Memorandum

MIAMI-DADE COUNTY

Date: July 20, 2010

Agenda Item No. 14(A)(19)

To: Honorable Chairman Dennis C. Moss
and Members, Board of County Commissioners

From: Carlos Alvarez
County Mayor

George M. Burgess
County Manager

Resolution No. R-836-10

Subject: Modification of Contract No. BW7514-15/24-2: 450 MHz UHF Radio Upgrade Project

RECOMMENDATION

It is recommended that the Board of County Commissioners (Board) approve modification of the referenced contract for additional spending authority for the Miami-Dade Fire Rescue (MDFR) and Enterprise Technology Services (ETSD) departments to purchase a new Microwave Radio Communication System and purchase additional equipment, parts, and services necessary to stabilize and upgrade the 450 MHz Ultra High Frequency (UHF) Radio System (System).

Contract No.:	BW7514-15/24-2
Contract Title:	450 MHz UHF Radio Upgrade Project
Type of Change:	Additional spending authority
Existing Allocation:	$ 3,723,000
Increase By:	$ 9,621,000
Modification Allocation:	$13,344,000
Current Expiration:	June 14, 2011

Using/Managing Departments and Funding Sources:

Department	Existing Allocation	Additional Allocation	Modified Allocation	Funding Source	Contract Manager
Aviation	$ 22,000	$ 0	$ 22,000	Proprietary Funds	Pedro Garcia
Enterprise Technology Services	$ 0	$5,960,000	$ 5,960,000	Special Obligation Bond Proceeds / Capital Outlay Reserve (COR)	Felix Perez
Fire Rescue	$3,440,000	$3,661,000	$ 7,101,000	Special Obligation Bond Proceeds and Interest	Lindsey Plummer
Unallocated	$ 261,000	$ 0	$ 261,000		
Total:	**$3,723,000**	**$9,621,000**	**$13,344,000**		

FISCAL IMPACT

The impacts of this contract and associated services are countywide. This modification request seeks approval for additional contractual spending authority for the following identified needs:

1.	Completion of Phase 2 UHF Implementation	$1,064,000
2.	Microwave Communication System	$5,960,000
3.	Radio Consoles equipment, parts, and services for the LightSpeed Facility	$2,597,000
	Total:	**$9,621,000**

Funding will be allocated for this project for the Miami-Dade Fire Rescue and Enterprise Technology Services departments as follows:

The completion of Phase 2 UHF Implementation is funded from available interest earned on the original UHF project proceeds from the Series 2004 Capital Asset Acquisition special obligation bonds ($1.064 million).

Funding for the Countywide Microwave Communication System ($5.96 million) is available from prior year funding authorized for radio communication-related uses and technology close-out costs, including Sunshine State loan proceeds, Series 2007 and Series 2009 Capital Asset Acquisition special obligation bonds ($4.04 million), and future Capital Outlay Reserve (COR) funding ($1.92 million).

Funding for the Radio Consoles electronic equipment is included in Series 2009 Capital Asset Acquisition project funding previously authorized for the LightSpeed facility ($2.597 million).

There is no additional fiscal impact beyond what is stated in this memorandum.

Vendor:	**Address**	**Principal**
Motorola, Inc. (Non-local Vendor)	1303 E. Alonquin Road Schaumburg, IL 60196	Edward J. Zander

Performance Data: There are no performance issues with the awarded firm.

Compliance Data: There are no compliance issues with the awarded firm.

Contract Measure: Community Small Business Enterprise (0.36%) Goal

Review Committee Date: November 15, 2003

Local Preference: The Local Preference Ordinance does not apply.

Living Wage: The Living Wage Ordinance does not apply.

User Access Program: This contract includes the User Access Program provision. The 2% program discount is being collected on all purchases.

DPM Contract Manager: James Munn Jr.

BACKGROUND

This contract was approved by the Board of County Commission in 2004, under Resolution No. R-457-04, for the Miami-Dade Fire Rescue Department (MDFR) to upgrade the 450 MHz Ultra High Frequency (UHF) Radio System. The contract allowed the County to stabilize the existing 450MHz UHF Radio System, design, and build a new 450MHz UHF Radio System, and provide System maintenance. The contract was awarded for an initial five year term with fifteen one year Option-To-Renew (OTR) periods to ensure the County could obtain long term support, maintenance, and equipment purchases related to the UHF Radio System used for Public Safety. Additionally, the Miami-Dade Aviation Department was granted an allocation for the purchase of equipment as needed. The contract is in its second renewal term which expires June 14, 2011.

The contract allowed MDFR to stabilize, upgrade, and expand the 450MHz UHF Radio System and provides the ability to purchase required maintenance support services, equipment, and parts, as needed, to ensure optimal System performance.

This project has been implemented in two phases:

- Phase 1 provided for stabilization of the existing radio system including replacement of outdated technology at twenty-seven sites, replacement of the UHF Medical Communications channels, installation of nine new dispatch consoles, and the addition of 34 T1 lines. All 14 milestones identified for Phase I were completed by October 2004.
- Phase 2 covered the design and implementation of a new System for Miami-Dade Fire Rescue Department. This System significantly enhanced the "in-building" radio signal penetration strength capability, radio coverage throughout the County, and also supports future expansion. During Phase 2, the County increased high density "in-building" coverage, obtained licenses, leased sites, and updated additional fire stations. This phase has 136 milestones of which 119 have been completed. At the beginning of the project, the County identified several sites to be utilized for completion of Phase 2. During the implementation of this Phase, delays were experienced due to lack of available sites. This required additional time, as staff was required to identify new sites, negotiate appropriate leases and to prepare sites for installation of the equipment.

RECOMMENDATION

Authorization is requested for additional contract spending authority for the Miami-Dade Fire Rescue (MDFR) and the Enterprise Technology Services (ETSD) departments to acquire a new Microwave Radio Communication System to support the implementation of the new system that will serve both

the 450 MHz UHF Radio System used by MDFR and the 800 MHz Radio System that supports public safety and general government functions that are Countywide and multi-jurisdictional in nature. The additional allocation will also be utilized by MDFR to purchase additional parts and services to complete Phase 2 of the UHF radio implementation, and purchase the required equipment and services for the Lightspeed Facility to stabilize and upgrade the existing 450 MHz Ultra High Frequency (UHF) Radio System.

Completion of Phase 2 UHF Radio Implementation
The additional monies requested by MDFR will be used to finalize Phase 2 UHF implementation, complete pending site activities, purchase the required maintenance support services, and obtain equipment needed to sustain of the Logistics Division within MDFR.

Lightspeed
This modification request will provide MDFR with the ability to purchase, install, and integrate a new dispatch center at the Lightspeed facility to enhance the County's current operations. The allocation requested for the Lightspeed facility communications center will provide for the purchase, installation and grounding of sixteen console electronics (radios), antenna, and necessary licenses.

Microwave Communication System
This additional spending authority will be utilized by MDFR and ETSD to execute contract Option E-2 (Microwave Option). At the time of award of the original contract, staff advised the Board that this option would be presented for approval when needed. Option E-2 provides for the purchase and installation of a new Microwave System. The acquisition of the Microwave System, which will support both the MDFR UHF and the 800 MHz radio systems, will provide essential performance improvement, a much higher degree of reliability, and enable the County to meet its obligation to upgrade and reband the 800 MHz Radio System pursuant to the recent rebanding and Radio System Purchase Agreement. The execution of agreements regarding radio rebanding with Nextel South Corporation and the Harris Corporation pursuant to the Federal Communication Commission (FCC) Mandate Order No. FCC-04-168, was approved by the Board on January 28, 2010, under Resolution No. R- 83-10.

The 800 MHz Radio System supports multiple County departments and external entities that depend on the system to perform their core functions including Police, Corrections and Rehabilitation, Transit, Public Works, Water & Sewer, Airport, Seaport, the School Board and 27 participating municipalities, supporting both the public safety and general government operations. In addition to the local agencies, numerous other state and federal agencies depend on this system for day-to-day communication among first responders, joint immediate response to natural disasters, and special events requiring the formation of multi-jurisdictional task forces. The 450 MHz UHF Radio System is solely used by MDFR to support first responders and other staff. The new Microwave System will provide benefits to users of both the 450MHz and 800MHz radio systems. The negotiated Supplemental Agreement contains provisions that mitigate the County's risk and ensure System compliance with a not to exceed amount. The Supplemental Agreement provides a clear understanding of the responsibilities required to meet the project objectives and timeline as fixed costs, payable upon the completion of milestone events.

The Microwave Communication System requires the County to obtain the licenses for the microwave frequencies from the FCC. These licenses are currently in high demand as they are utilized by other companies for Public Safety and Cellular Communications. Failure to approve this modification may jeopardize the County's ability to secure appropriate licenses due to market demand. It is therefore

necessary for the County to move forward with this project work or risks loss the opportunity to obtain the required frequency licenses.

Assistant County Manager

MEMORANDUM

(Revised)

TO: Honorable Chairman Dennis C. Moss and Members, Board of County Commissioners

DATE: July 20, 2010

FROM: R. A. Cuevas, Jr. County Attorney

SUBJECT: Agenda Item No. 14(A)(19)

Please note any items checked.

_____ **"3-Day Rule" for committees applicable if raised**

_____ **6 weeks required between first reading and public hearing**

_____ **4 weeks notification to municipal officials required prior to public hearing**

_____ **Decreases revenues or increases expenditures without balancing budget**

_____ **Budget required**

_____ **Statement of fiscal impact required**

_____ **Ordinance creating a new board requires detailed County Manager's report for public hearing**

_____ **No committee review**

_____ **Applicable legislation requires more than a majority vote (i.e., 2/3's ✓, 3/5's ____, unanimous_____) to approve**

_____ **Current information regarding funding source, index code and available balance, and available capacity (if debt is contemplated) required**

Approved _____ Mayor

Veto _____

Override _____

Agenda Item No. 14(A)(19)
7-20-10

RESOLUTION NO. R-836-10

RESOLUTION AUTHORIZING WAIVER OF FORMAL BID PROCEDURES FOR A NON-COMPETITIVE CONTRACT MODIFICATION FOR BW7514-15/24-2: 450 MHZ RADIO UPGRADE PROJECT, IN THE AMOUNT OF $9,621,000 AND AUTHORIZING THE COUNTY MAYOR OR THE COUNTY MAYOR'S DESIGNEE TO AWARD SAME

WHEREAS, the County Mayor recommends to this Board to waive formal bid procedures for the purchase of goods and services which cannot be purchased under normal bid procedures,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that this Board waives formal bid procedures for a non-competitive contract modification for BW7514-15-/24-2: 450 MHz UHF Radio Upgrade Project in substantially the form attached hereto and made a part hereof, in the amount of $9,621,000 and authorizes the County Mayor or County Mayor's designee to exercise contracts options, pursuant to Section 5.03(D) of the Home Rule Charter and Section 2-8.1 of the County Code by a two-thirds (2/3s) vote of the Board members present.

The foregoing resolution was offered by Commissioner Barbara J. Jordan who moved its adoption. The motion was seconded by Commissioner Dennis C. Moss and upon being put to a vote, the vote was as follows:

Dennis C. Moss, Chairman aye
Jose "Pepe" Diaz, Vice-Chairman absent

Bruno A. Barreiro	aye	Audrey M. Edmonson	aye
Carlos A. Gimenez	aye	Sally A. Heyman	absent
Barbara J. Jordan	aye	Joe A. Martinez	aye
Dorrin D. Rolle	aye	Natacha Seijas	aye
Katy Sorenson	aye	Rebeca Sosa	absent
Sen. Javier D. Souto	aye		

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The Chairperson thereupon declared the resolution duly passed and adopted this 20th day of July, 2010. This resolution shall become effective ten (10) days after the date of its adoption unless vetoed by the Mayor, and if vetoed, shall become effective only upon an override by this Board.

MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF COUNTY COMMISSIONERS

HARVEY RUVIN, CLERK

Approved by County Attorney as to form and legal sufficiency.

Oren Rosenthal

By: **DIANE COLLINS**
Deputy Clerk

MIAMI-DADE COUNTY, FLORIDA

CONTRACT SUPPLEMENTAL AGREEMENT NO. 1

Contract Number: **BW7514-15/24-2 (Initial Contract executed on April 28, 2004)**

Contract Title: **450 MHz UHF Radio System Upgrade Project**

Contractor: **MOTOROLA, INC.**
Commercial, Government and Industrial Solutions Sector
North American Group
8000 W. Sunrise Parkway,
Plantation, FL 33325

In accordance with the above referenced Contract Number and Title (hereinafter "Contract"), this Supplemental Agreement No.1, when properly executed, becomes a part of the County's Contract No. BW7514-15/24-2 and all renewals thereof in accordance with provisions of Article 5 Contract term by adding the supplemental conditions for the additional work described herein:

WHEREAS Miami-Dade County and the Contractor entered into an agreement on April 28, 2004 approved by the Board of County Commissioners under Resolution No.R-457-04, covering a five (5) year initial term with fifteen (15), one (1) year Options-To-Renew (OTR) the contract at the County's sole discretion;

WHEREAS the Contractor's submission of contract requirements for a Certificate of Insurance along with Payment and Performance Bonds resulted in this original contract becoming effective on June 15, 2004 and agreement to provide updates for these requirements during all renewal periods;

WHEREAS on the basis of this contract Miami-Dade County has expressed an interest in acquiring a Microwave System as referenced under Article 2 item 6 System Options (b) item E-2 Microwave Options;

WHEREAS Miami-Dade County and the Contractor have mutually agreed for the scope of work based on a revised Proposal for said Microwave System dated June 3, 2010 attached as Exhibit A;

Both Contractor and the County hereby agree this work shall proceed based on a not to exceed price of $5,959,948 with an agreed project timeline as set forth in Exhibit A and a final completion date on or before December 31, 2014. The project schedule provisions set forth in Exhibit A, Section 2.9, shall be modified to commence on the effective date of the Board of County Commission approval. All associated invoices for equipment and related services will reflect work completed and accepted by the County, and shall be rendered in accordance with the milestone payment schedule detailed below:

Milestone 1	Upon completion of Contract Design Review (CDR)	15%	$ 884,692.40
Milestone 2	Upon equipment delivery acceptance (Site by Site Milestones Apply)	30%	$ 1,769,384.40
Milestone 3	Upon completion of Installation Work (Site Milestones Apply)	30%	$ 1,769,384.40
Milestone 4	Upon completion of Acceptance Test Plan (ATP)	15%	$ 884,692.40
Milestone 5	Upon Final System Acceptance	10%	$ 589,794.80
	Subtotal:		***$ 5,897,948.00***

Milestone 6	Upon P25 Radio System integration or December 31, 2014	$ 62,000.00*
	Total:	**$ 5,959,948.00**

*Note: Milestone Payments 1 through 5 are based on $5,897,948. Milestone 6 is an agreed retention of funds until P25 Radio System integration work is completed to ensure full System interoperability and testing can be completed.

The Contractor has further agreed to invoice for shipments of equipment on a site-by-site basis, when 100% of the respective site's equipment is delivered and accepted. The Contractor has also agreed to invoice for completed and accepted equipment installation on a site-by-site basis. This shall be done in accordance with the site-by-site milestone payment table provided below.

Site-by-Site Milestone Payment Schedule		**Milestone 2 - Equipment Delivery**	**Milestone 3 – Equipment Installation**
TCC	Telecommunications Control Center	$218,077	$218,077
CAB	County Administration Building	$169,150	$169,150
INT	Interama	$88,018	$88,018
PSN	Palm Springs North	$87,132	$87,132
MIA	Miami International Airport	$62,500	$62,500
TG	Trail Glades	$166,918	$166,918
RNAS	Richmond Naval Air Station	$87,153	$87,153
K&B	Krome and Bauer	$147,696	$147,696
PRYD	Palmetto Rail Yard	$87,803	$87,803
ICT	Industrial Communications Tower	$87,294	$87,294
HH	Hialeah Hospital	$86,204	$86,204
SWM	Solid Waste Management	$86,924	$86,924
HWT	Homestead Water Tower	$64,386	$64,386
TGK	Turner Guilford Knight	$86,443	$86,443
KEY	Key Biscayne	$69,270	$69,270
MET	Metropolis	$86,558	$86,558
FS9	Fire Station 9	$87,858	$87,858
	TOTAL:	**$1,769,384**	**$1,769,384**

Due to the unique nature of this project, the payment milestones have been modified from Section 9.4A – Phase 1 of the contract. These terms are an exception to the standard outline in Section 9.4A and will only be applicable to this option. These terms may not be carried forward to future options or work outside of the scope of the Microwave System.

To achieve the required Project Timeline, the County acknowledges responsibility to address and resolve any/all outstanding site or antenna issues by October 31, 2011. If this date is not met by the County, the Contractor may provide the County with a Notice of Potential Claim in accordance with terms and conditions of Contract Article 9.5. The Contractor has reviewed the attached Site Status report, attached as Exhibit B, and confirms that the basis and terms of their proposal takes into account all information contained therein. The Contractor further accepts and acknowledges the Field Path Studies conducted to be an accurate depiction of the County's current environment. The Contractor further assumes the responsibility to make the appropriate technical adjustments once the updated Microwave Path Surveys are completed to ensure the Microwave System operates according to the Scope of Work and the not to exceed amount of this Supplemental Agreement.

The Contractor accepts and understands that failure to meet the stated project timeline requirements, notwithstanding the above referenced site obligation, shall be an Event of Default as set forth in Article 32 of the Contract and shall be an event subject to Liquidated Damages as set forth in Article 12 of the Contract.

The parties hereto further agree that all terms, covenants, conditions of the original contract including all applicable ordinances named in Articles 42, 43, 44 and specifically Article 51 covering the County User Access Program (UAP) with respect to other governmental, quasi-governmental or not-for-profit entities located within the geographical boundaries of Miami-Dade County, shall remain in full force and effect, and shall apply in the application of this contract amendment. In the event any term or condition of this Supplemental Agreement No. 1 ("Amendment") or Exhibit A conflict with any term or condition of the Contract, however, the terms and conditions of this Amendment shall take precedence.

IN WITNESS WHEREOF, the parties have executed this Supplement Agreement No. 1 to Contract No. BW7514-15/24-2 as of the date set forth below.

Contractor	Miami-Dade County
By: Marshall Wright	By: _____
Name: Marshall Wright	Name: _____
Title: MSSI Vice President & Director	Title: _____
Date: 6/4/2010	Date: _____
Attest: _____ Asst. Secretary	Attest: _____ Clerk of the Board

Stamp Corporate Seal

Approved as to form and Legal Sufficiency

Assistant County Attorney

6/7/10

Date

BW7514-15/24-2 – Supplemental Agreement No 1 (SA-1)
Exhibit B – Site Status Report

ANTENNA SITE LOCATIONS

The names and locations of the Tower and Antenna Sites where Project Work will be conducted in connection with installation of the Microwave System under this contract are listed below.

Site #	Site Name & Address	Type	Site & Integration Requirements	Comments
1	**Miccosukee** 36900 SW 8 Street Miccosukee Indian Reservation, FL 33194	Tower. A tower upgrade is not required for the Microwave System.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	New tower and shelter with generator built using T-Mobile contract in exchange for microwave frequencies. New Miccosukee to Trail Glades Microwave path completed by T-Mobile project. All UHF & P25 System, and Microwave integration related costs are covered in Motorola quote for microwave.
2	**Trail Glades** 17601 SW 8 Street Miami, FL 33185	Tower. A tower upgrade is not required based on Microwave Field Path Surveys completed by Motorola about 2 years ago. The site has 2 separate shelters for P25 800 MHz System and UHF System.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems. Install Microwave equipment in P25 800 MHz System's shelter.	Need new Microwave Field Path Surveys completed by Motorola. If microwave dish antenna locations change, need to perform another tower load analysis to determine if a tower upgrade is required or not. New Miccosukee to Trail Glades Microwave path completed by T-Mobile project. All UHF & P25 System, and Microwave integration related costs covered in Motorola quote for microwave. Needed site upgrades and connection of both shelters are covered by Motorola quote for microwave.
3	**Fire Station 9** 7777 SW 117 Avenue Miami, FL 33183	Monopole. A monopole upgrade is not required based on tower analysis results that were done by Motorola, which used Microwave Field Path Surveys completed by Motorola about 2 years ago.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola. If microwave dish antenna locations change, need to perform another tower load analysis for the monopole to determine if a monopole upgrade is required or not. UHF System and Microwave integration related costs covered in Motorola quote for microwave. Need to obtain copy of tower analysis report from Motorola. Needed site upgrades are be covered by Motorola quote for microwave.

BW7514-15/24-2 – Supplemental Agreement No 1 (SA-1)
Exhibit B – Site Status Report

Site #	Site Name & Address	Type	Site & Integration Requirements	Comments
4	**Telecommunications Control Center** 6010 SW 87 Avenue Miami, FL 33173	Tower. Needs to be upgraded with 800 MHz Rebanding Project funding and estimated to be completed in about 12 months after Microwave Field Path Surveys are completed by Motorola.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola before tower upgrade design can be finalized. We can then start tower upgrade permitting process. All UHF & P25 System, and Microwave integration related costs are covered in Motorola quote for microwave.
5	**Turner Guilford Knight Detention Center** 7000 NW 41st Street Miami, FL 33166	Rooftop.	There is sufficient space for microwave racks in the equipment room. Need to verify with MDCR the usage of this space for microwave. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. UHF System integration related costs covered in Motorola quote for microwave. Needed site upgrades are covered by Motorola quote for microwave.
6	**Solid Waste Management** 8831 NW 58th Street Miami, FL 33178	New Monopole needs to be installed with Phase 2 MDFR UHF Radio System Project Completion funding and estimated to be completed about 6 months after Change Order is approved.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. This is a new site that needs to be implemented as part of Phase 2 of the MDFR UHF Radio System project. It will have a new monopole and shelter. Change Order needs to be approved after Phase 2 MDFR UHF Radio System Project Completion funding is approved by BCC. UHF System integration related costs are covered in Motorola quote for microwave.
7	**Palmetto Railyard** 6601 NW 72 Avenue Miami, FL 33166	Tower. A tower upgrade is not required based on Microwave Field Path Surveys completed by Motorola about 2 years ago.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola. If microwave dish antenna locations change, need to perform another tower load analysis to determine if a tower upgrade is required or not. New shelter will be installed as part of 800 MHz Rebanding project. All UHF & P25 System and Microwave integration related costs are covered in Motorola quote for microwave.

BW7514-15/24-2 – Supplemental Agreement No 1 (SA-1)
Exhibit B – Site Status Report

Site #	Site Name & Address	Type	Site & Integration Requirements	Comments
8	**Hialeah Hospital** 651 East 25 Street Hialeah, FL 33013	Rooftop.	Microwave rack space reserved. Microwave power, backup power requirements can be satisfied. Motorola needs to verify if there is sufficient A/C available in the room for the microwave. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. Need to modify lease to add new microwave equipment and dishes. Motorola will like to install microwave in another location, in the attic. Need to verify with Hialeah Hospital if it can be used for microwave. UHF System integration related costs covered in Motorola quote for microwave. Needed site upgrades at the existing or new equipment location are covered by Motorola quote for microwave.
9	**Palm Springs North** 7750 NW 186 Street Miami, FL 33015	Tower. A tower upgrade is not required based on Microwave Field Path Surveys completed by Motorola about 2 years ago.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola. If microwave dish antenna locations change, need to perform another tower load analysis to determine if a tower upgrade is required or not. All UHF & P25 System, and Microwave integration related costs covered in Motorola quote for microwave. Needed site upgrades are covered by Motorola quote for microwave.
10	**Industrial Communications** 350 NW 215 Street North Miami, FL 33169	Tower. A tower upgrade is not expected, but we need to confirm it with a tower analysis. If there is not enough tower upgrade funding remaining in the 800 MHz Rebanding project and a tower upgrade is needed, another funding source will need to be identified.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. Need to modify lease to add new microwave equipment and dishes. Need to do tower analysis to confirm if a tower upgrade is not required. Needed site upgrades are covered by Motorola quote for microwave.
11	**Interama** 15655 Biscayne Blvd. Aventura, FL 33160	Tower. Needs to be upgraded with 800 MHz Rebanding Project funding and estimated to be completed in about 12 months after Microwave Field Path Surveys are completed by Motorola.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola before tower upgrade design can be finalized. We can then start tower upgrade permitting process. All UHF & P25 System, and Microwave integration related costs are covered in Motorola quote for microwave.

BW7514-15/24-2 – Supplemental Agreement No 1 (SA-1)
Exhibit B – Site Status Report

Site #	Site Name & Address	Type	Site & Integration Requirements	Comments
12	**Stephen P. Clark Center (SPCC)** 111 NW 1st Street Miami, FL 33128	Rooftop.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. All UHF & P25 System, and Microwave integration related costs covered in Motorola quote for microwave. Needed site upgrades are covered by Motorola quote for microwave.
13	**Miami International Airport** Flamingo Garage, SE roof	Rooftop. The site has 2 separate equipment rooms for P25 800 MHz System and UHF System.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems. Install Microwave equipment in P25 800 MHz System's equipment room, if there is sufficient room available. Otherwise, install in UHF System's equipment room.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. All UHF & P25 System, and Microwave integration related costs covered in Motorola quote for microwave. Motorola needs to verify if there is sufficient A/C available for the microwave. Needed site upgrades and connection of both equipment rooms are covered by Motorola quote for microwave.
14	**Cape Florida State Park** 1200 Crandon Boulevard Key Biscayne, FL 33149	Tower. Tower upgrade may be required with Phase 2 MDFR UHF Radio System Project Completion funding (Not-to-Exceed $250K) and estimated to be completed about 6 months after Change Order is approved.	Motorola needs to verify if there is sufficient power, backup power, and A/C available in the landlord's shelter for the microwave. Integrate Microwave with UHF System.	This is a new site that needs to be implemented as part of Phase 2 of the MDFR UHF Radio System project. Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. The lease for this site needs to be negotiated. Change Order needs to be approved after Phase 2 MDFR UHF Radio System Project Completion funding is approved by BCC The tower needs to be analyzed and potentially upgraded. Will try to use landlord's shelter. If not approved by landlord, need to look for a new site. The Motorola quote provided a new shelter for $667K, which County has no funding for at this time. UHF System integration related costs covered in Motorola quote for microwave. Needed site upgrades to landlord's shelter are covered by Motorola quote for microwave.

BW7514-15/24-2 – Supplemental Agreement No 1 (SA-1)
Exhibit B – Site Status Report

Site #	Site Name & Address	Type	Site & Integration Requirements	Comments
15	**Metropolis** 9055 SW 73rd Court Miami, FL 33156	Rooftop.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. Need to modify lease to add new microwave equipment and dishes. UHF System integration related costs covered in Motorola quote for microwave. Needed site upgrades are covered by Motorola quote for microwave.
16	**RNAS** 15200 SW 124 Avenue Miami, FL 33177	Tower on Rooftop. A tower upgrade is not required based on Microwave Field Path Surveys completed by Motorola about 2 years ago.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. If microwave dish antenna locations change, need to perform another tower load analysis to determine if a tower upgrade is required or not. All UHF & P25 System, and Microwave integration related costs are covered in Motorola quote for microwave.
17	**Krome & Bauer** 17602 SW 264 Street Miami, FL 33031	Tower. A tower upgrade is not required based on Microwave Field Path Surveys completed by Motorola about 2 years ago. The site has 2 separate shelters for P25 800 MHz System and UHF System.	Microwave rack space reserved. Microwave power, backup power and A/C requirements can be satisfied. Integrate Microwave with P25 800 MHz & UHF Systems. Install Microwave equipment in P25 800 MHz System's shelter.	Need new Microwave Field Path Surveys completed by Motorola. If microwave dish antenna locations change, need to perform another tower load analysis to determine if a tower upgrade is required or not. All UHF & P25 System, and Microwave integration related costs covered in Motorola quote for microwave. Needed site upgrades and connection of both shelters are covered by Motorola quote for microwave.
18	**Homestead Water Tower (Witkopp Park)** 505 NW 9 Street Homestead, FL 33030	Water Tower. Antenna Mount Structure on top of water tower is full and may need to be upgraded or replaced.	Microwave power and backup power requirements can be satisfied. Motorola needs to verify if there is sufficient space, and A/C available in the site for the microwave. Integrate Microwave with UHF System.	Need new Microwave Field Path Surveys completed by Motorola to verify dish antenna locations. Motorola needs to analyze load in antenna mount structure on top of the HWT water tower to see if it needs to be upgraded. Motorola and County will talk to landlord to see if they will ask some tenants to move to the Homestead Race Track (HRT) water tower site, which is close by. If not, Motorola will pay for the cost to upgrade or replace HWT mount structure to install microwave dishes. Needed site upgrades are covered by Motorola quote for microwave.

MOTOROLA

Exhibit A – Supplemental Agreement 1

Miami-Dade County, Florida

Microwave System Replacement

Miami Dade Contract BW7514-15/24 - 2

Contract Option E2

June 3, 2010

Data Restrictions

This proposal is considered Motorola confidential and restricted. The proposal is submitted with the restriction that it is to be used for evaluation purposes only, and is not to be disclosed publicly or in any manner to anyone other than those employed by Miami-Dade County, Florida required to evaluate this proposal without the express permission of Motorola.

Motorola, Inc.
8000 W Sunrise Blvd
Plantation, FL 33322

TABLE OF CONTENTS

Section 1. Project and System Overview

1.1 Overview

Motorola, Inc. ("Motorola") is pleased to present Miami-Dade County ("County") with a proposal for a new countywide microwave backhaul communication system. This new system will provide the County with improved reliability for their current voice systems and significantly reduce reliance on leased T1 circuits currently used to connect to radio transmit sites today. Additionally, with the OC-3 capacity of the proposed microwave system, there will be bandwidth available for future data components which the County desires.

The proposed customized eighteen (18) path 17 (seventeen site) microwave solution is configured as a two (2)-loop, OC-3 capacity digital network. The system is designed for ease of future upgrade to OC-12 capacity. Most of the twelve (12) 6 GHz paths and six (6) 11 GHz paths have already been frequency coordinated (for OC-3). Final build out should only require minor coordination modification. All antennas are cross polarized high-performance 155 MPH wind-rated with dual feed points for ease of future capacity expansion without having to change antennas systems.

