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Agenda Item 5: ATM and CNS Systems Modernization

LANDING INFORMATION DELIVERY (LID) SERVICE IN CHINA AND ITS IMPLICATIONS FOR FF-ICE/R2 OPERATIONAL SCENARIO RESEARCH IN APAC

(Presented by China)

SUMMARY

This paper presents the Landing Information Delivery (LID) ATC service launched by China in 2024. Based on existing ACARS datalink, the system automatically delivers key landing information including Standard Terminal Arrival Route (STAR), approach type, assigned runway, and stand to the cockpit 50 minutes prior to estimated landing time. It effectively reduces voice communication workload and improves operational safety and efficiency. LID is a concrete implementation of the FF-ICE/R2 concept for flight execution phase information synchronization in the terminal area arrival phase, and can provide a practical reference for APAC regional research on FF-ICE/R2 operational scenarios.

1. INTRODUCTION

1.1 With the continuous recovery and growth of global civil aviation, terminal area operational efficiency and safety at busy hub airports, especially multi-runway airports, face persistent challenges. Standard Terminal Arrival Routes (STARs) and runway assignments for arriving flights are typically confirmed through VHF voice communication upon initial contact with approach control, consuming approximately 15 seconds per aircraft. After entering the terminal area, flight crews may need to modify FMS settings temporarily, increasing "heads down" operation time and safety risks. Although ACC controllers could issue landing information on behalf of approach controllers, this not only increases the workload of ACC, but also requires approach controllers to conduct secondary confirmation.

1.2 ICAO is advancing the implementation of the Flight and Flow Information for a Collaborative Environment (FF-ICE) concept globally. FF-ICE/R1 focuses on information sharing during the pre-departure planning phase, with the Asia-Pacific region having already established a regional implementation target of 2032. FF-ICE/R2 addresses trajectory negotiation and information synchronization in the flight execution phase (post-departure); the ATMRPP is conducting concept validation, while Europe and the United States are also progressing with top-level process studies.

1.3 Against this backdrop, China has explored a practical and feasible FF-ICE/R2 application path based on operational practice, developing operational scenarios that provide valuable first-mover experience for the Asia-Pacific region in participating in the development of global R2 standards.

2. DISCUSSION

LID Operational Practices in China

2.1 On 11 November 2024, CAAC officially launched the LID service at the Shanghai Terminal Area, covering three airports: Shanghai Hongqiao (ZSSS), Shanghai Pudong (ZSPD), and Nantong (ZSNT). The system is deployed at the Shanghai Approach Flow Management Position (FMP). It automatically sends a structured arrival information package to the cockpit via the existing ACARS ATS datalink 50 minutes before the Estimated Landing Time (ELDT), including STAR, approach type, landing runway, and stand assignment.

2.2 Upon receiving the LID information during the cruise phase (typically before the T/D point), crews can directly load the relevant parameters into the MCDU or FMS. On initial contact with approach control, they simply report the pre-loaded information. After confirmation by the approach controller, subsequent instructions can be issued directly. This eliminates two voice communications exchanges with ACC and one confirmation with approach (as shown in **Figure 1**), reducing voice communication workload by approximately 75%.

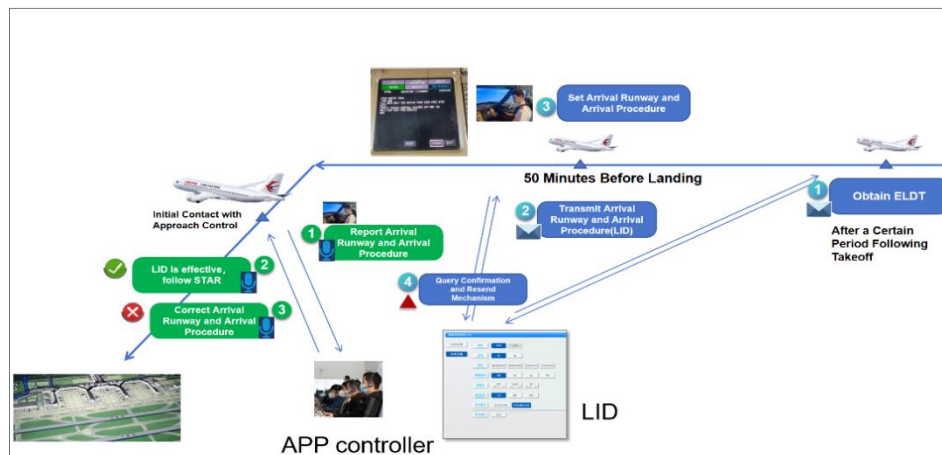


Figure 1. Workflow of LID

2.3 The LID system adopts a layered architecture: the Data Collection Layer acquires real-time ELDT, STAR, and runway assignment data via ACARS datalink; the Processing Layer dynamically matches runway direction, STAR, and approach type based on preset "operation modes" and includes an active comparison and verification mechanism; the Publication Layer supports both automatic mode (synchronized with ATC automation systems) and manual configuration mode; the User Interface Layer provides dual display modes (by airport or by waypoint) and categorizes flights by status for management.

