

Supporting
European
Aviation



The Benefits and Lessons learnt in the implementation of Free Route Airspace (FRA) in the European Region

Part 2 - Lessons learnt and Benefits

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Free Route Airspace



“Giving users the freedom to plan a route in Europe's airspace”

Free Route Airspace - Lessons Learnt Airspace Design

- Proper definition of FRA significant points (E, X, I, A, D, e.g.) to provide efficiency in flight planning.
- Consider efficient design of FRA significant points to avoid special areas, especially those for military use when active.
- Provision of airport connectivity via FRA connecting routes, when required for proper channelling of arrival and departure traffic to/from major airports.
- Adjustment of control sectors to FRA, when necessary avoiding short sector entries and border clips.
- Application of no planning zones, if necessary to protect unexpected trajectories.

Free Route Airspace - Lessons Learnt Procedural

- Consider all Civil-Military coordination requirements.
- Validation and ATCO training requirements (theoretical briefings or simulations), if needed.
- AOs involvement in flight plan checking, if such option exists;
- Preliminary ATM system feasibility assessment in the FRA planning phase. Provide OPS requirements for system developments, if any.
- Preferably avoid mixed FRA operation in terms of:
 - Night and day (not ideal solution);
 - FRA and ATS route network (AOs will rather use ATS route network);
 - Preferable avoid unpublished point (unpublished point, defined by geographical coordinates or by bearing and distance), not easy to manage it without proper system support and relevant ATC procedures (e.g. CPDLC).
- Post implementation activities, traffic monitoring and coordination with AOs to facilitate flight planning efficiency.
- Share lessons learned with others.



Free Route Airspace - Benefits - General View

- FRA is a way of overcoming the aviation sector's efficiency, capacity and environmental problems by helping to reduce fuel consumption and emissions, while improving flight efficiency. At the same time, it paves the way for further enhanced airspace design and ATM operational concepts.
- With FRA projects now in place across more than three quarters of European airspace, the region's flight efficiency targets are within grasp. Route extension - the difference between the flight flown and the corresponding portion of the great circle distance - due to airspace design went down **from 3.58% in December 2007 to 2.00% in December 2021**, thanks in part to initiatives like free route airspace and despite significant disruption in the network.
- FRA is a key landmark in achieving free routing across European airspace on the road to SESAR's business trajectories and 4D profiles. It will make it possible to meet the demands of future airspace users over the next 50 years, including civil and military unmanned aircraft systems (UASs), supersonic and hypersonic transport, spaceplane operations to sub-orbit and orbit, high altitude pseudo satellite (HAPS) platforms, plus balloons and airships.