The Telecommunications Control Center (TCC) site serves as a common point for both the northern and southern loops. The northern loop incorporates nine (9) sites including TCC. The southern loop is comprised of six (6) sites including TCC. Three (3) spur hops, originating from the loop, are used to connect the Miami International Airport (MIA), Homestead Water Tower (HWT), and Key Biscayne (KEY - future) sites to the system. The path between Key Biscayne and CAB hasn't been surveyed as the Key Biscayne site lease hasn't been finalized yet. After the lease for KEY is finalized and the path is surveyed the final design for this link can be completed. Additionally, there may be field time needed to clear outstanding interference cases with satellite earth stations. This additional engineering could change the final design. The frequency coordinated paths have been cleared for interference, Key Biscayne has not been coordinated. Motorola understands the County has no further funding for this project. In the unlikely even interference creates a problem, Motorola will propose alternate solutions within the approved funding,

Northern Loop Sites

- TCC – Telecommunications Control Center
- TGK - Turner Guilford Knight Correctional
- SWM- Solid Waste Management
- PRYD – Palmetto Rail Yard
- HH– Hialeah Hospital

- PSN – Palm Springs North
- ICT – Industrial Communications Tower
- INT – Interama
- CAB – County Administration Building

Southern Loop Sites

- TCC – Telecommunication Control Center
- MET – Metropolis II
- FS-9 – Fire Station 9
- RNAS – Richmond Naval Air Station
- K&B – Krome and Bauer
- TG – Trail Glades

Spur Sites

- KEY – connects to CAB
- MIA – connects to CAB
- HWT – connects to K&B

Diversity antenna systems are used in one (1) paths to provide the necessary path reliability.

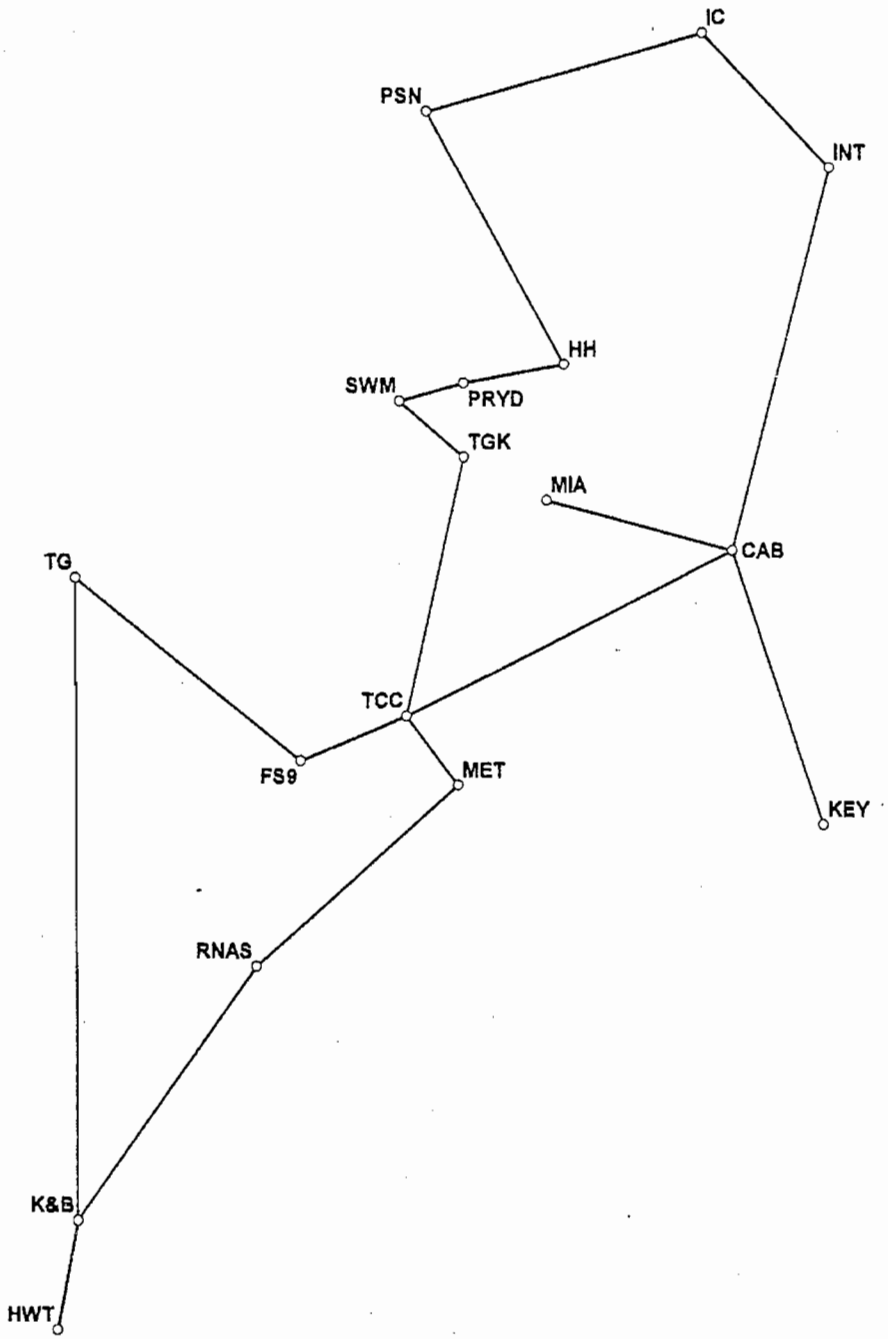
- TG – K&B

Cross-connect to the existing MIC – TG site is also included in the scope of this project.

This microwave system is designed and proposed as a OC3 capacity system, if the County 's requirements grow beyond an OC3 at any site, this would be beyond the scope and price of this proposal. Increasing the bandwith would be accomplished by deploying additional IRU600s in parallel, all the antennas proposed are cross-polled allowing for parallel radios to share antennas, assuming spectrum availability. The system is expansion ready.

In the future, the County may chose to incorporate Lightspeed into this microwave system, this would be beyond the scope of this proposal

Path redundancy is achieved using digital loop switching equipment. All T1 circuits in each loop is routed in two directions, "working path" and "protected path". This configuration protects the system from temporary path fades or permanent path outages in the microwave network. Each T1 circuit in the system has two (2) points of entry to its respective termination point. Circuits carried on the spur hops are also protected by use of hot standby radio equipment. These circuits are also carried in the loop network for transport to the required facility.



ISSUE	ENG NAME	DATE
A	MM	06-28-2006

SCALE:

0 5

miles

LEGEND:

IRU 600 11 128QAM
11.2 GHz, 1xOC-3 (157 Mbit/s) NP

IRU 600 L6 128QAM
6.2 GHz, 1xOC-3 (157 Mbit/s) NP

IRU 600 L6 128QAM
6.2 GHz, 1xOC-3 (157 Mbit/s) MHS-SD (split Tx/Rx)

IRU 600 11 128QAM
11.2 GHz, 1xOC-3 (157 Mbit/s) MHS

IRU 600 L6 128QAM
6.2 GHz, 1xOC-3 (157 Mbit/s) MHS

Aviat Networks

Motorola
Miami-Dade Fire Dept
System Layout

ENG BY: MM	REV
DWN BY:	DATE: 06-28-2006
SYSTEM ID: 5609-5600	Page 1 of 1

SL-A81659

5609-5600/ms/100413:1714

1.1.1 Provision Microwave Element Manager

The County microwave system includes the Provision Microwave Element Manager System solution. This includes the Provision Master Computer, a North Bound Interface to facilitate Provisions integration with a Network Manager and SNMP interfaces to other applicable OEM devices such as the chargers. Provision supports either central site or remote location management and offers immediate productivity by providing clarity and detail through a graphical representation of the OC-3 microwave network. Provision allows management of the IRU600 radio to a card level from the Master Computer located at TCC.

Provision is proposed as a Network Management tool. It is capable of external alarms which require additional equipment and is beyond the scope of this proposal.

1.1.2 IRU 600

The IRU600 is the latest microwave platform offering of Aviat Networks, providing state-of-the-art features and performance. The IRU600 can function as a terminal, repeater or hub radio off of a single Signal Process Unit/Shelf (SPU). Configured as a hub a single IRU600 SPU can support up to 6 independent microwave links. The radio is equipped with dual backplanes that allows each SPU shelf to be configured to support up to 200 Mb/s of Native TDM traffic and/or up to 5 Gb/s of Native IP traffic. In the proposed configuration for Miami -Dade County the IRU600s are equipped with a OC3 interface to a SONET mux which provide ring switching/redundancy to the system backbone links. The radio platform can support 6, 10 and 11 GHz using the IRU600 RFU and/or 13, 15, 18 and 23 GHz using the 300HP RFU, which can be rack mounted or antenna mounted to accommodate various installation scenarios. The SPU shelve support a variety of interfaces, including DS1, DS3, OC3, IP (10/100/100 BaseT). The bandwidth is "liquid" and can be software allocated and re-allocated as demand changes (as IP use increases). The IRU600 radio offers an elegant and petite footprint (5 rack mounting spaces for a MHSB terminal) and very low power consumption (135 watts for a MHSB high transmitter Powered terminal).

1.1.3 1.1.3 Radio System Cutover

Motorola has also considered Miami-Dade Fire Rescue's (MDFR) UHF radio system cutover from existing AT & T leased T1 circuits to the proposed microwave system. The system description scope of work includes the assumption that Motorola will interconnect and cut over MDFR's existing transmit site leased T1 lines to the microwave system and ensure the continued operation of the UHF system. This will be done in a coordinated manner after completion and testing of the MW system.

MDFR's less critical, receive-only sites would remain on leased T1 circuits provided by AT&T. Motorola and MDFR will mutually define the final T-1 to MW cutover procedures and schedule to insure minimal operational impact to fire communications.

Cutover of the 800 Mhz County Radio system is also included. This integration must be concluded by December 31, 2014. This allows a delay of 6 months to the P25 County stated schedule for P25 completion.

This proposal includes 1 year Warranty for the system. After installation, during the acceptance testing the system operating parameters will be documented. Prior to commencement of the P25 integration operating parameters will be verified.

1.1.3.1 Scope of Work to Connect the P25 800MHz County Radio System to the Proposed M-D County MW

1. This scope of work is to supply and install the T-1 cables required to interconnect the County radio system to the proposed County Microwave system. The County radio system operates on 800MHz, serves MDPD and other County departments. Both the UHF and 800MHz systems serve public safety.

   Proposal price is based on the by-site bandwidth and specifications requirements provided to Motorola by Miami- Dade County ETSD and shown in Figures 1 and 2 of this proposal Section.

   Figure 1 defines the bandwidth requirements for both the System A and B control points collocated at TCC.

   Figure 2 defines the T1 parameter requirements for the County radio system.

2. At the seven sites where MDFR and the County Radio system are collocated, (TCC, RNAS, CAB, Interama, Palmetto Rail Yard, and Palm Springs North)...

a. Motorola will supply and install the required T-1 cables to interconnect from the County Radio system demarcation point to the MW system patch panel.
b. Each cable will be installed and dressed in an appropriate manner to be mutually agreed at each site by Motorola and ETSD.
c. Each cable will be terminated at both ends in a male RJ-45 connector and will be properly labeled at each end.
d. Motorola and ETSD will jointly monitor the interconnection and verify proper levels and operation.
e. All work will be coordinated with ETSD to ensure site access and supervision of the interconnection of the County Radio System T-1's.

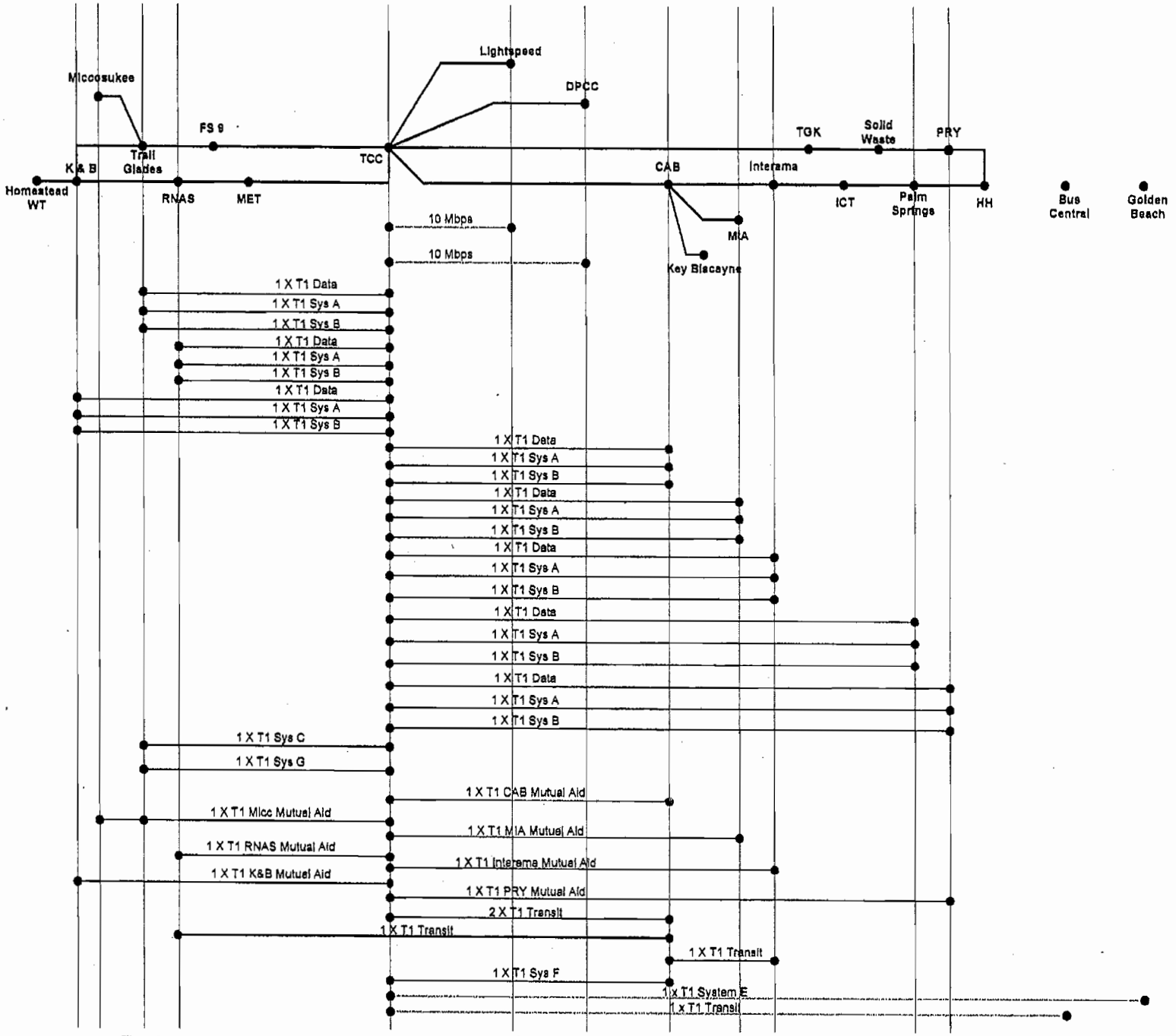
3. At the three sites where County Radio System and MDFR equipment is located in separate equipment rooms or shelters, (Krome and Bauer, Trail Glades and Miami Airport),..,
   a. Motorola will interconnect the County Radio System and MDFR buildings at each site using two inch buried PVC at K & B site and Trail Glade site, and rigid ¾ inch EMT on the MIA parking garage.
   b. Motorola will prepare all required drawings and obtain required permits.
   c. Copper grounding plates and surge protectors will be mounted at the T-1 entry point of each equipment room.
   d. Each T-1 will be routed through a surge protection device, then to the respective radio or MW demarcation point.
   e. Each T-1 cable will be installed and dressed in an appropriate manner to be mutually agreed at each site by Motorola and ETSD.
   f. Each cable will be terminated at both ends in a male RJ-45 connector and will be properly labeled at each end.
   g. Motorola and ETSD will jointly monitor the interconnection and verify proper levels and operation.
   h. All work will be coordinated with ETSD to insure site access and supervision of the interconnection of the Police T-1's.

4. All cabling work will be scheduled and completed prior to the final testing for each MW site.

5. T-1 lines that are installed for the County Rado System but not being used, will be terminated in loop back, or "decommissioned" on the MW system to prevent the MW system from reporting alarms.

6. When the County wishes to activate their looped or decommission T-1 lines mentioned in step 5, Motorola will be available to assist as needed to take down the loop back, or "commission" the desired line. This is easily done, but it requires coordination between ETSD and Motorola to avoid creating alarms on the active MW system..

System B control point at TCC
Primary NSC at TCC
Secondary NSC at Lightspeed
Transit NSCs at SPCC



Legend:

- South Loop Microwave →
- North Loop Microwave →
- Both Loops Microwave →
- Miami-Dade Fiber →

Total South Loop Microwave
T1's = 15

Total North Loop Microwave
T1's = 24

Figure 2 Specifications Requirements for 800 MHz County P25 System

Minimum Path Availability (one-way) 99.999%

Interface:	DSX-1 interface per ANSI T1.403-1989
Rate timing:	**1.544 Mbps +/- 30ppm, using internal terminal**
Framing:	Extended Superframe (ESF) per AT&T 62411
Pulse shape:	Per ANSI T1.403-1989
Line Codes:	(1)Bipolar with 8 zero substitution (B8ZS)
Terminal output Jitter:	Less than 0.05 UI per AT&T 62411, using internal timing.

Alarms

Minimum alarms required:

Audible alarm on any failure with cutoff/acknowledge control.

Visual Status of:

Normal Operation

Major Radio Alarm

Minor Radio Alarm

Normal Fail

Standby Fail

Pilot fail

DS1 Major

DS1 Minor

Main link failure

Alarm Contact closures for:

Major Radio Alarm

Minor Radio Alarm

7. Testing at time of P-25 connection.
    I. The microwave system operating parameters will be inventoried and documented at system acceptance. The system is expected to be fully functional prior to P25 integration.
    II. Each (P-25) T-1 line will be BER tested in loop back mode for 24 hours
    III. Miami-Dade County and Motorola FSO Techs will coordinate final interconnection of each (P-25) to MW to verify functionality of the P-25, the T-1 line and the MW.
    IV. A specific cutover plan and Method of Process (MOP) will be mutually agreed to between Miami-Dade County and Motorola prior to the P-25 integration and cutover to the MW system.

Completion of this scope is due no later than December 31, 2014. Payment is due upon successful completion, or no later than December 31, 2014, whichever comes first.

1.1.4 Site Facility Requirements

Most of the sites listed in this proposal will not require any modification to the building or tower facilities to implement the new microwave equipment. However, there are three sites that Miami-Dade County is in process of upgrading. The three sites that Miami-Dade County, was, is, or will be upgrading are: Miccocukee, Telecommunications Control Center and Interama. Once these upgrades are competed, the towers should meet current Florida Building code, for ANSI-TIA-222G, 146 MPH windspeed, Class 2, Exposure C, for the required loading to install the microwave dishes and waveguide noted in the March 2008 MW path surveys provided to the County.

For each new, or upgraded, tower, the County will provide to Motorola Florida licensed, PE sealed, structural analysis acceptable to the permitting agency. The analysis must include the quantity, size, and elevation of all items to be installed on the tower and should include any calculations and soil or foundation reports required by the permitting agency. This information is needed to obtain the proper building permits needed for installation of the MW antennas.

Miami-Dade County is responsible for any upgrades necessary for towers or sites. Miami-Dade County has provided a 'to be ready" commitment date for the Interama and TCC towers. The County's worst case estimated date is October 2011. Motorola has provided a base price that is reflective of the County's commitment to meet the October 2011 schedule.

Motorola will install the equipment at either UHF or MDPD shelters as desired by the County, pending on space availability.

1.1.5 Spares

The following spares inventory is included in the proposal:

Eclipse/IRU600 Spares	Quantity
IRU600, 6GHz Transceiver (HP/SP, HiBand/Low Band)	4
IRU600, 11GHz Transceiver (SP, HiBand/Low Band)	2
ECLIPSE, INTELLIGENT NODE UNIT, 2RMS. INCLUDES IDCV2, FAN, NCCV2	2
RAC 60, QPSK to 256QAM, Adaptive Modulation	2
DAC 1x155o, 1xSTM1/OC3, SM Optical	2
NODE PROTECTION CARD	2
Auxiliary and Alarm I/O Option Card (inlcuding alarm cable), w/3xRS422 ports	2
SONET MUX Spare	
OPTI-6100 (MX Chassis)	1
OPTI-6100 (SCM2), w/ GUI interface	1
OPTI-6100 OMM312V UPSR TRIB CARD	1
OPTI-6100 OC3/STM1 ENHNCD TRIB	1
IR Optics SFP, OC-3	1
10/100 EOS 8 PT ETHM8EW: OPTI-6100 advanced Ethernet module with 6 10/100 ports and 2 GigE copper ports	1
OPTI-6100 DS1VM2	1
Larus Spares	
GPS Antenna Kit spare	1
Output Card (T1, E1, CC, 2.048MHz)	1
Polyphaser Protector	1
GPS Receiver, Stratum 1 Performance	1
Chargers	
SPARE - uSageon 48/18 (120VAC) - Double Fused Rectifiers	1
SPARE - uSageon 48/25 (120VAC) - Double Fused Rectifiers	1

1.1.6 Training

The following training is included in the proposal, field courses will be customized. Sample syllabi are provided in the following pages.

TRAINING

Customer Field Training On IRU 600 for up to 12 Students using Customer radios, power, test equipment and training facilities. 3 days

Customer Field Training On Provision for up to 12 Students using Customer radios, power, test equipment and training facilities. 2 days.

Administrator Training for up to 12 Students. 1 days

Customer Field Training On Adtran for up to 12 Students using Customer radios, power, test equipment and training facilities. 3 days

1.1.7 Test Equipment

Quantity 1 (one) - Agilent 53147 with options 5314xa-001 and 5314xa-002d and Case.
Motorola APC Code: 262
Description: 53147A Microwave Counter/Power Meter/DVM, 20 GHz with Options 5314xa-001 and 5314xa-002d
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Frequency Counter (Agilent 53181A)
Motorola APC Code: 262
Description: Agilent 53131A/32A/81A Frequency Counter Base Unit - No Options
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Power Meter (Agilent E4418B)
Motorola APC Code: 262
Description: Agilent E4418B Single-Channel Power Meter Base Unit - No Options
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Power Meter Sensor (Agilent E4413A)
Motorola APC Code: 262
Quantity 1 (one) - Description: Agilent E4413A Wide Dynamic Range Power Sensor, E-Series Base Unit - No Options

Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Fixed Attenuator (Agilent 8493C with Opt 30)
Motorola APC Code: 262
Description: Agilent 8493C Coaxial Fixed Attenuator, DC to 26.5 GHz - Includes Option 30
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Anritsu Spectrum Master MS2724B (Including Option 9,25,27,31)
Motorola APC Code: 262
Description: Anritsu High Performance Handheld Spectrum Analyzer, 9 kHz to 20 GHz MS2724B - Includes Option 9,25,27,31
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) – 7/800 portable antenna and Reactel LC filter

Quantity 1 (one) - Motorola Part #: DS8494A
Description: 8494A Manual Step Attenuator, DC to 4 GHz, 0 to 11 dB, 1 dB steps
APC Code: 262
Supplier: Agilent
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Motorola Part #: DS8496A
Description: 8496A Manual Step Attenuator, DC to 4 GHz, 0 to 110 dB, 10 dB steps
APC Code: 262
Supplier: Agilent
Note: Item is non-cancelable and non-returnable once ordered.

Quantity 1 (one) - Motorola Part #: DS11716A
Description: 11716A Attenuator Interconnect Kit, Type-N
APC Code: 262
Supplier: Agilent
Note: Item is non-cancelable and non-returnable once ordered.

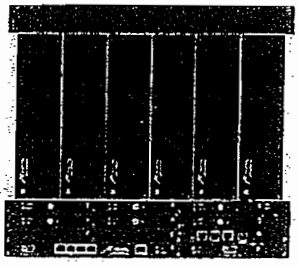
Quantity 1 (one) - Motorola Part #: DSFLUKEES2LANSX

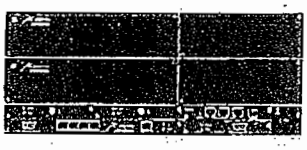
Description: NON-CANCELABLE / FLUKE ETHERSCOPE II ES2 LAN-SX I-KIT
Supplier: Fluke
Note: Item is non-cancelable and non-returnable once ordered.

TECHNICAL TRAINING

IRU 600

Maintenance and Operation Course
TR-IRU-01





Course Specifics

Duration:	3 days
Class capacity:	12 students
Location(s) for pre-scheduled class:	▪ San Antonio, Texas, USA
Materials provided:	▪ Instruction Manual ▪ Student Guide
Target Audience:	The Course is intended for anyone requiring basic theory, maintenance and hands on experience of the Eclipse™ IRU600 RFU.

Prerequisite

- Basic digital knowledge
- Basic modulation knowledge
- Digital communications formats
- Basic SONET/SDH

Each student must bring an IBM compatible laptop PC and have administrator rights on the PC. The PC must have minimum parameters of:

- Pentium – class laptop computer
- Microsoft Windows 98, 2000 Pro, XP
- CD ROM
- Ethernet card
- DB9 Serial Port connection (or adapter)

Objectives

At the end of this course, participants will be able to:

- Describe the characteristics and operation of the IRU600 Indoor Radio Frequency Unit (RFU).
- List the supporting Eclipse modules and minimum software required for the IRU600. Configure, diagnose and troubleshoot Eclipse radios with the IRU600 RFU

TECHNICAL TRAINING

Course Content

Overview

- Description
- Features
- System Lay Out

RFU Configurations

- General Information
- Standard Power
- High Power
- ACU
- Fan
- Protected vs. Unprotected

Troubleshooting

- Troubleshooting Overview
- Troubleshooting Lab

General Product Description

- 3 RMS RFU
- Vertical RFU
- 1.5 RMS RFU
- Eclipse plug-ins/Interconnections
- Configurations

Maintenance

- Maintenance Overview / Annual PM
- IRU600 Software Configuration
- Configuration Lab

Aviat

TECHNICAL TRAINING

ProVision Network

Management, Installation, configuration & Operation
TR-PRO-01

Course Specifics

Duration:	2 day
Class capacity:	8 students
Location(s) for pre-scheduled class:	▪ San Antonio, TX
Materials provided:	▪ Instruction Manual (CD-ROM) ▪ Student Guide
Target Audience:	This course is intended for Network Operations Center (NOC) Operators and Engineers involved in the installation, operation and maintenance of ProVision Software. Training consists of a combination of classroom lecture and practical exercises.

Prerequisite

Participants should have knowledge and experience in the areas of network operations fundamentals and telecommunications fundamentals. A Computer in an NT environment is required

Objectives

By the end of this course, the participant should be able to competently install, use, and administer ProVision software.

Course Content

ProVision Introduction

- Functions & features
- Minimum hardware specifications

Getting Started

- Start and exit a user session
- Basic set up and configuration procedures
- User interface description

TECHNICAL TRAINING

Deploying and Managing Radios

- When and why you would deploy radios
- Add, rename and deleted a container
- Deploy, rename, delete and manage and un-manage a radio
- Re-parent an object
- Create, verify, and delete a link
- Reposition map viewer objects
- Verify ProVision is receiving events
- View and change radio configuration
- View and change network IP addresses

Managing Services

- When and why you would manage services
- Adding, renaming, and deleting services and service links

Eclipse Features

- Trace, view and diagnose circuits
- Perform bulk software downloads
- Produce Inventory & fault reports

Managing Events

- When and why you would manage events
- Views, filters, browser options, network events, log filters, and event states
- Configure & interpret scoreboards

Performance Monitoring

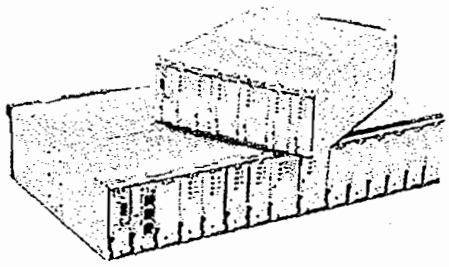
- Configure device data collection
- Interpret performance history & trends
- Produce Inventory & fault reports
- Understand ProVision Architecture

ProVision Installation and Administration

- Understand ProVision server/Client relationship
- Understand communication with Network elements
- Administer database and security profiles
- Northbound Interface (NBI)description and configuration
- Discuss remote access options
- Install server and Client software
- Understand licensing requirements and procedures.

ADTRAN The Network Access Company

OPTI-6100 Maintenance and Troubleshooting
1600COPT174



Delivery Method: Instructor Led

OPTI -6100 OVERVIEW
TROUBLESHOOTING OVERVIEW

- Local Connection
- Remote Connection [Menus via Telnet]: (requires IP connectivity
- Remote Connection [TL-1 via Telnet or Rlogin] (requires IP or OSI connectivity)
  - Understanding AIDs
    - Examples of Equipment AID
    - Examples of Facility AID
    - Examples of Path AID
    - Examples of Clock AID Structure

LEDS

- Introduction

SCM MODULE
OMM (HIGH SPEED) MODULES

- OMM12 Modules (OMM12IR, OMM12LR, OMM12VIR, OMM12VLR)
- OMM3 Modules (OMM3IR, OMM3LR)
- Cross Connect Module (OMMXCV)

TRIBUTARY (MID SPEED) MODULES

- DS1M Module
- DS1VM Module
- DS1VME MODULE
- DS3EC1M Module
- DS3EC1M3 Module
- DS3M3E Module
- ETHM Module
- ETHM8 Module
- TRAM Module
- TRAM3 Module
- O3TMIR Module
- O3TMLR Module

- O3TMM Module
- GECM Module
- GESM Module

CONNECT AND LOGON

- Introduction

CONNECT AND LOGON TO SYSTEM

- Connecting to a VT100 Terminal

SECURITY ACCOUNT MANAGEMENT

- Access Privileges

SYSTEM STATUS AND ALARMS

OPTI-6100 SHELF STATUS

- Shelf Status
- DCC Interface

OMM (HIGH-SPEED) MODULE STATUS

- Introduction
- OMM-12 Status
- OMM-3 Status
- Cross-Connect OMMXCV Module Status

TRIBUTARY MODULE STATUS

- DS3EC1M Status
- DS3EC1M3 Status
- DS3M3E Status
- DS1M Status
  - DS1VM Status
  - Equipment Functional State
  - Facility Functional State

DS1VME Status

- Equipment Functional State
- Framing
- Facility Functional State
- ETHM Status
- Equipment Functional State
- ETHM8 Status
- TRAM Status
- TRAM 3 Status
- O3TM Status
- GECM Status
- GESM/GEMM Status

SYSTEM ALARMS
- Shelf Alarm Status
- Environmental Alarms

LOOPBACKS
- DS1VM
  - Disabled
  - CSU
  - NIU
- DS1VME
  - Disabled
  - CSU
  - NIU
    - Inband
    - Outband

LOOPBACKS DS1M
- DS1 Remote Loopbacks
  - Disabled
  - CSU
  - NIU
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  - Disabled
  - Enabled
- DS3M3E
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  - Enabled

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- OMM3 (IR and LR)

TRIBUTARY (MID-SPEED) MODULES
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- DS3EC1M
- DS3EC1M3
- DS3M3E
- DS1M
- DS1VM
- DS1VME
- TRAM and TRAM3
- O3TM
- GECM
- GESM/GEMM

ADTRAN The Network Access Company

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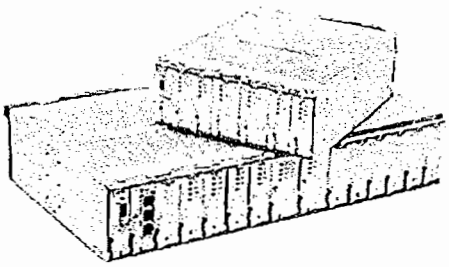

Delivery Method: Instructor Led

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LABS

Section 2. Statement of Work

2.1 Introduction

This Statement of Work (SOW) includes the overview of the scope and services that will be provided as part of this proposal. It includes an outline of the implementation team roles, steps of implementation, standards of workmanship, scope of services, and major task responsibilities. Through this section, the Statement of Work will be defined that will clearly demonstrate our approach to a successful project implementation.

