Free Route Airspace Implementation Workshop

17-18 November 2026







INTERNATIONAL CIVIL AVIATION ORGANIZATION

FREE ROUTE AIRSPACE

From local implementation to cross-border FRA

European experience • safety • capacity • interoperability • APAC pathway

Frédéric Deleau | IFATCA Europe

ICAO Free Route Airspace Implementation Workshop | 17–18 November 2026

From “A” to “F.R.A.-ther” – Cross Border FRA Operation

01 **Introduction**
Ex-IFATCA EVP EUR / Senior ATCO
Objectives

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Why does it matter?

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Objectives

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FRA - Bringing the World Together

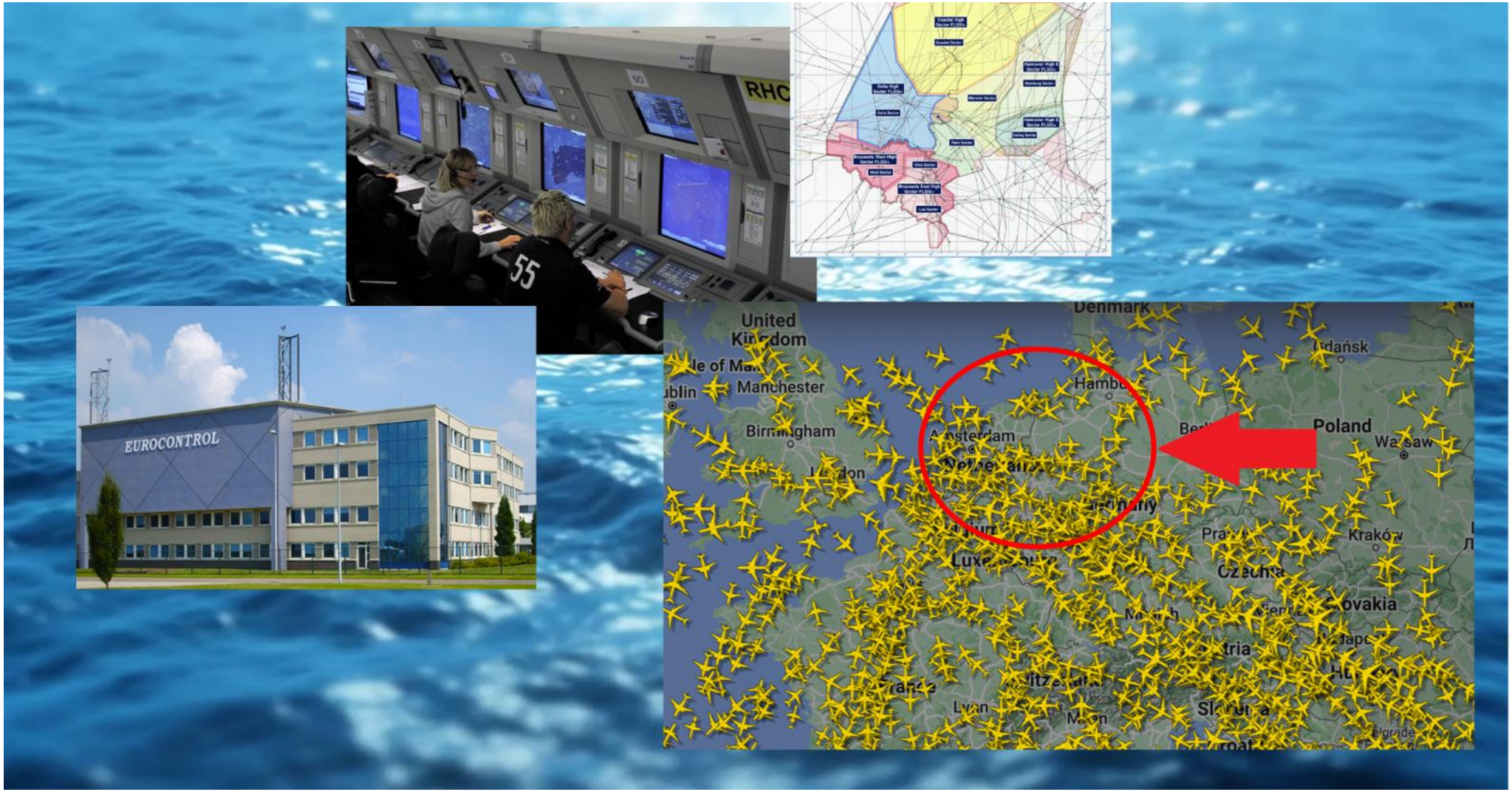
ICAO



Frédéric Deleau

EX - IFATCA Executive Vice-President Europe
34 years ATCO MUAC


RHC
EUROCONTROL
MAS-UAC, SECTORIZATION CHART
Coastal High Sector FL335+
Coastal Sector
Hannover High E Sector FL335+
Hamburg Sector
Delta High Sector FL335+
Münster Sector
Delta Sector
Hannover High E Sector FL335+
Sailing Sector
Ruhr Sector
Brussels West High Sector FL335+
Orio Sector
West Sector
Brussels East High Sector FL335+
Lux Sector
BUT WHERE IS MUAC?



