Free Route Airspace Implementation Workshop

17-18 November 2026







INTERNATIONAL CIVIL AVIATION ORGANIZATION

Free Route Airspace Implementation Workshop

Beijing, China

17 – 18 November 2026

Workshop Objectives

- To Improve Understanding of the FRA Concept
- To Understand the Implementation Requirements
- To Share Successful Cases around the World
- To Foster Dialogue between Stakeholders
- To Facilitate FRA Implementation within the APAC Region

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Welcome Remarks

Raphael Guillet

Chief, ICAO APAC Regional Sub-Office

Peng DOU

Regional Director, Operations, Safety and Security,

IATA

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Presentations

Workshop Agenda

Session 1: Introduction to Free Route Airspace (FRA)

1. General Introduction of FRA (ICAO)
2. Regional Guidance Material for Free Route Operation (FRTO) (IATA)

Session 2: Progressive steps towards FRA

3. Introduction and Implementation of Direct Routing (DCT) (ANSP, Airline)
4. Introduction and implementation of User-Preferred Routes (UPRs) (ANSP, Airline）
5. DCT Lessons and Experiences Learned (ANSP, Airline)
6. From Flexible Use of Airspace (FUA) to FRA (ICAO)

Session 3: Preparing FRA Implementation

7. How to Define a Pilot Scenario with FRA Implementation (ANSP)
8. Guidelines for Designing FRA with Different Airspace Environment (ANSP)
9. Operators' Readiness and Experience for FRA Implementation and Recommendations (Airline)
10. ANSP's Preparation for FRA Implementation
11. Airspace Simulation and Performance Monitoring of FRA (ATM Service Provider)
12. Data-driven and Performance-based Approach for FRA Development and Implementation (IATA)

Session 4: The Implementation of FRA

13. ANSP (Air Navigation Service Provider) - AU (Airspace User) Interaction for FRA Operation and Performance Monitoring (IATA)
14. Case Studies of FRA within APAC Region (ANSP)
15. Challenges of FRA Implementation and Mitigation Measures (ANSP, Airline)
16. Safety and Risk Management of FRA Operations (ANSP)
17. Post-operation Assessment of FRA with Airspace Users (Airline)

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General Introduction to FRA and Global Implementation

Mr.Yonggang, LIU

ICAO Asia-Pacific RSO
Regional Officer, Air Traffic Management

(17–18 Nov. 2026, Beijing)

Presentation Outline

01 General Introduction to Free Route Airspace

02 FRA and Related Concepts

03 Global FRA Implementation

04 Summary

01

General Introduction to Free Route Airspace



Definition of FRA with ICAO

Where does the Free Route Airspace Come From?

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

FRTO-B1/1	Free Route Airspace (FRA)	Operational

☐ Sixth edition of the GANP

Main Purpose

The Free Route Airspace (FRA) concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users.

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.

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.

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.



(source: https://ganpportal.icao.int/ASBU/)

Aviation System Block Upgrades

What does it mean?

The ICAO Global Air Navigation Plan, (GANP) **Aviation System Block Upgrades** (ASBU) methodology is a programmatic and flexible global approach that allows all Member States to advance their air navigation capacities based on their specific operational requirements.

Aviation System Block Upgrade (ASBU)

ASBU Thread: key feature area of the air navigation system that needs improvement in order to achieve the vision outlined in the Global ATM Operational Concept (GATMOC).

ASBU Element: a specific change in operations designed to improve the performance of the air navigation system under specified operational conditions.

ASBU Enabler: component (standards, procedures, training, technology, etc) required to implement an element.

ASBU Block: a six-year timeframe whose starting date defines a deadline for an element to be available for implementation.

ASBU Module: a group of elements from a thread that, according to the enablers' roadmap, will be available for implementation within the defined deadline established by the ASBU Block.

How is it implemented?

The ASBU framework is designed to be implemented in phases.

