International Civil Aviation Organization

Fifth Meeting of the Bay of Bengal Traffic Flow Review Group (BOB TFRG/5)

Bangkok, Thailand, 6 – 8 December 2023

Agenda Item 6: Any Other Business

US Federal Aviation Administration (FAA) Implementation of Performance-Based Separation Minima

(Presented by United States)

SUMMARY

This paper elaborates the process and actions that the FAA executed to implement Performance-Based separation minima, including changes to automation, collaboration with airlines and adjacent facility staff, controller training and other actions. We hope this information will be useful to ANSPs who are considering implementation of Performance Based separations in their own Control Areas (CTA).

1. INTRODUCTION

1.1 This paper provides information on the FAA's actions to implement reduced Performance Based ADS-C separation minima starting with the effort to obtain a new Oceanic Automation System that would support the application of the minima. The paper also discusses the implementation of PBCS requirements and other reduced separation minima. Information is also provided on the airspace benefits that come from the application of reduced separation minima.

2. DISCUSSION

2.1 Advanced Technologies and Oceanic Procedures (ATOP)

2.1.1 The FAA implemented the Oceanic Display and Planning System (ODAPS) system in 1989. ODAPS was a significant Oceanic Automation upgrade at the time that provided capabilities such as a visual traffic display, AIDC and CPDLC. ODAPS did not support reduced ADS-C separation minima. The FAA decided to replace ODAPS with a new automation system. This decision led to the Advanced Technologies and Oceanic Procedures (ATOP) program in 1998. The goal of the ATOP program was to evaluate existing Oceanic ATC systems and select and procure a system that would advance oceanic control for the FAA. The ATOP Program desired to acquire an Oceanic Control System that operated with a "control by exception" philosophy. With "control by exception" the oceanic ATC system would automate as many functions as safely possible and alert the controller to any situations that needed controller oversight or action. The new replacement system also needed to have the capabilities to support reduced ADS-C 30 NM longitudinal and 30 NM lateral (30/30) reduced oceanic separation minima that were published by ICAO in 2002. The FAA selected a replacement system from Lockheed Martin that was in use in New Zealand.

2.1.2 While a contract to procure the ATOP system was awarded in 2001 the work to implement the ATOP System was just beginning. The ATOP Program system evaluation had identified areas where the software was to be enhanced to meet FAA Controller needs. The heart of the new ATOP system was a certified Conflict Probe that controllers could rely upon to separate aircraft.

2.1.3 From 2001 to 2004, the FAA conducted extensive software testing and evaluations of the new ATOP system software. The FAA performed many system safety evaluations to determine when the system was ready for implementation. In June 2004 the ATOP system had advanced to the point where it was ready for initial limited-use evaluations. Oakland ARTCC conducted Initial Daily Use (IDU) testing. During IDU testing, Oceanic Control within one Oakland oceanic sector was provided by ATOP controllers for a couple of hours. During IDU, the Air Traffic Control services were mirrored on the legacy ODAPS control room so that responsibility for ATC services control be immediately transferred back to the ODAPS control room if a problem was encountered. Through offline testing and IDU, a safety assessment concluded that the ATOP system was ready for 24/7 operations.

2.1.4 Training Courses were developed for controllers and automation/hardware support personnel by the ATOP Subject Matter Experts (SME). The ATOP SMEs included FAA and New Zealand system experts. After several ATOP SME reviews of the ATOP Training courses, the courses were deemed ready for evaluation. The FAA conducted First Course Conducts (FCC) to evaluate the training courses. In an FCC, FAA personnel without ATOP experience were selected to take the course. After the lessons were completed, an evaluation of the lessons was completed and any necessary changes to the courses were made. The newly completed ATOP system controller training course required all the facility oceanic controllers to take a weeklong training course and skills assessment on an offline dynamic simulation (DYSIM) system. The ATOP ATC Training Course included how to operate the system, procedural rules for the application of reduced ADS-C separation minima and training on new functionalities like ADS-C. It took months to train all the facility oceanic controllers on the new ATOP system. To ensure the controllers retained their knowledge and skills on the ATOP system after completing the ATOP training course, they received weekly refresher training to retain their newly learned skills.

2.1.5 Transition plans from the legacy ODAPS system to the new ATOP system were developed. This included ATC procedures for 24/7 mirrored operations during the initial transition so that the facility could fall back to the legacy ODAPS control system if unexpected critical problems were encountered.

2.1.6 On October 5, 2005, Oakland ARTCC transitioned to ATOP for 24/7 operations; during a low traffic period the individual sectors were transferred one at a time to ATOP control. Initially, each sector was shadowed by an ODAPS legacy sector for a period of time until we were confident with the new ATOP system. Once the transition to ATOP began, several ATOP SMEs were available on the control room floor 24/7 to answer questions and assist controllers in operating the new system. Over time as controllers became more proficient on the new system, the number of ATOP SMEs was reduced until they were eventually unneeded.

2.1.7 The ATOP Conflict Probe applied standard oceanic separation minima based on the capabilities in the aircraft flight plan. For most aircraft standard oceanic separation was 50 NM laterally and 10 minutes longitudinally. The controller could elect to have ATOP apply 50 NM longitudinal separation (D50) to capable aircraft by selecting a D50 separation flag. The FAA delayed the transition to 30/30 separation for a few months to allow controllers to gain experience with the new ATOP System and the new D50 reduced CPDLC/ADS-C separation. During that time, a Safety Evaluation Team was formed to develop a transition plan to 30/30 separation by testing and validating the 30/30 minima in one ATC sector (OC3) at Oakland ARTCC. After completion of the required 30/30 refresher training, controllers started using 30/30 minima in Sector OC3. The Safety Evaluation Team carefully monitored OC3 operations to evaluate readiness for expansion of the reduced separation standard to the entire Oakland Oceanic FIR (KZAK). Due to several satellite Ground Earth Station (GES) outages during the evaluation period, which required controllers to revert to standard oceanic separation minima when CPDLC and ADS-C capabilities were lost, the Safety Evaluation Team recommended restricting the application of reduced separation minima (D50 and 30/30) to appropriately equipped aircraft that were climbing or descending through the flight level of another equipped aircraft. This restriction was deemed necessary to mitigate the risk of the data link GES outages.

