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Agenda Item: B.9.1 **INFORMATION PAPER** **LWP No: 163 IFATCA'25**

Advanced Technological Initiatives at Emirates ACC

Presented by Emirates Aviation Association (EAA)

SUMMARY

This paper outlines advanced technological initiatives implemented or underway at Emirates ACC that form part of the UAE's broader modernization strategy—to build a service-oriented, performance-driven, and globally interoperable Air Traffic Management (ATM) system.

Emphasis is placed on: the adoption of a shared Mode S conspicuity code; rule-based CPDLC for proactive messaging; automated label handover using OLDI/AIDC protocols; and the deployment of ATCOPAD for digital reporting and performance support.

By analyzing each initiative's impact on controller workload, coordination complexity, and situational awareness, and by outlining practical integration steps, the study offers actionable guidance for ANSPs seeking to enhance efficiency, capacity, and safety in modern ATM operations.

1. INTRODUCTION

1.1. The continuous rise in air traffic levels, and the increasing complexity of airspace management, necessitate innovative ATM solutions that enhance operational efficiency and controller performance.

1.2. As part of the comprehensive upgrade of the ATM system used in Emirates ACC—several advanced technological initiatives have been implemented or underway. This paper examines four key innovations introduced to reduce controller work load and enhancing efficient operation:

- Use of Mode S conspicuity code for transit flights.
- Rule-based CPDLC for proactive, standardized controller–pilot communications.
- Automated label handover via OLDI/AIDC messaging between ATC units.
- Integration of ATCOPAD for digital reporting and real-time performance support.

1.3. By exploring each initiative's benefits, implementation challenges, and practical adoption steps, we demonstrate how these measures collectively reduce ATCO workload and support safety-critical decision-making.

2. DISCUSSION

Use of Mode S Conspicuity Code for Transit Flights

2.1. The aviation industry has experienced significant recovery following the COVID-19 pandemic. This recovery has been particularly noticeable in the international sector, where the demand for cross-border travel has led to a substantial increase in the number of flights.

2.2. A consequence of this traffic flow has been the increasing difficulty in allocating Secondary Surveillance Radar (SSR) codes, offering a total of 4,096 technically available codes. The growing number of flights has strained the available code groups, making it challenging to assign unique SSR codes while adhering to the agreed-upon two-hour retention time.

2.3. To mitigate these challenges, the use of a unique Mode S conspicuity code and flight identification based on unambiguous Mode S identification offers a viable solution to optimize code utilization and maintain operational efficiency.

2.4. Mode S transponders, with their unique 24-bit aircraft address, ensure that each aircraft is distinctly identified without the risk of code duplication. Additionally, Mode S enhances situational awareness by providing detailed aircraft information to ATC systems. The use of a unique conspicuity code in conjunction with Mode S identification further enhances the efficiency of ATM by simplifying the process of code allocation for transit flights.

2.5. Conspicuity Codes are standard and non-discrete SSR codes telling the ATM systems NOT to make use of SSR code to identify the aircraft and couple the radar tracks with flight plan. Instead, the ATM systems should make of the Mode S interrogated information, such as the downlinked aircraft identification or ICAO 24-bit aircraft address, to identify the aircraft and couple the flight plans. In line with the EUR and APAC region, the ICAO Middle East SSR Code Management Plan (SSR CMP) designates SSR code A1000 as the Mode S conspicuity code.

2.6. The use of the conspicuity code, combined with Mode S aircraft identification, minimizes reliance on domestic SSR codes for flights operating within a single ATC unit's Area of Responsibility (AOR) and proves especially beneficial for transit flights crossing AOR boundaries, where all involved ATC units can rely on Mode S downlinked data for accurate identification and seamless flight plan coordination.

Rule-Based CPDLC Implementation

2.7. As part of the ATM system modernization program at Emirates ACC, the integration of Air-Ground Data Link Processing (AGDLP) with advanced CPDLC capabilities is transforming the way controllers communicate with pilots. One of the key innovations is Rule-Based CPDLC, a system that generates and uplinks standard messages to aircraft based on operational conditions, system status, and trajectory predictions.