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FRA - Bringing the World Together

What is Free Route Airspace?

Specified airspace in which users may plan between defined entry and exit points without reference to the ATS route network — subject to airspace availability. Flights remain subject to ATC.

TRAJECTORY FREEDOM

More route options and more efficient trajectories

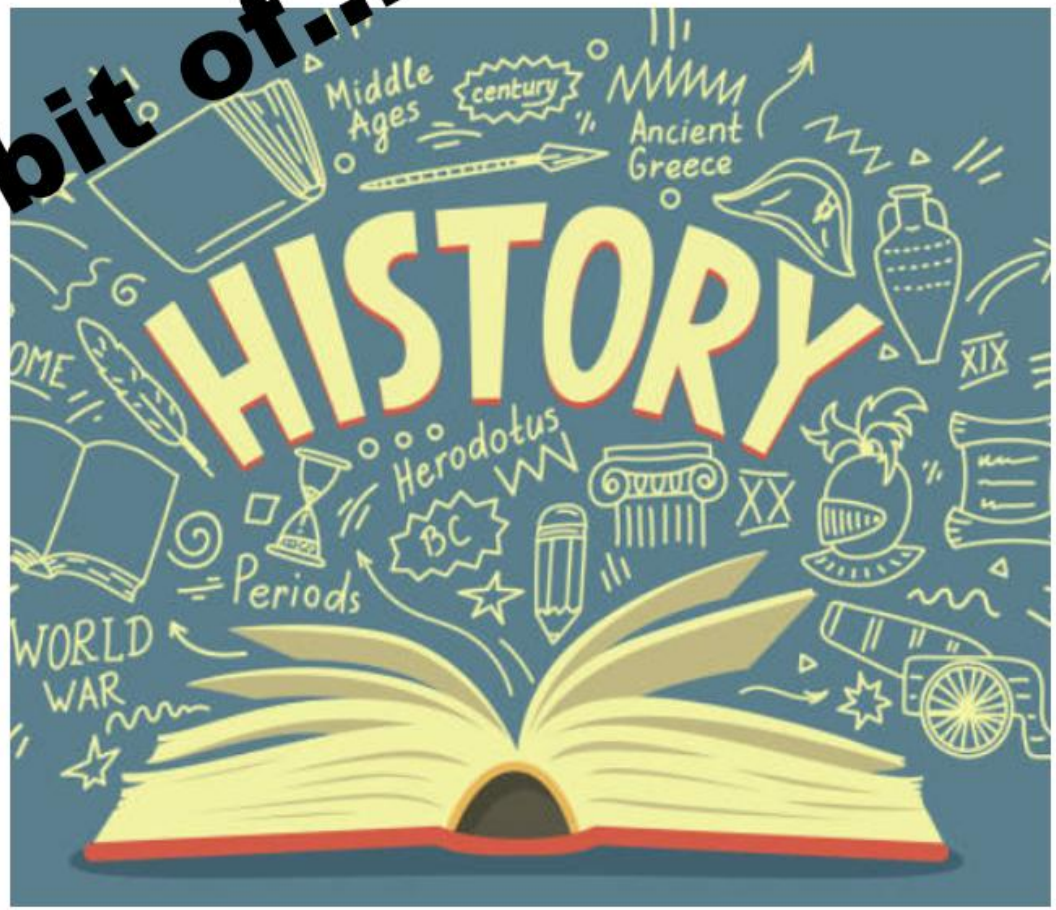
ATC RESPONSIBILITY

Flights remain subject to separation and ATC procedures

DESIGN FREEDOM

Freedom is structured by airspace availability and rules

A bit of...


Middle Ages
century
Ancient Greece
HISTORY
Herodotus
BC
Periods
WORLD WAR
XIX
XX

From corridors to free routing

- Fixed routes concentrate flows and constrain trajectory options.
- FRA progressively shifts the focus from route segments to trajectories and airspace constraints.
- The European journey was progressive: direct routes → local FRA → cross-border FRA.
- The lesson is not “remove all constraints”; it is “place the right constraints in the right places”.