2.1.8 Over the next two years, the FAA worked with the Data Link Service Provider (DLSP) to increase the reliability of their Satellite GES to an acceptable level. In June 2007, KZAK FIR controllers were authorized to apply the D50 and 30/30 minima between properly equipped aircraft at the same altitude for "targets of opportunity". Route structures were not revised to account for the 30 NM lateral minimum.

2.1.9 The FAA continued with the application of the D50 and 30/30 minima in their Oceanic FIRs for over 12 years. On March 29, 2018, ICAO introduced a global implementation of Performance-Based Communication and Surveillance (PBCS) Required Communication Performance 240 (RCP240) for CPDLC and Required Surveillance Performance 180 (RSP180) for ADS-C requirements to apply the D50 and 30/30 minima. Despite ICAO delaying the implementation of the PBCS requirements for over 15 months, many aircraft that were previously eligible for D50 and 30/30 separation did not have State approvals for PBCS RCP240 and RSP180 and were no longer eligible for the smaller minima. On March 29, 2018, the FAA along with many other ANSPs implemented software changes that added the requirements for an aircraft to have the RCP240 and RSP180 approvals in their flight plan to apply the D50 and 30/30 minima.

2.2 Enabling Further Performance Based Longitudinal Separation Reduction

2.2.1 In November 2020, ICAO published a 20 NM Performance Based Longitudinal Separation (PBLS) minimum in addition to the 30 NM PBLS minima. The 30 NM separation requires an ADS-C periodic reporting rate of at least one message every 12 minutes, while the 20 NM separation requires at least one message every 3.2 minutes. The FAA plans to implement the 20 NM PBLS minimum in its three Oceanic FIRs in 2024 after delays caused by the COVID-19 pandemic. The FAA ATOP system will have software modifications to manage the ADS-C periodic rates so that controllers will have the correct ADS-C reporting rate for the PBLS minimum being applied.

2.2.2 As per PANS-ATM document 4444, paragraph 5.4.2.9.2 Note, the ADS-C reporting rate required for application of the 20 NM PBLS minimum "*is intended for use during application of the 37 km (20 NM) separation minimum between specific aircraft pairs and is not intended for use as a default periodic reporting interval for all aircraft.*" Changing the ADS-C periodic reporting rate requirement to <u>a maximum of 3.2 minutes</u> raised FAA concerns about the potential to increase controller workload and time for processing aircraft clearances. Therefore, after the initial implementation of the 20 NM PBLS minima, the FAA is considering running a trial to determine if <u>*a 3.2 minute default*</u> periodic reporting rate would have a negative effect on PBCS performance. A default rate of 3.2 minutes is expected to reduce the time for processing aircraft clearances and controller workload associated with such tasks. An increased 3.2 minute default ADS-C reporting rate would also increase overall safety within the implementing FIR.

2.3 Enabling Further Performance Based Lateral Separation Reduction

2.3.1 In November 2016, ICAO revised the PANS-ATM Document 4444, paragraph 5.4.1.2.1.6 30 NM lateral minimum to 23 NM between aircraft with State approvals for RNP4, RCP240 and RSP180. The FAA recently introduced the 23 NM separation minimum in all 3 of the Oceanic FIRs in which they provide ATC services. The 23 NM lateral minimum introduced no new requirements to apply the minimum. The FAA revised the ATOP software to look for 23 NM instead of 30 NM. While not required for application of the 23 NM minimum, the FAA also introduced an ATOP software change to automatically probe aircraft that provided positions that were laterally Out of Conformance (OOC) by 5 NM or more for conflicts. This ATOP safety enhancement alerts controllers so that they may react quicker to aircraft that are laterally OOC.

2.4 NOPAC Redesign Project

2.4.1 Since 1974, the NOPAC route system consisted of 5 parallel routes with a minimum of 50 NM between the routes (See Figure 1). In 2016 the FAA proposed to IATA and JCAB a project to complete a redesign of the NOPAC parallel route system to utilize the 23 NM lateral minima. Aircraft flying the NOPAC Route System between Anchorage Oceanic and Fukuoka FIRs are predominantly equipped with satellite-capable FANS 1/A which could be capable of the 23 NM lateral minimum. In 2018 only 33% of the NOPAC aircraft had obtained State approvals for

RNP4, RCP240 and RSP180 necessary to apply the 23 NM lateral minimum. IATA and JCAB supported the NOPAC Redesign proposal.

