CONOPS for Free Route Airspace (FRA) implementation in AFI region.

The Free Route operational concept AFI

0-Background

Navigation Evolution

At the earlier stages of flying, pilots used visual markers to navigate from one point to another e.g. landmarks, rivers, mountains and cities etc. Later, as a result of invention of navigational aids e.g. Non-Directional Beacon (NDB), VHF Omnidirectional Range (VOR) and Distance Measuring Equipment (DME) traditional navigation was improved. In modern times, a more accurate navigation systems have been made available to pilots e.g. satellite-based navigation systems such as Global Position Systems (GPS), with far much better accuracy. Equipped with both Flight Management System (FMS) on-board aircraft and satellite-based navigation system, pilots can now navigate through a user preferred route trajectory (UPR) without reference to ground systems under the performance-based navigation (PBN) criteria and within a level of precision that was not available before.

Fuel and Flight Efficiency

Based on the above, is there a need to continue to confine flights to publish routes? The answer is not so simple. Depending on the complexity of the airspace and the existing air traffic management (ATM) infrastructure, aircraft can be flown directly from one waypoint to the next without reference to ground equipment. This, therefore, can provide opportunities for efficiency improvements in terms of reduced track miles, time and fuel, which can be further translated into reduced maintenance costs.

How can we then achieve direct-direct routing operations (***DRO-Direct Routing Operation***) which can be transitioned into ***Free Routing Airspace-FRA***? Working with strategic aviation stakeholders, including ICAO, IATA, AFRAA, CANSO,IFALPA ,IFATCA ,EAC ,ECOWAS etc.; a project management approach to implement DRO towards FRA is necessary in order to enable Africa to transit from fixed routes to free routing airspace without compromising safety of the provision of ATS and flight operations.

At APIRG 21 (3.2.2 of the Report), the Airspace and Aerodrome Operations (AAO SG/1) requested that states that are ready to begin FRA trials should continue to do so, recognizing the need to work on large portions of airspace covering multiple (or cluster) FIRs. **APIRG conclusion 22/36** of 2019 identified one such 'cluster' of states. However, the opportunities are far more than those identified under the said conclusion.

A Collaborative Framework

Free Route Airspace is a module of ASBU: module B1-FRTO and therefore forms part of AFI ASBU plan. With the development and implementation of various ATM-CNS infrastructure in various parts of Africa, the industry in ready to transition to the next stage of safety and efficiency in flight operations and air traffic management. The idea is to implement FRA in a phased and coordinated manner that is simple, safe, efficient, environmentally friendly and cost-effective. The implementation of FRA will be led by ICAO ESAF and WACAF offices with a project team consisting of participating States who will nominate subject matter expert as the Points of Contact (POC) to drive the program.

1-Definition of "Free Route":

Free Route operations enable airspace users to fly as closely as possible to their preferred trajectory without being constrained by fixed airspace structures or fixed route networks. Free Route Airspace can be defined as an airspace within which users may freely plan a route from a defined entry point to a defined exit point (may require an intermediate waypoint) subject to airspace availability. In an FRA airspace, all fixed route networks can be removed. However, flights remain subject to air traffic control.

The term "Free Route" is a high-level title under which two different types of implementation can occur. Therefore, distinction is to be made between "Direct Routing Operations" (DRO) and "Free Route airspace" (FRA) operations. It is envisaged that Direct Route Operations will precede the implementation of Free Route Airspace. DRO is just but a series of directs between certain waypoint and can be flight plannable (not tactical). DRO can also provide an opportunity for ANSPs to study, collect data and familiarize themselves with the concept of FRA.

2-Free route using "Direct Routing"-Tactical phase 1

Where States/ANSPs have implemented adequate ATM-CNS infrastructure, air traffic controllers are able to provide flights with direct routings between waypoints to reduce track miles or at times to reduce the complexity of traffic. These direct routes become ***tactical directs*** and therefore are not flight plannable. In order to provide benefits of such ATM-CNS infrastructure, these tactical directs should be available to flight dispatch so they can leave unnecessary fuel on the ground at departure aerodrome. Tactical directs are usually an indication of States/ANSPs readiness towards implementation of FRA.

