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Aircraft Derived Meteorological Data via Data Link for Wake Vortex, Air Traffic Management and Weather Applications

Operational Services and Environmental Definition (OSED)

RTCA DO-339
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Prepared by: SC-206

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FOREWORD

This document was prepared by Special Committee 206 (SC-206) and approved by the RTCA Program Management Committee on June 13, 2012.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal advisory committee, and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;

- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;

- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and

- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders and several advisory circulars.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

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1 SCOPE AND OBJECTIVE

This Operational Services and Environmental Definition (OSED) further defines a concept of operations for transmitting aircraft-derived meteorological data to enable a wide range of Next Generation Air Transportation System (NextGen) and Single European Sky ATM Research (SESAR) applications in the areas of wake turbulence, air traffic management, and meteorology. This concept was first published as informative appendices in DO-260B and DO-282B, Appendix V and Appendix S respectively (Ref 1, Ref 2).

This OSED takes a link agnostic approach and describes the information content necessary to support a broad range of applications without constraining the data elements or rates to stay within the limits of any specific link. A number of wake turbulence, air traffic management, and meteorological applications are described that can benefit from the downlink and crosslink of these aircraft-derived data. This OSED describes the specific data to be transmitted, including bit count and timing; addresses acquisition of required data from standard data labels on standard aircraft data buses as well as provisions for participation by aircraft not equipped with data buses and/or flight management systems; discusses constraints under which the proposed service must operate; and provides an overview of potentially applicable performance standards, error handling, system safety, and system security topics. Specific funded and/or planned projects and research in the areas of wake turbulence, air traffic management (ATM), weather situational awareness, and meteorological applications that could benefit from the proposed data service are identified.

SC-206 is performing a comprehensive analysis of data links to uplink, downlink, and crosslink meteorological data. This link analysis, together with the requirements of the data service described in this OSED, will inform the selection of the best available data link to support the information needs of NextGen and SESAR wake, ATM, and MET applications.

1.1 Motivation

It has been known for decades that aircraft, with appropriate provisioning, have the capability to measure and report meteorological data at a high resolution, under all weather conditions, and over areas of operational interest to a wide audience within the aviation community. Additionally, this data can have economic value to many non-aviation users by communicating a dense picture of weather conditions from thousands of flights operating daily in the global airspace. While some commercial airlines already capture and communicate weather data internally, the capability of aggregating this data has far reaching potential.

Many proposed concepts within NextGen and SESAR require reliable and valid information about the current and predicted aircraft position. Predicting future aircraft positions reliably requires knowing both the planned trajectory and the effects actual winds and temperatures will have on that trajectory. Currently, wind data are limited by the accuracy and age of meteorological data along planned aircraft routes. These limitations create operational inefficiencies that degrade the benefits achievable through implementation of NextGen and SESAR.

1.2 Background and History

In 2009, leaders within the Federal Aviation Administration (FAA) and the aviation industry stepped forward to request that RTCA Special Committee 186 (SC-186) start to develop consensus standards and lay the groundwork for international agreement on the