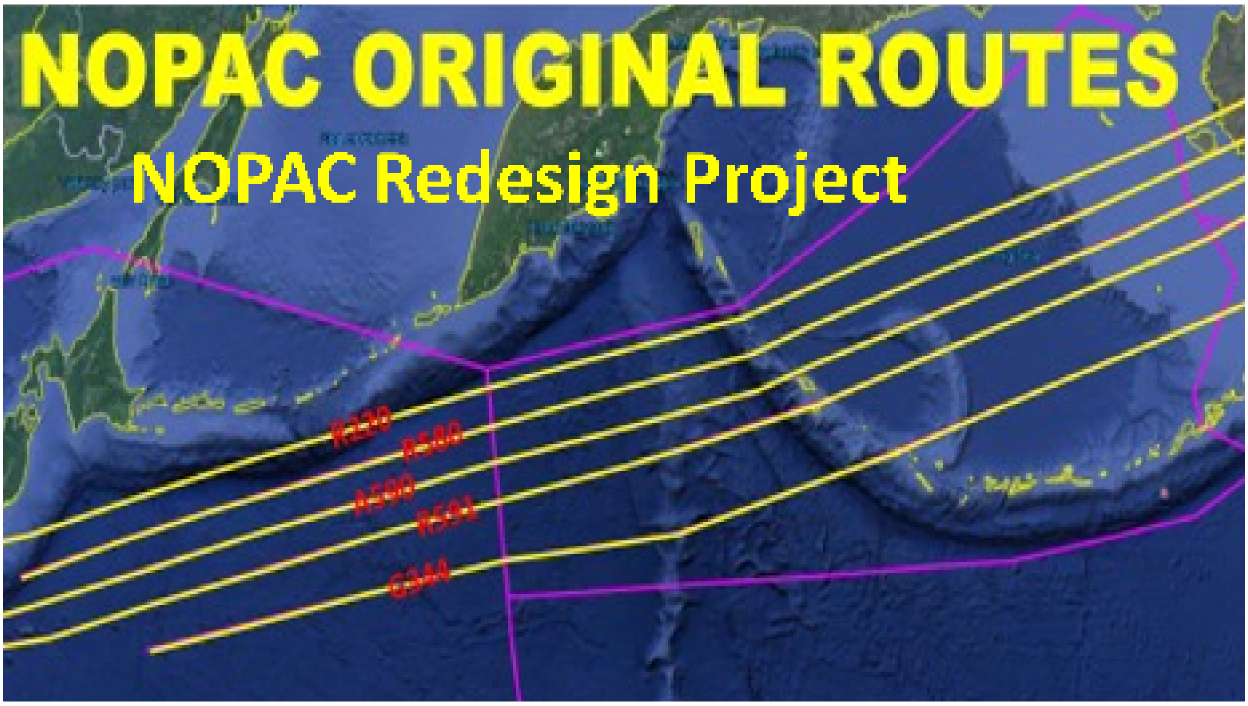

Figure 1, NOPAC Original Routes

2.4.2 Until the NOPAC Redesign, the FAA limited the application of 23 NM lateral, D50 and 30/30 separation minima to "targets of opportunity". Target of Opportunity meant that a controller may apply the reduced separation minima between an aircraft pair that meets the requirements if an opportunity existed. No route systems were developed with the 30 or 23 NM lateral minimum between the routes. The FAA began working on a collaborative effort with JCAB, IATA and the operators to develop a three-phased plan for compressing the NOPAC system into four unidirectional routes with a lateral spacing of 25 NM. Figure 2 illustrates the layout of the final NOPAC redesign plan. The plan removes the three southern routes in the original NOPAC system while retaining the underlying waypoints for flexible tracks and user-preferred route (UPR) flight plan filing. As a result, a significant portion of the NOPAC airspace will be opened for more efficient route flight planning.

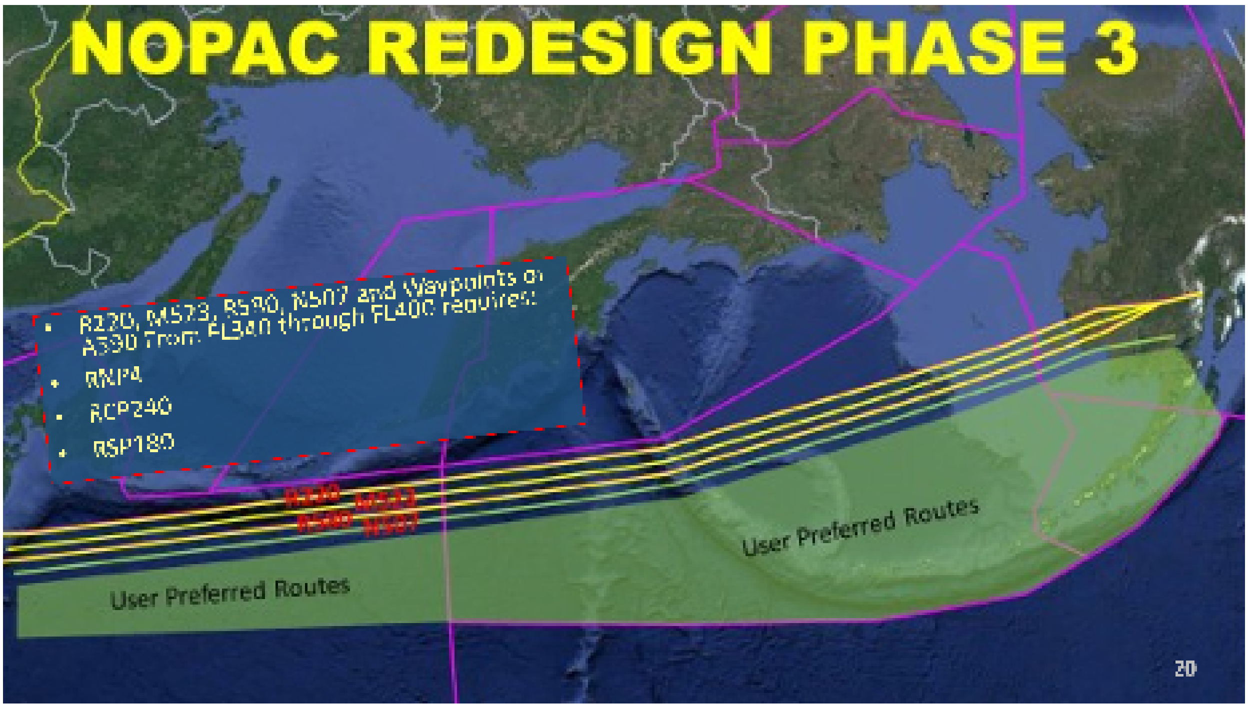

Figure 2, NOPAC Redesign Final Phase 3

2.4.3 The FAA and JCAB made a collaborative decision that the NOPAC overall RCP240, RSP180 and RNP4 approval percentage needed to be 90 percent or greater to proceed with the 23 NM lateral separation minimum between the routes. The 90 percent requirement was necessary to manage the controller workload. The FAA, JCAB and IATA worked to explain the benefits of the NOPAC redesign to the operators through presentations at several International Meetings over a 5-year period. Additionally, monthly NOPAC data collections were completed to identify NOPAC Airspace Users without RNP4, RCP240 and RSP180 approvals in their flight plan. Emails were sent to those airspace users when a contact could be found to advise them about the NOPAC Redesign and give them time to obtain the necessary approvals if they desired to get them. Through these outreach efforts, the overall RNP4, RCP240 and RSP180 NOPAC approval percentage was raised from 33% in April 2018 to over 93% in October 2023 (see Figure 3).

