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Next Generation Air/Ground Communication System (NEXCOM) Implementation Considerations: Factors and Issues to be Considered in Planning for the Transition to Air/Ground, ICAO, VDL Mode 3 Based Integrated Voice and Data Communications in the US National Airspace System (NAS)

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FOREWORD

This report was prepared by RTCA Special 198 and approved by the RTCA Program Management Committee (PMC) on October 28, 2003.

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- 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.

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EXECUTIVE SUMMARY

This document describes the current situation and identifies factors and issues to be considered when developing a plan for transition from analog Air/Ground (A/G) telecommunications to A/G Very High Frequency (VHF) Digital Link Mode 3 (VDL Mode 3) based integrated voice and data communications. In addition to identifying factors and issues, this document contains recommendations for schedules and priorities for achieving a transition from analog to VDL Mode 3 digital voice and Aeronautical Telecommunications Network (ATN) based data communications in the NAS. It includes a transition strategy from analog voice to VDL Mode 3 digital voice and Aeronautical Telecommunications Network (ATN) based data communications via VHF Digital Link Mode 2 (VDL Mode 2) and VDL Mode 3. It also contains recommendations for schedules and priorities for achieving those objectives for all domains in the United States National Airspace System (NAS).

This document notes that the final decision on whether to transition the NAS to VDL Mode 3 will be accomplished with aviation stakeholder and wider public input via the Notice of Proposed Rulemaking process.

Section 2, Scope, describes the purpose of the NEXCOM Implementation Considerations document.

Section 3, Background, describes the current situation in the U.S. NAS.

The NEXCOM Federal Aviation Administration (FAA) Mission Need Statement 137 articulates the agency requirement for an improved air/ground communication system that will accommodate future growth in support of Air Traffic Services. There are also discussions on the limitations of analog voice technology, and current relevant equipage considerations employed by airlines, military, general aviation and business users. The Spectrum Engineering discussion describes the increasing demands on a limited spectrum resource and the steps taken in mitigation until a solution is achieved via new technology. The Airspace discussion describes how airspace is allocated for use by en route and terminal categories of traffic and the process in place for making changes when they are necessary. It also discusses some recent initiatives to make better use of airspace at specific facilities and concludes with a discussion of phased NEXCOM deployment strategy. The strategy, first stage, begins with acquisition and fielding of the ground radio component deployed initially as a replacement for aging infrastructure and operating in the 25 kHz analog mode, transparent to users. Fielding of NEXCOM Multimode Digital Radios (MDR) to ground radio sites will begin in 2003. The second stage is development and production of the Ground Network Interface (GNI) and Radio Interface Unit (RIU) as a system. Deployment of these Ground System components will begin in 2008. The FAA has signed Government-Industry Agreements with three vendors to facilitate the development of the avionics component of the NEXCOM system concurrent with the development of the ground system. This should allow at least five years for users to equip prior to the initial operation of VDL Mode 3 voice communication, planned for no earlier than late 2010, subject to the results of the Notice of Proposed Rulemaking process

Section 4, Considerations, describes the factors to be considered when developing a transition strategy to guide each phase of the NEXCOM deployment into all domains of the U.S. NAS and as such, represents the “plan for the Plan”. It is offered for consideration by the FAA in its own subsequent detailed planning process.

There is considerable emphasis on the importance of ensuring any transition would not interfere with the continuing provision of air traffic services and safe aircraft operations and also that provides the necessary flexibility to accommodate the need for change.

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1.0 INTRODUCTION

This document describes the current situation and identifies factors and issues to be considered when developing a plan for transition from analog Air/Ground (A/G) telecommunications to A/G Very High Frequency (VHF) Digital Link Mode 3 (VDL Mode 3) based integrated voice and data communications. In addition to identifying factors and issues, this document contains recommendations for schedules and priorities for achieving a transition from analog to VDL Mode 3 digital voice and Aeronautical Telecommunications Network (ATN) based data communications in the NAS. It includes a transition strategy from analog voice to VDL Mode 3 digital voice and Aeronautical Telecommunications Network (ATN) based data communications via VHF Digital Link Mode 2 (VDL Mode 2) and VDL Mode 3. It also contains recommendations for schedules and priorities for achieving those objectives for all domains in the United States National Airspace System (NAS).

The final decision on whether to transition the NAS to VDL Mode 3 will be accomplished with aviation stakeholder and wider public input via the Notice of Proposed Rulemaking process. The recommendations/considerations discussed in this document should be considered in light of the fact that a final VDL-3 implementation decision lies in the future.

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2.0 SCOPE

This NEXCOM Implementation Considerations document includes a description of the current NAS A/G communication situation and provides high-level goals and objectives appropriate to use as an advisory document to guide detailed implementation planning. This document presents factors and issues to be considered in developing a detailed plan and does not include specific schedule events and dates for implementation unless participating FAA stakeholders have approved them.

The time and space functions described in this document correlate to the same divisions established in section 1.4 of RTCA DO-279, *NEXCOM Principles of Operation VDL Mode 3*. Each major section of the document describes the factors and issues that should be considered when developing a transition plan to guide the evolution of the NAS in terms of increasing use of VDL Mode 3 technology through different levels of airspace. The proposed transition approach begins at higher altitudes then progresses to optimal application of VDL Mode 3 digital voice and ATN based data communications via VDL Mode 2 and VDL Mode 3 throughout the NAS. The proposed time-phased approach is articulated in three segments, each of which is at least approximately three to four years in duration. One of the most significant factors with long-term impact to any NEXCOM implementation is user acceptance and equipage.

Considerations provided in Section 4 represent the "plan for the Plan". These are the factors that should be considered by the aviation community in any cooperative implementation of VDL Mode 3 deployment. An actual implementation plan remains within the authority and responsibility of the FAA.

These NEXCOM implementation considerations are intended for the information and use of government and industry personnel and airspace users to assist in planning for VDL Mode 3 digital communications in the twenty first century NAS.

The participating authors represent a wide spectrum of the aviation community and are members of Working Group 4 of the RTCA Special Committee (SC) 198, NEXCOM. The membership list for RTCA SC 198 is provided in Appendix C. The document has been reviewed by SC 198 and its contents represent the consensus of that committee.

Stakeholders were identified from DO-279. The stakeholder list is provided as Appendix D.

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