2.2 Systems Integration Overview

Systems Integration continues to be a key process in Motorola, Inc.'s ("Motorola") system implementations and in the manner in which we conduct business. Motorola's Systems Integration process effectively addresses the requirements of Miami-Dade County (the County), and focuses on multi-agency/multi-jurisdictional interoperability in multiple technology environments.

This Systems Integration Statement of Work (SOW) describes the deliverables to be furnished to the County and the tasks to be performed by Motorola, its subcontractors, and by the County in order to implement the proposed solution. It contains information that describes the most current understanding of the work required by both parties to provide a successful implementation.

It is understood that this SOW may be revised during contract negotiations or during the Contract Design Review and during the execution of the project. If there are changes to its scope, these changes must be reflected in the SOW before becoming binding on either party. This SOW will be an Exhibit to the Contract negotiated between Motorola and the County. After contract execution, changes to the SOW will be made through the formal contract Change Order process as set forth in the Contract.

2.3 Project Management

Project management is the application of knowledge, skills, tools, and techniques to address our customer's contractual requirements. To this end there are nine practices that are key to project management, highly interrelated, with each as important as the others. These nine key practices are identified and further described as:

- Scope management
- Schedule and time management
- Cost management
- Quality management
- Risk management
- Subcontracts and procurement management
- Resources management
- Communications management
- Integration management (System Implementation Work Plan)

2.3.1 Scope Management

Scope management is the process of maintaining control of the project in terms of the aims, goals, and objectives of the County. During the planning process, Motorola strives to ensure that the project scope includes all the work required to satisfy the contractual requirements of the project. Motorola's understanding of the scope of work is defined in this SOW and the System Description.

2.3.2 Schedule and Time Management

The project schedule identifies the Motorola and County projected timeline for completing the required tasks to implement the County's communication system successfully. A schedule is included with this proposal and shows an initial timeline for implementation, assuming a contract approval date of June 15, 2010.

Upon contract award, Motorola's Project Manager (PM) will provide an updated project schedule with specific sub-activities to display accurately the start and completion dates of the project; any changes to the schedule will only be proportional to a delay of contract execution resulting in a delay to the project start date. This schedule will be updated regularly, with mutual agreement of Miami-Dade County and Motorola during the implementation of the project and updates will be provided to the County's PM.

Motorola will closely coordinate the schedule with the County to adjust, compensate for, and take corrective actions as required by any schedule changes.

Upon completion of the agreed final schedule, it will be incorporated as part of the final contract.

2.3.3 Cost Management

Motorola understands the County will not accept additional cost change orders, therefore, in the unlikely event a modification to the proposal is needed in order to overcome an obstacle beyond our control, Motorola will work with Miami –Dade County and mutually alter the scope. If a change order requiring additional funds is necessitated, such a change order will require approval up to and including the Board of County Commission and follow the Change Order Provision outlined in Article 9 of the master terms and conditions.

During the execution of a project of this scope, contract modifications may arise to accommodate changes in scope. Either party may request changes within the general scope of the contract. If a requested change causes an increase or decrease in the cost or time required to perform the contract, Motorola and the County will agree upon an equitable adjustment of the Contract Price, Performance Schedule, or both, and document it as a part of the Change Control Plan included in this document.

If the project cannot be completed because of items beyond Motorola's or Miami - Dade's control, such as soil conditions, environmental requirements, inadequate microwave paths, site owner approvals, etc,, Motorola will provide alternate recommendations.

2.3.4 Quality Management

It is Motorola's policy to produce and provide products and services of the highest quality, which are responsive to the needs of our customers. Motorola has a well-established reputation for designing and developing high quality products and systems, on schedule, and within budget.

All work will be performed consistent with high quality commercial practice and in accordance with Motorola's Quality Standards for Fixed Equipment Installations and all applicable manufacturer installation and maintenance manuals.

2.3.5 Risk Management

One of the major tasks of project management is to mitigate risk to our customers, to Motorola, our subcontractors, the environment, and the public. No project is entirely without risk, but purchasing from Motorola reduces the risk by bringing the benefit of

our experience in implementing radio systems. Potential problems, which have been resolved in the past, can be planned for and avoided. Motorola's thorough review of customer requirements and cost analysis allows us to address these issues and develop a system implementation plan that is workable both from a time and cost standpoint while minimizing the risk to all parties.

2.3.6 Subcontracts and Procurement Management

Motorola has extensive experience in managing programs with many large subcontracted efforts. Motorola routinely employs teams of subcontractors as integral members of our system integration teams and we have established policies and procedures to manage these efforts. Early in the proposal phase, Motorola establishes the groundwork that enables a rapid execution of subcontracts with each of our team members. Motorola's subcontracts define the tasks to be performed and the Project Schedule, which are required from our subcontractors in accordance with our prime contract. Motorola will provide a listing of the subcontractors to be used for this project in accordance with County Policy.

2.3.7 Resource Management

Motorola believes that the success of any project depends upon obtaining and applying the best resources to every aspect of the project through organizational planning, staff acquisition, and team development. Our staffing approach brings together a team of specialists, subcontractors, engineers, and systems integration personnel under the direction of a PM. This philosophy also pervades our selection of suppliers, facilities, tools, and staff. By integrating our subcontractor's management and staff with the Motorola team, we are able to utilize the best-qualified personnel for every task, regardless of company affiliation. The team selections are based upon individual skill, prior experience, and qualifications.

2.3.7.1 Project Manager

Motorola's PM primary responsibility is the successful implementation and optimization of the system. The PM will serve as the primary liaison to the County for the project. The PM will track the progress of the project and take proactive measures to ensure that the project proceeds as planned. Motorola understands Miami Dade County is very satisfied with the services rendered by the present Project Manager, Harry Woodworth. Motorola management will continue to have this individual assigned to the project in the interest of customer satisfaction, as long as it is feasible for Motorola and for the individual, for one year. In the event a change in personnel is necessitated, Motorola will provide Miami-Dade County the maximum advance notification possible, not less than ninety (90) days notice, if possible, and will orchestrate a smooth transition of information and knowledge.

2.3.7.2 Lead Engineer

Motorola's lead engineer will lead the engineering and design personnel assigned to the project. The engineering team is responsible for the technical integration of all the subsystems into the defined system. Motorola understands Miami Dade County is very satisfied with the services rendered by the present Lead Engineer, Jorge Vasconcelos. Motorola management will continue to have this individual assigned to the project in the interest of customer satisfaction, as long as it is feasible for Motorola and for the individual, for one year. In the event a change in personnel is necessitated, Motorola will provide Miami-Dade County the maximum advance notification possible, not less than ninety (90) days notice, if possible, and will orchestrate a smooth transition of information and knowledge.

2.3.7.3 System Technologists and Field Service Organization

Motorola's system technologist is highly experienced and trained specializing in the optimization and troubleshooting of large two-way RF communications systems. The system technologist will perform the optimization process working with the local Motorola service technicians. Additionally, these individuals will work with the Motorola PM and County representative to decide upon the best configuration for, and then programming of, the system parameters.

2.3.7.4 Subcontractors

Motorola's PM will coordinate the activities of the subcontractors to assure cost-effective performance and resolution of technical interface issues during design as opposed to during integration activities.

Motorola's PM will be the single authority for subcontract actions and reporting and will have the full responsibility for quality performance, schedules, and cost control. We will use a straightforward procedure for managing and controlling work assignments to subcontractors.

Subcontractors will be selected for this project based on their experience and many have worked for Motorola on numerous projects. Each subcontractor will assign a lead manager who will be responsible for its company's performance. These managers will report directly to Motorola's PM on contractual issues and to the system engineer on specific technical assignments. All subcontractors will submit as-needed progress reports to Motorola describing progress, level of effort, and anticipated problems that will be integrated into the project's tracking system. These subcontractor weekly progress reports will serve as Motorola's primary mechanism for ensuring that they remain on track to deliver their promised results.

2.3.8 Communications Management

2.3.8.1 Correspondence and Approvals

The County will respond to all Motorola submittals, correspondence, and written requests within ten (10) calendar days of receipt. Any responses rejecting submittals, requests or correspondence will contain a detailed explanation in support of such rejection referencing the contract section or item number affected.

2.3.8.2 Status Meeting and Reports

Motorola's PM, or designee, will attend all project status meetings with the County as determined during the Contract Design Review meeting. Motorola will record the meeting minutes as related to the system proposed herein and supply this information to the County's PM within five (5) working days. The general agenda will include the following:

- Overall project status compared to the Project Schedule
- Product or service-related issues that may impact the Project Schedule
- Current status of action items and responsibilities in accordance to the Project Schedule
- Tasks completed over the last 30 days
- Tasks to be completed over the next 30 days
- Customer satisfaction issues

Any additional concerns of either the County or Motorola will be added to the general agenda.

2.3.8.3 Progress Milestone Submittal

During the course of the project, Motorola will submit milestone completion documentation to the County. This documentation will be submitted in accordance with the milestone schedule as agreed upon during the Contract Design Review. The County's approval of each milestone will signify confirmation that the work associated with the scheduled task has been completed and accepted by the County.

2.3.9 System Implementation Work Plan

An effective work plan ensures not only a timely and orderly implementation, but also the optimization of system effectiveness. This section outlines the Systems Integration processes that Motorola will incorporate throughout system

implementation to ensure County users a smooth and efficient transition to their new communications system.

Motorola has developed the implementation plan contained herein for most efficient utilization of resources and earliest possible completion of the project.

Motorola's process for the integration of the County's communications system will ensure that the implementation adheres to the highest quality and process standards. Several of the steps of this Systems Integration process parallel and complement Motorola's project management team activities previously discussed.

The steps of Motorola's Work Plan are described in detail in the following subsections. By following these steps and applying the previously described project management procedures, Motorola can monitor and control all aspects of the implementation to ensure successful on-time completion and total customer satisfaction to the County.

2.4 Kickoff Meeting

The implementation process will begin with the project kickoff meeting. This meeting will clarify the system design, identify any special product requirements and their impact on system implementation, and refine the system implementation plan. A discussion of the cutover plan and methods to document a detailed procedure for cutover will begin at this meeting. This meeting will also introduce all members of Motorola's implementation team and will allow the project team leaders to assign an initial list of tasks to appropriate team members.

2.5 Contract Initiation and Design Review

After the contract is signed, Motorola will hold a Contract Design Review of the proposed system design with the County. The goal of the Contract Design Review process is to verify and finalize agreement on the overall design and deliverables. Motorola will provide the following documents to the County for its review and approval:

- Preliminary Project Schedule
- Rack Elevation Drawings
- System Block Diagrams
- Antenna Network Diagrams
- Network Transport Plan
- Preliminary Acceptance Test Procedures

2.5.1.1 Frequency Licensing

Motorola, upon receipt of authorization by the County, will prepare the FCC License Application Form 601 with the appropriate technical data. Information such as site location, radio type and frequency will be listed. Motorola will complete and submit the Form 601 on line via FCC Universal Licensing System.

2.5.1.2 Path and Transmission Engineering

Motorola will perform all required Path Surveys and Transmission engineering required as part of this project. The following is a list of tasks that will be performed as part of the Path and Transmission Engineering:

- Provide site elevation above sea level.
- Provide site coordinate information (longitude and latitude).
- Provide existing tower description and information (tower type).
- Provide general survey observation and comments.
- Provide overall site plan (drawing with major landmarks for location purposes).
- Provide photograph(s) of each site.
- Provide a path calculation and profile for each proposed hop.
- Identify a location for possible sources of spectral reflections.
- Provide information concerning possible obstructions or obstacles, such as natural terrain or man made structures.
- Provide a path survey report.
- Perform preliminary path calculations.
- Perform path survey to confirm path reliability study.
- Coordinate radio frequencies.
- Recommend antenna size, type and mounting height.
- File FCC construction completion notice.

2.5.1.3 Interference

Motorola will work with the County to identify any mutual radio interference between the new communication system and any other existing radio systems. Motorola is not responsible for issues outside of its immediate control. Such issues include, but are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.

Motorola is not responsible for co-channel interference due to errors in frequency coordination by other parties or any other unlisted frequencies or the improper design, installation, or operation of systems installed or operated by others. Any costs associated with site changes and/or delays; including, but not limited to, re-engineering, frequency re-licensing, site zoning, site permitting, schedule delays, site abnormalities, re-mobilization, etc., due to a site being unusable for any frequency issues outside of Motorola's control will be adjusted through the Change Order process.

2.6 Civil Work Phase

Motorola has included no site improvements in the core of this proposal. Should any site improvements be required, this SOW will be updated via the Change Order process.

Motorola assumes the County will provide any existing site documentation as required to the Motorola PM to facilitate the permitting and deployment process.

2.6.1 Site Access

The County should provide reasonable access to all County-owned or leased sites of work as defined in this proposal. Access may be needed 24 hours a day during the course of this project. This includes but is not limited to, the following:

- Provide escort at no charge if escorts are required at any particular site. The availability of such escorts shall not be unreasonably withheld.
- Issue temporary identification cards to Motorola personnel if required for access to County facilities.

2.7 Deployment Phase

2.7.1 Ordering and Manufacturing

After the kickoff meeting and Contract Design Review, Motorola will process the orders for equipment and begin equipment manufacturing. The manufacturing facilities will test each subsystem from its base kit or module level up to the complete subsystem. In addition, the system will be staged at the factory and tested prior to shipment. The Customer is welcomed to visit the factory to witness the final testing. Travel and accommodations are at the customer's expense, and not included in this quote.

2.7.2 Equipment Delivery to the Field and Inventory

All equipment will be delivered to the designated County site or specific County Storage location defined in writing prior to shipment.

Prior to shipment of equipment the County shall provide Motorola a list of County personnel authorized to receive, inventory and attach property tags (if required).

2.7.3 Fixed Equipment Installation

Motorola will be responsible for the installation of all fixed equipment contained in the equipment list and as outlined in our technical responses based upon the agreed-to floor plans at the sites where the physical facility improvement is complete and the site is ready for installation. All equipment will be installed in a neat and professional manner, employing a standard of workmanship consistent with Motorola's own R56 installation standards and in compliance with applicable National Electrical Code (NEC), EIA, Federal Aviation Administration (FAA), and FCC standards and regulations.

For installation of the fixed equipment at the various sites, Motorola will furnish all cables for power, control, and radio transmission to connect the Motorola-supplied equipment to the power panels or receptacles and the data/control line connection point. All cabling will be properly connected and terminated based upon Motorola's installation quality standards and clearly labeled at both ends. All associated punch block connections will also be properly labeled. All cabling and punch block connections will be recorded into the final system as-built documentation. All cabling associated with computer equipment will be shielded and grounded based upon the manufacturer's specifications.

All Motorola-provided equipment will be properly grounded to the site's grounding system. All cabinets, racks, enclosures, telephone circuit surge protectors, and transmission line surge protectors provided by Motorola will be connected to the single point ground plate. Ground connections will be connected using approved split bolt or clamp connections. All painted surfaces where ground connections will be made will be scraped and dissimilar metal connections treated with an antioxidant compound.

To minimize interference, all cabling will be grouped by category and run separately. Cable categories will consist of control cabling (power, data), RF, and ground. All cables will be run and secured neatly in cable tray, under elevated flooring, conduit, or by other appropriate means. Any cuts in computer flooring will be dressed with a protective grommet to avoid sharp edges. All sawdust and metal shavings will be vacuumed from beneath the computer flooring. Entry holes placed in cabinets will have grommets installed to protect the cables from damage. Any wiring connections terminating at punch blocks will utilize appropriate bridging clips for cross connections.

Motorola will follow R56 installation practices in the assembly and installation of all antenna systems. Motorola will utilize appropriate connectors, and assemble the cables according to the manufacturer's specifications. All transmission lines will be run and installed without exceeding the manufacturer's specified bending radius. Transmission lines will be properly secured and/or fastened to the cable tray or ladder attached to the tower using the manufacturer's recommended devices.

During field installation of the equipment, any required changes to the installation will be noted and assembled with the final as-built documentation of the system. The as-built documents will be provided at the end of the project along with the maintenance and operator manuals. Upon completion of installation, Motorola will perform final site quality audits to verify proper physical installation and operational configurations of each individual site.

2.7.4 System Programming and Optimization

Upon completion of the installation process, the RF equipment will be powered up and then optimized by the Motorola system technologist under the direction of the PM. Motorola and its subcontractors will optimize each subsystem individually. Audio and data levels will be checked to verify factory settings. Radio equipment will have forward and reflected power checked after connection to the antenna systems to verify that they meet the FCC requirements and are within tolerances. Communication interfaces between devices will be verified for proper operation. Features and functionality will be tested to ensure that they are functioning according to the manufacturer's specifications and based upon the final configuration established during system staging.

2.7.5 Functional and Site Acceptance Test Plan

Upon completion of the fixed-end equipment optimization Functional Acceptance Testing of the fixed equipment at the sites will begin based upon the ATP agreed upon in the Contract Design Review. The ATP specifies the standards and tests to which Motorola and its authorized subcontractors will adhere. Motorola will conduct a Functional Acceptance Test to verify the operational functionality and features of both the individual subsystems and of the system as a whole. In the event that any task fails in the initial test, that particular task will be retested when Motorola determines that corrective action has been taken. All issues that arise during the acceptance test are to be fully documented and resolved before the subsystem is considered ready for integration into the system. Motorola will document the results of this acceptance test and these results will be available for review by the County.

Site acceptance tests of the individual components will be conducted as part of the system installation and optimization, and as such, have not been scheduled separately. County representatives are welcome to be present during the testing period to witness each of the tests. These tests include individual equipment specifications such as receiver sensitivity and RF transmitter power and will be performed as specified in the Acceptance Test Procedure developed during the Contract Design Review phase. Documentation of component tests will be made available for the County as part of the final documentation package.

Reference Section 5 of this proposal for complete ATP.

2.7.6 Cutover

A detailed cutover plan will be developed with the assistance of the County's PM and designated agency representatives to ensure that an effective and efficient transition occurs from the existing radio system to the new system. The cutover plan will detail which departments move to the new system and in which order they migrate. The Cutover plan is detailed in section 1.1.3 of this proposal.

2.7.7 System Acceptance

System Acceptance will occur upon the installation, optimization, and successful completion of the Functional Acceptance Tests, which apply to the specific system, or upon "Beneficial Use", whichever occurs first. "Beneficial Use" means use of the system or subsystem for operational purposes, other than for training or testing. If the County commences Beneficial Use of the system prior to system acceptance, final acceptance for the system or subsystem will have occurred. The warranty period shall commence upon the earlier of the date of System Acceptance or Beneficial Use.

After the successful completion of the cutover, the County will begin to use the system for its day-to-day operation. At that point, Motorola will transition the operations of the County's new system to our service organization for providing ongoing system management, maintenance, and support.

2.7.8 Documentation

The following is a brief description of documentation provided the County as part of this proposal:

- Sales Order Summary Sheet ("SOS"): The SOS document is a summary of the radio equipment and the configurations, as required per Motorola specific order. Equipment parameters are listed by rack number, radio type, frequency and site name.
- T1/VF Plan: The T1/VF plan is a system level diagram of channel connectivity from the originating site to the destination site.
- Block and Level Diagram ("BL"): The BL shows high level equipment connectivity per site.
- Rack Profile ("RP"): The RP shows the equipment mounting position on the equipment rack.
- Equipment List ("EL"): The EL is a list of Motorola provided equipment, as configured, per site.
- Wiring Table ("WT"): The WT shows wiring between equipment per site down to port, pin, color code or cable part number.

2.7.9 Punch Lists

During acceptance testing, a punch list will be generated noting any corrections that may be required to be made prior to Final Project Acceptance. A resolution to each punch-list item will be mutually agreed to and a timeframe for satisfactory completion will be listed. When punch-list items have been resolved and the final documentation delivered, County and Motorola will execute Final Project Acceptance.

2.7.10 Final Project Acceptance

After successful completion of system testing and acceptance of the system, Motorola will conduct meetings to verify with County that all contract deliverables have been satisfied and review the Managed Services Support Plan. These meetings will allow

the County an opportunity to discuss any final issues or address any questions associated with the closeout of the System Implementation phase. Reviewing the Managed Services Plan will provide the opportunity for the County to review the level of support supplied, the procedures that need to be followed, and who to call when questions or concerns arise.

The County will grant Final Project Acceptance to Motorola when all contractual commitments of Motorola have been completed.

2.8 Change Control Plan

A Change Control Plan is a simple yet effective method of managing project changes, which include identifying changes, investigating the probable impact of changes, evaluating the benefits and costs of the proposed changes, making a decision to implement, defer, or deny the change request, and reporting the impact of approved changes on the cost, schedule, and scope of the project.

Change Orders are used to ensure that all changes to the Agreement (Contract) are properly documented, reviewed, and approved prior to inclusion into the document. Changes to an agreement include, but are not limited to, such items as changes to the equipment ordered, changes in service options, etc. A Change Order is an amendment to the contract if it requires authorization by either the County or Motorola. Any change to be completed during the initial development, before delivery of production system (final user acceptance), may result in a change in the scope, schedule, or costs (or all three) of the project. With this in mind, a fundamental set of rules are followed when a Change Order is initiated from any source.

All Change Orders shall:

- Be documented, clearly stating the scope of work, responsible parties doing the work, a dollar amount, a schedule impact, and signatures.
- Require appropriate authorization, up to and including the Board of County Comissioners, before work can commence
- Be communicated to the people or organizations impacted by the pending change.
- Conform to the Scope of Work authorized by the County.

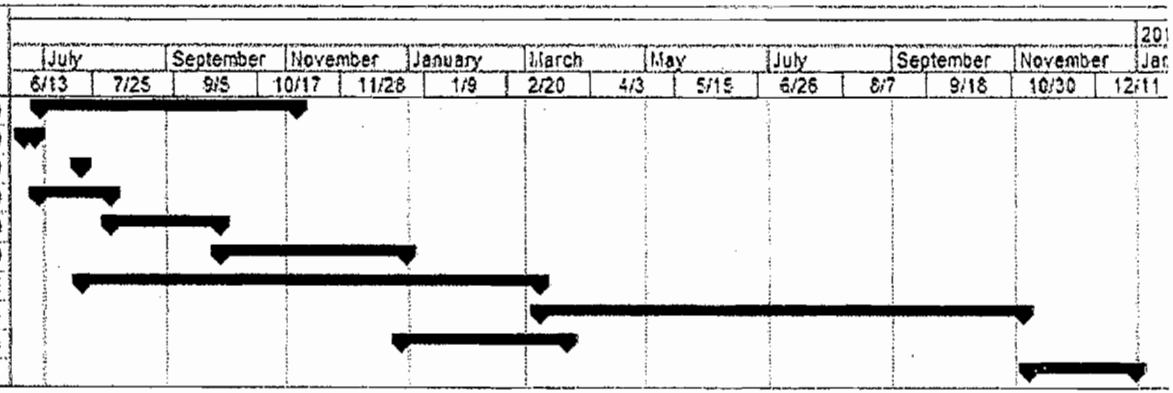
Once the SOW is approved and signed by authorized representatives of both parties, County and Motorola, a formal Change Control Plan will become effective. A Change Order Request Form will be completed, mutually agreed to, and executed by both the County's authorized PM and Motorola's PM prior to the initiation of work outlined in any proposed change.

Changes made after acceptance of the Contract Design Review will be billed to the County based upon the payment terms and milestone payment schedule (or as modified by the Change Order).

2.9 Project Timeline

Project Schedule in the following pages:

ID	Task Name	Duration	Start	Finish
1	Final Frequency License	94 days	Tue 6/29/10	Fri 11/5/10
7	Miami-Dade County	5 days	Mon 6/21/10	Fri 6/25/10
10	Customer Design Review	1 day	Mon 7/19/10	Mon 7/19/10
12	Network Engineering	26 days	Mon 6/28/10	Mon 8/2/10
16	Configuration Engineering	40 days	Tue 8/3/10	Mon 9/27/10
21	Manufacturing & Test	68 days	Tue 9/28/10	Thu 12/30/10
29	Project Engineering / Installation	165 days	Tue 7/20/10	Mon 3/7/11
36	Antenna Installation & Path Align	175 days	Tue 3/8/11	Fri 11/4/11
58	Radio Install, Interconnect wiring	59 days	Wed 12/29/10	Mon 3/21/11
78	System Test and acceptance	40 days	Mon 11/7/11	Fri 12/30/11



Miami-Dade Microwave Project Task List

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Miami-Dade County**	**401 days**	**Monday 6/21/2010**	**Friday 12/30/2011**	
2	Project Award	1 day	Monday 6/21/2010	Monday 6/21/2010	
3	Order Entry Process	4 days	Tuesday 6/22/2010	Friday 6/25/2010	2
4	**Final Frequency License**	**99 days**	**Tuesday 6/22/2010**	**Monday 11/15/2010**	
5	Transmission Engineering	9 days	Tuesday 6/29/2010	Friday 7/9/2010	2
6	Path Survey Reports	5 days	Monday 7/12/2010	Friday 7/16/2010	5
7	Frequency coord	15 days	Monday 7/19/2010	Friday 8/6/2010	6
8	License Application	5 days	Monday 9/20/2010	Friday 9/24/2010	7FS+30 days
9	License Complete	30 days	Monday 9/27/2010	Friday 11/5/2010	8
10	**Network Engineering**	**26 days**	**Tuesday 6/22/2010**	**Tuesday 7/27/2010**	
11	Initial System Design	15 days	Tuesday 6/22/2010	Monday 7/12/2010	2
12	Final System Design	10 days	Tuesday 7/13/2010	Monday 7/26/2010	11
13	Final Review	1 day	Tuesday 7/27/2010	Tuesday 7/27/2010	12
14	**Customer Design Review**	**1 day**	**Monday 7/19/2010**	**Monday 7/19/2010**	
15	Customer Design Review	1 day	Monday 7/19/2010	Monday 7/19/2010	6,11
16	**Configuration Engineering**	**40 days**	**Wednesday 7/28/2010**	**Tuesday 9/21/2010**	
17	System Factory Configuration	15 days	Wednesday 7/28/2010	Tuesday 8/17/2010	13
18	Drafting	10 days	Wednesday 8/18/2010	Tuesday 8/31/2010	17
19	Documentation Review	5 days	Wednesday 9/1/2010	Tuesday 9/7/2010	18
20	Factory OEM Ordering and Delivery	5 wks	Wednesday 8/18/2010	Tuesday 9/21/2010	17
21	**Manufacturing & Test**	**68 days**	**Wednesday 9/22/2010**	**Friday 12/24/2010**	
22	Radio MFG	7 wks	Wednesday 9/22/2010	Tuesday 11/9/2010	19,20
23	System Integration	3 wks	Wednesday 11/10/2010	Tuesday 11/30/2010	22
24	System Test and quality verification	1 wk	Wednesday 12/1/2010	Tuesday 12/7/2010	23
25	Customer Factory Acceptance	2 days	Wednesday 12/8/2010	Thursday 12/9/2010	24
26	Punch List / Pack and Ship	4 days	Friday 12/10/2010	Wednesday 12/15/2010	25
27	Transit	5 days	Thursday 12/16/2010	Wednesday 12/22/2010	26
28	Receive and Inventory	2 days	Thursday 12/23/2010	Friday 12/24/2010	27
29	**Project Engineering / Installation**	**165 days**	**Tuesday 7/20/2010**	**Monday 3/7/2011**	
30	Pre-installation surveys	3 wks	Tuesday 7/20/2010	Monday 8/9/2010	15
31	Prepare Install SOW	4 wks	Tuesday 8/10/2010	Monday 9/6/2010	30
32	OEM Ordering and Delivery (antennas)	10 wks	Tuesday 9/7/2010	Monday 11/15/2010	31
33	Installation Specifications	5 wks	Tuesday 8/10/2010	Monday 9/13/2010	30
34	Building Permit Cycle	60 days	Tuesday 9/14/2010	Monday 12/6/2010	33
35	Site Prep & Upgrades A/R	125 days	Tuesday 9/14/2010	Monday 3/7/2011	15,33
36	**Antenna Installation & Path Align**	**176 days**	**Tuesday 3/8/2011**	**Monday 11/7/2011**	
37	Mobilization / Delivery to Site	12 days	Tuesday 3/8/2011	Wednesday 3/23/2011	32,35
38	Site 1	3 days	Thursday 3/24/2011	Monday 3/28/2011	37
39	Site 2	3 days	Tuesday 3/29/2011	Thursday 3/31/2011	38
40	Site 3	3 days	Friday 4/1/2011	Tuesday 4/5/2011	39
41	Site 4	3 days	Wednesday 4/6/2011	Friday 4/8/2011	40
42	Site 5	3 days	Monday 4/11/2011	Wednesday 4/13/2011	41
43	Site 6	3 days	Thursday 4/14/2011	Monday 4/18/2011	42
44	Site 7	3 days	Tuesday 4/19/2011	Thursday 4/21/2011	43
45	Site 8	3 days	Friday 4/22/2011	Tuesday 4/26/2011	44
46	Site 9	3 days	Wednesday 4/27/2011	Friday 4/29/2011	45
47	Site 10	3 days	Monday 5/2/2011	Wednesday 5/4/2011	46
48	Site 11	3 days	Thursday 5/5/2011	Monday 5/9/2011	47
49	Site 12	3 days	Tuesday 5/10/2011	Thursday 5/12/2011	48
50	Site 13	3 days	Friday 5/13/2011	Tuesday 5/17/2011	49
51	Site 14	3 days	Wednesday 5/18/2011	Friday 5/20/2011	50
52	Site 15	3 days	Monday 5/23/2011	Wednesday 5/25/2011	51
53	Eq.& Hop checks, less INT and TCC	15 days	Thursday 5/26/2011	Wednesday 6/15/2011	52,75
54	**INT and TCC available**	**1 day**	**Saturday 10/29/2011**	**Saturday 10/29/2011**	
55	Site 16 - INT Dish and Line	3 days	Monday 10/31/2011	Wednesday 11/2/2011	54
56	Site 17-TCC Dish and Line	3 days	Thursday 11/3/2011	Monday 11/7/2011	55
57	**Radio Install, Interconnect wiring**	**59 days**	**Thursday 12/23/2010**	**Tuesday 3/15/2011**	
58	Mobilization / Delivery	8 days	Thursday 12/23/2010	Monday 1/3/2011	27
59	Site 1	3 days	Tuesday 1/4/2011	Thursday 1/6/2011	58
60	Site 2	3 days	Friday 1/7/2011	Tuesday 1/11/2011	59
61	Site 3	3 days	Wednesday 1/12/2011	Friday 1/14/2011	60
62	Site 4	3 days	Monday 1/17/2011	Wednesday 1/19/2011	61
63	Site 5	3 days	Thursday 1/20/2011	Monday 1/24/2011	62
64	Site 6	3 days	Tuesday 1/25/2011	Thursday 1/27/2011	63
65	Site 7	3 days	Friday 1/28/2011	Tuesday 2/1/2011	64
66	Site 8	3 days	Wednesday 2/2/2011	Friday 2/4/2011	65
67	Site 9	3 days	Monday 2/7/2011	Wednesday 2/9/2011	66

Miami-Dade Microwave Project Task List

ID	Task Name	Duration	Start	Finish	Predecessors
68	Site 10	3 days	Thursday 2/10/2011	Monday 2/14/2011	67
69	Site 11	3 days	Tuesday 2/15/2011	Saturday 2/19/2011	68
70	Site 12	3 days	Friday 2/18/2011	Tuesday 2/22/2011	69
71	Site 13	3 days	Wednesday 2/23/2011	Friday 2/25/2011	70
72	Site 14	3 days	Monday 2/28/2011	Wednesday 3/2/2011	71
73	Site 15	3 days	Thursday 3/3/2011	Monday 3/7/2011	72
74	Site 16	3 days	Tuesday 3/8/2011	Thursday 3/10/2011	73
75	Site 17	3 days	Friday 3/11/2011	Tuesday 3/15/2011	74
76	**System Test and Acceptance**	**209 days**	**Wednesday 3/16/2011**	**Friday 12/30/2011**	
77	Equipment "Burn In"	166 days	Wednesday 3/16/2011	Tuesday 11/1/2011	75
78	Site by Site Equipment Tests	8 days	Wednesday 11/2/2011	Friday 11/11/2011	77
79	Hop by Hop Tests	8 days	Monday 11/14/2011	Wednesday 11/23/2011	78
80	Loop Tests w/BER	2 days	Thursday 11/24/2011	Friday 11/25/2011	79
81	Acceptance Test Plan w/MDC	9 days	Monday 11/28/2011	Thursday 12/8/2011	80
82	Punch List / clean up	3 wks	Friday 12/9/2011	Thursday 12/29/2011	81
83	Final Acceptance Sign Off	1 day	Friday 12/30/2011	Friday 12/30/2011	82

Section 3. Pricing Summary and Payment Terms

The price for the system and services described is as follows. Pricing is consistent with Existing Miami- Dade Contract BW7514-15/24-2.

