

# AeroMACS - The Future Airport Data Link

The ICAO ACP WG-T recommended in its meeting in October 2007 to develop an airport data link based on the IEEE 802.16e (WiMAX) standard ported to C-band and adjusted to the aeronautical environment (AeroMACS). This recommendation is accompanied by the frequency assignment for airport communications in the C-band (5091 – 5150 MHz) provided by the last World Radio Conference (WRC 2007). DLR has developed a software simulator which includes different options of the WiMAX standard and enables system adaptations in order to meet the requirements of a future airport data link, while considering the characteristics of the wireless propagation channel typical for the airport environment. Statistical relevant propagation channel data have been gathered from DLR's measurement campaign at Munich airport in autumn 2007, see Figure 2, and used to implement typical airport channel models into the software simulator. Currently, the WiMAX standard and different physical layer adaptations are investigated with respect to their suitability for AeroMACS.

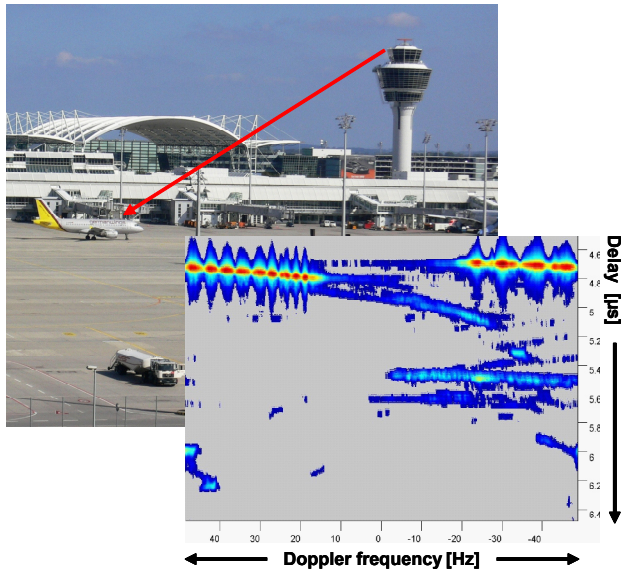


Figure 2: Propagation channel measurements performed at Munich airport for AeroMACS channel modeling.

## DLR at a glance

DLR is Germany's national research center for aeronautics and space. Its extensive research and development work in Aeronautics, Space, Transportation and Energy is integrated into national and international cooperative ventures. As Germany's space agency, DLR has been given responsibility for the forward planning and the implementation of the German space program by the German federal government as well as for the international representation of German interests. Furthermore, Germany's largest project-management agency is also part of DLR.

Approximately 6,500 people are employed at thirteen locations in Germany: Koeln (headquarters), Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stuttgart, Trauen and Weilheim. DLR also operates offices in Brussels, Paris, and Washington D.C.



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Information



## Future Aeronautical Data Links



DLR

## Introduction

Driven by the Air Traffic Management (ATM) evolution performed within SESAR in Europe and NextGen in the United States which involves a paradigm shift from voice to data link applications, future aeronautical data link development is currently of paramount interest. Moreover, communication technologies much more efficient than today's analogue voice system are required to provide the communication capacity required to safely manage the steadily growing air traffic in the future. The German Aerospace Center (DLR) is heavily involved in all areas of current aeronautical data link developments comprising direct air/ground communications, airport data link development, and ATM over satellite. In addition, DLR has developed the Networking the Sky (NEWSKY) concept and initiated the EC co-funded project NEWSKY to integrate all aeronautical data links into a common heterogeneous aeronautical communications network.

## L-DACS – Air/Ground Communications of the Future

In close cooperation with Frequentis AG, Austria, and University of Salzburg, Austria, DLR has designed the Broadband Aeronautical Multi-carrier Communications (B-AMC) system which is based on Orthogonal Frequency-Division Multiplexing (OFDM). B-AMC is foreseen to operate in the aeronautical L-band and designed to meet the capacity requirements of future ATM communications. From a variety of candidate technologies, B-AMC has been rated as most promising technology within the Future Communications Study (FCS) jointly performed by Eurocontrol and FAA (Federal Aviation Administration). As a result, in October 2007, the ICAO Aeronautical Communications Panel (ACP) Working Group Technology (WG-T) recommended to develop the L-band Digital Aeronautical Communication System Type 1 (L-DACS1) based on B-AMC combined with suitable characteristics of the P34 standard which has also been a candidate system. As an alternative to the broadband L-DACS1 system, the development of a narrowband system (L-DACS2) is also recommended. L-DACS1 is designed as an inlay system in L-band, i.e. it is operated between two adjacent channels of the widely deployed Distance Measuring Equipment (DME) system, see Figure 1. L-DACS1 applies Frequency-Division Duplex (FDD) and utilizes transmission channels for forward and reverse link with a bandwidth of 500 kHz. The inlay concept of L-DACS1 is especially attractive, since it enables the re-use of already assigned frequency spectrum without requiring changes of the legacy L-band systems and without dedicated spectrum assignments. This challenging goal can only be achieved if L-DACS1 does not interfere with existing legacy L-band systems and vice versa. DLR has developed different methods for reduction of out-of-band radiation

to reduce interference towards legacy L-band systems as well as several mitigation techniques to reduce the interference impact of DME and other L-band systems at the L-DACS receiver. Currently, the interference mitigation techniques are refined and an L-DACS laboratory demonstrator is implemented which will be used to prove co-existence between broadband L-DACS and legacy L-band systems.

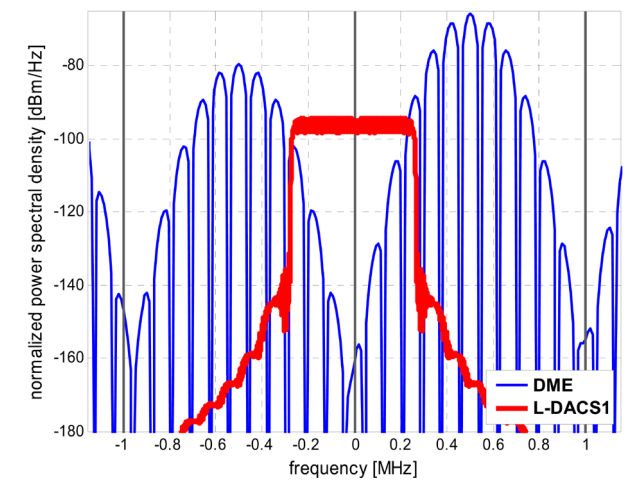


Figure 1: Transmission channel of L-DACS1 located in between two adjacent DME channels.

