NECESSARY CHANGES IN AIRSPACES OF STATES IN THE FAB CENTRAL EUROPE (FABCE)

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This article focuses on functional airspace blocks, mainly FABCE and opportunities to improve the quality of air transport as a result of this unification. There are proposed adjustments of airspace classes' positions, changes in FIR boundaries and suggested introduction of free route airspace.

K e y w o r d s: FAB, airspace, FIR, Single European Sky, FABCE

1 INTRODUCTION

Unification into functional airspace blocks has already been talked about for almost ten years and now the date is coming when all preparations should flip into the functional stage. This flip is planned with the arrival of the new calendar year. Unfortunately, the official merger does not really change anything, only another contract will be signed and therefore it is necessary to look to modifying the technical side of FABs. Three necessary adjustments are described in this article.

2 FUNCTIONAL AIRSPACE BLOCKS

The main element of the reorganization of Europe's airspace in the Single European Sky (SES) is reducing the number of airspaces from 67 to 9 functional blocks.

A functional airspace block (FAB) means an airspace block based on operational requirements and established regardless of State boundaries, where the provision of air navigation services and related functions are performance-driven and optimized with a view to introducing, in each functional airspace block, enhanced cooperation among air navigation service providers or, where appropriate, an integrated provider. [9]

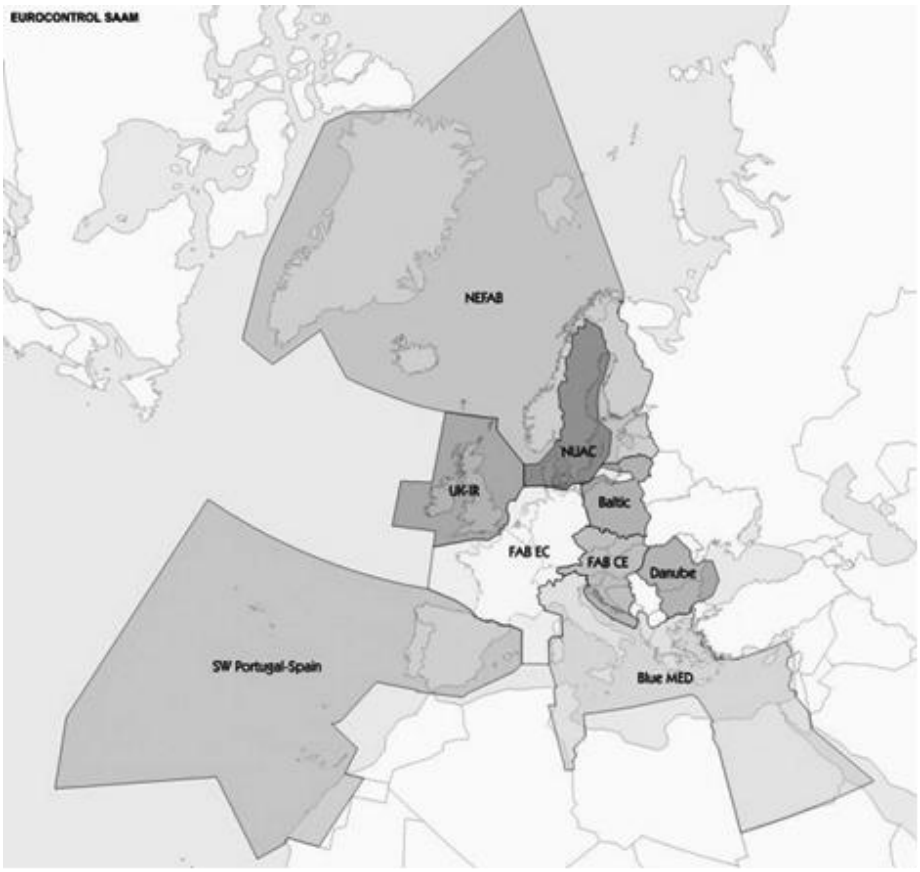

Figure 1 – European functional airspace blocks [2]

There are 9 FABs:

- UK-IRELAND FAB: United Kingdom, Ireland
- Danish-Swedish FAB: Denmark, Sweden
- BALTIC FAB: Poland, Lithuania
- BLUE MED: Italy, Malta, Greece, Cyprus, (Egypt, Tunisia, Albania, Jordan)
- FABCE (FAB Central Europe): Czech Republic, Slovak Republic, Austria, Hungary, Croatia, Slovenia, Bosnia and Herzegovina
- FABEC (FAB Europe Central): France, Germany, Belgium, Netherlands, Luxembourg, and Switzerland
- DANUBE: Bulgaria, Romania
- NEFAB (North European FAB): Estonia, Finland, Latvia, Norway
- SW FAB (South-West FAB): Portugal, Spain

3 OPTIMIZATION OF AIRSPACE CLASSES IN FABCE

Currently, each State has divided airspace in different way and uses different classes of airspace defined by ICAO. In the following paragraphs, I will discuss only the general airspace, so I will not take into consideration airspaces like TMA, CTR, and similar.