From corridors to free routing

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Why FRA? The operational case

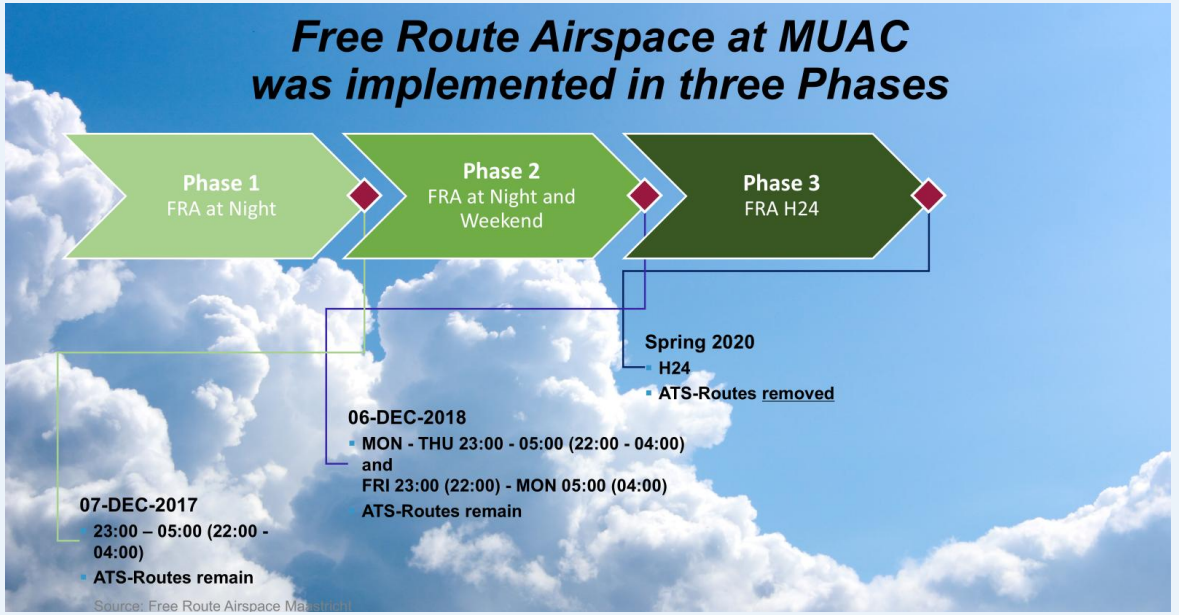
- Increase the number of route options and trajectory efficiency.
- Improve flight-plan predictability by allowing plans to reflect likely flown trajectories.
- Support more flexible demand/capacity balancing.
- The benefit is not automatic: it depends on design, traffic patterns and system readiness.
- MUAC material cited a Network Manager estimate of up to €26M/year for H24 FRA in its specific environment.



MUAC objectives and benefits — source MUAC.

MUAC: a phased implementation

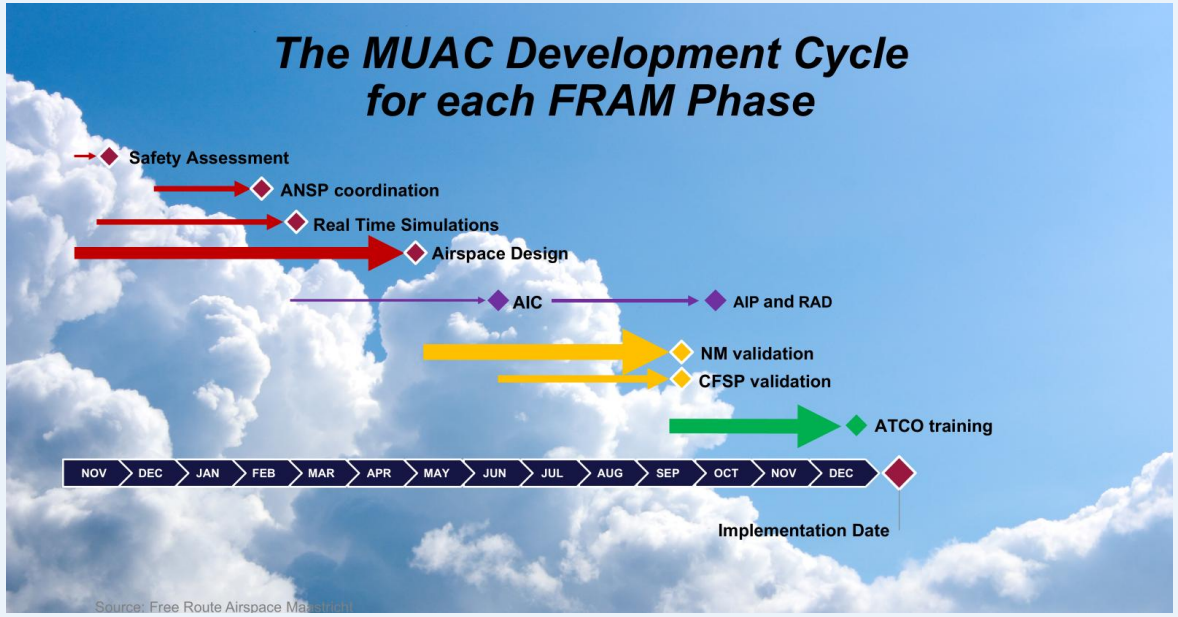
- Phase 1 — December 2017: night FRA; ATS routes retained.
- Phase 2 — December 2018: night + weekend FRA; ATS routes retained.
- Phase 3 — spring 2020: H24 FRA; ATS routes removed.
- Progression allowed operational experience, validation and confidence to grow before full implementation.



