

**59th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

*Cebu, Philippines
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AGENDA ITEM 4: AIR NAVIGATION

FUTURE CHALLENGES OF EXPANSION OF UPR

(Presented by Japan)

SUMMARY

This paper introduces the operation of User Preferred Route (UPR) in oceanic control area of Fukuoka Flight Information Region (FIR), highlights the need to advance CO2 reduction efforts through the introduction of seamless UPR, and recommend that States with oceanic control area in the APAC region consider introducing UPR.

FUTURE CHALLENGES OF EXPANSION OF UPR

1. INTRODUCTION

1.1 The 41st ICAO Assembly adopted a long-term global aspirational goal (LTAG) for international aviation of net-zero carbon emissions by 2050 and acknowledged “the progress achieved on all elements of the basket of measures available to address CO₂ emissions from international aviation, including aircraft technologies, operational improvements, sustainable aviation fuels and CORSIA” and affirmed “the preference for the use of aircraft technologies, operational improvements and sustainable aviation fuels that provide the environmental benefits within the aviation sector”.

1.2 Operational improvements that contribute to LTAG include Continuous Climb/Descent Operations (CCO/CDO), maintaining optimal altitude, routes with low fuel consumption, and reducing delays on the ground.

1.3 The introduction of Free Route Airspace (FRA), which reduce fuel consumption by flying optimal routes, is an important step towards the sustainable operations of aviation, as it achieves efficient flight operations while minimizing environmental impact.

1.4 In the Global Air Navigation Plan (GANP), FRA is defined as follows: “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between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) waypoints, without reference to the ATS route network, subject to airspace availability.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.”

1.5 UPR is one of the flight operation improvement measures, similar to FRA. In Japan, UPR operations have been introduced in the oceanic airspace of Fukuoka FIR. UPR is a route set for each flight by airspace users, taking into account fuel consumption (based on departure time, aircraft weight, flight route and upper wind) and flight time. The following section explains the current UPR operations over the Pacific Ocean.

2. DISCUSSION

Benefits of the introduction of UPR

2.1 Typical operational benefits of implement UPRs include:

- a) Flight distance will be reduced compared to ATS routes including flexible track system;
- b) More economical routes can be used, considering upper winds; and
- c) Safer routes can be used, considering severe weather.
- d) Compared to the case where the airspace has only fixed routes, UPR has the flexibility to plan horizontally separated routes, so there is the potential for aircraft to have more opportunities to use optimal altitudes.

