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(NACC/DCA/11)**

Varadero, Cuba, 28-30 June 2023

**Agenda Item 4: NAM/CAR Regional Safety/Air Navigation Implementation  
4.2 Air Navigation Implementation Matters**

**DIRECT ROUTING STRATEGY (DCT) ROUTING STRATEGY FOR THE NACC REGION**

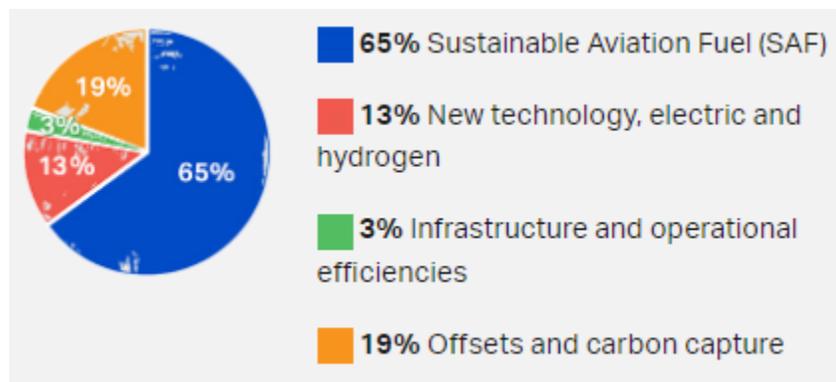
(Presented by IATA)

<b>EXECUTIVE SUMMARY</b>	
This working paper presents a proposed Direct Routing Strategy (DCT) for the NACC Region, based on the Guidance Material provided by the Global Air Navigation Plan – ASBU FRTO B 0/1 and FRTO B 1/1, applying the implementation of Strategic Direct Routing (EDE) and/or User Preferred Routes as a transition to achieve the final objective: Free Route Airspace (FRA, in its acronym in English).	
<b>Action:</b>	<ul style="list-style-type: none"><li>- Urge ICAO to lead the Direct Routing Implementation Process, in accordance with the guidance provided by the Global Navigation Plan</li><li>- Urge NACC states to implement or expand EDEs as soon as possible</li><li>- Urge NACC states to adopt the five-year objectives proposed in point 2.5 of this Working Paper</li></ul>
<b>Strategic Objectives:</b>	<ul style="list-style-type: none"><li>- Strategic objective 1 – Operational Safety</li><li>- Strategic objective 2 – Air navigation capacity and efficiency</li><li>- Strategic objective 5 – Protection of the environment</li></ul>
<b>References:</b>	<ul style="list-style-type: none"><li>- Global Air Navigation Plan</li><li>- Regional Air Navigation Plan</li></ul>

**1. Introduction**

1.1 The International Air Transport Association (IATA) is strongly encouraged by the adoption of a Long-Term Aspirational Goal (LTAG) to achieve net zero CO2 emissions by 2050 at the 41st Assembly of the International Civil Aviation Organization (ICAO).

1.2 Although “only” 3% of the Fly Net Zero is expected to come from infrastructure and operational efficiencies (see figure below), it is important to note that in some regions this percentage can be higher and it is significant for airlines and ANSPs operational efficiency.



1.3 Direct Routing in this working paper is a generic term applied to several initiatives, such as: User Preferred Routes (UPR), Strategic Direct Routing (SDR) and Free Route Airspace (FRA).

1.4 Both SDR and FRA are part of the ICAO's Global Air Navigation Plan and they are included in the Aviation System Block Upgrade under the thread named Improved Operations Through Enhanced En-Route Trajectories (FRTO), blocks FRTO B0/1 and FRTO B1/1. The strategy proposed in this working paper is limited to the blocks 0 and 1 only, which may be achievable in time horizon of 5 years. However, the proposed strategy may evolve to include in the future the remaining portions of FRTO, such as Dynamic Airspace Configuration and Large-Scale Cross Border Free Route Airspace (FRA), respectively FRTO B2/2 and FRTO B2/3.

1.5 In a Regional Level, ICAO shall take the lead of DCT Routing's implementation in the CAR/SAM Regions, through CAR/SAM Regional Planning and Implementation Group (GREPECAS). Under GREPECAS' project A – Airspace Optimization, a comprehensive guidance material regarding implementation of DCT Routing is expected to be given to States, ANSPs and Airspace Users. Also, under GREPECAS working program, is expected to include the DCT Routing Strategy in the CAR/SAM Air Navigation Plan, mainly in its Volume III, which contains dynamic/flexible plan elements related to the implementation of the air navigation system and its modernization.

1.6 Regarding the actual implementation of the DCT Routing, a close collaboration between Airspace Optimization Task Force from NACC/WG and Airspace Study and Implementation Group from SAM/IG are essential to harmonize and expedite the implementation of DCT routing in the CAR/SAM Regions, to provide flight efficiency and enhance aviation in the Regions. To fulfil the need of obtaining early benefits where States are not able to implement Strategic Direct Routing (SDR) and to expedite the coordination between ANSPs and Airlines, a joint working group formed by CANSO, IATA, and ICAO, named as CIIFRA, was created in 2021 to support implementation of UPRs. It is important to note that although the present CIIFRA's strategy is focus on the implementation of UPRs to obtain early benefits, SDR is also part of the group's strategy as a transition to FRA.

