace structure, the assignment of or changes to compulsory reporting points and ATS routes (Table ATS 1).~~

27. Flight Information Regions (FIR). Parameters of NAT Region FIRs are detailed in the xxxxx. 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.

28. Functional Airspace Blocks (FAB). The establishment of FABs, such as those established to accord with the EU Regulations on the Single European Sky, is not in itself subject to the process for amendment of ANPs. However, should changes to the FIR boundaries or to the facilities and services provided be required at a later stage, such changes might be subject to the ANP amendment procedure and should therefore be examined on a case-by-case basis. Pursuant to Article 83 of the ICAO Convention, agreements or arrangements for FABs are subject to registration with ICAO in accordance with the applicable Rules in ICAO Doc 6685.

29. 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.

~~13~~30. The vertical limits and classification of airspace shall be as follows:

a) the vertical limits for all control areas established in the NAT Region shall be:

1) upper limit — unlimited;

2) lower limit over the high seas — FL 55; and

b) except for domestic airspace and terminal control areas and control zones extending over the high seas, all controlled airspace be Class A and all uncontrolled airspace be Class G.

31. 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 NAT Region are contained in the FASID/electronic database.

32. Dynamic and flexible ATS route management should be provided when ATM and aircraft capabilities can safely accommodate such arrangements. (GPI-7 refers)

33. 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.

34. 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

35. The introduction of Performance Based Navigation and RNP equipped aircraft is expected to enable reductions in separation minima and route spacing. The extent of this improvement has yet to be assessed. Progressive reductions in separation minima are necessary if system capacity is to increase and improvements to flight economy are to be achieved. Any implementation plans should detail the staged developments in ATM which should be in place and verified before any defined reduction can take place. Careful planning is essential if delays to implementation are to be avoided.

AIR TRAFFIC SERVICES

Air traffic control service

36~~14~~. The ATC Service should maintain~~s~~ 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

3715. Flight information service ~~is~~ should be provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

3816. The requirements for flight information services are not expected to change significantly in the near term and the provision of HF VOLMET would continue to be required. It is, however, expected that data link messages will gradually reduce the requirement for ~~HF~~ 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 (FASID Table ATS 2).

Alerting Service

3917. Alerting service should be provide~~s~~d 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 V~~I~~I — SAR also refers).

~~**Separation**~~

~~18. Progressive reductions in separation minima are necessary if system capacity is to increase and improvements to flight economy are to be achieved. Any implementation plans should detail the staged developments in ATM which should be in place and verified before any defined reduction can take place. Careful planning is essential if delays to implementation are to be avoided.~~

Comment [p6]: moved to after Airspace Structure

Monitoring

(See also Part VIII – Safety)

Horizontal Plane

40. 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 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.

41. 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.

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

43. 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.

~~19. Operators engaged in North Atlantic operations and States having jurisdiction over such operators should investigate carefully any known or reported case of gross navigation error which has occurred during a flight in the NAT Region of an aircraft with which they are concerned and, where found appropriate, States concerned and operators should take necessary corrective action.~~

~~20~~44. 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

45. 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

46, The NAT SPG is in the process of developing performance objectives.

~~NAT ATS ROUTE NETWORK~~

~~(Table ATS 1)~~

~~21. Table ATS 1 lists the special ATS routes developed for use in the NAT Region by aircraft equipped with only one long-range navigation system and by aircraft equipped with short-range navigation equipment (VOR/DME, ADF).~~

APPENDIX - TABLE ATS 1 — ATS ROUTES

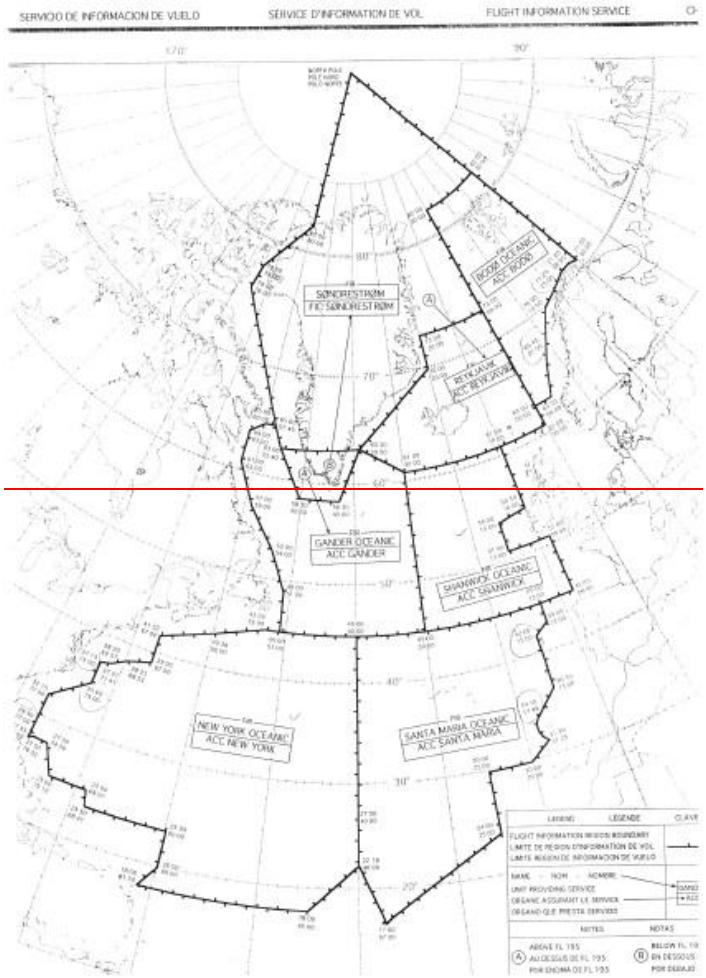
EXPLANATION OF THE TABLE

Routes for aircraft with short-range navigation equipment

Note.- The following routes may be flown by aircraft with short-range navigation equipment (VOR/DME/ADF) but State approval for operation within MNPS airspace is still necessary.