User Preferred Route (UPR) within Oceanic Control Area in Fukuoka FIR

2.2 Japan has a large oceanic control area over the west part of North Pacific Ocean (**Figure 1**).

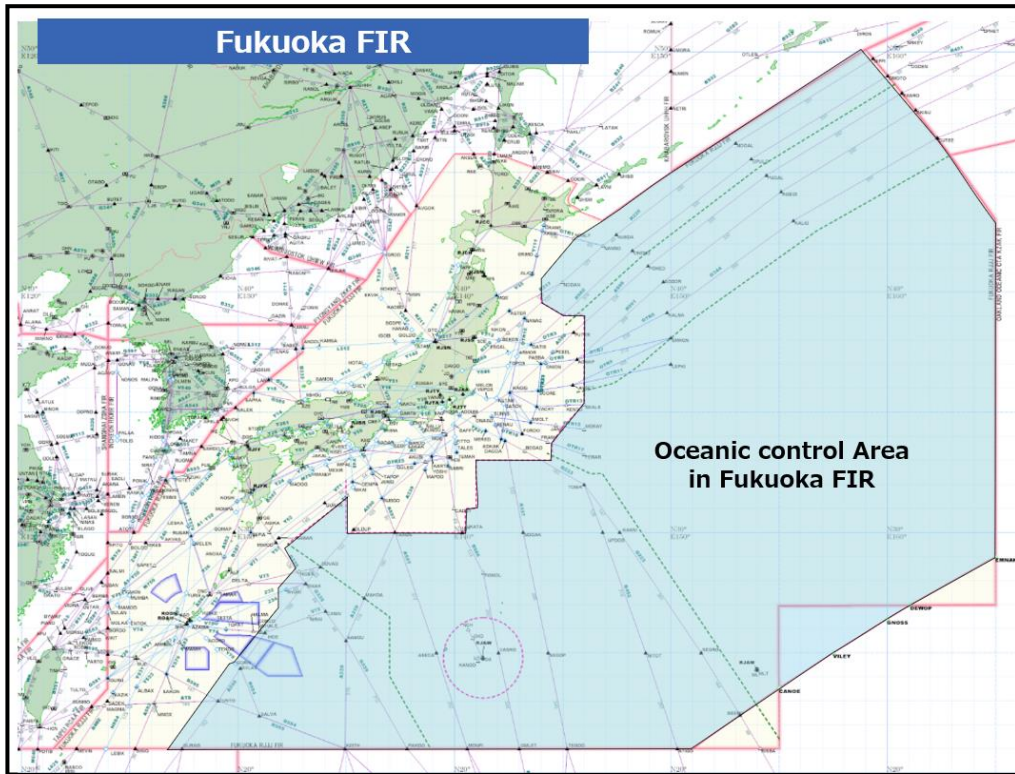


Figure1: Oceanic Control Area in Fukuoka FIR

2.3 Japan has introduced UPR in oceanic airspace between Japan and the United States since 2008. Currently, Japan and the United States are working to expand the areas where UPR is available step by step, shortening flight distance, improving the availability of optimal routes, and reducing the CO2 emissions.

2.4 The airspace in which UPR can be planned is the area excluding specific air routes or variable routes (Pacific Organized Track System; PACOTS) with heavy traffic.

2.5 The airspace in which aircraft crossing the Pacific Ocean can plan UPR is different for eastbound and westbound. For eastbound aircraft, the airspace excluding some of the NOPAC air routes where many westbound aircraft fly and 50 NM on either side of TRK2 of PACOTS with heavy eastbound traffic is applicable. (**Figure 2**)

2.8 Introduction of UPR in Pacific region have been discussed at Informal Pacific ATC Coordinating Group (IPACG) meeting, which is composed of related parties such as ANSP (FAA, JCAB), airlines and IATA. In addition to considering UPR, this meeting also reviews air routes and navigation requirements and considers the expansion of airspace capacity in areas over the Pacific Ocean.

Evaluation of the introduction of UPR

2.9 The key to introducing UPR is to thoroughly verify its effectiveness in terms of operational efficiency, safety, and airspace capacity, and to continuously improve it after introduction by conducting the following verifications:

- a) Consider the benefits of the entire airspace;
- b) Perform safety risk analysis and tabletop tests (if necessary) to determine the operational impact of implementing UPR;
- c) Consider the priority for altitude assignment between aircraft on ATS routes including flexible track system and on UPR; and
- d) Agree the operational procedure with adjacent ANSPs.

2.10 Since the introduction of UPR will change the way air traffic control is carried out, it is important to make adequate preparations and conduct advance verification. It is also important to note that UPR may not function effectively depending on the characteristics of the airspace, such as excessive traffic, or the configuration of the flight path.

Future Challenges

2.11 By expanding the UPR initiative to neighboring States rather than implementing it in a single state, it is expected that the possibility of further shortening routes and flying the optimal route will increase, and it will be possible to contribute to the realization of a sustainable sky, such as by providing benefits to airspace users and reducing CO2 emissions. (Figure 4)