2.4 The system incorporates a two-way link confirmation mechanism: five minutes after publication, it verifies the actual activated content in FMS through data link. If discrepancies are found, it highlights with red borders on the screen, ensuring a message delivery success rate of $\geq 99.9\%$ and an error rate of $< 0.01\%$.

Significant Benefits of LID Service

2.5 Operational data shows that the effective delivery rate of LID instructions exceeds 97%. It saves approximately 396 minutes of VHF communication time per day for 1,225 arrival flights in the Shanghai terminal area, reducing overall voice communication time by 4%. This allows controllers to focus more on radar control services. LID enables crews to obtain accurate arrival information and complete FMS input before descent, effectively avoiding sudden parameter modifications after entering the terminal area. For multi-runway airports, the system helps crews make informed decisions before descent, reducing uncertainties during the approach phase.

2.6 The LID service is compatible with over 99% of current aircraft types and operates entirely on existing ACARS infrastructure, requiring no aircraft hardware modification nor additional crew training. Flight crews can follow procedures after reviewing the relevant NOTAM. Compared with solutions requiring large-scale onboard equipment upgrades such as CPDLC, LID offers a significantly lower-cost, faster-deployment advantage.

2.7 Furthermore, since the service entered operation, crew feedback has been consistently positive, with widespread requests to extend the service to more airports. ATMRPP experts have also suggested that once the two-way datalink confirmation mechanism matures, the voice report and confirmation on initial contact could be further eliminated, continuously releasing VHF communication resources.

LID and Its Intrinsic Alignment with FF-ICE/R2

2.8 The core of FF-ICE/R2 is information synchronization and trajectory negotiation during the flight execution phase (post-departure), the Air Navigation Service Provider (ANSP) pushes updated trajectory and operational information to the Aircraft Operator (AU), with support for two-way negotiation. LID is operationally aligned with this concept: the ground-based ANSP (Shanghai Approach FMP) proactively pushes critical execution-phase information (arrival procedures, runway assignment) to the airborne AU (cockpit) and confirms receipt and activation through two-way datalink verification. It is a concrete implementation of the FF-ICE/R2 "Trajectory Information Delivery" service concept in the terminal area arrival phase.

2.9 ATMRPP is actively advancing standardization research on FF-ICE/R2, practical experience from the Asia-Pacific region holds significant value for improving global standards. China's LID practice demonstrates that, in the terminal area arrival phase, the "push-and-confirm" model based on existing ACARS infrastructure is an efficient, feasible, and rapidly deployable R2 application scenario, which can provide practical evidence from the Asia-Pacific region for global standardization efforts.

2.10 The promotion of the LID service is fully complementary to the ongoing FF-ICE/R1 implementation in APAC. FF-ICE/R1 establishes the pre-departure flight plan negotiation and information sharing framework, while LID/FF-ICE/R2 extends the information chain to the flight execution phase. The two are mutually reinforcing, together forming a complete gate-to-gate TBO information ecosystem.

2.11 SESAR is reported to launch a similar data link experiment in 2026. ATMRPP experts broadly agree that a unified LID operational standard is the optimal solution. Conducting regional research in the Asia-Pacific region based on China's practice echoes European and American explorations, helps contribute the Asia-Pacific perspective to global standard development and promotes the formation of more universally applicable FF-ICE/R2 international standards.

Feasibility of Expansion in the APAC Region

2.12 The LID service relies entirely on existing ACARS infrastructure, requiring no additional ground or airborne equipment. Major ANSPs across the APAC region already possess ACARS ATS data link capability, providing the technical foundation for rapid replication and deployment. China plans to further expand LID services to multi-runway hub airports in East China. The relevant experience can be directly referenced by other Member States in the region.

2.13 It is proposed that, within the framework of the APAC FF-ICE Ad-hoc Group, a dedicated workstream be established to study defining LID as a "vertical extension service" of FF-ICE/R2. Based on the existing 4D trajectory exchange (RTE/R2), "Approach Intent Package Data" (AIPD) including metadata such as STAR, runway, and stand would be added, and promote the inclusion of T/D point, STAR, ARWY and other relevant data dictionaries into FIXM 5.0 standard extensions.

2.14 ATM/SG/13 endorsed the incorporation of a TBO Roadmap into the Asia/Pacific Seamless ANS Plan, with the regional FF-ICE/R1 implementation target set at 2032. LID/FF-ICE/R2 research can serve as an early validation project for TBO Level 2 (flight execution phase trajectory negotiation) and be incorporated into the APAC TBO Roadmap, laying the foundation for further development beyond 2032.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in the paper;
- b) recommend that the APAC FF-ICE Ad Hoc Group, while continuing its work on the FF-ICE/R1 implementation framework, undertake research into FF-ICE/R2 operational scenarios based on LID practices, progressively develop a draft APAC FF-ICE/R2 operational concept, noting that this work is complementary to, and can proceed in parallel with, the FF-ICE/R1 implementation effort;
- c) note China's willingness to lead the LID regional expansion pilot under the APAC framework, and encourage interested States/Administrations to participate in LID trials, consolidate operational data and implementation experience, and submit APAC regional recommendations on FF-ICE/R2 related standardization issues, and support the inclusion of LID-related data elements in the future FIXM standard extension; and
- d) discuss any relevant matters as appropriate.

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