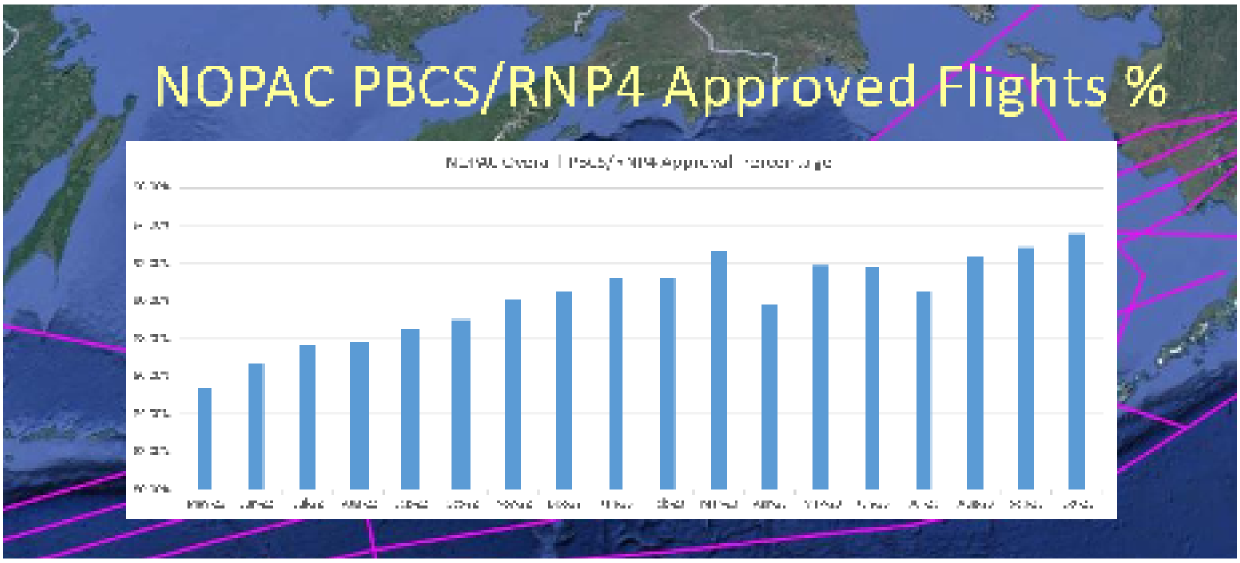

Figure 3, NOPAC Overall PBCS/RNP4 approved flights

2.4.4 The NOPAC Redesign Project consists of phased improvements as follows:

- Phase 1a was implemented in December 2021
- Phase 1b was implemented in February 2023: removing the two southernmost routes to create more airspace for flexible tracks and UPR flight plan filing.
- Phase 2 will be implemented on January 25, 2024: a new route, M523, will be published between the two northernmost routes R220 and R580 with a lateral spacing of 25NM between the routes.
  - The 23 NM lateral separation minimum (PANS-ATM 5.4.1.2.1.6) will be applied between these 3 northernmost routes from FL340 through FL400. Aircraft operating on R220, M523 and R580 are required to have RCP240, RSP180 and RNP4 approvals from FL340 through FL400 to accommodate the 23 NM lateral minimum applied between the routes. M523 is closed to aircraft at or below FL330 and at or above FL410.
  - Aircraft without the RCP240, RSP180 and RNP4 approvals may operate on R220 and R580 at or below FL330 and at or above FL410. Aircraft without these approvals may also operate on ATS route A590 or south of A590 without any altitude restrictions. More detailed information on the NOPAC Redesign Project is provided in the IPACG 48 WP-01, see Reference 1.
- Phase 3 implementation date is to be determined but is expected to be in the second half of 2024.

2.4.5 While it was suggested that the NOPAC routes be designated as PBCS and RNP4 exclusive airspace, there were many cargo and business aviation aircraft that didn't have their PBCS and RNP4 approvals. While not an absolute, these aircraft frequently operated at FL330 and below or FL410 and above. The impact of the NOPAC Redesign on these aircraft could be reduced by limiting the mandatory application of the 23 NM separation minimum to the FL340 through FL400 altitude stratum. After the initial implementation at FL340 through FL400 in NOPAC is completed, the aircraft capabilities will be monitored to possibly expand the altitude stratum in the future if it provides an advantage.

2.4.6 The 23 NM lateral separation minimum requires an RCP240 and RSP180 data link connection with the aircraft. The data link network that supports RCP240 and RSP180 experiences periodic outages. When an aircraft loses its data link connection, ATC must revert to larger separation minima without PBCS requirements. Depending on which part of the data link network fails, the number of aircraft that are affected will vary. Many NOPAC data link outages only affect a small subset of the data link aircraft in the NOPAC airspace. However, there are data link outages that affect the bulk of the aircraft in the NOPAC airspace.

2.4.7 A frequent question about the NOPAC Redesign project is "Why is there 25 NM between the routes when the separation minimum is 23 NM." The extra 2 NM was created on purpose to allow controllers to revert to standard oceanic RNAV10 lateral separation, 50 NM. In the event of a large-scale data link outage that affects multiple aircraft, every other route will be 50 NM apart. This allows controllers to change the altitudes on one NOPAC route to "even" flight levels (e.g. FL340, FL360, FL380, etc), and aircraft on the adjacent route would be transitioned to "odd" flight levels (e.g. FL350, FL370, etc). When the aircraft altitudes have been staggered to be at odd and even flight levels on the adjacent airways, standard RNAV10 lateral separation will exist. An example of this is shown in Figure 4 below. In Figure 4, AAL523 and JAL507 are climbed to FL380 during a data link network outage to create vertical separation with the adjacent route. CPA48 and JAL124 did not have to be moved to an "odd" altitude because they have standard oceanic longitudinal separation with AAL523.

