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ITEM 2

CONFERENCE ON THE ECONOMICS OF AIRPORTS AND AIR NAVIGATION SERVICES

(Montreal, 19 - 28 June 2000)

Agenda Item 2: Organizational issues

PERFORMANCE METRICS FOR EVALUATING AIR TRAFFIC SERVICE PERFORMANCE

(Presented by the United States of America)

SUMMARY

The growth in air traffic in the last decade has created increased demand for the provision of air traffic services (ATS). The increasing absolute cost of the provision of these services and the gradually changing emphasis – from the purely technological improvement in the provision of air traffic management services to the examination of the most efficient way to produce those services – has led to the development of metrics designed to measure whether user requirements are being met and at what performance levels.

ATS performance metrics fulfill three functions. They define what ATS services users value; they form a basis for assessing and monitoring the provision of air traffic management services; and they can provide common criteria for cost benefit analysis for CNS/ATM development. The performance metrics recommended here are similar to those proposed by the Air Transport Association, International Air Transport Association, Federal Aviation Administration, Eurocontrol, and Civil Air Navigation Services Organization.

1. Introduction

1.1 The airline industry is characterized by high rates of cash flow and narrow profit margins, with typical returns on capital averaging only a few percent. Intense competition demands that airlines closely control their costs to survive. They have done this, in part, by forming complex, networked route systems through hub-and-spoke design, corporate consolidation, code-sharing, and/or alliances in order to leverage their costs. In addition, airlines have developed sophisticated revenue management systems to maximize their revenues. Using these tools, airlines compete vigorously to produce a product – scheduled available seat-miles – of the highest possible quality, for the lowest possible cost.

1.2 The business/corporate segment of general aviation continues to grow world wide and new methods of aircraft ownership and operation have evolved such as fractional aircraft ownership. Thus, general aviation has increased requirements for access and efficient air traffic services.

1.3 The air traffic management system's impact on airlines' and corporate aviation's ability to plan and operate their flight schedules and manage their tightly networked assets and resources is therefore closely related to the performance of air traffic services.

1.4 Eventually, all air traffic management service and productivity issues (e.g., delay, flexibility, efficiency, etc.) emerge as the quality of service received as well as the cost of service to the ATS user, whether in the form of ticket taxes, airport landing fees, passenger facility charges, terminal area charges, or route charges. Customers of ATS providers become extremely concerned when air traffic service costs escalate without a corresponding improvement in service quality or performance. Therefore, the cost of service to ATS customers must always be considered when evaluating any proposal to improve air traffic management service quality or performance.

2. Discussion

2.1 Air traffic management systems have faced increasing demand for services in the last decade with relatively little growth in the infrastructure used to supply those services. This increased demand has begun to focus attention on the cost and performance of air traffic management systems as opposed to the previous emphasis on the technological capabilities of those systems. As the investment decisions required for providing air traffic services become more complex, the need for well-defined indicators and metrics for air traffic management system performance increases. Air traffic management systems should have performance metrics for: safety, delay, predictability, flexibility, efficiency, availability, access, and cost of service.

2.2 **Safety** is the primary requirement for any air traffic management system. Accidents are sufficiently rare that measures of accidents per control unit may not be sufficient. Measures should be developed that provide insight into the level of risk that actually exists.

2.3 **Delay** has traditionally been used as the most direct measure of air traffic service performance. However, measuring flight delay against scheduled times in a congested system has become much less meaningful over time, because so much expected delay is built into the schedule by airlines in order to maintain operating integrity. Conceptually, delay should compare actual flight times against baseline optimum flight times, not scheduled times, in order to assess overall air traffic management system performance.

2.4 **Predictability** can be regarded as a measure of the variability of a performance measure. For example, as the variability of taxi-out time (a measure of delay) increases, more and more disruption will be caused to an aircraft operator's schedule, with corresponding disruptions to flight connectivity. Conceptually, predictability metrics should compare actual flight time to the scheduled flight time or baseline optimum value, since the scheduled flight time includes the amount of expected delay at a targeted level of performance.

