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Data Multiplexing Network (DMN) Phase III Equipment Operational Test and Evaluation (OT&E)/Integration Test Plan

Wayne Bell

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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/CT-TN91/24		

4. Title and Subtitle	5. Report Date
DATA MULTIPLEXING NETWORK (DMN) PHASE III EQUIPMENT OPERATIONAL TEST AND EVALUATION (OT&E)/INTEGRATION TEST PLAN	October 1991
	6. Performing Organization Code
7. Author(s) Wayne Bell	8. Performing Organization Report No. DOT/FAA/CT-TN91/24
9. Performing Organization Name and Address Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405	10. Work Unit No. (TRAIS)
	11. Contract or Grant No.
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City International Airport, NJ 08405	13. Type of Report and Period Covered Technical Note
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This plan addresses the Operational Test and Evaluation (OT&E)/Integration testing of the Data Multiplexing Network (DMN) equipment in the current NAS environment. The approach and concept is to conduct integration tests with appropriate National Airspace System (NAS) systems to verify that NAS requirements and DMN specifications (FAA-E-2786) and Statistical Multiplexer (FAA-E-2860) requirements have been satisfied. This will be accomplished by conducting unit level tests at the Federal Aviation Administration (FAA) Technical Center and extensive integration tests at the key test sites of Albuquerque, New Mexico; Denver, Colorado; and Minneapolis, Minnesota Air Route Traffic Control Centers (ARTCC).

The DMN equipment being procured includes Deterministic Time Division Multiplexing (DTDM) Commercial Off-The-Shelf (COTS) equipment and NON-COTS equipment (a/b switch and clock box). This plan describes the test program for the DTDM COTS equipment.

17. Key Words	18. Distribution Statement
Data Multiplexing Network Deterministic Time Division Multiplexing Modem Multiplexer Statistical Multiplexer	Document is on file at the Technical Center Library, Atlantic City International Airport, NJ 08405

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	61	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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1. INTRODUCTION.

The Data Multiplexing Network (DMN) Phase III Equipment procurement is a continuation of National Airspace System (NAS) Plan Project 5-02 which was approved in 1981 to implement data multiplexing technology. Phase III is currently included as a Capital Improvement Plan (CIP), project 25-02. The DMN Phase III will be used to continue providing the equipment necessary to exploit the opportunities for using data multiplexing technology to satisfy existing data transmission requirements as well as providing data multiplexing services to NAS Plan Projects implemented in 1990 and beyond. The equipment will interconnect Federal Aviation Administration (FAA) facilities, providing a minimum number of discrete channels for multiple data transmission paths. The equipment will also provide the means for network backbone routing, real-time monitoring and control, multiple routing and automatic backup.

The DMN equipment being procured includes Deterministic Time Division Multiplexing (DTDM) modems, Commercial Off-The-Shelf (COTS), NON-COTS and Statistical Multiplexer (STATMUX) COTS. The DTDM COTS equipment consists of Types I-VI modems, Limited Distance Modems (LDM), High Speed Time Division Multiplexers (HSTDM), Channel Service Units/Data Service Units (CSU/DSU) and Automated Network Management Systems (ANMS). The NON-COTS is comprised of A/B Switches and the Clock Box. The STATMUX COTS consists of Type I, II, and III STATMUXs.

The Operational Test and Evaluation/Integration (OT&E/Integration) testing will be conducted at operational FAA facilities; i.e., Air Route Traffic Control Center (ARTCC), at Albuquerque, New Mexico; Minneapolis, Minnesota; Denver, Colorado; and the FAA Technical Center to verify that operational requirements are met. The test schedule is given in section 8.0 of this plan.

1.1 PURPOSE.

The purpose of this plan is to ensure the successful OT&E of the DMN equipment. To meet this objective, the DMN equipment must be tested with other operational systems which comprise the DMN transmission equipment. This plan is structured to provide guidance to cognizant organizations so that the DMN testing activities will proceed in a structured and well documented manner. This testing is part of the OT&E/Integration as described in Order 1810.4b, Test and Evaluation Program, and in the DMN Master Test Plan.

1.2 AUTHORITY TO CHANGE THE OT&E/INTEGRATION TEST PLAN.

A coordination process will be initiated by ACN-260 to solicit concurrence from appropriate FAA organizations for this plan. The ACN-260 office will maintain a record of all revisions to the plan.

2. REFERENCE DOCUMENTS.

The following documents are applicable to the extent referenced in this document:

a.	FAA-E-2786	Specification Data Multiplexing Network Equipment
b.	FAA-E-024a	Preparation of Test and Evaluation Documentation
c.	FAA-E-2860	Data Multiplexing Network, Statistical Multiplexers
d.	NAS-MD-110	ADL Test Terms and Definitions
e.	NAS-MD-790	Remote Maintenance Monitoring System Interface Control Document
f.	NAS-SS-1000	NAS System Specification, Functional and Performance Requirements for the National Airspace System

3. TEST PLAN PHILOSOPHY.

The OT&E is that phase of the testing conducted to verify system-level requirements (e.g., physical, functional, procedural, and NAS interface). The OT&E is comprised of the NAS Integration, for which ACN-260 is responsible, and of the NAS Shakedown, for which ASM-640 is responsible. A block diagram of the OT&E tests is given in figure 1. This plan will only address the NAS Integration since ASM-640 will prepare a separate test plan for the NAS Shakedown tests. This plan will ensure that the following integration related activities are accomplished:

a. Review those requirements that were not successfully completed during the Operational Capabilities Demonstration (OCD) to determine if a retest is necessary.

b. Verify those requirements from NAS-SS-1000, FAA-E-2786 and FAA-E-2860 identified as "D" for demonstration and "T" for test under the "Subsystem Level," "Integration Level," and "Site Level" categories. These requirements are shown in appendices A, B, C and D.

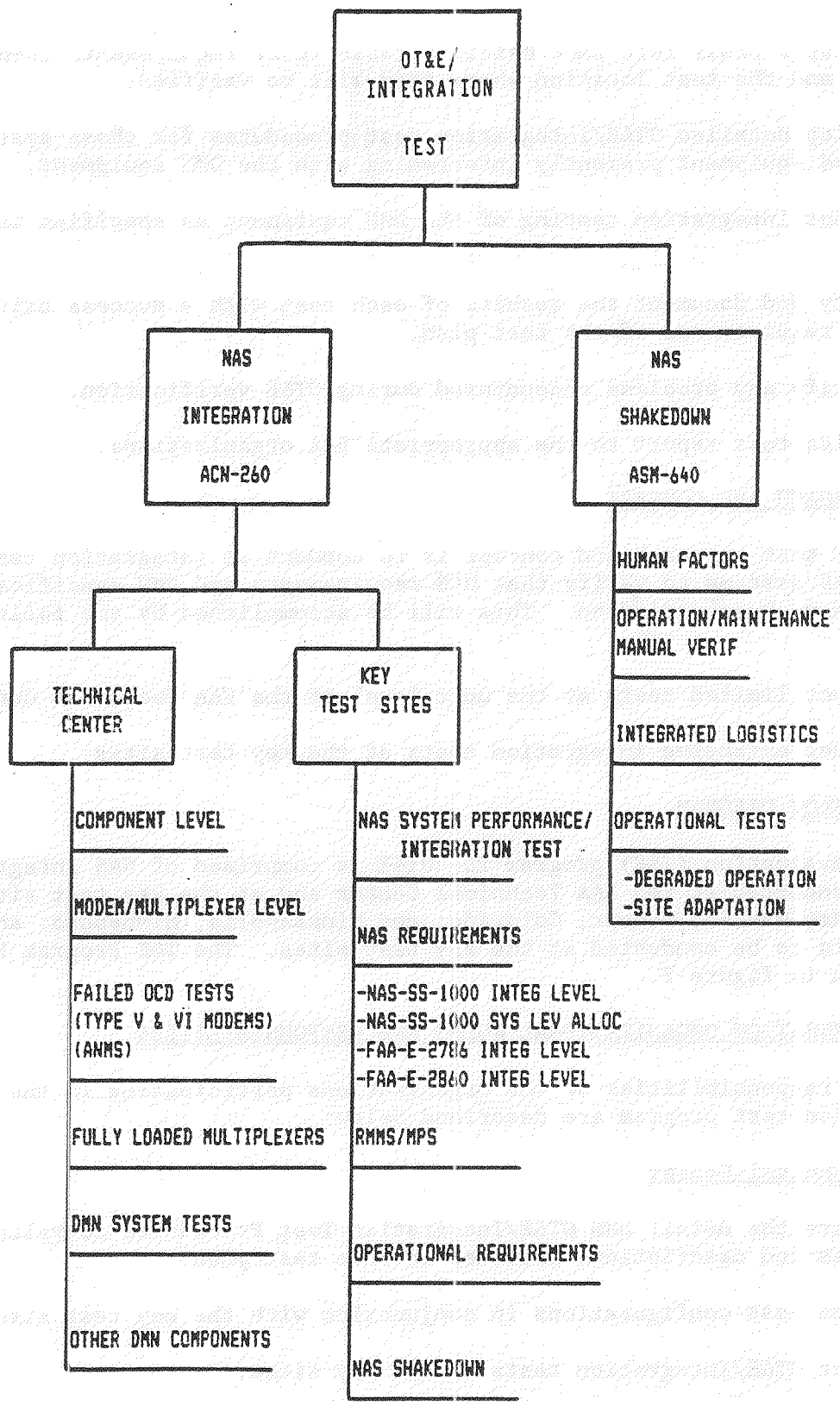

FIGURE 1. OT&E BLOCK DIAGRAM

c. Develop a cross reference matrix between those requirements identified in a and b above and the test location where they will be verified.

d. Develop detailed OT&E/Integration test procedures for those systems, subsystems, and equipment presently interfacing with the DMN equipment.

e. Conduct integration testing of the DMN equipment as specified in this plan.

f. Verify and document the results of each test with a success criterion that satisfies the requirements of the test plan.

g. Identify any problems encountered during OT&E verification.

h. Provide test report to the appropriate FAA organizations.

3.1 TEST APPROACH AND CONCEPT.

The basic OT&E test approach and concept is to conduct an integration test with appropriate NAS systems to verify that NAS requirements and DMN specification requirements have been satisfied. This will be accomplished by the following steps:

a. Conduct limited tests at the unit level at the FAA Technical Center.

b. Conduct extensive integration tests at the key test sites.

3.2 PROGRAM FLOW DIAGRAM.

The Test and Evaluation (T&E) program for OT&E is comprised of NAS Integration tests to be conducted at the FAA Technical Center and at the key test sites of Albuquerque, New Mexico; Denver, Colorado; and Minneapolis, Minnesota; and NAS Shakedown tests to be conducted at the key test sites. The T&E Program Flow Chart is shown in figure 2.

3.3 OT&E/INTEGRATION ORGANIZATIONAL ROLES AND RESPONSIBILITIES.

The roles and responsibilities of the organizations participating in the DMN OT&E/Integration test program are described below:

3.3.1 FAA Technical Center.

a. Prepare the detail DMN OT&E/Integration Test Procedures to validate the test objectives and descriptions provided in this test plan.

b. Define test configurations in conjunction with the key test sites.

c. Direct OT&E/Integration tests at the key sites.

d. Prepare test reports.