3-Free route using "Direct routing" Flight plannable: phase 2

Taking into consideration the existing airspace design, operational procedures, technologies and Air Traffic Flow Management (ATFM); the maturity of Flexible Use of Airspace (FUA), Free Route operations implementation is possible. Through operationalization of predictable *"direct routings"* for all phases of flight e.g. in cruise, climb and descent; States/ANSPs can implement Direct Routing Operations.

DRO can be implemented across FIRs borders even in a highly complex environment, provided there is coordination with adjacent FIRs. DRO can be applied to a block of airspace or to an entire FIRs. The airspace defined therein can be referred as ***Direct Route Airspace***.

Direct Route Airspace (DRA). A DRA can be defined within an identified route or combination of route segments or a block of airspace or an entire FIR and takes into consideration traffic flows. Just like FRA, DRA could be implemented with limitations of time, flight levels or blocks of airspace.

4-Direct Routing Operations in a Direct Route Airspace

4.1 Airspace organization:

Direct Routing airspace refers to an airspace defined laterally and vertically with a set of entry/exit conditions where direct routings are available. Direct Route Airspace is an extension of the concept of published en-route DCTs (Directs) across the FIR.

Vertical Limits of Direct Route Airspace (DRA) and publication

Whenever a Direct Routing Airspace is established in a Flight Information Region (FIR), its vertical limits will be published in the relevant national AIS Publications. The upper and lower vertical limits will be coordinated with neighbouring Flight Information Region (FIRs) to ensure smooth connectivity with the underlying fixed ATS route network.

Horizontal Limits of Direct Route Airspace and publication

Whenever a Direct Routing Airspace is established, its horizontal limits will be published in the relevant national AIS Publications.

Boundary limitations

In order to gain full benefits from its applicability, the vertical and horizontal limits of Direct Route Operations should be based on operational requirements and not necessarily on FIR/UIR or Air Traffic Services (ATS) Unit boundaries.

Air traffic control

Within direct route operations airspace, flights remain subject to Air Traffic Control (ATC). Pilots will adhere to the relevant publications for each State as stipulated in the relevant documents.

3.2 Direct -routing network:

A Direct Routing, by definition, is a succession of Direct Segments and ATS route segments.

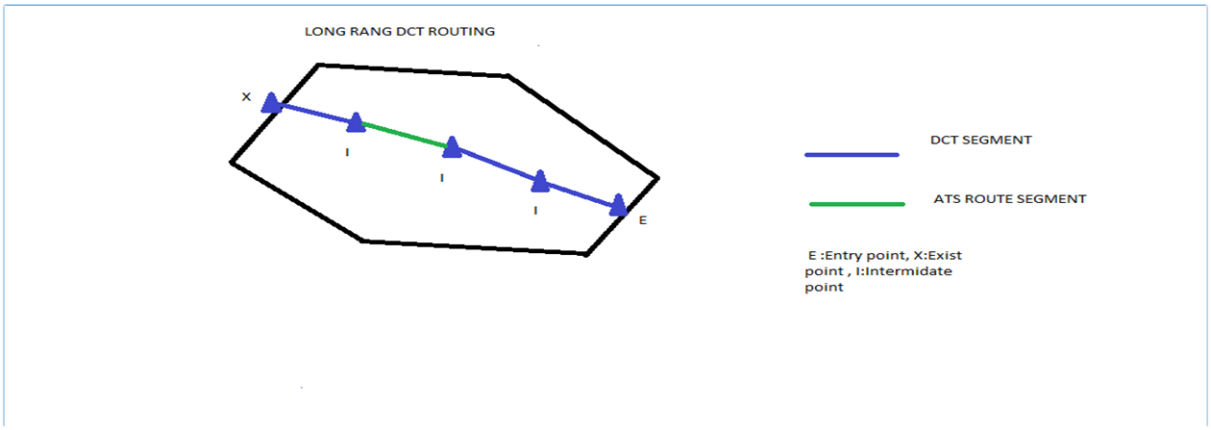


Figure 1: Long Rang Direct Rout

With regard to optimum Direct Segment length from Flight Operation Centre/Aircraft perspectives, short direct segments will allow both efficient flight planning and safe flight monitoring during the execution phase.