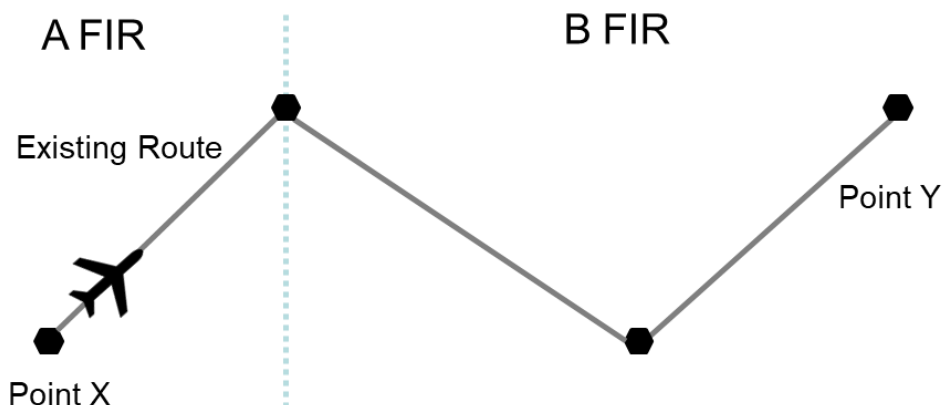


Figure4-1: Example of UPR introduction (existing routes only)

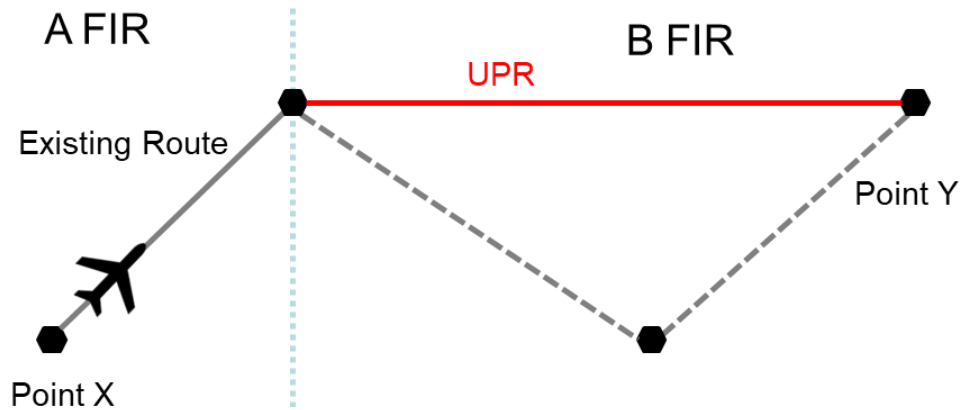


Figure4-2: Example of UPR introduction (when UPR can be set with B FIR)

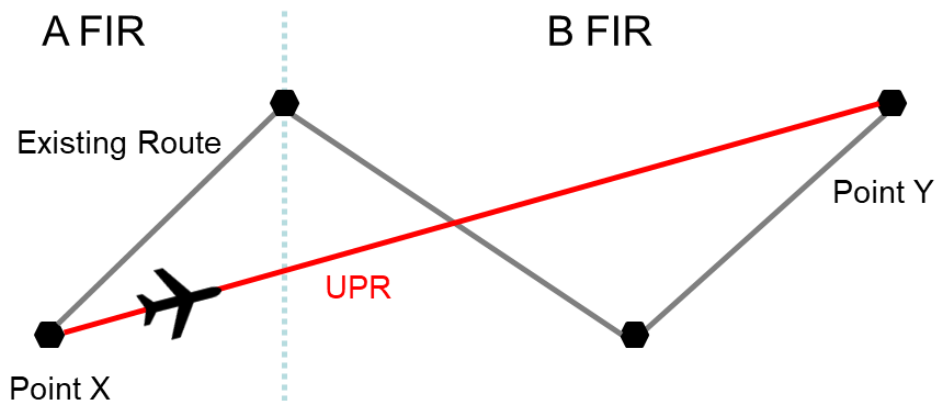


Figure4-3: Example of UPR introduction (when seamless UPR can be set in A FIR and B FIR)

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) note the effect of shortening flight distances and reducing CO2 emissions by implementing UPR / FRA
- b) recommend States to consider implementing seamless UPR/FRA between neighboring States; and
- c) share the implementation process, evaluation methods, and best practices to help promote the implementation of UPR/FRA in other states which are considering the implementation of UPR/FRA in the future.

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