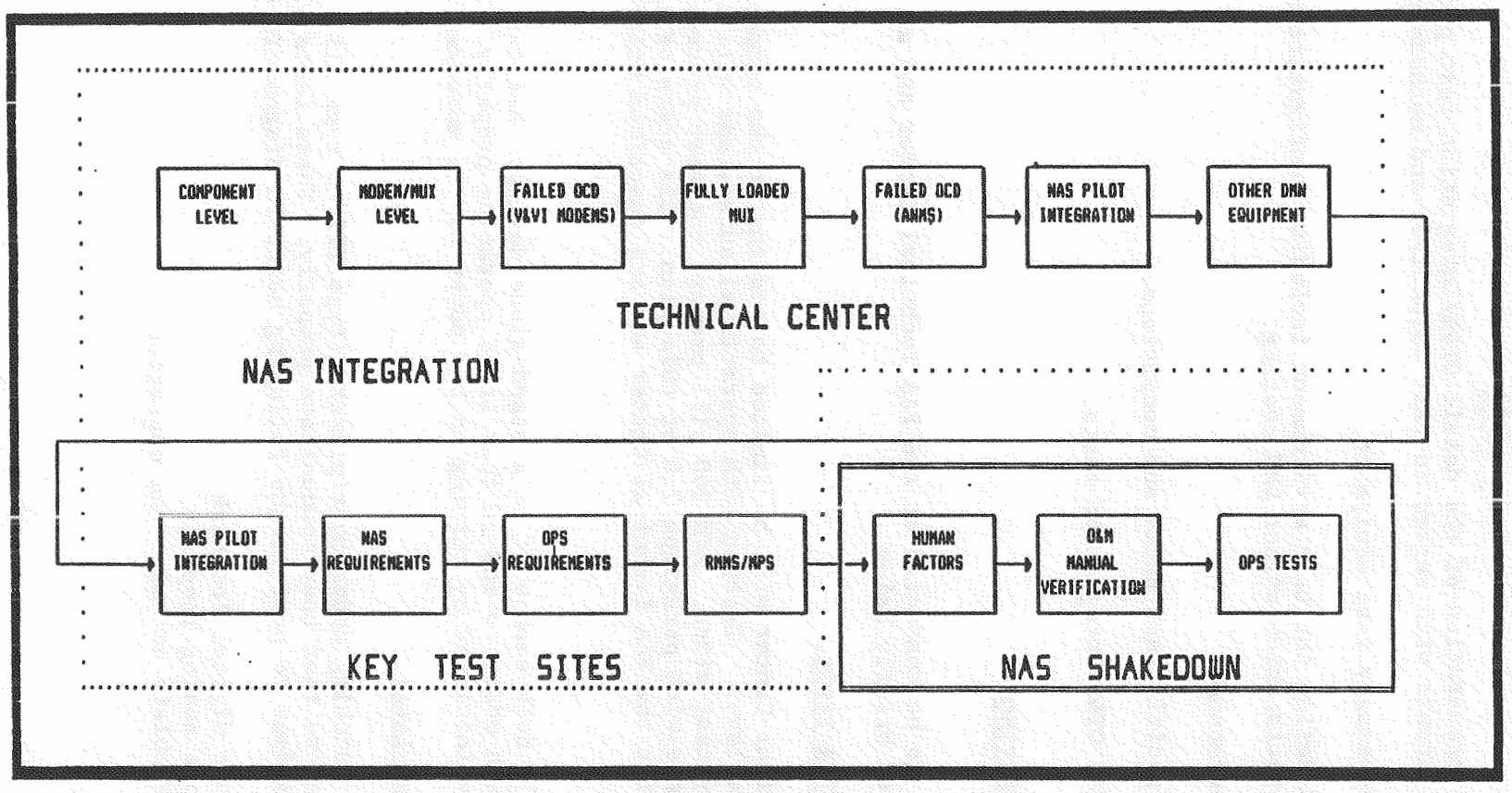

FIGURE 2. T&E PROGRAM FLOW CHART

3.3.2 Key Test Sites (Denver, Colorado; Albuquerque, New Mexico; and Minneapolis, Minnesota).

a. Assist in the preparation of the detail OT&E/Integration test procedures by providing technical inputs with regard to test objectives and methodologies.

b. Provide the necessary test equipment.

c. Establish and define the test environment including configurations and other site specific aspects which affect DMN testing.

d. Supply test personnel.

e. Define site specific test terms and conditions.

f. Conduct the NAS OT&E/Integration tests.

4. SYSTEM INTERFACE TESTING.

System Interface tests to be conducted at the FAA Technical Center and at the key test sites are described briefly below.

4.1 FAA TECHNICAL CENTER TESTS.

Tests at the FAA Technical Center will be limited to testing at the component level and simulated subsystem level. Testing with operational subsystems will be accomplished at the key test sites. ACN-260 will prepare the test procedures for these tests in accordance with paragraph 7.0 of this plan. Six areas of testing have been established for the FAA Technical Center and are described briefly below:

4.1.1 Unit Level.

This level of test will check each unit as a stand-alone device. Built-in self tests will be run on each modem to ensure that it is operating properly. These tests are automatically initiated by turning on the power to the modem/multiplexer.

4.1.2 Modem/Multiplexer Level.

These tests will check matching modem/multiplexers (type III to type III, type IV to type IV, etc.) to ensure that they communicate properly. These tests will check the capability of the modems to perform the following built-in diagnostic tests:

a. Local and remote digital loopback,
b. Local and remote analog loopback,
c. Self test to simulate actual modem operation.

4.1.3 Failed OCD Tests.

The following tests were not successfully completed at the OCD and will be reviewed to determine if a retest is necessary:

FAA-E-2786 Para. No.	Title
3.2.1.1.13.2	Semi-Automatic Dial Backup
3.2.1.6.1.2	Error Rate (Type V Modems)
3.2.1.6.1.3	Line Requirements (Type V Modems)
3.2.1.8.1.2	Error Rate (Type VI Modems)
3.2.3.8.1.3	Line Requirements (Type VI Modems)
3.2.1.10.1.3	Data Base (ANMS)
3.2.1.10.2.1	Continuous Monitoring (ANMS)
3.2.1.10.3	Transmission Line Evaluation (ANMS)
3.2.1.10.4	Parameter Changes (ANMS)
3.2.1.10.6	VF Line Impairment Monitoring (ANMS)
3.2.1.10.7	Modem Monitoring (ANMS)
3.2.1.10.11	Audible Alarm (ANMS)

FAA-E-2860 Para. No.	Title
(To be provided later)	

4.1.4 Fully Loaded Multiplexers.

During the OCD, only one port of the multiport multiplexers was tested. Tests in this area will check each port of a multiport multiplexer in a fully loaded condition, more closely simulating an operational environment.

4.1.5 DMN System Tests.

These tests utilize the test setup used for the OCD (figure 3) and simulate a DMN system/subsystem configuration. Test messages will be inserted at various inputs to the test configuration and the receiving locations will be monitored to assure that the messages were properly received. The ANMS operational and technical requirements will be verified during these tests.

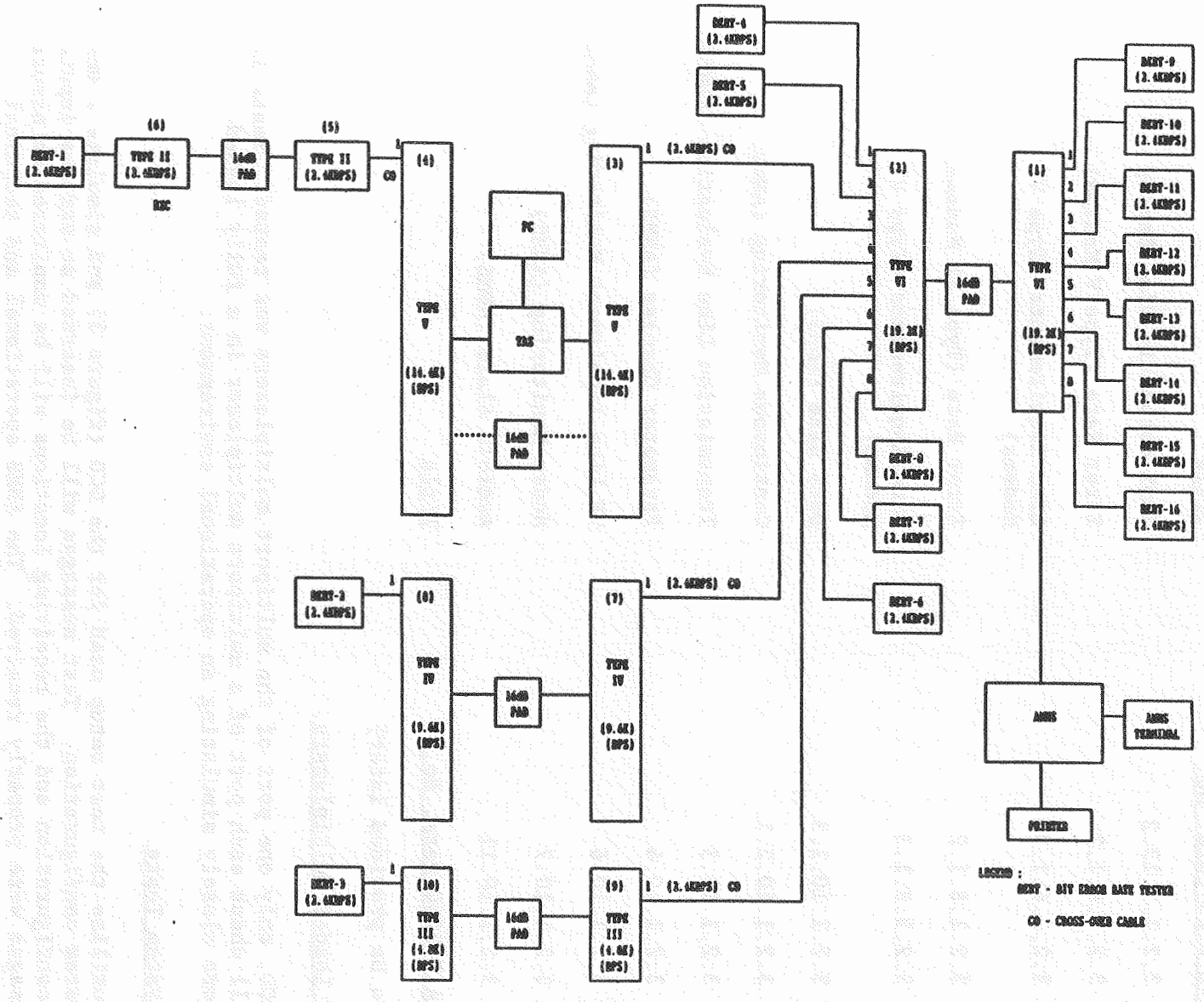

FIGURE 3. NAS PILOT INTEGRATION TEST CONFIGURATION

4.1.6 Other DMN Components.

This area of testing involves equipment other than the types I-VI modems, multiplexers, and ANMS being procured on the DMN Phase III program. This equipment includes Limited Distance Modems (LDM), High Speed Time Division Multiplexer (HSTDM), Port Sharing Device (PSD), Modem Sharing Device (MSD), Tail Circuit Synchronizer, "Hot" Standby Switch (HSS), Modem Substitution Switch (MSS), Digital and Analog Patch Panels, Channel Service Units/Data Service Units (CSU/DSU), Digital A/B Switch and Clock Box. The DT&E tests will have to perform on the A/B Switch and Clock Box since they are NON-COTS equipment. A separate test plan will be written to cover these tests.

5. NAS SYSTEM INTEGRATION TESTS.

This area of testing will evaluate the suitability and effectiveness of the DMN Phase III equipment to interface with NAS systems. Extensive field testing will be conducted at the key test sites in Albuquerque, New Mexico; Denver, Colorado; and Minneapolis, Minnesota. The present systems which interface with the DMN equipment are listed in table 1. Test procedures for these systems are in the process of being prepared for publication.

TABLE 1. PRESENT SYSTEMS INTERFACING WITH DMN EQUIPMENT

Deterministic Time Division Multiplexing Modems

- Air Route Surveillance Radars (Beacon Data, Radar Data, Remote Control Interface Unit Data)
- Central Flow Control Facility
- Automated Radar Terminal System
- Flight Data Input/Output
- Flight Service Data Processing System Service A
- Remote Maintenance Monitoring System (RMMS)
- DMN Statistical Time Division Multiplexing

Statistical Time Division Mutiplexers

- Computer-Based Instruction (CBI)
- Traffic Management System
- Maintenance Management System

Transmission Systems

- Radio Communications Link
- Public Switched Telephone Network
- Digital Data Service (Leased)

5.1 KEY SITE TESTS.

Integration tests will be conducted with simulated inputs for those systems that presently interface with the DMN equipment to minimize interference with operational systems. Tests to be conducted at the key test sites are listed and described below:

a. NAS System Performance/Integration tests
b. NAS requirements
c. Operational requirements
d. NAS Shakedown test

5.2 NAS SYSTEM PERFORMANCE/INTEGRATION TEST.

The System Performance/Integration testing will be conducted to determine the degree to which the DMN system meets NAS requirements. The DMN system will be operated over a variety of transmission media, e.g., D6 and D1 type lines. Tests using various connectivity, ARTCC to ARTCC via Radio Communications Link (RCL) and leased service connectivity, Telco lines. Figure 4 shows circuit diversity that will be included as part of the OT&E test program. Key site candidates for the OT&E/Integration tests are shown below:

Minneapolis ARTCC (ZMP)

- Apple Valley Long Range Radar (LRR) (QJE)
- Gettysburg LRR (QJB)
- Minneapolis/St. Paul (MSP) Terminal Radar Approach Control (TRACON)
- Minneapolis Airway Facilities Services (AFS)
- General National Airspace System (GNAS)

Denver ARTCC (ZDV)

- Parker LRR (QPK)
- Denver TRACON

Albuquerque ARTCC (ZAB)

