*International Civil Aviation Organization*

**MIDANPIRG Communication, Navigation and Surveillance Sub-Group (CNS SG/15)**

***(Doha, Qatar 11 – 14 May 2026)***

**Agenda Item 2: Communication Issues**

# INTEGRATION OF ATM SYSTEMS WITH NATIONAL DIGITAL PLATFORMS

*(Presented by Sultanate of Oman)*

**SUMMARY**

This paper proposes a secure and phased approach for sharing approved Air Traffic Management (ATM) data with national digital platforms. The approach supports traffic statistics, NOTAM context, prediction, capacity planning and management reporting, while keeping ATM systems operationally independent and protected from inbound enterprise connectivity.

It should be noted that the information presented in this paper constitutes a Concept of Operations (CONOPS) for the Integration of the ATM System with the National Digital Platform, and does not represent a fully implemented solution. The CONOPS is intended to serve as a foundational framework to guide subsequent development and will be advanced toward full implementation in due course.

Action by the meeting is at paragraph 3.

**REFERENCES**

- ICAO Doc 10039, Manual on the System-wide Information Management (SWIM) Concept
- ICAO Doc 9854, Global Air Traffic Management Operational Concept
- ICAO Global Air Navigation Plan (GANP)
- ICAO Annex 15, Aeronautical Information Services

## 1. INTRODUCTION

1.1 ATM environments contain valuable operational data. In many cases, this data is held in separate systems and formats, which makes reporting and analysis slower than necessary.

1.2 A controlled digital integration can help aviation authorities and service providers use approved ATM data for statistics, planning and management awareness. The integration must not create an operational dependency between ATM systems and enterprise platforms.

1.3 This paper focuses on a simple model: approved ATM data is exchanged through a controlled interface, validated and sanitized in a middle zone, and made available to authorized digital services.

## 2. DISCUSSION

2.1 The first phase should cover only approved data feeds and clearly defined uses. The proposed initial scope is shown in Table 1.

| Data feed | Primary digital-platform use | Control requirement |
|---|---|---|
| Flight plan data | Traffic counts, route trends, airport-pair analysis, demand forecasting and sector planning. | Approved export only. |
| NOTAM data | Operational context, affected airport or airspace awareness, route planning support and post-event review. | Verified source and defined validity. |
| Raw or processed flight data | Traffic density, sector loading, route use, peak-period analysis and performance monitoring. | Sanitized output. |
| Reference data | Sector definitions, fix points, airport metadata, route references and dashboard context. | Controlled baseline. |

*Table 1. Proposed first-phase ATM data feeds and approved digital-platform uses.*

2.2 Control commands, remote administration, enterprise queries into ATM and any operational dependency from ATM to the digital platform should remain out of scope unless they are separately assessed and approved.

2.3 The recommended model uses three logical zones: the ATM operational zone, the middle or interface zone, and the national digital platform zone. The ATM zone makes approved data available through controlled interfaces. The middle zone receives the data, validates it, quarantines invalid payloads and forwards approved outputs. The digital platform provides dashboards, reports, analytics, prediction and monitoring for authorized users.

**Key security principle: integration must preserve the operational independence of ATM systems and prevent unauthorized connectivity or dependency. The controlled interface should apply governance, validation, sanitization, monitoring and access controls before data is used by digital services.**

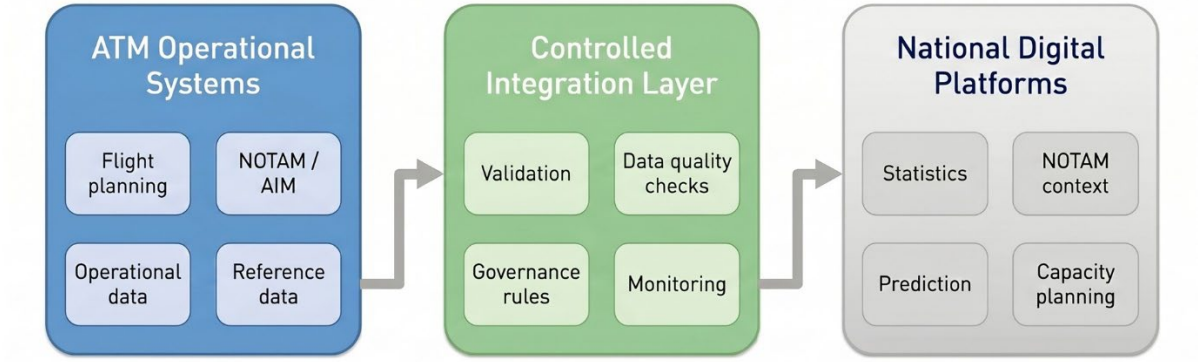


*Figure 1. High-level ATM-to-platform integration architecture*

2.4 The platform should support official traffic statistics, period selection, comparison, airport movement views, airline tables, sector tables, airway and fix-point summaries, and management-level analysis. Screenshots used in working papers should match the actual system output and should be sanitized before publication.


