

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

**Agenda Item 7 Aeronautical air-ground and air-to-air
: communications**

LEVERAGING INSTALLED DATA LINK AVIONICS: A WAY TO MAXIMISE AIR TRAFFIC SERVICE BENEFITS FOR ALL

(Presented by the Airline Telecommunications and Information Services (SITA))

SUMMARY

This paper provides an overview of the benefits that increasing numbers of air traffic service providers are obtaining by leveraging the use of existing avionics data link capabilities in commercial aircraft. The paper recommends that the expanded use of installed data link avionics be encouraged, as a means to realise near term and sustainable benefits ultimately for the benefit of the travelling public.

The paper also invites the conference to recognise and take into account the technical and commercial practicalities faced by all parties associated with the development and integration of new avionics equipment that may be required by any new data link system. Finally, with respect to performance, the paper advocates the need to compare the performance of existing data link systems with the current ATC voice communications systems rather than any potential future data link systems which may well be too expensive to ever implement.

AN-Conf/11-IP/59 provides relevant background information.

Action by the conference is in paragraph 3.

1. INTRODUCTION

1.1 SITA, as the airline owned and controlled organization providing global air/ground and ground/ground data communications services to the majority of the world's airlines and increasing numbers of air traffic service providers, is pleased to report on current trends in the implementation of air traffic service data link applications. These trends suggest a way forward to optimise the considerable investments required both of airlines and air traffic service providers for the ultimate benefit of the travelling public.

1.2 This paper provides an overview of near term benefits that increasing numbers of air traffic service providers are obtaining by leveraging the use of existing ACARS data link avionics in commercial aircraft.

1.3 The paper seeks the conference's endorsement that the expanded use of installed data link avionics be encouraged as a means to realise sustainable benefits. The paper invites the conference to recognise and take into account the technical and commercial practicalities as well as the expense associated with the development and integration of any new avionics equipment required by new data link systems.

1.4 Finally, with respect to performance, the paper advocates the need to compare the performance of existing data link systems with the current ATC voice communications rather than potential future data link systems which may well prove to be too expensive to ever implement.

2. DISCUSSION

2.1 SITA was requested by its members to provide global air/ground and ground/ground data communications services some years ago. Since that time the commercial pressures on airlines have increased considerably, and the need for them to have a voice in the planning of the future has become more acute. Based on our experience in providing these services, to air traffic service providers, as well as to airlines, SITA has been able to study the trends that have developed. The conference is referred to the SITA information paper (AN-Conf/11-IP/59) that outlines the history behind the implementation and rationale for the introduction of FANS 1/A and the use of "Plain Old ACARS" (POA) for initial air traffic service data link applications. The information paper also presents the current status of ICAO VDL standards and ATN implementation. It is clear that what the airlines and air service providers need are systems that are commercially justified, globally inter-operable and universal.

2.2 The use of ACARS by the air traffic service provider community, be it for initial air traffic service data link applications (e.g. Digital-ATIS, Departure Clearance, Oceanic Clearance Services) or via FANS 1/A technology continues to expand across the globe despite there being no definitive ICAO guidance on the subject. To ensure commonality of procedures and global interoperability of these services it is essential that the conference take note and requests that ICAO develops appropriate guidance material covering this subject.

2.3 It is noteworthy that the ICAO standardisation process for data link systems has, to date, taken little or no account of certification requirements and operational approval criteria, as they have been considered to be issues for national regulators and airlines. However, the business case for implementation of new data link systems (e.g. 3G, Next Generation Satellite System) must take due account of the issues and

costs involved in the aircraft certification and operational approval. Account of these issues must be made initially prior to and during the development of the ICAO Standards in order to avoid wasting resources defining technologies that in the end cannot be implemented due to certification issues.

2.4 A review of the recent developments (as set out in AN-Conf/11-IP/59) produces the following conclusions;

- a) The population of aircraft equipped with ACARS avionics (approx. 10 000 today) and FANS 1/A avionics (approx. 1 200 long haul today) and will continue to increase;
- b) Airframe manufacturers are considering the introduction of FANS 1/A technology in single aisle aircraft which will further add to the population of FANS 1/A aircraft;
- c) An increasing number of air traffic service providers have since the early 1990's/or shortly plan to introduce air traffic service data link applications (ADS, CPDLC, Digital-ATIS, Departure Clearance and Oceanic Clearance) to suitably equipped aircraft and, in many cases, are providing clear operational benefits to air traffic service providers and airlines alike;
- d) Operational FANS 1/A CPDLC services have been introduced by Eurocontrol in Maastricht airspace which ranks amongst the densest in the world;
- e) The North Atlantic Region plans to introduce Flight Management Computer Waypoint Position Reporting that will provide further operational benefits to the FANS 1/A ADS Waypoint Position Reporting service that is operational today;
- f) The SITA AIRCOM Data Link service is used by over 5 000 aircraft on a daily basis exchanging over 500 000 messages; Approximately 95 per cent of these messages are AOC and 5 per cent ATS communications; Based on recent trends the ATS component is set to increase significantly due to the continued take up of ACARS use to enable the exchange of ATS application data;
- g) The SITA ACARS and FANS communications service has supported the pioneering introduction of these initial air traffic service applications and has continued to evolve to meet the emerging air traffic service performance requirements;
- h) VDL Mode 2 has been standardised by ICAO to enable the exchange of both air traffic service and aeronautical operational control communications, initially using a single 25 MHz frequency channel that will be shared by the communications service providers and is therefore very efficient in its use of spectrum;
- i) VDL Mode 2 services enable data throughput rates per aircraft in the range of 12 - 13 kilobits/second as compared to the 300 bits/second performance provided by ACARS today;