- West Mesa LRR (QSA)
- Albuquerque TRACON
- Albuquerque GNAS

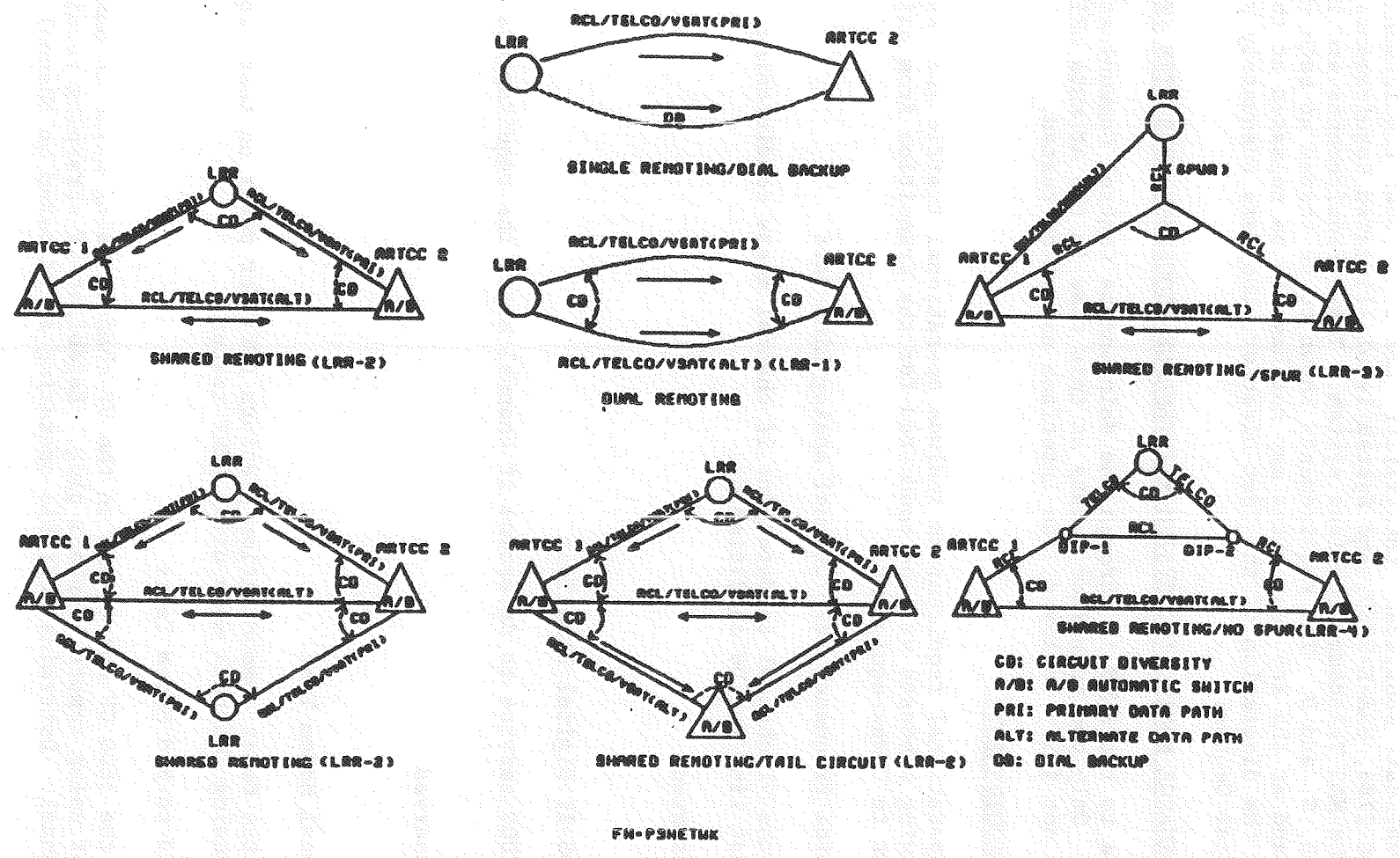

FIGURE 4. LRR-RDAT/BDAT ARCHITECTURAL MODELS

5.3 NAS REQUIREMENTS.

These tests will validate subsystem, integration, and site level requirements in NAS-SS-1000, FAA-E-2786, FAA-E-2860, and System level Allocated Requirements in NAS-SS-1000 for the NAS Telecommunications system. These requirements are listed in appendices A, B, C, and D. The requirements shown to be tested at both the FAA Technical Center and at the key test sites may not have to be repeated at the key test sites if, at the discretion of the Test Director, they are adequately verified at the FAA Technical Center.

5.4 REMOTE MAINTENANCE MONITORING SYSTEM/MAINTENANCE PROCESSOR SUBSYSTEM (MPS).

The ANMS interface to the RMMS is through the Maintenance Control Communications Processor (MCCP). Only one interface exists at this time in the Atlanta ARTCC. Since the MCCP is not fully deployed, the interface cannot be tested.

5.5 OPERATIONS REQUIREMENTS.

Tests to verify operational requirements include operational traffic and load tests. The following subtests will be conducted for the transition from existing Paradyne equipment to Codex equipment:

Subtest 1.1 - Voice Frequency (VF) Channel Analog Line Test

Objective: Test the VF channel to determine if channel meets conditioning requirements. Test line for D6 conditioning.

Subtest 1.2 - Reserved

Objective:

Subtest 1.3 - DDS-II Digital Line Test

Objective: Test DDS service to determine if channel meets the requirements of Bell System Pub 62310.

Subtest 1.4 - Reserved

Objective:

Subtest 2.1 - Local Modem Test

Objective: Test the Codex communication platform (CP) for power on test, modem test check, and analog loopback mode using BERT tester.

Subtest 2.2 - End-to-End Modem Tests

Objective: Test the 3600 CP end-to-end on the VF channel using built-in BERT tester. BERT test using remote loopback plug. Establish VF strapping requirements for unique VF channel. Determine reliable operating speed based on channel impairments.

Subtest 3.1 - Hot Standby Switch test

Objective: Test ANMS and manual switching functions of the HSS switch. Test main to spare and spare to main. Test power on/off switch hold.

Subtest 3.2 - Modem Substitution Switch test

Objective: Test ANMS and manual switching functions of the MSS switch. Test substitution for "N."

Subtest 3.3 - A/B Switch test

Objective: Download/upload switch parameters from ANMS. Configure A/B switches as groups. Test A/B switch function in automatic, ANMS control, local control, and remote panel control. Simulate loss of VF channels and test for A/B switching function.

Subtest 3.4 - Digital Switch Test for Radar Communications Interface Unit (RCIU)

Objective: Test the digital bridges as switch when used in conjunction with A/B switch. Test the RCIU operational functions through the digital bridge.

Subtest 3.5 - Clock Box Control tests

Objective: Test the external controls of the clock box and remote control functions from the AMNS. Test the clock box failure detection circuit and alarm functions. Test radar identification verification circuit.

Subtest 4.1 - Radar Parallel Test/baby "N" type connector (BNC)/Box/Quality Precheck

Objective: Test the 3600 CP in parallel with existing radar data interface. Quality precheck data at ARTCC with Transportable Radar Analysis Computer System (TRACS).

Subtest 4.2 - Reserved

Objective:

Subtest 4.3 - Radar Peripheral Adaptor Module Replacement Item (PAMRI) On-line Interface Test

Objective: Interface Codex DCE equipment through PAMRI into NAS. Perform Quality Analysis of Radar Sites (QARS) run quality precheck. Verify parrot in box.

Subtest 4.4 - RCIU Test/Restoral Path test

Objective: Verify operation of RCIU with MFS. Test automatic restoral functions using alternate path.

Subtest 4.5 - Radar Restoral Path test

Objective: Verify radar restoral operation using A/B automatic mode, ANMS control, local control, and remote panel control.

Subtest 4.6 - Radar Data (RDAT)/Beacon Data (BDAT)/RCIU Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning of long range radar.

Subtest 4.7 - Inter-Facility Data (IDAT) (NAS-Automated Radar Terminal System (ARTS)) PAMRI On-line Interface Test

Objective: Interface Codex Data Communications Equipment (DCE) through PAMRI into NAS. Perform IDAT test NAS to NAS using TD message (Test Message).

Subtest 4.8 - IDAT (NAS-NAS) Dual Remoting Restoral Path Test

Objective: Verify IDAT (NAS-NAS) restoral operation using A/B automatic mode, ANMS control, local control, and remote panel control.

Subtest 4.9 - IDAT (NAS-ARTS) Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning of IDAT (NAS-ARTS).

Subtest 4.10 - DCX to DCX On-line Interface test

Objective: Interface Codex DCE equipment with Data Communications Exchange (DCX). Perform DCX to DCX data transmission.

Subset 4.11 - DCX Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning of DCX.

Subtest 4.12 - MPS to GNAS On-line Interface Test

Objective: Interface Codex DCE equipment with Maintenance Processor Subsystem (MPS) to GNAS data transmission.

Subtest 4.13 - MPS to GNAS Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning.

Subtest 4.14 - MPS to MPS On-line Interface Test

Objective: Interface Codex DCE equipment with MPS to MPS data transmission.

Subtest 4.15 - MPS to MPS Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning of MPS.

Subtest 4.16 - GNAS to CBI Operational Interface Test

Objective: Interface Codex DCE equipment with GNAS to CBI data transmission.

Subtest 4.17 - GNAS to CBI Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning.

Subtest 4.18 - Flight Data Input/Output (FDIO) Dual Remoting (with ARTS) Restoral Path Test

Objective: Interface Codex DCE equipment with FDIO

Subtest 4.19 - Reserved

Objective:

Subtest 4.20 - Reserved

Objective:

Subtest 4.21 - IDAT NAS to NAS Restoral Path Test

Objective: Interface Codex DCE equipment with IDAT NAS to NAS Restoral Path data transmission.

Subtest 4.22 - IDAT NAS to NAS PAMRI On-line Interface Test

Objective: Interface Codex DCE equipment with IDAT NAS to NAS PAMRI data transmission.

Subtest 4.23 - IDAT NAS to NAS Operational Readiness Demonstration

Objective: A 24-hour operational demonstration prior to commissioning.

Subtest 5.1 - 9800 ANMS Test (Modem)

Objective: Configure the ANMS to operate with the 3600 CP, establish parameters, alarm thresholds, and diagnostic control.

Subtest 5.2 - 9800 ANMS Test CSU to DSU

Objective: Configure the ANMS to operate with the 3600 CP, establish parameters, alarm thresholds, and diagnostics control.

Subtest 5.3 - 9800 ANMS Operational Readiness Demonstration

Objective: Demonstrated the ANMS capability to function with operational environment.

Subtest 5.4 - 9800 ANMS Hot Standby Switch Test

Objective: Test ANMS and manual switching functions of the Hot Standby Switch from main to spare and back.

Subtest 5.5 - 9800 ANMS Dial Backup Test

Objective: Test the 3600 in point-to-point dial backup mode. Test the automatic front panel and ANMS control of dial backup and control speed.

Subtest 5.6 - Reserved

Objective:

Subtest 5.7 - Reserved

Objective:

Subtest 5.8 - 9800 ANMS HSTDM Emulation Test

Objective: Test the cooperation of the Codex 3500 and 6216 equipment within the FAA telecommunication environment.

Subtest 5.9 - 9800 ANMS Test-MSS

Objective: Test operation of the Modem Substitution Switch when initiated by 9800 ANMS.

Subtest 5.10 - 9800 Security Test

Objective: Test credibility of personnel and qualifications to 9800 ANMS.

Subtest 5.11 - 9800 ANMS Configuration Test

Objective: Verify the configuration functions of the 9800 ANMS and two point-to-point modem circuits (same type min.).

Subtest 5.12 - 9800 ANMS - Fault Management Test

Objective: Verify the fault management capabilities of the 9800 ANMS in snap generation, modem test, and job service scheduling mode.

Subtest 5.13 - 9800 ANMS - Device Restoral Test

Objective: Verify the device restoral capabilities of the 9800 ANMS equipment, hot standby switch, dial backup, A/B switch and modem substitution switch.

Subtest 5.14 - 9800 ANMS - Performance Management

Objective: Test the performance management capabilities and verify the database extraction, statistical collection, and report generation of the 9800 ANMS.

Subtest 5.15 - 9800 ANMS Event Management Tests

Objective: Verify the ability of the 9800 system to manage events effectively.

5.6 NAS SHAKEDOWN TESTS.

Shakedown tests will be conducted after the successful completion of the NAS Integration testing. Shakedown tests will be performed by ASM-640 and will include the following:

a. Human Factors
b. Operations and Maintenance (O&M) Manual Verification
c. Integrated Logistics
d. Operational Tests

6. DMN PHASE III EQUIPMENT INTEGRATION VERIFICATION CONTROL.

This section describes the method that will be used to ensure traceability of requirements to the verification categories and test configurations defined in this plan.

6.1 VERIFICATION METHODS.

Four types of verification methods will be used to ensure that the DMN Phase III Equipment meets performance requirements. The methods of verification are defined below:

a. TEST (T) - Test is defined as a method of verification wherein performance requirements are verified by measurement during or after controlled applications of functional and/or environmental stimuli. Quantitative measurements are analyzed to determine the degree of compliance. These measurements may require the use of laboratory equipment, recorded data, procedures, items, and services.

b. DEMONSTRATION (D) - Demonstration is defined as a method of verification denoting the qualitative determination of properties of an end item including software and/or the use of technical data and documentation. The items being observed are visually demonstrated but not qualitatively measured, in a dynamic state.

c. ANALYSIS (A) - Analysis is defined as a method of verification by the examination of an item, its elements and their relationship to each other and/or known properties.

d. INSPECTION (I) - Inspection is defined as a method of verification wherein the requirement is visually examined.