G3	**G11**
VALDI 6113N 00000W	SIDER 6100N 00509W
Myggenes	Akraberg
Ingo	Myggenes
Keflavík	

~~**CHART ATS 1 – FLIGHT INFORMATION SERVICE**~~



NAT ANP, VOLUME I, BASIC ANP

PART V - METEOROLOGY (MET)

INTRODUCTION

1. This part of the North Atlantic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to the Meteorology (MET) part of the CNS/ATM System as developed for the NAT Region by the North Atlantic Systems Planning Group (NAT SPG) and considered to be the minimum necessary for effective planning of MET facilities and services in the North Atlantic Region. A detailed description/list of the facilities and/or services to be provided by States in order to fulfil the requirements of the ANP is contained in the North Atlantic Facilities and Services Implementation Document (NAT FASID), as agreed between the provider and user States concerned. During the transition and pending full implementation of the future system, it is expected that the existing requirements will gradually be replaced by new CNS/ATM related requirements. Further, it is expected that some elements of the CNS/ATM System will be subject to amendment, as necessary, on the basis of experience gained in their implementation. [LIM NAT (1992)]

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

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

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

3. Background information of importance in the understanding and effective application of the plan is contained in the reports of the LIM NAT (COM/MET/RAC) RAN Meeting (Doc 9618, 1992) supplemented by information appropriate to the NAT Region which is contained in the reports of other regional air navigation meetings. [NATSPG/40]

4. References shown in brackets below a heading indicate the source of the paragraph or sub-paragraph following the heading. Also, they are shown immediately following each paragraph or sub-paragraph when there is no heading. [NATSPG/40]

METEOROLOGICAL SERVICE REQUIRED AT AERODROMES AND REQUIREMENTS FOR METEOROLOGICAL WATCH OFFICES
(FASID Tables MET 1A and 1B) [NATSPG/40]

5. The service to be provided at international aerodromes listed in FASID Table AOP 1 is in FASID Table MET 1A.

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

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

8. At aerodromes with limited hours of operation, routine reports and forecasts should be issued sufficiently early to meet pre-flight and in-flight planning requirements for flights due to arrive at the aerodrome concerned as soon as it is opened for use. Furthermore, aerodrome forecasts should be issued with adequate periods of validity so that, collectively, they cover the entire period during which the aerodrome is open for use.

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

10. The following sets out the duties of the meteorological office/meteorological watch office located in Reykjavik and provided under the current ICAO Icelandic Joint Financing Agreement:

a) provision of routine aerodrome forecasts (TAF) and necessary amendments thereto for Keflavik and Reykjavik aerodromes; and
b) provision of area meteorological watch for the Reykjavik FIR including the issue of SIGMET information.

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

METEOROLOGICAL OBSERVATIONS AND REPORTS [NATSPG/40]

12. Hourly METAR with SPECI should be issued for all airports listed in FASID Table MET 1A.

13. When appropriate, information on the state of the runway should be included as supplementary information in all METAR and SPECI issued at Keflavik and Reykjavik.

FORECASTS [NATSPG/40]

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

15. 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.

16. 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. TAFs for destination and alternate aerodromes which are not issued on a routine basis but on request should commence one hour before the estimated time of arrival, or earlier if so requested, and cover a period up to the estimated time of arrival at the farthest alternate plus 2 hours.

17. The scheduled international exchange of TAF should be completed 30 minutes before commencement of the period of validity.

18. The forecast maximum and minimum temperature together with their respective dates and times of occurrence should be included in the 24 and 30-hour TAF for certain aerodromes as agreed between the meteorological authority and the operators concerned.

19. Trend forecasts should be provided for designated aerodromes as specified in FASID Table MET 1A.

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

20. Tropical cyclone advisory centre (TCAC) Miami has been designated to prepare advisory information. FASID Table MET 3A set out the area of responsibility and period of operation of the TCAC and the MWOs to which the advisory information should be sent. [IAVWOPSG Conclusion 3/2]

21. Volcanic ash advisory centres (VAACs) London, Montreal, Toulouse and Washington 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. [IAVWOPSGConclusion 3/2]

22. 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/1 Conclusion 1/1]

23. 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/FICs to which the notification should be sent by the observatories. [IAVWOPSG Conclusion 2/2]

24. Each MWO should arrange for the transmission to all aerodrome meteorological offices within its associated FIR of its own SIGMET messages and relevant SIGMET messages for other FIRs, as required for briefing and, where appropriate, for flight documentation [NATSPG/40].

25. Each MWO should arrange for the transmission to its associated ACC/FIC of SIGMET messages and special air-reports received from other MWOs [NATSPG/40].

Note.— The receipt of SIGMET messages and special air-reports from other MWOs is controlled by the exchange requirements indicated in FASID Table MET 2B which has been based on the Statement of Basic Operational Requirements.