2.5 **Flexibility** in the traffic management system refers to the ability of ATS users to adapt their operations to changing conditions. Greater flexibility would permit them to exploit operational opportunities as they occur, such as allowing them to obtain more favorable routes, or minimizing impacts on passengers as a result of unplanned capacity-constraining events such as severe weather. Conceptually, flexibility metrics

should address how well the air traffic management system allows users to make dynamic operating decisions as a result of changes in weather or operating conditions, either prior to or during a flight.

2.6 **Efficiency** can be measured in terms of the deviation of a flight from an optimum flight routing. An efficient routing would reduce direct operating costs by optimizing flight path trajectory and by eliminating excess flight time, route distance, and fuel usage at non-optimum speeds and altitudes. Since airlines fly millions of single operations per year, small incremental savings of direct operating costs on every flight can add up to significantly improved financial performance. Conceptually, efficiency metrics should compare the planned or actual flight path trajectory to an optimum baseline.

2.7 **Availability** of air traffic services is an indicator of the reliability and quality of ATS provided. Disruptions to key systems can reduce system capacity, causing delay, flight diversion and cancellation. The result is an increase in user costs to both air carriers and some segments of the general aviation community. Conceptually, availability metrics should measure the frequency or likelihood that systems crucial to maintaining the level of system capacity at current levels cannot be operated.

2.8 **Access** to airport and airspace air traffic services can increase the value to all of the previously mentioned performance metrics. As with trajectory efficiency, the value of access may be gained through the release of airspace currently inaccessible to operations due to lack of air traffic services, reduction to airport or airspace constraints, and lessening of national security restrictions. Conceptually, access metrics should take into account the ability of ATS users to fly through restricted areas, the availability and quality of preferred routings, and the ability of air traffic control systems or airports to meet capacity demands.

2.9 All ATS productivity and cost issues eventually emerge as components of the quality of ATS services received by ATS users or as a cost to the ATS provider and, ultimately, a cost to the ATS user. These costs may take several forms, such as ticket/fuel taxes, airport landing fees, passenger facility charges, route charges, terminal area charges, and special aircraft equipage requirements. Users of ATS become extremely concerned when ATS charges and related costs escalate without a corresponding improvement in one or more of the ATS quality performance metrics, ultimately depresses profitability and return on revenue or investment. The **cost of service** to ATS users should be considered by ATS providers whenever any proposal to improve ATS performance on any of the ATS quality performance metrics is considered.

2.10 To manage CNS/ATM services, ATS providers need to have a reliable method to identify the true cost of providing service. ATS providers need reliable cost information to manage their own operations effectively, to inform and communicate with their customers, to assess their efficiency, and to set priorities and costs for improvements to the air traffic management system. To be effective, a costing system needs to be able to clearly identify the cost components associated with providing specific CNS/ATM services at a detailed level that is directly tied to the services they provide and the opportunities available to improve those services.

3. Conclusion

3.1 The airline industry is highly visible and international in scope, with narrow profit margins. General aviation has become more sophisticated not only with respect to equipment and ownership, but also with respect to operating organizations. For the airlines and other users of air traffic services, it is important that increases in the costs of air traffic services are accompanied by a corresponding improvement in the quality of service provided. In order to monitor the quality of service provided by air traffic service providers, data on the following air traffic system performance metrics needs to be collected and maintained: safety, delay, predictability, flexibility, efficiency, availability, access, and cost of service.

4. Action by the Conference

4.1 The Conference is invited to urge States to encourage their air traffic providers to:

a) develop and collect data on safety, delay, predictability, flexibility, efficiency, availability, access, and cost of service;

b) incorporate these metrics into the processes used to evaluate and improve the quality of air traffic services provided;

c) use these metrics to help support their investment decisions;

d) seek ATS user community involvement to promote the dialogue and information exchange needed to achieve a mutual understanding and consensus on these issues; and

e) develop and maintain costing systems that permit them to understand the true costs of providing services.

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