Free Route Airspace - Benefits - Airspace Users

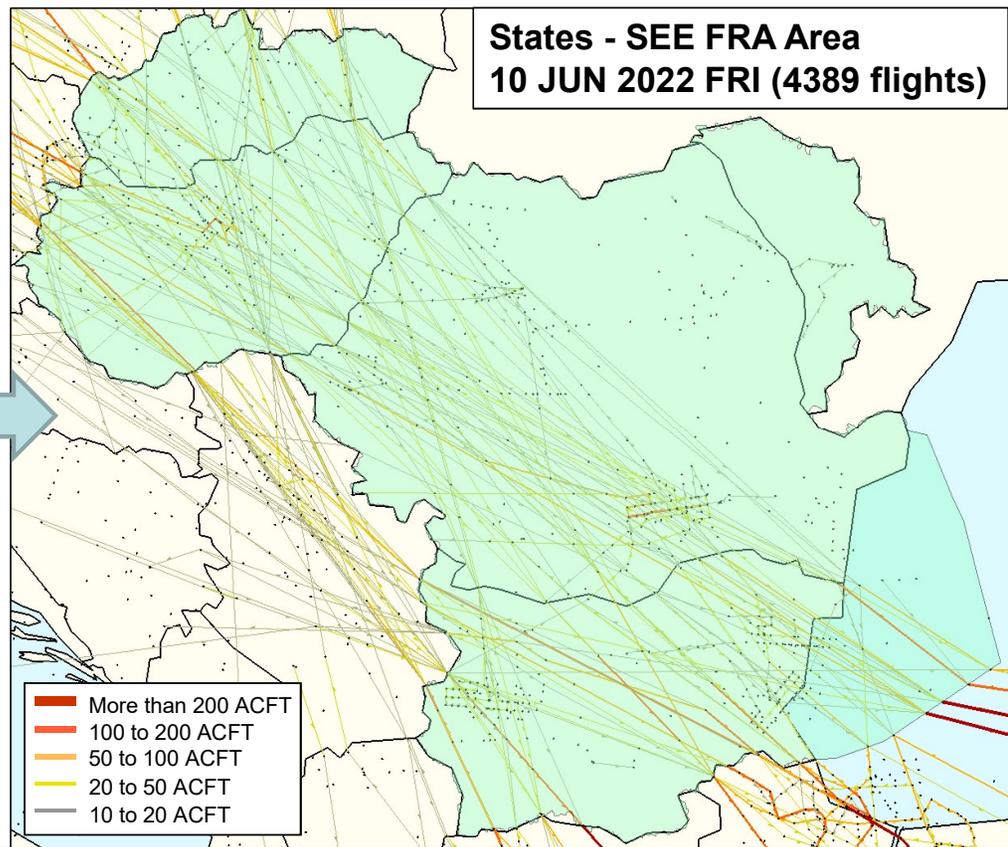
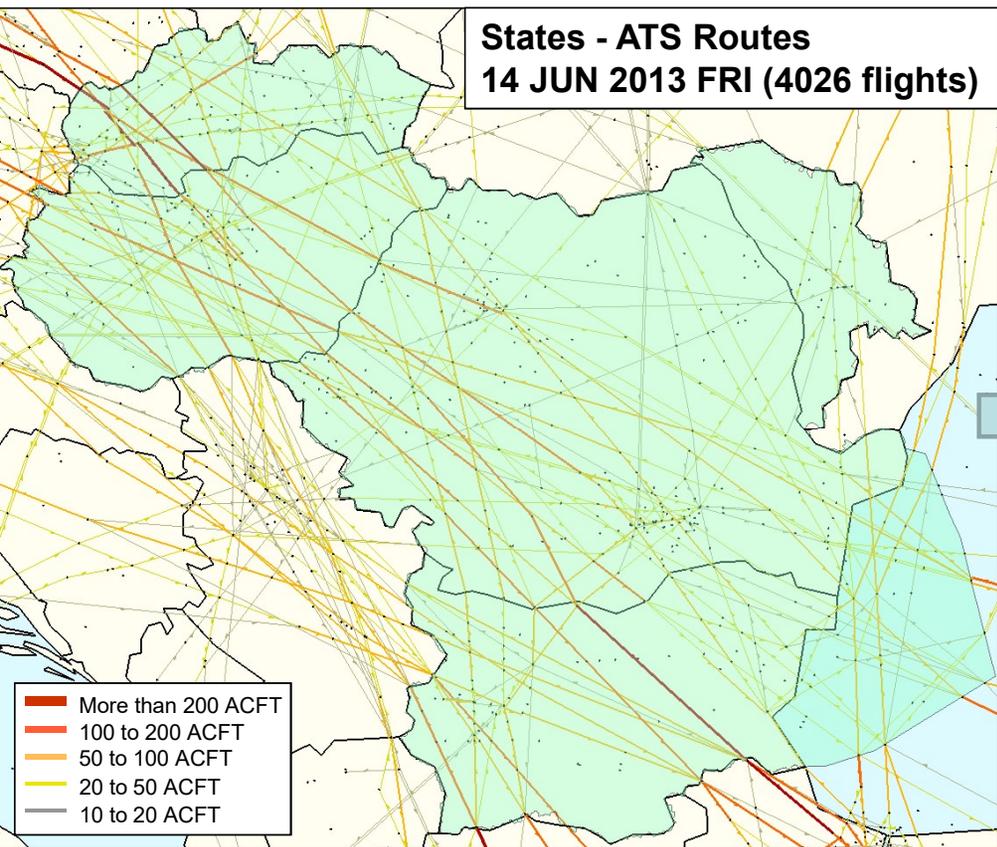
- The move from routes to free route airspace availability offers significant opportunities to airspace users.
- Once fully implemented at European level, these improvements should allow the following savings, compared with the current situation:
 - **1 billion** nautical miles.
 - **6 million** tonnes of fuel.
 - **20 million** fewer CO₂ tonnes.
 - **€ 5 billion** in fuel costs savings.

