



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 1: Strategic issues that address the challenge of integration, interoperability and harmonization of systems in support of the concept of “One Sky” for international civil aviation

1.1: Global Air Navigation Plan (GANP) – framework for global planning

THE VISION FOR A GLOBAL DATA LINK SYSTEM FOR AIR TRAFFIC MANAGEMENT (ATM)

(Presented by the Civil Air Navigation Services Organisation)

SUMMARY

This paper presents CANSO’s vision of a global data link system for air traffic management (ATM). For this vision to become reality, it is essential that policies and strategies be established and agreed that will ensure the timely implementation of data link in support of seamless and safe global ATM operations.

Action: The Conference is invited to consider the recommendation contained in paragraph 3.

1. INTRODUCTION

1.1 Data link is an essential component for the success of implementing modern air traffic management (ATM) in all regions of the world, which includes the United States’ Next Generation Air Transportation System (NextGen), Europe’s Single European Sky ATM Research (SESAR), and Japan’s Collaborative Actions for Renovation of Air Traffic Systems (CARATS).

1.2 The aviation community has already proven that data link delivers improvements in air transportation safety and efficiency, together with a reduction in operating costs, and has reduced environmental impact; however, data link expansion has been hindered by a number of issues. CANSO hosted the ATM/Aircraft Data Communications Policy Conference in Amsterdam, 6 to 8 September 2011, to discuss the issues. At the conference, delegates agreed that it is not a lack of suitable technology that is preventing data link deployment, but rather the lack of a global cooperation and commitment among air navigation service providers (ANSPs) and other stakeholders on a common way to move forward. CANSO’s vision for moving forward will be achieved through leadership of its Member air navigation service providers (ANSPs) in cooperation with other stakeholders to establish policies and strategies that will ensure timely implementation of data link that supports seamless and safe global ATM operations.

¹Arabic, Chinese, English, French, Spanish and Russian versions provided by CANSO.

2. DISCUSSION

2.1 There are complex and interrelated issues that must be addressed before data link implementation can effectively be expanded to enable significant operational improvements in safety, efficiency and environmental impact. These issues are related to sovereign policies and regulations, international, government and industry standards for airworthiness, flight operations, provision of air traffic services, human factors and continued operational safety of a global air navigation system. Effective implementation of data link will require a multi-disciplinary approach to address policies, technologies and operations to ensure that systems are designed to meet the needs of the end-users.

2.2 CANSO will provide the forum for obtaining consensus among its members in co-operation with other stakeholders on the policies and strategies that will address the issues and provide a clear way forward for implementing globally-compatible data link for ATM.

2.3 Data link is in widespread use for a wide range of performance based services such as reducing separations, operating on user preferred routes (UPRs), conducting dynamic airborne re-route procedures (DARP), climb/descent procedures (CDP) and tailored arrivals (TAs). Data link is also proliferating into International General Aviation (IGA) and business markets. It is generally not mandated and can be advantageously applied to ‘targets of opportunity’ between approved aircraft pairs to safely reduce separation. Data link is essential for growth and is a key building block to future ATM programs, such as to conduct trajectory based operations, which is common to CARATS, SESAR, and NextGen. However, ANSPs will need to support a mixed-capable fleet environment as operators equip with different data link capabilities that are beneficial to their business. These global needs for data link include supporting infrastructure and significant fleets of capable aircraft for data link applications that will ensure benefits are realized.

2.4 While technology is not constraining the progress of our programs to meet needs, regions and States are challenged with a need to implement data link systems that are globally interoperable and using consistent globally harmonized procedures. This is a worthy goal, but more realistically, managing the number of data link implementations will be the most pressing challenge for the foreseeable future. FANS1/A and ATN Baseline 1 (as implemented by Link 2000+ CPDLC), which are not interoperable, will need to be accommodated for a long time, and RTCA/EUROCAE and ICAO are developing an updated data link definition for CPDLC and ADS-C, referred to as Baseline 2 which is expected to enter service with a sufficient capable fleet from 2018.

2.5 Different region-specific data link implementations provide the biggest challenge for the aircraft manufacturers. Boeing, Airbus and Embraer each called for clear guidance on ANS requirements, noting that solutions are available and factory fitted. Retrofit can be complex and expensive for many aircraft, even though there are some aircraft such as the B737 and A320 families for which retrofit is available. The bottom line is that ANSPs need to provide ATM services where the benefits outweigh the costs for the aircraft data link capability on forward-fit and retrofit aircraft. Strategy follows vision. Consequently, it is not surprising that the various conflicting national and regional visions have led us to what we have today. There is a need for ANSPs to agree on a harmonized global view of operational requirements and enabling services, and fully commit to implementation. The industry needs data communications that safely meet operational needs using performance based criteria in a competitive provider landscape – data link is clearly an essential foundation for ATM capacity growth.

