



Agenda Item 3: Implementation of air traffic flow management (ATFM) and improvement of procedures for coordination between units

AIR TRAFFIC FLOW MANAGEMENT (ATFM) CONCEPT FOR THE SOUTH AMERICAN (SAM) REGION

(Prepared by Colombia)

SUMMARY

The constant increase in the number of aircraft operations in the SAM Region, the capacity limitations and an ATFM operational concept that varies among the States and flight information regions that make up the regional ATM system, result in significant capacity/demand imbalances, especially under unexpected meteorological or CNS availability conditions subject to flow control measures (by ATC), unilateral actions that, in some cases, are ineffective, affecting operational efficiency in terms of delays, less-than-optimum flight profiles, additional ATC workload, and air traffic inconsistencies between adjacent areas.

The UAE of civil aviation of Colombia and the capacity and air traffic flow management unit (FCMU COL) have seen the need to include cross-border traffic in national ATFM measures and one dedicated ATFM for international airports and ATC sectors of the various SAM States.

The common demand/capacity balancing challenges faced by said States provide an opportunity for ANSPs to generate an initiative of a cross-border ATFM operational concept, establishing a multimodal network and, in the future, consider a centralised regional concept that may contribute to the ATM system, based on CDM, to support sustained growth of air traffic in the region.

Taking into account the experience of Colombia with an automated ATFM, the discussion about a cross-border concept would apply to any airport or airspace providing services to a significant number of domestic and international flights of different SAM States.

1. Background

1.1 Some ANSPs and airport operators are currently undergoing saturation and congestion.

1.2 When adverse weather conditions result in capacity reductions, traditional flow restriction and controls are frequently applied, such as larger longitudinal separations at transfer of control points between adjacent sectors and FIRs to regulate air traffic flow. This generates the need to implement ATFM initiatives (TMI), such as Ground Delay Program (GDP), amongst others. Implementation of these measures may not be too effective or efficient and could have a negative impact on regional operations.

1.3 With the development of information technologies, tools and methods have been developed that can be implemented or adopted by States to improve existing ATFM practices, while

cooperation and collaboration among ATM system stakeholders are critical for success. These include the ATFM and CDM principles that together seek global cooperation and collaborative decision-making environments.

ATFM and its applications cannot be limited to a single ANSP or a single FIR, due to the domino effect on other areas or airspace sectors. One example of regional ATFM collaboration is South East Asia. The multimodal distributed ATFM network concept taken from working document -A39-WP / 243 – presented by Australia, Hong Kong, China, Indonesia, Laos, Philippines, Malaysia, Singapore, Thailand, CANSO and IATA, drives what has become an implementation requirement in the SAM Region.

Another example of application of CDM criteria, which support ATFM, was presented by the Civil Air Navigation Services Organisation (CANSO) at the meeting of the Implementation Group of the ICAO South American Regional Office in may 2017, and at the Seventh meeting of civil aviation directors of North American, Central America and the Caribbean, NACC / DCA / 07 – WP / 17 Rev. 06/09/17. The document explains a nodal concept for ATFM called CANSO ATFM Data Exchange Network for the Americas (CADENA).

1.4 The SAM Region is characterised by having ANSPs that work in an isolated manner in an ATM network. There are many ATC sectors within a flight information region (FIR), even more than one flight information region within a national airspace system by State, all within the complex SAM Region, with different ATM capabilities, different demand characteristics, and different ATFM capacities. Some ANSPs have implemented the ATFM service, as well as ATFM units, according to their needs, and other are in the process of doing so. The implementation of an ATFM unit brings about many difficulties, which, added to the absence of a significant need, lead to the postponement of its implementation in the best of cases, affecting the network and future demand. The growing air traffic demand, the complex tropical meteorological behaviour patterns, and the diverse complexity of operations in terminal areas and airports contribute significantly to low predictability of operations, which finally results in delays and noncompliance with schedules in the regions.

2. Discussion

2.1 The distributed cross-border ATFM concept is based on an ATM network made up by several ANSPs, with or without an ATFM implemented in their areas of jurisdiction, in coordination with the stakeholders, through the exchange of information and data. Based on a common ATFM operational concept, information exchange protocols, and defined coordination procedures, the ANSPs, airspace users and airport operators could be more effective in the application of ATFM measures that not only apply to domestic traffic, always under the CDM concept that allows aircraft operators and other stakeholders to participate in decisions and in the proposed exchange of information.

2.2 Colombia started the implementation of ATFM in 2005. In 2014, the UAE of Civil Aeronautics acquired an automated ATFM system, consisting of a set of advanced tools that enables the ANSP to enhance operational efficiency in the planning (strategic), advance (pre-tactical) and reactive (tactical) phases, in order to improve safety, reduce ground delays, and eliminate in-flight holding. This system, called METRON HARMONY, distributes the necessary information to all aircraft operators and, in general, to all the ATFM community for the benefit of the entire system. One of the most important aspects of this automated system is CDM, which involves the participation of all the users of the system, the exchange of information and data, specific displays, the system interface and the regulations, promoting collaboration among ATM system participants, such as the ATC, the aircraft operators, airport operators and other operators and service providers (ground handlers and authorities). The objective is to provide the best possible information for decision-making in accordance with the operational

requirements and causing the least possible impact. It also enables solutions to ensure constant control so that demand will not exceed capacity, while providing for a more efficient use of airspace and airport and ATM resources in general, providing equal access to all airspace users, according to the operational needs of each.