Microwave System

Description	Price
Microwave equipment and services to install microwave system	**$5,959,948.00**

Milestones for Contract Price of $5,959,948.00

Customer will make payments to Motorola within forty-five (45) days after the date of each invoice. Customer will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution and in accordance with the following milestones. Overdue invoices will bear simple interest at the maximum allowable rate.

1. 15% of $5,897,948 upon Contract Design Review (CDR);
2. 30% of $5,897,948 upon Equipment Delivery Acceptance
3. 30% of $5,897,948 upon completion of installation
4. 15% of $5,897,948 upon completion of Acceptance Test Plan (ATP);
5. 10% of $5,897,948 upon final acceptance
6. $62,000 upon P25 integration or December 31, 2014.

Motorola will invoice for delivery of equipment on a site-by-site basis, when 100% of a respective site's equipment is "delivery accepted", per the schedule in the following page. Motorola will also invoice installations on a site-by-site basis, when 100% of a respective site's installation is completed, per the schedule in the following page. Acceptance of delivery cannot be unreasonably withheld. The County shall inventory and accept the equipment within 5 days of delivery.

Due to the unique nature of this project, the payment milestones have been modified from section 9.4A – Phase 1 of the contract. These terms are an exception to the standard outline in section 9.4A and will only be applicable to this option. These terms may not be carried forward to future options or work outside of the scope of the Microwave System.

Site Name		Milestone 2 - Equipment Delivery Acceptance
TCC	Telecommunications Control Center	$218,076
CAB	County Administration Building	$169,150
INT	Interama	$88,018
PSN	Palm Springs North	$87,132
MIA	Miami International Airport	$62,500
TG	Trail Glades	$166,918
RNAS	Richmond Naval Air Station	$87,153
K&B	Krome and Bauer	$147,696
PRYD	Palmetto Rail Yard	$87,803
ICT	Industrial Communications Tower	$87,294
HH	Hialeah Hospital	$86,204
SWM	Solid Waste Management	$86,924
HWT	Homestead Water Tower	$64,386
TGK	Turner Guilford Knight	$86,443
KEY	Key Biscayne	$69,270
MET	Metropolis	$86,558
FS9	Fire Station 9	$87,858
	TOTAL	**$1,769,384**

Site Name		Milestone 3 - Equipment Installation
TCC	Telecommunications Control Center	$218,076
CAB	County Administration Building	$169,150
INT	Interama	$88,018
PSN	Palm Springs North	$87,132
MIA	Miami International Airport	$62,500
TG	Trail Glades	$166,918
RNAS	Richmond Naval Air Station	$87,153
K&B	Krome and Bauer	$147,696
PRYD	Palmetto Rail Yard	$87,803
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KEY	Key Biscayne	$69,270
MET	Metropolis	$86,558
FS9	Fire Station 9	$87,858
	TOTAL	**$1,769,384**

Section 4. Warranty and Maintenance Support

4.1 Overview

Motorola has the most comprehensive service organization in the Land Mobile Industry. Since 1947, Motorola has been building a unique service team: national in scope, but local in its ability to respond to our customers' diverse needs. As product and systems complexity evolve, the Motorola Radio Products and Service Division responds with new service products and programs. This approach ensures Miami Dade County that Motorola will remain at the cutting edge of service delivery and maintainability.

4.2 Warranty Service Program Review

During the first year after system acceptance, Motorola will provide a warranty and maintenance program that will deliver state-of-the-art system service focused on achieving responsive service, maximum system operation, and optimum reliability. The program will commence upon system acceptance and consist of a full one-year parts and labor warranty, and preventive and emergency maintenance services.

The Service program combines the services of our Local System Service Team, our Local Subcontractor Team, and the National Service Team for technical, engineering, and administrative support. This approach allows for maximum utilization of resources.

4.2.1 Dispatch Service

The System Support Center (SSC) Call Center Operations (CCO) is the central point of contact for customer service requests. Their function is to manage all incoming service request calls. Each call is tracked and monitored, from beginning to end, via the case management process.

Our customer support representatives are trained on the multiple system platforms offered by Motorola. The team tracks the case status and ensures that all personnel involved, in the resolution process, have access to the necessary information. In the event that difficulty is experienced in the case management process, the customer support representative may escalate the issue to the appropriate service management team. Our goal is to resolve the issue as quick as possible and ensure continued customer satisfaction.

Miami-Dade ETSD will be the liaison for all trouble reports. Miami-Dade ETSD will also provide escort needed for troubleshooting or repair.

4.2.2 On-Site Infrastructure Response

On-site Infrastructure Response provides for on-site response as determined by pre-defined severity levels and response times. Severity 1 issues are dispatched twenty-four (24) hours a day, three hundred sixty five (365) days a year, including holidays. On Site response will be provided by the Motorola Field Service Organization.

Severity Definitions

Severity Level	Problem Types
Severity 1	▪ **Response is provided Continuously** ▪ Major System failure ▪ 33% of System down ▪ 33% of Site channels down ▪ Site Environment alarms (smoke, access, temp, AC power. ▪ This level is meant to represent a major issue that results in an unusable system, sub-system, Product, or critical features from the Customer's perspective. No Work-around or immediate solution is available.
Severity 2	▪ Response during Standard Business Day ▪ Significant System Impairment not to exceed 33% of system down ▪ System problems presently being monitored ▪ This level is meant to represent a moderate issue that limits a Customer's normal use of the system, sub-system, product, or major non-critical features from a Customer's perspective
Severity 3	▪ Response during Standard Business Day ▪ Intermittent system issues ▪ Information questions ▪ Upgrades/Preventative maintenance ▪ This level is meant to represent a minor issue that does not preclude use of the system, sub-system, product, or critical features from a Customer's perspective. It may also represent a cosmetic issue, including documentation errors, general usage questions, recommendations for product enhancements or modifications, and scheduled events such as preventative maintenance or product/system upgrades.

Response Times:

Severity 1 – Within 2 hours from receipt of notification, continuously 24x7

Severity 2 - Within 4 hours from receipt of notification, standard business day

Severity 3 - Within 24 hours from receipt of notification, standard business day

4.2.3 Infrastructure Repair

In the event that the Motorola Field Service Organization finds a malfunctioning board/unit at the site location, they will contact CCO to request a Return Authorization (RA) number. The malfunctioning board/unit is then shipped to the SSC for repair.

Upon receipt of malfunctioning equipment, the SSC will conduct a full system test and repair to the malfunctioning boards/units. The repairs are done down to the component level utilizing automated test equipment. A system test is performed to ensure that all software and hardware is set to current customer configuration. If Motorola does not manufacture the unit, the unit may be returned to the Original Equipment Manufacturer (OEM) for repair.

Once the equipment is received from the SSC, Motorola Service will either re-install the equipment or return to your spare inventory.

4.2.4 Technical Support

Telephone Technical Support for the microwave system is available 24 hours a day, 7 days a week, including holidays. The telephone technical support staff works in conjunction with the Motorola Field Service Organization to address any service support issues related to the microwave system.

4.2.5 Post Warranty (Maintenance) Support Pricing

During the post warranty (maintenance) support period Motorola will deliver the following services:

- Dispatch Service
- 24 x 7 On Site Support
- Infrastructure Board Repair
- Telephone Technical Support

The cost of these services starting year 2 after the warranty support period is:

- Year 2 - $339,677
- Year 3 - $349,686
- Year 4 - $385,364
- Year 5 – $396,925

SECTION 5. ACCEPTANCE TEST PLAN

Acceptance Test Plan

Network Engineering

Release 3.0

MIAMI-DADE COUNTY

MOTOROLA

MICROWAVE SYSTEM

NA-G01134

AVIAT NETWORKS		***MIAMI -DADE COUNTY***	
Prepared By:	Dennis Hartzog	***Approved By:***	
Title:	Building Studies Engineer	***Title:***	
Date:	4/28/2010	***Date:***	
Approved By:	Philippe Pagnier	***MOTOROLA***	
Title:	Engineering Manager	***Approved By:***	Harry Woodworth
Date:	4/28/2010	***Title:***	Project Manager
		Date:	4/29/2010

Issue Releases

Issue Number	Issue Release Date	Changes	Preparer
1.0		Initial Release	S. Dube
2.0	4/22/2010	Revised	S. Dube
2.0	4/28/2010	Revised per customer request	D. Hartzog

TABLE OF CONTENTS

1. INTRODUCTION

1.1. PURPOSE OF DOCUMENT

Aviat Networks (Aviat) provides for the installation and commissioning of a new digital microwave radio system (18 hops) for Miami - Dade County located in and around Miami, Florida. The purpose of this document is to outline a method of procedure to be used to test the Motorola / Dade County Microwave System at the hop level as well as at the system level.

1.2. RESPONSIBILITIES

Aviat Networks performs the testing of all microwave radios and associated Aviat provided ancillary or supporting equipment.

Motorola and Miami Dade County will witness and sign off on the successful completion of the Field Acceptance Tests.

Future cutover of traffic will be coordinated with Fire and Police users AFTER completion of the System Testing, and is not included in this test document.

1.3. SYSTEM DESCRIPTION

The new proposed microwave radio system consists of eighteen (18) hops of IRU 600 radios (11 & 6 GHz), DC rectifiers, batteries, dehydrators, DSX cross connect panels, Adtran multiplexers, and ProVision Network Management System (NMS). All radios in the new network will have an air-link capacity of 1xOC3 (157Mbps). Radios and antenna systems will be installed by Aviat Networks.

In this system, the following equipment is to be tested following installation:

- IRU600 6/11 GHz Digital Microwave Radios
- Eclipse Intelligent Node Units (INU)
- Andrew Antenna Systems
- Adtran OPTI-6100 SONET Multiplexers
- C&D Batteries and Chargers
- Digital Order Wire System

1.4. SYSTEM LOCATION AND LIST OF SITES

The system is located in the State of Florida, in and around Miami-Dade County. The sites are as follows:

Homestead (HWT)	Krome & Bauer (K&B)	Telecom Center (TCC)
County Admin Bldg. (CAB)	Solid Waste (SWM)	Interama (INT)
Industrial Communication(IC)	Key Biscayne (KEY)	Palm Springs (PSN)
Hialeah Hospital (HH)	Palmetto Rail (PRYD)	MIA
Trail Glade (TG)	TGK Jail	Metropolis (MET)
Richmond (RNAS)	Fire Station 9 (FS9)	

1.5. REFERENCE DRAWINGS AND OTHER DOCUMENTS

The following documents will be used during the testing and will be supplied by Aviat Networks or the Customer:

- IRU600 and Eclipse User Manual
- Installation and Operation Manuals for Adtran OPTI-6100 SONET MUX
- Digital Order Wire Installation and User Manual
- Radio factory test sheets
- Installation and Operating Instructions for C&D Chargers and Batteries
- System Layout
- Factory Test Data Sheets
- Field Test Data Sheets
- Statement of Work
- Path Calculations
- Frequency Coordination Sheets
- Installation Specification
- Installation Completion Report

2. STANDARD TEST EQUIPMENT

In addition to the standard test equipment suggested below, a laptop PC loaded with the *ECLIPSE PORTAL* diagnostic software must be available on-site when performing the outlined test procedures in this document. This provides access to the Eclipse radio's on-board diagnostics and real-time performance monitoring tools.

All test equipment will have a current Calibration certification, if applicable.

2.1. VOLTAGE AND DIGITAL RF TEST

The Voltage and Digital Radio Frequency (RF) portion of the tests will use the following test equipment:

2.1.1. Digital Multimeter - measures rack DC voltages.

2.1.2. RF Power Meter - measures transmitter output power.

2.1.3. Low / Medium Power Sensor or Head - used in conjunction with the RF Power Meter.

2.1.4. Sweep Gear – used in sweeping the waveguide runs terminated by antenna within frequency range and record the results.

2.1.5. Calibrated attenuators – 11 GHz and 6 GHz – for fade testing.

2.2. BIT ERROR RATE TEST (BERT)

The Bit Error Rate (BER) Test will use the following test equipment:

2.2.1. Bit Error Rate Test Set for T1 and OC3 tester - measures BER.

2.2.2. Printer for the Bit Error Rate test results.

2.3. ETHERNET TESTS

Ethernet tests will use the following test equipment:

2.3.1. Agilent Framescope 350 or any equivalent with RFC2544 (Industry accepted standard for Ethernet testing) support for Throughput and Latency, (delay), testing as a minimum.

2.3.2. Printer for Ethernet test results.

3. TESTING

3.1. FIELD TEST PLAN OVERVIEW

Equipment and System Field Testing is conducted on all Aviat Networks-supplied equipment and other ancillary equipment to demonstrate compliance with product and contract specifications. These Field Tests repeat the equipment and system level factory tests, and system staging tests, done prior to shipment.

Equipment and System Testing consists of Five Phases listed below. Miami Dade County staff are encouraged to participate in these tests and sign all data sheets to verify participation and observation of the recorded data.

At the completion of Equipment level and Hop level tests, all equipment will be left powered up. Due to tower delays with TCC and INT sites, all the equipment will have close to six months of power on "burn in" prior to the final End to End Tests.

3.1.1. **Equipment Inspection and Rack Test**

- Visual mechanical inspection of installed equipment.
- DC Power
- Transmit (TX) Output Power
- Received Signal Level (RSL)
- Receive (Rx) Threshold Verification

3.1.2. **OEM Equipment Test**

- Test the –48VDC power plant system (C&D chargers and batteries)
- Test the antenna, waveguide and pressurization systems (Andrew Equipment)
- Test the Adtran OPTI-6100 SONET Multiplexer for alarm continuity using the manufacturer's Installation Manual.
- Test the digital order wire call functions to verify communications to all sites in the network from a single site.

3.1.3. **Hop Test**

- This test is performed in conjunction with the final alignment of the antennas in each hop. It verifies the proper site to site operation of the MW system.

3.1.4. **Ethernet Testing**

- Perform Throughput and Latency, (delay), Testing per RFC2544.

3.1.5. **System End-to-End "LOOP" Test**

- After all hops are tested and established, the System End-to-End Test commences.

3.2. EQUIPMENT INSPECTION AND RACK TEST

Upon completion of the system installation, the first phase of the Equipment and System Testing commences. This test phase verifies all Aviat Networks equipment wiring including alarm and control points, DC power, transmitter power and equipment configuration setup, ("strapping"). Test results are recorded on Field Test Data / Hop Test Forms.

Use the following instructions to perform the Rack Testing and record the results in the corresponding fields on the Field Test Data / Hop Test form for each site:

3.2.1. Perform a visual mechanical inspection of all installed equipment and cabling at the site. Note any deficiencies on the Site Punchlist.

3.2.2. DC Voltages = -48V (-40.5 to -60)

3.2.2.1. Measure Source Voltage on the power terminal block located on the back of the Fuse & Alarm panel at the top of the rack.

3.2.2.2. Verify the redundancy of the power supply if INdoor Unit (INU) is fitted with the Node Protection Card (NPC). Power protection switching is hitless.

3.2.2.2.1. Ensure that the Eclipse INU is powered up and radio links are operational.

3.2.2.2.2. Ensure that the NCC and NPC Status LED is green. The NPC Protect LED is unlit.

3.2.2.2.3. Disconnect the -48Vdc connector from the NCC card. Eclipse should not lose power. Power is now provided by the NPC.

3.2.2.2.4. Reconnect power to the NCC.

3.2.2.3. Enter the DC Voltage (VDC) reading for in the appropriate field on the Field Test Data / Radio Hop Test form.

3.2.3. Transmitter (Tx) Power Output

Refer to the IRU600 Transmitter output power specification sheet for the expected Tx output power level as per modulation configuration of the RFU under test.

3.2.3.1. Measure Tx power (Main & Standby Tx) using a power meter connected to the Tx output ports of the IRU600 RF unit. Determine Tx power at Top of the Rack (TOR) using coupler calibration given in factory test sheets.

3.2.3.1.1. Zero out and calibrate the power meter and set correct power factor setting for the frequency band under test.

3.2.3.1.2. Attach a 20dB attenuator to the power sensor and enter it's attenuation as the Power Meter offset.

3.2.3.1.3. Remove the ACU front panel cover of the IRU600 shelf.

3.2.3.1.4. In the Portal Diagnostics/System/Controls screen, send a Tx mute to the RFU under test.

3.2.3.1.5. Disconnect the RFU Tx output cable and connect the power sensor (with 20dB attenuator) to the RFU Tx output.

3.2.3.1.6. In the Portal Diagnostics/System/Controls screen, turn off Tx mute and click send.

3.2.3.1.7. Record power level. Tx power setting can be adjusted in the Portal radio plug-in screen in 0.1 dB steps. Tx power output accuracy is +/- 2dB.

3.2.3.1.8. Compare the measured Tx output power to the Detected Tx power displayed in Portal.

3.2.3.1.9. To measure the Tx output level of the Standby radio, send a Tx protection switch to the secondary radio using Portal. Repeat steps 3.2.3.1.4 to 3.2.3.1.9 above.

3.2.3.2. Enter the Transmitter Power Output for the Main and Standby radios in the appropriate fields on the Field Test Data / Radio Hop Test form.

3.2.4. Received Signal Level (RSL)

3.2.4.1. Measure top of rack (TOR) RSL at receiver filter output with power meter.

3.2.4.2. Compare RSL TOR to path calculation (must be within +/- 2dB of calculated value). Compare RSL measurement to the RSL level measured by Portal in the radio Performance screen.

3.2.5. Receive (Rx) Threshold Verification (Fade Margin)

3.2.5.1. Perform measurements by inserting a calibrated variable attenuator between the RFUs main Rx input and the main filter Rx output.

3.2.5.1.1. Measure insertion loss (Idb) of calibrated variable attenuator equipped with SMA cables at minimum attenuation.

3.2.5.1.2. Mute the far end Tx.

3.2.5.1.3. Insert variable attenuator assembly between input of main Rx input and the filter Rx output.

3.2.5.1.4. Un-mute the far end Tx.

3.2.5.1.5. Connect BER tester to DS1 port looped back at far end site and check DS1 continuity and absence of errors.

3.2.5.1.6. Increase variable attenuator down to 10-6 BER and note attenuation (AdB).

3.2.5.1.7. Calculate fade margin (dB) : FM = AdB (attenuation) + IdB (insertion loss)

3.2.5.1.8. Repeat test inserting the variable attenuator between the Standby Rx input and the filter Rx output.

3.2.5.1.9. Compare to margin given in path calculation (must be +/- 2dB from calculation).

3.2.5.1.10. Record results on the Field Test Data / Radio Hop Test form.

3.3. OEM EQUIPMENT TESTING

Other vendor's equipment (chargers and batteries, etc.) which are integrated with or support the Aviat Networks radios in the over-all system will be tested using the manufacturer's installation manuals.

3.3.1. Test the –48VDC power plant system (C&D chargers and batteries) for proper voltage and alarm continuity using the manufacturer's Installation Manual. Indicate Pass / Fail on the Field Test Data / Radio Hop Test form.

3.3.2. Test the antenna, waveguide and pressurization systems (Andrew Equipment) for leaks and ability to maintain proper pressurization, using the manufacturer's Installation Manual.

3.3.2.1. Perform a sweep test of the waveguide to verify that the transmission system will work at coordinated frequencies. Passing criteria is a return loss of > 20 dB at the coordinated frequency. Print out and attach the sweep test results to the Field Test Data / Radio Hop Test form.

3.3.2.2. Perform a four (4) hour pressure test of the waveguide and antenna system.

3.3.2.2.1. Shut off the gas distribution manifold valve to antenna being tested.

3.3.2.2.2. Record the starting pressure in pounds per square inch (psi) on the Field Test Data / Radio Hop Test form.

3.3.2.2.3. After four (4) hours record the finishing pressure (psi) on the Field Test Data / Radio Hop Test form.

3.3.2.2.4. A pressure loss of >/= 1 psi is within tolerance.

3.3.3. Test the Adtran OPTI-6100 SONET multiplexer.

3.3.3.1. Verify the alarm continuity using the manufacturer's Installation Manual.

3.3.3.2. Verify Provisioning of circuits using T1 plan.

3.3.3.3. Verify the timing of the multiplexers using the established sync plan.

3.3.3.4. Indicate Pass / Fail on the Field Test Data / Radio Hop Test form.

3.3.4. Test the Digital Order Wire, (DOW), to verify that communications to all sites is possible from any site/node that is part of a ring.

3.3.4.1. Perform an "all call" function for verification that all DOW units in each site in the network will receive the signal and will ring.

3.3.4.2. Perform a selective calling function to verify that only one site will ring when it's respective number is dialed.

3.3.4.3. Force a path failure at the East direction of a ring node/site to verify that DOW communication is still possible to all sites when the loop is working on the West direction.

3.3.4.4. Indicate Pass / Fail on the Field Test Data / Radio Hop Test form.

3.4. HOP TEST

This test is performed after the final alignment of the antennas for each hop. Once the Equipment Inspection and Rack Testing is completed, a short 1 hour Bit Error Rate (BER) test is performed on the hop at the OC-3 level. Test results are recorded on Field Test Data / Radio Hop test Forms.

Performance Objective: 1 x 10-10 BER one-way, under no fade conditions.

Use the following instructions to perform the Hop Testing:

3.4.1. For the Main radio perform a one (1) hour Bit Error Rate (BER) Test at the OC-3 level for the provisioned OC-3. Record the results on the Field Test Data / Radio Hop Test datasheet. Attach BER Test printouts to Field Test Data / Radio Hop Test datasheet. *Performance Objective: 1 x 10^{-10} BER one-way unfaded.*

3.4.2. For the Standby radio (if applicable) perform a one (1) hour Bit Error Rate (BER) Test at the OC-3 level for the provisioned OC-3. Record the results on the Field Test Data / Radio Hop Test datasheet. Attach BER Test printouts to Field Test Data / Radio Hop Test datasheet. *Performance Objective: 1 x 10^{-10} BER one-way unfaded.*

3.4.3. Simulate a failure of the Main Transmitter and verify switching to Standby per hop (if applicable).

3.4.4. The Aviat Networks Field Engineer and the Customer Representative must sign and date the Field Test Data / Radio Hop Test datasheets for each radio. The Aviat Networks Field Engineer will make copies of the signed documents to submit to the Aviat Networks Project Manager and submit the originals to the Customer for Final System Acceptance.

3.5. ETHERNET TESTING

For this system, the throughput and latency measurement will be measured per hop. The Ethernet tester will be connected to the Adtran OPTI-6100 multiplexer Ethernet module 10/100 Base-T port or 1000 Base-T port. The OPTI multiplexers Ethernet ports and the tester ports speed and duplex be set to fixed 100Mbps Full Duplex or 1000Mbps Full Duplex.

Ethernet Test will cover the following:

3.5.1. Throughput Testing

3.5.1.1. The goal of the throughput test is to determine the rate at which the test can run without losing frames and to measure the throughput over the specified period of time (duration). With this goal in mind the first thing the test set does is determine the rate at which it can run error free. It will start at the maximum bandwidth specified by the user and reduce it (if necessary) till it finds where the circuit runs error free. It will then run the test for the duration specified and

measure the throughput. The results will show a configured rate and a measured rate. The configured rate is the rate the unit determined was error free. This is the rate it transmitted during the test. The measured rate is what was received and measured.

3.5.1.2. The throughput test must be at least 60 seconds for each frame size; 64, 128, 256, 512, 1024, 1280 and 1518/1522/1526.

3.5.1.3. Record the results on the Ethernet Test datasheet.

3.5.2. Latency Testing

3.5.2.1. The Latency is measuring round trip delay. The number of trials and trial durations determine the amount of time the measurements are performed. Trials results are averaged together. The error free throughput rate determined in the throughput testing is the rate at which frames are transmitted during this test.

3.5.2.2. *The latency test must be 120 seconds and 20 measurements must be taken for each frame size; 64, 128, 256, 512, 1024, 1280 and 1518/1522/1526*

3.5.2.3. Record the results on the Ethernet Test datasheet.

3.5.3. The Aviat Networks Field Engineer and the Customer Representative must sign and date the Ethernet Test datasheet. The Aviat Networks Field Engineer will make copies of the signed documents to submit to the Aviat Networks Project Manager and submit the originals to the Customer for Final System Acceptance.

3.6. SYSTEM END-TO-END "LOOP" TEST

After all hops are tested and established, the System End-to-End Test commences. Orderwire circuits, if any will also be tested for system continuity at this time. One end of the system is used as the test site where the BER test set is connected. A DS1 circuit off the Adtran OPTI-6100 Multiplexer is selected and physically or electronically patched through at the middle and/or repeater sites to the far end site where the circuit is physically or electronically looped back. Test results are recorded on the System Acceptance Test datasheet.

System End-to-End Test will cover the following:

3.6.1. Perform a twenty-four (24)-hour BER (Bit Error Rate) Test at the DS1 level on the Main radio end-to-end with the DS1 looped back. Record the results on the System Acceptance Test. Attach BER printouts to System Acceptance Test datasheet.
Performance Objective: BER not to exceed test objective of N X 10^{-10}, where "N" is equal to the number of radio hops, (i.e. for a single hop looped at one end, N=2; for two hops looped at one end, N=4, and so on).

3.6.2. Perform a twenty-four (24)-hour BERT (Bit Error Rate Test) at the DS1 level on the Standby radio end-to-end with the DS1 looped back. Record the results on the System Acceptance Test. Attach BER printouts to System Acceptance Test datasheet.
Performance Objective: BER not to exceed test objective of N X 10^{-10}, where "N" is equal to the number of radio hops, (i.e. for a single hop looped at one end, N=2; for two hops looped at one end, N=4, and so on).

3.6.3. Where applicable, simulate a failure on the Main radios and verify switching to the Standby radios. Record the results on both the System Acceptance Test datasheet indicating Pass / Fail.

3.6.4. Verify operation of IRU 600 equipment alarms through radio C-dry alarm contacts. Record the results on both the System Acceptance Test datasheet indicating Pass / Fail.

3.6.5. The Aviat Networks Field Engineer and the Customer Representative must sign and date the System Acceptance Test datasheet. The Aviat Networks Field Engineer will make copies of the signed documents to submit to the Aviat Networks Project Manager and submit the originals to the Customer for Final System Acceptance.