MUAC FRAM implementation phases.

The development cycle: safety before implementation

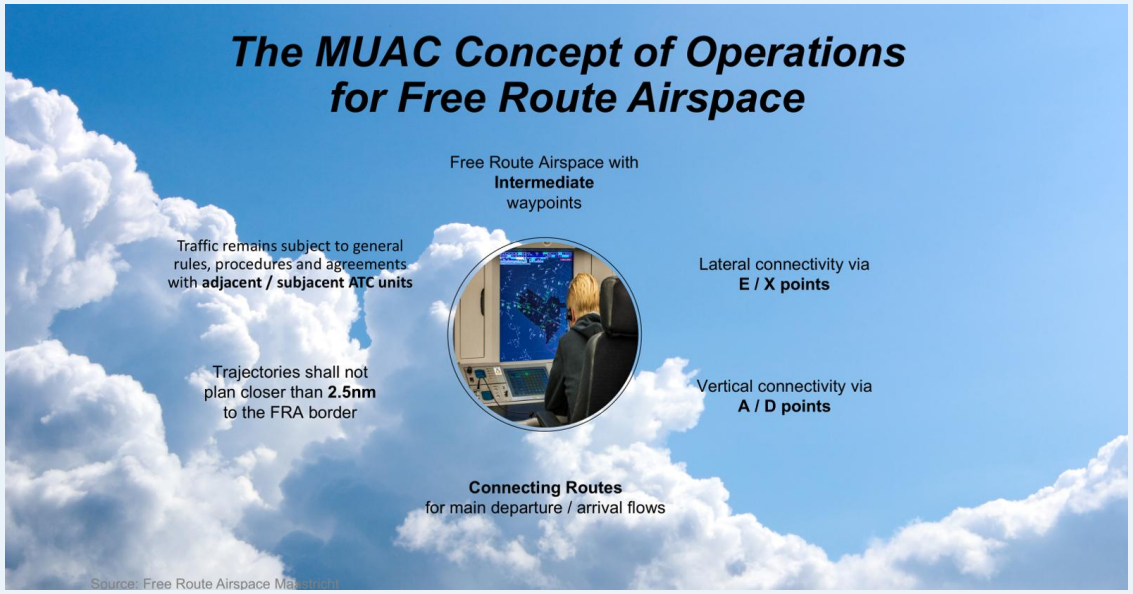
- Safety assessment and airspace design.
- Early coordination with neighbouring ANSPs and stakeholders.
- Real-time simulations with controllers.
- Network Manager and flight-planning / CFSP validation.
- AIP / RAD publication and ATCO training.
- Implementation is the final step — not the first.



MUAC development cycle for each FRAM phase.

Concept of Operations: freedom with structure

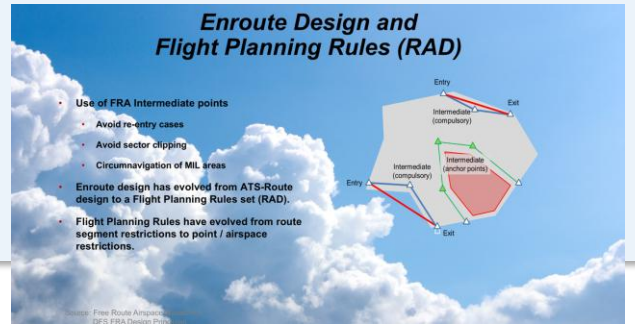
- Published entry/exit points and intermediate FRA points structure traffic.
- Connecting routes provide predictable vertical transitions to/from lower airspace and major aerodromes.
- MUAC used a 2.5 NM planning buffer from the FRA border as a safety/workload design rule.
- Traffic remains subject to existing rules, procedures and agreements with adjacent/subjacent units.