26. AIRMET messages are not required to be issued by MWOs.

EXCHANGE OF OPERATIONAL METEOROLOGICAL (OPMET) INFORMATION

(FASID Tables MET 2A and MET 2B) [NATSPG/40].

27. All OPMET information issued as METAR, SPECI and TAF from aerodromes included in FASID Table MET 1A, SIGMET messages issued by MWOs listed in FASID Table MET 1B and special air-reports that are not covered by a SIGMET message previously issued or about to be issued, should be disseminated to the designated international OPMET data bank and to the uplink stations of ISCS and SADIS.

International OPMET data bank

28. The Brussels International OPMET data bank has been designated to serve the NAT Region.

29. The response time for requests to the data bank should be less than 15 minutes. AFTN messages containing requests to the data bank and replies from the data bank should achieve transit times of less than 5 minutes.

30. When OPMET information required to be available by regular exchange is not received, the information should be requested from the Brussels International OPMET data bank.

31. METAR, SPECI and TAF which should be available at meteorological offices, area control centres and flight information centres are contained in FASID Table MET 2A. This table should be updated, as necessary, by the ICAO EUR/NAT Regional Office on the basis of changes in the pattern of aircraft

operations and in accordance with the Statement of Basic Operational Requirements and Planning Criteria, in consultation with those States and international organizations directly concerned.

32. The exchanges indicated in FASID Table MET 2A should be implemented as soon as possible to meet the requirements of current aircraft operations. The availability at meteorological offices of the required OPMET information should be reviewed continuously. Any changes in this respect (i.e. additional OPMET information needed or OPMET information no longer required) should be notified to the corresponding meteorological authority which, in turn, should amend its corresponding address lists and inform the ICAO EUR/NAT Regional Office.

33. The exchange requirements for SIGMET, volcanic ash and tropical cyclone advisories, and special air-reports for which a SIGMET has not been issued, are contained in FASID Table MET 2B. This table should be updated, as necessary, by the ICAO EUR/NAT Regional Office on the basis of changes in the pattern of aircraft operations and in accordance with the Statement of Basic Operational Requirements and Planning Criteria, in consultation with those States and international organizations directly concerned.

34. The information specified in FASID Tables 2A and 2B as well as special air-reports that are not covered by a SIGMET message previously issued or about to be issued should be exchanged amongst ground stations using aeronautical fixed service (AFS) channels. States should establish procedures for the relay of OPMET information to their own aerodromes or other locations requiring them.

WORLD AREA FORECAST SYSTEM
(FASID Table MET 5)

35. FASID Table MET 5 sets out the NAT Region requirements for WAFS forecasts to be provided by WAFC London and Washington.
[WAFSOPSG Conclusion 1/2]

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

37. WAFS forecasts should be made available by WAFC London and Washington using the satellite distribution system for information relating to air navigation (SADIS), international satellite communications system (ISCS) or using the satellite and Internet service.
[WAFSOPSG Conclusion 6/2]

38. Each State should make the necessary arrangements to receive and make full use of operational WAFS forecasts made available by WAFC London or Washington. The lists of the authorized users of the SADIS, WIFS and ISCS services in the NAT Region and the locations of the operational VSATs and Internet-based services are available from the following websites:

- www.icao.int/safety/meteorology/sadisopsg *(click: "Operational Information" and then "Status of implementation") for SADIS*;
- www.weather.gov/iscs *(click: "Documents" and "Status of implementation of ISCS listed by ICAO regions") for ISCS.*

[WAFSOPSG Conclusion 6/2]

SURFACE AND UPPER AIR SYNOPTIC NETWORKS AND OBSERVATIONS
[LIM NAT (1992)]

39. The observations required under the current ICAO Joint Financing Agreements are given in Appendix MET A to this Part.

Appendix MET A
SURFACE AND UPPER AIR SYNOPTIC NETWORKS AND OBSERVATIONS
Observations to be provided under ICAO Joint Financing Agreements

Index No. Chiffre indicatif Indicativo	Station Estación	Surface synoptic observations Observations synoptiques à la surface Observaciones sinópticos de superficie								Half-hourly observations Observations semi-horaires Observaciones semi-horarios	Time of observation Heure d'observation Observaciones horarios							
											Radiowind Radiovent Radioviento				Radiosonde Radiosonda			
		00	03	06	09	12	15	18	21		00	06	12	18	00	06	12	18
	GREENLAND (D)																	
04220	Egedesminde	X	X	X	X	X	X	X	X		X		X		X		X	
04270	Narssarssuaq	X	X	X	X	X	X	X	X		X		X		X		X	
04320	Danmarkshavn	X	X	X	X	X	X	X	X		X		X		X		X	
	ICELAND (I)																	
04005	Bolungarvik	X	X	X	X	X	X	X	X									
04018	Keflavik	X	X	X	X	X	X	X	X	0000-2400[1]	X		X		X		X	
04082	Hofn Hornafjordur	X	X	X	X	X	X	X	X									

1. Plus any necessary special observations.
Prière d'ajouter toute observation spéciale.
Más cualquier otra observación especial.

LEGEND / LÉGENDE / CLAVE

D ICAO 1956 Danish Joint Financing Agreement
Accord de financement collectif de l'OACI avec le Danemark (1956)
Acuerdo de financiamiento colectivo de la OACI de 1956 con Dinamarca.