ICAO / Aviation System Block Upgrades

Aviation System Block Upgrades (ASBU) Operational Threads:

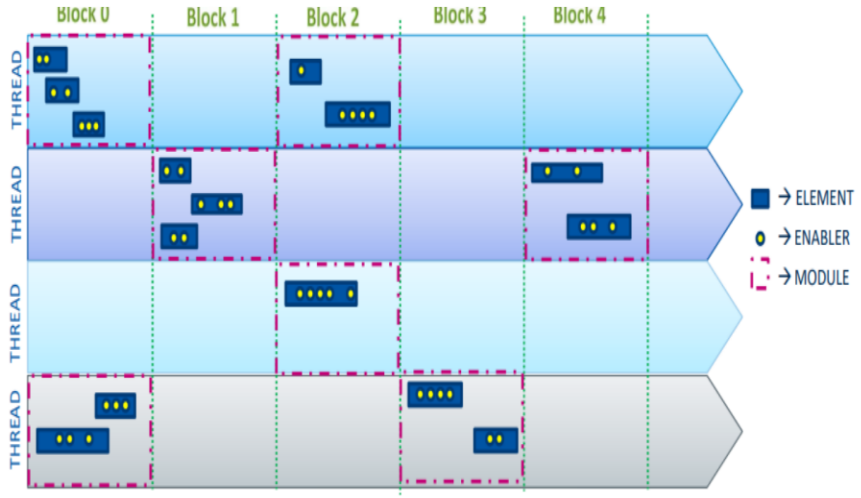
FRTO-B0/1: Direct Routing (DCT)

FRTO-B1/1: Free Route Airspace (FRA)

FRTOB2/3: Large Scale Cross-Border Free Route Airspace

Aviation System Block Upgrade (ASBU)

- BBB = Basic Building Block (baseline)
- Block 0 = from 2013
- Block 1 = from 2019
- Block 2 = from 2025
- Block 3 = from 2031
- Block 4 = from 2037



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Definition of FRA with Eurocontrol

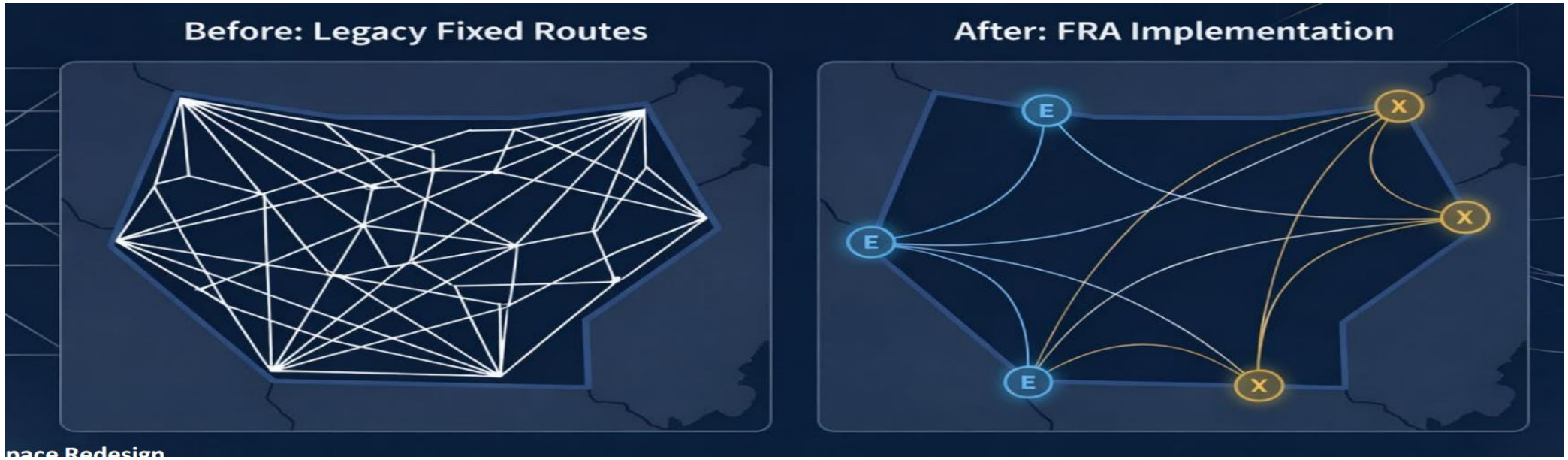
Free route airspace (FRA) is a specified airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) significant points, without reference to the ATS route network, subject to airspace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

Difference between ICAO definition and Eurocontrol definition:
waypoints vs. significant points

FRA is often used interchangeably with “Free Route Operations” (FRTO).