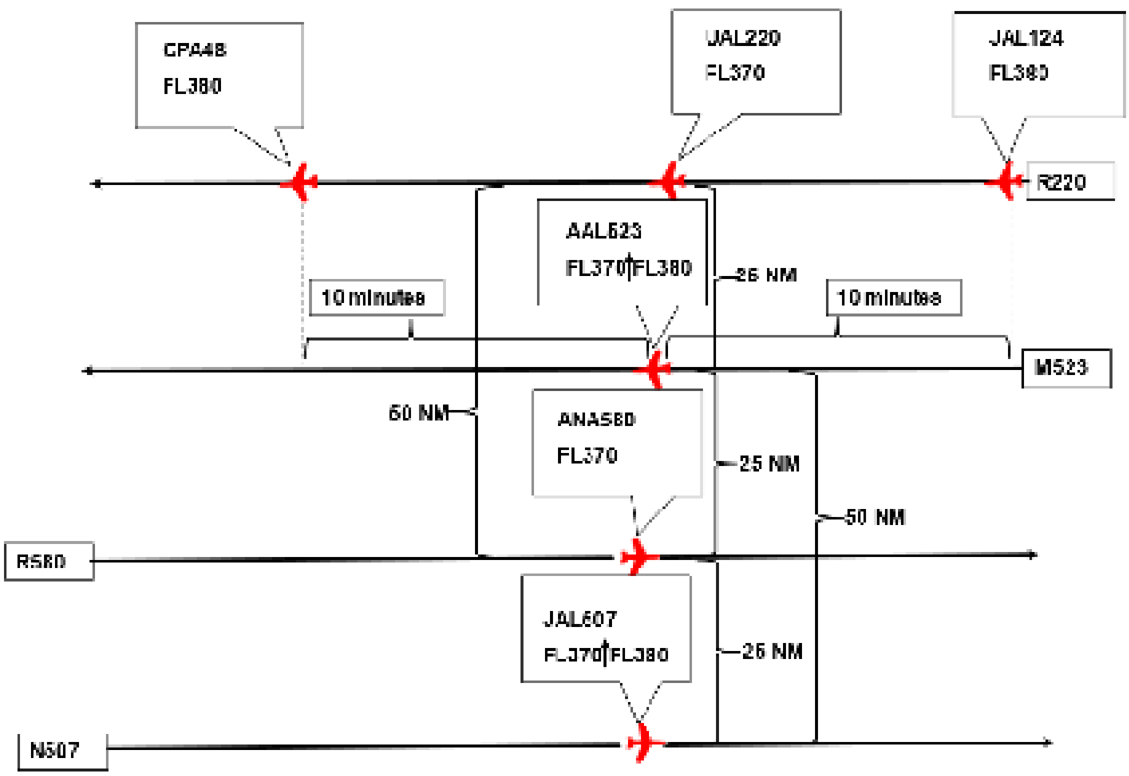

Figure 4, NOPAC Altitude Staggering on Adjacent Routes during a Data Link Outage.

2.4.8 The NOPAC airways cross the Fukuoka/Anchorage FIR boundary, so it is critical that Fukuoka and Anchorage Controllers use the same data link outage procedures. Fukuoka ATMC and Anchorage ARTCC have discussed the procedures to manage traffic during a data link network outage. At the beginning of a data link outage, the two facilities will discuss the outage, and how large the impact is and agree on a plan to manage the outage. For outages that only affect a few aircraft, the plan will most likely be to tactically revert the few affected aircraft to the standard larger oceanic minima and continue normal operations with the unaffected aircraft. If the data link outage has a large impact and affects multiple aircraft, the decision will likely be to revert all the aircraft to standard oceanic separation and temporarily close some airways to new aircraft entering the airspace until the data link network outage is restored.

2.5 BENEFITS OF REDUCED SEPARATION MINIMA: The FAA is working to implement oceanic reduced separation minima when a cost-effective overall benefit can be obtained. The reduced separation minima contributes to improved overall airspace efficiency.

2.5.1 To measure airspace efficiency, the FAA began tracking some oceanic airspace metrics in 2003 to measure airspace aircraft capabilities and airspace efficiencies. Figure 5 below measures the percentage of times when a controller was able to clear an aircraft to change altitude in response to an aircraft request in the KZAK FIR. When ATOP and D50 separation was implemented in October 2005 we can see about a 5% increase in the percentage of FANS1A data link aircraft that were able to obtain clearance to their requested altitude. In June of 2007 when 30/30 was allowed to be applied to aircraft at the same altitude, there was only a modest increase in the number of aircraft that were able to receive clearance to their requested altitude. A larger increase in the percentage of aircraft that were able to be cleared to their requested altitude when 30/30 separation was implemented would be expected, but it makes more sense when you look at the aircraft capability data in Figure 6 below.