*Figure 2. Example aviation statistics dashboard view.*

2.5 Prediction views should show the forecast horizon, time window, sector load and totals clearly. Any published values should be verified against the platform output. If values cannot be verified, the figure should be presented as a concept only.

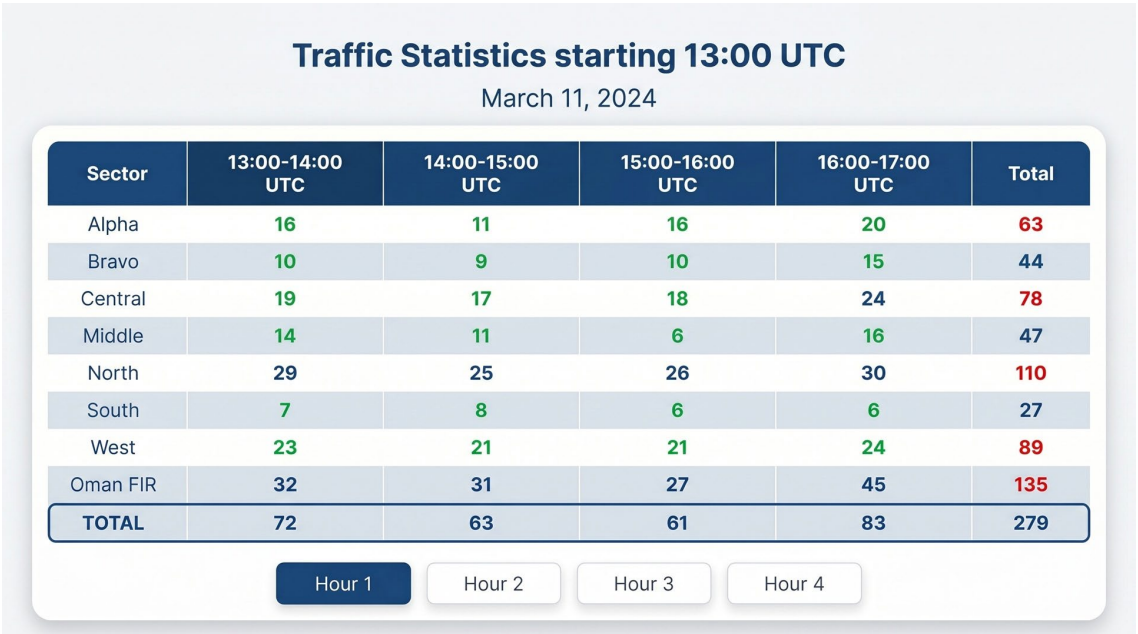


*Figure 3. Example prediction and sector-load table.*

2.6 NOTAM information should be integrated with planning context so users can understand affected locations, validity periods, routes, sectors and operational impacts. The aim is to improve awareness and post-operational review, not to replace official NOTAM origination or publication processes.

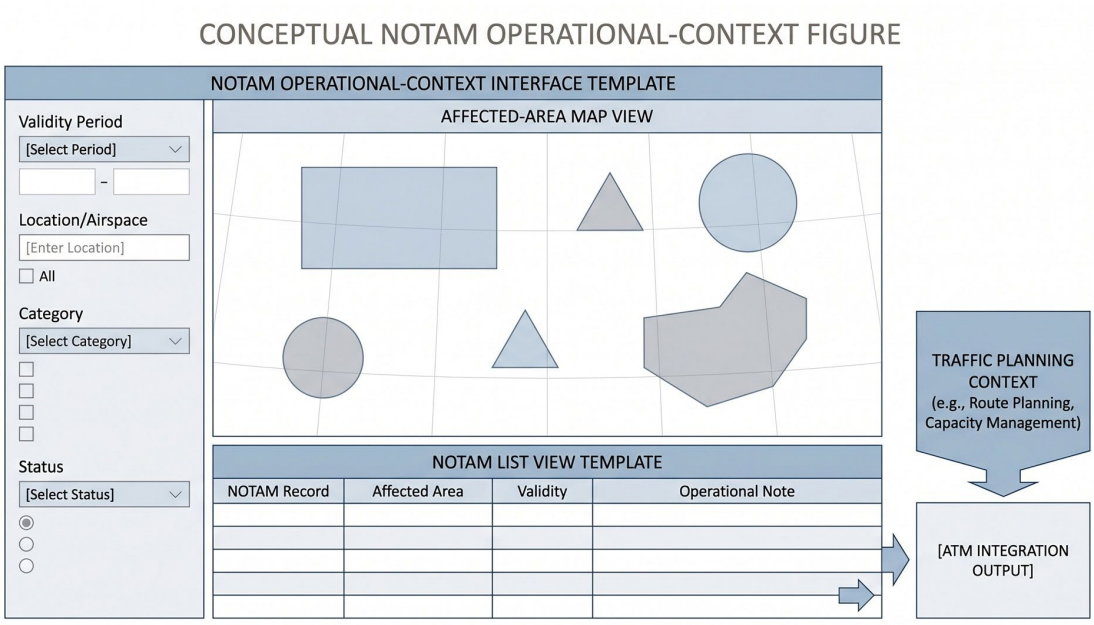


*Figure 4. Conceptual NOTAM operational-context view.*

2.7 The integration should be monitored separately from end-user dashboards. Monitoring should show feed freshness, validation status, queue health, quarantine status and security alerts without exposing unnecessary operational detail.

