

NPRM: Automatic Dependent Surveillance-Broadcast (ADS-B) OUT Performance Requirements to Support Air Traffic Control (ATC) Service

Docket No. FAA-2007-29305; Notice No. 07-15

The following comments on the subject NPRM are provided by **DayJet Corporation**, 3561 FAU Blvd., Suite 200, Boca Raton, FL. For inquiries or clarification, contact Dr. Bruce J. Holmes, 561-613-5845, bruce.holmes@dayjet.com.

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EXECUTIVE SUMMARY

DayJet Corporation and its subsidiary, DayJet Services, LLC (“DayJet”) strongly support the FAA’s program to establish ADS-B as a key element of the infrastructure for the NextGen Concept of Operations. DayJet and others in the on-demand air transport industry operate technologically advanced aircraft, such as very light jets (VLJs). We are committed to support the vision for transformation led by the U.S. Joint Planning and Development Office (JPDO). Our assessment of NextGen technologies convinces us that environmental and economic benefits will accrue as a result of their implantation to the communities we serve, the states, the federal government, our industry, consumers, and the Nation. In this spirit, we are pleased to offer this response to the subject NPRM. We recommend additional focus and investment in particular that of ADS-B IN strategies for deployment at smaller community airports and rural regions, trials to accelerate implementation, and use of multi-lateration systems to accelerate the benefits to those airports constrained by one-in-one-out procedural separation and to those who equip with ADS-B technologies.

We encourage implementation of ADS-B IN and ADS-B OUT as soon as feasible to increase safety, capacity, and efficiency for all aircraft and airport operators who are willing to equip with the requisite systems. DayJet’s business model connects many markets in which the National Airspace System (NAS) has not usually provided radar services traditionally required to support near all-weather air and ground operations. In our operations to date, we have experienced enroute and terminal area inefficiencies that ADS-B OUT and IN applications would clearly remedy. These inefficiencies occur at and between the smaller community airports we serve, as well as in the airspace near our larger operational bases. We understand the value DayJet would derive from ADS-B applications, and recognize the accompanying reduced ATC workload and improved safety of flight operation benefits for the public and the air transportation industry. We specifically propose that the FAA develop a joint (FAA-Industry) ADS-B Operational Implementation Transition Plan directed towards the on-demand transport operators who provide services in small community airports. DayJet is willing to commit its time and resources to participate with the FAA in a NextGen operational implementation that would culminate in final operational services predicated upon specific ADS-B applications.

The supporting data gathered and operational experience gained from the proposed operational implementation will provide significant benefits of the following types:

- Energy savings
- Carbon footprint reduction
- Environmental impact management through departure and arrival procedures that accommodate community interests related to particularly noise-sensitive area
- Fleet departure and arrival management practices with greater precision, safety, capacity and efficiency, to include enhanced visual approaches and closer spacing in instrument meteorological conditions (IMC)
- Acceleration of airspace expansion through evolutionary processes identified and validated during trials in non-congested airspace

Within a transition plan, the focus would include under-utilized areas of the NAS for which radar services have not been traditionally provided and offers airspace capacity and safety benefits. Underutilized airports and airspace typify the target of market expansion for the emerging on-demand air transport operators. Implementation of ADS-B in these areas can provide an orderly, well proven, community supported, sustainable process for accelerating use of operating capabilities envisioned in the JPDO NextGen Concept of Operations. Lessons learned in these sectors of the NAS can then be efficiently infused into the more congestion-challenged regions of the NAS.

INTRODUCTION AND BACKGROUND

DayJet is an on-demand, per-seat air transportation service provider located in the Southeast region of the U.S. operating Eclipse 500 (EA-500) very light jets (VLJ) across a number of small community airports. We are currently operating 28 aircraft between 60 communities in Florida, Georgia, Alabama, Mississippi, and South Carolina. We plan to expand our fleet size and expand services to communities in North Carolina and Tennessee by the end of 2008. DayJet will not operate at Class B (OEP 35) airports. Our business model operates effectively in markets outside of those large airport service areas.