6.2 TEST VERIFICATION REQUIREMENTS TRACEABILITY MATRIX (TVRTM).

Appendix A provides a Verification Requirements Traceability Matrix (VRTM) for those requirements specified by NAS-SS-1000, Volume IV, applicable to data multiplexing equipment. These are listed under paragraph 3.2.1.4, Transmission Subelement and its subparagraphs. Table 2 defines the test level at which these parameters will be verified. Appendix B provides a VRTM for those requirements defined by FAA-E-2786 and similarly shows which parameters will be verified at the integration test level. Appendix C provides a VRTM for those parameters defined in FAA-E-2860. Those requirements verified by demonstration (D) or by test (T) which could not be verified at a lower level of testing will be verified. Maximum use will be made of the results of the OCD and contractor factory tests. The contractor is responsible for verifying the test requirements in appendix B, FAA-E-2786 VRTM; and appendix C, FAA-E-2860 VRTM, prior to OT&E/Integration tests conducted by the FAA. Appendix D contains the System Level Allocated Requirements from NAS-SS-1000. The TVRTM contained in appendices A, B, C, and D identify the DMN Phase III Equipment end-state and interim requirements that will be verified throughout DMN integration testing. The TVRTM was developed from the Master Test Plan (MTP) VRTM using the requirements from NAS-SS-1000, FAA-E-2786, FAA-E-2860, Interface Requirements Documents (IRD), and in accordance with appendix IV of FAA-STD-024a.

System integration testing will take place at the FAA Facilities in Albuquerque, New Mexico; Denver, Colorado; Minneapolis, Minnesota; and at the FAA Technical Center in Atlantic City, New Jersey. Test Procedures will be written in accordance with this OT&E/Integration Test Plan. The procedures will provide all the detail needed for execution of thorough integration testing and for transitioning the DMN Phase III Equipment into the NAS.

6.3 CROSS REFERENCE MATRICES.

Table 2 provides a cross reference matrix listing the NAS-SS-1000 Subsystem Level, Integration Level, and System Level Allocated test requirements, how they relate to FAA-E-2786 and FAA-E-2860, and the test location where they will be verified. Table 3 lists the FAA-E-2786 Subsystem and Integration Level test requirements and the test location where they will be verified. Table 4 lists the FAA-E-2860 Subsystem and Integration Level test requirements and the test location where they will be verified.

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 1 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTES
				FAA TC	KEY SITE	
3.2.1.4.1.1.2.B	DATA MULTIPLEXERS	3.2.1.4.2.2 3.2.1.5.2.2 3.2.1.6.2.1 3.2.1.8.2.1 3.2.1.21	D D D D D			
3.2.1.4.1.1.3.1	PERFORMANCE MONITORING AND ALARM GENERATION	3.2.1.1.7	D			
3.2.1.4.1.1.3.1.2	DM ANMS	3.2.10	D			
3.2.1.4.1.2.2	TRANSMISSION DELAY		A/T			
3.2.1.4.1.2.5.1	BIT ERROR RATE	3.2.1.3.1.2 3.2.1.4.1.2 3.2.1.5.1.2 3.2.1.6.1.2 3.2.1.8.1.2	A/T A/T A/T A/T A/T			
3.2.1.4.1.2.5.2	ERROR FREE SECONDS		A/T			
3.2.1.4.1.2.6.1.1	(TDM) INPUT PORTS	3.2.1.4.2.2 3.2.1.5.2.2 3.2.1.6.2.1 3.2.1.8.2.1	T T T T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 2 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTE
				FAA TC	KEY SITE	
3.2.1.4.1.2.6.1.2	INPUT DATA RATES	3.2.1.2.1.1	X			
		3.2.1.2.2.1	X			
		3.2.1.2.5	X			
		3.2.1.3.1	X			
		3.2.1.4.1	X			
		3.2.1.5.1	X			
		3.2.1.6.1	X			
		3.2.1.8.1	X			
		3.2.1.21.1	X			
		3.2.1.22.3	X			
3.2.1.4.1.2.6.1.3	BIT ERROR RATE	3.2.1.3.1.2	X			
		3.2.1.1.5.2	X			
		3.2.1.6.1.2	X			
		3.2.1.8.1.2	X			
3.2.1.4.1.1.2.B	DATA MULTIPLEXERS	3.2.1.4.2.2	D			
		3.2.1.5.2.2	D			
		3.2.1.6.2.1	D			
		3.2.1.8.2.1	D			
		3.2.1.21	D			
3.2.1.4.1.1.3.1	PERFORMANCE MONITORING AND ALARM GENERATION	3.2.1.1.7	D			
3.2.1.4.1.1.3.1.2	DM ANMS		D			
3.2.1.4.1.2.2	TRANSMISSION DELAY		T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 3 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTES
				FAA TC	KEY SITE	
3.2.1.4.1.2.5.1	BIT ERROR RATE	3.2.1.4.1.2 3.2.1.5.1.2 3.2.1.6.1.2 3.2.1.8.1.2	T T T T			
3.2.1.4.1.2.5.2	ERROR FREE SECONDS		T			
3.2.1.1.8.1.1.A	DATA SERVICE FOR TRANSMISSION OF SURVEILLANCE DATA, WEATHER PRODUCTS, ATC, FLIGHT PLANNING AND MAINTENANCE & OPERATIONS INFO		D			
3.2.1.1.8.1.1.B	FLEXIBILITY TO ENABLE RECONFIG OF FACILITY AND/OR SUBSYSTEM CONNECTIVITY FOR COMMUNICATIONS CAPABILITY WHEN FAILURES OCCUR	3.2.1.1.1.1 3.2.1.1.9	D D			
3.2.1.1.8.1.1.C	FLEXIBILITY TO ENABLE GROWTH FOR FUTURE DATA COMM REQUIREMENTS		A			
3.2.1.1.9.1.A	(RMM) THE NAS SHALL CONTINUALLY MONITOR SYSTEM PERFORMANCE TO OBTAIN THE DATA NEEDED BY SPECIALISTS FOR MAINTENANCE AND OPERATIONS SUPPORT	3.2.1.1.7 3.2.1.10.1 3.2.1.10.2.1	D D D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 4 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTES
				FAA TC	KEY SITE	
3.2.1.1.9.1.B	THE NAS SHALL PROVIDE THE STATUS OF SUBSYSTEMS TO SPECIALISTS AND SHALL GENERATE AN ALARM UPON DEVIATION OF DESIGNATED PARAMETERS FROM PRESCRIBED LIMITS	3.2.1.10.3 3.2.1.10.9	D D			
3.2.1.1.9.1.C	THE NAS SHALL PROVIDE THE CAPABILITY FOR A SPECIALIST ON-SITE OR AT AN OFF-SITE LOCATION TO CONTROL SELECTED SUBSYSTEMS FOR MAINTENANCE PURPOSES	3.2.1.10.2.2	D			
3.2.1.1.9.1.D	THE NAS SHALL PROVIDE THE SPECIALISTS THE CAPABILITY TO IDENTIFY THE LINE REPLACEABLE UNIT CAUSING AN EQUIPMENT FAILURE	3.2.1.10.10	D			
3.2.1.1.9.1.G	THE NAS SHALL PROVIDE THE SPECIALIST ACCESS TO MONITORING, CONTROL AND DATA MANAGEMENT CAPABILITIES OF NAS AS REQUIRED AND AS AUTHORIZED BY MANAGEMENT DIRECTIVES	3.2.1.10	D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 5 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTES
				FAA TC	KEY SITE	
3.2.1.2.8.1.A	A DATA SERVICE AVAILABILITY OF 0.99999 FOR THE TRANSMISSION OF WEATHER, AIR TRAFFIC CONTROL, AND FLIGHT PLAN INFORMATION TO AIRCRAFT		T			
3.2.1.2.8.1.B	A DATA SERVICE AVAILABILITY OF 0.99999 BETWEEN AN ACF. ATCT, AFSS AND OTHER FAA FACILITIES FOR DATA PROCESSING EQUIPMENT REQUIRING CRITICAL SERVICE		T			
3.2.1.2.8.1.D	THE FLEXIBILITY TO ENABLE RECONFIGURATION OF CRITICAL INTERFACILITY DATA COMMUNICATIONS WITHIN 6 SECONDS	3.2.1.11.9.4.1	T			
3.2.1.2.8.1.E	THE FLEXIBILITY THROUGH MODULARITY TO ENABLE GROWTH FOR FUTURE DATA COMM REQUIREMENTS		X			
3.2.1.2.9.A	THE NAS SHALL PROVIDE THE CAPABILITY TO CONTINUALLY MONITOR THE STATUS, ALARMS/ALERTS AND PERFORMANCE DATA OF SELECTED SUBSYS		T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPEC ION, X=NOT APPLICABLE

NOTES:

TABLE 2. NAS-SS-1000. CROSS REFERENCE TEST MATRIX (SHEET 6 OF 6)