2. **Discussion**

2.1 **User Preferred Routes (UPRs)**

2.1.1 UPRs are routes requested by the airlines that optimize the route between a specific city-pair. UPRs must be approved by all ANSPs, through their Flow Management Units, Area Control Centre managers, or Civil Aviation Authorities, as applicable, in which any segment of the route occurs. Once a UPR is approved for the trial, it will be available for a specified period (i.e., trial period) and a specific airline. The purpose of the route trials is to determine the operational feasibility of the routes and once the operational feasibility of the routes is verified, to have them published via AIC/AIP. After the States publish the route segments within their AIC/AIPs, those segments may be used by all airlines for any city pair until further notice

2.1.2 CIIFRA developed a catalogue of UPRs, which contains airline proposals to be coordinated with ANSPs to initiate a trial period and then the full Implementation. As of January 27, 2023, the route catalogue contains 22 UPRs involving the CAR and SAM Regions and 9 UPRs in the SAM Region only. The publication of the 31 UPRs of the route catalogue and other proposals that will be made by airlines, have the potential to significantly increase savings and contribute to the evolution towards Strategic Direct Routing (SDR) and Free Route Airspace (FRA).

	Baseline Flight Plan Route vs Trial UPRs Reported Data Projected to 1-Year Savings
3.	
Savings:	
Flight min	18,664 min
Fuel (lb)	3,715,493 lb
CO2 (kg)	6,142,965 kg
Cost (\$ USD)	\$ 3,139,759

CANSO-IATA-ICAO Free Route Airspace (CIIFRA) - Trial UPRs Benefit Data  
As of: December 27, 2022

2.3 **Strategic Direct Routing (SDR)**

2.3.1 SDR allows users to plan a route using any named waypoints within a specified volume of airspace if the route complies with parameters set by the State. The parameters may include restrictions such as hours in which SDR rules apply, at or above altitude requirements and maximum distance between waypoints. Users must file flights via authorized (i.e., published) routes to the entry and exit point at the **boundaries** of the SDR airspace volume; that is, the SDR system only applies inside the defined volume of airspace. SDR is a transition to the implementation of the Free Route Airspace (FRA) concept.

2.3.2 The implementation of Strategic Direct Routing (SDR) should be based on Global Air Navigation Plan – ASBU FRTO B0/1, with the objective of providing airspace users with additional flight planning options, with route choices on a larger scale across FIRs, so that planned distances can be generally reduced compared to the fixed route network. SDR should be established at national and regional level and is made available for flight planning (with published terms of use). SDR enable airspace users to optimize flight and fuel planning.

2.3.3 The SDR could be implemented, if necessary, in a limited manner, for example:

- Time restriction (fixed or subject to traffic/availability);
- Traffic restriction (based on traffic flow and/or level);
- Flight level;
- Lateral restrictions; and
- Entry/exit points.

2.3.4 The following procedures and processes may need to be considered:

- Identify SDR airspace volume (lateral and vertical) and applicable time;
- Direct routes may coexist with the ATS route structure;
- Adapt airspace design to ensure horizontal and vertical connectivity with SDR.
- ATFM procedures for SDR;
- Review the LoAs with adjacent ATS units;
- Publish data relevant to SDR in the AIP;
- Airspace management procedure for the implementation of direct routes; and
- ATC procedures for SDR coordination, including handover, path changes in direct routing, conflict detection.

2.3.5 Operational and dependent relationship with other ASBU elements:

- NOPS-B0/1 Initial integration of collaborative airspace management with air traffic flow management - The integration of airspace management and air traffic flow management is a desirable requirement, with a view to optimizing SDR implementation.
- FRTO-B0/2 -Airspace planning and Flexible Use of Airspace (FUA) - The application of FUA could optimize SDR implementation considering that DCT routes could enter special use airspace, in accordance with pre-established procedures.
- FRTO-B0/4 -Basic conflict detection and conformance monitoring - Medium-Term Conflict Detection (MTCD) and Conformance Monitoring tools are considered as requirements to reduce the workload of air traffic controllers in high air traffic volume settings. Accordingly, they can be considered as desirable requirements and should be considered when upgrading ATM systems.
- FICE-B0/1 - Automated basic interfacility data exchange (AIDC) - Similarly, AIDC is considered a desirable tool for SDR implementation, with a view to reducing ATCO workload, especially in high air traffic volume operational environments, particularly when there is handover of SDR flights in both FIRs.

2.3.6 Regarding the enablers, the Global Air Navigation Plan in FRTO BO/1 lists a series of EUROCONTROL documents, which could be used as guidance material. However, it is necessary to observe that the implementation of the SDR in the CAR/SAM Region consider the characteristics of the airspace and the demand for air traffic, which is significantly lower than in Europe.