I ICAO 1956 Icelandic Joint Financing Agreement
Accord de financement collectif de l'OACI avec l'Islande (1956)
Acuerdo de financiamiento colectivo de la OACI de 1956 con Islandia.

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PART VII

SEARCH AND RESCUE SERVICES (SAR)

INTRODUCTION

1. 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.

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

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

~~2. This part of the North Atlantic Basic Air Navigation Plan contains elements and procedures of the existing planning methods and systems and introduces the basic operational requirements and planning criteria (BORPC) related to search and rescue (SAR) services, as developed for the NAT Region.~~

~~3. As a complement to the Statement of Basic Operational Requirements and Planning Criteria set out in Part I of the Basic ANP, Part VII constitutes the stable guidance material considered to be the minimum necessary for effective planning of SAR facilities and services in the North Atlantic Region. This guidance material has been developed through the ICAO regional planning processes which, in the case of the NAT region, is based largely on the work of the North Atlantic Systems Planning Group (NAT SPG).~~

NAT REGION RESPONSIBILITIES

3. The ICAO Regional Office will, through the NAT SPG:

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

ii) Manage proposed amendments to ICAO SAR documentation.

~~PLAN OF SEARCH AND RESCUE REGIONS (SRR)~~

~~4. The plan for search and rescue regions (SRR) is shown on Chart SAR 1.~~

STATE RESPONSIBILITIES

~~SEARCH AND RESCUE SERVICES~~

~~Organization and facilities~~

4~~5~~. 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. ~~States should establish and/or maintain the appropriate rescue co-ordination centres (RCC) or rescue subcentres (RSC) listed in the Facilities and Services Implementation Document (FASID) Table SAR 1 and ensure the availability of the facilities on a 24 hour basis.~~

~~*Note. The facilities listed need not be utilized exclusively for SAR operations but may be suitable equipped aircraft or ships used also on other assignments provided that they can be made available for SAR operations at short notice.*~~

5~~6~~. 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 NAT FASID.

6. 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

7. States should take the steps necessary and practicable to ensure the availability of effective aeronautical SAR services throughout the NAT region by:

a) identifying aeronautical search and rescue~~SAR~~ 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.

8. 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.

~~8. 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.~~

9. 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.

10. ~~States should consider the establishment of SAR committees as recommended in the IAMSAR Manual.~~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

11. 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

~~c)~~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.

~~SEARCH AND RESCUE OPERATIONS~~

~~12. States should take measures to ensure that the operating plans of RCC contain provisions for rapid response times, and that RCCs have readily available the required response times of primary search and rescue facilities.~~

~~13. States should:~~

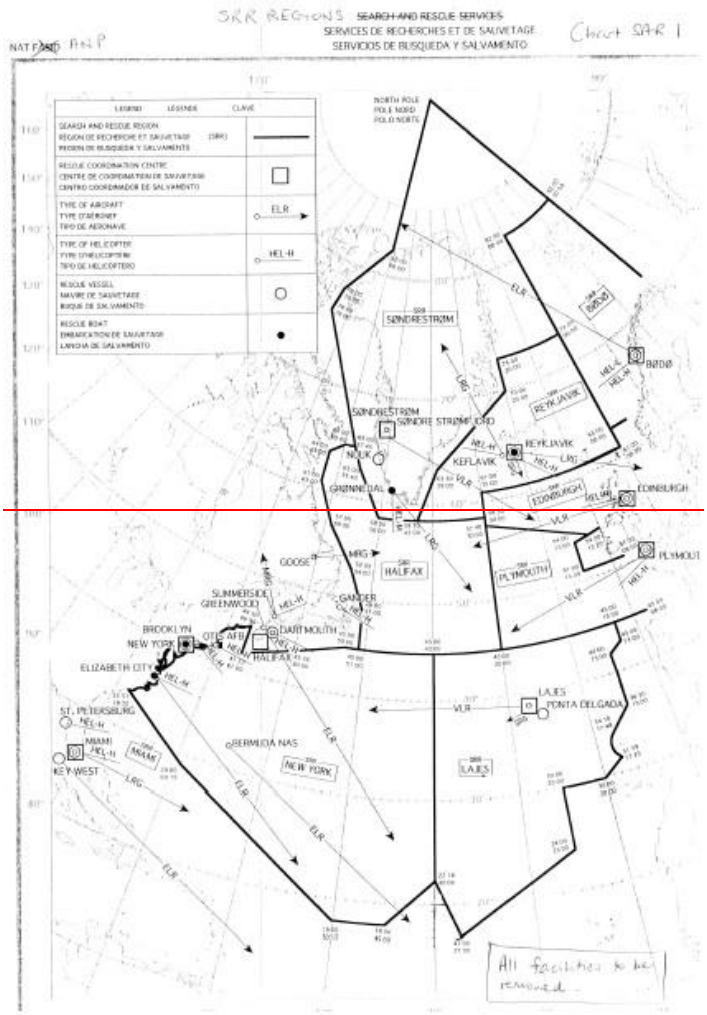
~~i. when considered feasible, make arrangements for joint SAR exercises between their SAR units and those of other States and with operators, at regular intervals and, if possible, at least once a year;~~

~~ii. invite observers from other interested States and organizations to participate in such exercises; and~~

~~iii. grant fellowships to SAR personnel to enable them 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.~~