4. CUSTOMER SYSTEM ACCEPTANCE

After all testing has been successfully completed and the required test documents have been signed and dated, the Aviat Representative and the Customer Representative Authorized to Accept the System will complete, sign and date the INSTALLATION / SERVICES COMPLETION REPORT enclosed in this document. All punch list items will be noted on this form prior to sign-off of the system.

5. FIELD TEST DATA FORMS

Enclosures:

- IRU 600 Field Test Data / Radio Hop Test
- Ethernet Test
- IRU 600 System Acceptance Test
- Installation Completion Report

Aviat NETWORKS

IRU 600
Field Test Data / Radio Hop Test

Customer: _____ SO #: _____

Project: _____

Site Name: _____ Rack #: _____

Radio # ☐ #1 ☐ #2 ☐ #3 ☐ #4 Facing Site _____

3.2.1	**Visual Mechanical Inspection:** Verify the physical installation of all Aviat Networks provide equipment at the site. Record deficiencies in Comments Section below.			INITIAL
3.2.2	**Measure Source Voltage:** -48VDC (-40.5 to -60)			VDC
	Verify Power Redundancy of the Node Protection Card (NPC)			Pass/Fail
3.2.3	**Transmitter Power Output:**	Main		dBm
		Standby		dBm
3.2.4	**RSL:** Measured	Main		dB
	Portal Reading	Main		dB
	Measured	Standby		dB
	Portal Reading	Standby		dB
3.2.5	**Rx Threshold Verification** Measured	Main		dB
	Path Calculation Value (+/- 2 dB)	Main		dB
	Measured	Standby		dB
	Path Calculation Value (+/- 2 dB)	Standby		dB
3.3.1	**Charger System Results:** test per mfr Install Manual			Pass/Fail
	Battery System Results: test per mfr Install Manual			Pass/Fail
3.3.2	**Waveguide Sweep Testing:** Verify Return Loss > 20 dB for the waveguide / antenna system.	RL		dB
	Waveguide Pressure Test: Shut off air supply for a period of 4 hrs and monitor pressure drop (>/= 1 psi is passing).			Start psi
				Finish psi
3.3.3	**Adtran OPTI-6100 SONET multiplexer**	Verify Alarm Continuity		Pass/Fail
		Verify T1 Provisioning		Pass/Fail
		Verify Multiplexer Timing		Pass/Fail
3.3.4	**Digital Order Wire**	Perform an "All Call"		Pass/Fail
		Perform a Selective Call		Pass/Fail
		OW works with single path failure		Pass/Fail
3.4	**Bit Error Rate Test (BERT) — 1 Hour – OC3**	Main		
	Objective: ≤ 1x 10^{-10}, one way, unfaded.	Standby		
	Transmitter Switch Test (if applicable)			Pass/Fail

COMMENTS:

	Miami-Dade County Representative		**Aviat Networks Representative**		**Motorola Representative**
Signed:		Signed:		Signed:	
Name:		Name:		Name:	
Title:		Title:		Title:	
Date:		Date:		Date:	

Aviat NETWORKS

IRU 600
Ethernet Test

Customer: _____ SO #: _____

Project: _____

Site Name: _____ Rack #: _____

Radio # ☐ #1 ☐ #2 ☐ #3 ☐ #4 Facing Site _____

3.5.1 Throughput Results

Frame Size (Bytes)	Throughput (Mbps)	Error Free Yes / No
64		
128		
256		
512		
1024		
1518		

3.5.2 Latency Results

Frame size	Latency (ms)
64	
128	
256	
512	
1024	
1518	

COMMENTS:	

	Miami-Dade County Representative		**Aviat Networks Representative**		**Motorola Representative**
Signed:		Signed:		Signed:	
Name:		Name:		Name:	
Title:		Title:		Title:	
Date:		Date:		Date:	

Aviat NETWORKS

IRU 600
System Acceptance Test

Customer: _____ SO #: _____

Project: _____

3.6.1	**BERT (Bit Error Rate Test) – Primary - 12 Hour (DS1)**	A1		
	Objective: BER not to exceed N x 10^{-10} (The number N is derived			
	From the number of hops X 2 for a looped condition).1-way unfaded.			
3.6.2	**BERT (Bit Error Rate Test) – Standby - 4 Hour (DS1)**	A2		
	Objective: BER not to exceed N x 10^{-10} (The number N is derived			
	From the number of hops X 2 for a looped condition).1-way unfaded.			
3.6.3	**Protection Switching:** Simulate an equipment failure and verify			
	protection switching. Failure of Primary Transmitter			Pass/Fail
3.6.4	**Verify IRU 600 Alarms through radio alarm contacts**			Pass/Fail
	Verify operation of radio via Provision.			
	Confirm network layout on Provision screen.			Pass/Fail
	Compare radio site reading to Provision readings.			Pass/Fail
	Perform traffic switching operations on equipment is reported on Provision.			Pass/Fail
	Fail component and verify status on Provision.			Pass/Fail
3.6.5	Submit Radio Hop Test & System Acceptance Test completion forms to customer for review and system acceptance.			INITIAL

COMMENTS:	

	Miami-Dade County Representative		**Aviat Networks Representative**		**Motorola Representative**
Signed:		Signed:		Signed:	
Name:		Name:		Name:	
Title:		Title:		Title:	
Date:		Date:		Date:	

Aviat
NETWORKS

AVIAT NETWORKS
INSTALLATION / SERVICES COMPLETION REPORT

Aviat Sales Order:		**Site Name:**	
Customer:		**Project Name:**	

Equipment / Services:

The Aviat supplied microwave equipment has been completely installed and tested and has been accepted for traffic use and/or all services contracted have been completed with the following exceptions:

(Use additional sheets if required)

	Miami-Dade County Representative		**Aviat Networks Representative**		**Motorola Representative**
Signed:		Signed:		Signed:	
Name:		Name:		Name:	
Title:		Title:		Title:	
Date:		Date:		Date:	

Section 6. Option to Remove Microwave Dishes

6.1 Overview

This option, as requested by Miami-Dade includes the removal of the old microwave dishes from the towers. This Statement of Work is an option to the proposal. This option may be executed at the County's discretion.

6.2 Statement of Work

- For the eight sites listed Table 1, Motorola will remove the MW Dish and the associated feedline.
- For each tower mounted Dish, the associated dish leg mount assembly will be removed.
- For the MIA and RNAS wall mounted Dishes, the wall mount assemblies will not be removed from the wall.
- Motorola will haul away and discard all removed materials from each site.
- Motorola tower crews will remove feedline from ice bridges as required, but will not enter sites to disconnect feedlines.
- It shall be the responsibility of Miami-Dade County to deactivate and disconnect the MW lines being removed.
- The work may be scheduled on a site by site basis, with 10 working days advance notice to Motorola PM.
- Miami-Dade County is responsible to provide site access as needed and reseal the entry ports to its' sites.

TABLE 1 List of Microwave Equipment To Be Removed

Site Name	Dish Description	Approximate Feedline to be removed (Feet)	Elevation (Feet)	Type of Tower
Trail Glades	6'Dish	225	188	Self supporting
Interama	6'RFS Dish	250	209	Self supporting
Krome & Bauer	8'RFS Dish with Radome	350	301	Self supporting
Palm Springs North	PAR6-65A-PXA-6'Parabolic with radome – 6GHz	200	146	Self supporting
CAB	Quantity 2 – 6' Dishes	200	Rooftop	Rooftop
Airport	6'Dish	50	Rooftop	Flamingo Parking Lot
Richmond -NAS	6'RFS Dish	175	150/wall	Self supporting

TCC	6'RFS Dish	300	247	Self suppoting
TCC	6'RFS Dish	225	180	Self suppoting
TCC	6'RFS Dish	300	245	Self suppoting
TCC	6'RFS Dish	230	193	Self suppoting

6.3 Pricing

The price of this option is $48,910. This price is valid through June 30, 2011.

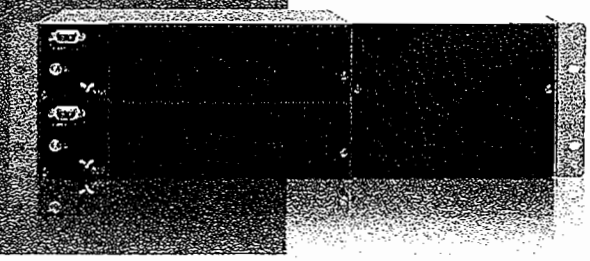
Price quoted reflects receipt of PO by June 30th, 2011, and sites available for completion of work by Dec 31st, 2011.

Section 7. Literature

IRU600™

HIGH PERFORMANCE, COMPACT INDOOR RADIO UNIT FOR ECLIPSE PACKET NODE™ – ENABLING IP NETWORK CONVERGENCE

The Aviat Networks IRU600 is the new generation indoor radio unit for the Eclipse Packet Node transport solution. It is future-focused to dramatically increase nodal and radio link native packet handling capacity to meet the transport requirements expected for 4G networks in North America.



Packet Node addresses the growing demands for high speed packet transport in next generation mobile backhaul networks. The IRU600 radio unit delivers unprecedented transmission performance, and industry-leading deployment flexibility so network operators can move quickly to deliver all-IP network performance ahead of growing market demands.

NEW GENERATION RADIO PLATFORM FOR IP NETWORK CONVERGENCE

The IRU600 is a new generation of Aviat Networks indoor radio that delivers market-leading performance, capacity and deployment flexibility in an ultra-compact form factor, with ultra-low power consumption.

DEPLOYMENT-READY FOR NORTH AMERICA

The IRU600 is designed to meet specific deployment requirements of North American operators, who often require indoor-mounted equipment for ease of integration and maintenance. The compact, modular design of the IRU600 is ideal where rack and shelter spaces are limited.

With both standard and high transmit power options, the IRU600 can be deployed for long-reach links. Even with high power transmitters, the IRU600 has industry-leading low power consumption. These space-and-energy saving features will be important to help meet green objectives for improving site energy efficiency.

The IRU600 leads the industry with an unparalleled number of choices of protection options along with nodal and repeater configurations. These choices provide network planners with immense flexibility, transforming their existing networks for new 4G mobile services and applications.

KEY FEATURES

- FCC Part 101, NTIA and Industry Canada frequencies L6/U6, 7/8, 10 and 11 GHz
- Software-configurable support for all-IP, all-TDM, or hybrid combination of both transports
- High capacity available per T/R, per polarization:
  - Up to 260 Mbit/s in 40 MHz
  - Up to 127xDS1 or 4xDS3 or OC-3
- Indoor, ultra-compact chassis design
  - 1+1 Protected RFU + ACU: 3 RMS height
- Standard and High Tx power available in same-sized 3 RMS chassis
- Optimized for performance and flexibility
- Built-in expansion port for simplified expansion, connection to existing radio antenna systems and network cutover
- Supports unpaired frequencies in all frequency bands
- M:N expandable with link aggregation for ultra-high capacities and advanced configurations
- Adaptive Coding & Modulation support up to 256QAM
- Optional frequency re-use with XPIC for high throughput link capacities
- 24/48 VDC operation

GENERAL IRU600 SPECIFICATIONS

GENERAL IRU600 SPECIFICATIONS				
Frequency Band options		L6, U6, 7, 8, 10, 11 GHz		
Capacity support per transceiver		12 - 261 Mbit/s Ethernet 8 - 127 DS1 1, 3, 4x DS3 1 x OC-3		
Modulation support		QPSK, 16, 32, 64, 128, 256 QAM		
STANDARDS COMPLIANCE				
EMC		FCC CFR 47, Part 15		
Operation		EN 300 019, Class 3.1E		
Storage		EN 300 019, Class 1.2		
Transportation		EN 300 019, Class 2.3		
Safety		UL 60950-1		
Radio Frequency		FCC CFR 47, Part 101, FCC CFR 47		
NEBS		GR-1089-CORE, GR-63-CORE		
ENVIRONMENTAL				
Operating Temperature		Guaranteed	-5° to +45° C (23° to +113° F)	
Humidity		Guaranteed	0 to 93%, non-condensing	
Altitude		Guaranteed	4,500 meters (15,000 ft)	
FAULT AND CONFIGURATION MANAGEMENT				
Protocol		SNMP v2 & v3		
Interface, electrical		Ethernet 10/100 Base-T or RS232		
Interface, physical		RJ-45		
Local/remote Configuration and Support Tool		Portal		
Performance Monitoring		ITU-T Rec. G.826		
Routing Protocols supported		Static and dynamic routing, RIP I, RIP II, OSPF		
Network Management		Aviat Networks ProVision		
Engineering Orderwire		Via optional VoIP handset or external RS-422 Digital Orderwire Unit		
EMISSION DESIGNATOR	**5 MHz**	**10 MHz**	**30 MHz**	**40 MHz**
QPSK	5M00G7W	10M0G7W	30M0G7W	40M0G7W
QAM	5M007W	10M0D7W	30M0D7W	40M0D7W
IF SPECIFICATIONS				
Intermediate Frequency	Transmit	311 MHz		
	Receive	126 MHz		
RFU/IRU INTERFACES				
IF cable connector		SMA		
RSSI monitor point		BNC		
DC Power Connector (High Tx Power Version Only)		2 pin D-SUB Power Type		
GENERAL TRANSMITTER SPECIFICATIONS				
Transmit Power Tolerance		± 1 dB		
Transmitter Source		Synthesized		
Frequency Stability		± 10 ppm		
Manual Transmitter Power Control range	QPSK	20 dB		
	16QAM	18 dB		
	32QAM	17.5 dB		
	64QAM	17 dB		
	128QAM	16 dB		
	256 QAM	14 dB		
	Resolution	0.1 dB steps		
	Display accuracy	± 2 dB		
Automatic Transmitter Power Control	Range	Configurable over full available manual attenuation range		
	Resolution / Speed	0.1 dB steps / 6 dB per second		
Transmitter Mute		> 50 dB		
Channel Selection		By software control within tuning range of RFU/ACU		
Synthesizer Resolution	Maximum	31.25 kHz		
GENERAL RECEIVER SPECIFICATIONS				
Receiver Source		Synthesized		
Frequency Stability		± 10 ppm		
Receiver Overload	BER = $1x10^{-4}$	-22 dBm		
Residual (Background) Bit Error Rate		Better than 10-13		
RSSI Accuracy	-40 to -70 dBm, +20 to +30oC	± 2 dB		
	25 to -85 dBm, -5 to +45oC	± 4 dB		
ELECTRICAL		**STANDARD POWER**		**HIGH POWER**
IRU600 1+1 Power Consumption	Typical	81 W		135 W
MECHANICAL	**SIZE (HXWXD)**			**WEIGHT**
IRU600 1+1	132mm (3RU) x 482mm (19in) x 335mm (13.18 in) (up to 412.5 mm with waveguide)			
RFU only				4.1 kg
RFsection in 3 RMS (2x RFU, ACU and chassis)				15 kg

All specifications are typical values unless otherwise stated, and are subject to change without notice.

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IRU600 PERFORMANCE SPECIFICATIONS

SYSTEM				L6/U6 GHz		7/8 GHz	10 GHz	11 GHz
Frequency Range, GHz				5.93 - 6.42, 6.43 - 7.125		7.125 - 7.9, 7.7 - 8.5	10.5 - 10.68	10.7 - 11.7
Standard T-R Spacings supported, MHz (Non-standard T-R options supported with spot tuned filters)				160, 170, 252.04, 340		150, 175, 300, 360	65	490, 500
Standard Frequency Assignments Supported per Regulatory Plans				FCC Part 101, SRSP 306.4		SRSP 307.1, SRSP 307.7 NTIA Red Book	FCC Part 101, SRSP 310.5	FCC Part 101, SRSP 310.7
Number of RFU Options per band per power level				L6 GHz - 2, U6 GHz - 2		7 GHz - 2, 8 GHz - 2	2	2
ANTENNA INTERFACE								
ACU Antenna Port Interface				CPR-137G		CPR-112G	CPR-90G	CPR-90G
TRANSMITTER POWER OUTPUT, GUARANTEED [4]				STD POWER	HIGH POWER	HIGH POWER	HIGH POWER	HIGH POWER
QPSK				28.50	32.50	32.00	26.50	27.50
16QAM - SG				28.50	32.50	32.00	25.50	27.50
16QAM - TP				26.50	30.50	30.00		25.50
32QAM				27.50	31.50	31.00		26.50
64 QAM - SG				27.50	31.50	31.00		26.50
64 QAM - TP				25.50	29.50	29.00		24.50
128QAM				26.50	30.50	30.00		25.50
256QAM - SG				25.50	29.50	29.00		24.50
256 QAM - TP				22.50	26.50	26.00		21.50
RECEIVER THRESHOLD, 10^{-6} BER, GUARANTEED								
3.75 MHz Channel								
Non-ACM	12 Mbit/s	8xDS1	32QAM	-84.00 dBm	-84.00 dBm	-83.50 dBm	-82.50 dBm	-83.00 dBm
5 MHz Channel								
Non-ACM	24 Mbit/s	16xDS1	128QAM	-77.00 dBm	-77.00 dBm	-76.50 dBm	-75.50 dBm	-76.00 dBm
10 MHz Channel								
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK	-92.50 dBm	-92.50 dBm	-92.00 dBm		-91.50 dBm
ACM - Maximum System Gain	23 Mbit/s	15xDS1	16 QAM	-86.50 dBm	-86.50 dBm	-86.00 dBm		-85.50 dBm
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM	-80.00 dBm	-80.00 dBm	-79.00 dBm		-78.50 dBm
ACM - Maximum System Gain	56 Mbit/s	36xDS1	256 QAM	-72.50 dBm	-72.50 dBm	-72.00 dBm		-71.50 dBm
ACM - Maximum Throughput	14 Mbit/s	9xDS1	QPSK	-90.00 dBm	-90.00 dBm	-89.00 dBm		-88.50 dBm
ACM - Maximum Throughput	29 Mbit/s	18xDS1	16 QAM	-82.50 dBm	-82.50 dBm	-82.00 dBm		-81.50 dBm
ACM - Maximum Throughput	44 Mbit/s	28xDS1	64 QAM	-76.00 dBm	-76.00 dBm	-75.50 dBm		-75.00 dBm
ACM - Maximum Throughput	61 Mbit/s	39xDS1	256 QAM	-67.00 dBm	-67.00 dBm	-66.50 dBm		-66.00 dBm
Non-ACM	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	-76.00 dBm	-76.00 dBm	-75.50 dBm		-75.00 dBm
Non-ACM	56 Mbit/s	36xDS1	256 QAM	-73.00 dBm	-73.00 dBm	-72.00 dBm		-71.50 dBm
30 MHz Channel								
ACM - Maximum System Gain	38 Mbit/s	24xDS1	QPSK	-88.00 dBm	-88.00 dBm	-87.50 dBm		-87.00 dBm
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM	-81.50 dBm	-81.50 dBm	-81.00 dBm		-80.50 dBm
ACM - Maximum System Gain	134 Mbit/s	87xDS1	64 QAM	-74.50 dBm	-74.50 dBm	-73.50 dBm		-73.00 dBm
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM	-68.00 dBm	-68.00 dBm	-67.00 dBm		-66.50 dBm
ACM - Maximum Throughput	45 Mbit/s	29xDS1	QPSK	-85.00 dBm	-85.00 dBm	-84.50 dBm		-84.00 dBm
ACM - Maximum Throughput	92 Mbit/s	59xDS1	16 QAM	-78.00 dBm	-78.00 dBm	-77.00 dBm		-76.50 dBm
ACM - Maximum Throughput	142 Mbit/s	91xDS1	64 QAM	-70.50 dBm	-70.50 dBm	-70.00 dBm		-69.50 dBm
ACM - Maximum Throughput	193 Mbit/s	124xDS1	256 QAM	-62.50 dBm	-62.50 dBm	-61.50 dBm		-61.00 dBm
Non-ACM	134 Mbit/s	87xDS1 or 3xDS3	64QAM	-74.50 dBm	-74.50 dBm	-73.50 dBm		-73.00 dBm
Non-ACM	155 Mbit/s	100xDS1	128QAM	-71.50 dBm	-71.50 dBm	-70.50 dBm		-70.00 dBm
Non-ACM		1xOC3	128QAM	-71.50 dBm	-71.50 dBm	-70.50 dBm		-70.00 dBm
Non-ACM High System Gain [6]		1xOC3	128QAM	-73.00 dBm	-73.00 dBm	-72.00 dBm		-71.50 dBm
Non-ACM	179 Mbit/s	115xDS1 or 4xDS3	256QAM	-67.50 dBm	-67.50 dBm	-66.50 dBm		-66.00 dBm
Non-ACM High System Gain [6]	179 Mbit/s	115xDS1 or 4xDS3	256QAM	-69.50 dBm	-69.50 dBm	-68.50 dBm		-68.00 dBm
40 MHz Channel								
ACM - Maximum System Gain	52 Mbit/s	33xDS1	QPSK			-86.00 dBm		-85.50 dBm
ACM - Maximum System Gain	105 Mbit/s	67xDS1	16 QAM			-79.50 dBm		-79.00 dBm
ACM - Maximum System Gain	173 Mbit/s	110xDS1	64 QAM			-73.00 dBm		-72.50 dBm
ACM - Maximum System Gain	241 Mbit/s	127xDS1	256 QAM			-66.50 dBm		-65.00 dBm
ACM - Maximum Throughput	61 Mbit/s	39xDS1	QPSK			-82.50 dBm		-82.00 dBm
ACM - Maximum Throughput	123 Mbit/s	79xDS1	16 QAM			-76.00 dBm		-75.50 dBm
ACM - Maximum Throughput	191 Mbit/s	123xDS1	64 QAM			-68.00 dBm		-67.50 dBm
ACM - Maximum Throughput	260 Mbit/s	127xDS1	256 QAM			-58.50 dBm		-58.00 dBm
Non-ACM	134 Mbit/s	87xDS1 or 3xDS3	32QAM			-75.00 dBm		-74.50 dBm
Non-ACM	155 Mbit/s	100xDS1	64QAM			-73.00 dBm		-72.50 dBm
Non-ACM		1xOC3	64QAM			-73.00 dBm		-72.50 dBm
Non-ACM	179 Mbit/s	115xDS1 or 4xDS3	64QAM			-71.50 dBm		-71.00 dBm

All specifications for the IRU600 are referenced to the antenna flange, are guaranteed values at room temperature (20 to 30°C, 68 to 86°F) unless otherwise stated, and subject to change without notice.
[1] Threshold values are for BER=10^{-6}.
[2] Ethernet/IP data capacities shown are approximate rates for mixed frame sizes. Up to 50% throughput improvement is possible using pre-suppression and header compression options.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet throughput figures shown.
[4] Guaranteed Values for Tx Power and Rx Threshold are derated by one dB each respectively over full operating temperature range.
[5] 3.75MHz 32QAM TxPower is derated by 1.5dB
[6] High System Gain Profiles have extended latency - contact Aviat Networks for details

IRU600 RF PERFORMANCE SPECIFICATIONS

SYSTEM GAIN, 10^{-6} BER, GUARANTEED				L6/U6 GHz		7/8 GHz	10 GHz	11 GHz
				STD POWER	HIGH POWER	HIGH POWER	HIGH POWER	HIGH POWER
3.75 MHz Channel								
Non-ACM	12 Mbit/s	8xDS1	32QAM	110.0 dB	114.0 dB	113.0 dB	107.5 dB	108.0 dB
5 MHz Channel								
Non-ACM	24 Mbit/s	16xDS1	128QAM	103.5 dB	107.5 dB	106.5 dB	101.0 dB	101.5 dB
10 MHz Channel								
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK	121.0 dB	125.0 dB	124.0 dB		119.0 dB
ACM - Maximum System Gain	23 Mbit/s	15xDS1	16 QAM	115.0 dB	119.0 dB	118.0 dB		113.0 dB
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM	107.5 dB	111.5 dB	110.0 dB		105.0 dB
ACM - Maximum System Gain	56 Mbit/s	36xDS1	256 QAM	98.0 dB	102.0 dB	101.0 dB		96.0 dB
ACM - Maximum Throughput	14 Mbit/s	9xDS1	QPSK	118.5 dB	122.5 dB	121.0 dB		116.0 dB
ACM - Maximum Throughput	29 Mbit/s	18xDS1	16 QAM	109.0 dB	113.0 dB	112.0 dB		107.0 dB
ACM - Maximum Throughput	44 Mbit/s	28xDS1	64 QAM	101.0 dB	105.0 dB	104.5 dB		99.5 dB
ACM - Maximum Throughput	61 Mbit/s	39xDS1	256 QAM	89.5 dB	93.5 dB	92.5 dB		87.5 dB
Non-ACM	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	103.5 dB	107.5 dB	106.5 dB		101.5 dB
Non-ACM	56 Mbit/s	36xDS1	256 QAM	98.5 dB	102.5 dB	101.0 dB		96.0 dB
30 MHz Channel								
ACM - Maximum System Gain	38 Mbit/s	24xDS1	QPSK	116.5 dB	120.5 dB	119.5 dB		114.5 dB
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM	110.0 dB	114.0 dB	113.0 dB		108.5 dB
ACM - Maximum System Gain	134 Mbit/s	87xDS1	64 QAM	102.0 dB	106.0 dB	104.5 dB		99.5 dB
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM	93.5 dB	97.5 dB	96.0 dB		91.0 dB
ACM - Maximum Throughput	45 Mbit/s	29xDS1	QPSK	113.5 dB	117.5 dB	116.5 dB		111.5 dB
ACM - Maximum Throughput	92 Mbit/s	59xDS1	16 QAM	104.5 dB	108.5 dB	107.0 dB		102.0 dB
ACM - Maximum Throughput	142 Mbit/s	91xDS1	64 QAM	96.0 dB	100.0 dB	99.0 dB		94.0 dB
ACM - Maximum Throughput	193 Mbit/s	124xDS1	256 QAM	85.0 dB	89.0 dB	87.5 dB		82.5 dB
Non-ACM	134 Mbit/s	87xDS1 or 3xDS3	64QAM	102 dB	106 dB	104.5 dB		99.5 dB
Non-ACM	155 Mbit/s	100xDS1	128QAM	97.0 dB	101.0 dB	99.5 dB		94.5 dB
Non-ACM		1xOC3	128QAM	98.0 dB	102.0 dB	100.5 dB		95.5 dB
Non-ACM High System Gain[5]		1xOC3	128QAM	99.5 dB	103.5 dB	102.0 dB		97.0 dB
Non-ACM	179 Mbit/s	115xDS1 or 4xDS3	256QAM	93.0 dB	97.0 dB	95.5 dB		90.5 dB
Non-ACM High System Gain[5]	179 Mbit/s	115xDS1 or 4xDS3	256QAM	95.0 dB	99.0 dB	97.5 dB		92.5 dB
40 MHz Channel								
ACM - Maximum System Gain	52 Mbit/s	33xDS1	QPSK			118.0 dB		113.0 dB
ACM - Maximum System Gain	105 Mbit/s	67xDS1	16 QAM			111.5 dB		106.5 dB
ACM - Maximum System Gain	173 Mbit/s	110xDS1	64 QAM			104.0 dB		99.0 dB
ACM - Maximum System Gain	241 Mbit/s	127xDS1	256 QAM			94.5 dB		89.5 dB
ACM - Maximum Throughput	61 Mbit/s	39xDS1	QPSK			114.5 dB		109.5 dB
ACM - Maximum Throughput	123 Mbit/s	79xDS1	16 QAM			106.0 dB		101.0 dB
ACM - Maximum Throughput	191 Mbit/s	123xDS1	64 QAM			97.0 dB		92.0 dB
ACM - Maximum Throughput	260 Mbit/s	127xDS1	256 QAM			84.5 dB		79.5 dB
Non-ACM	134 Mbit/s	87xDS1 or 3xDS3	32QAM			106.0 dB		101.5 dB
Non-ACM	155 Mbit/s	100xDS1	64QAM			104.0 dB		99.0 dB
Non-ACM		1xOC3	64QAM			104.0 dB		99.0 dB
Non-ACM	179 Mbit/s	115xDS1 or 4xDS3	64QAM			100.5 dB		95.5 dB

[1] System Gain values are for BER=10^{-6}.
[2] Ethernet/IP data capacities shown are approximate rates for mixed frame sizes. Up to 50% throughput improvement is possible using pre-suppression and header compression options.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet Throughput figures shown.
[4] Guaranteed Values for System Gain are derated by 2 dB over full operating temperature range
[5] High System Gain Profiles have extended latency - contact Aviat Networks for details

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ECLIPSE™ PACKET NODE

MANAGE EXPLOSIVE NETWORK GROWTH

Eclipse Packet Node is the industry-leading wireless backhaul solution for 4G network evolution. Eclipse Packet Node delivers a unique combination of scalable high capacity packet transport, intelligent IP networking and key convergence features.

TRANSFORMING BACKHAUL NETWORKS TO ALL-IP

HIGH SPEED PACKET TRANSPORT

A combination of advanced features enables link speeds up to 2 Gbit/s from a single compact unit.

HIGHEST NODAL PACKET CAPACITY

New Packet Plane™ accelerates nodal networking with 5 Gbit/s of packet-handling capacity.

ENHANCING FREQUENCY EFFICIENCY

Adaptive Coding and Modulation, XPIC, and optimized packet transmission drives more throughput than ever before while also preserving valuable frequency resources.

ADVANCED IP INTELLIGENCE

Latest generation embedded Layer 2 Ethernet switch provides sophisticated QoS controls and traffic monitoring

NATIVE MIXED MODE OPERATION

Comprehensive hybrid support for Native Mixed Mode TDM+IP transport enables smooth network migration

KEY CONVERGENCE FEATURES

Including network optimization, intelligent Pseudo wires and integrated synchronization support.