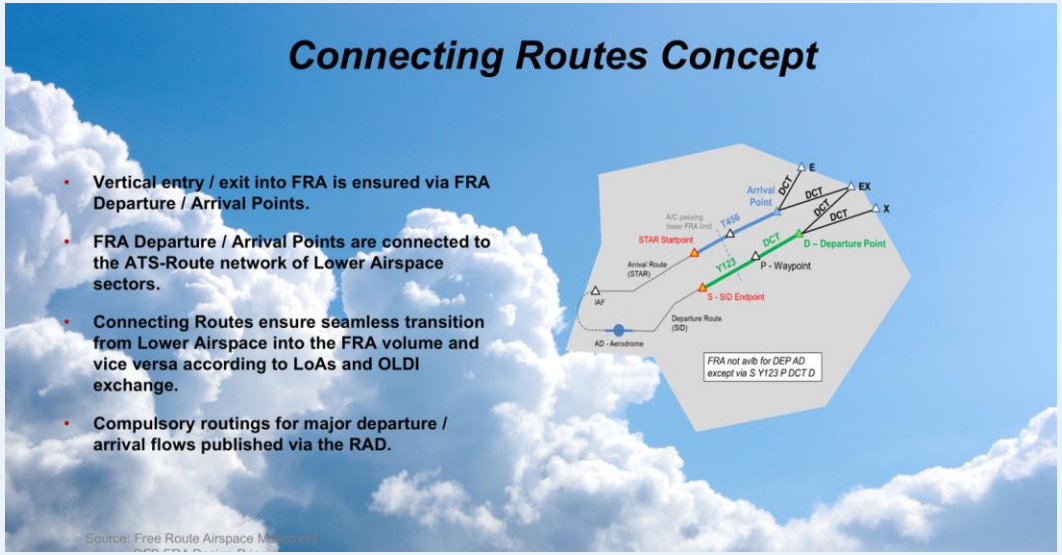


MUAC FRA Concept of Operations.

Flight planning, RAD & interoperability

- Route design evolves into point-/airspace-based flight-planning rules.
- Avoid re-entry, sector clipping and conflicts with unavailable military areas.
- Compulsory routings may remain for major departure/arrival flows.
- RAD becomes a key mechanism for making constraints transparent.



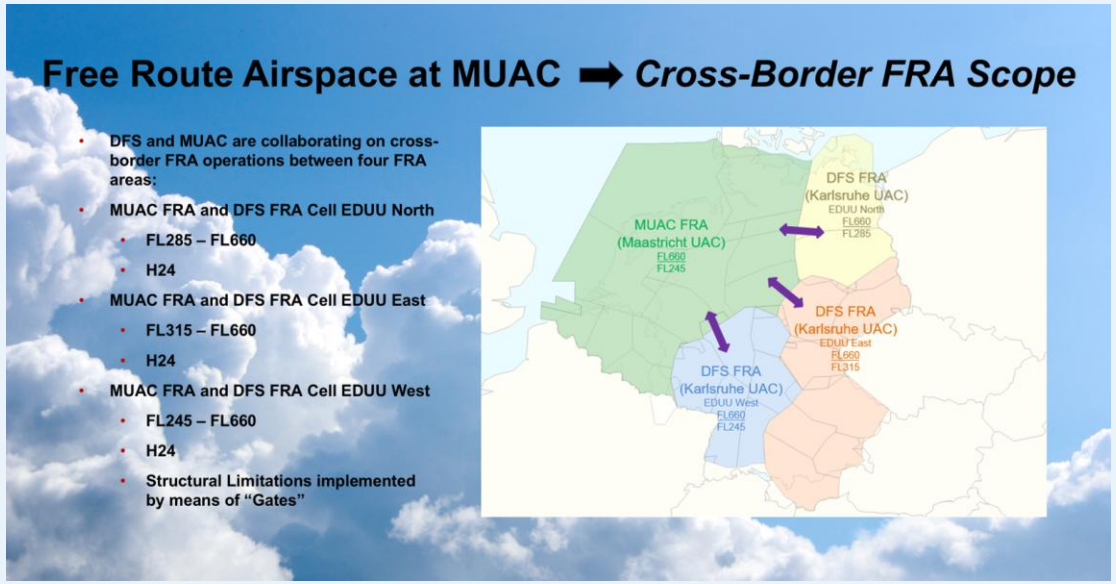


System interoperability is a safety and performance enabler.

Legacy FDPS may not fully process FRA / DCT flight plans.
Early validation with NM, CFSPs and neighbouring ANSPs is essential.

Cross-border FRA: the next step

- Cross-border FRA expands the potential benefit by allowing trajectories to continue across FIR boundaries.
- It also creates dependencies between ANSPs, flight-planning systems and published constraints.
- MUAC–Karlsruhe experience used structural “gates” to manage cross-border complexity.
- Regional performance depends on the readiness of all participating interfaces.



MUAC / DFS Karlsruhe cross-border FRA scope.

Risk & safety management: what changes?

Traffic complexity	More dispersed / converging conflict patterns	→	Monitor complexity, hotspots and demand patterns
Conflict detection	Fewer predictable route intersections	→	MTCD, tactical tools, trajectory monitoring
Workload & awareness	Higher cognitive demand in peaks/interfaces	→	HMI, support tools, training, workload monitoring
Interfaces	FRA/fixed-route and sector-boundary effects	→	Explicit transfer & coordination procedures
Military / dynamic airspace	Availability changes can alter trajectories	→	FUA, robust restrictions and contingency planning

Capacity is not automatically neutral

FRA should not automatically be considered capacity-neutral or cost-neutral during initial implementation.

European experience shows that safety and capacity can be maintained when design, tools, procedures, validation and training match the traffic environment.

Unrestricted free routing is not a universal starting point.