~~CHART SAR 1 – SRR REGIONS~~

~~*[Secretariat note: Current Chart SAR to be transferred from FASID and all facilities depicted to be removed]*~~



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PART VII - AERONAUTICAL INFORMATION MANAGEMENT (AIM)

Secretariat Remarks only – not to be part of final document

This part presents a major change in comparison to the previous version (1st Edition, 2006). Differences have therefore not been reflected in track changes.

a) The opportunity has been taken to change the title of this Part from AIS to AIM to reflect the future direction on the provision of aeronautical information in the context of the Global ATM Operational Concept and associated System Wide Information Management.
b) The key elements that States should provide in the provision of aeronautical information are detailed.
c) An overview of the Transition to AIM is provided.
d) The requirement for States to develop national plans for transition to AIM is reflected. Details are to be shown in the NAT FASID.

NAT ANP, VOLUME I, BASIC ANP

PART VII - AERONAUTICAL INFORMATION MANAGEMENT (AIM)

1. INTRODUCTION

Regional AIS/AIM Planning

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

1.2 The dynamic material constituted by the AIS/AIM facilities and services required for international air navigation is contained in the NAT 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.

1.3 During the transition 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

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

a) Annex 4 – Aeronautical Charts;
b) Annex 15 – Aeronautical Information Services;
c) Doc 7030 – Regional Supplementary Procedures, NAT 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.

2. GENERAL PROCEDURES/REQUIREMENTS

NAT Region Responsibilities

2.1 The ICAO Regional Office will, through the NAT SPG:

i) process endorsed proposals for amendment to ICAO AIS/AIM related documents.

State Responsibilities

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

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

2.4 Each Contracting State should take all necessary measures to ensure that the aeronautical information/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/data to the aeronautical information service by each of the State services associated with aircraft operations.

2.5 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.

2.6 The designated International NOTAM Offices for the NAT Region are listed in the **NAT ANP Volume 2 - FASID Table AIM-1**.

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

2.8 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 AIS/AIM for the preparation, production and issue of the relevant material.

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

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

Each Contracting State should:

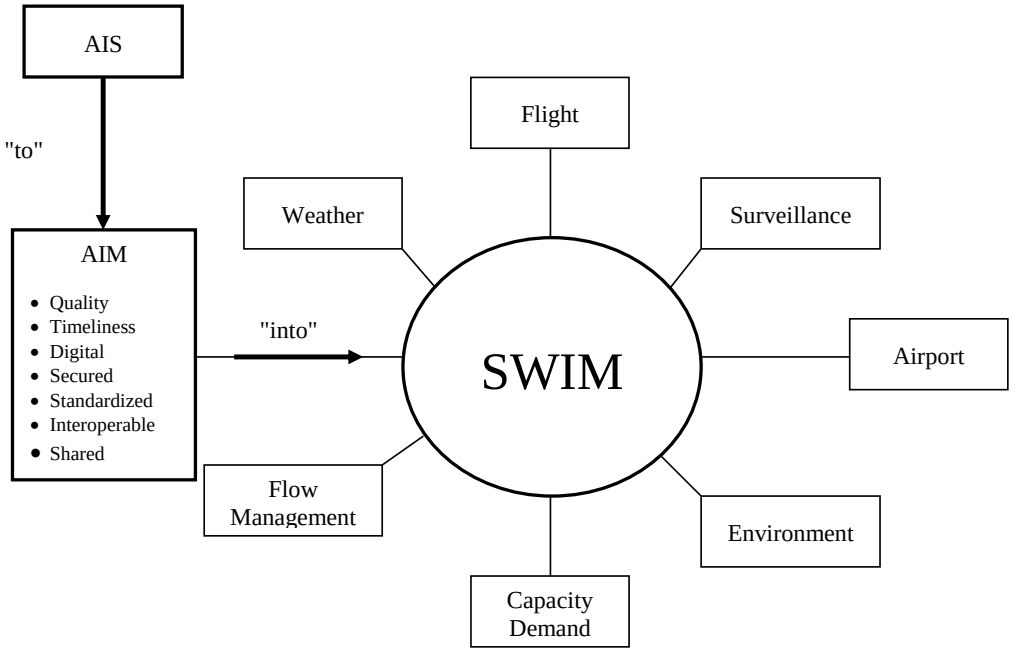
a) Arrange for the implementation of a quality management system for aeronautical information and chart services. The quality management system should include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable 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 requirements of Annex 15;
e) Arrange for the provision of an electronic AIP (eAIP) in accordance with the requirements of Annex 15;
f) Comply with WGS 84 requirements;
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 requirements of Annex 15, using Automated pre-flight information systems for the supply of aeronautical information/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
k) Arrange for the production and publication of necessary aeronautical charts in accordance with Annex 4 provisions and regional agreements.

3. AERONAUTICAL INFORMATION MANAGEMENT

3.1. 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.

3.2. 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.

3.3. 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

3.4. 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. (GPI-18 refers).

Guiding Principles for the Transition to AIM

3.5. 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

3.6. 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.

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

Phase 1 — Consolidation

3.8. 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

3.9. 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

3.10. 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 data 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

3.11. 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

3.12. The following provisions/regulatory requirements complement those contained in ICAO Annex 4 and Annex 15 with a view to expedite AIM implementation in the NAT 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)

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

3.14. States should designate and implement an authoritative Integrated Aeronautical Information Database (IAID). The designation of authoritative databases should be clearly stated in States' AIPs.

