

ELEVENTH AIR NAVIGATION CONFERENCE**Montreal, 22 September to 3 October 2003****Agenda Item 1 Introduction and assessment of a global air traffic management (ATM)
: operational concept****UNITED STATES ATC CAPACITY ENHANCEMENT — TRAFFIC
FLOW MANAGEMENT (TFM) REAL WORLD GAINS**

(Presented by the United States)

SUMMARY

This paper will discuss the United States approach to global traffic flow management (TFM) and collaborative decision-making (CDM) by presenting current and planned government/industry initiatives. Global TFM will drive toward a seamless system that traverses international boundaries to share pertinent information and capitalize on benefits such as: enhanced security, improved effectiveness and hemispheric interaction. International collaboration is essential in order to build tools necessary to address this global direction and increased traffic demand expanding to new heights as we transition toward commercial space transportation.

Action by the conference is in paragraph 6.

REFERENCES

1. Collaborative Decision-Making Process, 2003 briefing: Dialogue for the RTCA Meeting April 16, 2003: <http://www.metronaviation.com/cdm>
2. Collaborative Decision-Making (CDM), 2003: Global II Air Traffic Flow Management Briefing: <http://www.eurocontrol.int/eatmp/events/atfm.html>
3. Operational Evolution Plan (OEP) Web Page:
<http://www1.faa.gov/programs/oep>
4. National Airspace Redesign Web Page: <http://www.faa.gov/ats/nar/>
5. Flight Schedule Monitor (FSM) User Guide, Version 1.8.5, March 2003 :
AUA-700/Metron Aviation
6. "Operational Evolution Plan Overview and Sample Results",
AN-Conf/11-IP/27

1. **BACKGROUND**

1.1 The United States traffic flow management (TFM) system mission is to balance air traffic demand with system capacity to ensure the maximum efficient utilization of the national airspace system (NAS). A safe, orderly, and expeditious flow of traffic while minimizing delays is fostered through continued analysis, coordination, and dynamic utilization of traffic flow management initiatives and programmes.

1.2 The United States Federal Aviation Administration (FAA) Air Traffic Control System Command Center (ATCSCC) monitors and manages the flow of air traffic throughout the NAS, producing a safe, orderly, and expeditious flow of traffic while minimizing delays. The United States TFM units monitor and balance traffic flows within their areas of responsibility in accordance with traffic management directives. The collaborative decision-making (CDM) is a joint FAA/industry initiative to develop new technology and procedures. CDM focuses on improving the efficiency of TFM initiatives through common situational awareness, increased predictability, and improved system planning. CDM has been in operation since 1998 and has demonstrated significant gains in NAS system efficiency.

1.3 The CDM concept is one of the five core technologies of Free Flight Phase I and has traversed international boundaries with acceptance in Canada, Japan, and Europe.

2. **CONTEXT**

2.1 Recent events have prompted intensification of aviation security procedures and processes. It is vital that cross border communication and coordination activities continue to be supported to maintain a safe, efficient and orderly aviation environment.

2.2 Closer coordination with neighbouring flight information regions optimizes airspace, improves collaboration and coordination, and develops cooperative operational techniques in areas such as:

- a) north Atlantic track system;
- b) north American route system; and
- c) north American route programme.

2.3 Agreements that are appended as annexes to existing Memorandums of Cooperation and/or Understanding with other air traffic service providers or executive flow management units such as Japan's Fukuoka Air Traffic Flow Management Center, EUROCONTROL's Central Flow Management Unit (CFMU), and NAV Canada's National Operational Control Centre enhance international:

- a) data exchange between FAA's enhanced traffic management system (ETMS) other air traffic service providers' automated data systems;
- b) airspace utilization;
- c) collaboration and coordination; and

d) TFM tactical procedures and operations.

2.4 International/space flow management positions are needed for worldwide flow management coordination, collaboration and communication. As the aviation industry transitions to include commercial space vehicle operations, these positions will merge aviation and space transportation requirements. Proactively developing these positions will centralize hemispherical processes for international/space TFM collaboration.

3. COLLABORATIVE DECISION-MAKING AT THE UNITED STATES ATM NETWORK LEVEL

3.1 As a joint FAA/industry initiative, CDM focuses on common situational awareness, increased predictability, and improved system planning.

3.2 CDM is composed of three basic principles: 1) Establishment of common situational awareness through data exchange. Shared information allows all parties to be aware of system demand and constraints. 2) Use of distributed planning regarding the input of NAS stakeholders. NAS stakeholders provide input into traffic management decisions to ensure the limited resources are used in a manner that accommodates individual business needs collectively with system success. 3) Robust performance analysis to measure benefits and to further enhance system performance based on experience and expertise. Traffic management tools are used to continually monitor initiative progress or decline and modified as necessary based on experience and expertise.

