



**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

SOFTWARE REQUIREMENTS SPECIFICATION

**RADIO INTERFACE UNIT (RIU) MAINTENANCE DATA TERMINAL
(MDT) MAINTENANCE APPLICATION**

The NEXCOM Integrated Product Team, AND-360

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RECORD OF CHANGES

Revision	Date	Action
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1.0 SCOPE

1.1 Identification

This document contains the specification for Radio Interface Unit (RIU) Maintenance Data Terminal (MDT) Maintenance Application software (SW) module to be hosted on the FAA's Maintenance Data Terminal (MDT). This SW Computer Software Configuration Item (CSCI), hereafter referred to as the Maintenance Data Terminal Software for the RIU (MDTSR), will enable the MDT to control the NEXt generation air/ground COMmunication (NEXCOM) Radio Interface Unit (RIU), and to request readout of the RIU's operational and maintenance parameters. This document describes the SW function required for the MDTSR to carry out the required control and maintenance function. This document was prepared in accordance with the format requirements of FAA standard FAA-STD-005e.

The FAA maintenance field representatives use the MDT in the ground facilities where RIU is installed to perform parameter setting, readout, and associated control and maintenance functions. The MDT SW module and an Interface control document (ICD) describing the RIU/MDT interface will be delivered with the RIU hardware.

1.2 Functional Overview

The RIU Subsystem Specification (SSS) specifies the requirements for the parameters that need to be adjustable in the field and that need to be modifiable in the field. This function will be carried out via the MDT, a laptop computer based tool used by the FAA field personnel for fieldwork.

The MDT is the primary tool for FAA field personnel to perform equipment maintenance. The MDT is connected to the RIU via an RS-232 interface, as specified in the RIU SSS. The MDT SW then signs on to the RIU in a secure manner and carries out the tasks of interrogating RIU parameter values and other relevant maintenance information as needed and verifying the modifications.

2.0 APPLICABLE DOCUMENTS

2.1 Government Documents

The following documents form a part of this specification and are applicable to the extent specified here. In case of conflict between the documents referenced here and the contents of this specification, the contents of this specification shall take precedence.

2.1.1 Specification

FAA:

FAA-E-TBD	Radio Interface Unit (RIU) Subsystem Specification, TBD, 2002
FAA-E-2958	Next Generation Air/Ground Communications (NEXCOM) System Requirements Document, April 6, 2002, V1.0

2.1.2 Standards

2.1.3 Other Government Documents

FAA:

NAS-IC-41034105	Interface Control Document for Radio Interface Unit/ UHF Radio Equipment, April 16, 2002, V0.0
NAS-IC-41033502	Interface Control Document for Radio Interface Unit/Multimode Digital Radio, July 23, 2001, Version 3.0

2.2 Non-Government Documents

EIA:

EIA-RS-232-C	Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange
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3.0 REQUIREMENTS

3.1 Definitions

3.1.1 “Shall”

When used in this specification, the word “**shall**” refers to an explicit requirement of a system component or the complete system.

3.1.2 “Should”

When used in this specification, the word “*should*” refers to a desired characteristic of a system component or the complete system.

3.1.3 “Will”

When used in this specification, the word “**will**” provides information for a characteristic of a related system component or a complete related system.

3.2 Minimum Maintenance Data Terminal Platform (MTDSR Host Computer) Configuration

- a) The MDTSR **shall** meet specified requirements while operating on industry standard laptop/notebook Personal Computers that are configured with at least the following:
 - 1) Windows 95, 98, 2000 and NT
 - 2) 100 Mb of Hard Drive space for MDTSR exclusive use
 - 3) 32 Mb of RAM
 - 4) 800x600x8 display
 - 5) Pentium 200 processor
 - 6) RS-232 serial interface using DB-9 connector
 - 7) Single Standard High Density Floppy drive

3.3 Secured Access

- a) The MDTSR **shall** identify and authenticate the MDTSR operator by User ID, of up to 20 characters, and Password, of at least 8 characters/numerals, before allowing operator access to MDTSR functions.
- b) All passwords and password authentication data stored within the MDTSR, or on the MDT platform, **shall** be encrypted.
- c) The MDTSR **shall** store a security token and transfer it as defined by the RIU SSS.
- d) The security token **shall** be stored in such a way that its function is not discernable.

3.4 Log In

- a) The MDTSR **shall** detect connection to an RIU, and log into the RIU, by issuing control parameter, Log-In/**Log-Out**, as specified in the RIU SSS.