In Member States of FABCE, five of the seven existing airspace classes are used. Their allocation is shown in Figure 2.

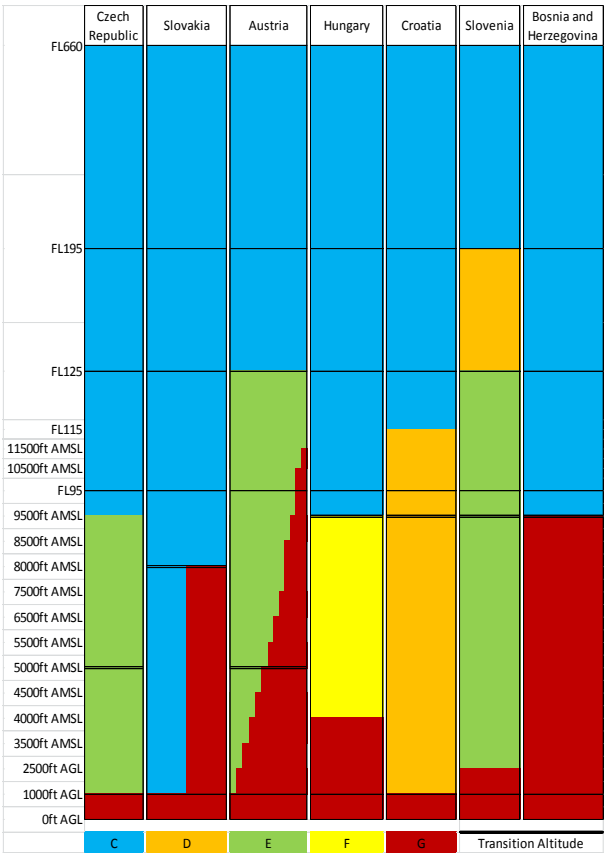

Figure 2 – The allocation of airspace classes in the FABCE states

The reason for the introduction of functional blocks is to eliminate fragmentation of airspace in Europe. Therefore, at the beginning, airspace boundaries of one class in each country should be modified, in order to do not change flight rules when flying at same flight level in every state of the functional airspace block.

The figure shows that above FL195 in the whole FABCE is class C, so there is no need for any changes. Between FL125 and FL 195 it is necessary to change airspace class in Ljubljana FIR from Class D to C. Thanks to this change the class C would be found in all airspace of FABCE between FL125 and FL660, which is sufficient for the main flight operations. Changes in the lower airspace would have been difficult due to different geographic surfaces of individual states and would require compromises that would not be too far from the status quo. Therefore, my recommendation is to leave FABCE airspace below FL 125 in the current state.

4 SUGGESTION OF OPTIMIZATION OF ROUTES IN FABCE AIRSPACE

4.1. Prerequisites

The following routes design optimization deals only with the upper airspace, which is the same class and is above FL 195 (it is class C according to chapter 3, and after adjustments could lower limit move to FL 125). This proposal is also based on two prerequisites that should be met.

The first one is that providers of air traffic control services will have the same or very similar computer system. These systems must seamlessly communicate among themselves to ensure smooth transfer of data from one sector to another and between adjacent air traffic control services. It should function the same way like now between one ATC service sectors. The fulfillment of this assumption is the most important thing, what is needed to meet.

The second prerequisite is the willingness to delegate the control of the airspace of the state to the provider of air traffic control in neighboring state. This requirement is necessary to design and to optimize sectors across the FABCE airspace. The problem here may be in the disagreement with this delegation for military reasons.

4.2 Adjustment of FIR boundaries

The fundamental step in the FABCE optimization is a shift of outer boundaries of sectors of the FIR areas to make them more direct. In the best case, the sector boundary between the two states should look like sectors boundary in one FIR, so ideally straight line, respectively line with one break. Also the sector boundaries should be chosen to avoiding repeated entry and exit into any sector. Before proposing the allocation of airspace, it is important to determine whether to introduce a free route airspace,

which poses slightly different requirements for the sector allocation than the fixed airways network.

Figure 3 – FABCE area and sectors border modification

Internal borders of outer sectors of member states FIRs should look approximately as shown in Figure 3 (red line). As you can see, the second prerequisite must be fulfilled, the delegation agreement of airspace with the adjacent ANSP. Here, however, there may be a problem that some states will not agree with this delegation. Greatest territorial shifts are designed between Croatia and Bosnia and Herzegovina and because of it, designed there is a possible alternative allocation of FIRs , which is displayed by the blue line in Figure 3.