DEPLOYMENT FLEXIBILITY IN ULTRA COMPACT FORM

All-indoor chassis for RFU + ACU addresses integration and maintenance requirements for North America operators

SYSTEM PARAMETERS

GENERAL			
Operating Frequency Range			5 to 23 GHz
Throughput/Capacity Range Options	Native Carrier Ethernet/IP		11 - 365 Mbit/s
	Native TDM		1 - 127x DS1; 1, 3, 4x DS3; OC-3
Modulation Options	Fixed or Adaptive		QPSK, 16, 32, 64, 128, 256 QAM
Error Correction	Fixed or Adaptive		LDPC
Adaptive Equalisation			24 tap T/2 equalizer
STANDARDS COMPLIANCE			
EMC	Indoor Equipment		FCC CFR 47, Part 15
Operation	Outdoor Equipment		ETS 300 019, Class 4.1
Operation	Indoor Equipment		EN 300 019, Class 3.1E
Storage			EN 300 019, Class 1.2
Transportation			EN 300 019, Class 2.3
Safety			UL 60950-1
Radio Frequency			Title 47, CFR part 101
NEBS			GR-1089-CORE, GR-63-CORE
ENVIRONMENTAL			
Operating Temperature	Indoor Equipment	Guaranteed	-5° to +45° C (23° to +113° F)
	Outdoor Equipment	Guaranteed	-33° to +55° C (-27° to +131° F)
Humidity	Indoor Equipment	Guaranteed	0 to 93%, non-condensing
	Outdoor Equipment	Guaranteed	0 to 100%
Altitude		Guaranteed	4,500 meters (15,000 ft)
FAULT AND CONFIGURATION MANAGEMENT			
Protocol			SNMP v2 & v3
Local/remote Configuration Tool			Eclipse Portal
Element Management			Aviat Networks ProVision®
Network Management			Aviat Networks NetBoss™

EMISSION DESIGNATOR	3.75MHZ	5MHZ	10MHZ	20MHZ	30MHZ	40MHZ	50MHZ	80MHZ
QPSK	N/A	5M00G7W	10M0G7W	20M0G7W	30M0G7W	40M0G7W	50M0G7W	80M0G7W
QAM	3M75D7W	5M00D7W	10M0D7W	20M0D7W	30M0D7W	40M0D7W	50M0D7W	80M0D7W

DISPERSIVE FADE MARGIN (DFM)	CAPACITY	CHANNEL BW	MODULATION	SYMBOL RATE (MBAUD)	GROSS BIT RATE (MBIT/S)	DFM (DB)
	12 Mbit/s	3.75 MHz	32 QAM	2.87	14.4	79
	25 Mbit/s	5 MHz	128 QAM	3.98	27.8	67
	11-13 Mbit/s	10 MHz	QPSK	8.4	16.8	76
	23-27 Mbit/s	10 MHz	16 QAM	8.4	33.6	74
	39-45 Mbit/s	10 MHz	64 QAM	8.4	50.4	68
	50 Mbit/s	10 MHz	128 QAM	8.4	58.8	62
	55-59 Mbit/s	10 MHz	256 QAM	8.4	67.2	52
	24-28 Mbit/s	20 MHz	QPSK	17.1	34.2	72
	48-57 Mbit/s	20 MHz	16 QAM	17.1	68.3	68
	81-89 Mbit/s	20 MHz	64 QAM	17.1	102.5	60
	114-122 Mbit/s	20 MHz	256 QAM	17.1	136.7	45
	24-28 Mbit/s	30 MHz	QPSK	25.9	51.8	70
	48-57 Mbit/s	30 MHz	16 QAM	25.9	103.5	62
	81-89 Mbit/s	30 MHz	64 QAM	25.9	155.3	55
	157 Mbit/s	30 MHz	128 QAM	25.9	181.2	50
	178-189 Mbit/s	30 MHz	256 QAM	25.9	207.1	40
	50-59 Mbit/s	40 MHz	QPSK	34.7	69.3	65
	101-118 Mbit/s	40 MHz	16 QAM	34.7	138.6	56
	135 Mbit/s	40 MHz	32 QAM	34.7	173.4	55
	156-187 Mbit/s	40 MHz	64 QAM	34.7	208.0	52
	238-255 Mbit/s	40 MHz	256 QAM	34.7	277.3	38
	63-74 Mbit/s	50 MHz	QPSK	43.3	86.6	60
	127-145 Mbit/s	50 MHz	16 QAM	43.3	173.2	52
	212-243 Mbit/s	50 MHz	64 QAM	43.3	259.8	48
	297-318 Mbit/s	50 MHz	256 QAM	43.3	346.4	36
	72-85 Mbit/s	80 MHz	QPSK	49.6	99.3	58
	145-170 Mbit/s	80 MHz	16 QAM	49.6	198.6	50
	243-267 Mbit/s	80 MHz	64 QAM	49.6	297.9	45
	318-365 Mbit/s	80 MHz	256 QAM	49.6	397.1	34

All specifications are typical values unless otherwise stated, and are subject to change without notice. For all specifications not listed please refer to the Eclipse Platform Datasheet.

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ECLIPSE NODE, INTELLIGENT NODE UNIT (INU) COMMON UNITS

IDC, INDOOR CHASSIS 1RU		
Dedicated plug-in card slots		2 (NCC, FAN)
Universal plug-in card slots		4
Maximum number of ODUs supported		3
Dimensions (including mounting brackets)		44mm (1RU) x 482mm (19in) x 282.5mm (11.1in)
Weight	Empty	2.6 kg (5.8 lb)
IDCE, EXTENDED INDOOR CHASSIS 2RU		
Dedicated plug-in card slots		3 (NCC, NPC, 2RU FAN)
Universal plug-in card slots		9
Maximum number of ODUs supported	Combination of RAC 60/6X and RAC 30/3X/40/4X	6
	RAC 60 only; RAC 6X only	5; 4
Dimensions (including mounting brackets)		88mm (2RU) x 482mm (19in) x 282.5mm (11.1in)
Weight	Empty	4.8 kg (10.6 lb)
NCC, NODE CONTROLLER CARD		
NMS LAN interface	Type	4-port 10/100BaseT Hub
	Connector	4x 8-pin RJ45
Serial Maintenance Interface	Standard	Complies to TIA/EIA-561
	Speed	1200 bps to 115.2 kbps
	Connector	8-pin RJ45
Configuration memory, removable		Up to 128 Mbyte CompactFlash card (on-board)
Electrical	DC Supply input range	-40.5 to -60 VDC
	DC Fuse type and rating	25A fast-acting ceramic body cartridge
	Over voltage protection	< -70 VDC
	Under voltage protection	-32 VDC
	DC connector	2-pin DSUB power type
Power consumption (including DC/DC efficiency)		< 4 W
LED Indicators		2x Tri-state ("Test", "Status")
Dimensions (including front panel and rear connector)		22mm (0.5RU) x 260mm (10.2in) x 268mm (10.6in)
Weight		0.6 kg (1.35 lb)
NPC, NODE PROTECTION CARD		
Electrical	DC Supply input range	-40.5 to -60 VDC
	DC Fuse type and rating	25A fast-acting ceramic body cartridge
	Over voltage protection	< -70 VDC
	Under voltage protection	-32 VDC
	DC connector type	2-pin DSUB power type
Power consumption (including DC/DC efficiency)		< 4 W
LED Indicators		2x Tri-state ('Protect', 'Status')
Dimensions (including front panel and rear connector)		22mm (0.5RU) x 130mm (5.1in) x 268mm (10.6in)
Weight		0.4 kg (0.88 lb)
FAN, FAN CARD 1RU		
Fans		2
LED Indicators		1x Red LED ('Fault')
Power consumption		< 2 W
Dimensions (including front panel and rear connector)		44mm (1RU) x 40mm (1.6in) x 264mm (10.4in)
Weight		0.23 kg (0.5 lb)
FAN, FAN CARD 2RU		
Fans		2
LED Indicators		1x Red LED ("Fault")
Power consumption		< 4 W
Weight		0.46 kg (1.0 lb)
AUX, AUXILARY SERVICE CARD		
Aux Data Channels / Interface		3 / RS232 or RS422
Line Rate	Asynchronous; Synchronous	1.2 to 19.2 kbit/s; 64 kbit/s
Aux Data Connector		High Density DSUB26
External Alarm Inputs	TTL Inputs; TTL input thresholds	Up to 6 (1); 0.8V min low, 2.0V min high
External Alarm Outputs	Form C Relays (NC)	Up to 4 (1)
Alarms Connector		High Density DSUB15
LED Indicators		1x Tri-state ('Status')
Power consumption		< 3 W
Dimensions (including front panel and rear connector)		22mm (0.5RU) x 130mm (5.1in) x 268mm (10.6in)
Weight		0.35 kg (0.77 lb)

All specifications are typical values unless otherwise stated, and are subject to change without notice.

(1) For applications requiring additional alarm inputs or outputs, multiple AUX cards can be installed if free INU/INUe slots are available. Optional stand-alone Alarm Interface Unit is available. Contact Aviat Networks for further details.

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RADIO ACCESS CARDS (RAC)

RAC 6D/RAC 6X		
IF connector		SMA(1)
IF interface	Transmit	311 MHz, -8.0 to -12.0 dBm
	Receive	126 MHz, -8 to -27 dBm
Packet Plane Interface, electrical	Interfaces	1x 1000baseT
	Connector	RJ45
LED Indicators		2x Tri-state ("Online", "Status")
RFUs supported		IRU600, ODU300hp, ODU300ep
Capacities supported		11 - 365 Mbit/s (NxOS1 + Ethernet)
Modulations supported	Fixed and Adaptive Coding & Modulation	QPSK, 16, 32, 64, 128, 256QAM
XPD Improvement	RAC 6X only	20 dB
XPIC connectors	RAC 6X only	2x SMB
Power consumption	RAC 60 / RAC 6X	12 W / 14 W
Dimensions (including front panel and rear connector)		22mm (0.5RU) x 130mm (5.1in) x 268mm (10.6in)

DATA ACCESS CARDS (DAC)

GENERAL	
LED Indicators	1x Tri-state ("Status")
Power consumption (nominal)	< 3 W
Dimensions (including front panel and rear connector)	22mm (0.5RU) x 130mm (5.1in) x 268mm (10.6in)
Weight (nominal)	< 0.34 kg (0.74 lb)

DAC GE - CARRIER ETHERNET/IP					
Backplane Throughput Maximum Capacity					200 Mbit/s
Packet Plane Throughput Maximum Capacity					2 Gbit/s
Interface Parameters			Standard	Option	Option
	Ethernet Interface, fixed electrical	Interfaces	3x 10/100/1000BaseT		
		Connectors	3x 8-pin RJ45		
	Ethernet Interface, SFP electrical	Interfaces		1x 1000BaseT	1x 1000BaseT
				LOS enabled	LOS disabled
		Connectors		1x RJ-45 (SFP)	1x RJ-45 (SFP)
	Ethernet Interface, SFP optical	Interfaces	1x 1000BaseLX, 1300nm singlemode	1x 1000BaseLX, 1300nm multimode	1x 1000BaseSX, 850nm multimode
		Connectors	1x LC (SFP)	1x LC (SFP)	1x LC (SFP)
		Tx Output Center Wavelength	1310 nm	1310 nm	850 nm
		Tx Average Optical Output Power	-9.5 to -3 dBm	-9 to -1 dBm	-9.5 to 0 dBm
		Rx Sensitivity	-20 dBm	-19 dBm	-18 dBm
		Rx Input Power Saturation	-3 dBm	-1 dBm	0 dBm
Ethernet Standards Compliance		Ethernet			IEEE 802.3
		Framing			IPv4 and IPv6, IEEE 802.3d
		Flow Control			IEEE 802.3x
		VLAN			IEEE 802.1Q, QinQ
		QoS			Port based, IEEE 802.1p, Diffserv (RFC 2474)
		RMON			RFC 1757
Frame sizes supported		Bi-directional			64 - 7000 bytes
		Uni-directional			7001 - 9600 bytes
Throughput Acceleration		Improvement dependent upon Frame Size			IFG & preamble suppression
Link Aggregation		Layer 1			Physical Layer
		Layer 2			IEEE 802.1AX
RSTP		Aviat Network Patent Pending			Resiliant Wireless Packet Ring (RWPR™)
MAC address register size					8000 entries

All specifications are typical values unless otherwise stated, and are subject to change without notice.

(1) RAC Installation Kit includes 3 meter jumper cable, SMA to N-type.

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DATA ACCESS CARDS (DAC)

DAC 4x, DAC 16x v2 - TDM (NXDS1)						
Interface, configurable	DAC 4x	Electrical				1 to 4x 1.544 Mbit/s (DS1)
	DAC 16x v2	Electrical				1 to 16x 1.544 Mbit/s (DS1)
Electrical interface parameters	Standards Compliance	DS1				Compliant to ITU-T Rec. G.703, G.823
	Line code	DS1				AMI or B8ZS, selectable per Tributary
	Connectors	DAC 4x				RJ45
		DAC 16x v2				50 pin HDR
	Impedance	DS1				100 ohm balanced
Redundancy						Hot-standby tributary protection
Ethernet over unframed DS1						1.5 Mbit/s per trib; 24 Mbit/s per DAC
DAC 3XDS3M - TDM (NXDS3)						
Interface						1 to 3x 44.736 Mbit/s (DS3)
Functionality						2x DS3 (Interface) to 2x28x DS1 (TDM Bus) Mux, channelized
						3x DS3 (Interface) to 3x DS3 (TDM Bus) Transparent
Electrical interface parameters	Standards Compliance					Compliant to ITU-T Rec. G.703, G.823
	Line code					B3ZS
	Connectors					Slimline BNC
	Impedance					75 ohm unbalanced
DAC 155O, 2X155O, 2X155E - SONET (1XOC3)						
Interface, configurable	DAC 155o	Optical				1x 155.52 Mbit/s (OC3)
	DAC 2x155o	Optical				1 or 2x 155.52 Mbit/s (OC3)
	DAC 2x155e	Electrical				1 or 2x 155.52 Mbit/s (OC3)
Electrical interface parameters						Compliant to ITU-T Rec. G.703, G.825
		Line code				G703/CMI
		Connectors				BNC
		Impedance				75 ohm unbalanced
Optical interface parameters		Standards Compliance				Compliant to ITU-T Rec. G.957, G.825
		Optical interface				Short Range S-1.1
		Connectors				SC
		Tx Output Center Wavelength				1310 nm
		Tx Average Optical Output Power				-15 to -8 dBm
		Rx Sensitivity				-31 dBm
		Rx Input Power Saturation				-7 dBm
DAC 1560M SONET MULTIPLEXER (1XOC3)						
Interface	SFP Optical					1x 155.52 Mbit/s (OC3)
Functionality						1x OC3 (Interface) to 84x DS1 (TDM Bus) Mux
Connectors						LC
Optical interface parameters			Short Range S1.1	Multi-Mode	Multi-Mode	Long Range L1.1
		Tx Output Center Wavelength	1261 to 1360 nm	1310 nm	850 nm	1280 to 1355 nm
		Tx Average Optical Output Power	-15 to -8 dBm	-9 to -1 dBm	-10 to -4 dBm	-5 to 0 dBm
		Rx Sensitivity	-34 dBm	-19 dBm	-24 dBm	-35 dBm
		Rx Input Power Saturation	0 dBm	-1 dBm	0 dBm	0 dBm
			15 km			
Timing modes, configurable						Loop Time (Clock recovered from received OC3)
						Local Reference Clock (XO)

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GENERAL RF UNIT SPECIFICATIONS

GENERAL		IRU600	ODU300
Frequency Band options		L6, U6, 7, 8, 10, 11 GHz	5, L6, U6, 7, 8, 10, 11, 15, 18, 23 GHz
Capacity support		11 - 260 Mbit/s Ethernet	11 - 365 Mbit/s Ethernet
		7 to 127x DS1	7 to 127x DS1
		1, 3, 4x DS3	1, 3, 4x DS3
		1x OC-3	1x OC3
Modulation support	Fixed and Adaptive Coding and Modulation	QPSK, 16, 32, 64, 128, 256 QAM	QPSK, 16, 32, 64, 128, 256 QAM
RFU INTERFACES			
DC Power Connector	IRU600 High Power only		2 pin D-SUB Power Type
Intermediate Frequency	Transmit		311 MHz
	Receive		126 MHz
IF cable connector			N-Type
INU to ODU IF Cable, recommended	CNT-300 Type		0.3 inch/copper braid/solid copper centre conductor, 50Ω
			Maximum IF Cable length 150 meters (500 ft)
	CNT-400 Type		0.4 inch/copper braid/copper clad aluminum centre conductor, 50Ω
			Maximum IF Cable length 300 meters (1,000 ft)
AGC monitor point	ODU300 only		BNC
Antenna port Interface	5 GHz		Coax, 7/16 DIN F
Antenna port Interface	6-23 GHz		Standard EIA rectangular waveguide, refer to ODU System specifications
Polarisation, field selectable			Vertical (standard) or Horizontal
ODU Antenna Mounting	5 GHz, standard		Remote mount via coax connection
	Standard		Proprietary direct mount for antenna diameters 0.3 to 1.8m (1 to 6ft)
			Remote mount for antenna diameters >1.8m (>6ft)
	Optional		Remote mount via flex/elliptical waveguide
GENERAL TRANSMITTER SPECIFICATIONS			
Transmit Power Tolerance	IRU600		± 1 dB
	ODU300		± 2 dB
Transmitter Source			Synthesized
Frequency Stability			± 10 ppm
Manual Transmitter Power Control range		5 GHz	6-23 GHz
	QPSK	30 dB	20 dB
	16QAM	26 dB	18 dB
	32QAM	25.5 dB	17.5 dB
	64QAM	25 dB	17 dB
	128QAM	24 dB	16 dB
	256 QAM	22 dB	14 dB
	Resolution		0.1 dB steps
	Accuracy		± 2 dB
Automatic Transmitter Power Control	Range		Configurable over full available manual attenuation range
	Resolution / Speed		0.1 dB steps / 6 dB per second
Transmitter Mute			> 50 dB
Channel Selection			By software control within tuning range of ODU
Synthesizer Resolution			0.125 MHz
GENERAL RECEIVER SPECIFICATIONS			
Receiver Source			Synthesized
Frequency Stability			± 10 ppm
Receiver Overload	BER = $1x10^{-6}$		-22 dBm
Residual (Background) Bit Error Rate			Better than 10^{-13}
RSSI Accuracy [1]	-40 to -70 dBm, 0 to +35°C		± 2 dB
	-25 to -85 dBm, -33 to +55°C		± 4 dB

All specifications are typical values unless otherwise stated, and are subject to change without notice.

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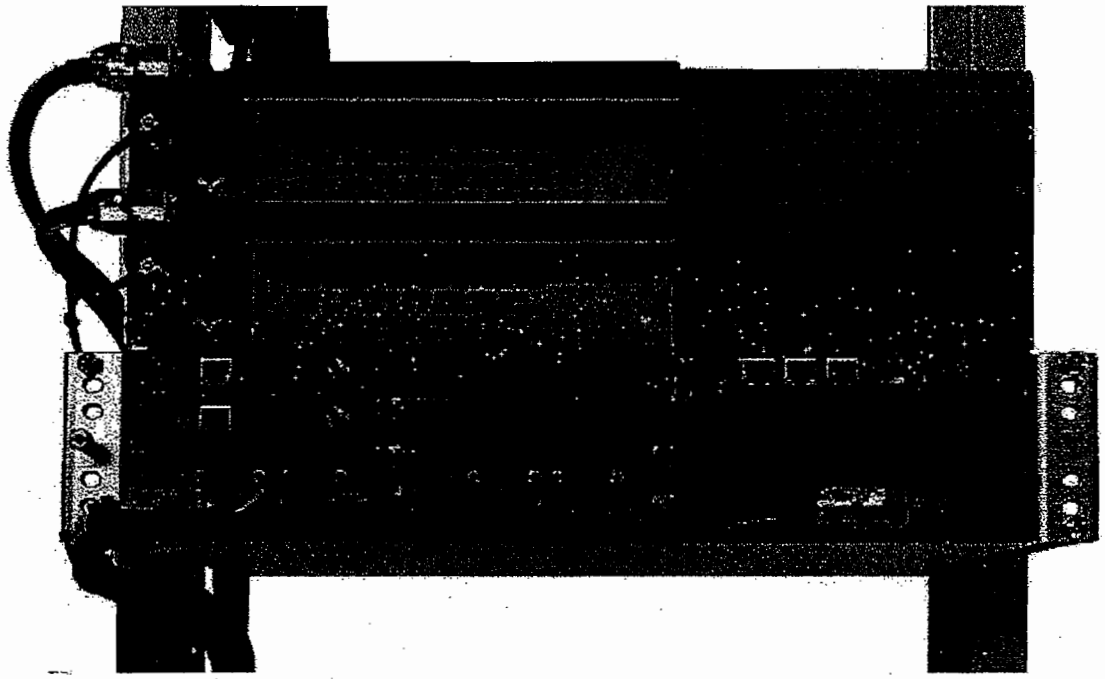
GENERAL RF UNIT SPECIFICATIONS

ADDITIONAL PROTECTION LOSSES	FREQUENCY BAND	MAIN CHANNEL	PROTECTION CHANNEL
IRU600	5.8 to 11 GHz	Dependent upon configuration. Contact Aviat Networks for details	
ODU Coupler	5 GHz / 6 to 18 GHz / 21 to 23 GHz	1.5 dB / 1.6 dB / 1.8 dB	6.4 dB / 6.6 dB / 6.8 dB
ELECTRICAL			
Power Consumption, nominal	IRU600	1+0, SP / HP	52 W / 90 W
		1+1, SP / HP	82 W / 124 W
	ODU300	5 GHz	50 W
		6-11 GHz	30 W
		13-23 GHz	30 W
MECHANICAL		**SIZE (HXWXD)**	**WEIGHT**
IRU 600 1+1		132mm (3RU) x 482mm (19in) x 335mm (13.18 in)	15 kg (33 lb) (2x RFU, ACU and chassis)
IRU 600 1+1, with waveguide		132mm (3RU) x 482mm (19in) x 412.5mm (16.2 in)	
ODU300, 5 GHz		287mm (11.3 in) x 287mm (11.3 in) x 175mm (6.9 in)	8.3 kg (18.7 lb)
ODU300, 6-23 GHz		287mm (11.3 in) x 287mm (11.3 in) x 119mm (4.7 in)	6.4 kg (14 lb)
ODU Protection Splitter/Coupler	086-523221 Top/Bottom (Andrew)	600mm (23.6 in) x 250mm (9.8 in) x 105mm (4.1 in)	6.5 kg (14.3 lb)
	086-523321 Back-to-Back (Apollo)	250mm (9.8 in) x 370mm (14.6 in) x 180mm (7.1 in)	6.0 kg (13.2 lb)
	086-523341 Back-to-Back	290mm (11.4 in) x 365mm (14.4 in) x 160mm (6.3 in)	3.9 kg (8.6 lb)
	086-523341 Back-to-Back (XPOL)	290mm (11.4 in) x 365mm (14.4 in) x 160mm (6.3 in)	4.0 kg (8.8 lb)
	086-523221 5GHz splitter/ combiner	36mm (1.4 in) x 76mm (3 in) x 144mm (5.7 in)	1.0 kg (2.2 lb)

(1) RSSI accuracy is only valid when there is no unwanted signal or potential interferer present within ±30MHz of the RX frequency.



IRU600 with INUe (High Power)

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IRU600 RF SPECIFICATIONS - TRANSMITTER AND RECEIVER PERFORMANCE

SYSTEM						
Frequency Range, GHz			5.93 - 6.42, 6.43 - 7.125	7.125 - 7.9, 7.7 - 8.5	10.5 - 10.68	10.7 - 11.7
Standard T-R Spacings supported, MHz (Non-standard T-R options supported with spot tuned filters)			160, 170, 252.04, 340	150, 175, 300, 360	65	490, 500
Standard Frequency Assignments Supported per Regulatory Plans			FCC Part 101, SRSP 306.4	SRSP 307.1, SRSP 307.7 NTIA Red Book	FCC Part 101, SRSP 310.5	FCC Part 101, SRSP 310.7
Number of RFU Options per band per power level			L6 GHz - 2, U6 GHz - 2	7 GHz - 2, 8 GHz - 2	2	2
ANTENNA INTERFACE						
ACU Antenna Port Interface			CPR-137G		CPR-112G	CPR-90G	CPR-90G
TRANSMITTER POWER OUTPUT			STD POWER	HIGH POWER	HIGH POWER	HIGH POWER	HIGH POWER
Guaranteed values set at factory	QPSK		28.50	32.50	32.00		27.50
	16QAM - Maximum System Gain		28.50	32.50	32.00		27.50
	16QAM - Maximum Throughput		26.50	30.50	30.00		25.50
	32QAM - Maximum System Gain		27.50	31.50	31.00		26.50
	32QAM - Maximum Throughput		26.00	30.00	29.50	25.00	25.00
	64QAM - Maximum System Gain		27.50	31.50	31.00		26.50
	64QAM - Maximum Throughput		25.50	29.50	29.00		24.50
	128QAM - Maximum System Gain		26.50	30.50	30.00		25.50
	128QAM - Maximum Throughput		24.50	28.50	28.00	23.50	23.50
	256QAM - Maximum System Gain		25.50	29.50	29.00		24.50
	256QAM - Maximum Throughput		22.50	26.50	26.00		21.50

RECEIVER THRESHOLD: 10^{-6} BER: GUARANTEED [1]	Airlink Capacity [2]	Max DS1s					
3.75 MHz Channel							
Non-ACM - Max Throughput	12 Mbit/s	8xDS1	32QAM	-83.75 dBm	-83.25 dBm	-82.50 dBm	-82.50 dBm
5 MHz Channel							
Non-ACM - Max Throughput	25 Mbit/s	16xDS1	128QAM	-78.50 dBm	-77.75 dBm	-77.00 dBm	-77.25 dBm
10 MHz Channel							
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK	-92.75 dBm	-92.00 dBm		-91.50 dBm
ACM - Maximum System Gain	23 Mbit/s	14xDS1	16 QAM	-86.50 dBm	-86.00 dBm		-85.25 dBm
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM	-79.50 dBm	-79.00 dBm		-78.25 dBm
ACM - Maximum System Gain	55 Mbit/s	35xDS1	256 QAM	-73.75 dBm	-73.00 dBm		-72.50 dBm
ACM - Maximum Throughput	13 Mbit/s	8xDS1	QPSK	-89.75 dBm	-89.25 dBm		-88.50 dBm
ACM - Maximum Throughput	27 Mbit/s	17xDS1	16 QAM	-84.00 dBm	-83.25 dBm		-82.75 dBm
ACM - Maximum Throughput	43 Mbit/s	27xDS1	64 QAM	-78.75 dBm	-78.00 dBm		-77.50 dBm
ACM - Maximum Throughput	59 Mbit/s	37xDS1	256 QAM	-69.75 dBm	-69.00 dBm		-68.50 dBm
Non-ACM - Max Throughput	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	-78.50 dBm	-77.75 dBm		-77.25 dBm
Non-ACM - Max Throughput	50 Mbit/s	32xDS1	128QAM	-77.25 dBm	-76.50 dBm		-76.00 dBm
Non-ACM - Max System Gain	56 Mbit/s	36xDS1	256 QAM	-74.50 dBm	-74.00 dBm		-73.25 dBm
20 MHz Channel							
ACM - Maximum System Gain	24 Mbit/s	15xDS1	QPSK	-89.50 dBm	-88.75 dBm		-88.25 dBm
ACM - Maximum System Gain	48 Mbit/s	31xDS1	16 QAM	-83.00 dBm	-82.50 dBm		-81.75 dBm
ACM - Maximum System Gain	81 Mbit/s	52xDS1	64 QAM	-76.00 dBm	-75.50 dBm		-74.75 dBm
ACM - Maximum System Gain	114 Mbit/s	73xDS1	256 QAM	-70.50 dBm	-70.00 dBm		-69.25 dBm
ACM - Maximum Throughput	28 Mbit/s	17xDS1	QPSK	-86.50 dBm	-85.75 dBm		-85.25 dBm
ACM - Maximum Throughput	57 Mbit/s	36xDS1	16 QAM	-80.25 dBm	-79.75 dBm		-79.00 dBm
ACM - Maximum Throughput	89 Mbit/s	57xDS1	64 QAM	-75.00 dBm	-74.50 dBm		-73.75 dBm
ACM - Maximum Throughput	122 Mbit/s	78xDS1	256 QAM	-67.50 dBm	-67.00 dBm		-66.25 dBm

All specifications for the IRU600 are referenced to the antenna flange, are guaranteed values at room temperature (20 to 30°C, 68 to 86°F) unless otherwise stated, and subject to change without notice.

[1] Threshold values are for BER=10^{-6}.
[2] Airlink Capacities are shown. Ethernet/IP throughput will vary based on frame sizes.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet Throughput figures shown.