- b) The MDTSR **shall** provide the MDT platform's unique identification number (for example, the Windows operating system OEM number) as the Terminal identification field in control parameter, Log-In/**Log-Out**, as specified in the RIU SSS.
- c) A user configurable number of seconds (with zero meaning disable) after the MDTSR User commands an RIU to Reset, the MDTSR **shall** automatically attempt to log into the reset RIU, to re-establish a control session.

3.5 Log-Out

- a) Upon operator command, the MDTSR **shall** log out of the RIU by issuing control parameter, Log-In/Log-Out, as specified in the RIU SSS, without the Security Token.

3.6 Display of Monitored Parameters

- a) MDTSR **shall** display operator selected RIU Monitored parameters and Control parameters, as described in the RIU specification.
- b) MDTSR **shall** allow operator to select either numeric or graphical (e.g. bar graph or simulated meter) type display for numeric parameters selected for display.
- c) MDTSR **shall** allow operator to select and display at least 3 parameters simultaneously.
- d) MDTSR **shall** allow the operator to select one-shot read, or continuous (near real time) read and display of Monitored Parameters.
- e) When continuous (near real-time) read and display is selected for a parameter, the MDTSR shall issue control parameter Request Readback (with appropriate data) to the RIU at the operator-specified rate of once per second (approximately) to once per 240 milliseconds.
- f) MDTSR **shall** update the display of operator-selected monitored parameters with each new readback sample when continuous read (near real time) read and display is selected.

3.7 Setting Of Control Parameters

- a) The MDTSR **shall** allow the operator to change the values of each RIU Control parameter.
- b) After an operator commanded control parameter change, the MDTSR **shall** update the display of the current value of the Control Parameter with the then-current value.

Note: Steps envisioned are:

- 1) *operator selects parameter to display*
- 2) *operator inputs value to change control parameter*
- 3) *MDTSR sends change to RIU*
- 4) *RIU acknowledges change*
- 5) *MDTSR reads control parameter from RIU, and then displays*

- c) MDTSR **shall** display any error messages generated by the RIU relating to the attempt to change the value of the control parameter.

Note: Since, range checking will (also) be performed by RIU, error messages generated by the RIU in reaction to MDT activity must be displayed on the MDT to the MTDSR operator.

3.8 Alarm/Alert Threshold Setting

- a) MDTSR **shall** allow operator to read the RIU values for alarm thresholds and alert thresholds.
- b) MDTSR **shall** allow operator to change the alarm minimum thresholds, alarm maximum thresholds, alert minimum thresholds and alert maximum thresholds independently.
- c) MDTSR **shall** display any error messages generated by RIU relating to the attempt to set the minimum thresholds equal or greater than the maximum thresholds.

3.9 Control Parameter Sets

- a) MDTSR **shall** store at least fifteen control parameter sets, with operator selectable set labels, which can be selected for downloading from, or uploading to the RIU.
- b) MDTSR **shall** allow the operator to edit the Control Parameter values in each control parameter set.
- c) MDTSR **shall**, upon operator command, download from the RIU all Control Parameter values, associate them with their Control Parameter ID numbers, apply the operator-selected file name or label and store the Control Parameter set.
- d) MDTSR **shall**, upon operator command, upload the operator-selected control parameter set to the RIU.
- e) MDTSR **shall** verify all Control Parameter settings before indicating successful Control Parameter set uploads.
- f) MDTSR **shall** allow the operator to store Control Parameter sets on, or retrieve Control Parameter sets from, floppy disks.
- g) MDTSR **shall** allow the operator to specify whether each Control Parameter Set for uploading to the RIU contains all, or a subset of, the control parameters.

3.10 Alarm/Alert Threshold Sets

- a) MDTSR **shall** store at least nine Alarm/Alert Threshold sets with operator selectable set labels, which can be selected for downloading from, or uploading to the RIU.
- b) MDTSR **shall** allow the operator to edit the alarm/alert threshold values in each alarm/alert threshold set.
- c) MDTSR **shall**, upon operator command, download from the RIU the alarm/alert threshold set, apply the operator-selected file name or label and store the alarm/alert threshold set.
- d) MDTSR **shall**, upon operator command, upload the operator-selected alarm/alert threshold set.
- e) MDTSR **shall** verify each alarm/alert threshold setting before indicating successful alarm/alert threshold set upload.

3.11 RIU Operating Software Sets

Note: An RIU Operating Software set is a specific version of all the uploadable software that would be provided by the MDT to the RIU to allow the RIU to operate. It is not the MDT platform operating system or the RIU Maintenance Application residing on the MDT platform which would be used to exercise the RIU during maintenance.