Electronic Terrain and Obstacle Data and Aerodrome Mapping Data Bases (AMDB)
(FASID Table AIM-3)

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

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

3.17. States should manage the eTOD implementation as a national programme supported by the necessary resources and detailed planning including priorities and timelines for implementation.

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

3.19. 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.

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

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

3.22. States should endeavour to integrate the acquisition of eTOD and AMDB data to realize efficiency gains and to take into account the complementary nature of AMDB and eTOD datasets.

Aeronautical Data Quality
(FASID Table AIM-4)

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

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

3.25. The Quality Management System in AIM should define procedures to meet the safety and security management objectives.

3.26. 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.

3.27. States should ensure that the Critical, Essential and Routine aeronautical data/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 data exchange format.

AIM Certification
(FASID Table AIM-9)

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

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

3.30. 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.

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PART VIII - SAFETY (SAF)

Secretariat Remarks only – not to be part of final document

This is a new ANP chapter and provides an overview of aviation safety and associated requirements that aviation stakeholders should consider when planning and delivering aviation services.

The introduction underlines that this Part refers to safety matters associated with navigation services, ATM/CNS and the work of the NAT SPG.

Whilst it states the overarching requirements of the Global Aviation Safety Plan (GASP) and associated global safety initiatives, this has been included to show the contribution the safe delivery of navigation services makes to the ICAO global strategic safety objective.

To ensure there is no confusion with Global Safety Initiatives (GSI), the term "regional safety initiative (RSI)" has been replaced with "regional safety objective (RSO)". This term better describes what will be developed as a safety objective to overcome identified deficiencies or gaps. These can equally be considered as regional performance objectives in the safety arena as they should be readily measurable.

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PART VIII - SAFETY (SAF)

INTRODUCTION

1. 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 North Atlantic 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.

2. 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

3. 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

4. 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:

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	

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

A Global Strategy for Aviation Safety

6. 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.

7. **ICAO Global Aviation Safety Plan's three major objectives:**

1. Reduction in the number of fatal accidents and related fatalities worldwide
2. Significant reductions in the global accident rate
3. No Region to have an accident rate more than double the world average

8. 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.

9. To support ICAO Safety targets, the NAT SPG will develop Regional Safety Objectives.

NAT Region Safety Objectives

10. The NAT SPG 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. In order to expedite the resolution of safety related deficiencies, the NAT SPG, 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 NAT SPG management of safety related deficiencies is detailed in the *NAT SPG Handbook*.

11. Analysis of the ICAO Universal Safety Oversight Audit Program (USOAP)[3] reports of States of the ICAO NAT Region, and safety related deficiencies identified through the NAT SPG 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.

12. The implementation of NAT RSO, in addition to addressing navigation related matters, will in some cases also contribute to addressing wider aviation safety related deficiencies.

13. The NAT SPG will continue to provide oversight of NAT Region deficiencies and will provide assistance on a case-by-case basis. The ICAO EUR/NAT 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

Under development

State Responsibilities

Safety Oversight

14. States should ensure they meet their duties and responsibilities in respect of aviation safety oversight. Detailed description and guidance is contained in *Safety Oversight Manual* (Doc 9734).

Standards and Recommended Practices

15. 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

[3] USAOP will be replaced by a Continuous Monitoring Approach process.

that any differences to SARPS have been assessed in respect of safety and are notified in accordance with ICAO requirements.

State Safety Programme

16. 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).

17. 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.

18. Detailed guidance on SSP requirements and methodology are contained in the *Safety Management Manual* (Doc 9859).

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

Safety Management System

20. ICAO Standards require States to ensure that Safety Management System (SMS) are established. The NAT SPG 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

21. 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).

22. The NAT SPG 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:

   i) a unique aviation taxonomy such as the ICAO ADREP 2000 model, and the EUROCONTROL HEIDI model (Harmonisation of European Incident Definition Initiative for ATM);

   ii) a harmonised safety reporting and investigation process; and

   iii) software tools capable to support a systemic analysis and to allow the sharing of safety intelligence.

c) provide required airspace safety monitoring data to the NAT Central Monitoring Agency (NAT CMA).

23. Reported material will contribute to the future development of NAT Region safety objectives.

NAT ANP, VOLUME I, BASIC ANP

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

Secretariat Remarks only – not to be part of final document

This is a new Chapter which 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.

Human Resource planning is considered on the basis of Doc 9956 - *Global and Regional 20-year Forecasts*, developed by ICAO 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. In this respect both global and NAT Region forecasts are reflected.

The Training element provides information on ICAO Training Policy and latest developments in respect of ICAO's TrainAir Plus initiative. Reference to access the Aviation Training Directory of ICAO is provided.

Lastly, the related EUR/NAT Office support to the North Atlantic Region and support from States are shown.

NAT ANP, VOLUME I, BASIC ANP

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

Introduction

1. This part of the North Atlantic 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.

2. Human Resource planning can be considered *the systematic and continuing process of analysing an organisation's human resource needs under changing conditions and developing personnel policies appropriate to the longer-term effectiveness of the organisation. It is an integral part of corporate planning and budgeting procedures since human resource costs and forecasts both affect and are affected by longer-term corporate plans.*[4]

3. Whilst not described in this Chapter, 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.

4. 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

5. 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.