As far as possible the fixed ATS route network will be maintained inside Direct Routing Airspace so as to provide more flight planning options to all airspace users.

Wherever a Direct Routing Airspace (DRA) is published (with or without a fixed ATS route network), entry and exit points of the Direct Routing Airspace, as well as any intermediate points of the Direct Routing Network, will be published in AIS publications.

The interconnectivity between Direct Routing Network and the underlying/adjacent fixed ATS route network can be ensured by the use of published points interfacing the Direct Segments of the Direct Routing Network to the fixed ATS route network.

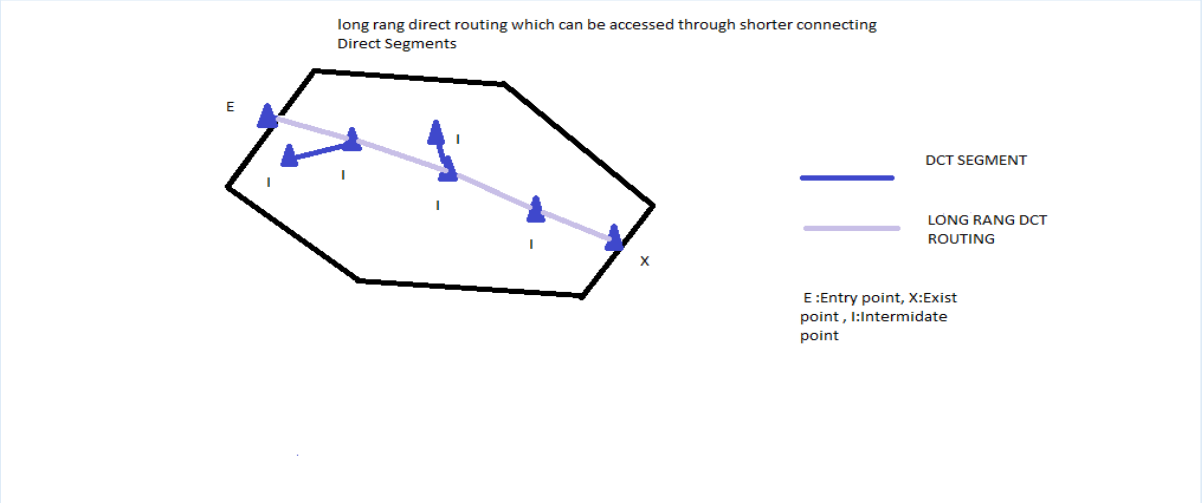
Direct Segments defined within the Direct Routing Airspace can be used as per DRA vertical limit.

Wherever a Direct Routing Airspace is published (with or without a fixed ATS route network), its entry and exit points will be connected to the underlying and to the adjacent fixed ATS Route Network.

3.3 Direct routing efficiencies:

Direct Routing in high complexity environments aims at offering Airspace Users an airspace volume where the network of Direct Routings is optimized enabling maximization of flexibility in flight planning. The significant number of Direct Routings is part of the environment complexity.

Figure 2: Long rang direct routing accessed by short direct segments



In order to facilitate flight planning while allowing aircraft operators' flight planning flexibility, Long Range Direct Routings - i.e. large geographical scale cross-border Direct Routings structured along the main traffic flows and accommodating the in-demand traffic - will be used to optimize the En-Route Direct Routing Network.

The efficiency of a Direct Routing Network will be maximized by a good access to Long Range Direct Routings which can be provided by shorter connecting Direct Segments and by the use of Intermediate points allowing for joining in or leaving the long Range Direct Routings for any reason and/or at any time. The promulgation of these Intermediate points will be made through relevant national AIS publications with a clear indication of the nature of these points (i.e. intermediate points).

