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Free Route Airspace WEBINAR

29 AUGUST 2023





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Welcome Speech

- Mr. Liu Lujiang
Deputy Chief of the ICAO APAC Regional Sub-Office



Objectives

- To improve understanding on FRA concept and implementing requirements:
 - Definition and Benefits of FRA
 - Sharing successful Implementations and Case studies
 - Exchanging Knowledge
 - Fostering Dialogue

ICAO's Strategic Objectives





Agenda

1. Introduction to FRA – ICAO
2. Case study and Requirements for Implementation of FRA
 - Case study : IFATCA (EUR), FAA (USA)
 - Technology : EUROCONTROL
 - Airspace management and Training for ATCOs : Indonesia
 - Operative perspective of FRA : IATA
 - ★ After talking each topic, Q&A session will be followed for 5 min'
3. Summarizing and Takeaways



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ICAO APAC Webinars 2023

Introduction to FRA

Mr. Hyuk Jin Kwon

Regional Officer, Air Traffic Management (AOM-ASM)



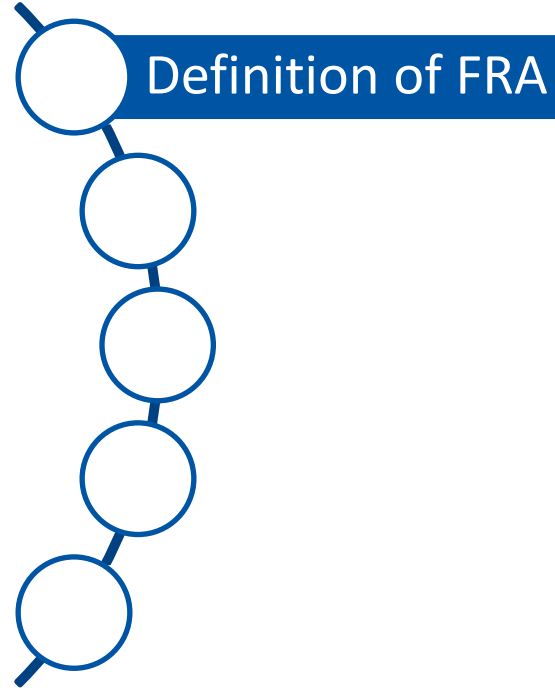


Outline

- Definition of FRA
- Understanding FRA Operation and Infrastructures
- Similar Concepts
- Benefits of FRA Implementation
- Summary and Takeaways



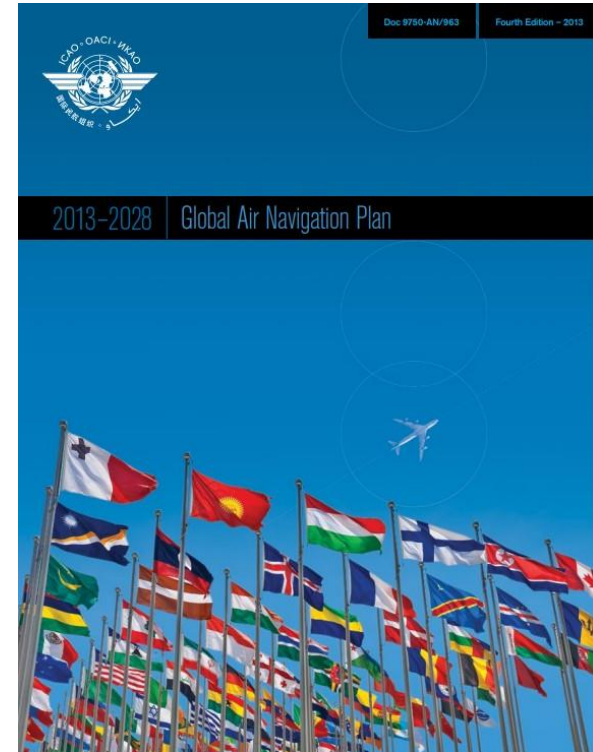
Outline





Where is the FRA originated from?