2.8. By automating the preparation and transmission of messages such as frequency changes, holding instructions, STAR assignments, and route clearances, Rule-Based CPDLC helps reduce the repetitive workload on ATCOs.

2.9. For example, upon detecting a flight entering a holding pattern, the system may uplink instructions including EAT, altitude adjustments, and relevant QNH settings—reducing the need for voice transmissions and manual input. Similarly, for outbound flights, it automates initial routing and reporting instructions.

2.10. This capability significantly supports controllers during peak periods by automating tactical communications, thereby enhancing situational awareness and reducing cognitive load.

Automated Label Handover between ATC Units

2.11. The increasing volume of air traffic in the MID region necessitates improvements in coordination between ATC units. To meet sustained traffic growth across UAE FIR, Emirates ACC introduced the implementation of automated label handover using On-Line Data Interchange (OLDI) or ATS Inter-Facility Data Communication (AIDC) messages, which reduce workload, enhance accuracy, minimize miscommunication, and enable seamless, real-time transfer of control across FIR boundaries.

2.12. Benefits of implementing automated label handover:

- Improved Transfer of Control
  - Ensures seamless and timely transfers between ATC units.
  - Reduces reliance on voice coordination, minimizing errors and miscommunication.
  - Automates flight-data updates in real time.
- Safe Release Conditions
  - Flights are only released when proper conditions are met, reducing conflict risk.
  - Allows tailored transfer execution based on aircraft and traffic conditions.
  - Reduces workload by automating repetitive tasks, allowing controllers to focus on situational awareness and decision-making.
- Enhanced Airspace Management
  - Optimizes sector capacities via better adjacent-unit coordination.
  - Improves predictability and flow in high-density environments.
  - Boosts system planning and safety tool performance (e.g., MTCD).

ATCOPAD Integration at Emirates ACC

2.13. To address the challenges of information management and reduce the time ATCOs spent searching through extensive documentation, Emirates ACC has deployed ATCOPAD, an iPad-based “single-touch-for-information” platform integrated into each controller workstation. Key capabilities include:

- Instant retrieval of AIP data, STAR/SID procedures, airway and airport charts, sector capacity figures, SZC holding details, ATIS frequencies, live NCM (National Center of Meteorology) weather radar, and the in-flight emergency response manual.
- Searchable databases of ICAO airport codes and aircraft callsigns.
- A dedicated PIREP form forwards pilot weather reports directly to NCM and the ACC operations supervisor, removing manual reporting steps.

- A built-in Suggestion Box empowers ATCOs to request new information or features, ensuring the platform evolves with operational needs.

2.14. By integrating ATCOPAD into daily workflows, Emirates ACC has notably reduced information-search time and manual reporting burdens, empowering controllers to concentrate on traffic management and safety-critical decisions while handling high volumes of air traffic.

3. CONCLUSION

3.1. The four technological initiatives detailed in this paper collectively demonstrate significant potential to enables efficient data exchange, reduces errors and prevent unnecessary workload increases for ATCOs.

3.2. Employing a shared Mode S conspicuity code streamlines SSR management and ensures accurate flight identification for transit operations. Rule Based CPDLC standardizes and automates routine communications, mitigating voice channel congestion. Automated label handover accelerates inter-unit transfers and reduces coordination errors, while ATCOPAD delivers seamless digital reporting and performance insights. Together, these innovations foster consistent procedures, improved situational awareness, and an enhanced capacity to safely manage escalating traffic volumes.

4. DRAFT RECOMMENDATIONS

4.1. It is recommended that IFATCA continue to promote these shared practices—both regionally and internationally—to enhance efficiency, safety, and capacity across all FIRs.

4.2. It is recommended that neighboring ANSPs collaborate with each other and with ICAO to align technical standards, share best practices, and coordinate synchronized technology deployments for seamless cross border operations.

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