INTERNATIONAL CIVIL AVIATION ORGANIZATION

Seventh Meeting of the APIRG Airspace and Aerodrome Operations Sub-Group (AAO/SG7)

Nairobi, Kenya, 12 - 16 August 2024.

Agenda Item 3.2: Achievement in Airspace and Aerodrome Operations

Status of Implementation of the Free Route Airspace (FRA) and Direct Route Operations (DRO) in the AFI Region

(Presented by FRA PMT)

SUMMARY	
This paper presents the progress made in the implementation process of the Free Route Airspace (FRA). The paper highlights the need for continuous improvement and adaptation as essential aspects of Free Route Airspace (FRA) management to address evolving operational needs, optimize airspace utilization, and enhance efficiency and safety in the AFI region Action by the meeting is in **paragraph 3**	
REFRENCE(S)	Global Air Navigation Plan (GANP) APIRG/22 and APIRG/26 Reports
ICAO Strategic Objective(s)	Safety, Efficiency, Capacity, and Environment.

1. INTRODUCTION

The introduction of Free Route Airspace (FRA) in the AFI region marks a significant milestone in the regional aviation sector. FRA allows airlines to plan and optimize flight routes more flexibly, choosing direct paths between entry and exit points without being bound by traditional airways.

1.1 **APIRG Conclusion 22/36** called upon States to incorporate the FRA concept into airspace and air traffic management.

1.2 **APIRG Conclusion 23/02** of APIRG urges that priority be given to FRA implementation while

1.3 **APIRG Conclusion 24/14** invites States/ANSPs, IATA, AFRAA, ICAO, and AFPP to consider optimizing the ATS route structure in the AFI En-route airspace ;

1.4 **APIRG Conclusion 25/03** encourages States that have implemented FRA to share lessons learnt from their experience;

1.5 **APIRG/26 Decision 26/04** stated that the FRA, PBN, and CMC Civil-Military Cooperation PMTs to coordinate the conduct of at least two joint workshops/ meetings to optimize resources and improve coordination of activities;

1.6 and finally **APIRG/26 Conclusion 26/09** implemented User Preferred Routes (UPR) Trials to Support FRA Implementation in the Continental AFI airspace.

2. DISCUSSION

2.1 The AFI FRA implementation project established in 2020 is progressing and has achieved a lot of deliverables and activities, including:

- FRA concept of operations (CONOPS) 2nd Edition, which includes Procedures for FRA implementation and some safety requirements,
- Gap analysis. The gap analysis revealed the level of preparedness of the AFI States in implementing FRA.
- Roadmap to December 2023
- FRA Safety Assessment Excel spreadsheet template with some examples
- AIC/AIP SUP Templates have been developed as well
- Presentation at Coordination Meetings and other opportunities.

2.2 As FRA and DRO are being implemented, feedback mechanisms for stakeholders in Free Route Airspace (FRA) operations are crucial for fostering collaboration, addressing concerns, and driving continuous improvement.

2.3 One effective feedback mechanism is to organize regular meetings between air navigation service providers (ANSPs), airlines, pilots, and other airspace users to discuss FRA operations, share feedback, and address related issues. Meetings can also be scheduled at predefined intervals or in response to specific events or issues affecting FRA airspace, ensuring representation from all relevant stakeholders.

2.4 The first indicators focused on saving distance, and therefore time and fuel, as a benefit for airlines. Other indicators are necessary for air navigation service providers, passengers, and other FRA stakeholders. By monitoring specific indicators, including those proposed in Appendix A, stakeholders can assess FRA's performance, address any challenges or issues that arise, and continuously improve the efficiency, safety, and effectiveness of the airspace management system.

2.5 Training has been identified to be essential, as well as skill development programs for air traffic controllers, pilots, and other aviation professionals involved in FRA operations, and there is a need to incorporate lessons learned from operational experiences and safety events, if any, into training curriculum to improve awareness and preparedness for handling similar situations in the future.

2.6 Among the difficulties encountered during the development of the FRA project, we would mention the change of assignment and retirement of six team members, including the secretariat. This could have had slowing effects if a tactical approach had not been adopted, as was the case for the East Cluster and the West and Central Clusters, to name but a few. The list of national focal points must also be updated through designation by States/Organizations. On the other hand, the need for a physical workshop bringing together the main players and all the focal points and experts continues to be felt. For stability reasons, alternate contact

persons will need to be appointed. FRA TOR updates are proposed in **Appendix B**.

2.7 The introduction of UPR trials under the coordination of the FRA team is an important step towards the implementation of direct cross-border routes and should lead, over time, to an optimization of the route network in upper airspace at FIR boundaries. It will also be necessary to rethink the connection between the FRA and the terminal areas in lower airspace at the departure and destination aerodromes.