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Concept of FRA



Free Route operations enable airspace users to fly to their preferred trajectory without being constrained by fixed route networks or structures.

Operational Differences between Traditional Routing and FRA Routing

Feature	Traditional Routing	FRA Routing
Routing Structure	Fixed ATS airways and predefined corridors	Flexible routing between published entry and exit points
Flight Path Design	Constrained by airway network geometry	Closer to optimal or direct trajectory
Operational Flexibility	Limited rerouting options	High flexibility within defined FRA boundaries
Flight Planning Complexity	Simpler but less efficient routing options	More dynamic, requires validation checks
Fuel Efficiency	Often less efficient due to detours	Generally improved due to shorter track miles
ATC Control	Full control within fixed routes	Full control with flexible route approval
Airspace Restrictions	Built into airway structure	Must be dynamically validated (TRA/TSA, etc.)
ATFM Interaction	Fully dependent on airway congestion points	Still subject to ATFM restrictions
Cross-Border Operations	May require multiple airway transitions	More seamless routing across FIR boundaries where FRA is active
Operational Risk	Lower variability in routing	Higher planning complexity but greater efficiency gains

FRA in Asia Pacific

Asia/Pacific Seamless ANS Plan (V4.0）

7.32 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** and **B0/2, FRTO-B0/1** to **B0/4** and **FRTO-B1/1** to **B1/7**.

7.34 ATS surveillance systems should enable basic conflict detection and conformance monitoring STCA, MTCD, APW, APM and MSAW consistent with **FRTO-B0/4** and **SNET-B0/1** to **B0/4** (Priority 1). Route Adherence Monitoring (RAM) should be utilised when monitoring PBN route separations. Cleared Level Adherence Monitoring (CLAM) should be utilised to monitor RVSM airspace.

7.54 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** to **B1/7**.

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



FRA is a strategic priority of the Asia/Pacific Seamless ANS PLAN

FRA and Related Concepts

- Free Flight
- Trajectory-Based Operations (TBO)
- Flexible Use of Airspace (FUA)
- Direct Routing (DCT)
- User Preferred Routes (UPRs)



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FRA and Related Concepts

Free Route Airspace vs. Free Flight

- Free Flight: A safe and efficient flight operating capability under instrument flight rules (IFR) in which the operators have the freedom to select their path and speed in real time. Air traffic restrictions are only imposed to ensure separation, to preclude exceeding airport capacity, to prevent unauthorized flight through special-use airspace, and to ensure safety of flight. (*RTCA,1995*)
- FRA is a pretactical route planning concept, seperation provision is subject to ground ATC.
- Free Flight is a real-time operational concept, seperation assurance is airborne-centric.
- Free flight is an ideal longterm vision only trialed in a small-scale and low-density case, not a mainstream concept in the present aviation world.