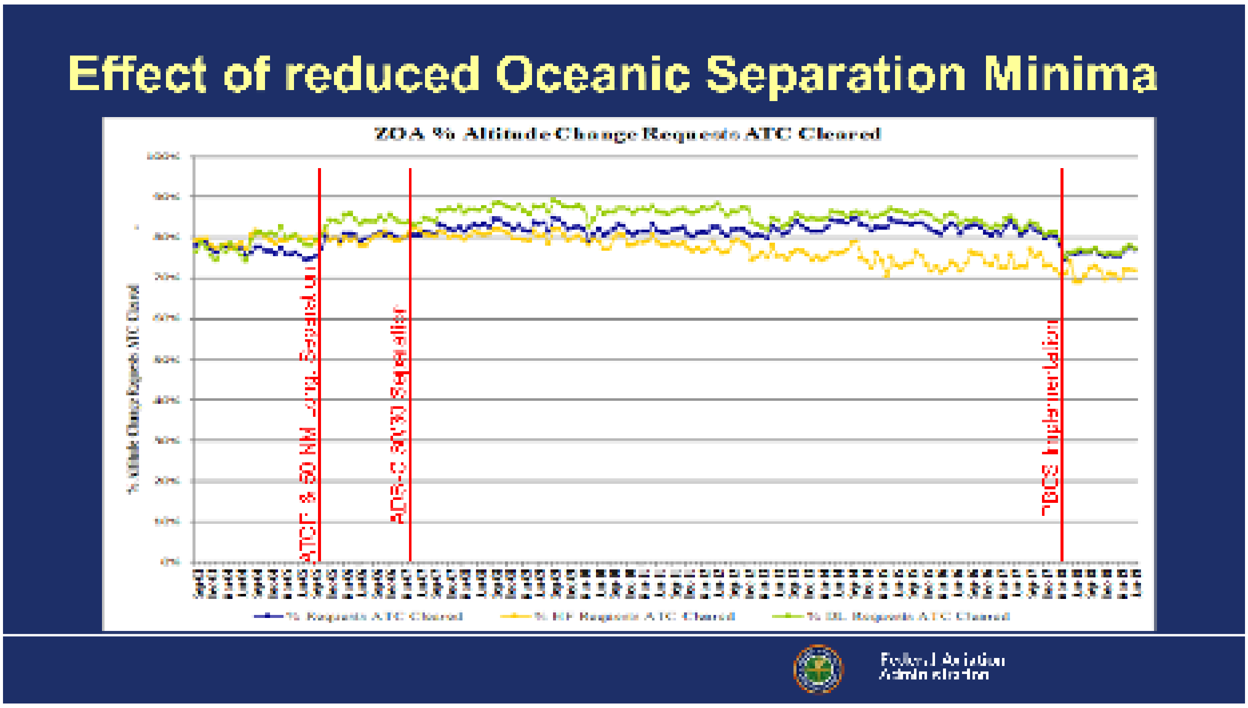

Figure 5, Effect of Reduced Oceanic Separation Minima

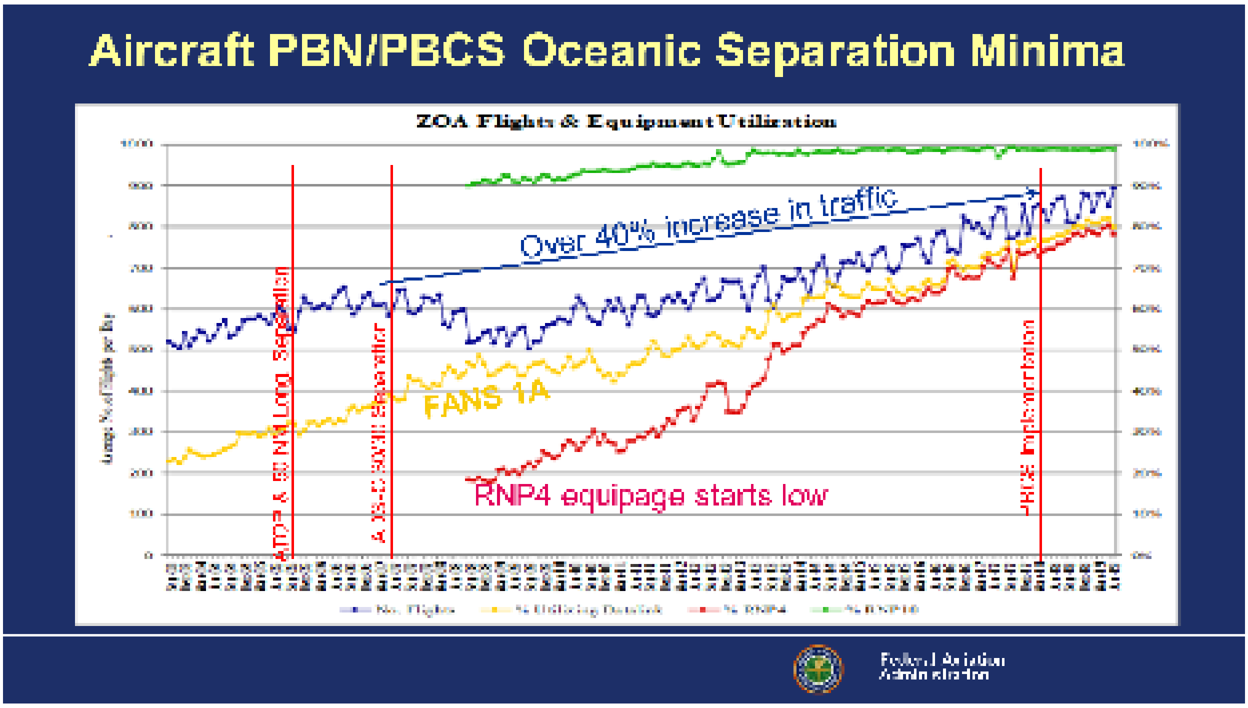

Figure 6, Aircraft PBN and Data Link capabilities in the Oakland Oceanic FIR

2.5.2 Application of the 30/30 separation minima in 2007 required RNP4, CPDLC and ADS-C. In June 2007, only about 40 percent of the aircraft in the KZAK FIR had the CPDLC/ADS-C capability. The percentage of aircraft with RNP4 approvals was even lower, below 20 percent. In order to apply the 30/30 minima both aircraft had to have the CPDLC, ADS-C and RNP4 capabilities; this meant that there were few opportunities for the controller to apply the 30/30 minima when it was first introduced. Over the next ten years, traffic increased 40% in the KZAK FIR. With the large increase in traffic, it would be expected that the percentage of aircraft that were able to be cleared to their requested altitude would drop, but the percentage in Figure 5 remained relatively the same. This makes sense when you consider that while the traffic levels increased, at the same time the CPDLC, RNP4 and ADS-C capability also increased to about 75 percent. So while there was more traffic competing for the airspace, controllers were able to apply the 30/30 minima to more aircraft, and the percentage of aircraft that were able to receive clearance to their requested altitude remained fairly constant.

