International Civil Aviation Organization

Sixth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/6)

Bangkok, Thailand 2-4 June 2025

Agenda Item 5: ATM Automation System Implementation Experience by States

INTEGRATION OF A MODERN FLIGHT PLANNING SERVICE INTO ATMAS OPERATION

(Presented by New Zealand)

SUMMARY
Starting in 2021 Air New Zealand and Airways Corporation (Airways) worked collaboratively to integrate the airline's new flight planning functionality into operations. The project was carried out over 3 years and realised benefits and challenges in its operationalisation that are discussed in this paper.

1. INTRODUCTION

1.1 In 2021 Air New Zealand initiated replacement of its legacy flight planning system with a Flight Plan (FPL) Service Provider – Flightkeys. The airline worked with New Zealand's ANSP (Airways) to collaboratively integrate the new flight planning functionality. This paper summarises ATMAS integration activity, and the benefits and challenges encountered in application. Learnings from the New Zealand experience are also provided.

2. DISCUSSION

Integration project overview

2.1 In 2021 Air New Zealand commenced a program to replace its existing flight planning system with a FPL Service Provider – Flightkeys. It did so for several reasons:

- Future withdrawal of support by existing flight planning system vendor
- Reducing a significant amount of technical debt
- Earlier planning horizon and trajectory management flexibility
- Workload efficiency gains and resulting safety impact
- Preparation for Trajectory-Based Operations (TBO)/FF-ICE[1]

2.2 The airline approach Airways to commence integration with the ANSP's two ATMASs (One Domestic/One Oceanic). Integration spanned 3 years, with both sides working collaboratively on FPL ingestion and handling, then validating design via end-to-end testing.

[1] Flight and Follow – Information for a Collaborative Environment

2.3 Technical integration was relatively straight forward as both the flight planning service and ATMASs used ICAO FPL 2012 and associated messaging. Only one significant technical change to the Domestic ATMAS was required to support the airline's desired FPL route filing.

2.4 Implementation was conducted in two phases 18 months apart. Phase One, Jet fleets and Phase Two, Turboprops. Several benefits were realised, though the flight planning service's trajectory management and early filing capabilities created operational challenges.

Domestic ATMAS enhancement for route filing without using SRC designators

2.5 Used within New Zealand, Standard Route Clearance (SRC) designators, are a shorthand version of the ATS preferred routes defined in the New Zealand AIP. In New Zealand, initial ATC clearance is inclusive of the full route. SRCs provide an efficient way for ATC to convey clearances *by voice*. However, for aircrew they create workload as they must record the SRC and decode it into full route detail. SRC are also not FMS supported, so crew must also cross reference the SRC route with that loaded in the FMS to confirm synchronisation.

2.6 Air New Zealand wished to cease filing SRCs due the above and as SRCs were not inherently supported by the new flight planning service without enhancement. However, both the airline and Airways wished to preserve the efficiency of initial clearance delivery that SRCs afforded.

2.7 To resolve non-SRC filing, all parties worked collaboratively to modify their systems. Airways enhanced the Domestic ATMAS and tower-based Electronic Flight Strip (EFS) system to process longform ATS preferred routes in an effective manner while Air New Zealand, Flightkeys and Airways reviewed and modify route databases to align them and avoid issues that would otherwise manifest in filing the SRC described longform route[2]

2.8 Now, when any FPL is received with a longform route, it is checked against a database of ATS preferred routes and, if matched, the ATMAS/EFS system provide an indication to ATC that the route is approved (PRF – Preferred). They then clear the aircraft "*Via FPL route*". Datalink-based delivery automatically processes clearance requests with route detail that matches and provides a clearance response with a '*ROUTE: FPR*' (Route: Flight Plan Route) element.

2.9 For longform routes that don't match the database, the ATMAS provides no PRF indication. ATS will fully describe the route at clearance delivery. Digital clearance delivery will stop and revert the clearance request to ATC for a voice clearance inclusive of route description.

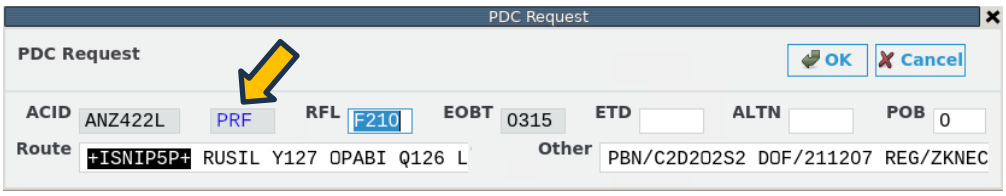

Fig. 1 ATMAS PRF indication for a FPL route/ATS preferred route match at clearance request

2.10 The enhancement of ATM and EFS systems to effectively process longform ATS preferred routes has facilitated aircrew workload and safety objectives but retained clearance delivery efficiency and integrity.