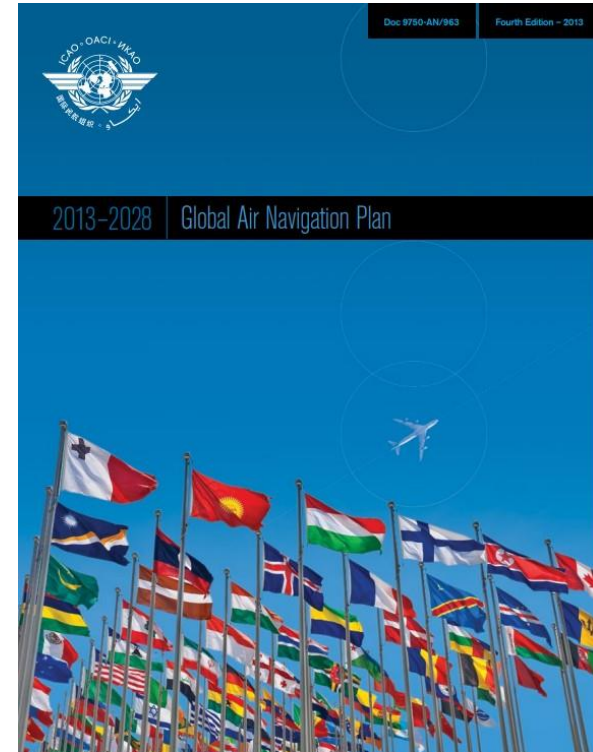
- FRA in ICAO Documents
 - The ICAO Global Air Navigation Plan (GANP) identifies “Enable airspace users to fly their preferred trajectories” as a Global Plan Initiative. (Para 5.2.14)
 - It will be provided by that “PIRGs identify dynamic/flexible planning elements for modernizing the regional air navigation systems, following a performance-based approach”, aimed at accommodating preferred flight trajectories. (Para 2.2.4.4)





Where is the FRA originated from?







- Enabling airspace users to **fly their preferred trajectories**
 - It's often referred to as **Free Route Airspace (FRA)** in the aviation industry.
- Enhancing Direct Routings with FRA
 - The term FRA is used to describe the many **variations of dynamic and flexible ATS route systems** that have been implemented in different locations throughout the world.





Where is the FRA originated from?

- In ASBU an enabler as Block 1-1 in FRTO

FRTO-B1/1	Free Route Airspace (FRA)	Operational   
<input type="checkbox"/> Sixth edition of the GANP 	<p data-bbox="409 562 1734 620">Main Purpose  The Free Route Airspace (FRA) concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users.</p> <p data-bbox="409 655 1748 713">As a step to full trajectory-based operations, the FRA concept brings increased flight predictability, reduced uncertainty for the ATM network function, which in turn can lead to potential capacity increases for ATM, which will also benefit the user.</p> <p data-bbox="409 769 1748 860">New Capabilities  FRA is a specified volume of 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) waypoints, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.</p> <p data-bbox="409 895 1758 953">FRA enables airspace users to fly as close as possible to what they consider the optimal trajectory without the constraints of a fixed route network structure.</p>	



What is the Free Route Airspace(FRA)?

- **Free Route Airspace** is for “Giving airspace users the freedom to plan a route within specified airspace.”
 - It’s **the concept of corridor airspace** as specified operating time and predefined vertical, horizontal boundaries to use it.



FRA in Asia Pacific

- In Seamless ANS Plan for APAC region

7.29 Within Category R airspace, ADS-C surveillance and CPDLC should be enabled to support PBN-based separations, as well as **UPR and DARP**, consistent with **COMS-B0/1 – 2** and **FRTO-B0/1-4** and **FRTO-B1/1 – 7**.

Note: At the 6th Worldwide Air Transport Conference (ATCONF, Montréal, 18-22 March 2013) support was expressed for work to be undertaken on the schemes of economic incentives, 'best equipped or capable, best served' and 'most capable, best served' concepts. The CONOPS states that in each case where any aircraft that does not meet specified requirements, it should receive a lower priority, except where prescribed (such as for State aircraft).

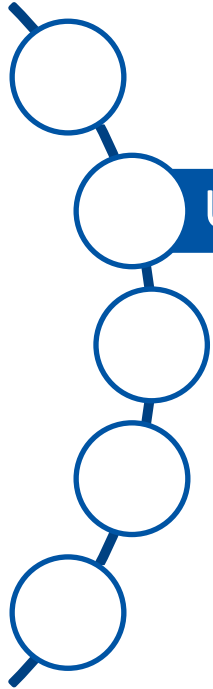
En-Route Operations

7.51 ACCs should enable, where practicable, Free Route Airspace, RNP routes, Advanced FUA and Airspace Management (ASM), Dynamic Sectorisation, Enhanced Conflict Detection Tools and Conformance Monitoring and Multi-Sector Planner Function consistent with **FRTO-B1/1 – 7**.

Note: CPAR is a key enabler for 'free route airspace' and enroute UPR and DARP operations.