2.3.7 It is expected that initially SDR be implemented State by State, within the limits of their airspaces, using the waypoint published in the boundaries as entry/exit point from one SDR system to the next, based on specific rules established by each State. However, it is also expected an evolution to a cross border SDR, based on harmonized standard regulation and procedures involving CAR/SAM Regions. This will allow an even greater efficiency by using more waypoints in the boundaries of FIRs and making available more options of direct routing. A specific target to initiate a cross-border SDR in Latin America is to use the already implemented SDR airspace to stimulate adjacent FIRs to join the SDR implementation in a harmonized manner. An example would be SDR already implemented in Brazil (Amazonica FIR), Guyana (Georgetown FIR) and Venezuela (Maiquetia) as well as the planned implementation in Trinidad y Tobago (Piarco FIR).

2.3.8 SDR was implemented in some extent in 6 South American States (Brazil, Chile, Ecuador, Guyana, Peru, and Venezuela), applying procedures published via AIP amendment or AIC, based on an aeronautical publication model developed by South American Airspace Study and Implementation Group (GESEA).

2.3.9 As an example of SDR implementation, the most recent data collection (July 2022) and considering only the flights benefited from the implementation of the SDR in the Brazilian Airspace, GOL airline computed a reduction of 1,285 NM, generating a reduction of 5.5 tons of fuel (equivalent to a reduction of 17.38 Tons of CO<sub>2</sub>). AZUL Airlines reported that the SDR concept in two months of analysis (April 21 to June 20, 2022) allowed a reduction in flying distances of more than 1,935 NM, saving around 8.7 tons of fuel (equivalent to a reduction of 27.49 Tons of CO<sub>2</sub>).

2.3.10 Active participation of States, ANSPs and Airlines are essential to the implementation of Strategic Direct Routing and UPRs as initial steps to reach the goal of implementing Free Route Airspace (FRA). It is important to note that Strategic Direct Routing is the more suitable way to progress into the FRA, in accordance with the GANP, and its implementation by some States in the Region has already demonstrated its feasibility and corresponding benefits.

## **2.4 Free Route Airspace**

2.4.1 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.

2.4.2 Similarly, to the SDR, it is expected that FRA be implemented firstly inside the boundaries of States, using their specific procedures and limitations, evolving to a Cross Border FRA, as provided by the ASBU FRT0 B2/3 - Large-Scale Cross Border Free Route Airspace.

2.4.3 Some States are expected to develop a CONOPS FRA to be applied in their airspace and initiate trials in the next 2 years. It will be necessary to stimulate ICAO to lead the development of a Regional CONOPS FRA as well as an Implementation Guidance Material to boost the Cross Border FRA in medium/long term.

## **2.5 Five Years Goals**

### **2.5.1 Short term (2023/2024)**

- Implement UPRs of route catalogue
- Create a process to expedite publication of UPRs
- Develop a Regional Guidance Material for implementing SDR and UPR, including operational/technical requirements.
- Develop a Regional FRA CONOPS, including operational/technical requirements.
- Initiate FRA trial in at least 1 CAR/SAM State
- Include UPR, SDR and FRA in the CAR/SAM Air Navigation Plan, through GREPECAS and corresponding NACC and SAM Implementation Groups.

### **2.5.2 Medium term (2025-2027)**

- Implement SDR in 80%+ of SAM FIRs
- Implement SDR cross-border in at least 4 adjacent SAM FIRs
- Implement FRA in 20%+ of CAR/SAM FIRs

## **2.6 Risks, Challenges, and Interdependencies**

- Lack of CNS infrastructure
- Deficiency of ATM System
- Lack of ATC capacity due to inappropriate sectorization
- Lack of Human Resources, mainly Air Traffic Controllers, to open new ATC sectors necessary to support growing demand and implementation of SDR/FRA.
- Misuse of Airport Infrastructure generating a domino effect in the airspace management.
- Need of harmonized implementation of new ATM systems to comply with SDR/FRA requirements, such as MTCD and Conformance Monitoring tools.
- Include SDR/FRA requirement in the AIDC's implementation process.

### 3 Suggested action

3.3 The NACC Meeting is invited to:

- 3.3.1 Take note of the information provided in this working paper.
- 3.3.2 Urge ICAO to lead the Direct Routing Implementation Process, in accordance with guidance provided by the Global Air Navigation Plan, as well as to include this initiative in the Regional Air Navigation Plan, as a contribution to comply with the portion related to infrastructure and operational efficiencies to the Long-Term Aspirational Goal (LTAG) to achieve net zero CO<sub>2</sub> emissions by 2050.
- 3.3.3 Urge NACC States to implement or expand SDR as soon as possible, as a commitment to the initial steps toward the achievement of net zero CO<sub>2</sub> emissions by 2050; and
- 3.3.4 Urge NACC States to adopt the five years goals proposed in the item 2.5 of this working paper as part of the SAM Region efforts toward the achievement of net zero CO<sub>2</sub> emissions by 2050.