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IRU600 RF SPECIFICATIONS - TRANSMITTER AND RECEIVER PERFORMANCE

SYSTEM				L6/U6 GHZ	7/8 GHZ	10 GHZ	11 GHZ
				STD POWER	HIGH POWER	HIGH POWER	HIGH POWER	HIGH POWER
30 MHz Channel							
ACM - Maximum System Gain	39 Mbit/s	24xDS1	QPSK	-87.50 dBm	-87.00 dBm	-86.25 dBm
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM	-81.25 dBm	-80.75 dBm	-80.00 dBm
ACM - Maximum System Gain	135 Mbit/s	87xDS1	64 QAM	-74.25 dBm	-73.75 dBm	-73.00 dBm
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM	-68.75 dBm	-68.25 dBm	-67.50 dBm
ACM - Maximum Throughput	44 Mbit/s	28xDS1	QPSK	-84.50 dBm	-84.00 dBm	-83.25 dBm
ACM - Maximum Throughput	88 Mbit/s	56xDS1	16 QAM	-78.50 dBm	-78.00 dBm	-77.25 dBm
ACM - Maximum Throughput	139 Mbit/s	89xDS1	64 QAM	-73.25 dBm	-72.75 dBm	-72.00 dBm
ACM - Maximum Throughput	189 Mbit/s	122xDS1	256 QAM	-65.75 dBm	-65.00 dBm	-64.50 dBm
Non-ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	64QAM	-75.00 dBm	-74.50 dBm	-73.75 dBm
Non-ACM - Max System Gain	155 Mbit/s	100xDS1	128QAM	-72.00 dBm	-71.50 dBm	-70.75 dBm
Non-ACM - Max System Gain	157 Mbit/s	1xOC3	128QAM	-72.00 dBm	-71.25 dBm	-70.75 dBm
Non-ACM - Max System Gain	178 Mbit/s	115xDS1 or 4xDS3	256QAM	-68.75 dBm	-68.00 dBm	-67.50 dBm
40 MHz Channel							
ACM - Maximum System Gain	50 Mbit/s	32xDS1	QPSK		-87.00 dBm	-86.50 dBm
ACM - Maximum System Gain	101 Mbit/s	65xDS1	16 QAM		-79.50 dBm	-78.75 dBm
ACM - Maximum System Gain	170 Mbit/s	109xDS1	64 QAM		-72.50 dBm	-71.75 dBm
ACM - Maximum System Gain	238 Mbit/s	127xDS1	256 QAM		-67.00 dBm	-66.25 dBm
ACM - Maximum Throughput	59 Mbit/s	37xDS1	QPSK		-83.00 dBm	-82.25 dBm
ACM - Maximum Throughput	118 Mbit/s	76xDS1	16 QAM		-76.75 dBm	-76.00 dBm
ACM - Maximum Throughput	187 Mbit/s	120xDS1	64 QAM		-71.50 dBm	-70.75 dBm
ACM - Maximum Throughput	255 Mbit/s	127xDS1	256 QAM		-65.25 dBm	-64.75 dBm
Non-ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	32QAM		-75.00 dBm	-74.50 dBm
Non-ACM - Max System Gain	156 Mbit/s	100xDS1	64QAM		-74.25 dBm	-73.50 dBm
Non-ACM - Max System Gain	159 Mbit/s	1xOC3	64QAM		-73.25 dBm	-72.75 dBm
Non-ACM - Max Throughput	178 Mbit/s	115xDS1 or 4xDS3	64QAM		-71.75 dBm	-71.25 dBm

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IRU600 RF SPECIFICATIONS - SYSTEM GAIN PERFORMANCE

SYSTEM GAIN, 10⁻⁶ BER, GUARANTEED [1]	Airlink Capacity [2]	Max DS1s		L6/U6 GHZ STD POWER	L6/U6 GHZ HIGH POWER	7/8 GHZ HIGH POWER	10 GHZ HIGH POWER	11 GHZ HIGH POWER
3.75 MHz Channel								
Non-ACM - Max Throughput	12 Mbit/s	8xDS1	32QAM	109.75 dB	113.75 dB	112.75 dB	107.50 dB	107.50 dB
5 MHz Channel								
Non-ACM - Max Throughput	25 Mbit/s	16xDS1	128QAM	103.00 dB	107.00 dB	105.75 dB	100.50 dB	100.75 dB
10 MHz Channel								
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK	121.25 dB	125.25 dB	124.00 dB		119.00 dB
ACM - Maximum System Gain	23 Mbit/s	14xDS1	16 QAM	115.00 dB	119.00 dB	118.00 dB		112.75 dB
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM	107.00 dB	111.00 dB	110.00 dB		104.75 dB
ACM - Maximum System Gain	55 Mbit/s	35xDS1	256 QAM	99.25 dB	103.25 dB	102.00 dB		97.00 dB
ACM - Maximum Throughput	13 Mbit/s	8xDS1	QPSK	118.25 dB	122.25 dB	121.25 dB		116.00 dB
ACM - Maximum Throughput	27 Mbit/s	17xDS1	16 QAM	110.50 dB	114.50 dB	113.25 dB		108.25 dB
ACM - Maximum Throughput	43 Mbit/s	27xDS1	64 QAM	104.25 dB	108.25 dB	107.00 dB		102.00 dB
ACM - Maximum Throughput	59 Mbit/s	37xDS1	256 QAM	92.25 dB	96.25 dB	95.00 dB		90.00 dB
Non-ACM - Max Throughput	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	104.00 dB	108.00 dB	106.75 dB		101.75 dB
Non-ACM - Max Throughput	50 Mbit/s	32xDS1	128QAM	101.75 dB	105.75 dB	104.50 dB		99.50 dB
Non-ACM - Max System Gain	56 Mbit/s	36xDS1	256 QAM	100.00 dB	104.00 dB	103.00 dB		97.75 dB
20 MHz Channel								
ACM - Maximum System Gain	24 Mbit/s	15xDS1	QPSK	118.00 dB	122.00 dB	120.75 dB		115.75 dB
ACM - Maximum System Gain	48 Mbit/s	31xDS1	16 QAM	111.50 dB	115.50 dB	114.50 dB		109.25 dB
ACM - Maximum System Gain	81 Mbit/s	52xDS1	64 QAM	103.50 dB	107.50 dB	106.50 dB		101.25 dB
ACM - Maximum System Gain	114 Mbit/s	73xDS1	256 QAM	96.00 dB	100.00 dB	99.00 dB		93.75 dB
ACM - Maximum Throughput	28 Mbit/s	17xDS1	QPSK	115.00 dB	119.00 dB	117.75 dB		112.75 dB
ACM - Maximum Throughput	57 Mbit/s	36xDS1	16 QAM	106.75 dB	110.75 dB	109.75 dB		104.50 dB
ACM - Maximum Throughput	89 Mbit/s	57xDS1	64 QAM	100.50 dB	104.50 dB	103.50 dB		98.25 dB
ACM - Maximum Throughput	122 Mbit/s	78xDS1	256 QAM	90.00 dB	94.00 dB	93.00 dB		87.75 dB

All specifications for the IRU600 are referenced to the antenna flange, are guaranteed values at room temperature (20 to 30°C, 68 to 86°F) unless otherwise stated, and subject to change without notice.

[1] System Gain values are for BER=10^{-6}.
[2] Airlink Capacities are shown. Ethernet/IP throughput will vary based on frame sizes.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet Throughput figures shown.

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IRU600 RF SPECIFICATIONS - SYSTEM GAIN PERFORMANCE

SYSTEM GAIN TO 1E-6 BER GUARANTEED [1]				6/U6 GHZ		7/8 GHZ	10 GHZ	11 GHZ
				STD POWER	HIGH POWER	HIGH POWER	HIGH POWER	HIGH POWER
30 MHz Channel								
ACM - Maximum System Gain	39 Mbit/s	24xDS1	QPSK	116.00 dB	120.00 dB	119.00 dB		113.75 dB
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM	109.75 dB	113.75 dB	112.75 dB		107.50 dB
ACM - Maximum System Gain	135 Mbit/s	87xDS1	64 QAM	101.75 dB	105.75 dB	104.75 dB		99.50 dB
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM	94.25 dB	98.25 dB	97.25 dB		92.00 dB
ACM - Maximum Throughput	44 Mbit/s	28xDS1	QPSK	113.00 dB	117.00 dB	116.00 dB		110.75 dB
ACM - Maximum Throughput	88 Mbit/s	56xDS1	16 QAM	105.00 dB	109.00 dB	108.00 dB		102.75 dB
ACM - Maximum Throughput	139 Mbit/s	89xDS1	64 QAM	98.75 dB	102.75 dB	101.75 dB		96.50 dB
ACM - Maximum Throughput	189 Mbit/s	122xDS1	256 QAM	88.25 dB	92.25 dB	91.00 dB		86.00 dB
Non-ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	64QAM	102.50 dB	106.50 dB	105.50 dB		100.25 dB
Non-ACM - Max System Gain	155 Mbit/s	100xDS1	128QAM	98.50 dB	102.50 dB	101.50 dB		96.25 dB
Non-ACM - Max System Gain	157 Mbit/s	1xOC3	128QAM	98.50 dB	102.50 dB	101.25 dB		96.25 dB
Non-ACM - Max System Gain	178 Mbit/s	115xDS1 or 4xDS3	256QAM	94.25 dB	98.25 dB	97.00 dB		92.00 dB
40 MHz Channel								
ACM - Maximum System Gain	50 Mbit/s	32xDS1	QPSK			119.00 dB		114.00 dB
ACM - Maximum System Gain	101 Mbit/s	65xDS1	16 QAM			111.50 dB		106.25 dB
ACM - Maximum System Gain	170 Mbit/s	109xDS1	64 QAM			103.50 dB		98.25 dB
ACM - Maximum System Gain	238 Mbit/s	127xDS1	256 QAM			96.00 dB		90.75 dB
ACM - Maximum Throughput	59 Mbit/s	37xDS1	QPSK			115.00 dB		109.75 dB
ACM - Maximum Throughput	118 Mbit/s	76xDS1	16 QAM			106.75 dB		101.50 dB
ACM - Maximum Throughput	187 Mbit/s	120xDS1	64 QAM			100.50 dB		95.25 dB
ACM - Maximum Throughput	255 Mbit/s	127xDS1	256 QAM			91.25 dB		86.25 dB
Non-ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	32QAM			106.00 dB		101.00 dB
Non-ACM - Max System Gain	156 Mbit/s	100xDS1	64QAM			105.25 dB		100.00 dB
Non-ACM - Max System Gain	159 Mbit/s	1xOC3	64QAM			104.25 dB		99.25 dB
Non-ACM - Max Throughput	178 Mbit/s	115xDS1 or 4xDS3	64QAM			100.75 dB		95.75 dB

ODU300 RF SPECIFICATIONS - TRANSMITTER AND RECEIVER PERFORMANCE

SYSTEM			5 GHZ [4]	L6/U6 GHZ	7/8 GHZ	10 GHZ	11 GHZ	13 GHZ	15 GHZ	18 GHZ	23 GHZ
Frequency Range, GHz			4.4 - 5.0	5.925 - 7.11	7.125 - 8.5	10.5 - 10.68	10.7 - 11.7	12.75 - 13.25	14.4 - 15.35	17.7 - 19.7	21.2 - 23.632
T-R Spacings supported, MHz			300, 312	160, 170, 252.04, 340	150, 175, 300, 360	65	490, 500	266	475, 640	1560	600, 1200
Standard			NTIA Red Book EN 302 217	FCC Part 101 SRSP 306.4	SRSP 307.1 SRSP 307.7 NTIA Red Book	FCC Part 101 SRSP 310.5	FCC Part 101 SRSP 310.7	Part 74	SRSP 314.5 NTIA Red Book	FCC Part 101 SRSP 317.8	FCC Part 101 SRSP 321.8
Maximum Tuning Range (dependent upon T-R spacing), MHz			56	56	140	165	165	84	245	380	370
ANTENNA INTERFACE											
Waveguide Type			N/A	R70 (WR137)	R84 (WR112)	R100 (WR90)	R100 (WR90)	R120 (WR75)	R140 (WR62)	R220 (WR42)	R220 (WR42)
Flange Type			Coax	UDR70	UDR84	UDR100	UDR100	UBR120	UBR140	UBR220	UBR220
Mating Flange Type			7/16"	PDR70 or CDR70	PDR84 or CDR84	PDR100 or CDR100	PDR100 or CDR100	PBR120 or CDR120	PBR140 or CBR140	PBR220	PBR220
TRANSMITTER POWER OUTPUT SPECIFICATIONS (dBm)											
		QPSK	30.5	28.5	28.5		24.0	23.0	22.0	19.5	19.5
		16QAM - Maximum System Gain	26.5	28.5	28.5		24.0	23.0	22.0	19.5	19.5
		16QAM - Maximum Throughput	26.5	26.5	26.5		22.0	21.0	20.0	17.5	17.5
		32QAM- Maximum System Gain	26.5	27.5	27.5		23.0	22.0	21.0	18.5	18.5
		32QAM- Maximum Throughput	26.0	26.0	26.0	22.0	21.5	20.5	19.5	17.0	17.0
		64QAM - Maximum System Gain	27.5	27.5	27.5		23.0	22.0	21.0	18.5	18.5
		64QAM - Maximum Throughput	25.5	25.5	25.5		21.0	20.0	19.0	16.5	16.5
		128QAM - Maximum System Gain	26.5	26.5	26.5		22.0	21.0	20.0	17.5	17.5
		128QAM - Maximum Throughput	24.5	24.5	24.5	20.5	20.0	19.0	18.0	15.5	15.5
		256QAM - Maximum System Gain	25.5	25.5	25.5		21.0	20.0	19.0	16.5	16.5
		256QAM - Maximum Throughput	22.5	22.5	22.5		18.0	17.0	16.0	13.5	13.5

RECEIVER THRESHOLD SPECIFICATIONS (10^{-6} BER) [1] (dBm)	Airlink Capacity [2]	Max DS1s									
3.75 MHz Channel											
Non-ACM - Max Throughput	12 Mbit/s	8xDS1	32QAM		-84.50	-84.50	-82.75	-84.25			
5 MHz Channel											
Non-ACM - Max Throughput	25 Mbit/s	16xDS1	128QAM		-79.25	-79.25	-77.50	-79.00			
10 MHz Channel											
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK		-92.50	-92.50		-92.25	-92.25	-92.00	-91.75	-91.50
ACM - Maximum System Gain	23 Mbit/s	14xDS1	16 QAM		-86.25	-86.25		-86.00	-86.00	-85.75	-85.50	-85.25
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM		-79.25	-79.25		-79.00	-79.00	-78.75	-78.50	-78.25
ACM - Maximum System Gain	55 Mbit/s	35xDS1	256 QAM		-73.50	-73.50		-73.25	-73.25	-73.00	-72.75	-72.50
ACM - Maximum Throughput	13 Mbit/s	8xDS1	QPSK		-89.50	-89.50		-89.25	-89.25	-89.00	-88.75	-88.50
ACM - Maximum Throughput	27 Mbit/s	17xDS1	16 QAM		-83.75	-83.75		-83.50	-83.50	-83.25	-83.00	-82.75
ACM - Maximum Throughput	43 Mbit/s	27xDS1	64 QAM		-78.50	-78.50		-78.25	-78.25	-78.00	-77.75	-77.50
ACM - Maximum Throughput	59 Mbit/s	37xDS1	256 QAM		-69.50	-69.50		-69.25	-69.25	-69.00	-68.75	-68.50
Non ACM - Max Throughput	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	-79.25	-79.25	-79.25		-79.00	-79.00	-78.75	-78.50	-78.25
Non ACM - Max Throughput	50 Mbit/s	32xDS1	128 QAM	-78.00	-78.00	-78.00		-77.75	-77.75	-77.50	-77.25	-77.00
Non ACM - Max System Gain	56 Mbit/s	36xDS1	256 QAM	-75.25	-75.25	-75.25		-75.00	-75.00	-74.75	-74.50	-74.25

All specifications are referenced to the ODU antenna flange, and are typical values unless otherwise stated, and are subject to change without notice.

For Guaranteed values (over time and operational range), subtract 2dB from Power Output, add 2dB to Threshold values.
[1] Rx Threshold values indicated are typically improved by 0.5 dB for BER=10-3.
[2] Airlink Capacities are shown. Ethernet/IP throughput will vary based on frame sizes.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet Throughput.
[4] For switchable diplexer option, 5GHz system gain is reduced by 4 dB.

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ODU300 RF SPECIFICATIONS - TRANSMITTER AND RECEIVER PERFORMANCE

	Airlink Capacity[1]	Max DS1s		5 GHz[2]	L6/U6 GHz	7/8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz
20 MHz Channel												
ACM - Maximum System Gain	24 Mbit/s	15xDS1	QPSK		-89.25	-89.25	-89.00	-89.00	-88.75	-88.50	-88.25	
ACM - Maximum System Gain	48 Mbit/s	31xDS1	16 QAM		-82.75	-82.75	-82.50	-82.50	-82.25	-82.00	-81.75	
ACM - Maximum System Gain	81 Mbit/s	52xDS1	64 QAM		-75.75	-75.75	-75.50	-75.50	-75.25	-75.00	-74.75	
ACM - Maximum System Gain	114 Mbit/s	73xDS1	256 QAM		-70.25	-70.25	-70.00	-70.00	-69.75	-69.50	-69.25	
ACM - Maximum Throughput	28 Mbit/s	17xDS1	QPSK		-86.25	-86.25	-86.00	-86.00	-85.75	-85.50	-85.25	
ACM - Maximum Throughput	57 Mbit/s	36xDS1	16 QAM		-80.00	-80.00	-79.75	-79.75	-79.50	-79.25	-79.00	
ACM - Maximum Throughput	89 Mbit/s	57xDS1	64 QAM		-74.75	-74.75	-74.50	-74.50	-74.25	-74.00	-73.75	
ACM - Maximum Throughput	122 Mbit/s	78xDS1	256 QAM		-67.25	-67.25	-67.00	-67.00	-66.75	-66.50	-66.25	
30 MHz Channel												
ACM - Maximum System Gain	39 Mbit/s	24xDS1	QPSK		-87.25	-87.25	-87.00		-86.75	-86.50	-86.25	
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM		-81.00	-81.00	-80.75		-80.50	-80.25	-80.00	
ACM - Maximum System Gain	135 Mbit/s	87xDS1	64 QAM		-74.00	-74.00	-73.75		-73.50	-73.25	-73.00	
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM		-68.50	-68.50	-68.25		-68.00	-67.75	-67.50	
ACM - Maximum Throughput	44 Mbit/s	28xDS1	QPSK		-84.25	-84.25	-84.00		-83.75	-83.50	-83.25	
ACM - Maximum Throughput	88 Mbit/s	56xDS1	16 QAM		-78.25	-78.25	-78.00		-77.75	-77.50	-77.25	
ACM - Maximum Throughput	139 Mbit/s	89xDS1	64 QAM		-73.00	-73.00	-72.75		-72.50	-72.25	-72.00	
ACM - Maximum Throughput	189 Mbit/s	122xDS1	256 QAM		-65.50	-65.50	-65.25		-65.00	-64.75	-64.50	
Non ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	64QAM	-75.75	-75.75	-75.75	-75.50		-75.25	-75.00	-74.75	
Non ACM - Max System Gain	155 Mbit/s	100xDS1	128QAM	-72.75	-72.75	-72.75	-72.50		-72.25	-72.00	-71.75	
Non ACM - Max System Gain	157 Mbit/s	1xOC3	128QAM	-72.75	-72.75	-72.75	-72.50		-72.25	-72.00	-71.75	
Non ACM - Max System Gain	178 Mbit/s	115xDS1 or 4xDS3	256QAM	-70.00	-70.00	-70.00	-69.75		-69.50	-69.25	-69.00	
40 MHz Channel												
ACM - Maximum System Gain	50 Mbit/s	32xDS1	QPSK			-87.50	-87.25		-87.00	-86.75	-86.50	
ACM - Maximum System Gain	101 Mbit/s	65xDS1	16 QAM			-79.75	-79.50		-79.25	-79.00	-78.75	
ACM - Maximum System Gain	170 Mbit/s	109xDS1	64 QAM			-72.75	-72.50		-72.25	-72.00	-71.75	
ACM - Maximum System Gain	238 Mbit/s	127xDS1	256 QAM			-67.25	-67.00		-66.75	-66.50	-66.25	
ACM - Maximum Throughput	59 Mbit/s	37xDS1	QPSK			-83.25	-83.00		-82.75	-82.50	-82.25	
ACM - Maximum Throughput	118 Mbit/s	76xDS1	16 QAM			-77.00	-76.75		-76.50	-76.25	-76.00	
ACM - Maximum Throughput	187 Mbit/s	120xDS1	64 QAM			-71.75	-71.50		-71.25	-71.00	-70.75	
ACM - Maximum Throughput	255 Mbit/s	127xDS1	256 QAM			-65.75	-65.50		-65.25	-65.00	-64.75	
Non ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	32QAM			-76.50	-76.25		-76.00	-75.75	-75.50	
Non ACM - Max System Gain	156 Mbit/s	100xDS1	64QAM			-75.50	-75.25		-75.00	-74.75	-74.50	
Non ACM - Max System Gain	159 Mbit/s	1xOC3	64QAM			-74.75	-74.50		-74.25	-74.00	-73.75	
Non ACM - Max Throughput	178 Mbit/s	115xDS1 or 4xDS3	64QAM			-73.25	-73.00		-72.75	-72.50	-72.25	
50 MHz Channel												
ACM - Maximum System Gain	63 Mbit/s	40xDS1	QPSK							-85.75	-85.50	
ACM - Maximum System Gain	127 Mbit/s	81xDS1	16 QAM							-78.00	-77.75	
ACM - Maximum System Gain	212 Mbit/s	127xDS1	64 QAM							-71.00	-70.75	
ACM - Maximum System Gain	297 Mbit/s	127xDS1	256 QAM							-65.50	-65.25	
ACM - Maximum Throughput	74 Mbit/s	47xDS1	QPSK							-81.50	-81.25	
ACM - Maximum Throughput	148 Mbit/s	95xDS1	16 QAM							-75.25	-75.00	
ACM - Maximum Throughput	233 Mbit/s	127xDS1	64 QAM							-70.00	-69.75	
ACM - Maximum Throughput	318 Mbit/s	127xDS1	256 QAM							-64.00	-63.75	
80 MHz Channel												
ACM - Maximum System Gain	72 Mbit/s	46xDS1	QPSK							-85.00	-84.75	
ACM - Maximum System Gain	145 Mbit/s	93xDS1	16 QAM							-77.50	-77.25	
ACM - Maximum System Gain	243 Mbit/s	127xDS1	64 QAM							-70.50	-70.25	
ACM - Maximum System Gain	340 Mbit/s	127xDS1	256 QAM							-65.00	-64.75	
ACM - Maximum Throughput	85 Mbit/s	54xDS1	QPSK							-81.00	-80.75	
ACM - Maximum Throughput	170 Mbit/s	109xDS1	16 QAM							-74.75	-74.50	
ACM - Maximum Throughput	267 Mbit/s	127xDS1	64 QAM							-69.50	-69.25	
ACM - Maximum Throughput	365 Mbit/s	127xDS1	256 QAM							-63.50	-63.25	

ODU300 RF SPECIFICATIONS - SYSTEM GAIN PERFORMANCE

SYSTEM				5 GHz[4]	6/U6 GHz	7/8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz
Frequency Range, GHz				4.4 - 5.0	5.925 - 7.11	7.125 - 8.5	10.5 - 10.68	10.7 - 11.7	12.75 - 13.25	14.4 - 15.35	17.7 - 19.7	21.2 - 23.632
SYSTEM GAIN SPECIFICATIONS (10⁻⁶ BER)[1] (dB)												
	Airlink Capacity[2]	**Max DS1s**										
3.75 MHz Channel												
Non-ACM - Max Throughput	12 Mbit/s	8xDS1	32QAM		110.50	110.50	104.75	105.75				
5 MHz Channel												
Non-ACM - Max Throughput	25 Mbit/s	16xDS1	128QAM		103.75	103.75	98.00	99.00				
10 MHz Channel												
ACM - Maximum System Gain	11 Mbit/s	7xDS1	QPSK		121.00	121.00		116.25	115.25	114.00	111.25	111.00
ACM - Maximum System Gain	23 Mbit/s	14xDS1	16 QAM		114.75	114.75		110.00	109.00	107.75	105.00	104.75
ACM - Maximum System Gain	39 Mbit/s	25xDS1	64 QAM		106.75	106.75		102.00	101.00	99.75	97.00	96.75
ACM - Maximum System Gain	55 Mbit/s	35xDS1	256 QAM		99.00	99.00		94.25	93.25	92.00	89.25	89.00
ACM - Maximum Throughput	13 Mbit/s	8xDS1	QPSK		118.00	118.00		113.25	112.25	111.00	108.25	108.00
ACM - Maximum Throughput	27 Mbit/s	17xDS1	16 QAM		110.25	110.25		105.50	104.50	103.25	100.50	100.25
ACM - Maximum Throughput	43 Mbit/s	27xDS1	64 QAM		104.00	104.00		99.25	98.25	97.00	94.25	94.00
ACM - Maximum Throughput	59 Mbit/s	37xDS1	256 QAM		92.00	92.00		87.25	86.25	85.00	82.25	82.00
Non ACM - Max Throughput	45 Mbit/s	29xDS1 or 1xDS3	64 QAM	104.75	104.75	104.75		100.00	99.00	97.75	95.00	94.75
Non ACM - Max Throughput	50 Mbit/s	32xDS1	128 QAM	102.50	102.50	102.50		97.75	96.75	95.50	92.75	92.50
Non ACM - Max System Gain	56 Mbit/s	36xDS1	256 QAM	100.75	100.75	100.75		96.00	95.00	93.75	91.00	90.75
20 MHz Channel												
ACM - Maximum System Gain	24 Mbit/s	15xDS1	QPSK		117.75	117.75		113.00	112.00	110.75	108.00	107.75
ACM - Maximum System Gain	48 Mbit/s	31xDS1	16 QAM		111.25	111.25		106.50	105.50	104.25	101.50	101.25
ACM - Maximum System Gain	81 Mbit/s	52xDS1	64 QAM		103.25	103.25		98.50	97.50	96.25	93.50	93.25
ACM - Maximum System Gain	114 Mbit/s	73xDS1	256 QAM		95.75	95.75		91.00	90.00	88.75	86.00	85.75
ACM - Maximum Throughput	28 Mbit/s	17xDS1	QPSK		114.75	114.75		110.00	109.00	107.75	105.00	104.75
ACM - Maximum Throughput	57 Mbit/s	36xDS1	16 QAM		106.50	106.50		101.75	100.75	99.50	96.75	96.50
ACM - Maximum Throughput	89 Mbit/s	57xDS1	64 QAM		100.25	100.25		95.50	94.50	93.25	90.50	90.25
ACM - Maximum Throughput	122 Mbit/s	78xDS1	256 QAM		89.75	89.75		85.00	84.00	82.75	80.00	79.75
30 MHz Channel												
ACM - Maximum System Gain	39 Mbit/s	24xDS1	QPSK		115.75	115.75		111.00		108.75	106.00	105.75
ACM - Maximum System Gain	78 Mbit/s	50xDS1	16 QAM		109.50	109.50		104.75		102.50	99.75	99.50
ACM - Maximum System Gain	135 Mbit/s	87xDS1	64 QAM		101.50	101.50		96.75		94.50	91.75	91.50
ACM - Maximum System Gain	179 Mbit/s	115xDS1	256 QAM		94.00	94.00		89.25		87.00	84.25	84.00
ACM - Maximum Throughput	44 Mbit/s	28xDS1	QPSK		112.75	112.75		108.00		105.75	103.00	102.75
ACM - Maximum Throughput	88 Mbit/s	56xDS1	16 QAM		104.75	104.75		100.00		97.75	95.00	94.75
ACM - Maximum Throughput	139 Mbit/s	89xDS1	64 QAM		98.50	98.50		93.75		91.50	88.75	88.50
ACM - Maximum Throughput	189 Mbit/s	122xDS1	256 QAM		88.00	88.00		83.25		81.00	78.25	78.00
Non ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	64QAM	103.25	103.25	103.25		98.50		96.25	93.50	93.25
Non ACM - Max System Gain	155 Mbit/s	100xDS1	128QAM	99.25	99.25	99.25		94.50		92.25	89.50	89.25
Non ACM - Max System Gain	157 Mbit/s	1xOC3	128QAM	99.25	99.25	99.25		94.50		92.25	89.50	89.25
Non ACM - Max System Gain	178 Mbit/s	115xDS1 or 4xDS3	256QAM	95.50	95.50	95.50		90.75		88.50	85.75	85.50

All specifications are referenced to the ODU antenna flange, and are typical values unless otherwise stated, and are subject to change without notice.

For Guaranteed values (over time and operational range), subtract 4 dB from System Gain values.
[1] System Gain & Threshold values are for BER=10^{-6}. Values for BER=10^{-3} are improved by 0.5 dB.
[2] Airlink Capacities are shown. Ethernet/IP throughput will vary based on frame sizes.
[3] Enabling TDM transport will subtract equivalent capacity from available Ethernet Throughput.
[4] For switchable diplexer option, 5GHz system gain is reduced by 4 dB.

