



International Civil Aviation Organization

Second Meeting of the Advanced Inter-Regional ATS Route Development Task Force (AIRARDTF/02)

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Agenda Item 6: Free Route Airspace Concept implementations within the EUR Region

FREE ROUTE AIRSPACE DESIGN

(Presented by EUROCONTROL)

SUMMARY

This paper presents the Free Route Airspace Design Procedures focusing on the main pillars the FRA Concept and requirements for appropriate FRA AIP publication. This paper also presents the approved FRA definitions and gives details on all other aspects related to proper FRA implementation in ICAO EUR/NAT Region.

1. INTRODUCTION

1.1 The overall scope of the Free Route Airspace (FRA) Concept is to provide an enabling framework for the harmonised implementation of FRA in Europe whenever a State / FAB / ANSP, a group of States / FABs / ANSPs decides to proceed with such implementation. The FRA Concept forms the basis for a common understanding for all ATM partners involved in FRA implementation.

1.2 FRA AIP publication harmonisation is also crucial for proper presentation to the airspace users of all procedures related to the FRA, including explanation and definitions of applied FRA relevant points.

1.3 The Free Route Airspace Design procedures are further described in more details in European Route Network Improvement Plan (ERNIP), Part 1, Chapter 6 and can be found on EUROCONTROL web site - <http://www.eurocontrol.int/operations-planning>.

2. DISCUSSION

FRA Concept

2.1 Definitions

Free Route Airspace (FRA)

A specified airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) way points, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.

FRA Arrival Connecting Point (A)

A published Significant Point to which FRA operations are allowed for arriving traffic to specific aerodromes.

FRA Departure Connecting Point (D)

A published Significant Point from which FRA operations are allowed for departing traffic from specific aerodromes.

FRA Horizontal Entry Point (E)

A published Significant Point on the horizontal boundary of the Free Route Airspace from which FRA operations are allowed.

FRA Horizontal Exit Point (X)

A published Significant Point on the horizontal boundary of the Free Route Airspace to which FRA operations are allowed.

FRA Intermediate Point (I)

A published Significant Point or unpublished point, defined by geographical coordinates or by bearing and distance via which FRA operations are allowed.

2.2 Scope

The FRA Concept encompasses various FRA implementation scenarios that will:

- Meet the Safety Objectives;
- Be compatible with existing operations;
- Be sustainable through further development;
- Be capable of expansion/connectivity to/with adjacent airspace;
- Be capable of being exported to other regions.

2.3 Enablers

The enablers are:

- Appropriate System Support - enhancement for the purposes of Flight Planning and ATFCM;
- Procedures - enhanced procedures where necessary for operations within FRA and at its interfaces;
- Adaptations to airspace structures;
- Adaptations to airspace management procedures;

No additional equipment requirements or flight planning procedures changes are foreseen for aircraft operators. Nevertheless, modifications to flight planning systems may be required to ensure that full benefit of the FRA can be realised.

2.4 Airspace Classification

FRA will, in principle be classified as Class C airspace, with certain agreed exemptions.

2.5 Limited Applicability of FRA*Time Limited*

Even though the goal is to implement FRA on a permanent basis, a limited implementation during defined periods could facilitate early implementation. Procedures for transitioning between FRA and fixed ATS route operations shall be set.

Structurally Limited

In complex airspace, the full implementation of FRA could potentially have a detrimental effect on capacity. In such airspace, States / FABs / ANSPs may decide to implement FRA on a structurally limited basis, for example by restricting the available FRA Horizontal entry/exit points for certain traffic flows, which could increase predictability and reduce the number of potential conflicts.

2.6 Flight Planning

The FRA Concept includes the General Issues on flight planning and detailed clarification on Flight Plan Format used, Use of Unpublished Intermediate Points for Flight Planning, Flight Planning Routeings Through Airspace Reservations, Route Description, Flight Planning Facilitation Through the Use of DCTs, Cruising FL Change, Flight Plan Submission, Flight Plan Checking and Correction and Flight Plan Distribution, DCT Limits.

The main aspects to be highlighted are that the FRA flight planning is fully in accordance with ICAO provisions:

- No change is envisaged to the ICAO flight-plan format in respect of FRA. OAT flight plans shall continue to comply with national regulations;
- FRA published significant points or unpublished points defined by geographical coordinates or by bearing and distance shall be described using the standard ICAO format;
- Route portions between all defined FRA points shall be indicated by means of DCT in accordance with ICAO Doc 4444. Within the FRA there are no limitations on the use of DCT, other than those recommended by ICAO.