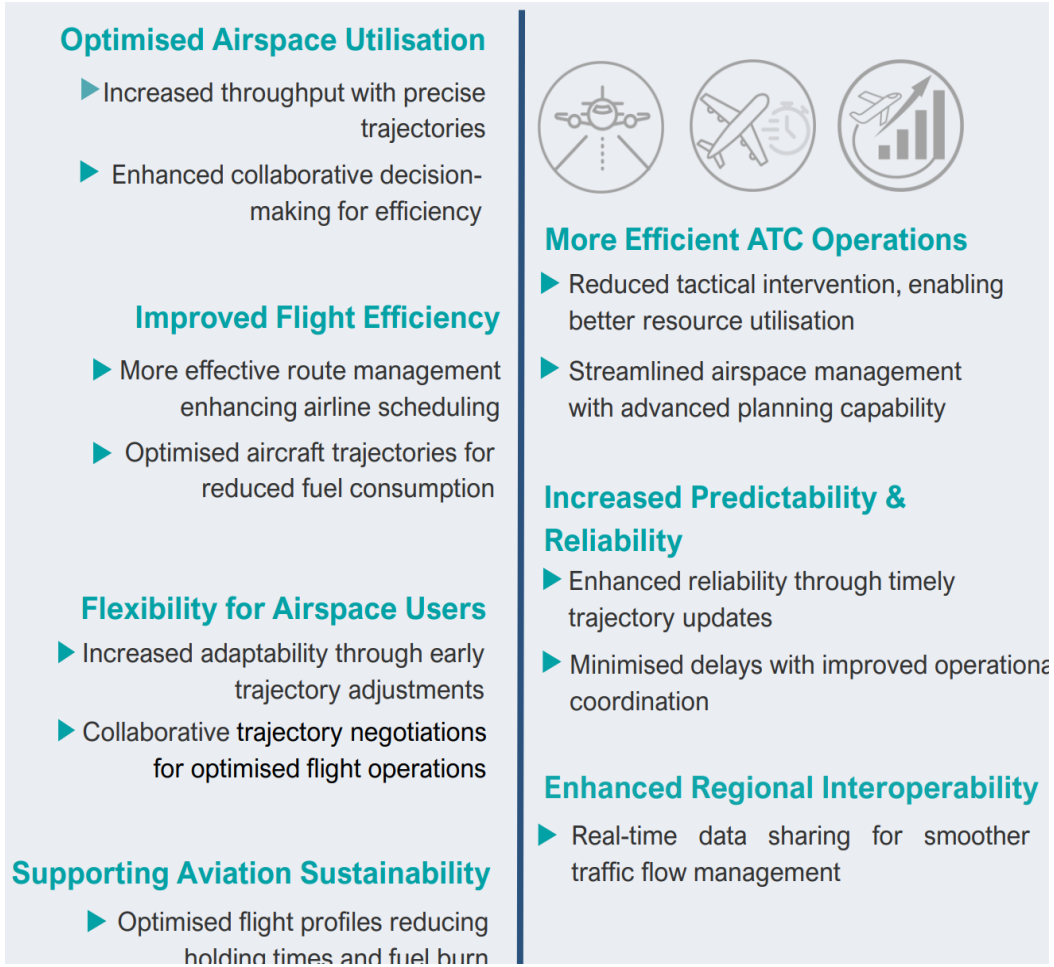
FRA and Related Concepts

- Trajectory-Based Operations (TBO) is the collaborative management concept of aircraft trajectories from departure to arrival, which means the entire planned flight trajectory.

Instead of asking: Where is the aircraft now?

TBO asks: Where will the aircraft be—and when will it be?

Benifits of TBO



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FRA and Related Concepts

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 the desired 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 ANSPs

FRA and Related Concepts

Flexible Use of Airspace(FUA) VS FRA

- FUA:An airspace management concept based on the principle that airspace should not be designated as purely civil or military, but as a continuum in which all user requirements are accommodated to the greatest possible extent.

FUA: An airspace management concept, airspace availability

FRA: A specified volume of airspace, route planning within the available airspace



FRA and Related Concepts

User Preferred Routes (UPR) vs FRA

- User Preferred Route is a route proposed by the airspace user, designed to meet the user's operational preferences (e.g. minimum distance, time or fuel burn). UPR is not constrained by published ATS routes or waypoints.
- A UPR may be planned inside or outside FRA, and is subject to ATC approval and airspace/flow constraints.
- Airspace users could file UPRs that are accepted on a tactical basis
- FRA is an airspace planning concept that allows for more direct routing.
- UPR describes the user-desired route intent which allows pilots to select a preferred route from a set of predefined routes.

FRA and Related Concepts

Direct Routing(DCT) vs UPR

- Direct Routing(DCT)
  A route segment between two significant points without following the intermediate ATS route network.
- UPRs are the intents of the users, it could be DCT, and may not be DCT.
- DCT is one form of realization of UPR

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FRA and Related Concepts

- TBO is the overarching oeprational framework
- FRA is an airspace regime that facilitates UPRs.
- DCT can be approved on an ad-hoc basis in conventional airspace, but routinely planned within FRA.
- An UPR may adopt DCT, but DCT is not nessessarily UPR
- FRA is preceded by UPR, DCT, FUA, etc.