2.8 The team would like to thank Eurocontrol, CANSO, IATA, AFRAA, and all the organizations and experts who are always available to contribute to FRA implementation in the AFI region. The status of implementation of DRO and FRA is attached as **Appendix C** for inputs by the FIRs concerned.

3 ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information contained in this working paper.
b) Support the following draft conclusions:

Draft conclusion XX: Enhancement of FRA implementation in AFI
That to enhance the implementation of FRA in the region

a) The updated terms of reference of FRA PMT in Appendix B are endorsed,

b) The FRA PMT, in coordination with the secretariat, conduct a survey or gather feedback from aircraft operators to assess their satisfaction with FRA implementation in AFI, including route flexibility, operational efficiency, and ease of planning.

c) The FRA PMT monitor safety events within FRA to ensure that safety standards are maintained or improved post-implementation.

d) States are encouraged to provide training materials and skill development programs for air traffic controllers, pilots, and other aviation professionals involved in FRA operations.

e) *States are encouraged to take advantage of UPR trials to prepare for Cross-border FRA, which has greater advantages than local FRA.*

Draft conclusion XX: FRA implementation key performance indicators

That to effectively measure the impact of FRA implementation on airspace operations, flight operations and environmental protection,

a) the list of FRA indicators in Appendix A be endorsed, and
b) States be encouraged to use these indicators to measure the impact of FRA implementation, and report their performance to the APIRG Secretariat for inclusion in the annual report.

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Appendix A: FRA KPI post-implementation

The following indicators can be used for post-implementation evaluation and ongoing monitoring of the FRA:

a) **Flight Efficiency:** Analyze flight times and distances for flights using FRA compared to those following traditional airways. Improved efficiency, such as shorter flight times and reduced distances, demonstrates the benefits of FRA implementation.
b) **Compliance Rate:** Measure the percentage of flights that utilize FRA as planned compared to those that deviate from the preferred routes. This indicates how well aircraft operators are adhering to FRA procedures.
c) **Safety Performance:** Monitor safety incidents, near misses, and airspace infringements within FRA to ensure that safety standards are maintained or improved post-implementation.
d) **Airspace Capacity:** Evaluate the FRA's ability to accommodate increased air traffic demand without congestion or delays. Monitoring airspace capacity helps ensure efficient flow management.
e) **User Satisfaction:** Conduct surveys or gather feedback from aircraft operators to assess their satisfaction with FRA procedures, including route flexibility, operational efficiency, and ease of planning.
f) **Air Traffic Controller Workload:** Monitor the workload of air traffic controllers handling flights within FRA to ensure it remains manageable and does not compromise safety or efficiency.
g) **Fuel Savings:** Calculate the fuel saved by aircraft operators when using FRA compared to traditional route structures. Fuel savings contribute to cost reduction and environmental benefits.
h) **Route Optimization:** Analyze route planning data to identify opportunities for further route optimization within FRA, such as identifying commonly used routes and adjusting airspace design accordingly.
i) **Environmental Impact:** Assess the reduction in greenhouse gas emissions resulting from fuel savings achieved by utilizing FRA. Monitoring environmental impact helps demonstrate the sustainability benefits of FRA.
j) **Cost-Benefit Analysis:** Conduct a cost-benefit analysis to evaluate the overall economic impact of FRA implementation, considering factors such as fuel savings, reduced operational costs, and increased airspace capacity.

Appendix B: FRA TOR Updates

TERMS OF REFERENCE OF THE FREE ROUTE AIRSPACE IMPLEMENTATION.

Updated, July 2024

1. Background:

The Free Route Airspace (FRA) is a concept that allows states/ANSPs to overcome the efficiency, capacity, and environmental issues facing aviation, and its full efficiency benefits will only be achieved if it is deployed over large areas and appropriate measures are taken to reduce its safety risks.

The APIRG 22 conclusion 22/36 Free Routing Airspace encourages states with the potential to implement free routing to incorporate the FRA concept into their national airspace concept and Air Traffic Management master plan in line with the B1-FRTO ASBU module.