3.4 ATC safety considerations

The mix of Direct Routings and fixed ATS Routes can be difficult to manage at the ATC level. Indeed, conflict in border of the sector is an important source of complexity that might be difficult to manage in execution phase.

In order to ease the safe management of Direct Routings by ATS, Direct Segments leading to conflicts close to sector boundaries might be limited.

3.5 Optimal design options

Optimal design options for the Direct Routing Network will be:

1. Some cross-border Direct Routings defined along major traffic flows at large geographical scale, which may be joined/left at various published intermediate points;
2. Many shorter Direct Routings – constituted by a single of few Direct Segments - used to:
   a. Connect Long Range Direct Routings from/to a route of the fixed ATS Route Network (for secondary flows and/or arrival/departure flows);
   b. Provide shortcuts.
3. Direct segments are not necessarily designed with strategic separation.

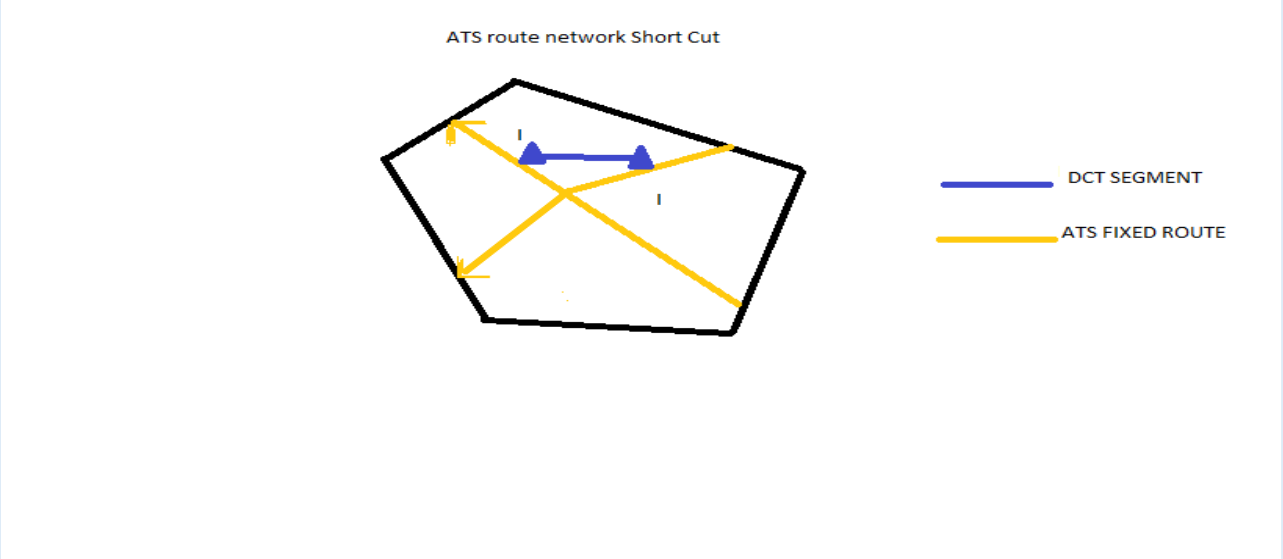


Figure 3: DCT segment shortcuts

Despite the fact that individual implementations of Free Route airspace at states level (FIRs) can take place, greatest benefits can only be realized after harmonization. It is therefore required to have the same basic rules concerning publication, design principles and constraints, structural elements and hence flight planning requirements.

Within these basic rules and structures each Air Navigation Service Provider (ANSP) can have some flexibility with regards to its own implementation.

4-Traffic Characteristics:

Traffic Level for En-Route ACC:

- High Capacity: between 100 and 200 movements per busy hour

Traffic Mix:

- Mix of business / mission flights (essentially IFR flights)
- Accommodation of a variety of different aircraft capabilities is required in DRA

Traffic Patterns:

- Overflights, climbing and descending flights above a certain vertical limit

5-Free route through “direct routing” - Airspace Characteristics:

Airspace Classification: Free Route operations airspace will, in principle be classified as Class A.