2.5.3 In April of 2018, we can see around a 5% drop in the percentage of aircraft that were able to receive clearance to their requested altitude. This drop is associated with the March 29, 2018, implementation of PBCS RCP240 and RSP180 requirements to apply the D50 and 30/30 separation minima. Prior to March 2018, about 75% of aircraft were eligible to have the 30/30 separation minima applied to them. After March 29, 2018, the percentage of 30/30 aircraft eligible aircraft dropped to 33 percent. Thirty-three percent was the percentage of aircraft with RNP4/PBCS approvals in the KZAK FIR. See Figure 7 below. The 5 percent drop in aircraft cleared to their requested altitude would have been higher if not for the ADS-C Climb and Descent Procedure (CDP). The CDP was in use in the KZAK FIR when PBCS was implemented. The CDP allows an aircraft to climb or descend through a blocking aircraft's altitude with as little as 15 NM longitudinal separation. After PBCS was implemented, the number of CDP clearances issued increased dramatically in the KZAK FIR.

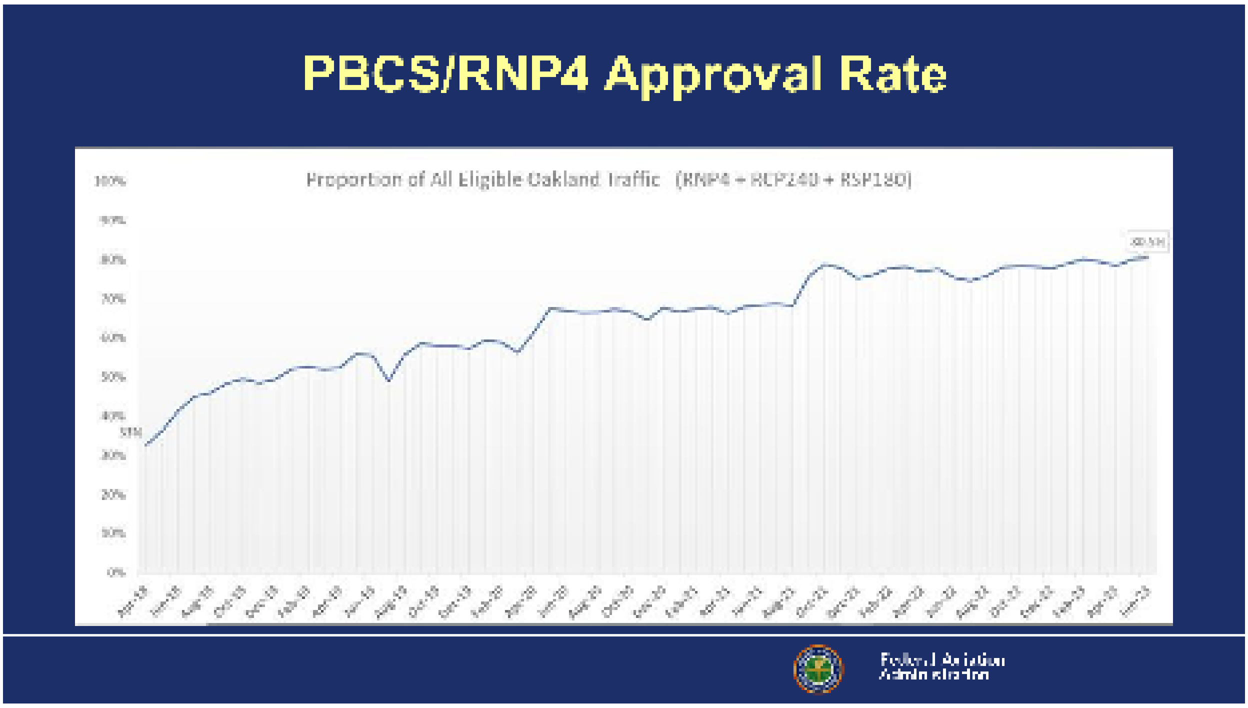

Figure 7, Percentage of aircraft in the KZAK FIR with RNP4, RCP240 and RSP180 approvals

2.5.4 The data in Figures 5 and 6 demonstrate that reduced oceanic separations contribute to airspace efficiency, but only if aircraft have the capabilities to apply the reduced minima. The FAA published many papers in the Pacific after the implementation of the 30/30 minima to promote the efficiency benefits of reduced oceanic separations and the aircraft approvals necessary to apply the minima. It can be seen in Figures 6 and 7 that the operators recognized the benefits of reduced separations and obtained their RNP4 and PBCS approvals.

2.6 Lessons Learned From the Implementation of Reduced Separation Minima

2.6.3 CONCEPT OF OPERATIONS: It is important to have a Concept of Operations (CONOPS) when implementing a new separation minimum. The CONOPS defines how and where the new separation minimum will be applied. The CONOPS will help drive the Airspace Safety Assessment, ATC Automation Changes, Adjacent ANSP LOA changes, and implementing controller procedures.

2.6.4 SAFETY ASSESSMENT: Prior to implementing a new separation minimum in an airspace volume, States must complete a local safety assessment to ensure the airspace will maintain the Target Level of Safety. The ICAO SASP safety assessment undertaken for global purposes does not always contain all the information required to address specific local implementation requirements. ICAO now publishes guidance material with new separation minima to assist States in implementing the minimum. The PANS-ATM Doc 4444 will usually list the applicable ICAO Implementation Manual Circular or Document. ICAO has not published some of the Implementation Guidance Manuals that are currently listed in PANS-ATM Doc 4444 separation minima. If unable to obtain the Implementation Guidance Material listed in PANS-ATM, contact ICAO or a Separation and Airspace Safety Panel (SASP) member who should be able to provide a copy of the final draft implementation document.

2.6.5 COLLABORATION WITH ADJACENT ANSPs: In a perfect world all ANSPs would implement new separation minima as they are published, and aircraft would seamlessly transition from one CTA/FIR into the next. Most often though, different ANSPs will implement separation minima at different times or another ANSP may not implement a separation minimum in their CTA/FIR at all. When considering implementing a new separation minimum in your CTA/FIR, discuss your implementation plans with adjacent ANSPs to hopefully reach an agreement to implement a new minimum at the same time, ensuring seamless operations for aircraft crossing the CTA/FIR boundary. Pre-implementation collaboration will ensure that both ANSPs are using the same procedures and any differences may be mitigated in an LOA. When CTAs implement new separation minima at different times, an ANSP must develop procedures to manage instances where an adjacent ANSP will not accept a minimum.

