

Improved Collaborative Air Traffic Management

Summary Description:

This solution set covers strategic and tactical flow management, including interactions with operators to mitigate situations when the desired use of capacity can not be accommodated. Collaborative Air Traffic Management (CATM) solution set includes flow programs and collaboration on procedures that will shift demand to alternate resources (e.g. routings, altitudes, and times). CATM also includes the foundational information elements for managing National Airspace System (NAS) flights. These elements include development and management of aeronautical information, management of airspace reservation, and management of flight information from pre-flight to post-analysis.

Background:

Current tools for managing Air Traffic Management system demand and capacity imbalances are relatively coarse. Optimal solutions would minimize the extent to which flights are either over or under constrained. Flight restrictions unnecessarily interfere with operator objectives and the cost of travel. Situations where constraints are less than optimal similarly generate excess costs. Restrictions also inhibit operators from specifying a preferred alternative and restrain their involvement in resolving imbalance issues.

The overall philosophy driving the delivery of CATM services in the NextGen is to accommodate flight operator preferences to the maximum extent possible. Restrictions should be imposed only when a real operational need exists, such as meeting capacity, safety, security, or environmental constraints. CATM proposes to adjust airspace and other assets to satisfy forecast demand, rather than constraining demand to match available assets. If restrictions are required, the goal is to maximize the opportunity for an airspace operator to resolve them, based on enlightened historical information.

Operational Capability Description:

When the NextGen goal is achieved, all airspace operators will be able to collaborate on Air Traffic Management (ATM) decisions. Collaborative ATM intends for the exchange of information to create a mutual understanding among participants resulting in stakeholder influence on overall objectives and decision-making. This information exchange will include current large-scale flight operations centers with complete CATM automation tools to individual pilots with hand-held, personal computers. Individual pilots (personal users) will have appropriately scaled CATM collaboration access.

Stakeholder decisions will be supported through access to a rich information exchange environment. A transformed collaborative decision-making (CDM) process will provide wider access to information by all parties (whether airborne or ground), while maintaining privacy and security. Information will be timely, relevant, accurate, and quality-assured. Decision-makers will have the ability to request information when needed, publish information as appropriate, and automatically receive desired information through subscription services. This

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improved information environment will enable timely information access and increased situational awareness, while providing information consistency among decision-makers.

The CATM process recognizes that expertise, data, and processing capabilities necessary to balance NAS constraints and multiple operator objectives are cross-organizational (including Air Navigation Service Providers [ANSP], flight operators, and other stakeholders). This cross-organizational involvement applies to situation assessment, plan generation, execution, contingency management, and adaptation. To the maximum extent possible, decisions will be made at the local level, with an awareness of system-wide NextGen implications. This will include, to a greater extent than ever before, an increased level of decision-making by the flight crew and/or flight operations centers.

Within this projected CATM environment, flight operators will have a range of flight planning capabilities that optimize flights based on individual mission objectives, available aircraft, security and airspace constraints, and forecasted weather. Operators will also have access to an authoritative source of weather information that provides forecasts and current conditions. Flight planning automation will use weather information and system constraint data in planning individual flights or groups of flights.

CATM will be the means by which operator objectives and constraints are balanced with overall NAS performance objectives. To ensure that locally developed solutions do not conflict with overall goals or other implemented strategies, decision-makers will be guided by NAS-wide objectives and test solutions to identify interference and conflicts with other initiatives. Decision-making will revert to higher authority only when a constraint cannot be resolved. A prioritization scheme will need to be established for solutions to mitigate constraints. Adjustments may be required of congestion management policies.

Flight planning is iterative and interactive. For some operators, flight plans represented as 4D trajectories are planned months in advance. Trajectory and other information associated with the flight are stored in the flight object. As more information becomes available about conditions affecting a flight, operators are automatically informed, and in turn, make adjustments to provide “best known” information via a 4D trajectory. The level of uncertainty will decrease as the time to actual flight departure decreases. Operators also have multiple options for indicating contingency plans associated with a given flight. For example, a filed flight may include alternative 4D trajectories that represent the operator’s preferences. The operator also may provide some contingency criteria to the ANSP to provide guidance for ANSP-generated changes to the 4D trajectory. Operators maintain the ability to negotiate changes to a 4D trajectory and may initiate a 4D trajectory proposal in anticipation of a planned constraint.

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Flight planners (or an operator's flight-planning automation) interact with a common flow strategy and trajectory analysis service, available to all NAS stakeholders. This service provides common situational awareness of current and projected NAS status and constraints. In addition to having common services for understanding the potential effects on a trajectory (or the effects of a flow strategy), operators and the ANSP can collaborate on the selection of both capacity management and flow contingency management strategies. This allows balance of NAS performance objectives with Flight operator goals. National goals and desired NAS performance objectives are common knowledge to all parties. Transparent strategies are established for achieving overall performance objectives, including airspace management (to maximize capacity when demand is high) and, as required, flow management initiatives (to ensure safe levels of traffic are not exceeded when capacity limits are reached).