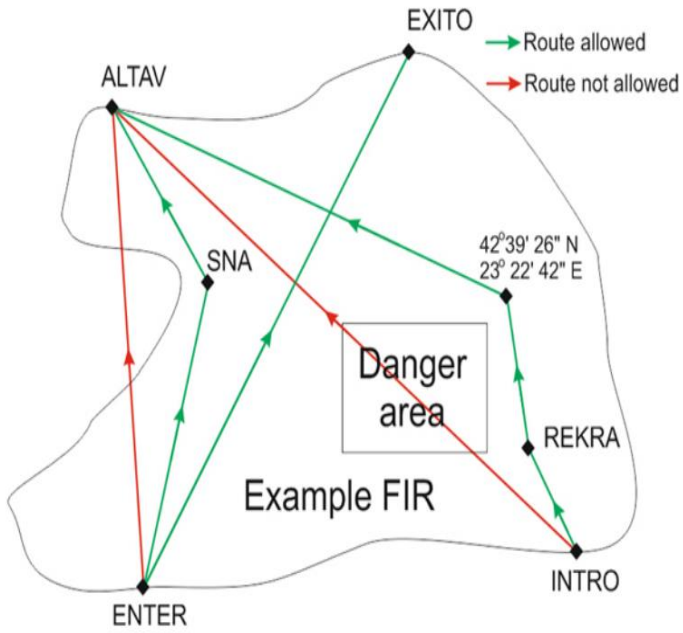
Outline



Understanding FRA Operation and Infrastructures



Understanding FRA operation-1



From EuroControl Potal website

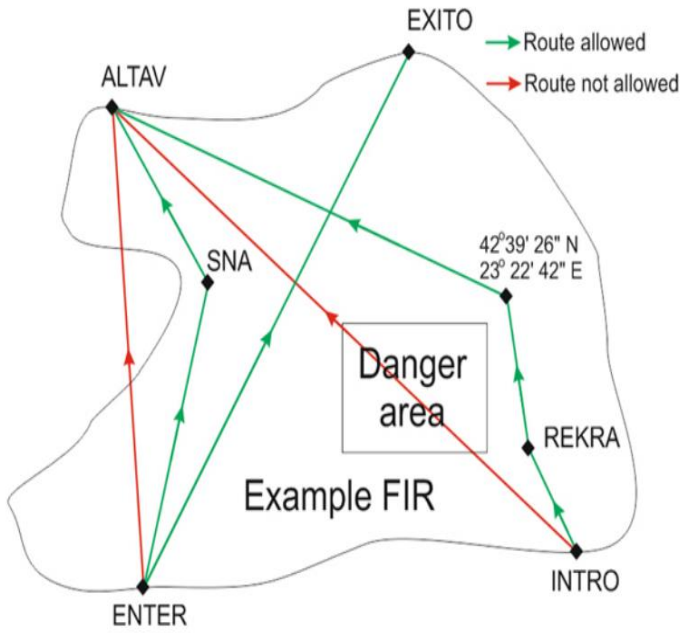
- Definition and Concept of FRA
 - Flexibility vs. Standard Airway Usage
 - **Route Determination in FRA**

- Choosing Routes within FRA
 - Limitations: Entry/Exit Points and Avoiding Restrictions
 - **Navigational Aids and Turning Points**

- Turning Points and Their Role
 - Navigational Aids, Published Points, and Coordinates
 - **Visualizing FRA Rules**



Understanding FRA operation-2



From EuroControl Potal website

- Diagram: Allowed and Not Allowed FRA Routes
 - Reasons for Route Rejection
 - **Scope of FRA Implementation**
- FRA within Sectors and FIRs
 - Extending FRA Across Multiple FIRs
 - **Tactical Direct Routing and Its Limitations**
- Tactical Direct Routing and Fuel Efficiency
 - Shortcomings: Adjustments and Fuel Costs
 - **Customized Fuel-Efficient Routes in FRA**
- Planning in Free Route Airspace
 - **Benefits of Custom Route Planning**



Infrastructure for FRA implementation-1

- To apply and operate FRA, states need to have the necessary infrastructure.
 - Advanced ATM systems
 - Establish procedures for the coordination and communication
- More detail requirements
 - Safety Management
 - **Advanced CNS Technologies**
 - **Airspace Design and Configuration**
 - **Air Traffic Control Procedures**