REF. PARAGRAPH	REQUIREMENT DESCRIPTION	FAA-E-2786	VERIFICATION METHOD	TEST LOCATIONS		NOTES
				FAA TC	KEY SITE	
3.2.1.4.1.1.2.B	DATA MULTIPLEXERS	3.2.1.4.2.2	D			
		3.2.1.5.2.2	D			
		3.2.1.6.2.1	D			
		3.2.1.8.2.1	D			
		3.2.1.21	D			
3.2.1.4.1.2.1.A	CRITICAL SERVICES		T			
3.2.1.4.1.2.1.B	ESSENTIAL SERVICES		T			
3.2.1.4.1.2.1.C	ROUTINE SERVICES		T			
3.2.1.4.1.2.2	TRANSMISSION DELAY		T			
3.2.1.4.1.2.4.3.5	ENVELOPE DELAY DISTORTION		T			
3.2.1.4.1.2.4.3.6	IMPULSE NOISE	3.2.1.10.6	T			
3.2.1.4.1.2.4.3.7.A	2ND ORDER INTERMODULATION	3.2.1.10.6	A/T			
3.2.1.4.1.2.4.3.7.B	3RD ORDER INTERMODULATION	3.2.1.10.6	A/T			
3.2.1.4.1.2.4.3.8.A	20HZ TO 300HZ (PHASE JITTER)	3.1.2.10.6	T			
3.2.1.4.1.2.4.3.8.B	4HZ TO 300HZ (PHASE JITTER)	3.2.1.10.6	T			
3.2.1.4.1.2.4.3.9	FREQUENCY SHIFT	3.2.1.10.6	T			
3.2.1.4.1.2.4.4.1	BIT ERROR RATE	3.2.1.3.1.2	A/T			
		3.2.1.4.1.2	A/T			
		3.2.1.4.1.3	A/T			
		3.2.1.5.1.2	A/T			
		3.2.1.6.1.2	A/T			
		3.2.1.8.1.2	A/T			
3.2.1.4.1.2.4.4.2	ERROR FREE SECONDS		X			
3.2.1.4.1.2.5.3	AVAILABILITY		A/T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 1 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.1.1	MODEM DIGITAL INTERFACES	D	D			
3.2.1.1.1.1	INTERFACE OPTION	D	D			
3.2.1.1.2	MODEM LINE INTERFACES	I	I			
3.2.1.1.3.1	TYPE I MODEMS	D	D			
3.2.1.1.3.2	TYPE II - IV MODEMS	D	D			
3.2.1.1.4	TIMING SIGNALS AND TAIL CKTS	T	T			
3.2.1.1.5.1.1	TYPE I MODEMS	D	D			
3.2.1.1.5.1.2	TYPE II - VI MODEMS	D	D			
3.2.1.1.5.2	STATUS INDICATORS	D	D			
3.2.1.1.6	MOUNTING	I	I			
3.2.1.1.7	NETWORK MONITORING	D	D			
3.2.1.1.8	SECONDARY CHANNEL	T	T			
3.2.1.1.9	POWER LOSS CONFIGURATION	D	D			
3.2.1.1.10	SOFTWARE CONFIGURABLE	D	D			
3.2.1.1.11	TEST TONE	T	T			
3.2.1.1.12	MODEM COMPATIBILITY	A	A			
3.2.1.1.13.1	MANUAL DIAL BACKUP	D	D			
3.2.1.1.13.2	SEMI-AUTOMATIC DIAL BACKUP	D	D			
3.2.1.1.13.3	AUTOMATIC DIAL BACKUP	D	D			
3.2.1.1.13.4	MULTIPOINT OPERATION	D	D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 2 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.1.13.5.1	PRIVATE LINES	D	D			
3.2.1.2.1.1	TYPE IA MODEMS	T	T			
3.2.1.2.1.2	TYPE IB MODEMS	T	T			
3.2.1.2.2.1	TYPE IA MODEMS	T	T			
3.2.1.2.2.2	TYPE IB MODEMS	T	T			
3.2.1.2.3.1	TYPE IA MODEMS	T	T			
3.2.1.2.3.2	TYPE IB MODEMS	T	T			
3.2.1.2.4	LINE REQUIREMENTS	D	D			
3.2.1.2.5	INPUT CHANNEL SPECIFICATIONS	D	D			
3.2.1.2.6	AUTO/ANSWER AUTO/DIAL	D	D			
3.2.1.2.7	AUTOMATIC RATE ADJUST	D	D			
3.2.1.2.8	TYPE IA OPTION	D	D			
3.2.1.3.1	PERFORMANCE CHARACTERISTICS	T	T			
3.2.1.3.1.1	TYPE II MODEM STANDARD	T	T			
3.2.1.3.1.2	ERROR RATE	T	T			
3.2.1.3.1.3	LINE REQUIREMENTS	D	D			
3.2.1.3.2	OPTIONS	D	D			
3.2.1.4.1	PERFORMANCE CHARACTERISTICS	T	T			
3.2.1.4.1.1	TYPE III MODEM STANDARD	T	T			
3.2 1.4.1.2	ERROR RATE	T	T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 3 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.4.1.3	LINE REQUIREMENTS	D	D			
3.2.1.4.1.4	FALLBACK DATA RATE	T	T			
3.2.1.4.2.1	TRAIN ON DATA	D	D			
3.2.1.4.2.2	TIME DIVISION MULTIPLEXING	T	T			
3.2.1.5.1	PERFORMANCE CHARACTERISTICS	T	T			
3.2.1.5.1.1	TYPE IV MODEM STANDARD	T	T			
3.2.1.5.1.2	ERROR RATE	T	T			
3.2.1.5.1.3	LINE REQUIREMENTS	D	D			
3.2.1.5.1.4	FALLBACK DATA RATE	T	T			
3.2.1.5.2.1	TRAIN ON DATA	D	D			
3.2.1.5.2.2	TIME DIVISION MULTIPLEXING	T	T			
3.2.1.6.1	PERFORMANCE CHARACTERISTICS	T	T			
3.2.1.6.1.1	TYPE V MODEM STANDARD	T	T			
3.2.1.6.1.2	ERROR RATE	T	T			
3.2.1.6.1.3	LINE REQUIREMENTS	D	D			
3.2.1.6.1.4	FALLBACK DATA RATE	T	T			
3.2.1.6.1.5	FORWARD ERROR CORRECTION	A/T	A/T			
3.2.1.6.2.1	TIME DIVISION MULTIPLEXING	T	T			
3.2.1.6.2.2	EYE PATTERN GENERATOR	D	D			
3.2.1.8.1	PERFORMANCE CHARACTERISTICS	T	T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 4 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.8.1.2	ERROR RATE	T	T			
3.2.1.8.1.3	LINE REQUIREMENTS	D	D			
3.2.1.8.1.4	FALLBACK DATA RATE	T	T			
3.2.1.8.1.5	FORWARD ERROR CORRECTION	A/T	A/T			
3.2.1.8.2.1	TIME DIVISION MULTIPLEXING	T	T			
3.2.1.8.2.2	EYE PATTERN GENERATOR	D	D			
3.2.1.10	AUTOMATED NETWORK MANAGEMENT SYSTEM (ANMS)	D	D			
3.2.1.10.1	PERFORMANCE CHARACTERISTICS	D	D			
3.2.1.10.1.1	NON-INTERFERENCE WITH DATA	T	T			
3.2.1.10.1.2	RESPONSE TIME	T	T			
3.2.1.10.1.3	DATA BASE	D	D			
3.2.1.10.2.1	CONTINUOUS MONITORING	D	D			
3.2.1.10.2.2	CONTROL	D	D			
3.2.1.10.3	TRANSMISSION LINE EVALUATION	D	D			
3.2.1.10.4	PARAMETER CHANGES	D	D			
3.2.1.10.5	USER FRIENDLY OPERATION	D	D			
3.2.1.10.6	VF LINE IMPAIRMENT MONITORING	T	T			
3.2.1.10.7	MODEM MONITORING	D	D			
3.2.1.10.8	EIA INTERFACE MONITORING	D	D			
3.2.1.10.9	EXCEPTIONS	D	D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 5 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.10.10	DIAGNOSTIC TESTS	D	D			
3.2.1.10.11	AUDIBLE ALARM	D	D			
3.2.1.10.12	ANMS CAPACITY	A/I	A/I			
3.2.1.10.13	MODEM CONFIGURATION CHANGE	D	D			
3.2.1.10.14	MODEM TEST TONE INITIATION	T	T			
3.2.1.10.15	DIAL BACKUP	D	D			
3.2.1.10.16	MEMORY	D	D			
3.2.1.10.17	HARD DISK	D	D			
3.2.1.11.1	CABLES	I	I			
3.2.1.11.2.1	RS-232/EIA-530 INTERFACE ADAP	T	T			
3.2.1.11.2.2	V.35/EIA-530 INTERFACE ADAP	T	T			
3.2.1.11.3	PORT SHARING DEVICE (PSD)	T	T			
3.2.1.11.4	MODEM SHARING DEVICE (MSD)	T	T			
3.2.1.11.5	TAIL CIRCUIT SYNCHRONIZER	T	T			
3.2.1.11.6	"HOT" STANDBY SWITCH	D	D			
3.2.1.11.7	MODEM SUBSTITUTION SWITCH	D	D			
3.2.1.11.8	DIGITAL & ANALOG PATCH PANELS	T	T			
3.2.1.11.10	RACKS	I	I			
3.2.1.20.1	PERFORMANCE CHARACTERISTICS	T	T			
3.2.1.20.1.1	DIGITAL INTERFACE	T	T			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X= OT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 6 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.20.1.1.1	INTERFACE OPTION	D	D			
3.2.1.20.2	PERFORMANCE STANDARD	T	T			
3.2.1.20.3	DIAGNOSTICS	D	D			
3.2.1.20.4	TIMING SIGNALS	T	T			
3.2.1.20.5	DATA RATES	T	T			
3.2.1.20.6.1	CONTROLS	D	D			
3.2.1.20.6.2	STATUS INDICATORS	D	D			
3.2.1.20.7	CONFIGURATION	I	I			
3.2.1.20.8	ANMS INTERFACES	T	T			
3.2.1.20.9	TEST PATTERN GENERATOR OPTION	T	T			
3.2.1.20.10.1	DDSII SECONDARY CHANNEL	D	D			
3.2.1.21	HIGH SPEED TIME DIVISION MUX	D	D			
3.2.1.21.1	INPUT CHANNEL PARAMETERS	T	T			
3.2.1.21.2	INPUT INTERFACE	D	D			
3.2.1.21.2.1	INTERFACE OPTIONS	D	D			
3.2.1.21.2.2	CARRIER OPERATION	D	D			
3.2.1.21.3.1	OUTPUT CHANNEL PARAMETRS	T	T			
3.2.1.21.3.2	OUTPUT INTERFACES	A/T	A/T			
3.2.1.21.4	TIMING SIGNALS	T	T			
3.2.1.21.5	DIAGNOSTICS	D	D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 7 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.1.21.6.1	CONTROLS	D	D			
3.2.1.21.6.2	STATUS INDICATORS	D	D			
3.2.1.21.7	CONFIGURATION	I	I			
3.2.1.22.1	DIGITAL INTERFACES	T	T			
3.2.1.22.2	LINE INTERFACES	D	D			
3.2.1.22.3	SPEEDS	D	D			
3.2.1.22.4	DISTANCE	T	T			
3.2.1.22.5	DIAGNOSTICS	D	D			
3.2.1.22.6.1	CONTROLS	D	D			
3.2.1.22.6.2	STATUS INDICATORS	D	D			
3.2.1.22.7	MOUNTING	I	I			
3.2.2.1	GENERAL	A	I			
3.2.2.2	RACK MOUNTING	I	I			
3.2.2.3	ENCLOSURES	I	I			
3.2.2.4	POWER SUPPLY	D	D			
3.2.3	RELIABILITY	T	D			
3.2.4	MAINTAINABILITY	D	D			
3.2.5	ENVIRONMENTAL CONDITIONS	T	X			
3.2.5.1	AMBIENT TEMPERATURE	T	X			
3.2.5.2	RELATIVE HUMIDITY	T	X			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 3. FAA-E-2786, CROSS REFERENCE TEST MATRIX (SHEET 8 OF 8)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.5.3	ALTITUDE	T	X			
3.2.5.4	FUNGUS	T	X			
3.3.1	FINISHES	I	X			
3.3.2	ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY	T	X			
3.3.3	GROUNDING	T	X			
3.3.4	INTERCHANGEABILITY	D	X			
3.3.5	VENTILATION AND COOLING	D	X			
3.3.6	WIRE AND CABLE	D	I			
3.4	DOCUMENTATION	A	X			
3.5	CONFIGURATION MANAGEMENT	A	X			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

TABLE 4. FAA-E-2860, CROSS REFERENCE TEST MATRIX (SHEET 1 OF 3)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.1.1.1.1	PROTOCOL COMPATIBILITY	D	T			
3.1.1.1.2	PERFORMANCE CHARACTERISTICS	T	T			
3.1.1.1.2.1	DIGITAL INTERFACES	T	T			
3.1.1.1.2.1.1	INTERFACE OPTIONS	D	D			
3.1.1.1.2.2	INPUT CHANNEL SPECIFICATIONS	T	T			
3.1.1.1.2.3	COMPOSITE LINK SPECIFICATIONS	T	T			
3.1.1.1.2.4	OTHER SPECIFICATIONS	T	T			
3.1.1.1.2.5.1	CONTROLS	D	D			
3.1.1.1.2.5.2	STATUS INDICATORS	D	D			
3.1.1.2.1	INPUT CHANNEL SPECIFICATIONS	T	T			
3.1.1.2.2	COMPOSITE LINK SPECIFICATIONS	T	T			
3.1.1.4.1	INPUT CHANNEL SPECIFICATIONS	T	T			
3.1.1.4.2	COMPOSITE LINK SPECIFICATIONS	T	T			
3.1.1.4.3	OTHER SPECIFICATIONS	D	D			
3.1.1.4.4.1	CONTROLS	D	D			
3.1.1.4.4.2	STATUS INDICATORS	D	D			
3.1.1.4.5.1	MONITOR	D	D			
3.1.1.4.5.2	PACKET SWITCH INTERFACE	T	T			
3.1.1.4.5.3	SPLIT BANDWIDTH	T	T			
3.1.1.4.5.4	SWITCHING AND CONTROL	D	D			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 4. FAA-E-2860, CROSS REFERENCE TEST MATRIX (SHEET 2 OF 3)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.1.1.4.5.5	PROTOCOL CONVERSION	T	T			
3.1.1.4.5.6	DIAGNOSTICS	T	T			
3.1.1.5.1	CABLES	I	I			
3.1.1.5.2	RACKS	I	I			
3.1.2.1	MOUNTING	D	D			
3.1.2.1.1	RACK MOUNTING	D	D			
3.1.2.1.2	FREE STANDING	D	D			
3.1.2.3	POWER SUPPLY	T	T			
3.1.2.3.1	FREE STANDING STATISTICAL MUX	I	I			
3.1.2.3.2	RACK MOUNTED STATISTICAL MUX	D	D			
3.1.3	RELIABILITY	T/A	D			
3.1.4	MAINTAINABILITY	D	D			
3.1.4.1	OPERATIONAL AVAILABILITY	D	D			
3.1.5	ENVIRONMENTAL CONDITIONS	T	X			
3.1.5.1	AMBIENT TEMPERATURE	T	X			
3.1.5.2	ALTITUDE	T	X			
3.2.1	GENERAL	I	I			
3.2.2	FINISHES	I	I			
3.2.3	ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY	T	X			
3.2.4	GROUNDING	T	X			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

TABLE 4. FAA-E-2860, CROSS REFERENCE TEST MATRIX (SHEET 3 OF 3)

PARAGRAPH NO.	REQUIREMENT DESCRIPTION	VERIFICATION METHOD		CROSS REFERENCE DMN TEST LOCATION		NOTES
		SUBSYS LEVEL	INTEG LEVEL	FAA TC	KEY SITES	
3.2.5	INTERCHANGEABILITY	D	X			
3.2.7	WIRE AND CABLE	D	I			
3.3	DOCUMENTATION	A	I			

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, X=NOT APPLICABLE

NOTES:

7. TEST PROCEDURES.

Detailed test procedures will be written by ACN-260 with technical inputs from key test site personnel for all NAS Integration tests to be conducted during OT&E/Integration and by ASM-640 for NAS Shakedown tests.

7.1 TEST PROCEDURE OUTLINE.

All test procedures will follow the outline given below:

1. INTRODUCTION.

1.1 TEST OBJECTIVE.

1.2 BACKGROUND.

1.3 EQUIPMENT DESCRIPTION.

2. TEST APPROACH.

3. TEST REQUIREMENTS.

3.1 NAS REQUIREMENTS (NAS-SS-1000, VOLUME IV).

3.2 RMMS/MPS REQUIREMENTS (NAS-MD-790).

4. TEST EQUIPMENT REQUIRED.

5. TEST SEQUENCE.

6. DATA COLLECTION.

6.1 DATA REDUCTION AND ANALYSIS.

7. TEST RESPONSIBILITIES.

8. TEST SCHEDULE.

7.2 NAS SYSTEM PERFORMANCE TEST PROCEDURES.

Tests in this area will evaluate how well the DMN Phase III Equipment interfaces with a minimum set of NAS systems. A block diagram of the proposed test configuration is given in figure 3. This test configuration utilizes Types II, III, IV, V, and VI modems and the ANMS. Tests will be conducted using simulated data inputs generated by the Telecommunications Analysis System (TAS) Test Set. The OT&E Test Facility will be available at the FAA Technical Center to provide a test configuration for future testing.

7.3 NAS SYSTEM INTEGRATION TEST PROCEDURES.

This area of testing involves those systems that presently interface with the DMN as described in section 5. Preliminary test procedures for these systems are given in the process of being prepared for publication. Test procedures will also be written to verify Integration Level and System Level Allocated requirements specified in NAS-SS-1000 and Integration Level Requirements specified in FAA-E-2786 and FAA-E-2860 (appendices B and C). These requirements are listed in tables 2, 3, and 4 and test procedures will be provided at a later date.