3.3 With stakeholders working together to provide training solutions and procedures, and integrated TFM tools/technologies, CDM increases system efficiency, safety and responsiveness. One method the FAA uses to compensate for reduced capacity at an airport is to delay flights arriving at that airport before those flights have departed. This is known as a ground delay programme. As part of the CDM effort, the FAA developed flight schedule monitor (FSM) and deployed it at operational facilities including airline operations centers starting in 1998. Through FSM, the FAA and airline participants established common situational awareness and dramatically improved the efficiency of ground delay programmes. Today, enhancements to FSM continue to improve the reliability, functionality and effectiveness of managing high-density traffic situations.

3.4 FSM creates a common situational awareness among all users and service providers in the NAS. Using real-time data culled from enhanced traffic management system (ETMS), FSM presents a graphical and timeline presentation of airport demand and capacity information. Based on the FSM display, users can determine whether a demand/capacity imbalance exists and may choose to cancel, delay, or move flights around to keep traffic moving. Before users take any action on their flights, they can model several traffic management scenarios and view the results of the actions on their operation in a matter of seconds. FSM also contains powerful utilities for ground delay programme (GDP) and ground stop management and analysis so all users can react quickly to NAS constraints. FSM allows air traffic service providers and airspace users to make better decisions resulting in more efficient operations.

4. ACCOMPLISHMENTS/BENEFITS

4.1 FAA conducted a TFM benefits assessment for the NAS in the spring 2003. Initial analysis shows that an estimated 13.7 million minutes — 21.7 million minutes of additional delay was avoided as a result of CDM tools and procedures in 2002. This translates to \$341.5 to 542.5 million savings per year. Furthermore, improvements are projected to yield up to \$365 million additional savings per year.

5. FUTURE PERSPECTIVES

5.1 To progress toward a global TFM system, we must balance technological advancement with efficiency while maintaining safety. Many new developing TFM projects have potential to elevate TFM techniques and procedures to astonishing levels. The following paragraphs outline some of FAA's new TFM projects:

5.2 The Free Flight Programme was established in 1998 to implement specific enhancements to the NAS. CDM was one of the core capabilities recommended for implementation as part of these recommendations. As part of CDM, FSM continues to provide operational enhancements to the NAS user. Notable enhancements include:

- a) dynamic management of arrival flow through multi-fix ground delay programmes;
- b) coordination of flow rates among airports using multi-airport ground delay programmes;
and
- c) dynamic management of unexpected demand.

5.3 Traffic flow management modernization (TFM-M) — is the FAA multi-year plan to replace portions of the existing TFM automation systems with a modernized automation environment that supports both legacy and new functional capabilities. The automation systems to be modernized by the TFM-M programme include the current TFM centralized processing capability located at the Volpe National Transportation Systems Center; the TFM subsystems located at the ATCSCC; and the TFM subsystems located at the various ATC facilities.

5.4 Operationalevaluation programme (OEP) — is the FAA's rolling ten-year plan providing the vision and road map for modernizing the NAS and influences the direction of CDM and TFM-M. OEP increases the capacity and efficiency of the NAS while enhancing safety and security. The OEP represents the agreements and commitments of FAA, Department of Defense (DOD), and the aviation community to modernize the NAS and solve problems in four core areas which are: arrival/departure rates, en route congestion, airport weather conditions, and en route severe weather. Additional information on the OEP can be found in AN-Conf/11-IP/27.

5.5 The national airspace redesign is the FAA's continuing multi-year plan to review, redesign, and restructure the nation's airspace to meet the rapidly changing and increasing operational demands on the NAS. Similar to the OEP, the national airspace redesign will influence the direction of TFM and CDM development. The FAA is working with NAS users and service providers, using available airspace, facilities

and equipment, and calculating future use of these resources to improve efficiency and reduce delays. As part of the redesign, the high altitude changes in navigation structure and operating methods for en-route operations for the high altitude airspace environment. Required navigational performance, area navigation, and point-to-point navigation will incrementally replace the higher altitudes of the present jet-route structure. The process once developed will have a phased-in implementation approach based on advanced technology as it becomes available in the cockpit and on the ground.

6. ACTION BY THE CONFERENCE

6.1 The conference is invited to:

- a) note the collaborative planning approach adopted in the United States, Canada, Japan, and other contracting States by air traffic service providers and airspace users;
- b) recommend that ICAO provide guidance to contracting States to consider adopting a similar collaborative planning approach process, and sharing in the exchange of aviation information;
- c) recommend that ICAO continue efforts to support global TFM projects and activities and standardize TFM operating procedures globally. Ensure that worldwide air traffic service providers and airspace users are involved in the process; and
- d) recommend ICAO support the development of TFM international/space processes and procedures.

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