Flight Level Orientation: The Flight Level Orientation Scheme (FLOS) applicable within Free Route operations airspace will be promulgated through the relevant national AIS publications.

Airspace Organization: Airspace reservations will remain.

Civil/Military Cooperation: should be taken into account in order to ensure harmonized procedures and service provision for the benefit of all the airspace users.

Publication and maintenance of ATS Route Network: Waypoints (5LNC) and possible fixed route network will be published in AIS publications.

Sectorization: The present sectorization scheme may need to be restructured to accommodate traffic flows within FRA

Letters of Agreement (LoA) and Coordination Procedures: In case of cross border FRA, Letters of Agreement will be adapted to reflect the specificities of Free Route operations in regard to transfer points, links with the fixed route network, high fluctuations in traffic flows, possibility to leave/enter the airspace at random points, etc.

In case of cross border FRA, the automatic exchange of flight data between ACCs will need to consider the possibility of transfer at random points using dynamic Co-ordination Point (COPs). This would be facilitated by exchange of FPL field 15 (via ATS Interfacility Data Communication (AIDC) or On-Line Data Interchange (OLDI).

In case of cross border FRA, Transfer procedures and restrictions currently stipulated in the existing Letters of Agreement may no longer be applicable in airspace allowing for Free Route operations. Appropriate procedures will be defined to reflect these new provisions.

ATS delegation: In areas where operational boundaries do not coincide with FIR/UIR boundaries, and delegation of ATS is effective, if one ATC unit has implemented Free Route Airspace but the adjacent one has not, the operational boundaries of Free Route Airspace will be published in the national AIS publications of both States. The Letters of Agreement between the concerned ATS units will be amended accordingly to reflect any changes to the applicable procedures in the airspace where ATS is delegated.

*NB: individual implementation of FRA at a state level (FIR) will require less changes and amendment of the current LOAs and automatic exchange of flight data.

6- The operational needs for Airspace Users and ATS Providers to support safe and efficient Direct Routing operations in high complexity environments:

6.1 ATS providers and Airspace users' operational procedures and technologies:

ANSPs Flight Planning Processing:
In planning phase, the ANSPs will invalidate (suspend or reject) FPLs with Direct Routings going through prohibited, dangerous and restricted areas or failing to comply with any other airspace utilization requirements;
In case of rejection of a flight plan by the ANSP ATM system, the ANSP will provide the reason of the rejection.

Cross- border Coordination procedures:
Coordination procedures will require being adapted to Direct routing operations including cross border aspects. (no major change (if any) in case of one state FRA implementation).
The coordination procedures between adjacent ATS Unit (ATSU)s will no longer be based on published coordination points; this might also require some Flight Data Processing System (FDPSs) to be adapted. (in case of cross border FRA)
The coordination procedures between adjacent ATSUs will continue to be based on published coordination points (in case of one state implementation)
The inter-ATSU coordination procedures and associated working method might require to be amended.

Provide Tactical Separation Assurance:
in Direct Routing Airspace (depending on the density of the Direct Routing network), special attention should be paid to the separation responsibility for those conflicts occurring close to a sector boundary or at the sector boundary

Ensure Trajectory Adherence:
Enhanced Monitoring Aids (MONA) will support the controller team in providing the ATC service through monitoring the traffic situation and detecting when an aircraft deviate from the predicted trajectory (Recommended).
Ground Based and Airborne Safety nets:
Airspace infringement management relates to the management by controllers of unauthorized airspace penetration by aircraft into prohibited or danger areas etc. assisted by Area Proximity Warning (APW).
Short Term Conflict Management relates to the management of mid-air collision hazards (involving at least one controlled flights) by air traffic controllers assisted by Short Term Conflict Alert (STCA).
Imminent Mid-Air Collision relates to the management of mid-air collision hazards (involving at least one ACAS equipped aircraft) by flight crews and ACAS RAs.