7.4 RMMS/MPS TEST PROCEDURES.

These tests will determine how well the modems/multiplexers interface with the RMMS/MPS through the ANMS.

7.5 OPERATIONS REQUIREMENTS TEST PROCEDURES.

Two areas of testing fall into this area; operations traffic and load tests. These tests will be a mini-Shakedown test. A listing of some of these tests is provided in section 5.5.

7.6 NAS SHAKEDOWN TEST PROCEDURES.

Test procedures for the Shakedown tests will be written by ASM-640 and will be provided at a later date.

8. TEST SCHEDULE.

Listed below is a preliminary test schedule for the COTS and NON-COTS tests:

COTS TEST SCHEDULE

Distribute OT&E/Integration Test Plan for review	9/90
Update OT&E/Integration Test Plan	4/91
Complete OT&E/Integration Test Procedures	
- FAA Technical Center tests	6/91
- Key site tests	6/91
Receive DMN Equipment	
- FAA Technical Center	11/90
- Key site tests	5/91
Conduct FAA Technical Center tests	11/90
Conduct key site tests	6/91

Prepare Test Reports	
- FAA Technical Center Tests	9/91
- Key site tests	9/91
Conduct SHAKEDOWN Tests	8/91
Submit Test Reports to Program Office	9/91

NON-COTS TEST SCHEDULE

DT&E Completed	3/92
PAT&E Completed	4/92
Equipment to First Field Site	5/92
OT&E/Integration Completed	7/92
SHAKEDOWN	8/92
Test Report to Program Office	9/92

9. ACRONYMS AND ABBREVIATIONS.

AFS	Airway Facilities Services
A/B	A/B Switch
ANMS	Automated Network Management System
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
BDAT	Beacon Data
BNC	Baby "N" Type Connector
CBI	Computer-Based Instruction
CIP	Capital Improvement Plan
COTS	Commercial Off-the-Shelf
CP	Communication Platform
CSU/DSU	Channel Service Unit/Digital Service Unit
DCE	Data Communications Equipment
DCX	Data Communications Exchange
DMN	Data Multiplexing Network
DTDM	Deterministic Time Division Multiplexing
FAA	Federal Aviation Administration
FDIO	Flight Data Input/Output
GNAS	General National Airspace System

HSS	Hot Standby Switch
HSTDM	High Speed Time Division Multiplex
IDAT	Inter-Facility Data
IRD	Interface Requirements Document
LDM	Limited Distance Modem
LRR	Long Range Radar
MCCP	Maintenance Control Communications Processor
MPS	Maintenance Processor Subsystem
MSD	Modem Sharing Device
MSP	Minneapolis/St. Paul
MSS	Modem Substitution Switch
MTP	Master Test Plan
NAS	National Airspace System
O&M	Operations and Maintenance
OCD	Operational Capabilities Demonstration
OT&E/Integration	Operational Test and Evaluation/Integration
PAMRI	Peripheral Adaptor Module Replacement Item
PSD	Port Sharing Device
QARS	Quality Analysis of Radar Sites
RCIU	Radar Communications Interface Unit
RCL	Radio Communications Link
RDAT	Radar Data
RMMS	Remote Maintenance Monitoring System
STATMUX	Statistical Multiplexer
T&E	Test and Evaluation
TAS	Telecommunications Analysis System
TRACON	Terminal Radar Approach Control
TRACS	Transportable Radar Analysis Computer System
VF	Voice Frequency
VRTM	Verification Requirements Traceability Matrix

APPENDIX A

NAS-SS-1000, VOLUME IV, VERIFICATION REQUIREMENTS TRACEABILITY MATRIX APPLICABLE TO DATA MULTIPLEXING NETWORK

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT NAS-SS-1000 VOL IV		VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.4	TRANSMISSION SUBELEMENT				
3.2.1.4.1	TRANSMISSION EQUIPMENT (TE)				DESCRIPTION
3.2.1.4.1.1	TE FUNCTIONAL CHARACTERISTICS				DESCRIPTION
3.2.1.4.1.1.1	INTERCONNECTION OF FACILITIES	L	L	L	
3.2.1.4.1.1.1.B	COMMON CARRIER LEASED SERVICES	D	X	D	
3.2.1.4.1.1.2	TRANSMISSION ACCESS				LEAD-IN
3.2.1.4.1.1.2.B	DATA MULTIPLEXERS	D	D	D	
3.2.1.4.1.1.2.2	DATA MULTIPLEXER	I	X	I	
3.2.1.4.1.1.2.2.1	MULTIPLEXER TYPES				LEAD-IN
3.2.1.4.1.1.2.2.1.A	TIME DIVISION MULTIPLEXERS	I	X	I	
3.2.1.4.1.1.2.2.1.B	STATISTICAL MULTIPLEXERS	I	X	I	
3.2.1.4.1.1.2.3	COMMON CARRIER LEASED LINES	X	X	I	
3.2.1.4.1.1.3	FAULT DETECTION	L	L	X	
3.2.1.4.1.1.3.1	PERFORMANCE MONITORING AND ALARM GENERATION	D	D	X	
3.2.1.4.1.1.3.1.2	ON ANMS	D	D	X	
3.2.1.4.1.2	TE PERFORMANCE CHARACTERISTICS				
3.2.1.4.1.2.1	AVAILABILITY	L	L	L	
3.2.1.4.1.2.1.A	CRITICAL SERVICES	A	X	T	LEAD-IN
3.2.1.4.1.2.1.B	ESSENTIAL SERVICES	A	X	T	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LAYER RQMT, X=NOT APPLICABLE

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT NAS-88-1080 VOL IV		VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.4.1.2.1.C	ROUTINE SERVICES	A	X	T	
3.2.1.4.1.2.2	TRANSMISSION DELAY	A T	T	T	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LAYER RQMT, X=NOT APPLICABLE

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT NAS-88-1000 VOL IV		VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.4.1.2.4.3.5	ENVELOPE DELAY DISTORTION	X	X	T	
3.2.1.4.1.2.4.3.6	IMPULSE NOISE	X	X	T	
3.2.1.4.1.2.4.3.7	INTERMODULATION DISTORTION				LEAD-IN
3.2.1.4.1.2.4.3.7.A	SECOND-ORDER INTERMODULATION	X	X	A T	
3.2.1.4.1.2.4.3.7.B	THIRD-ORDER INTERMODULATION	X	X	A T	
3.2.1.4.1.2.4.3.8	PHASE JITTER				LEAD-IN
3.2.1.4.1.2.4.3.8.A	20 HZ TO 300 HZ	X	X	T	
3.2.1.4.1.2.4.3.8.B	4 HZ TO 300 HZ	X	X	T	
3.2.1.4.1.2.4.3.9	FREQUENCY SHIFT	X	X	T	
3.2.1.4.1.2.4.4	LEASED HIGH SPEED DATALINES				
3.2.1.4.1.2.4.4.1	BIT ERROR RATE	X	X	A T	
3.2.1.4.1.2.4.4.2	ERROR-FREE SECONDS	X	X	A T	
3.2.1.4.1.2.5	WIDEBAND DATA CHANNEL MUX ON RCL	L	L	X	
3.2.1.4.1.2.5.1	BIT ERROR RATE	A T	T	X	
3.2.1.4.1.2.5.2	ERROR-FREE SECONDS	A T	T	X	
3.2.1.4.1.2.5.3	AVAILABILITY	A	X	A T	
3.2.1.4.1.2.6	VOICE FREQUENCY CHANNEL DATA MULTIPLEXERS, MODEMS	L	L	X	
3.2.1.4.1.2.6.1	TIME DIVISION MULTIPLEXERS AND MODEMS				SUB-TITLE
3.2.1.4.1.2.6.1.1	INPUT PORTS	T	X	X	
3.2.1.4.1.2.6.1.2	INPUT DATA RATES	T	X	X	
3.2.1.4.1.2.6.1.3	BIT ERROR RATE	A T	X	X	
3.2.1.4.1.2.6.2	STATISTICAL MULTIPLEXERS				SUB-TITLE
3.2.1.4.1.2.6.2.1	INPUT PORTS	T	X	X	
3.2.1.4.1.2.6.2.2	INPUT DATA RATES	T	X	X	
3.2.1.4.1.2.6.2.3	COMPOSITE LINK PORTS	T	X	X	
3.2.1.4.1.2.6.2.4	COMPOSITE LINK DATA RATES	T	X	X	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LAYER RQMT, X=NOT APPLICABLE

APPENDIX B

FAA-E-2786, VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2786	VERIFICATION LEVEL AND METHOD			
PARA. NO TITLE	SUBSYS LEVEL	INTER LEVEL	SITE LEVEL	REMARKS
1. SCOPE	X	X	X	
2. APPLICABLE DOCUMENTS	X	X	X	
3. REQUIREMENTS				TITLE
3.1 MAJOR COMPONENT LIST	X	X	X	
3.1.1 DEFINITION	X	X	X	
3.2 EQUIPMENT CHARACTERISTICS				TITLE
3.2.1 OPERATING CHARACTERISTICS	L	L	L	
3.2.1.1 GENERAL MODEM REQUIREMENTS	L	L	L	
3.2.1.1.1 MODEM DIGITAL INTERFACES	D	D	I	
3.2.1.1.1.1 INTERFACE OPTION	D	D	D	
3.2.1.1.2 MODEM LINE INTERFACES	I	I	I	
3.2.1.1.3 DIAGNOSTICS				TITLE
3.2.1.1.3.1 TYPE I MODEMS	D	D	D	
3.2.1.1.3.2 TYPE II - VI MODEMS	D	D	D	
3.2.1.1.4 TIMING SIGNALS AND TAIL CIRCUITS	T	T	X	
3.2.1.1.5 CONTROLS AND STATUS INDICATORS				TITLE
3.2.1.1.5.1 CONTROLS				TITLE
3.2.1.1.5.1.1 TYPE I MODEMS	D	D	I	
3.2.1.1.5.1.2 TYPE II - VI MODEMS	D	D	I	
3.2.1.1.5.2 STATUS INDICATORS	D	D	I	
3.2.1.1.6 MOUNTING	I	I	I	
3.2.1.1.7 NETWORK MONITORING	D	D	D	
3.2.1.1.8 SECONDARY CHANNEL	T	T	X	
3.2.1.1.9 POWER LOSS CONFIGURATION	D	D	X	
3.2.1.1.10 SOFTWARE CONFIGURABLE	D	D	D	
3.2.1.1.11 TEST TONE	T	T	D	
3.2.1.1.12 MODEM COMPATIBILITY	A	A	X	
3.2.1.1.13 OPTIONS				TITLE
3.2.1.1.13.1 MANUAL DIAL BACKUP	D	D	D	
3.2.1.1.13.2 SEMI-AUTOMATIC DIAL BACKUP	D	D	D	
3.2.1.1.13.3 AUTOMATIC DIAL BACKUP	D	D	D	
3.2.1.1.13.4 MULTIPOINT OPERATION	D	D	I	
3.2.1.1.13.5 MASTER DEMARCATION SYSTEM INTERFACE				TITLE
3.2.1.1.13.5.1 PRIVATE LINES	D	D	D	

VERIFICATION METHODS: T-TEST, D-DEMONSTRATION, A-ANALYSIS, I-INSPECTION, L-VERIFIED BY LOWER LEVEL DOMS, X-NOT APPLICABLE

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2784		VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.2	TYPE I MODEMS				TITLE
3.2.1.2.1	PERFORMANCE CHARACTERISTICS				TITLE
3.2.1.2.1.1	TYPE IA MODEMS	T	T	D	
3.2.1.2.1.2	TYPE IB MODEMS	T	T	D	
3.2.1.2.2	TYPE I MODEM STANDARD				TITLE
3.2.1.2.2.1	TYPE IA MODEMS	T	T	X	
3.2.1.2.2.2	TYPE IB MODEMS	T	T	X	
3.2.1.2.3	ERROR CORRECTING PROTOCOL				TITLE
3.2.1.2.3.1	TYPE IA MODEMS	T	T	I	
3.2.1.2.3.2	TYPE IB MODEMS	T	T	I	
3.2.1.2.4	LINE REQUIREMENTS	D	D	D	
3.2.1.2.5	INPUT CHANNEL SPECIFICATIONS	D	D	X	
3.2.1.2.6	AUTO ANSWER/AUTO DIAL	D	D	D	
3.2.1.2.7	AUTOMATIC RATE ADJUST	D	D	D	
3.2.1.2.8	TYPE IA OPTION	D	D	I	
3.2.1.3	TYPE II MODEMS				TITLE
3.2.1.3.1	PERFORMANCE CHARACTERISTICS	T	T	D	
3.2.1.3.1.1	TYPE II MODEM STANDARD	T	T	X	
3.2.1.3.1.2	ERROR RATE	T	T	X	
3.2.1.3.1.3	LINE REQUIREMENTS	D	D	D	
3.2.1.3.2	OPTIONS	D	D	D	
3.2.1.4	TYPE III MODEMS				TITLE
3.2.1.4.1	PERFORMANCE CHARACTERISTICS	T	T	D	
3.2.1.4.1.1	TYPE III MODEM STANDARD	T	T	X	
3.2.1.4.1.2	ERROR RATE	T	T	X	
3.2.1.4.1.3	LINE REQUIREMENTS	D	D	D	
3.2.1.4.1.4	FALLBACK DATA RATE	T	T	X	
3.2.1.4.2	OPTIONS				TITLE
3.2.1.4.2.1	TRAIN ON DATA	D	D	D	
3.2.1.4.2.2	TIME DIVISION MULTIPLEXING	I	I	I	
3.2.1.5	TYPE IV MODEMS				TITLE
3.2.1.5.1	PERFORMANCE CHARACTERISTICS	T	T	D	
3.2.1.5.1.1	TYPE IV MODEM STANDARD	T	T	X	
3.2.1.5.1.2	ERROR RATE	T	T	X	
3.2.1.5.1.3	LINE REQUIREMENTS	D	D	D	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LEVEL DOMT, X=NOT APPLICABLE