2.7 Air Traffic Flow and Capacity Management

The FRA Concept includes the General Issues on Air Traffic Flow and Capacity Management and detailed clarification on Sector Configuration Management, Sector and Traffic Volumes Capacities/Monitoring Values, Letters of Agreement Restrictions, Re-Routeing Proposals.

The management of FRA is different to that of the fixed ATS route network and the Air Traffic Flow and Capacity Management and Flight Planning in Europe need additional system support and new procedures in certain areas such as:

- Taking into account routing schemes outside FRA;
- The expected increase in RPL updates;
- Tools for ATFCM planning within FRA;
- Tools for re-routeing;
- Tool to calculate and manage traffic loads at a local level (FMP) and central level.

2.8 Other aspects covered by the FRA Concept

- a. Flight Level Orientation - The Flight Level Orientation Scheme (FLOS) applicable within FRA shall be promulgated through the relevant national AIS publications. This does not constitute a change to the current system of 2 FLOS in Europe;
- b. Airspace Organisation - includes General Issues and clarifications on Applicable Airspace, Vertical Limits of FRA and Their Publication, Horizontal Limits of FRA and Their Publication, Vertical Connection between FRA and the underlying Fixed ATS Route Network;

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- c. Maximising Efficiency of FRA - to maximise the efficiency of FRA and to ensure safe and efficient transfer of flight, all efforts need to be made to ensure any required realignment of the fixed ATS route network in adjacent airspace not applying FRA;
 - d. Access To/From Terminal Airspace - it will need to be considered and appropriate refinements to TMA structures initiated, including the definition of additional SIDs/STARs to permit more flexibility;
 - e. Publication of a Contingency ATS Route Network - no over-arching requirement for a European contingency fixed ATS route network;
 - f. Maintenance of a Fixed ATS Route Network within FRA - wherever a fixed ATS route network is maintained within FRA, details shall be published in AIS publications;
 - g. Airspace Reservations - In the context of FRA Concept, “airspace reservation” refers to airspace of defined dimensions for the exclusive use of specific users, including TRA, TSA, CBAs, D, R, P, Areas and any specially activated areas;
 - h. Route Availability - the role, format and applicability of the Route Availability Document (RAD) have been adapted to accommodate FRA requirements;
 - i. Sectorisation - the present sectorisation scheme may need to be restructured to accommodate traffic flows both within FRA and according to the underlying fixed ATS route network;
 - j. Sector and Traffic Volumes Capacities/Monitoring Values - Sector capacities shall take into account the more dynamic variations of traffic patterns;
 - k. ATS Delegation - in areas where operational boundaries do not coincide with FIR/UIR boundaries, and delegation of ATS is effective the operational boundaries of FRA shall be published in the national AIS publications of both States;
 - l. Airspace Management - includes General Issues and clarifications on OAT Handling;
 - m. Letters of Agreement and Coordination Procedures - Letters of Agreement shall be adapted to reflect the specificities of FRA in regard to transfer points, flexible changes in sectorisation, links with the fixed ATS route network, high fluctuations in traffic flows, possibility to leave/enter the airspace at random points, etc..

FRA - AIP Publication

2.9 The AIP publication is in accordance with Annex 15 provisions and is further detailed and clarified to meet the FRA Concept requirements.

2.10 Terminology

Common terminology and relevant terms/abbreviations used for FRA operations will be published in *GEN 2.2 Abbreviations used in AIS publications*. Those terms/abbreviations that are not defined in ICAO Doc 8400, will be marked with an asterisk to indicate “non-ICAO” status - in accordance with ICAO SARPs.

2.11 FRA General Procedures

As the FRA procedures are seen as supplementary to the general IFR procedures, they will be described in *ENR 1.3 Instrument Flight Rules*. Additionally the explanation and definitions of applied FRA relevant points will also be described.