What may be needed

- FDPS / conflict-detection capability
- ATCO training and validation
- Additional safety assurance
- Flight-planning / data validation
- Capacity and complexity monitoring
- Operational constraints during transition

From local capability to regional capability

LOCAL READINESS

- MTCD / conflict detection
- HMI & trajectory monitoring
- Safety reporting & assurance
- Procedures & training
- Local validation

→

INTEROPERABILITY

- Compatible flight-plan processing
- Common coordination principles
- Shared constraints / publication
- Contingency arrangements
- Cross-border validation

→

REGIONAL BENEFIT

- Seamless trajectories
- Greater network efficiency
- Flexible demand / capacity balance
- Shared operational vision

One step at a time — all towards the same vision.

European FRA update: where are we in 2026?

EUROCONTROL implementation outlook • published 1 November 2026

~76

ACCs with full or partial FRA

End-2025 baseline

>75%

of European airspace covered

FRA projects in place

2029

Europe-wide full operations

EUROCONTROL forecast

The next challenge: connect national FRA areas and lower the base levels safely.

Source: EUROCONTROL FRA Implementation Projections (1 Nov 2026); EUROCONTROL FRA concept page.

What changed in the last six months?

Selected confirmed developments • May–November 2026

14 MAY

Spain–Portugal cross-border FRA

ESPORTFRA introduced between Portuguese and Spanish FRA areas.

30 OCT

European FRA point lists updated

New reference data published, including points effective 26 November.

1 NOV

New European implementation outlook

EUROCONTROL projects region-wide full FRA operations by 2029.

Sources: EUROCONTROL RAIS 5.0 (14 May 2026); FRA points list (30 Oct); projections (1 Nov).

The operational message for APAC

Network-wide benefits are measurable — but FRA is not a stand-alone solution

502,000 NM

shorter filed routes

11 June–8 July 2026

10,044 tonnes CO_2

avoided in the same AIRAC period

Network improvements overall — not FRA alone

Three lessons from Europe

- Phase implementation, with safety assessment and ATCO validation.
- Make flight-planning systems, procedures and cross-border interfaces compatible.
- Measure real traffic complexity, capacity and efficiency after implementation.

Source: EUROCONTROL ERNIP Monitoring Report AIRAC 2606 (10 Aug 2026); network-wide filed flight plan indicator.

A pragmatic APAC implementation path

1	**National preparation**	Safety case, airspace design, systems, procedures and stakeholder engagement.
2	**Controlled trials**	Limited volumes, time periods and levels to build operational evidence.
3	**Sub-regional cross-border**	Compatible planning, coordination and contingency arrangements.
4	**Harmonisation**	Common principles for data, flight planning, publication and safety monitoring.
5	**Seamless regional FRA**	Progressive expansion where safety, interoperability and readiness are demonstrated. NOT BASED ON A DEAD-LINE ONLY!

Key lessons from Europe

1	**FRA is an operational transformation**	It is not simply the removal of ATS routes.
2	**Progressive implementation works**	Phasing builds competence, evidence and confidence.
3	**Safety assurance must lead**	Assessment, simulation and validation precede major changes.
4	**Interfaces determine regional success**	Cross-border FRA depends on neighbouring capabilities.
5	**Collaboration is an enabler**	ANSPs, NM, military, airlines, CFSPs and regulators must share the same operational picture.

Conclusion:

“A serious message deserves a memorable delivery, to make sure you don't forget today's conclusion.

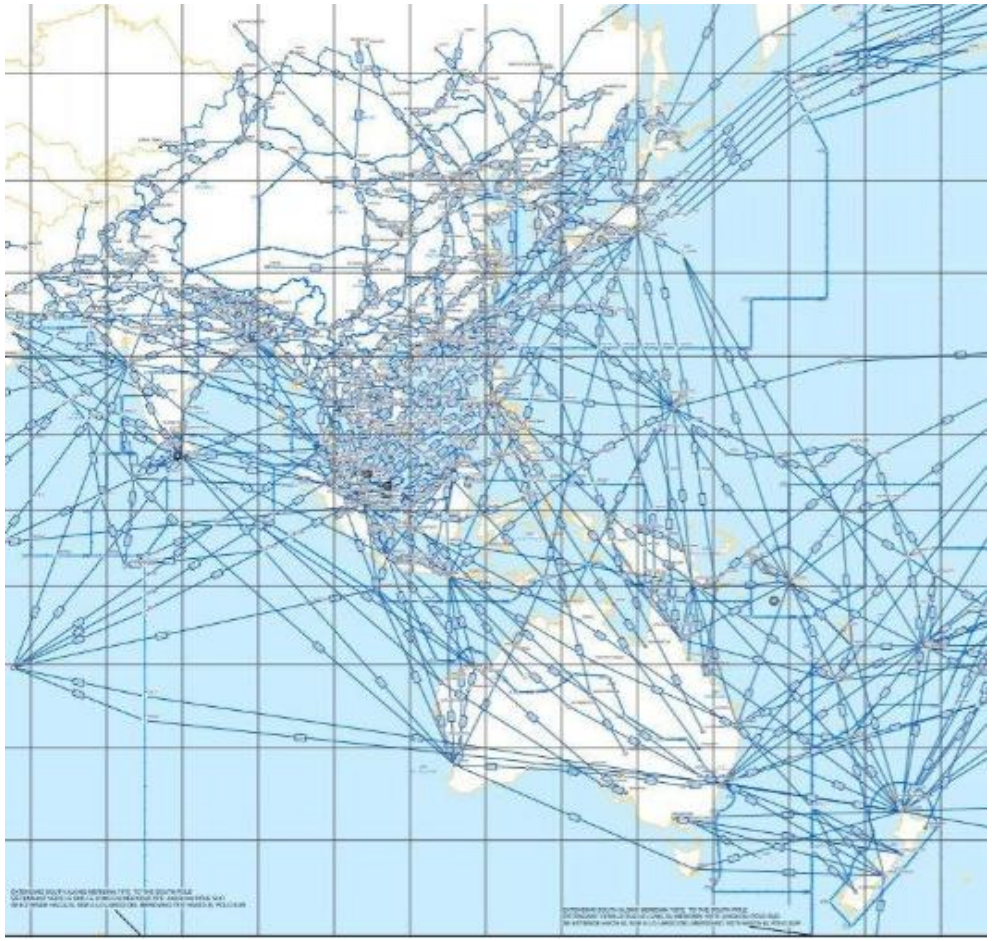
I've decided therefore to change my approach… and my outfit!