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2784	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.5.1.4	FALLBACK DATA RATE	T	T	X	
3.2.1.5.2	OPTIONS				TBTLE
3.2.1.5.2.1	TRAIN ON DATA	D	D	D	
3.2.1.5.2.2	TIME DIVISION MULTIPLEXING	T	T	I	
3.2.1.6	TYPE V MODEMS				TBTLE
3.2.1.6.1	PERFORMANCE CHARACTERISTICS	T	T	D	
3.2.1.6.1.1	TYPE V MODEM STANDARD	T	T	X	
3.2.1.6.1.2	ERROR RATE	T	T	X	
3.2.1.6.1.3	LINE REQUIREMENTS	D	D	D	
3.2.1.6.1.4	FALLBACK DATA RATE	T	T	X	
3.2.1.6.1.5	FORWARD ERROR CORRECTION (FEC)	A/T	A/T	X	
3.2.1.6.2	OPTIONS				TBTLE
3.2.1.6.2.1	TIME DIVISION MULTIPLEXING	T	T	I	
3.2.1.6.2.2	EYE PATTERN GENERATOR	D	D	X	
3.2.1.7	RESERVED				TBTLE
3.2.1.8	TYPE VI MODEMS				TBTLE
3.2.1.8.1	PERFORMANCE CHARACTERISTICS	T	T	D	
3.2.1.8.1.1	RESERVED				TBTLE
3.2.1.8.1.2	ERROR RATE	T	T	X	
3.2.1.8.1.3	LINE REQUIREMENTS	D	D	D	
3.2.1.8.1.4	FALLBACK DATA RATE	T	T	X	
3.2.1.8.1.5	FORWARD ERROR CORRECTION (FEC)	A/T	A/T	X	
3.2.1.8.2	OPTIONS				TBTLE
3.2.1.8.2.1	TIME DIVISION MULTIPLEXING	T	T	I	
3.2.1.8.2.2	EYE PATTERN GENERATOR	D	D	X	
3.2.1.9	RESERVED				TBTLE
3.2.1.10	AUTOMATED NETWORK MANAGEMENT SYSTEM (ANMS)	D	D	D	
3.2.1.10.1	PERFORMANCE CHARACTERISTICS	D	D	D	
3.2.1.10.1.1	NON-INTERFERENCE WITH DATA	T	T	D	
3.2.1.10.1.2	RESPONSE TIME	T	T	D	
3.2.1.10.1.3	DATA BASE	D	D	D	
3.2.1.10.2	MONITORING ANMS CONTROL				TBTLE
3.2.1.10.2.1	CONTINUOUS MONITORING	D	D	D	
3.2.1.10.2.2	CONTROL	D	D	D	
3.2.1.10.3	TRANSMISSION LINE EVALUATION	D	D	D	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LEVEL ROMI, X=NOT APPLICABLE

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2786	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.10.4	PARAMETER CHANGES	D	D	D	
3.2.1.10.5	USER-FRIENDLY OPERATION	D	D	I	
3.2.1.10.6	W LINE IMPAIRMENT MONITORING	T	T	D	
3.2.1.10.7	MODEM MONITORING	D	D	D	
3.2.1.10.8	EIA INTERFACE MONITORING	D	D	D	
3.2.1.10.9	EXCEPTIONS	D	D	D	
3.2.1.10.10	DIAGNOSTIC TESTS	D	D	D	
3.2.1.10.11	AUDIBLE ALARM	D	D	D	
3.2.1.10.12	ARMS CAPACITY	A/I	A/I	I	
3.2.1.10.13	MODEM CONFIGURATION CHANGE	D	D	D	
3.2.1.10.14	MODEM TEST TONE INITIATION	T	T	D	
3.2.1.10.15	DIAL BACKUP	D	D	D	
3.2.1.10.16	MENUS	D	D	D	
3.2.1.10.17	HARD DISK	D	D	D	
3.2.1.11	ANCILLARY EQUIPMENT SUPPLIED BY THE CONTRACTOR				TITLE
3.2.1.11.1	CABLES	I	I	I	
3.2.1.11.2	INTERFACE ADAPTORS				TITLE
3.2.1.11.2.1	RS-232 TO EIA-530 INTERFACE ADAPTORS	T	T	I	
3.2.1.11.2.2	V.35 TO EIA-530 INTERFACE ADAPTORS	T	T	I	
3.2.1.11.3	PORT SHARING DEVICE (PSD)	T	T	I	
3.2.1.11.4	MODEM SHARING DEVICE (MSD)	T	T	I	
3.2.1.11.5	TAIL CIRCUIT SYNCHRONIZER	T	T	I	
3.2.1.11.6	"HOT" STANDBY SWITCH	D	D	I	
3.2.1.11.7	MODEM SUBSTITUTION SWITCH (MSS)	D	D	I	
3.2.1.11.8	DIGITAL AND ANALOG PATCH PANELS	T	T	D	
3.2.1.11.9	DIGITAL A/B SWITCH				TITLE
3.2.1.11.9.1	PERFORMANCE CHARACTERISTICS	T	T	I	
3.2.1.11.9.2	INTERFACES	T	T	X	
3.2.1.11.9.2.1	INTERFACE OPTIONS	D	D	X	
3.2.1.11.9.3	CONTROL	T	T	D	
3.2.1.11.9.4	AUTOMATIC SWITCHING				TITLE
3.2.1.11.9.4.1	PRIMARY TO SECONDARY SWITCHING	T	T	D	
3.2.1.11.9.4.2	SECONDARY TO PRIMARY SWITCHING	T	T	D	
3.2.1.11.9.5	EXTERNAL ARMS CONTROL				TITLE
3.2.1.11.9.5.1	EXTERNAL CONTROL INTERFACE	D	D	D	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, S=VERIFIED BY LOWER LEVEL ECMI, X=NOT APPLICABLE

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2784	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.11.9.5.2	RESERVED				USTALE
3.2.1.11.9.5.3	EXTERNAL CONTROL ALARM	D	D	D	
3.2.1.11.9.6	CONTROLS AND STATUS INDICATORS				USTALE
3.2.1.11.9.6.1	CONTROLS	D	D	I	
3.2.1.11.9.6.2	STATUS INDICATORS	D	D	D	
3.2.1.11.9.6.3	REMOTE PANEL INTERFACE	D	D	D	
3.2.1.11.9.7	SLAVE OPERATION	D	D	X	
3.2.1.11.9.8	CONFIGURATION	D	D	X	
3.2.1.11.9.9	A/B SWITCH POWER SUPPLY REQUIREMENTS	D	D	X	
3.2.1.11.9.10	REMOTE PANEL	D	D	X	
3.2.1.11.10	RACKS	I	I	I	
3.2.1.12	RESERVED				USTALE
3.2.1.12.1	RESERVED				USTALE
3.2.1.12.2	RESERVED				USTALE
3.2.1.12.2.1	RESERVED				USTALE
3.2.1.12.2.1.1	RESERVED				USTALE
3.2.1.12.2.2	RESERVED				USTALE
3.2.1.12.2.3	RESERVED				USTALE
3.2.1.12.2.4	RESERVED				USTALE
3.2.1.12.2.5	RESERVED				USTALE
3.2.1.12.2.5.1	RESERVED				USTALE
3.2.1.12.2.5.2	RESERVED				USTALE
3.2.1.13	RESERVED				USTALE
3.2.1.13.1	RESERVED				USTALE
3.2.1.13.2	RESERVED				USTALE
3.2.1.14	RESERVED				USTALE
3.2.1.14.1	RESERVED				USTALE
3.2.1.14.2	RESERVED				USTALE
3.2.1.15	RESERVED				USTALE
3.2.1.16	RESERVED				USTALE
3.2.1.16.1	RESERVED				USTALE
3.2.1.16.2	RESERVED				USTALE
3.2.1.16.3	RESERVED				USTALE
3.2.1.16.4	RESERVED				USTALE
3.2.1.16.4.1	RESERVED				USTALE

VERIFICATION METHODS: T-TEST, D-DEMONSTRATION, A-ANALYSIS, I-INSPECTION, L-VERIFIED BY LOWER LAYER DOME, X-NOT APPLICABLE

SECTION 3 REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2786		VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.16.4.2	RESERVED				TITLE
3.2.1.17	RESERVED				TITLE
3.2.1.17.1	RESERVED				TITLE
3.2.1.17.2	RESERVED				TITLE
3.2.1.17.3	RESERVED				TITLE
3.2.1.17.4	RESERVED				TITLE
3.2.1.17.5	RESERVED				TITLE
3.2.1.17.6	RESERVED				TITLE
3.2.1.18	RESERVED				TITLE
3.2.1.19	CLOCK BOX				TITLE
3.2.1.19.1	CLOCK BOX-CD INTERFACE	T	T	X	
3.2.1.19.2	CLOCK BOX-MODEM INTERFACE	T	T	X	
3.2.1.19.2.1	CLOCK BOX-MODEM STRAPPING	T	T	I	
3.2.1.19.3	INTERNAL CIRCUITRY	T	T	D	
3.2.1.19.4	CLOCK GENERATOR CIRCUITRY				TITLE
3.2.1.19.4.1	CLOCK VOLTAGE LEVELS	T	T	X	
3.2.1.19.4.2	BACKUP CLOCK	T	T	D	
3.2.1.19.4.3	CLOCK FREQUENCY	T	T	X	
3.2.1.19.4.4	CLOCK REDUNDANCY	T	T	X	
3.2.1.19.5	EXTERNAL CLOCK CONTROL				TITLE
3.2.1.19.5.1	FRONT PANEL CONTROL	D	D	I	
3.2.1.19.5.2	EXTERNAL CONTROL	D	D	I	
3.2.1.19.6	CONTROLS AND STATUS INDICATORS				TITLE
3.2.1.19.6.1	CONTROLS	D	D	I	
3.2.1.19.6.2	STATUS INDICATORS	D	D	D	
3.2.1.19.7	CONFIGURATION	I	I	I	
3.2.1.20	CHANNEL SERVICE UNIT/DATA SERVICE UNIT (CSU/DSU)				TITLE
3.2.1.20.1	PERFORMANCE CHARACTERISTICS	T	T	X	
3.2.1.20.1.1	DIGITAL INTERFACE	T	T	I	
3.2.1.20.1.1.1	INTERFACE OPTION	D	D	X	
3.2.1.20.2	PERFORMANCE STANDARD	T	T	X	
3.2.1.20.3	DIAGNOSTICS	D	D	D	
3.2.1.20.4	TIMING SIGNALS	T	T	X	
3.2.1.20.5	DATA RATES	T	T	X	
3.2.1.20.6	CONTROLS AND STATUS INDICATORS				TITLE

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LEVEL DOCS, X=NOT APPLICABLE

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2786	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.1.20.6.1	CONTROLS	D	D	I	
3.2.1.20.6.2	STATUS INDICATORS	D	D	I	
3.2.1.20.7	CONFIGURATION	I	I	I	
3.2.1.20.8	AMHS INTERFACES	I	I	D	
3.2.1.20.9	TEST PATTERN GENERATOR OPTION	I	I	I	
3.2.1.20.10	OPTIONS				TITLE
3.2.1.20.10.1	DOSIS SECONDARY CHANNEL	D	D	I/D	
3.2.1.21	HIGH SPEED TIME DIVISION MULTIPLEXER	D	D	X	
3.2.1.21.1	INPUT CHANNEL PARAMETERS	I	I	X	
3.2.1.21.2	INPUT INTERFACE	D	D	I	
3.2.1.21.2.1	INTERFACE OPTIONS	D	D	X	
3.2.1.21.2.2	CARRIER OPERATION	D	D	I	
3.2.1.21.3	AGGREGATE OUTPUT PARAMETERS				TITLE
3.2.1.21.3.1	OUTPUT CHANNEL PARAMETERS	I	I	X	
3.2.1.21.3.2	OUTPUT INTERFACES	A/I	A/I	I	
3.2.1.21.4	TIMING SIGNALS	I	I	X	
3.2.1.21.5	DIAGNOSTICS	D	D	D	
3.2.1.21.6	CONTROLS AND STATUS INDICATORS				TITLE
3.2.1.21.6.1	CONTROLS	D	D	I	
3.2.1.21.6.2	STATUS INDICATORS	D	D	I	
3.2.1.21.7	CONFIGURATION	I	I	I	
3.2.1.22	LIMITED DISTANCE MODEM (LDM)				TITLE
3.2.1.22.1	DIGITAL INTERFACES	I	I	I	
3.2.1.22.2	LINE INTERFACES	D	D	I	
3.2.1.22.3	SPEEDS	D	D	D	
3.2.1.22.4	DISTANCE	I	I	D	
3.2.1.22.5	DIAGNOSTICS	D	D	D	
3.2.1.22.6	CONTROLS AND STATUS INDICATORS				TITLE
3.2.1.22.6.1	CONTROLS	D	D	I	
3.2.1.22.6.2	STATUS INDICATORS	D	D	I	
3.2.1.22.7	MOUNTING	I	I	I	
3.2.2	PHYSICAL CHARACTERISTICS				TITLE
3.2.2.1	GENERAL	A	I	X	
3.2.2.2	RACK MOUNTING	I	I	I	
3.2.2.3	ENCLOSURES	I	I	I	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LEVEL DOMS, N=NOT APPLICABLE