[2] Expanded SRC route often end with a route designator – Without modification, ATMAS ingestion of the designator could result in a disconnect for SID termination/STAR commencement waypoints and filing errors

Route/Level filing flexibility

2.11 Prior to the new functionality, submitted FPL would generally default to a predominant ATS preferred route, despite there often being more than one available between domestic city pairs. Level filing was similarly static. Change would often be requested by aircrew at clearance request or after departure when they assessed conditions at briefing or during flight. This situation created workload and planning limitations for crew and ATS.

2.12 Air New Zealand sought to utilise the dynamic trajectory management capabilities of the new flight planning service to calculate and, if operational data was updated, re-calculate route and level up to departure. With ATC able to accommodate the new filing method optimisation was viable and had the following benefits:

- *Reduced workload* – Trajectory prediction and accuracy mean change requests at clearance/in flight have reduced; the trajectory filed is now more often that which is flown
- *Extended planning horizon* – With a lower likelihood of trajectory change after submission, crew/ATC can put greater reliance on FPL information for tactical planning
- *Greater flexibility and efficiency* – With the limitations imposed by a preferred route structure, Air New Zealand has greater flexibility in flight planning, trajectory optimisation and efficiency gains

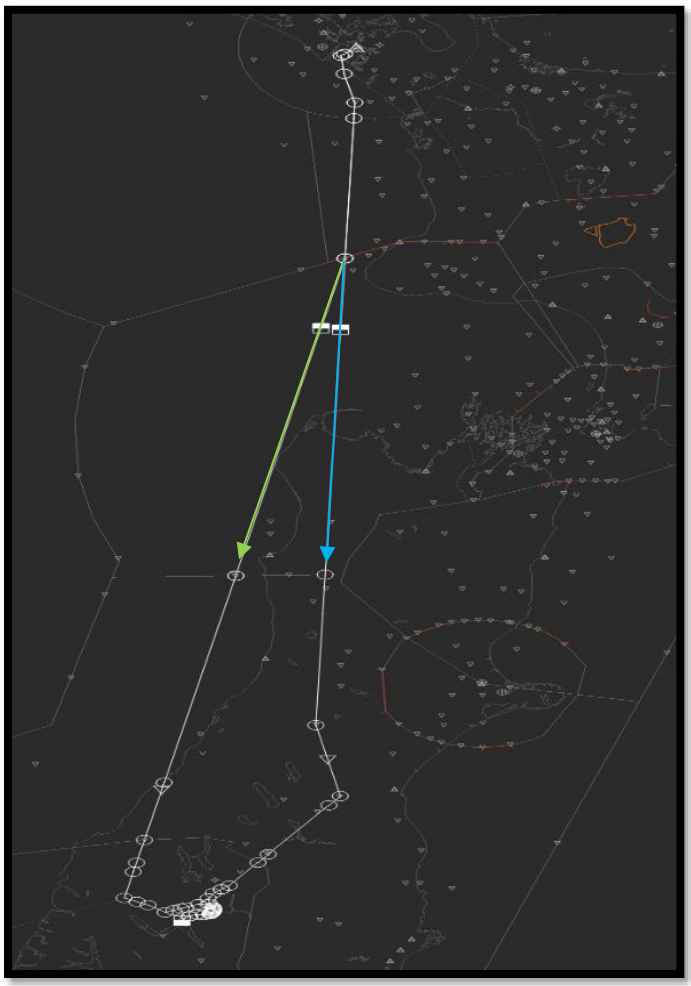

Fig. 2 Example alternative ATS Preferred Route between Auckland (NZAA) and Queenstown (NZQN). Predominant (left/Green) and alternative (right/Blue). The alternative is used when turbulence effects the predominant route.

Before the new flight planning function went live, the alternative route would be requested by crew after departure and crew assessment. Coordination of such change was workload heavy and included manual ATC notification and coordination across 3-4 units, atop the re-clearance to crew.

Now the alternative route is filed before departure based on Flightkeys calculation performance. Downstream coordination workload has been removed.

2.13 The dynamic nature of FPL trajectory management did require ATC/aircrew adjustment. Despite training, there were occurrences of ATC surprised by aircraft not routing as expected, though FPL detail was correct. There were also instances of aircrew, who had received their clearance, believing a subsequent flight operations originated change was inclusive of ATC approval. In both instances education and revised good operating practice resolved the issues.

FPL message handing

2.14 A modern flight planning system can conduct a lot of re-calculation. This reflects the orientation of such systems towards optimised trajectory. With the new flight planning service calculating/re-calculating up to departure, the level of CHG/DLA and CNL/Re-file messaging received by Airway's ATMASs increased significantly. The increase had a primary operational impact after the point that FPL distribution to ATS units occurred.

2.15 Airway's Domestic ATMAS will not auto-process FPL messaging received within the ATS posting timeframe (+26 min ETD). Such messages are routed to a Flight Data Repair (FDR) position who contact posted ATS units, ID the FPL, confirms the change, then update the system. This avoids desynchronisation of clearance/FPL detail between ATC and aircrew.