Requirement for a specific navigation specification:
There is no requirement for a specific navigation performance on direct segments of a Free Route airspace, taking into consideration the current AFI aircraft capabilities, RNAV 10 specification would be suitable.

6.1.1 Aircraft capabilities:

Communication:
- Technical capability, both in pre-departure and during execution, to receive by ACARS from FOC and easily load in airborne Navigation functions 3D trajectories based on published routes (SIDs, Airways, STARs)
- Progressive capabilities for Air / ground data link exchange of CPDLC messages

Navigation: Basic navigation capabilities to manually modify, delete, add route segments of waypoints in the FMS (Flight Management System)

Surveillance: ACAS Resolution Advisory transmitted to the ground station via e.g. Mode S Transponder and ADS-B-Out as per standards DO260/260A.

Airborne Safety net: Airborne Safety Net, i.e. ACAS II 7.1

6.1.2 ATS capabilities:

Free Route operations will impact the current working methods of the ATC operators, so it requires appropriate support tools to maintain sector capacity without a detrimental effect on safety.

A variety of controller support tools should be considered such as:

a) Ground-based Safety nets: Ground-based safety nets will be of prime importance in complex Direct Routing Airspace as the last ATC barriers against collision / airspace infringement hazards.
- Short-Term Conflict Alert (STCA) is a ground-based safety net intended to assist the controller in preventing collision between aircraft by generating, in a timely manner, an alert of a potential or actual infringement of separation minima. STCA parameters setting might require being adapted in order to better fit this purpose in Free Route environment.
- Area Proximity Warning (APW) is a ground-based safety net intended to warn the controller about unauthorized penetration of an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement of the required spacing to that airspace volume, which require attention/action.

b) Conflict Detection and Resolution (CD/R) Tools to provide automated assistance to the Planning Controllers (PC), as well as Tactical Controllers (TC).
c) Monitoring Aids (MONA) to help controllers to reduce the workload associated with traffic monitoring tasks by providing warnings if aircraft deviate from a clearance or plan and reminders of instructions to be issued and providing conformance monitoring triggering trajectory re-calculation essential for the CDT

- System supported co-ordination (SYSCO): The concept of SYSCO is the provision of system support capability and the development of procedures to automatically electronically co-ordinate and transfer flights in sectors of an ATS unit or between adjacent ATS units, based on a shared set of flight data.

7-Separation minima:

No change in En-Route separation minima (i.e. Vertical and horizontal separation minima based on ATS surveillance) is needed in relation to Free Route operations

Separation minima between aircraft are expected to continue to be based on guidance, regulations, and factors used in today's environment (ICAO Doc 4444 Procedures for Air Traffic Management, especially Chapter 5, Differences from DOC 4444 standards (if any) are to published in national AIPs,)

8-Maintenance of fixed ATS routes within DRO/FRA airspaces.

Fixed ATS route network will be maintained within DRO airspace in order to:

1. Provide additional additional flight planning options.
2. Ensure smooth vertical transition between FRA/DRO and no DRO areas.
3. Airspace users that would rather file their flight plans the traditional way.
4. Airspace users not eligible for DRO/FRA operations.
5. In case of contingencies situations such as:

a. In the event of total or partial failure of communication system along the specified Flight Plannable Direct Route or portion thereof- nevertheless ATS surveillance services are provided or not.
b. In the event of total failure of surveillance system (Radar and ADS-C/CPDLC)-only in airspaces with high volumes of traffic and in adequate airspace design
c. In the event of severe weather conditions that may not permit flight over direct route as planned.
d. During ATM contingency that may affect the safety and efficiency of flight operations on such Direct Routes.

9.The safety requirements expected to support the safe and efficient deployment of Free route through use of direct routing.