2.6.6 The NOPAC Redesign Project is a prime example of ANSP collaboration. Without close collaboration between the FAA and JCAB, the NOPAC Redesign Project wouldn't have been possible. With support from IATA, JCAB and the FAA met to reach an agreement on a plan to reduce the spacing between the NOPAC Routes from 50 NM to 25 NM. It has been 7 years since the NOPAC Redesign project was first proposed. There were challenges throughout the process that had to be managed by JCAB and the FAA. The COVID-19 Pandemic caused a major reduction in the overall percentage of PBCS/RNP4 aircraft approvals that are needed to apply the 23 NM lateral minimum between the routes. Additionally, both the FAA and JCAB encountered ATC system software delays needed to apply the 23 NM minimum. How to safely manage periodic data link network outages was one of the largest challenges to be cleared. JCAB and the FAA worked together to persevere over these challenges, and Phase 2 of the project with 25 NM laterally spaced routes will be implemented on January 25, 2024.

2.6.7 COLLABORATION WITH AIRSPACE OPERATORS: The amount of Airspace Operator collaboration required can vary greatly depending on the magnitude of the project. In the cases where the FAA implemented reduced Performance Based ADS-C Separation minima to Targets of Opportunity, there was little operator collaboration required. The FAA presented papers to International Meetings advising operators of our intent to implement a reduced separation minimum between aircraft with the required capabilities. Experience has shown that many operators will not obtain the necessary approvals to apply a reduced minimum unless a clear positive business case can be presented. A prime example of this is the FAA implementation of the 30/30 minima. A low percentage of operators had obtained RNP4 approval for their aircraft. Operators didn't want to obtain RNP4 approval because it would cost them more money for the more frequent ADS-C reports associated with RNP4. The papers showed that the operators were losing more money by being stuck at suboptimal altitudes because of a lack of RNP4 approvals. An example of one of these Lost Fuel Savings Due to Lack of RNP 4 & FANS-1A Equipage papers is provided in Reference 2. These papers were very successful in increasing the number of aircraft with RNP4 approvals.

2.6.8 The NOPAC Redesign Project was not needed by the FAA and JCAB to manage the traffic in the NOPAC airspace. The project is an effort to improve airspace efficiency for the operators. The NOPAC Redesign would not be possible unless a high level of NOPAC airspace users obtained PBCS and RNP4 approvals. JCAB and the FAA worked with IATA and the operators to gain their support for the NOPAC Redesign by showing the project benefits through meeting papers/presentations and emails. Through collaborative efforts, we were able to increase the percentage of NOPAC aircraft with both PBCS and RNP4 approvals from 33% to over 93%.

2.6.9 ATC AUTOMATION SYSTEM CHANGES: When implementing a new Performance-Based Separation Minima, ATC System automation changes are usually required. The FAA ATOP system and ATC rely upon a sophisticated Conflict Probe to provide control services. So, when a new separation minimum is implemented, changes to the conflict probe software are required. Many of the Conflict Probe requirements are driven by the PANS-ATM Doc 4444 separation requirements, but there may be additional changes needed to meet operational and safety needs. For example, how will the separation be applied by controllers according to the CONOPS? Should the ATC System automatically apply the separation minimum, or should the controller tell the system when to apply the minima between aircraft pairs that meet the requirements? The Safety Assessment may also necessitate additional automation requirements. For example, the PANS-ATM Doc 4444 paragraph 5.4.2.9.2 requires a maximum 12-minute periodic rate. The FAA safety assessment for the implementation of 30 NM longitudinal separation required a maximum 10-minute periodic reporting rate to meet the Target Level of Safety (TLS) in the New York and Anchorage Oceanic FIRs.

2.6.10 ICAO IMPLEMENTATION GUIDANCE: The ICAO Implementation Guidance Docs/Circulars describe certain airspace assumptions that SASP used in the Collision Risk Modelling (CRM) for a separation minimum. A State's local Safety Assessment may identify areas where automation changes will help meet the SASP airspace assumptions for the CRM. An FAA example of this is the Controller Reaction Time (CRT) to aircraft in lateral Out of Conformance (OOC) situations. The FAA implemented a conflict probe for aircraft that were laterally OOC, to improve the controller's capability to quickly react to an uncleared aircraft deviation toward another aircraft. Overall, the CONOPS, Safety Assessment, ICAO Implementation Manuals, ICAO PANS-ATM, and Controller needs will drive automation requirements.

2.6.11 The CONOPS defines where the separation minimum will be applied. The FAA ATOP system has adaptation data that defines where the minimum may be applied both internally and externally. If an adjacent ANSP does not apply a minimum, their CTA is not adapted as eligible for the minimum. In this case, the Conflict Probe will identify a conflict between any aircraft pairs that have less than the minimum separation applied in the external CTA starting at the boundary. The controller may then establish another form of separation prior to the aircraft pair crossing the boundary.

2.6.12 CONTROLLER TRAINING: The scope of the change will drive Controller Training. Small changes may only require a controller briefing on the change. Larger changes may require briefings and possibly offline DYSIM training. The FAA puts together a team of SMEs to evaluate future changes and develop the necessary training requirements and materials.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

3.1.3 note the information contained in this paper;

3.1.4 encourage and support the implement of reduced oceanic separation minima;

3.1.5 discuss any relevant matters as appropriate.

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REFERENCES

1. *North Pacific (NOPAC) Route System Redesign*, Eleventh Meeting of the Air Traffic Management Sub-Group (ATM/SG/11) of APANPIRG, WP/29, https://www.icao.int/APAC/Meetings/2023%20ATM%20SG%2011/WP29%20North%20Pacific%20(NOPAC)%20Route%20System%20Redesign.pdf
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