Free Route Airspace - Benefits - ANSPs

- Operating an FRA environment offers improved traffic predictability due to more stable trajectories. At the same time, it enhances the use of conflict detection tools. The FRA concept leads to a better spread of conflicts compared with the concentration of conflicts generated by the former fixed ATS route network.
- EUROCONTROL studies also show a slight decrease in ATCOs workload as a result of FRA implementation, mainly coming from a decrease in radio transmissions, monitoring and coordination tasks.
- ATCOs working with FRA environment are adamant that they do not want to go back to a fixed ATS route network. Before FRA, aircraft received tactical directs from ATCOs to shorten their route, but there was no logical correlation between the fixed ATS route network and how the aircraft actually flew. FRA offers airspace users the ability to fly directly according to their filed flight plan route while ensuring efficiencies in fuel planning, consumption and costs.

Free Route Airspace - Benefits - Visualisation

South East Europe Free Route Airspace





Free Route Airspace - Frequently Asked Questions (1)

- **Are the air carriers technically prepared to perform “directs” in FRA? Are they consistently taking advantage of the benefits FRA offers?**

Airspace users are faced with a freedom of choice that has not existed during the past 50 years of airspace design and operation. The move from ATS route to airspace availability is offering significant opportunities and the airspace users are gradually adapting their flight planning systems to fully exploit the full potential of the concept. However it remains their decision as to whether they change their operation and realise the benefits now being offered.

Importantly, FRA provides the foundation and flexibility for meeting the demands of future airspace users over the next 50 years, such as civil and military RPAS, hypersonic transport, spaceplane operations to sub-orbit, wireless network balloons and airships.

- **Are there any parts of the airspace that are experiencing or could experience more issues as a result of FRA implementation? What has been or is being done about that?**

FRA is now implemented at Maastricht UAC, by DFS in Germany and NATS in UK, proof that the ANSPs concerned do not see any major issues that may prevent them from implementing the concept in one of the busiest pieces of airspace in the world. EUROCONTROL works with those ANSPs to develop and implement appropriate solutions to further enhance operational performance.

- **Do air carriers need any specific approval to conduct direct routes? Are there any special operational requirements?**

No approval is required, current navigation capability fits with FRA operations.

Free Route Airspace - Frequently Asked Questions (2)

- **Directs may also mean reduced flight times and therefore potentially higher aircraft utilization? Is not this going to cause more traffic at airports? Are airports prepared?**

Yes there is the possibility of users conducting more rotations as the result of time saved using FRA, but the scale of this change will be relatively small in comparison with the overall need to improve flight efficiency and capacity of the European ATM system across Europe due to the increase in traffic and this is not related to FRA, but to the continuous development of air transport in Europe.

- **Have ANSPs developed strategies to mitigate the potentially more difficult detection of conflicts that comes with FRA implementation?**

Over the last 15 years ATC systems across Europe have been modernised to include conflict detection tools while using aircraft trajectories calculated by the ground system which are updated in real time as a flight progresses. The good news is that in an FRA environment these trajectories are likely to be more stable than today's operation and as a consequence will help improve predictability. The tools help controllers identify conflicts well in advance of them occurring and are well suited for FRA operations. Indeed one might say that the investments made in these new systems provide an additional return by enabling free route operations and a consequence an improvement in the quality of service provided by ANSPs. At the same time, the implementation of FRA generates a much better spread of conflicts compared to the concentration of conflicts generated by the fixed route network.

Free Route Airspace - Frequently Asked Questions (3)

- **Is there a risk for airspace around airports to become over crowded? What is being done in this respect?**

This is not specifically FRA related - improvements have to be made in all aspects of ATM to accommodate future demand. Nevertheless, specific airspace design solutions have been developed and documented by EUROCONTROL to ensure organised traffic flows around the airports. Airspace in TMAs will still be structured with dedicated arrival/departure routes.

- **What is the status of FRA implementation in other regions of the world? Are there any lessons learnt from the European experience?**

Europe is the first region in the world having implemented a full FRA concept. However flight efficiency initiatives in various forms exist in other parts of the world i.e. North America and Australia.

Lessons learnt from the implementation so far have included the following:

- Implementation on an incremental basis, starting with State implementation followed by cross-border operations over a region, when all neighbours are ready, is the best option for achieving full benefits.
- Close coordination between airspace users, ANSP and the Network Manager has guaranteed the success of the implementation so far in terms of time and cost.



Free Route Airspace - Supporting Information

EUROCONTROL FRA website

<https://www.eurocontrol.int/concept/free-route-airspace>

FRA Concept - Video Presentation (July 2016)

<https://www.youtube.com/watch?v=297-ypllsHc>



QUESTIONS