DayJet is fully supportive of the FAA's program to establish ADS-B as a key element of the infrastructure and as an aid to successful transition into the next generation air transportation system. This ADS-B initiative will succeed in part because of the commitments of leaders in the air transport industry, particularly the VLJ operators. The VLJ operators are ready for early adoption of NextGen capabilities by virtue of their new aircraft, new business models, and willingness to invest on the basis of assured known ROI computations. These operators are committed to modernization of aircraft and avionics on the basis of the life-cycle economics and performance of modern technology. DayJet's analyses and operating experience indicate that the suburban, rural, and remote communities we serve will benefit substantially in terms of the economic opportunity brought about by widely distributed regional air mobility.

For small communities and regional airports to take advantage of these economic opportunities, reliable ADS-B-based air traffic services must expand beyond the OEP 35 and 250 second tier airports, to underutilized routes and smaller community airports. Our discussions with state transportation and aviation officials indicate that many smaller airports are eager to update and enhance their airport infrastructure and service capabilities to accommodate on-demand air transportation services. We also understand that, according to the U.S. JPDO studies, implementing NextGen only in the OEP 35 and 250 second tier airports with large commercial airline operators will not resolve congestion or relieve delays by 2015 or even by 2025. We believe that opportunities exist to move quickly toward more RNP routes and an expanded use of ADS-B and NextGen digital radios to expand the use of the nation's airspace capacity to include underutilized routes and airports.

We applaud the initiative taken by the FAA's ADS-B service provider (ITT Corporation) to reach out to the air taxi industry in the Southeastern U.S. operating region. Further, we favor stronger institutionalization of ADS-B system installation to support airport and airspace infrastructure outside the domain comprising of the OEP 35 and additional 250 second-tier airports. We also believe that significant new lessons will be learned by implementing NextGen in underutilized regions that can achieve measurable results and demonstrate improved service quicker than implementation in the more congested and thereby complex higher density regional environments. DayJet supports development of airspace expansion through early implementation of the NextGen architecture and its networked surveillance concepts as identified in this response.

DayJet is one of the founding members of the Personal Air Taxi Alliance (PATA). PATA is a not-for-profit organization dedicated to advancing innovation in the new VLJ on-demand air transport industry and promotes the new generation of on-demand jet services. Member companies include operators, manufacturers, and associate industry supporters, most of whom are small businesses. This response to the FAA's NPRM has been coordinated with and is supported by the Board of Governors of PATA and a number of other industry partners. Separate submissions by PATA members may reflect views similar to those expressed herein.

DayJet is also a founding member of the Air Taxi Association (ATXA). This organization is a leading supporter of personal air travel at greatly reduced prices by taking people off our crowded roads into next-generation aircraft. This association is backed by air taxi companies with a mission to speed the adoption of the air taxi models by businesses, individuals, and communities. An international arm of the association coordinates its activities with those in Europe. Since the benefits of the NetGen concept of operations accrue to all users of the NAS, DayJet has included members of ATXA in discussions and in efforts leading to the acceptance of the objectives of the NPRM and its future implications.

VALUE AND BENEFIT OF ADS-B

DayJet believes that the mandatory equipage proposal for operators is vital for the NAS transformation. The success of this mandate is tightly coupled to the national deployment of an ADS-B OUT receiver ground network. We believe that the value of the operator equipage requirement can be demonstrated by inclusion of ADS-B IN functionality. This strategy is effective where operators are willing to equip with ADS-B IN and where ground deployment across the NAS is contemporaneously. Such a strategy can and should be employed through partnership between the public and private sectors, a concept DayJet would support.