6. Air Transport is forecast to grow globally by 4.7% during the period 2010-2030. Within the NAT Region the average growth during the period 2010-2025 is forecast to be 3.4%.

7. 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.

[4] Defined by the UK Institute of Personnel and Development

ICAO CIVIL AVIATION TRAINING POLICY

Scope

8. 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. 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.

10. 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.

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

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

ICAO TRAINAIR Plus

13. 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.*

14. 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.

15. 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.

16. 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.

17. 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.

18. 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 NAT Region Support

19. The EUR/NAT Office of ICAO 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 States.

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

State Support

21. 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.

22. 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 NAT SPG and its IMG 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.

NAT ANP, VOLUME I, BASIC ANP

PART X - CONTINGENCY PLANNING (CPLN)

Secretariat Remarks only – not to be part of final document

This is a new ANP chapter and provides an overview of policy and requirements that States and air navigation service providers should consider in preparing contingency plans to maintain the provision of services in airspaces for which they are responsible.

Note: Reference has not been made to a corresponding text in the Facilities and Services Implementation Document (FASID).

NAT ANP, VOLUME I, BASIC ANP

PART X - CONTINGENCY PLANNING (CPLN)

INTRODUCTION

1. 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."

2. 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 availabilty of airspace.

3. 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. The Chapter does not provide guidance on Business Continuity planning, which is anticipated to be aligned, at least in part, with State and ANSP contingency planning considerations.

4. 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) *Air Traffic Management Operational Contingency Plan - North Atlantic Region* - ICAO NAT Doc 006;
i) *ICAO Assembly Resolution A37-13, Appendix M - Delimitation of Air Traffic Services (ATS) Airspaces* – ICAO Doc 9958.

5. 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.

6. 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.

7. 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.

NAT REGION RESPONSIBILITIES

8. 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.

9. Regional contingency plans (e.g. Volcanic Ash Contingency Plan) have been developed, approved and maintained by NAT SPG. These plans are detailed in NAT Doc 006, Parts I and II.

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

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

12. 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.

13. 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

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

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.

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

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.

18. The Contingency Plan should be prepared in advance and submitted to ICAO Headquarters as necessary through the EUR/NAT Region 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 NAT 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 EUR/NAT Region Office.

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

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.

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

NAT ANP, VOLUME I, BASIC ANP

PART XI - ENVIRONMENT (ENV)

Secretariat Remarks only – not to be part of final document

This is a new ANP chapter and provides an overview of ongoing work to mitigate the impact of aviation on the environment. The Chapter discusses a wide range of initiatives, including some outside of the traditional PIRG area of responsibility e.g. research and development of alternative fuel. These have been shown to demonstrate the efforts across the entire aviation spectrum in respect of the sustainable development of aviation.

The Part highlights areas where PIRGS can directly influence the adoption of measures to improve the efficiency of air navigation including adoption of *performance based navigation* and improved *civil/military co-ordination* thus facilitating the flexible use of airspace.

NAT ANP, VOLUME I, BASIC ANP

PART XI - ENVIRONMENT (ENV)

Introduction

1. The need to minimise the environmental impact of aviation 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.

2. 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 North Atlantic 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*

3. 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.*

4. 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

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

6. 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

7. 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

8. 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).

9. 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

10. 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. 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.

12. 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

13. 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 CO_2 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.

14. 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 9750), 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 NAT Region Environmental Objectives/Goals

15. The NAT SPG expects States to ensure environmental factors are taken into consideration when developing CNS/ATM systems implementation plans.

16. States in the ICAO NAT Region are encouraged to *adopt best practices* from other States and international organisations (UNFCCC; WMO; IATA, ACI).

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

18. 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

19. 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

20. 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 CO2 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.

21. 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.

22. The 37th ICAO Assembly (Resolution 37-11 refers) urged States to complete a PBN implementation plan as a matter of urgency. States should continue their PBN planning and implementation activities in accordance with the ICAO PBN concept as detailed ICAO Doc 9613. Information on the status of implementation provided to the EUR/NAT Office of ICAO would be timely and helpful to foster implementation. Implementation of PBN is considered a significant enabler to deliver environmental benefits.

23. States are requested to 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.

Global and Regional Initiatives

NextGen

24. A strategic approach to proactively manage environmental issues is a central element of the United States' Federal Aviation Administration (FAA) NextGen programme. The FAA expects environmental benefits from NextGen systems and procedures to help offset the environmental impact from the expected growth of flight operations. The programme is focusing on minimising delays and carbon emissions, while maximising safety and savings. The target is that by 2018 delays will be reduced by 35% and fuel use by 5.7 billion litters cumulative. CO_2 emissions are expected to be reduced by 14.1 million tons cumulative through the implementation of NextGen's five pillar approach which includes the use of alternative fuels, accelerated ATM improvements and operational efficiencies.

SESAR

25. Single European Sky ATM Research (SESAR) is the operational and technological dimension of the Single European Sky initiative. SESAR seeks to reduce the environmental impact per flight by 10% without compromising safety and with clear capacity and cost efficiency targets in mind.

26. The efficiency gains made possible by the implementation of SESAR will enable *the reduction of the environmental impact of every movement in European airspace and at European airports*. The enhancements in air traffic management through the optimisation of flight trajectories have the potential to trim down the cumulative in-flight CO_2 emissions up to 2020 by around 50 million tons.