2. Terms of Reference:

The AFI FRA Project Management Team (PMT) primary responsibility is to work towards FRA implementation in an incremental manner for delivering "route" efficiencies in a project management approach through helping states to:

- Develop the AFI FRA regional concept of operations (AFI FRA CONOPS)
- Develop a gap analysis checklist/tool that will allow PMT to collect information on the capability/capacity of AFI States to implement FRA
- Conduct a gap analysis in order to assess AFI States readiness to implement FRA based on ATM Infrastructure, capabilities and procedures.
- Develop the AFI regional action plan to address the challenges associated with the FRA implementation, such as, but not limited to, air traffic control personnel capacity, Training, Aeronautical Mobile Communication (AMC), surveillance infrastructures, air traffic controller conflict detection tools, airspace structure, and management, etc.
- Support AFI States in the development of their national action plans
- Collaborate with closely related projects such as PBN, flexible use of airspace, civil-military cooperation, capacity and ATFM, etc.
- Work closely with the UPR trials at the continental level as a complementary approach to implementing the FRA
- Collaborate with Regional Economic Communities (RECs) and strategic development partners and aviation stakeholders to ensure the required support, for example, airspace design, the concept of operations, procedures, training, guidance material, standardization of aeronautical publication etc. is provided to each State implementing FRA environment in the region.
- Develop safety case guidance material to be used in the region.
- Encourage the application of Collaborative Decision Making (CDM) principles in the implementation of FRA in order to ensure consistency and harmonization among AFI States
- Collect post-implementation data, monitor performance and adjust targets (defined KPIs) as necessary.

- Facilitate sharing of knowledge, expertise and lessons learnt among member States and air navigation service providers (ANSPs) in order to achieve a seamless FRA across the region.

3. Composition:

States and international organization SMEs can participate in any meeting of the PMT. Any other SME can be invited on an ad-hoc basis to provide specific advice to address specific needs to the project team/meeting

4. FRA Project Management Team (FRA PMT)

The AFI FRA PMT will be composed of experts from the following states and organizations:

ESAF: Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Tanzania and Uganda.

WACAF: Cape Verde, Democratic Republic of Congo, Ghana, Nigeria, Roberts FIR, and ASECNA

Organizations: AFRAA, ASECNA, CANSO, EAC, IATA, IFALPA and IFATCA

5. Pilot Projects: Implementation Clusters

ICAO WACAF States

- *West and Central Cluster:* States include ASECNA, Ghana and Nigeria, Cape Verde, DR Congo, Guinea Conakry, Liberia, and Sierra Leone

ICAO ESAF States

- *East Cluster:* States include Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Tanzania, Uganda and, Mogadishu (*)
- *South Cluster:* Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

(*) In the spirit of ICAO No State Left Behind, as much support as possible shall be provided as well to Somalia* and South Sudan*

6. Reporting

The FRA PMT is a working group constituted under the APIRG Airspace and Operational Sub-Group (AAO SG). It will provide status reports for all AAO SG meetings in the form of working papers.

7. Activities and Deliverables

In order to meet the mandate given by APIRG, the project management team will

- Develop the AFI FRA CONOPS.
- Develop a gap analysis checklist.-
- Conduct the assessment for each State and report on the agreed scorecard.
- Classify states in terms of their readiness to implement FRA.

- Develop the AFI Regional FRA implementation action plan.
- Develop a Template to be used by AFI States in developing their national action plans.
- Develop guidance material to assist states in conducting national safety cases.
- Share data and outcomes from implementing Direct Routing Operations (DROs) with the states to ensure a smooth and safe transition to FRA.
- Coordinate the implementation process in a timely and safe manner.
- Collect post-implementation data, monitor performance, and review and adjust targets (defined KPIs) as necessary.-
- Share and report lessons learned for continuous improvement and development of the airspace.
- Provide status report to AAO SG as required.

Appendix C: The AFI FRA and DRO implementation Status, July 2024

a) ESAF PMT FRA Implementation Status:

Ethiopia, Kenya, Madagascar*, Mauritius, Rwanda*, Seychelles, Tanzania and Uganda.

	Mauritious	**Seycheles**	**Ethiopia**	**Kenya**	**Dar es Salam**	**Uganda**
FRA opertations	FRA with UPR	UPR	DRO	DRO	DRO	DRO/FRA
Time of Operation		H24		H24	H24	H24
Area of Application	FL245 - FL460 South Part 25S	Above FL245	Above FL290	Above FL250	Above FL250	Above FL250
Fixed routes co-existance	Yes	Yes	Yes	Yes	Yes	Yes
Eligible Flights	Overflights	Overflights	Overflights	Overflights	Overflights	Overflights
Entry/Exit points	Published Way points ; Entry/Exit	Published Way points	Existing routes Entry/Exit	Published DCT only	Existing routes Entry/Exit	
Lat/Long Coord usage	Allowed	Allowed				
Equipment	ADS-C, CPDLC	ADS-C, CPDLC	Mode-S, ADS-B		TCas II, Mode S, ADS B or ADS C CPDLC	TCas II, Mode S, ADS B or ADS C CPDLC
DCT Segment length max	Not applicable		200Nm		200Nm	200Nm
UPR Interval reporting	60 min	30 min				
RNAV Spec	10	10				
Cross border application			Prior Coord.		Prior Coord.	Prior Coord.
FPL before EOBT					3H	3H – 2H
FPL Closer to FRA border	3Nm or more					
Available E/X points						Published
Available DCTs				Published	Published	
Combination E/X/I				Specified	Specified	Not Spec.
Flexible use of airspace		Prior CMC			Prior CMC	Prior CMC
FRA/DRO Suspension (Faillure of…)			Wx, CNS, Contingency	Surveillance		

*(See ASECNA)

b) WACAF PMT FRA Implementation Status:

Cape Verde, Democratic Republic of Congo, Ghana, Nigeria and Roberts FIR.