We believe that ADS-B OUT alone will provide the benefits noted in the FAA's NPRM analysis documents. However, these benefits largely accrue to the operator of the ground infrastructure, with marginal benefits to the aircraft operator, thus discouraging investment in equipment and adding to equipment costs of many aircraft owner/operators. Therefore, we strongly urge that ADS-B OUT implementation be coupled with ADS-B IN in segments of the NAS where aircraft operators are willing and able to install the equipment necessary to use the technology and establish operating procedures to assure direct benefits to the investing operator. We believe that there is a critical requirement for full ADS-B based surveillance coverage and performance throughout the underutilized airspace characteristically used by the on-demand operators (block-to-block, including on the surface at all airports served). We and other VLJ operators are equipping our fleet with avionics capabilities to meet RNP requirements necessary for enroute segments and terminal areas in which we will operate. We will maintain aircrew proficiency and aircraft operational control at the level necessary to gain maximum value with enhanced safety and minimal burden to the NAS service provider.

DayJet is currently evaluating key aspects of its business model, including the effects of outmoded airspace procedures, surveillance, and communications capabilities. In our assessments, operational use of 4-D based RNP procedures (Trajectory Based Operations -- TBO) has great merit to networked, on-demand fleet operations. The JPDO vision for transformation regarding ADS-B and RNP can be more fully realized when supported by implementation of airborne networking. In order to achieve this vision, DayJet believes there is a need to develop a complete aircraft and ground system operational performance specification that links Required Communications Performance (RCP) with Required Navigation Performance (RNP) to establish an overarching Required Surveillance Performance (RSP) specification. Thus, TBO, ADS-B, RNP and airborne networking are vitally intertwined. The FAA and the aviation user community would be well served if the criteria for ADS-B system performance (RSP) did not constrain the certification process but rather allowed other providers to install and integrate their systems with those managed by the FAA.

DayJet also believes that establishment of an unambiguous performance specification is vital. This specification would apply to our use of ADS-B OUT/ IN systems and applications integrated with our digital avionics system architecture. The same technical

forces (e.g., Moore's Law¹) at work in lowering the cost of "glass" cockpits over the past decade will lower the cost of ADS-B systems through such open performance and interface control standards. Such a performance standard will lead to benefits and economies of scale that lower our cost of avionics equipage and implementation of operational procedures to levels we believe make business sense within our financial capabilities. We strongly believe that significant cost mitigation for both providers and users can be achieved through improved operations and expansion of airspace utilization into untapped altitudes and routes.

Our evaluation of the potential improvements in fleet network performance is based on our experience with our Eclipse 500 VLJ aircraft, along with our analysis of the effects on our operations with the Avio NG avionics system that incorporates the 1090 ES transponder capability. We anticipate that our fleet will be equipped with ADS-B OUT and IN in the near future. The FAA strategies regarding ADS-B will affect the timing of our update of equipment in our fleet.

We are in a position to provide further details directly to the FAA upon request regarding our experiences with inefficiencies (in time, fuel burn, and customer satisfaction) on a number of routes between specific communities we serve. The reductions in fuel burn are significant, and in many cases range from 10-percent to more than 20-percent. With our regional air traffic service providers, along with the university community, we have initiated research on the design of RNP-based alternatives to the routes and terminal procedures we fly today. The new procedures can result in significant savings which can reduce the cost of air service to smaller communities. ADS-B applications will be vital for our ability to begin operating on these alternative routes during the coming year or so.

While benefits accrue to service providers due to implementation of ADS-B OUT, significantly more benefits can accrue to both providers and users from implementation of ADS-B IN. Furthermore, the current Segment I plan for sensor installation in the U.S. appears to offer minimal benefits over radar surveillance service volumes existing in the airspace and at the airports we currently use in our operating region in the Southeastern U.S. This is especially true where one-in-one-out procedural separation is the norm. Users and providers would be well served by more rapid expansion of airspace capacity through provision of separation services based on ADS-B IN. Most of the airports at which we operate have minimal radar surveillance today.