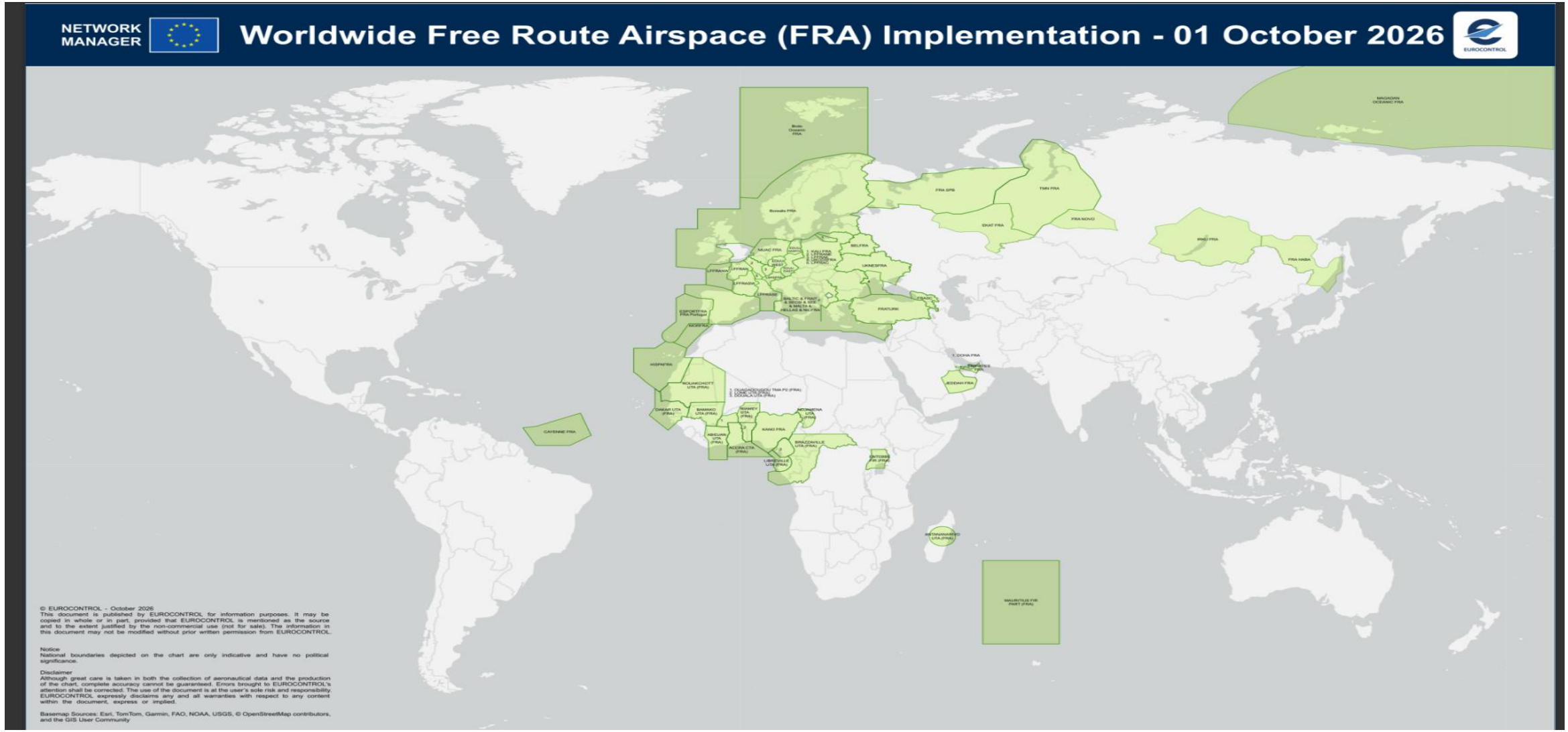
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Global FRA Implementation



Global FRA Implementation



*Source:*https://www.eurocontrol.int/concept/free-route-airspace

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Global FRA Implementation

EUR/NAT: widely implemented

- Western Part: Within around 40 states implemented FRA with large scale cross-border FRA implementation.
- Eastern Part: Belarus, Russian Federation (FRA Kaliningrad, Magadan, Magadan Oceanic, Khabarovsk, Yekaterinburg,Tyumen, Novosibirsk,Irkutsk).
- NAT: Typical parallel routes - NAT Tracks.

NACC: a unique system

- Cayenne FRA (SOOOFRA).
- USA: A unique system, NRP, also with DCT and UPRs.