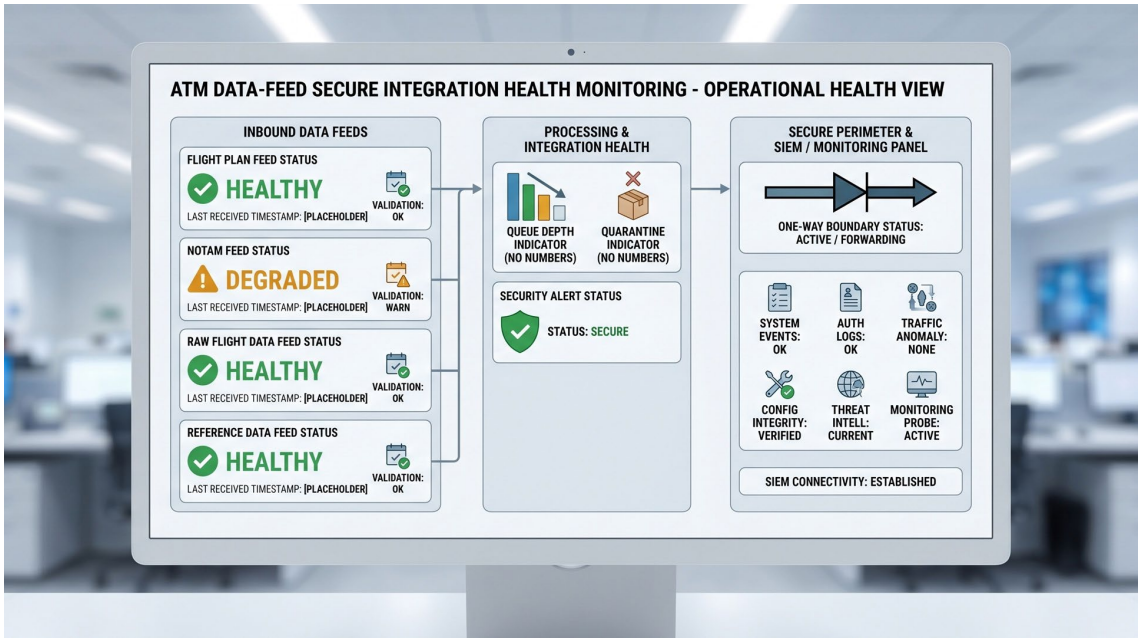


*Figure 5. Example integration health-monitoring view.*

2.8 Each feed should have a clear data owner, approved purpose, schema, update frequency, retention period and sensitivity classification. The middle zone should enforce schema validation, size limits, timestamp checks and quarantine rules.

2.9 Users should access the digital platform through role-based permissions and audit logging. AI outputs and prediction outputs should remain decision-support information unless they are separately validated and approved for operational use.

| Expected benefits | Main risks to manage |
|---|---|
| Faster and more consistent traffic statistics and management reports. | Creating an unintended return path from enterprise systems into ATM. |
| Better awareness of sector demand, route utilization and peak periods. | Using inconsistent definitions for flights, movements, sectors or periods. |
| Improved NOTAM-aware planning and post-operational review. | Publishing figures that show inaccurate or unverified aviation data. |
| Less manual handling of data and fewer spreadsheet-based reporting steps. | Overstating AI or prediction outputs beyond their validated purpose. |
| A secure foundation for future SWIM-aligned information exchange. | Allowing enterprise delays or outages to affect ATM export processes. |

*Table 2. Summary of expected benefits and risks to manage.*

2.10 Implementation should be phased. The first phase should approve the feed list, define data contracts and deploy the middle-zone receiver or data guard. The second phase should add validation, quarantine, monitoring and audit evidence. Later phases may expand analytics and prediction after cybersecurity, operational acceptance and data-quality evidence are reviewed.

| Step | Required activity | Output |
|---|---|---|
| 1 | Approve the first-phase data feeds and the controlled integration principle. | Defined scope. |
| 2 | Define data contracts for flight plan, NOTAM, flight data and reference data. | Agreed schemas. |
| 3 | Implement the middle-zone receiver or data guard with validation and quarantine. | Controlled interface. |
| 4 | Publish sanitized dashboards and use verified values in working papers. | Approved outputs. |
| 5 | Review cybersecurity, operational acceptance and data-quality evidence before expansion. | Controlled growth. |

*Table 3. Recommended phased implementation steps.*

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information in this Paper.

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