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2786	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.2.2.4	POWER SUPPLY	D	D	I	
3.2.3	RELIABILITY	I	D	X	
3.2.4	MAINTAINABILITY	D	D	X	
3.2.5	ENVIRONMENTAL CONDITIONS	I	X	X	
3.2.5.1	AMBIENT TEMPERATURE	T	X	X	
3.2.5.2	RELATIVE HUMIDITY	T	X	X	
3.2.5.3	ALTITUDE	T	X	X	
3.2.5.4	FUNGUS	T	X	X	
3.3	DESIGN AND CONSTRUCTION				SITE
3.3.1	FINISHES	I	X	X	
3.3.2	ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY	T	X	X	
3.3.3	GROUNDING	T	X	I	
3.3.4	INTERCHANGEABILITY	D	X	X	
3.3.5	VENTILATION AND COOLING	D	X	X	
3.3.6	WIRE AND CABLE	D	I	I	
3.4	DOCUMENTATION	A	X	I	
3.5	CONFIGURATION MANAGEMENT	A	X	X	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LAYER SCHT, X=NOT APPLICABLE

APPENDIX C

FAA-E-2860, VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2840	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
1.	SCOPE	X	X	X	
2.	APPLICABLE DOCUMENTS	X	X	X	
3.	REQUIREMENTS				TITLE
3.1	EQUIPMENT CHARACTERISTICS				TITLE
3.1.1	OPERATING CHARACTERISTICS				TITLE
3.1.1.1	GENERAL CHARACTERISTICS FOR TYPES I, II AND III STATISTICAL MULTIPLEXERS				TITLE
3.1.1.1.1	PROTOCOL COMPATIBILITY	D	T	D	
3.1.1.1.2	PERFORMANCE CHARACTERISTICS	T	T	D	
3.1.1.1.2.1	DIGITAL INTERFACES	T	T	I	
3.1.1.1.2.1.1	INTERFACE OPTIONS	D	D	D	
3.1.1.1.2.2	INPUT CHANNEL SPECIFICATIONS	T	T	X	
3.1.1.1.2.3	COMPOSITE LINK SPECIFICATIONS	T	T	X	
3.1.1.1.2.4	OTHER SPECIFICATIONS	T	T	X	
3.1.1.1.2.5	CONTROLS AND STATUS INDICATORS				TITLE
3.1.1.1.2.5.1	CONTROLS	D	D	X	
3.1.1.1.2.5.2	STATUS INDICATORS	D	D	X	
3.1.1.2	TYPE I STATISTICAL MULTIPLEXERS	L	L	X	
3.1.1.2.1	INPUT CHANNEL SPECIFICATIONS	T	T	X	
3.1.1.2.2	COMPOSITE LINK SPECIFICATIONS	T	T	X	
3.1.1.3	TYPE II STATISTICAL MULTIPLEXERS	L	L	X	
3.1.1.3.1	INPUT CHANNEL SPECIFICATIONS	T	T	X	
3.1.1.3.2	COMPOSITE LINK SPECIFICATIONS	T	T	X	
3.1.1.4	TYPE III STATISTICAL MULTIPLEXERS	L	L	X	
3.1.1.4.1	INPUT CHANNEL SPECIFICATIONS	T	T	X	
3.1.1.4.2	COMPOSITE LINK SPECIFICATIONS	T	T	X	
3.1.1.4.3	OTHER SPECIFICATIONS	D	D	D	
3.1.1.4.4	CONTROLS AND STATUS INDICATORS				TITLE
3.1.1.4.4.1	CONTROLS	D	D	D	
3.1.1.4.4.2	STATUS INDICATORS	D	D	D	
3.1.1.4.5	OPTIONAL STATISTICAL MULTIPLEXER FEATURES				TITLE
3.1.1.4.5.1	MONITOR	D	D	I	
3.1.1.4.5.2	PACKET SWITCH INTERFACE	T	T	I	
3.1.1.4.5.3	SPLIT BANDWIDTH	T	T	I	

VERIFICATION METHODS: T-TEST, D-DEMONSTRATION, A-ANALYSIS, I-INSPECTION, L-VERIFIED BY LOWER LEVEL SCMI, N-NOT APPLICABLE

SECTION 3	REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT FAA-E-2860	VERIFICATION LEVEL AND METHOD			
PARA. NO	TITLE	SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	REMARKS
3.1.1.4.3.4	SWITCHING AND CONTROL	D	D	I	
3.1.1.4.3.5	PROTOCOL CONVERSION	T	T	I	
3.1.1.4.3.6	DIAGNOSTICS	T	T	D	
3.1.1.5	ANCILLARY EQUIPMENT				TITLE
3.1.1.5.1	CABLES	I	I	I	
3.1.1.5.2	RACKS	I	I	I	
3.1.2	PHYSICAL CHARACTERISTICS				TITLE
3.1.2.1	MOUNTING	D	D	I	
3.1.2.1.1	RACK MOUNTING	D	D	I	
3.1.2.1.2	FREE STANDING	D	D	I	
3.1.2.3	POWER SUPPLY	T	T	I	
3.1.2.3.1	FREE STANDING STATISTICAL MULTIPLEXERS	I	I	I	
3.1.2.3.2	RACK-MOUNTED STATISTICAL MULTIPLEXERS	D	D	I	
3.1.3	RELIABILITY	T/A	D	X	
3.1.4	MAINTAINABILITY	D	D	X	
3.1.4.1	OPERATIONAL AVAILABILITY	D	D	X	
3.1.5	ENVIRONMENTAL CONDITIONS	T	X	X	
3.1.5.1	AMBIENT TEMPERATURE	T	X	X	
3.1.5.2	ALTITUDE	T	X	X	
3.2	DESIGN AND CONSTRUCTION				TITLE
3.2.1	GENERAL	I	I	A	
3.2.2	FINISHES	I	I	X	
3.2.3	ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY	T	X	X	
3.2.4	GROUNDING	T	X	I	
3.2.5	INTERCHANGEABILITY	D	X	X	
3.2.6	RESERVED	X	X	X	
3.2.7	WIRE AND CABLE	D	I	I	
3.3	DOCUMENTATION	A	I	I	

VERIFICATION METHODS: T=TEST, D=DEMONSTRATION, A=ANALYSIS, I=INSPECTION, L=VERIFIED BY LOWER LAYER ENT, X=NOT APPLICABLE

APPENDIX D

NAS-SS-1000, VOLUME I, VERIFICATION REQUIREMENTS TRACEABILITY MATRIX APPLICABLE TO DATA MULTIPLEXING NETWORK

SYS-LEVEL REQUIMENTS PARAGRAPHS REFERENCE	AIR TRAFFIC CONTROL																				COMMUNICATIONS											M & OS						
	AREA CNTL		ATC	FLIGHT PLANNING				TM		WX PROCESSING											CONTROL		VOICE SWITCHING				DATA SWITCHING		XMISSION			RMMS		SYS SUPP FACILITIES			
	ACCC	LCN	TCCC	FSBWP	FSDPS	AFSS WS	DUAT Service	TMP	ATCCC WS	CFWMP	FMP	MWP	WCP	AWP	WMSCR	CNSP	NOTAM WS	ADAS	GWDS	NMCE	PCE	VSCS	TCS	ICSS	TMVS	PE	NADIN IA	NADIN II	TE	NABACS	RMS	RMSC	MPS	MDT	MMC	TECH CTR	AERO CTR
3.2.1.2.6.2.B.2																																						
3.2.1.2.6.2.B.3																																						
3.2.1.2.6.3.A																																						
3.2.1.2.6.3.A.1																																						
3.2.1.2.6.3.A.2																																						
3.2.1.2.6.4.A																																						
3.2.1.2.6.4.B																																						
3.2.1.2.6.4.C																																						
3.2.1.2.6.4.C.1																																						
3.2.1.2.6.4.C.2																																						
3.2.1.2.6.4.D																																						
3.2.1.2.6.4.E																																						
3.2.1.2.6.4.F																																						
3.2.1.2.6.4.G																																						
3.2.1.2.6.4.H																																						
3.2.1.2.6.4.I																																						
3.2.1.2.7.1																																						
3.2.1.2.7.1.1																																						
3.2.1.2.7.2.A																																						
3.2.1.2.7.2.B																																						
3.2.1.2.7.2.C																																						
3.2.1.2.7.2.D																																						
3.2.1.2.7.3.A																																						
3.2.1.2.7.3.B																																						
3.2.1.2.7.3.C																																						
3.2.1.2.7.4.A																																						
3.2.1.2.7.4.B																																						
3.2.1.2.7.4.C																																						
3.2.1.2.7.4.D																																						
3.2.1.2.7.4.E																																						
3.2.1.2.7.5.A																																						
3.2.1.2.7.5.B																																						
3.2.1.2.7.5.C																																						
3.2.1.2.8.1.A																						O	O				O	O	O									
3.2.1.2.8.1.B																						O	O				O	O	O									
3.2.1.2.8.1.C																				O	O	O	O	O	O		O	O	O									
3.2.1.2.8.1.D																				O	O	O	O	O	O		O	O	O									
3.2.1.2.8.1.E																				O	O	O	O	O	O		O	O	O	O	O							
3.2.1.2.8.1.F																				O	O	O	O	O	O		O	O	O	O	O							
3.2.1.2.8.1.G																				O	O	O	O	O	O		O	O	O	O	O							
3.2.1.2.8.1.H																				O	O	O	O	O	O		O	O	O	O	O							

SYS-LEVEL REQUIMENTS PARAGRAPHS REFERENCE	AIR TRAFFIC CONTROL																			COMMUNICATIONS										M & OS						
	AREA CNTL		ATC	FLIGHT PLANNING				TM		WX PROCESSING										CONTROL		VOICE SWITCHING					DATA SWITCHING		XMISSION		RMMS					SYS SUPP FACILITIES	
	ACCC	LCN	TCCC	FSBMP	FSDPS	AFSS WS	DUAT Service	TMP	ATCCC WS	CFMP	RWP	IWP	WCP	AWP	WMSCR	CNSP	NOTAM WS	ADAS	GWDS	NMCE	RCE	VSCS	TCS	ICSS	TMVS	PE	NADIN IA	NADIN II	TE	NABACS	RMS	RMSC	MPS	MDT	MMC	TECH CTR	AERO CTR
3.2.1.2.8.2.A																																					
3.2.1.2.8.2.B																																					
3.2.1.2.8.2.C																																					
3.2.1.2.8.2.D																																					
3.2.1.2.8.2.E																																					
3.2.1.2.8.2.F																																					
3.2.1.2.8.2.G																				O		O	O	O	O		O	O	O	O							
3.2.1.2.8.2.H																				O	O	O	O	O	O				O								
3.2.1.2.8.2.I																				O	O	O	O	O	O				O								
3.2.1.2.8.2.J																				O		O	O	O	O				O								
3.2.1.2.8.3.A	O		O		O	O		O	O	O	O		O	O	O	O	O					O	O	O		O		O									
3.2.1.2.8.3.B	O		O		O	O		O	O	O	O		O	O	O	O	O									O											
3.2.1.2.8.3.B.1	O		O		O	O		O	O				O	O	O	O	O									O											
3.2.1.2.8.3.B.2	O		O		O	O		O	O	O	O		O	O	O	O	O									O											
3.2.1.2.8.3.C																										O											
3.2.1.2.8.3.C.1																										O											
3.2.1.2.8.3.C.2																										O											
3.2.1.2.8.4.A	O					O		O														O	O	O													
3.2.1.2.8.4.B	O					O		O		O	O		O	O	O	O						O	O	O	O	O											
3.2.1.2.8.4.C	O		O						O	O	O		O	O	O	O		O				O	O	O	O	O											
3.2.1.2.9.A	O	O	O		O	O		O	O	O	O		O	O	O	O	O	O		O	O	O	O	O	O		O	O	O		O	O	O	O	O		
3.2.1.2.9.B																															O		O		O		
3.2.1.2.9.C																															O		O		O		
3.2.1.2.9.D																															O	O	O	O	O		
3.2.1.2.9.E																															O	O	O	O	O		
3.2.1.2.9.F	O	O				O																														O	O
	O																																				