The safety requirement area	Title	The safety requirement	Rationale
Business Trajectory (BT)/ Mission Trajectory (MT) Flight Execution	Training / familiarization of pilots on direct routings lower limit	Requirement relating to training/familiarization of pilots.	Pilot shall be informed of direct routings lower limit and of potential impacts in case of non-compliance with this constraint (possible rerouting)
Airspace Management	Design of manageable direct segments	Direct routings and direct segments will be designed so as to induce a manageable level of airspace complexity for Air Traffic Control Officer (ATCOs).	Direct routings and direct segments are not purely designed based on the needs from airspace users. Some ATC constraints can be considered during the design phase in order to ensure that the direct routing network will be manageable safely by ATCO. Particularly, number of direct segments inducing conflicts at sector/ATSU boundaries need to be limited.
Airspace Management	Maximum length of direct segments	The maximum length of the direct routing / direct segment will take into account ATC operational and technical constraints: Long direct segments can induce operational and technical issues for ATC	-Operational aspects: It can be an issue to resume navigation in the case of long-range direct routing (if next waypoint is located in another sector/ATSU) -Technical aspects: next waypoint might not be known by the technical system if it is located in another ATSU
Airspace Management	Direct Routing Airspace Publication in AIP	Wherever the fixed ATS route network is removed for direct routings, a Direct Routing Airspace will be published in national AIS Publications	If fixed ATS Route Network (ARN) is removed inside DRA, Airspace Users have to be aware of Direct Routing Airspace dimension.
Airspace Management	Direct Segments Publication in a Direct Routing environment	The limits and condition of use of the Direct segments constituting a Direct Routing will be published.	
Airspace Management	Publication of Points in a Direct Routing environment	Wherever a Direct Routing Airspace is published, its Entry, Exit, Arrival, Departure and Intermediate Points will be published in national AIS Publications (using standard ICAO format description)	If fixed ARN is removed inside DRA, Airspace User (AUs) have to be notified about Entry/Exit points where Direct Routings start/end, as well as about exit, arrival and intermediate point. All points to be used for flight

			planning have to conform to current ICAO standards in order to allow exchange between relevant parties.
Airspace Management	No safety impact from DRA lower limit	The setting of the lower limit of Direct Routing Airspace will not adversely impact safety of operations in any adjacent/subjacent non-DRA volume	Direct Routing Airspace has to facilitate transition to and from non-DRA airspace. The parameters to be taken into account to facilitate this transition include; traffic flows, complexity of traffic, sector capacity and safety aspects in DRA (and adjacent) airspace. Balance has to be found between safety & capacity.
Airspace Management	Smooth connectivity between Direct Routing network and underlying fixed ATS route	The vertical connection between Direct Routing network and the underlying fixed ATS route network will take into account the various climbing and descending profiles	Smooth connectivity between Direct Routing network and underlying fixed ATS route
Airspace Management	Determination of DRA Entry and Exit points	Wherever a Direct Routing Airspace is published, its entry and exit points will be connected to the underlying and to the adjacent fixed ATS Route Network by Direct Segments or fixed ATS route segments if maintained in the airspace	A Direct Routing Airspace has to facilitate transition to and from non-Direct Routing Airspace taking into account the possible effects on; 1-Controller workload 2-Flight Planning 3- Letters of agreement
Airspace Management	Sector Design in Direct Routing environment	In Direct Routing environment, sectors will be designed to accommodate traffic flows including flows on direct segments	Sector design criteria should, at least, take into account: The principle traffic flows and orientation; Minimizing short transits through sectors; Minimizing sector and ACC re-entry; Positions of airspace reservations; Coherency with adjoining fixed route sectors and link routes to SIDs and STARs; Civil / military coordination aspects.
Planning Separation Assurance	Inter-sector coordination procedures adapted to Direct Routing operations	in Direct Routing environment of high complexity, the Planning Controller will be provided with procedures for ATSU/sector coordination of flights with unnamed Coordination Points	Possible lack of named Coordination Points for Direct Routings across ATSU/sector boundaries to support seamless Direct Routing operations
Planning Separation Assurance	Letter Of Agreement in Direct Routing environment	In support to Direct Routing operations across ACC/FIR borders, the LoA will be adapted to not necessarily refer to published route network or fixed coordination point	Today, acceptable handover conditions are often described with reference to the route structure and coordination point. In direct routing environment, these

