AERONAUTICAL COMMUNICATIONS PANEL (AMCP)

Working Group C – 7th meeting
Toulouse, France
20-24 October 2003

Agenda Item 5: VHF Spectrum Congestion

Boeing Position Paper on VDLM4

Presented by

Alvin H. Burgemeister
B-twelve Associates, Inc.
Boeing
International Coordinating Council of Aerospace Industries Associations (ICCAIA)

SUMMARY

This working paper describes the position of the Boeing Company regarding the potential of installing and certifying VDL Mode 4 radios on commercial transport airplanes. Significant work remains to be done to solve installation and certification problems for Mode 4 equipment. Due to the autonomous, continual broadcast of ADS-B with VDL-4, interference to VHF voice receivers on the aircraft is a high priority problem to be solved.

A similar position, co-written by Boeing and Airbus, was presented by ICCAIA at the recent 11th Air Navigation Conference. That paper was Working Paper 91.

Boeing Position Paper on VDLM4

Introduction

In the last couple years, Europe has been moving forward with VDLM4. Significant progress has been made. The ICAO SARPs and EUROCAE MOPS have been written for VDLM4.   The purpose of this paper is to present the Boeing position regarding the current state of VDLM4.

Discussion

Interference
VDLM4 has unique antenna and transmitting requirements, in that, two antennas are required for each transceiver and the capability to transmit nearly continuously (5 second rate). With such requirements, interference would need to be addressed at the early state. Boeing has done a study and found that it is not possible to transmit VDLM4 without increasing the amount of interference to existing VHF voice and data communications. Beside the analysis and studies, Flight testing must be done with the potential configuration(s) to evaluate the actual interference. The interference from the operation of the VDLM4 on the operation of other communications and navigation systems and vice versa would have to be measured and analyzed.

Applications
Even though VDLM4 has the capability to support other applications beside ADS-B, industry consensus has not been reached in the type of applications that can be supported, CPDLC in particular. System architecture and integration cannot be done until the supported applications are known. The architecture will likely be different if the VDLM4 will be used for Surveillance only or both Surveillance and Communications. The level of integration would also change based on the supported applications. Since VDLM4 is much different from VDLM0 and VDLM2, actual live testing must be done to ensure that the subnetwork can satisfy the performance and capacity requirements of the supported applications.

Specifications
The ICAO SARPs and EUROCAE MOPS have been developed to provide function and performance requirements. Additionally, the AEEC/ARINC specification would have to be developed to provide the interchangeability standards, i.e., form, fit and interfaces. It is required for the integration of the VDLM4 on-board the air transport category aircrafts.

Global Solution
The industry is divided on the media for ADS-B. VDLM4 has not been accepted as the media for ADS-B globally. Global solution is required for a feasible implementation. Regional solution would reduce the benefits and drive the cost up considerably due to the complex architecture to accommodate different regional requirements.

Cost/Benefit Study
Depending on the system architecture requirements and the supported applications, costs and benefits will vary significantly. Cost and Benefit study would have to be performed on the final configuration. Boeing have looked at several VDLM4 architectures and found that the impact and cost are so high such that it is impossible to justify the implementation.

Conclusion

There are many issues with the current state of VDLM4. Until the identified issues are satisfactory addressed, VDLM4 could not be considered for implementation on board Boeing aircrafts.