2.16 The increase messaging received after posting created high workload for FDR/ATS and raised the risk of FPL desynchronisation, particularly when CNL/New FPL was used for change and the order of sending or processing was incorrect. As a result, there were instances of FPL desynchronisation or, when crew requested clearance, missing FPLs.

2.17 ATS analysis of messaging also highlighted the threshold for change had decreased significantly. Degrees of change included:

- 1 kt speed changes
- 1minute delay changes

2.18 Discussion between Airways and Air New Zealand highlighted that most messaging received after posting was operationally irrelevant or better managed by direct aircrew/ATC coordination. Airways asked if flight planning enhancement was available, but it was not, so both teams agreed on an alternative manual solution. Firstly, criteria were established for what was notifiable change. Air New Zealand Flight Operations then applied a manual process to check messaging from the flight planning system and stop the sending of any that didn't meet the criteria. The airline also revised the use of CNL/New FPL to avoid using this messaging for changes better handled by CHG/DLA. These changes significantly reduced the quantity of messaging and out of order/processing errors.

2.19 Another issue with message handling manifested with the use of the filing capability of the flight planning service. With the system's profile planning commencing +48 hours before operation, filing times could be extended. Prior to the introduction of the new flight planning service, filing times were:

- Domestic flights – approximately 3 hours before ETD
- International flights – approximately 1-3 hours before ETD

2.20 Air New Zealand wanted to use earlier filing to support planning and efficiency. Modern ATMASs support FPL ingestion days in advance of operation, so filing times were revised to:

- Domestic flights – 12 hours before ETD
- International flights – 6 hours before ETD

2.21 Unfortunately, unanticipated effects on Airway's ATMASs manifested once earlier filing went operational, primarily:

- Increase FPL messaging after submission affected the Oceanic ATMAS. Such messaging could initiate trajectory re-calculation and separation probing within that system. This created warning indications and workload for ATC to manage
- Inbound International FPL detail (level/route) could become desynchronised post submission due order of message reception or processing. This issue was amplified for international flights as Air New Zealand files FPL messages to all affected FIRs. Some FIRs then would re-send received FPL messages to downstream FIR.

2.22 Neither Airways nor Air New Zealand anticipated the issues with early filing. Analysis by both resulted in the airline revising filing times back to the pre-go-live criteria. This and the reduction of post-submission FPL message generation alleviated the above issues.

Lost FPL

2.23 There was one occurrence of lost FPLs. This manifested as crew calling for clearance but ATC not finding a FPL in the ATMAS. Though resolved on the day with re-filing, Air New Zealand subsequently contacted Airways, and staff began to look through FPL messaging history.

2.24 The occurrence of this issue was very limited (approximately 4 FPLs) but concerning as no issue with filing, connectivity, or message processing was initially found. However, further investigation by Airways found that, with the airline's flight planning originating in Europe, then passing through downstream AMHS connections, a brief outage in a downstream State, coupled with no queuing of the unsent FPLs, meant they were lost. Discussion with the State concerned confirmed the AMHS issue had been resolved and was being monitored. There has been no recurrence.

2.25 This lost FPL highlighted the need for robust message routing or contingencies, but also highlighted how ACK (Acknowledgement) and RQP (Request FPL) can support FPL message management.

2.26 For ACK, both Domestic and Oceanic ATMAS were enhanced to send 'ACK' when FPL messages were received from Air New Zealand Flight Operations. Receipt/non-receipt of an ACK flags on the airline's Flight Operation operator's display. For the lost FPL, investigation found that the display prominence for non-receipt was too small, and staff missed the alert. Subsequent modification was carried out to correct.

2.27 The lost FPL event included subsequent CHG messages for the missing FPL. It was questioned why an RQP was not sent by the ATMAS as a response. In New Zealand, the Domestic ATMAS only supports manual sending of a RQP as ATS find direct contact with operations more efficient. Manual RQP or direct contact were not used in this case as the CHG was assessed as being associated with an already deleted FPL and itself deleted.

Learnings

2.28 Airspace users will increasingly expect ATMAS to support modern flight planning functionality given the benefits such functionality can enable in planning, trajectory optimisation/achievement, and efficiency gain.

2.29 Modern flight planning trajectory management is data rich and dynamic. Such capability is geared towards FF-ICE type planning, filing and trialing processes. When modern flight

planning functionality is integrated with existing 2012 FPL handing and ATMAS processing, issues such as New Zealand experienced, can arise.

2.30 ANSPs, airspace users and FPL service/system providers need to carefully consider implementation, particularly operational FPL handling scenarios and message management because of the dynamic nature of modern flight planning functionality.

2.31 With potential for remote FPL service provision and high levels of messaging, airspace users and ANSPs need to assess messaging networks, contingencies and delivery confirmation processes when introducing FPL handling functionality.

2.32 Despite the issues highlighted, the introduction of modern FPL handling should not be delayed. There are immediate trajectory planning, flexibility and predictability benefits to be gained that directly benefit aircrew and ATS workload and safety aspects. Introduction also prepares airspace users and ANSPs for the sunset of FPL 2012 and the coming of TBO.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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