			conditions will need to be revised, particularly for long range cross border direct routings.
Planning Separation Assurance	ATC coordination support tools adapted to Direct Routing operations	In Direct Routing environment of high complexity, the Planning Controller will be provided with tools to support coordination of flights across ATSU/sector boundaries with unnamed coordination points	Coordination of flights in Direct Routing across ATSU/sector boundaries outside named Coordination Points will need to be supported by the ATC systems in order to assist the ATCOs in the identification of COPs
Planning Separation Assurance	Consistent ATC coordination procedures for Direct Routing operations	In support to Direct Routing operations across ACC/FIR borders, any ATC procedure for ATSU/sector coordination will be consistently applied by adjacent ATC service providers	Consistent ATC coordination procedures permit seamless Direct Routing operations and cross ACC boundary processing
Planning Separation Assurance	Mid-term Conflict Detection support tool in Direct Routing environment	In Direct Routing environment of high complexity, the Planning Controller will be provided with trajectory-based Conflict Detection Tool to support the mid-term detection of encounters between two flights	To manage Direct Routing operations in high complexity airspace (e.g. with dense or complex en-route DCT network inducing conflicts at the boundaries between sector/ATSU), the PC needs a support to assess the global air situation including flights that follow an unfamiliar route. Also, conflicts may occur at border between two sectors and the PC needs a support to detect such conflicts in advance. A mid-term detection of encounters permits to predict potential loss of separation between two planned trajectories of interest for the sector (20 minutes time horizon as an order of magnitude).
Tactical Separation Assurance	Training / familiarization of the ATCO on direct routings lower limit	ATCO of upstream sector will be aware of the Direct Routings lower limit and give appropriate clearance to make it possible for the aircraft to be above this lower limit when reaching the Direct Routing entry point	If aircraft is not at the appropriate flight level (above Direct Routing lower limit) when reaching the first point of its user defined trajectory, it will affect the ATCO activities (aircraft flying an unexpected route). A training / familiarization of the ATCO of lower limit of the airspace is needed in order to avoid this kind of situation.
Tactical Separation Assurance	FDPS database in Direct Routing environment	In Direct Routing environment, FDPS database will include all points of interest for the ATCO (e.g. all points within the maximum length of the direct segments including points outside the ATSU area of responsibility)	FDPS database needs to include some points of neighbouring area in order to avoid reception of flight plan with unknown points and consequently rejection of the flight plan

Ground-Based Safety Nets	Short-Term Conflict Alert (STCA) system in Direct Routing environment	In Direct Routing environment, the ATCOs will be assisted by a Short-term Conflict Alert system	ATCOs need system assistance to prevent collisions between aircraft when confronted with a multitude of ever different trajectories in direct routing environment. In a Direct Routing environment, this is all the more true as the mix of Direct segments and fixed ATS Route segments can be complex to manage in the execution phase, at ATC level.
Ground-Based Safety Nets	Area Proximity Warning (APW) system in Direct Routing environment	In Direct Routing environment, the ATCOs will be assisted by an Area Proximity Warning system	Controllers need system assistance to be warned in short-term of unauthorised penetration of flights (e.g., controlled flights into restricted airspace) when confronted with a multitude of ever different trajectories and management of restricted areas in direct routing environment.

10.Conclusion

Vertical and horizontal limits of FRA shall be published through the AIP. States/ANSPs should take necessary steps to coordinate with neighbouring FIRs when establishing these limits. This is to ensure harmonization with neighbouring States that intend to apply FRA and also to avoid coordination failures between adjacent FIRs.

11. Attachments

11-1 FRA Gap analysis checklist

11-2 DRO AFI publication Template

11.3 DRO _Operational data reporting template

12.References:

ICAO Document 9854 Global Air Traffic Management Operational Concept

ICAO Document 4444 PANS-ATM

European ATM Master Plan - The Roadmap for Sustainable Air Traffic Management

SESAR Concept of Operations

EUROCONTROL -European Airspace Design Methodology Guidelines