

ELEVENTH AIR NAVIGATION CONFERENCE**Montreal, 22 September to 3 October 2003****Agenda Item 7 Aeronautical air-ground and air-to-air communications**

:

**CONCERNS WITH CONSIDERATION FOR VDL MODE 4
TO SUPPORT ATC DATA COMMUNICATIONS**

(Presented by United States)

SUMMARY

This paper identifies concerns with consideration of very high frequency (VHF) data link (VDL) Mode 4 to support air traffic control data communications. Proliferation of data links, outstanding technical issues and documented industry opposition are identified as supporting rationale for opposition.

Action by the conference is in paragraph 6.

1. INTRODUCTION

1.1 The International Civil Aviation Organization (ICAO) Aeronautical Communications Panel (ACP) has been investigating the possible use of the very high frequency (VHF) digital link (VDL) Mode 4 (VDL Mode 4) system to support air traffic control (ATC) point-to-point data communications. As a result of this work, the Air Navigation Commission (ANC) is considering a proposal from the eighth meeting of the ICAO Aeronautical Mobile Communications Panel (AMCP) to amend the current Standards and Recommended Practices (SARPs), Annex 10 — *Aeronautical Telecommunications*. ICAO State letter, AN 7/1.383-03/59, dated June 27, 2003, requests comments on a proposal for the amendment of Annex 10, Volume III, concerning SARPs relating to HF DL and VDL. This proposed amendment includes the deletion of existing Note 4 to paragraph 6.1 of Annex 10, which indicates that VDL Mode 4 SARPs apply to surveillance applications only. The ICAO letter notes that approval of the change would result in adding another point-to-point data link operating in the VHF band and that the use of VDL Mode 4 would only satisfy the same requirements and desirable features as are already included in the VDL Mode 3 data link. The letter states that, “The Commission is concerned that various types of avionics should not be allowed to proliferate in cockpits at the expense of the operators.”

1.2 The United States Federal Aviation Administration (FAA) disagrees with the proposed amendment and will recommend against the proposed note deletion in its response to the State letter issued

by ICAO. A number of outstanding technical issues as well as the concern with the proliferation of data links form the basis for United States opposition to this change. The aviation industry has also expressed lack of support for the implementation of this technology as an ATC communications link and if accepted, the proposed change, will lead to a global interoperability problem.

2. PROLIFERATION OF DATA LINKS

2.1 At the Communications/Meteorology/Operations Divisional Meeting (1990), Recommendation 2/4 called for “States and an appropriate ICAO body to urgently conduct the necessary studies on the possibilities, advantages, consequences and conditions for improving communications in the 117.975 - 137 MHz VHF band, including channel spacing of 12.5 kHz and other alternatives, taking into account all technical, operational, planning and economic aspects of the problem, including compatibility with other equipment using 25 kHz channel spacing”. The AMCP was tasked by the ANC to study this matter and the panel reported its work on this subject in 1994. Based on this information, the Special Communications/Operations Divisional Meeting (1995) agreed that SARPs for a new system, which should satisfy identified technical and operational requirements and is based on time division multiple access (TDMA) technology, should be completed as early as possible. Recommendation 6/2 (Development of the future VHF air-ground voice and data link system) as identified in the COM/OPS/95 Report states that ICAO should expedite work on the 25 kHz TDMA integrated voice and data link system with identified draft standards to be finalized.

2.2 The same COM/OPS/95 meeting identified an additional Recommendation 6/3 to develop data links to support navigation and surveillance applications. They did not request additional data links to support communications.

2.3 The AMCP has followed this direction and as a result, there are now approved SARPs available for the VDL Mode 3 technology, which is based on TDMA technology and supports both voice and ATC data as identified by the COM/OPS/95. Given the fact that an agreed-upon international standard exists, the introduction of yet another point-to-point data link operating in the VHF band would most likely compromise global interoperability and result in unnecessary additional costs and inefficiencies for the airline operators.

3. TECHNICAL ISSUES/CONCERNS

3.1 A number of technical issues, as described below, have been identified which further support the recommendation to disapprove the deletion of the existing footnote.