- j) VDL Mode 2 has been accepted by the industry as the natural evolutionary replacement for ACARS as demonstrated by the commercial availability of VDL Mode 2 avionics, major airline plans to equip entire fleets with VDL Mode 2;
- k) VDL Mode 2 services are available today in Western Europe, Singapore, USA, Australia, Japan and will shortly be introduced in Spain and Brasil;
- l) VDL Mode 2 has been adopted by the USA (FAA CPDLC Build 1 Programme) and Europe (Link2000+ Programme) as the underlying subnetwork technology for the exchange of ICAO compliant CPDLC services over an ATN infrastructure;
- m) VDL Modes 3 and 4 will need to overcome significant challenges to implement for the reasons outlined in paragraphs 5.4, 5.5 and 5.6 of the companion Information Paper; furthermore, as set out in the IATA position (ANC-Conf/11-WP/54) the majority of the world's airlines do not favour either VDL 3 or VDL 4 implementation;
- n) When standardising future data link technology, ICAO needs to take into account a number of issues including the overall business case, the technical feasibility of developing and integrating such avionics in commercial aircraft and ensuring that the appropriate frequency channel assignments can be made available;
- o) With respect to the approval of data link for ATS, the performance of the data links should be evaluated against their improvement over existing systems (e.g. VHF R/T) rather than comparing the existing data links with potential future links that may never be implemented; and
- p) The standardisation process of ICAO data link technologies needs to take into account the certification and operational issues that will be faced when the technology is eventually implemented.

3. ACTION BY THE CONFERENCE

3.1 FANS 1/A applications using ACARS

3.1.1 With respect to FANS 1/A applications using ACARS data link avionics and networks, the conference is invited to:

- a) note that, given the increasing numbers of aircraft equipped with FANS 1/A technology, and its increasing deployment around the globe, including as an operational service (CPDLC) in dense Western European airspace in parallel with CPDLC using ATN data links, whilst the air traffic service use of ACARS for applications such as Digital-ATIS, Departure Clearance and Oceanic Clearance services continues to expand around the globe;
- b) request that ICAO:

- 1) recognize that the massive investment by aircraft operators and avionics providers in FANS 1/A systems using ACARS data link makes it essential to maximize the use of this technology to provide ATS benefits and that aircraft with these systems should not also be required to install new systems providing the same applications; and
- 2) develop appropriate guidance material for States planning the implementation of Air Traffic Service data link applications, i.e. FANS 1/A, Digital-ATIS, Departure Clearance and Oceanic Clearance Services in order to maximise benefits and ensure global interoperability.

3.2 ICAO Standard VDL implementation

3.2.1 With respect to the implementation of VDL, the conference is invited to:

- a) note that VDL Mode 2 services are operational today and VDL Mode 2 avionics are available from the major avionics vendors such that many airlines are now committed to its introduction and that VDL Mode 2 has been selected by the USA (FAA CPDLC Build 1 Programme) and Europe (Link2000+ Programme) as the technology to enable the introduction of ICAO compliant CPDLC services over an ATN infrastructure; and
- b) request that ICAO:
 - 1) confirm that Air Traffic Service providers should use VDL Mode 2 to support the initial implementation of CPDLC in dense airspace and should not require the installation of the other VDL Modes for that purpose;
 - 2) provide updated guidance on the implementation of VDL Mode 3 in light of the level of fleet equipage with radios supporting 8.33 kHz channel and the potential for providing cockpit voice service via new satellite systems; and
 - 3) provide updated guidance on the implementation of VDL Mode 4 given the implementation of ADS-B using the Mode S extended squitter and of VDL Mode 2 to provide improved communications.

3.3 Implementation and standardisation of new data links

3.3.1 With respect to the implementation and standardisation of new data links, the conference is invited to request that ICAO:

- a) require Technical Panels to include in their validation of any standards for new data link technologies:
 - 1) the development of a viable and sustainable business case for implementation from an avionics vendor/air frame manufacturer, airline and air traffic service provider perspective;

- 2) the confirmation of technical feasibility of developing and integrating such technologies in commercial aircraft;
- 3) the definition of an evolutionary transition from existing technologies to the future technology;
- 4) an evaluation of the cost and duration of the certification and operational approval processes that must form an integral part of the business case; and
- 5) develop plans for acquiring the necessary frequency channel assignments.

— END —