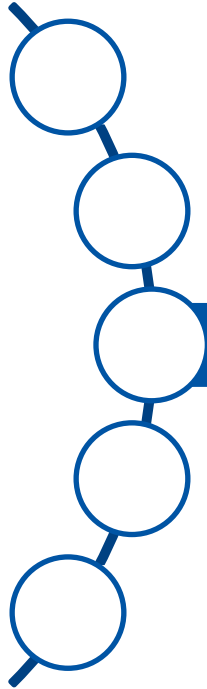


Infrastructure for FRA implementation-2

- More detail requirements
 - **Trajectory prediction and conflict detection tools**
 - **AIS publications to provide clear procedures**
 - Training and Education
 - **Air Traffic Flow Management (ATFM)**
 - Regulation and Standards
 - Performance Monitoring and Evaluation



Outline



Similar Concepts



Similar Concept to FRA-1

- **Trajectory-Based Operations (TBO)**
 - The collaborative management concept of aircraft trajectories from departure to arrival
 - ✓ To enhance **predictability**
 - ✓ By collaborative decision making (**CDM**)
 - ✓ For optimizing aircraft **trajectories for fuel efficiency**
 - ✓ With **advanced automation** systems



Similar Concept to FRA-1

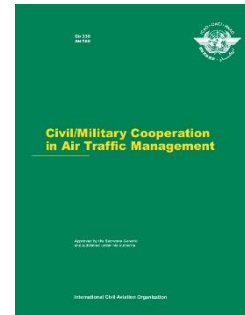
- TBO vs FRA**

	TBO	FRA
Scope	focuses on the collaborative management of aircraft trajectories	focuses on providing aircraft with the freedom to plan and fly their own routes
Planning Horizon	involves long-term strategic planning of aircraft trajectories	focuses on the flexibility of route selection during flight within a predefined airspace
Collaboration	typically involves multiple stakeholders	coordination between airspace users and air traffic control



Similar but Different Concept to FRA

- **Difficulties transitioning from fixed routes to FRA**
 - Created some modified FRA schemes
 - Without allowing complete free routing
- **Flexible Use of Airspace (FUA).**
 - Allowing flexible airspace use for both military and civil purposes
 - Enhancing direct routing benefits





Similar Concept to FRA-3

- **User Preferred Routes (UPR) vs FRA**
 - Airspace users could file UPRs that are accepted on a tactical basis.
 - It allows pilots to select a preferred route from a set of predefined routes.
 - FRA is an airspace operating concept that allows for more direct routing.

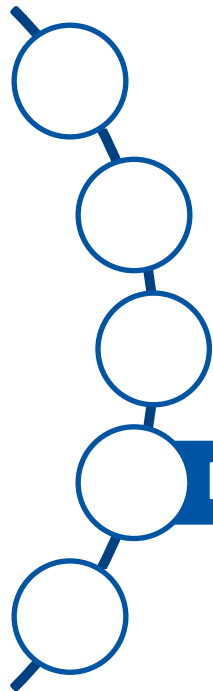


Similar Concept to FRA-4

- **Dynamic Airborne Reroute Procedure (DARP)**
 - A procedure that allows aircraft to change their flight plan while in flight.
 - ✓ For avoiding bad weather or taking advantage of favorable winds
 - ✓ More efficient flight paths, reduced fuel consumption and emissions



Outline



Benefits of FRA Implementation



Benefits of Introducing FRA Operations

- Recent empirical data from Latin American association CADENA
 - Data obtained from 90 days trial through airlines operating 6 UPR routes in 2021



	Benefits
Time	9,659 minutes : flying time saved/year
Fuel	1,820,041 lbs : of fuel saved/year
Saving Environment	2,826,330 kg : Co2 saved/year
Money	1,579,325 USD : saved/year
Application	4,398 flights : impacted/year



Key takeaway

- Trajectory Based Operation (TBO) is the **broadest concept** encompassing free flight.
 - Free Route Operation (FRTO) is a **method within TBO** that enables this.
 - **FRTO** includes Free Route Airspace (FRA).
 - And **FRA is preceded by** User Preferred Route (UPR), Direct Route (DRT), Flexible Use of Airspace (FUA), Dynamic Airborne Rerouting Procedure (DARP), etc.



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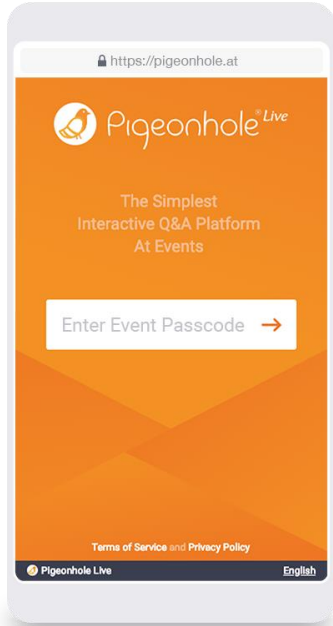
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