Issue	Rationale
Unavailability of VHF spectrum to support VDL Mode 4 for ATC data communications	Spectrum availability has to be assessed. The number of channels required to support data communications is uncertain; however, as many as 7 (and more) channels have been suggested. This is likely to be unacceptable for some regions that are experiencing congestion in the limited VHF Spectrum. In addition, there is severe difficulty in identifying the global signalling channels required by the SARPs.

Issue	Rationale
VDL-4 System does not support a simple voice and data communication installation	The COM/OPS/95 decision required a TDMA system, which supports voice and data to take advantage of efficiency gains from requiring a single antenna and receiver.
There is no comparative assessment to support additional benefits over the existing internationally accepted system	The existing analysis provided in the “VHF data links for point-to-point communications” report concludes that VDL Mode 4 does not provide any additional benefits over the existing internationally accepted system, VDL-3.
Certification, safety and availability concerns with placing communications, navigation and surveillance functionality in the same box.	Even with redundant equipment, there are serious concerns about certifying an architecture, which has communications, navigation and surveillance functions all dependent on the same single system.
Introduction of a new communications system will introduce international interoperability problems	Compliance with the ICAO 1995 decision will lead to international interoperability.
On-board co-site interference	Studies indicate that VDL Mode 4 transmissions will unacceptably interfere with existing VHF voice and data communications.

4. INDUSTRY OPPOSITION

4.1 Both Airbus and Boeing have recently announced that they have no plans to proceed further with VDL Mode 4. They note that these decisions are based on technical studies and cost considerations. The following organizations have stated policies similar to Airbus and Boeing:

- a) IATA, AEA;
- b) AAL, DAL, DLH, SAS and other Link 2000+ airlines;
- c) FAA, DFS, NATS. Eurocontrol, CANSO; and
- d) ARINC, SITA.

4.2 Airbus has indicated that VDL Mode 4 has short squitter transmissions, which are periodic, permanent and relatively frequent thus making existing safety mitigation techniques for interference ineffective. VDL Mode 4 would also require installation of an additional 2 new radios, installation of additional antennas and wiring, modifications to the wingfence and 6-12 MHz guard bands to mitigate interference with essential VHF radios. It will also require additional channels. Airbus states that, “In the North European ADS-B Network Update Programme Phase 2 (NUP 2) time-scale and budget, Airbus does not know how

to safely install VDL Mode-4 radios on an airliner that will be used worldwide, unless existing VHF Communications radios are changed in a way that no-one has contemplated before.”¹

4.3 A further reason for concern is the fact that a number of air carriers, including Lufthansa and SAS are now provisioning for implementation of VDL Mode 2 for VHF data communications. VDL Mode 2 is also an internationally standardized system. It is highly unlikely that air carriers will equip with both VDL Modes 2 and 4 to support AOC communications.

5. CONCLUSION

5.1 The United States shares the concerns of the ICAO ANC relative to the unnecessary proliferation of data links for point-to-point communications. In addition the United States has identified a number of outstanding technical issues that must be resolved before further actions should be taken. Finally, the airline community (i.e., Airbus and Boeing) also shares many of these same concerns and have expressed their intentions not to pursue future consideration of VDL Mode-4. Based on these observations the United States is opposed to the proposed amendment in ICAO State letter AN 7/1.383-03/59 to delete the current note, which restricts VDL Mode 4 to surveillance applications.

6. ACTION BY THE CONFERENCE

6.1 Recognizing civil aviation’s concerns of proliferation with introducing another ATC data link that provides no additional benefit; the outstanding technical issues associated with VDL Mode 4; and the lack of support for VDL Mode 4 expressed by industry, the conference is invited to agree on the following recommendation:

**Recommendation 7/xx — Concerns with considerations for VDL
Mode 4 to support ATC data
communications**

That ICAO:

Not amend Annex 10 to allow VDL Mode 4 for point-to-point data communications.

— END —

¹ Peter POTOCKI, Airbus and Eric WALTER, Airbus France, “AIRBUS views on datalinks and VDL Mode 4”, ACP/WG-M7, 7-11 April 2003 p 4.