So, for our final recommendations… let's put on the hat and recap the recipe for a successful Free Route Airspace!”

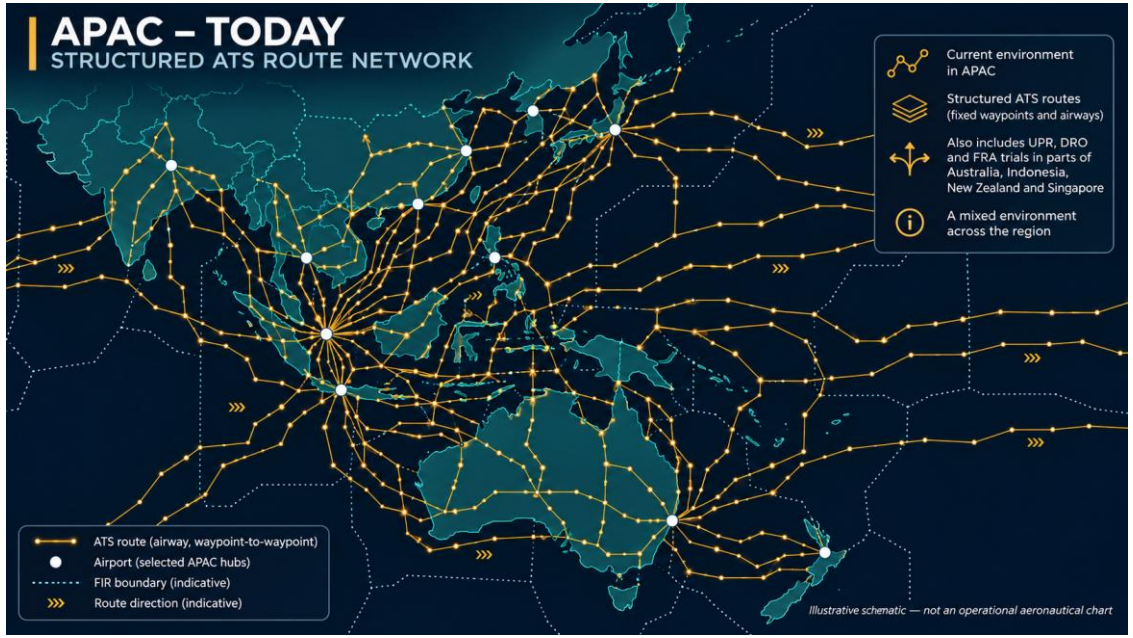
Conclusion:



Conclusion:




Lübeck
Fuhlsbuttel
Finkenwerder
Wunstorf
Celle
Buckeburg
Wiesbaden
Rhein-Main


APAC – TODAY
STRUCTURED ATS ROUTE NETWORK
Current environment in APAC
Structured ATS routes (fixed waypoints and airways)
Also includes UPR, DRO and FRA trials in parts of Australia, Indonesia, New Zealand and Singapore
A mixed environment across the region
ATS route (airway, waypoint-to-waypoint)
Airport (selected APAC hubs)
FIR boundary (indicative)
Route direction (indicative)
Illustrative schematic — not an operational aeronautical chart

Conclusion:



Pad Thai

- Rice noodles
- Shrimp
- Tofu
- Bean sprouts
- Peanuts
- Tamarind



Sushi Rolls

- Rice
- Nori
- Salmon
- Cucumber
- Avocado
- Soy sauce



Pho

- Rice noodles
- Beef
- Broth
- Basil
- Lime
- Bean sprouts



Bibimbap

- Rice
- Beef
- Spinach
- Carrot
- Egg
- Gochujang



Butter Chicken

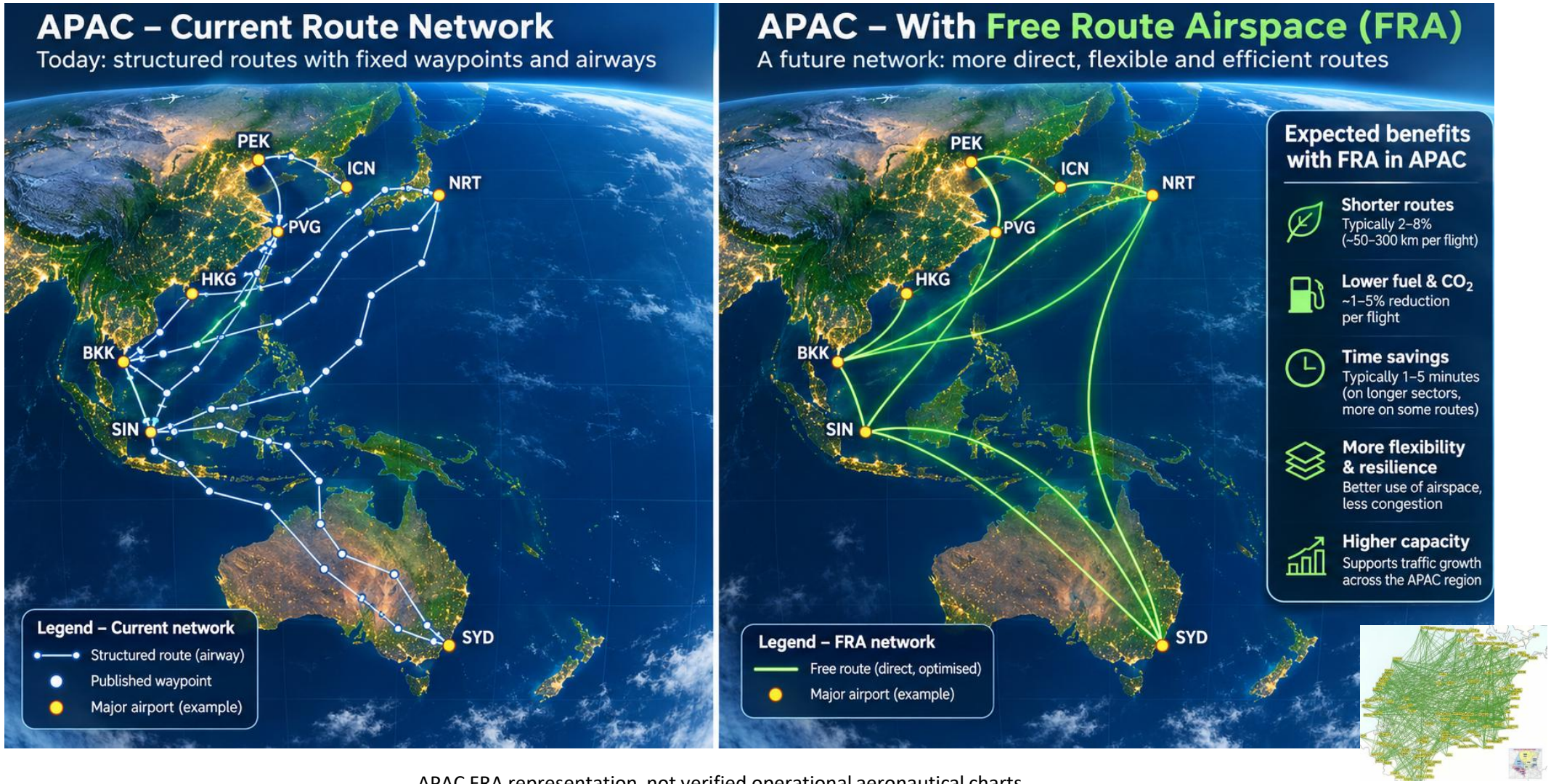
- Chicken
- Tomato
- Butter
- Cream
- Garam masala
- Ginger



Dim Sum Dumplings

- Dumpling wrappers
- Pork or shrimp
- Ginger
- Scallions
- Soy sauce

Conclusion:



APAC FRA representation, not verified operational aeronautical charts.
The savings illustrated are hypothetical rather than validated performance figures

Conclusion:



“TOGETHER – F.R.A.-ther”

LEARN • TRUST • SAFE • EFFICIENT

Local readiness enables FRA.
Regional readiness enables the full benefits.

Collaboration and transparency are the foundations of sustainable cross-border FRA.

Questions

Presentation prepared by a human based on experience and knowledge – framing and design done with the help of A.I. ☺ FD

THANK YOU FOR YOUR ATTENTION!



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