Global FRA Implementation

Africa（WACAF&ESAF）

- FRA ASECNA
- FRA FL245 - UNL
- Mauritania - Nouakchott UTA (GQNN)　Mali - Bamako UTA (GABV),
  Burkina Faso - Ouagadougou TMA Partie 2 (DFFD),
  Côte d'Ivoire - Abidjan UTA (DIII), Togo/Benin - Lome UTA (No ICAO code for Lome),
  Niger - Niamey UTA (DRRR), Cameroon - Douala UTA (FKKK)
  Gabon - Libreville UTA (FOOL), Congo - Brazzaville UTA (FCCC)
  Senegal - Dakar (GOOO) UTA, Chad - N'djamena (FTTT) UTA
  Madagascar - Antananarivo (FMMM) UTA (FL245 - FL450).
  FRA Ghana,Accra FIR (DGAC) between latitudes 2N and 11N FL290 - FL460
  FRA Nigeria,Kano FIR (DNKK) ABV FL245
  FRA Mauritius, Mauritius FIR (FIMM) South of 25S FL245 - FL460

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Global FRA Implementation

MID: partial implementation within the Gulf States

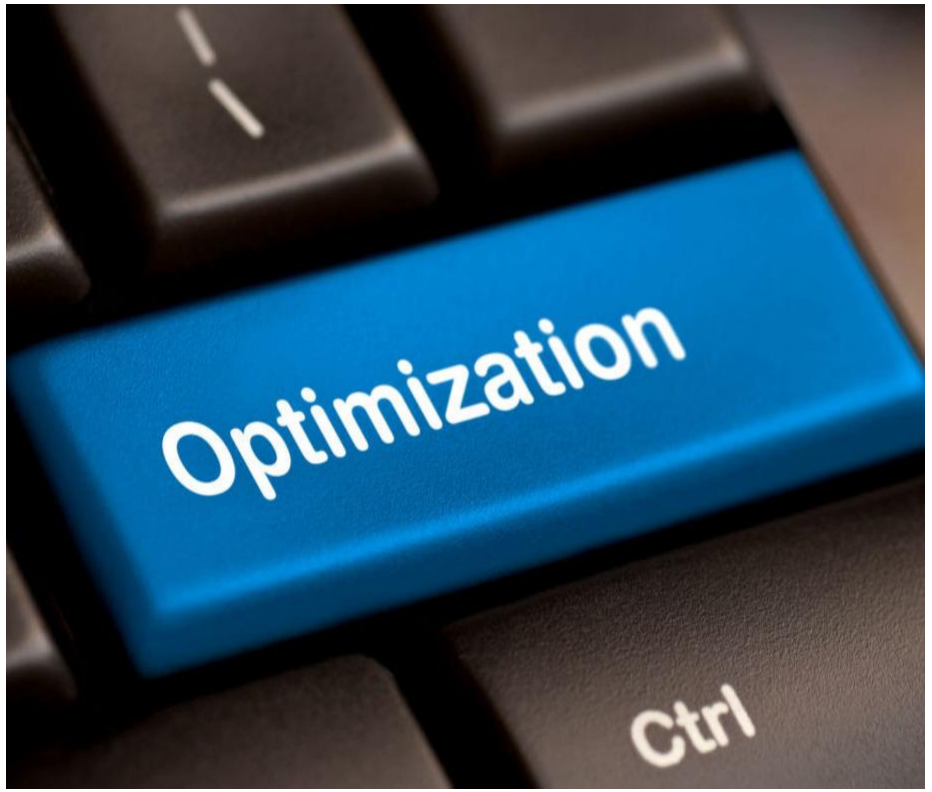
- UAE (Emirates FIR): Above FL355
- Qatar (Bahrain FIR): Above FL275
- Saudi Arabia (Jeddah FIR): Above FL300

SAM: planned for implementation

- FRA Planned to be implemented from 2028 in Brazil (SAMIG/34).

APAC: sporadic implementation

- Indonesia, Singapore, Australia, New Zealand, FRA trial



04

Summary



Summary

- FRA is usually implemented with a phased approach
- DCT and UPR are progressive stages to full FRA
- Trial operations usually come before full implementation
- FRA is usually conducted from local implementation before cross-border implementation
- FRA implementation brings significant benefits while generating new safety issues and operational complexity
- FRA could not be implemented before safety issues being soloved


Best Wishes
For Success

Thank You



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