- a) MDTSR **shall** store at least four RIU Operating Software sets which can be selected for uploading to the RIU.
- b) Each MDTSR RIU Operating Software set **shall** contain only one version of software (code).
- c) MDTSR **shall**, upon double-verified operator command, upload to the RIU the operator selected RIU Operating Software set.
- d) MDTSR **shall** display the Digital Signature authentication result provided by the RIU after the software upload of the RIU Operating Software set.

3.12 Recording Of Monitored Parameters

- a) MDTSR **shall**, upon operator command, record the operator-selected continuous, real-time read/displayed monitored parameters, for later review and analysis.
- b) MDTSR monitored parameter recording **shall** be discontinuable at any time after initiation.
- c) MDTSR monitored parameter recording rate **shall** be operator selectable from 1 sample per minute (approx.) to 1 sample per 240 milliseconds.
- d) MDTSR monitored parameter recording **shall** store up to 15,000 samples per recorded parameter.
- e) MDTSR monitored parameter recording **shall** record at least two parameters simultaneously, while displaying at least two monitored parameters.
- f) MDTSR monitored parameter recording **shall** record parameter ID, value and recording time.
- g) MDTSR **shall** allow control parameter setting while recording.

3.13 Local Diagnostic Audible Indication Function

- a) MDTSR **shall** provide an audible alert function, which will provide a MDT generated tone when the operator-selected parameter crosses an operator-selected high and/or low threshold.
- b) MDTSR **shall** provide an audible alert function, which will provide a MDT generated tone when the selected parameter achieves peak/valley (min/max) values.

3.14 RIU Event Log Download

- a) MDTSR **shall** store at least fifty RIU Event Logs, with operator selectable Log labels, which can be selected for downloading from the RIU.
- b) MDTSR **shall**, upon operator command, upload from the RIU the RIU Event Log, apply the operator-selected file name or label, and store the RIU Event Log.
- c) MDTSR **shall** allow operator to view an RIU Event Log.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Testing Conditions

- a) Unless otherwise specified, all testing **will** be performed in accordance with the Testing Conditions specified in the RIU SSS.
- b) Testing of MDTSR requirements will be conducted in accordance with Appendix B.

4.2 Verification Methods

- a) Verification methods **will** be utilized in measuring equipment performance and compliance of individual requirements contained in this specification. The four verification methods, TEST, DEMONSTRATION, ANALYSIS, and INSPECTION, listed in decreasing order of complexity, are described as follows:
 - 1) TEST. Test is a method of verification wherein performance is measured during or after the controlled application of functional and/or environmental stimuli. Quantitative measurements are analyzed to determine the degree of compliance. The process uses laboratory equipment, procedures, items, and services.
 - 2) DEMONSTRATION. Demonstration is a method of verification where qualitative determination of properties is made for an end item, including the use of technical data and documentation. The items being verified are observed, but not quantitatively measured, in a dynamic state.
 - 3) ANALYSIS. Analysis is a method of verification that consists of comparing hardware design with known scientific and technical principles, procedures and practices to estimate the capability of the proposed design to meet the mission and system requirements.
 - 4) INSPECTION. Inspection is a method of verification to determine compliance without the use of special laboratory appliances, procedures, or services, and consists of a non-destructive static-state examination of the hardware, the technical data and documentation.

5.0 PREPARATION FOR DELIVERY

- a) The MDTSR **will** be delivered in accordance with Section F of the contract.

6.0 NOTES

6.1 Notes on Information Items

The contents of this Section are for informational purposes only and are not a part of the requirements of this specification. They are not contract requirements nor binding on either the Government or the Contractor. In order for these terms to become a part of the resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the Contractor on the information in these Subsections is wholly at the Contractor's own risk.

6.2 Applicable Definitions

Definitions for the MDTSR can be found in the Radio Interface Unit Subsystem Specification.

APPENDIX A

Acronyms

A/G	Air/Ground
CSCI	Computer Software Configuration Item
ICD	Interface Control Document
RIU	Radio Interface Unit
MDR	Multimode Digital Radio
MDT	Maintenance Data Terminal
NEXCOM	Next Generation Air/Ground Communication
SSS	Subsystem Specification
SW	Software

APPENDIX B

Verification Requirements Testability Matrix

Table B-1

Verification Requirements Testability Matrix

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

SECTION	REQUIREMENT	A	I	D	T	N / A
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TO BE SUPPLIED