27. SESAR is focused on showing tangible results every year. In many airports in Europe, initiatives such as 'green' approaches are already being introduced – especially in densely populated areas where the reduction of noise and the improvement of local air quality are highly appreciated.

28. SESAR will introduce the so-called '4D trajectory' when developing new and more efficient air- and ground systems as well as procedures. Optimised air traffic management will lead to emissions savings in all phases of flight.

AIRE

29. The Atlantic Interoperability Initiative to Reduce Emissions (AIRE) is an example of how the SESAR and NextGen programmes work collaboratively on an international basis to substantially accelerate the pace of change in reducing the environmental impact of air transport. A total of 1152 trials lead to savings of an amount of 390 tons of CO_2 per flight. The two first complete (gate-to-gate) green transatlantic flights from Charles de Gaulle to Miami included enhanced procedures to improve the aircraft's energy efficiency.

ALTERNATIVE AVIATION FUEL

30. 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

31. 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 illustrated 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.

32. 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.

33. 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.

34. 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.

35. 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.

36. 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

37. 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).

38. In their present form the EPIs produced in airline and airport environmental reports do not provide a means of comparing relative environmental (or social) performance. 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* (Doc 9854).

39. 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.

40. ICAO requests that all States/ANSPs 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.

41. Whilst ICAO has developed the 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.

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 to be implemented	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	**AEM** III	EUROCONTROL	Climate Change	Used partially	Advanced Emission Model (AEM) is an aircraft stand-alone system developed and maintained by EUROCONTROL. AEM uses several underlying system databases (aircraft, aircraft engines, fuel burn rates and emission indices) provided by external data agencies in order to assure the quality of the information provided. This system information is combined with dynamic input data, represented by the air traffic flight profiles. References for fuel burn calculation: - Above 3000 ft: based on BADA 3.7 (Base of Aircraft Data) - Below 3000ft: based on ICAO (International Civil Aviation Organisation); Access is under licence from EUROCONTROL.
12	**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.

	Tool	Source	Modelling Area	Implementation status	Comments _recommendation
13	**ALAQS**	EUROCONTROL	Air Quality	Used by some European airports	The ALAQS project is designed to promote best practice methods for airport LAQ analysis concerning issues such as emissions inventory, dispersion, and the data required for the calculations, including emission factors, operational data, and aircraft landing and take-off profiles. The ALAQS-AV toolset is a GIS based research tool. It is a test bed that can be used to investigate the sensitivity of different inventory and dispersion methodologies. The choice of a GIS as a test bench simplifies the process of defining the various airport elements (runways, taxiways, buildings, etc.) and allows the spatial distribution of emissions to be visualized. The ALAQS emissions factors and operations profiles will provide this for use by airport authorities and planners.
14	**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.
15	**ANP**	EUROCONTROL	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.
16	**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. Access to this tool is by request to the FAA.
17	**BADA**	EUROCONTROL	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).
18	**FAST**	UK DfT	Climate Change	Ready and in use	Future Aviation Scenario Tool (FAST) is a model for climate change/GHG emission calculation.

	Tool	Source	Modelling Area	Implementation status	Comments _recommendation
19	**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.
20	**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).
21	**PEGAS**	Russian Federation Civil Aviation Environmental Safety Centre	Air Quality	Ready and in use	PEGAS calculates the pollutants concentration in the airport area, so it is a LAQ Tool. It provides comparative analysis of measurement and computational results. Used in some eastern European States: e.g. Russia & Ukraine.
22	**SONDEO**	European Union Model developed by Spain (ANOTEC)	Noise	Ready and in use	Study on noise exposure around European airports. Developed around a noise contour engine database. It calculates Lden and Lnight noise contours based on the ANP noise and performance database managed by EUROCONTROL.
23	**STAPES**	EUROCONTROL	Noise	Ready and in use	The System for Airport Noise Exposure Studies (STAPES) is a multi-airport noise model capable of providing valuable input into both European and international policy-making analyses. The STAPES project has identified the European Environment Agency's population database as an appropriate single source of data for use in relation to EU airports dealing with issues such as noise exposure. STAPES has successfully contributed to the assessments of CAEP/8 policies on the European region.

Data Sources:

- Airports Database; US FAA, EUROCONTROL;
  - Common Operations Database; US FAA, EUROCONTROL
  - 2006 Campbell-Hill Fleet Database
- ICAO/CAEP: WG1 noise & WG3 emissions
- Population Database
- ICAO aircraft engine emissions databank (EDB)

List of Acronyms

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
ANOTEC	Spanish Company
ANP	Aircraft Noise and Performance
APM	Aircraft Performance Model
APMT	Aviation Environnemental Portfolio Management Tool
APU	Auxiliary Power Unit
BADA	Base of Aircraft Data
BMVBS	German Ministry of Transport
CAEP	ICAO Committee on Aviation Environmental Protection
CO	Carbon Oxide
CO2	Carbon Dioxide
DfT	Department for Transport
ECAC	European Civil Aviation Conference
ECI	Environmental Condition Indicator
EDMS	Emissions and Dispersion Modelling System
EPI	Environmental Key Performance Indicator
EUROCONTROL	The European 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

Acronym	
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
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
PEGAS	Russian Federation Air Quality Model
RNL	Reference Noise Levels
SAGE	System for Assessing Aviation's Global Emissions
SESAR	Single European Sky ATM Research
SONDEO	Study on Noise Exposure Around European Airports
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

– END –