2.6 The data communication policies and strategies must take into account lessons learned and current activity, emphasizing the need to balance global harmonization with local needs, and consider the following:

- a) defining operational services and expected outcomes that are beneficial and ensure global safety;
- b) building on the ICAO data link harmonization strategy by:
 - 1) leveraging benefits from current FANS 1/A and Link 2000+ capability through implementation of ground-based solutions, where beneficial, rather than requiring “multiple stacks” on the aircraft.
 - 2) converging the next generation data communications for ATM through standards developed by ICAO, e.g., Operational Data Link Panel (OPLINKP), and industry standards organizations such as joint RTCA/EUROCAE groups, e.g., SC 214/WG 78, SAE and AEEC;
 - 3) implementing a performance-based framework for the application of required communication performance (RCP) and required surveillance performance (RSP) specifications to safely manage a mixed-capable fleet in common airspace over long transition periods; and
 - 4) determining the support required to accommodate an evolving fleet, evolving operations and evolving technologies that is consistent with converging to a globally compatible next generation data link capability;
- c) facilitating the provision of air traffic services, operator readiness, common procedures for the controller and the flight crew, and post-implementation monitoring and analysis through guidance provided in the Global Operational Data Link Document (GOLD);
- d) ensuring inter-dependencies, such as ATS inter-facility data communications (AIDC), are implemented to ensure expected benefits are attained;
- e) allowing ATS data link to be compatible with and share communications infrastructure with other types of communications, such as aeronautical operational control (AOC) data link, for major operator benefit even though requirements are different; and
- f) making informed decisions regarding the planning and implementation of data link through post-implementation monitoring and global information exchange of the results and lessons learned through regional/State monitoring agencies.

2.7 By 2015, ANSPs should have committed to a global performance-based framework for communications and surveillance, based on agreed RCP and RSP specifications (e.g., such as provided in the GOLD), and to complement performance based navigation (PBN) specifications. This framework is needed for ANSPs to safely allow mixed-capable fleet operations in transition to an evolving globally harmonized data communication solution and to apply a best-equipped, best-served policy. This policy and associated procedures will incentivize implementation and equipage, optimize ATM efficiency and ensure safety when ATM operations are predicated on communication and surveillance performance.

2.8 The global performance based framework will enable:

- a) ICAO to associate RCP and RSP specifications with specific ATM operations in global standards;

- b) regions/States to prescribe these specifications in Regional Supplementary Procedures and Aeronautical Information Publications (AIPs or equivalent publication) to applicable airspace or ATM operations based on local needs and timeframes, but globally consistent;
- c) operators to qualify aircraft equipment, maintenance and operational practices and to file performance based designators in their flight plans;
- d) ANSPs to implement ATC automation that assesses aircraft capability from flight plan information, to determine eligibility and safely apply the appropriate ATM operations to any particular flight; and
- e) ANSPs to monitor operational performance, as required by Annex 11 Safety Management System (SMS), and initiate problem reports with regional/State monitoring agencies to correct non-compliances for continued operational safety.

2.9 In addition, ANSPs will need to fully commit to the ICAO data link harmonization strategy and provide resources beginning now to support development and validation of an internationally agreed common technical definition for data link implementation. This definition must be based on operational requirements that are provided in ICAO standards and recommended practices (SARPs), and guidance material, as appropriate. The performance based framework is essential to allow for flexibility in varying implementations and transitions to using more advanced technologies. However, it is imperative that the next generation data link technical definition will result in a “converged” implementation – from any ANSP – that will be globally interoperable and will enable seamless operations for the entire flight.

2.10 Regarding the aviation system block upgrades (ASBUs) ASBU 0 (2013) supports consistent and extended use of FANS1/A and ATN Baseline 1 (implemented as Link 2000+ CPDLC). These applications should be extended into new airspace, where beneficial, such as to enable reduced separations, increased airspace capacity, user preferred routes, reroutes, reduced fuel burn, ATC communications and transfer of communications. ASBU 1 (2018) supports introduction of the Baseline 2 applications (e.g. converged CPDLC and includes ADS-C) implying progressive phase out of ATN Baseline 1 and FANS1/A applications from this date. With a performance based framework mixed-capable fleet operations are sustainable for as long as they are beneficial. However, the determination and promulgation of "sunset" dates for legacy applications is seen as an important part of any global strategy. ASBU 2 (2023) and ASBU 3 (2028) are supporting extended use of Build 2 applications and potential use of alternate air-ground networks (e.g. IPS) and physical layers (e.g. AeroMACS, new SATCOM and/or future terrestrial air/ground communication sub-network) as they mature and enter service.

2.11 ASBU 2 (2023) must be clearly defined as soon as possible. Given that standards, which define the next generation data link capability, are available by no later than 2015, any significant population of aircraft and on-ground ATM systems with next generation data link capability would not be expected before 2023.

3. CONCLUSION

3.1 CANSO has taken an action to develop a global vision for data link in ATM that will ultimately include guidance for implementation and use. CANSO will lead this initiative and ensure global cooperation and commitment among its member ANSPs on the way forward. To Conference is invited to agree to the following recommendation:

Recommendation 1/x - The vision for a global data link system for air traffic management

That the Conference:

- a) note the information in this paper;
- b) agree to the considerations for defining the data link policies and strategies as provided in paragraph 2.6;
- c) agree to the high level definitions for the aviation system block upgrades concerning data link as provided in paragraphs 2.10 and 2.11; and
- d) request ICAO to address these issues in the ICAO communications roadmap and Global Air Navigation Plan.

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