2.3 In 2018, Colombia became active member of the ATFM Data Exchange Network for the Americas (CADENA). Through CADENA and through its daily operations, the ATFM personnel of the UAE of Civil Aeronautics has shared the experience of working with neighbouring flight information regions (FIRs) and supporting ATFM operations in the region, showing the importance of communication between regions for ATFM purposes. The ATFM personnel of the FCMU Colombia is receiving advanced ATFM training, including best practices, CM, and participation of the stakeholders in all ATFM phases, advanced ATFM functionalities for airspace sectors (Airspace Flow Program), use of dynamic tools, laboratory exercises and simulations, modelling and implementation of advanced ATFM initiatives (MIT, MINIT, Rerouting, Capping, Levelling, etc.), with the purpose of assessing the best alternative in terms of safety and efficiency, the capacity to monitor operational conditions, current and foreseen demand for flights operating in their airspace to/from airports, in support of ATFM/CDM; dynamic capacity calculation for ATC sectors and post-operational reviews based on data and trend analyses for continuous improvement.

2.4 The FCMU COL is equipped with a METRÓN HARMONY system for ANSP, and is currently in the process of implementing the latest version of this system and conceptualising the implementation of ATFM tools and modules to:

- a) Visualise the meteorological and air traffic conditions, as a common ATFM situational awareness solution for demand/capacity monitoring, strategic, pre-tactical and tactical forecasts for airports and airspaces, consistent with CDM concepts to improve efficiency and predictability, integrating data from multiple sources in all time phases, and monitoring traffic at airports and ATC sectors in real time, providing forecasts of future demand, ensuring alignment with ICAO guidelines and the ASBU NOPS module on demand/capacity balancing in a changing environment for collaborative decision-making and common situational awareness by all stakeholders and ATM system users, all in a graphical environment resulting from the integration of FDS (flight data server), SSR, ADS-B, MLAT data.
- b) ATFM simulation for assessing possible ATFM operational scenarios and improving collaborative development of concepts. A simulation platform whereby users can make sure that the solution being applied is the correct one for the operational environment, and conduct analyses to identify and assess key performance indicators (KPIs) during the simulation, in order to constantly improve ATM performance.
- c) Guarantee ATM resilience in face of adverse meteorological conditions through advance capacity estimates for ATC sectors, based on forecasts and trends, with the ability to mitigate the impact through alternate routing scenarios. SWIM integration for the exchange of aeronautical, meteorological and flight information for all airspace users and stakeholders through METRÓN HARMONY.

Colombia has ample experience in the establishment of the FCMU COL. The development of the ATFM operational concept foresees the development of the concept for the use of these and other technologies to be implemented following a timetable aligned with ASBU and investment objectives consistent with the advanced needs of the ATFM service, and the update and improvement of the different automated systems and modules, and personnel capabilities in the short, medium and long term.

Likewise, the UAE of Civil Aeronautics of Colombia is considering the integration within the ATFM operational concept of various processes and systems that will permit optimum sector configuration, easy acquisition of alternate routing options within the available network, analysis of the impact of ATFM measures on the network, re-routing options, modelling and fast-time simulation of aircraft operations, ongoing updates of meteorological patterns, exchange of operational information through a website, technical and operational support for the users, traffic display for a common situational awareness for all users, display of the list of flights and their status on the network, the airspace and in relation to ATFM restrictions, integration of surveillance data from the various sources, integration of movement data and updating of operational intention sent by airport systems, and acting as crisis command centre.

3. Conclusion

3.1 The implementation of a cross-border ATFM concept, a centralised multimodal network for the SAM Region would help solve the demand/capacity imbalance that currently exists, making a significant contribution to safety, reduce fuel consumption, reduce emissions of polluting gases into the environment, and would contribute to optimise airport and regional ATC system capacity, considering that demand in the SAM Region is expected to continue growing without a significant improvement of the airspace. Delays will increase, affecting safety and operational efficiency, which will have an adverse impact on the public and the operators in the region.

3.2 The ATFM automated system of the UAE of Civil Aeronautics of Colombia allows the FCMU COL to exchange and share ATFM information with ATFM units and systems, whether adjacent or not, in order to participate in cross-border ATFM processes and support the evolution of an international seamless ATFM system. This concept would create a management network for the SAM Region, with agreed and harmonised procedures and processes for ATFM within the regional ATM system, capable of connecting to the ATFM network for the development of a centralised regional concept, providing efficient and equitable ATFM to the different ANSPs in the traditional model or through the development of the distributed multimodal ATFM network concept, providing interfaces to support the interaction of the various stakeholders with multiple ATFM systems within the SAM Region. The FCMU COL can include and integrate ATFM systems and units of the ANSPs of the SAM Region, offering the use of the FCMU COL as the ATFM unit for the aforementioned regions, incorporating the different ATFM capacities of the ANSPs and providing web capabilities for the exchange of information and decision-making, and to distribute calculated ATFM hours, i.e. CTOT, according to the needs of each resource, including long-haul flights, opening different channels of ATFM communication for stakeholders, defining the requirements for centralised access to ATFM information, coordinating operational agreements and standards, to secure the necessary inputs to ensure predictability and decision-making in coordination with the ANSPs and the CDM community.

4. Suggested action

States are urged to take into account this working paper for the development of the regional ATFM CONOPS applying a cross-border ATFM concept for the SAM Region.