Critical factors that drive our business model include time, distance, and related routings and altitudes. These factors are directly affected by FAA surveillance support. Development and implementation of RNP procedures would ensure timely aircraft dispatch, direct line of flight, and optimum altitudes throughout the NAS, including larger air transport airports and smaller community facilities. These RNP routes and

¹ Moore's Law: In 1965, his prediction, popularly known as Moore's Law (Intel co-founder Dr. Gordon Moore), states that the number of transistors on a chip will double about every two years. But Moore's Law can also mean decreasing costs. As silicon-based technology gains in performance, it becomes less expensive to produce, more plentiful and powerful, and more seamlessly integrated into our daily lives. – source: Intel

procedures may be developed by the FAA or through private sector, Federal, or state initiatives. In any case, implementation of RNP procedures should be initiated early and contemporaneously with the ADS-B ground system deployment.

We have assessed the impact of the projected DayJet fleet, combined with other operators of VLJs and other technologically advanced aircraft during the next 14 years. Our assessment indicates that the air traffic services necessary to support flight operations outside of the OEP 35 airspace could become as workload intensive (if procedural separation were the standard) as those operations currently flown by most of larger airlines using large airports. This need not be the case if we accelerate adoption and use of ADS-B-based services to include reliever airports. These airports can benefit directly from multi-lateration technologies along with RNP procedures, and airborne networked radios. Our market analysis indicates that increased passenger demand and service support for our operations will involve smaller community airports at lower flight levels where every minute of delay or inefficiency represents a significant penalty for the operator and for the NAS service provider. The benefits of providing ADS-B-based services goes beyond just the NAS users and providers to include the economic benefits for the communities served by the emerging on-demand operators along with the already well documented national focus on congestion relief and minimization of airport passenger flight delays.

Accordingly, we are convinced that the FAA ADS-B Program deployment allocate significantly more resources for more widely distributed infrastructure that supports innovators such as on-demand air transport operators serving small communities across the nation. This infrastructure supports the ability of these operators to sustain safety and regularity of flight, to expand airspace capacity, and to greatly increase operating efficiencies.

TRANSITION ISSUES

As the FAA moves forward with the ADS-B ground system implementation, we believe that there are a number of significant transition issues that are of great significance to the broad community of users of smaller aircraft for both public and personal air mobility at the nation's smaller community airports. Following are those issues that we believe should be given special consideration:

- FAA engagement in certification of displays for ADS-B-IN traffic graphics for spacing and merging use in enhanced VFR and IFR safety, capacity and efficiencies at traditionally non-radar-surveilled airports, specifically for CFAR14 Part 23 aircraft used in Part 135 operations
- More widespread implementation of surface surveillance capabilities (*e.g.* multi-lateration, virtual/ remote tower operations, etc.) at smaller airports used by the emerging on-demand air transport industry
- Accelerated adoption of equipage through selected implementation of multi-lateration with Traffic Information Service-Broadcast (TIS-B) to enable both equipped and non-cooperating aircraft to gain the safety, capacity and efficiency benefits sooner than would otherwise occur through the 2022 mandate timeline

- Aircraft operator and controller staff training initiatives
- FAA's further support for a streamlined operational approval of these newer technologies by the Flight Standards Service.

CONCLUSION

In conclusion, in the context of the needs of the on-demand air transport industry, DayJet supports the mandate. Further, DayJet proposes that the FAA develop a joint (FAA-Industry) ADS-B Transition Plan expanded to encompass the on-demand flight service operators. These operators provide services at the small community airports and are willing to install the equipment necessary to meet the requirements of the JPDO NextGen vision for transformation of the U.S. air transportation system. DayJet is willing to participate with the FAA in a NextGen operational implementation that culminates in final operational services. We believe that the resulting data and operational experience will show significant benefits for today's NAS challenges, including provision of validated data and information to support:

- Energy saving
- Carbon footprint reduction
- Noise impact management through departure and arrival procedures that accommodate community interests
- Fleet departure and arrival management practices with greater precision, safety, capacity and efficiency
- Assured regularity of flight operations to meet public expectations regarding the use of these emerging on-demand services
- Transition/ evolution to full NAS data and model through trials in non-congested airspace

Implementation of the proposed transition plan in the under-utilized areas of the NAS for which radar services have not been traditionally provided, but which are the target of market expansion for next generation on-demand air transport operators, can provide an orderly, well proven, community supported, sustainable process to accelerate implementation of certain of the operating capabilities envisioned in the JPDO NextGen Concept of Operations. Lessons learned in these parts of the NAS can be incorporated more effectively into implementation in the more congestion-challenged regions of the NAS.

We are confident that the FAA will consider these comments from the emerging on-demand community of VLJ operators and other technologically advanced aircraft and adapt them for implementation in the interest of encouraging air transportation innovations that improve safety and capacity and reduce costs. We look forward to meeting with your representatives to expand upon or clarify any issues or actions that we have proposed. We are eager to see rapid implementation of modern technology throughout the NAS and accordingly view this NPRM intended mandatory equipage as a significant step toward achieving universal ADS-B equipage.

DayJet's additional responses to specific questions noted in the NPRM are provided below.

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NPRM IDENTIFIED SPECIFIC COMMENTS:

The following paragraphs address specific comments requested:

Comments from Manufacturers of Aircraft- While DayJet is not a manufacturer, we maintain a close strategic relationship with our aircraft supplier, Eclipse Aviation Corporation. Our comments have been coordinated between our two companies and are supported by the aircraft manufacturer and other supporting suppliers and operators.

Weight Assumption for ADS-B OUT Transponder- We concur with the assumption that there would be no additional weight or fuel burn impacts. In fact, fuel burn impacts will be favorable if the ADS-B applications allow for shortened route structures.

Cost, Maintenance, Replacement Assumptions for Transponder and Position Source Units- Because our aircraft are equipped with the transponder and position source units as standard package by the aircraft manufacturer, we have accounted for known costs, including maintenance and life-cycle, in our business plan. These costs are offset by the gains in fleet network performance in our operations.

Potential Benefits Not Identified- The DayJet operating model incorporates DayPorts and DayStops airport categories. We base approximately 15 aircraft at each of our DayBases (a term used for internal company management purposes). From each DayBase, we deploy and recover our aircraft multiple times during any normal eighteen hour operating period, Monday through Friday. The potential efficiency of the fleet deployment and recovery will benefit significantly from ADS-B IN if we are permitted to minimize separation and crew work load actions during merging and spacing. There are a number of schemes that enable automation of these deployment and recovery operations, including using the ADS-B message set to communicate required times of arrival (RTAs) to our DayJet Command Information Center (CIC). Preferably, such information could be communicated over an airborne network capable of assured message delivery through Internet protocols. The ADS-B position information is vital to the calculations needed to perform these deployment and recovery operations.

ADS-B IN Costs, Benefits and Likelihood of Voluntary Equipage - We will invest and voluntarily equip with ADS-B IN because we note that the benefits over costs and the value to our customers of the time savings can be demonstrated and quantified on our anticipated flight segments.

FAA Surveillance Deployment Strategies for Acceleration of Achievement of Benefits- We believe that among many approaches to incentivize equipage, multi-lateration

technology, coupled with TIS-B (derived from ADS-B), and other procedural changes at smaller community airports will accelerate the adoption rate for ADS-B.

Degree of Hardship For Small Entities-

No comment.

Comments on FAA's Competitive Analysis and Alternatives for Achieving Compliance-

No comment.

Assumption Regarding Zero Maintenance and Replacement Costs for ADS-B OUT for GA-

As the old transponder (Mode A, C) technology and equipment ages, and the new technology responds to the forces driving digital systems costs ever downward, the reliability of the new generation systems will arguably be much improved and the cost much lower than those factors for the old systems.