ASECNA : Abidjan, Bamako, Antananarivo, Brazzaville, Dakar, Douala, LibreVille, Lome, Ndjamena, Niamey, Nouactchott, Ougadougou UTAs and Madagascar.

	CAPE VERDE	**DR CONGO**	**GHANA**	**NIGERIA**	**ROBERTS FIR**	**ASECNA**
FRA opertations	Not Published	DRO	FRA with AORA	FRA	Data not available	FRA
Time of Operation		H24		H24		H24
Area of Application		Above FL290	FL290 – FL460 Lat 2N – 11N	Above FL245		Above FL250
Fixed routes co-existance		Yes	Yes	Yes		Yes
Eligible Flights		Overflight	Overflight	Arr, Dep, Overflight		
Entry/Exit		Published Way points	Existing routes Entry/Exit			
Lat/Long Coord usage		Allowed	Between Two Published WP			
Equipment		TCas II, ADS B or ADS C CPDLC	ADS-B ADS-C RNAV 5 / 10			TCas II, Mode S, ADS B or ADS C CPDLC
DCT Segment length max		200Nm	Not Applicable			200Nm
UPR Interval reporting						
RNAV Spec			5 or 10			
Cross border application		Prior Coord.	Not allowed	Not allowed		Prior Coord.
FPL before EOBT		1H				
FPL Closer to FRA border			5 Nm or more	3Nm or more		
Available E/X points						
Available DCTs			Published	Published		
Combination E/X/I				Specified		Not Spec.
Flexible use of airspace		Prior CMC	Prior CMC	NOTAM or Tactic by ATC		Not Allowed
FRA/DRO Suspension (Faillure of…)				Surveillance		

c) ICAO WACAF States

- *West and Central Cluster :* States include ASECNA, Ghana and Nigeria, Cape Verde, DR Congo*, Guinea Conakry, Liberia and Sierra Leone

	Guinea Conakry	**Liberia**	**Sierra Leone**			
FRA opertations	Not yet	Not Yet**	Not yet			
Time of Operation						
Area of Application						
Fixed routes co-existance						
Eligible Flights						
Entry/Exit						
Lat/Long Coord usage						
Equipment						
DCT Segment length max						
UPR Interval reporting						
RNAV Spec						
Cross border application						
FPL before EOBT						
FPL Closer to FRA border						
Available E/X points						
Available DCTs						
Combination E/X/I						
Flexible use of airspace						
FRA/DRO Suspension (Faillure of…)						

* See PMT WACAF

**AORRA experience

d) *South Cluster:* Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

	Angola	**Botswana**	**Malawi**	**Mozambique**	**Namibia**	**South Africa**	**Zambia**	**Zimbabwe**
FRA/DRO opertations	Not yet*	Not yet	Not yet	Not yet	Not yet	Not yet**	Not yet	DRO
Time of Operation								H24
Area of Application								Above FL245
Fixed routes co-existance								Yes
Eligible Flights								Overflights
Entry/Exit								
Lat/Long Coord usage								
Equipment								TCas II, Mode S, ADS B or ADS C CPDLC
DCT Segment length max								200Nm
UPR Interval reporting								
RNAV Spec								
Cross border application								Prior Coord.
FPL before EOBT								6H
FPL Closer to FRA border								
Available E/X points								
Available DCTs								
Combination E/X/I								Not Spec.
Flexible use of airspace								Prior CMC
FRA/DRO Suspension (Faillure of…)								

*AORA experience

** AORA and oceanic UPR experience

e) *East Cluster:* Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Tanzania, Uganda* and Mogadishu

	Mogadishu					
FRA/DRO opertations	Data not available					
Time of Operation						
Area of Application						
Fixed routes co-existance						
Eligible Flights						
Entry/Exit						
Lat/Long Coord usage						
Equipment						
DCT Segment length max						
UPR Interval reporting						
RNAV Spec						
Cross border application						
FPL before EOBT						
FPL Closer to FRA border						
Available E/X points						
Available DCTs						
Combination E/X/I						
Flexible use of airspace						
FRA/DRO Suspension (Faillure of…)						

*see PMT ESAF

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