- 2.12 Flight Planning
- Within FRA, flight planning procedures need to be understandable, easy to use and coherent with procedures for the fixed ATS route network. *ENR 1.10 Flight Planning* is the placeholder for information relevant for FRA flight planning for eligible flights, enabling of correct flight planning and submission of a flight plan.
- 2.13 Free Route Airspace structures
- The FRA structures, including sectors, will be published in:
- *ENR 2.1 FIR, UIR, TMA and CTA* - if based on FIR/UIR or ATC unit boundaries; or
 - *ENR 2.2 Other regulated airspace* - if the FRA lateral limits do not coincide with FIR/UIR or ATC unit boundaries.
- 2.14 Cross-border application of FRA
- If FRA is implemented cross-border between adjacent FIRs/UIRs or CTAs/UTAs, the publication of the FRA information shall clearly reflect this cross-border application. In addition to inserting in ENR 1.3 information on the involved FIRs/UIRs or CTAs/UTAs, the *ENR 2.2 Other regulated airspace* is the adequate placeholder for description of the cross-border FRA structure.
- 2.15 Delegation of the responsibility for provision of ATS
- In order to facilitate the publication of the FRA applicability in areas where the responsibility for provision of ATS is delegated the following AIP placeholders are available in the ICAO AIP Specimen (Doc 8126) for publication:
- *GEN 3.3 - Air Traffic Services, GEN 3.3.2 Area of Responsibility*; and
 - *ENR 2.2 Other regulated airspace, ENR 2.2.2 The area involved in the transfer of ATS responsibility*.
- While publication of ATS responsibility in GEN 3.3 does not need to be re-assessed, appropriate publishing of ATS delegation in areas involving FRA shall be fully considered.
- 2.16 FRA Connecting Routes to/from terminal airspace and aerodromes
- For the publication of defined FRA connecting ATS routes, the AIP placeholder *ENR 3.5 Other Routes* may be used, with a dedicated section named "FRA Connecting Routes". This placeholder is appropriate for publishing the complete connecting route package for a terminal area.
- The description of established connecting routes shall be coherent with published FRA general procedures in ENR 1.3 and flight planning instructions for FRA published in ENR 1.10.
- Alternatively, the description of the FRA connecting routes can also be published together with details on flight procedures (AD2.21 Flight procedures) for the aerodrome concern, if appropriate.
- 2.17 FRA Significant Points
- Publication of FRA relevance on 5LNC and navigation aids - en-route falls under *ENR 4.1 Radio navigation aids - en-route* and *ENR 4.4 Name-code designators for significant points*.

For information on FRA (ref. Annex 15, Appendix 1), the Remarks column in ENR 4.1 and ENR 4.4 tables shall be used to specify specific information with respect to FRA usage, if needed.

or, by an extension to the ENR 4.1 and 4.4 tables, by adding one column.

The FRA relevance of the significant points shall be indicated by the following letters and published within brackets:

- (E), *for* “FRA Horizontal Entry Point”;
- (X), *for* “FRA Horizontal Exit Point”;
- (I), *for* “FRA Intermediate Point”;
- (A), *for* “FRA Arrival Connecting Point”;
- (D), *for* “FRA Departure Connecting Point”.

2.18 Airspace reservations

The following AIP sections are used for publication of information of Special Areas (SA):

- *ENR 1.9 Air Traffic Flow Management and Airspace Management* - to include general information on CDR and TSA/TRA;
- *ENR 5.1 Prohibited, Restricted and Danger Areas*;
- *ENR 5.2 Military Exercise and Training Areas and Air Defence Identification Zone (ADIZ)* shall be used for any “special use airspace” (CIV/MIL) including TSA/TRA specific information.

2.19 Charts Publication

a. ENR 6 En-route Charts:

Two alternatives are available:

- *ENR 1.9 Air Traffic Flow Management and Airspace Management* - to include general information on CDR and TSA/TRA;
- To embed the relevant information into the existing En-route charts. In case FRA vertical limit coincides with the LOWER/UPPER limits, States may recognise no need to publish a separate chart.

or

- If the FRA vertical limit does not coincide with the LOW/UPP limit - a new FRA dedicated En-route chart may need to be developed and published in the AIP as a new *sub-section of ENR 6. EN-ROUTE CHARTS (ENR 6.x)*;
- *This FRA chart will accompany the LOW/UPP En-route Chart(s).*

b. Aerodrome Charts (SID/STAR and Area Charts)

Updates and changes to Aerodrome Charts (ref. Annex 15 Appendix 1, AD2.24) may be needed if SIDs/STARs are extended, or for publishing connecting ATS routes. Therefore, FRA implementation may affect also the Area Chart - ICAO, if published by States.

c. FRA Chart symbols

The example is available below.

- FRA boundary in coincidence with FIR with on-request entry/exit point;
- Independent FRA boundary with compulsory entry/exit point.



The FRA relevance of a significant point shall be indicated by the letters described in 2.17 above and published within brackets. Combinations of letters can be published, in accordance with the relevant matrix.

Examples:

(EX) - Horizontal entry/exit point.

(XD) - Horizontal exit/departure connecting point.

Letter(s) in the charting symbol are not viable options as might be unreadable on the charts.

Suggestion is made to add FRA related information in the label like in the example above.

Based on the best practice applied by EUROCONTROL ERC/ERN Charts and in cooperation with charting experts, green colour is suggested.

These proposals have been developed to comply with ICAO Annex 4, Appendix 2:

- Conformity with ICAO symbols 121 (Annex 4, Appendix 2-18); and green colour suggested for FRA related points;
- Conformity with ICAO airspace classifications 126 (Annex 4, Appendix 2-19); and green colour for FRA related boundary.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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