4.3 The introduction of free route airspace

Free route airspace is the third system (technology), which should take place at least throughout the upper airspace in FABCE from FL 245 to FL 660. The ideal would be to introduce free route airspace from lower flight levels, such as the FL165. This could be the case if the optimized allocation of airspace classes, as mentioned in Chapter 3, will happen. This space should have entry and exit points on the "outer boundary", where by the "outer boundary" is understood the boundary of FABCE states FIRs, which is adjacent to the third state (Figure 3). Since free route airspace would be introduced over a large area (529,497 km^2 [3]), there will be very noticeable fuel and time savings for aircraft operators.

When introducing free route airspace, firstly, it is necessary to establish border waypoints between the free route airspace of FABCE and surrounding airspace. Waypoints already in use can be selected for these waypoints and only define their type (entry, exit, entry / exit). Consequently, it is also necessary to establish procedures for descent and climb and for transition from a fixed airways network to the area of free route airspace. For this procedures can be specified a temporary waypoints, which may be chosen from the current used waypoints. And the procedure would be: If pilot wants to climb the aircraft above FL 240 (FL 160), he must have equipment for free routes airspace and may start climbing only in the defined waypoints. For descent, the same applies vice versa.

Figure 4 – Functional Airspace Block of Central Europe – FABCE [3]

The shape of FABCE area (Figure 4) suggests, that it will be necessary to have exceptions in planning possibilities of free routes, when the route will led through other airspace than airspace of the functional block. This condition can be specified by prohibiting planning direct routes from waypoint XXX to waypoint YYY, if we have defined border and waypoints.

5 CONCLUSION

After the introduction of functional blocks European airspace should become simpler for its users. This will not happen "overnight". The official introduction of functional airspace blocks is the matter of just a few signatures, whereas technical implementation will take several years.

In this article, I described the necessary steps that must be performed before it can be said that the functional airspace block perform its function. The first step is the regulation of the ICAO airspace classes, where, although there are only 7 classes, it's still very much and it would be good to unify them across the large FAB area. The second step is to optimize flight routes, which is a key element, due to which are these functional airspace blocks introduced. There is the need to do it in two stages, adapt FIR borders and implement the free routes airspace. In this article, these three adjustments, which lead to the successful exploitation of the functional airspace blocks, are described for functional airspace block of Central Europe (FABCE).

6 ACKNOWLEDGEMENTS

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BIBLIOGRAPHY

[1] KULČÁK, L. a kol.: Air traffic management, Akademické nakladatelství CERM, 2002, Brno, ISBN 80-7204-229-7
[2] AIS/AIM FAB Activities [online] EUROCONTROL. [cit. 2012-05-02]. Available at: <http://www.eurocontrol.int/articles/aisaim-fab-activities>
[3] FABCE Initiative [online]. FABCE. [cit. 2012-05-02]. Available at: <http://www.fab ce.eu/index.php/initiative>
[4] HILBURN,B. G., NIJHUIS H., JOOSSE, M. Human Performance Measurements – Summary Report [online]. EIGHT-STATES FREE ROUTES AIRSPACE PROJECT. EUROCONTROL, August 2001. [cit. 2012-05-02]. Available at: <http://www.eurocontrol.int/airspace/gallery/content/public/documents/frap/human_performance_assessment_summary_report.pdf>
[5] JELINEK, F., QUESNE, A., CARLIER, S. The Free Route Airspace Project (FRAP) – Environmental Benefit Analysis [online]. EEC / BA / ENV / Note 004/2002. EUROCONTROL Experimental Centre, January 2002. [cit. 2012-05-02]. Available at: http://www.eurocontrol.int/airspace/gallery/content/public/documents/frap/LastFRAPReport-v4.pdf
[6] Free Route Airspace (FRA) During the Night Period in CTA Praha. ŘLP, a.s., 2011.
[7] EAD Basic [online]. EUROCONTROL. [cit. 2012-09-24]. Available at: <http://www.ead.eurocontrol.int/publicuser/public/pu/logout.do;jsessionid=yW2sPgQp70QGcVnNhzvNs6DhtDvML43nyyvbttQ2V60y2yn3GTGh!942399925>
[8] Single European Sky II [online]. European Commission. [cit. 2012-09-25]. Available at: <http://ec.europa.eu/transport/air/single_european_sky/ses_2_en.htm>
[9] Regulation (EC) No. 1070/2009 of the European Parliament and of the Council. [online]. In: *Official Journal of the European Union*. 2009. [cit. 2012-09-25] Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:300:0034:0050:EN:PDF>

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