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ODU300 RF SPECIFICATIONS - SYSTEM GAIN PERFORMANCE

	AirUnk Capacity[4]	MaxDS1s		5 GHz[9]	6/U6 GHz	7/8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz
40 MHz Channel												
ACM - Maximum System Gain	50 Mbit/s	32xDS1	QPSK		116.00	111.25			109.00	106.25	106.00	
ACM - Maximum System Gain	101 Mbit/s	65xDS1	16 QAM		108.25	103.50			101.25	98.50	98.25	
ACM - Maximum System Gain	170 Mbit/s	109xDS1	64 QAM		100.25	95.50			93.25	90.50	90.25	
ACM - Maximum System Gain	238 Mbit/s	127xDS1	256 QAM		92.75	88.00			85.75	83.00	82.75	
ACM - Maximum Throughput	59 Mbit/s	37xDS1	QPSK		111.75	107.00			104.75	102.00	101.75	
ACM - Maximum Throughput	118 Mbit/s	76xDS1	16 QAM		103.50	98.75			96.50	93.75	93.50	
ACM - Maximum Throughput	187 Mbit/s	120xDS1	64 QAM		97.25	92.50			90.25	87.50	87.25	
ACM - Maximum Throughput	255 Mbit/s	127xDS1	256 QAM		88.25	83.50			81.25	78.50	78.25	
Non ACM - Max System Gain	135 Mbit/s	87xDS1 or 3xDS3	32QAM		104.00	99.25			97.00	94.25	94.00	
Non ACM - Max System Gain	156 Mbit/s	100xDS1	64QAM		103.00	98.25			96.00	93.25	93.00	
Non ACM - Max System Gain	159 Mbit/s	1xOC3	64QAM		102.25	97.50			95.25	92.50	92.25	
Non ACM - Max Throughput	178 Mbit/s	115xDS1 or 4xDS3	64QAM		98.75	94.00			91.75	89.00	88.75	
50 MHz Channel												
ACM - Maximum System Gain	63 Mbit/s	40xDS1	QPSK							105.25	105.00	
ACM - Maximum System Gain	127 Mbit/s	81xDS1	16 QAM							97.50	97.25	
ACM - Maximum System Gain	212 Mbit/s	127xDS1	64 QAM							89.50	89.25	
ACM - Maximum System Gain	297 Mbit/s	127xDS1	256 QAM							82.00	81.75	
ACM - Maximum Throughput	74 Mbit/s	47xDS1	QPSK							101.00	100.75	
ACM - Maximum Throughput	148 Mbit/s	95xDS1	16 QAM							92.75	92.50	
ACM - Maximum Throughput	233 Mbit/s	127xDS1	64 QAM							86.50	86.25	
ACM - Maximum Throughput	318 Mbit/s	127xDS1	256 QAM							77.50	77.25	
80 MHz Channel												
ACM - Maximum System Gain	72 Mbit/s	46xDS1	QPSK							104.50	104.25	
ACM - Maximum System Gain	145 Mbit/s	93xDS1	16 QAM							97.00	96.75	
ACM - Maximum System Gain	243 Mbit/s	127xDS1	64 QAM							89.00	88.75	
ACM - Maximum System Gain	340 Mbit/s	127xDS1	256 QAM							81.50	81.25	
ACM - Maximum Throughput	85 Mbit/s	54xDS1	QPSK							100.50	100.25	
ACM - Maximum Throughput	170 Mbit/s	109xDS1	16 QAM							92.25	92.00	
ACM - Maximum Throughput	267 Mbit/s	127xDS1	64 QAM							86.00	85.75	
ACM - Maximum Throughput	365 Mbit/s	127xDS1	256 QAM							77.00	76.75	

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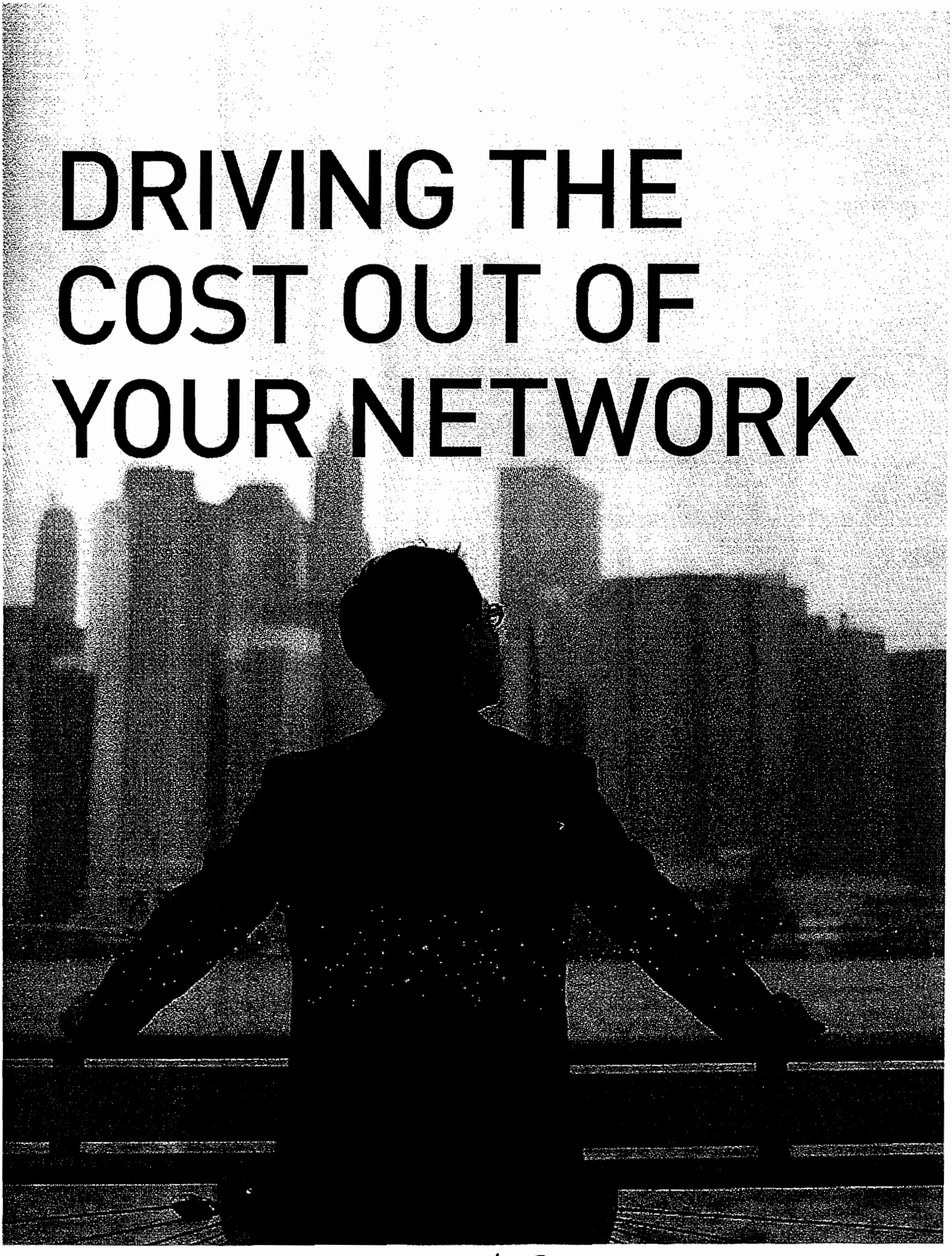
DRIVING THE COST OUT OF YOUR NETWORK



MORE SECURITY, FEWER COSTS WITH PROVISION NETWORK INTELLIGENCE

ProVision is your complete Element Management System for all current Aviat products and partner solutions.

ProVision gives network operators more control and better security at a lower cost. It integrates field-proven control and response processes with in-depth intelligence about microwave network operations.

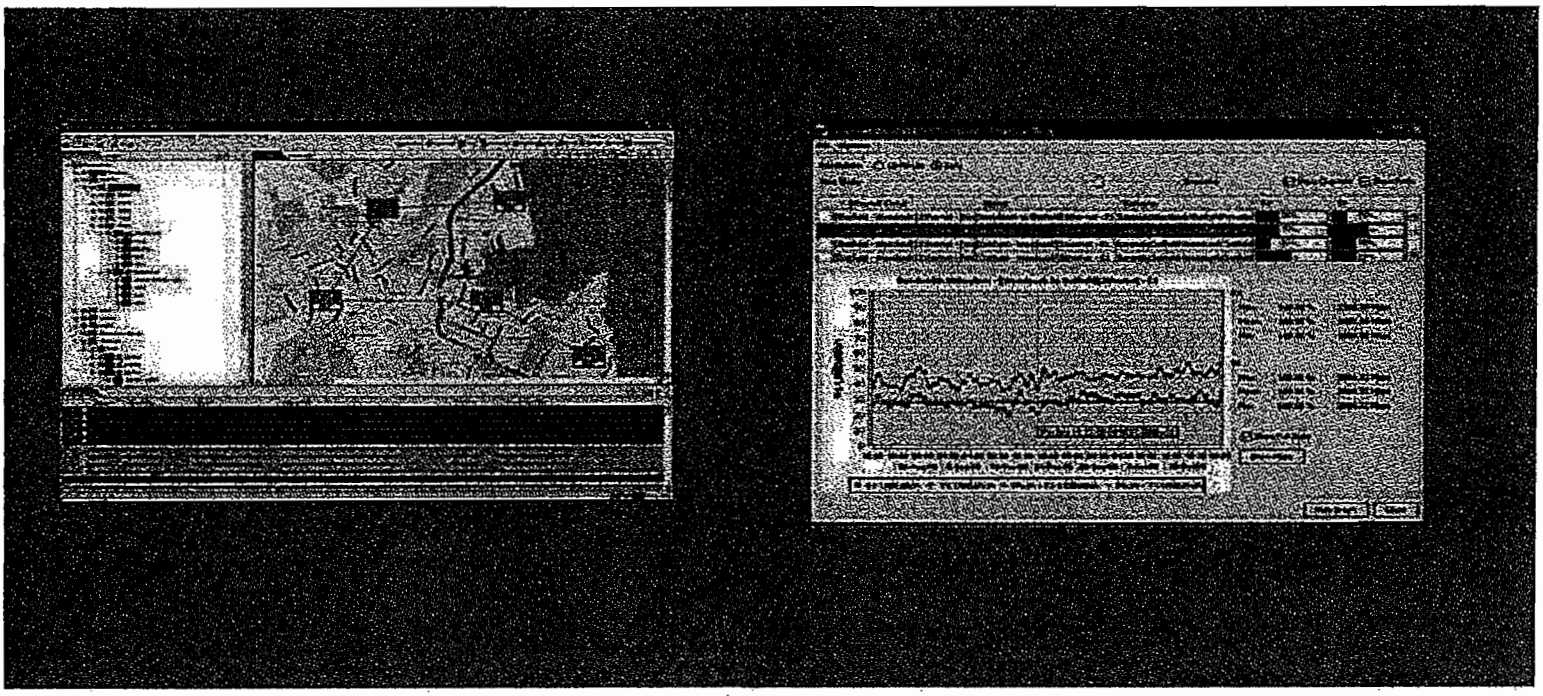
By reducing total network downtime and expensive on-site configuration, ProVision can lead to immediately, significantly lower costs for network management and operation.

The ProVision solution is co-developed with Aviat Networks microwave and WiMAX solutions. Operators use ProVision to fix network problems and analyze system status directly, with its detailed, intuitive graphical interface and simplified control processes.

With a user-friendly GUI, simplified system administration, and Aviat global support, ProVision manages over 200 customer networks worldwide.

ELEMENT MANAGEMENT SYSTEM

Driving the cost out of your network



SMART NETWORK VISIBILITY

ProVision is the only Element Management System you need, supporting all current Aviat and partner products up to 20 client terminals. Support includes:

- Eclipse™, Eclipse Packet Node, TRuepoint®, and Constellation™ microwave radios
- WiMAX networks, including StarMAX Base Stations, Subscriber Stations and the Wireless Services Gateway (WSG)
- Aviat EfficientSite™ site management
- Generic Device Support (GDS) fault management for partner products, including: Adtran,
- Asentria, Bayly, Benning, Eltek, Fujitsu, Loop, Multitel, Sagem, Tejas, and Tellabs.
- Legacy Aviat microwave radios such as Altium, XP4, MegaStar and MicroStar

STRATEGIC NETWORK INTEGRATION

ProVision can be a standalone Element Management System (EMS) or can be integrated into a Operational Support System (OSS). Operators can also integrate it into a standards-based OSS using feature-rich, easy to configure Northbound Interfaces (NBI). These provide data for events, performance, configuration/inventory, and network topology.

ProVision smooths network rollout and expansion. It provides network auto auto-discovery, identifying and deploying many Aviat devices automatically.

Customers switching from StarView to ProVision benefit from the StarView Migration tool, by eliminating data re-entry.

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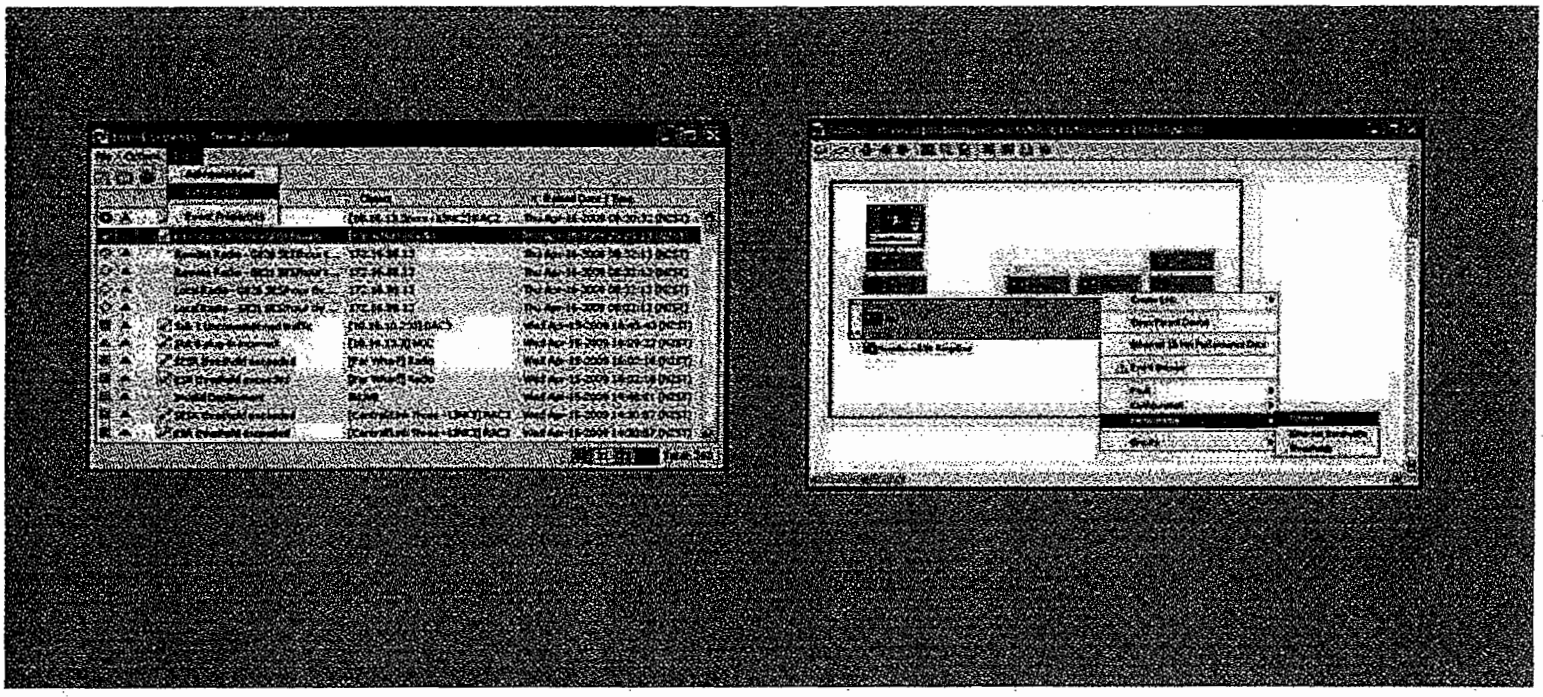

PROVISION AND ECLIPSE – VITALLY INTEGRATED

ProVision is the strongest network management system available for the Eclipse and Packet Node platform. Eclipse support features include:

- GUI-based end-to-end Eclipse circuit discovery and provisioning
- Detailed Ethernet throughput monitoring
- Inventory reports capturing all serial and part numbers for every Eclipse node in the network
- ProVision automatically backs up all Eclipse node configuration
- Network configuration profiles define common attributes such as SNMP TRAP destination or SNTP configuration

SECURITY AND RAPID EVENT NOTIFICATION

ProVision provides a vital layer of security for your network, ensuring that your customers' traffic is transmitted. Many devices can be configured in ProVision with encrypted strong security.

To notify operators when problems strike, ProVision has dynamic, highly visible event updating. Detailed event help includes probable cause and recommended repair actions.

Event pre-filtering ensures that operators only need to analyze serious network-impacting events, without repetition. Sophisticated event notifications (audio, email, text message) send vital event data to the operators without delay.

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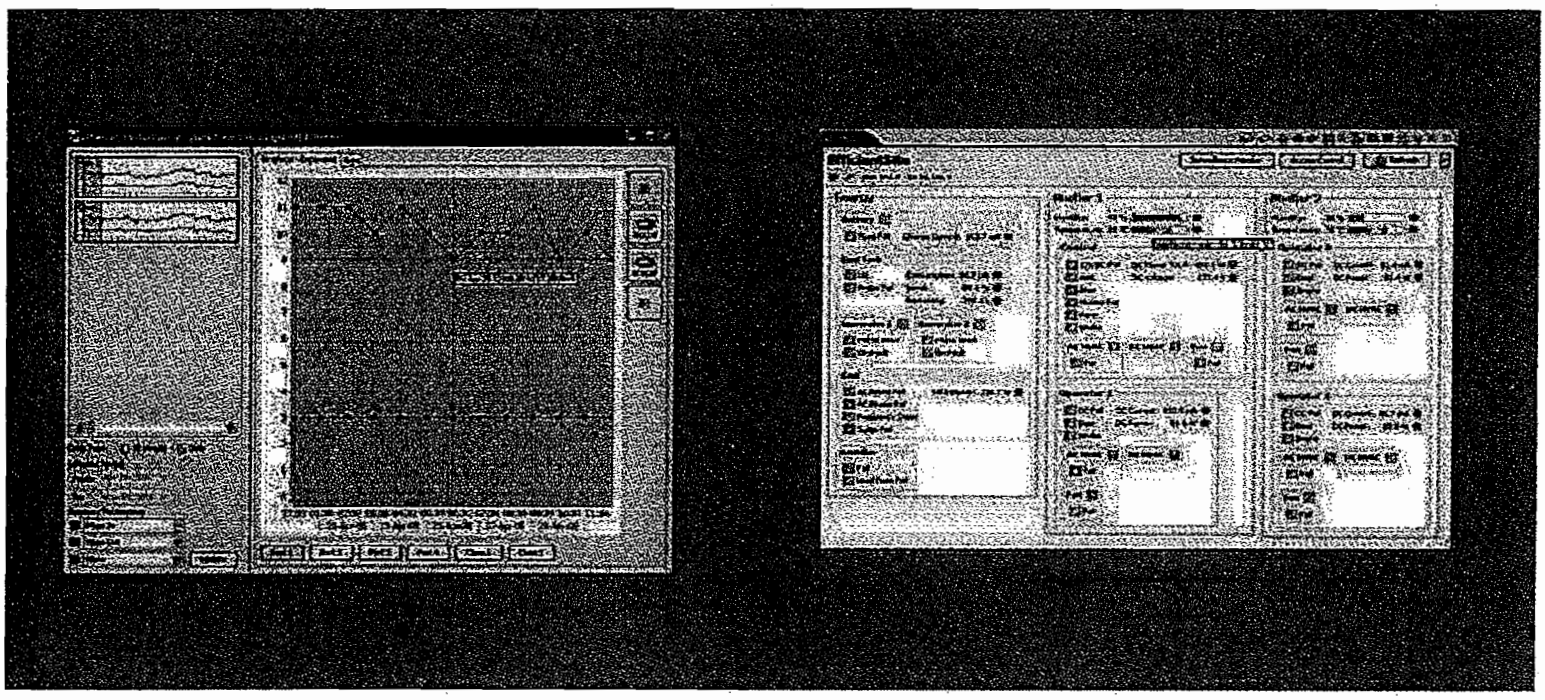
ELEMENT MANAGEMENT SYSTEM

Driving the cost out of your network



STRENGTHEN NETWORK MANAGEMENT

ProVision is a proven solution, delivering the core functions network operators need, and data analysis for optimizing long-term network use. Operators learn fast, thanks to ProVision's efficient workflow and easy access to favored functions. With craft tool integration for all device types, ProVision quickly becomes the network management center.

Over the long term, use ProVision to analyze and optimize networks, with its exportable reporting on reporting on Inventory, Capacity, Network Health, Faults, and more. For Eclipse, ProVision traces Ethernet performance trends and Ethernet bandwidth utilization.

SIMPLIFY NETWORK ADMINISTRATION

All ProVision administration functions, including user access controls and database management, are available from the GUI. Features include:

- Low administration support requirement
- Network-wide configuration profiles
- Upgrade device software remotely
- Advanced security and database maintenance options
- Choice of hardware platform: Windows or Unix
- Easy to configure NorthBound Interfaces for integration into OSS systems

MIAMI-DADE COUNTY, FLORIDA

CONTRACT SUPPLEMENTAL AGREEMENT NO. 2

Contract Number:	**BW7514-15/24-2 (Initial Contract Executed on April 28, 2004)**
Contract Title:	**450 MHz UHF Radio System Upgrade Project**
Contractor:	**MOTOROLA, INC.** **Commercial, Government and Industrial Solutions Sector – North American Group** **8000 W. Sunrise Parkway,** **Plantation, FL 33322**

In accordance with the above referenced Contract Number and Title (hereinafter "Contract"), this Supplemental Agreement No.2, when properly executed, becomes a part of the County's Contract No. BW7514-15/24-2 and all renewals thereof in accordance with provisions of Article 5 Contract term by adding the supplemental conditions for the additional work described herein:

WHEREAS Miami-Dade County and the Contractor entered into an agreement on April 28, 2004 approved by the Board of County Commissioners under resolution R-457-04, item 801A, covering a Five (5) year initial term with Fifteen (15), one (1) year options to renew (OTR) the contract at the County's sole discretion;

WHEREAS the Contractor's submission of contract requirements for a Certificate of Insurance along with Payment and Performance Bonds resulted in this original contract becoming effective on June 15, 2004 and agreement to provide updates for these requirements during all renewal periods;

WHEREAS on the basis of this contract Miami-Dade County has expressed an interest in acquiring a Radio Console Equipment required for Dispatch controls and functions in the Light Speed Building as allowed under Contract Article 8 Pricing and Article 17 Parts, Products and Discontinued Equipment;

WHEREAS Miami-Dade County and the Contractor have mutually agreed for the scope of work based on Contractor's revised proposal for said Radio Console Equipment dated March 24 2010 attached as Exhibit A;

Both Contractor and the County hereby agree this work should proceed based on a mutually agreed fixed price $2,597,123 with an agreed project timeline having a final completion on or before December 31, 2010. The project payment schedule provisions set forth in section 5.1 of Exhibit A shall be based on the effective date of the County Board Commission approval. All associated invoices for equipment and related professional services shall be rendered in accordance with the following milestone payment schedule detailed below:

1) $ 259,712.30 (10%) upon execution and County Board approval
2) $ 389,568.45 (15%) upon completion of Contract Design Review (CDR)
3) $ 908,993.05 (35%) upon equipment delivery acceptance
4) $ 389,568.45 (15%) upon completion of Installation Work
5) $ 389,568.45 (15%) upon completion of Acceptance Test Plan (ATP)
6) $ 259,712.30 (10%) upon Final System Acceptance

The Contractor accepts and understands that failure to meet the stated project timeline requirements, notwithstanding the above referenced site obligation, shall be an Event of Default as set forth in Article 32 of the Contract and shall be an event subject to Liquidated Damages as set forth in Article 12 of the Contract.

The parties hereto further agree that all terms, covenants, conditions of the original contract including all applicable ordinances named in Articles 42, 43, 44 and specifically Article 51 covering the County User Access Program (UAP) with respect to other governmental, quasi-governmental or not-for-profit entities located within the geographical boundaries of Miami-Dade County, shall remain in full force and effect, and shall apply in the application of this contract amendment. In the event any term or condition of this Supplemental Agreement No. 2 ("Amendment") or Exhibit A conflict with any term or condition of the Contract, however, the terms and conditions of this Amendment shall take precedence.

IN WITNESS WHEREOF, the parties have executed this Amendment No 2 to County Contract No. BW7514-15/24-2 as of the date first herein above set forth.

Contractor	Miami-Dade County
By: Marshall Wright	By: _____
Name: Marshall Wright	Name: _____
Title: MSSI Vice President & Director	Title: _____
Date: 6/4/2010	Date: _____
Attest: _____ Asst. Secretary	Attest: _____ Clerk of the Board

Stamp Corporate Seal

Approved as to form and Legal Sufficiency

_____
Assistant County Attorney

6-7-10
Date

Proposal for

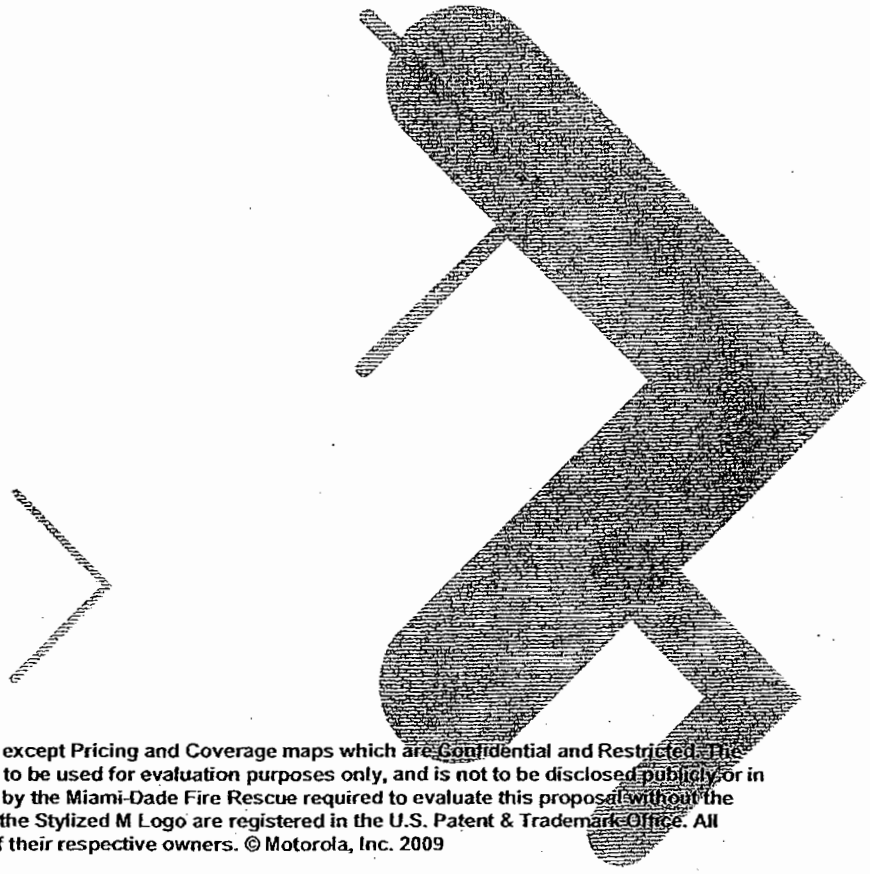
Miami-Dade Fire Rescue

Contract BW7514-15/24-2 Exhibit A – Supplemental Agreement 2

Dispatch Center Consoles

March 24, 2010

(Section 5 Pricing, Tables 1 -3 added June 2, 2010, to provide requested pricing breakdown and maintenance pricing. June 9, 2010 – changed payment milestone)



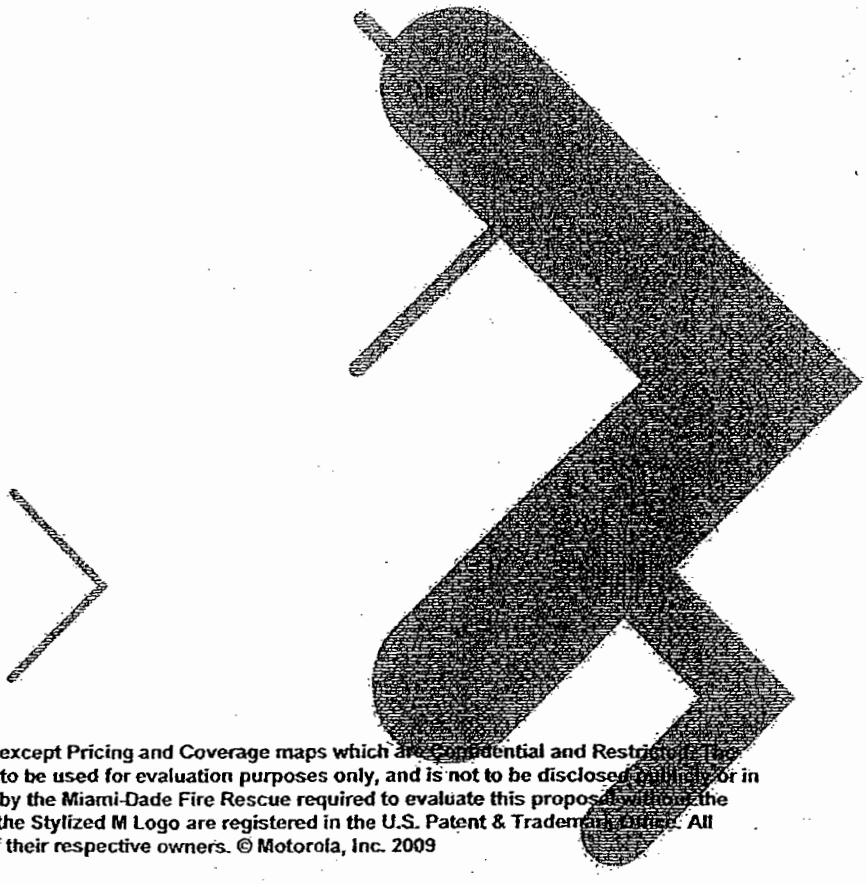
8000 West Sunrise Blvd., Plantation, FL 33322

Proposal for

Miami-Dade Fire Rescue

Dispatch Center Consoles

March 24, 2010



8000 West Sunrise Blvd., Plantation, FL 33322

Table of Contents

Section 1. System Description

1.1 Introduction

The MCC 7500 is Motorola's ASTRO® 25 IP console, and the most advanced offering in Motorola's line of radio dispatching products.

Although the MCC 7500 IP platform is capable of many features, only those applicable to Miami-Dade Fire Rescue (MDFR) are detailed.

Important features include:

- Standards-based Platform – APCO 25 compliant.
- Intuitive User Interface – Graphical User Interface (GUI) based.
- Reduced Hardware – Smaller footprint compared to APCO16 systems.
- Logging Recorder – Interfaces to customer provided IP recorder.
- Wireline Interface – Compatible with existing system.
- Antenna Configuration consisting of 7 antennas, 7 feedlines, 7 antenna mounts, and 5 combiners
- Seamless integration with ASTRO 25 trunking systems:
  - Supports the IP protocols of the trunking system's transport network; no circuit-switched network to packet-switched network conversion equipment is necessary.
  - Configuration of the console subsystem via the radio system's centralized configuration subsystem (Network Manager) so the user has a single point to configure the radio system. The configuration subsystem may be accessed from multiple remote locations so users can still have convenient access while enjoying the benefits of centralized configuration.
  - Management of the console subsystem via the radio system's centralized network management subsystem so the customer has a single point for managing faults, accounting, performance, and security of the radio system. The network management subsystem may be accessed from multiple remote locations so customers can still have convenient access while enjoying the benefits of centralized management.
- Centralized logging of conventional radio audio associated radio call information and certain radio system events.

The MCC 7500 console subsystem is tightly integrated to the ASTRO 25 digital voice system. The MCC 7500 is a state-of-the-art console system that will be installed in accordance with recognized industry standards of police and fire dispatch centers. The new console system will meet public safety dispatching needs for Miami-Dade Fire Rescue.

The MCC 7500 console features the same intuitive GUI as Motorola's widely accepted Gold Elite™ console system. It operates under the Microsoft Windows® XP platform and follows the same standards as other Windows programs around the world. The screen layout is simple and uses valuable space efficiently. Key information and critical functions are clearly identified with easy to understand icons. Dispatchers can quickly recognize these icons instead of reading text, hence maximizing their productivity.

Many tasks can be completed more quickly and easily than ever before with the MCC 7500 consoles. Channels are displayed in on-screen "folders" for prioritization. Flashing red indicators easily identify incoming emergencies. The tools you need to communicate with field personnel are at your fingertips. Dispatchers can see information about who is calling, such as the time and call type.

There are three main components of a MCC 7500 system:

- Dispatch console.
- Archiving Interface Server – AIS (logging interface).
- Conventional channel gateway.

Various combinations of these are connected together and to the rest of the radio system via console site routers and switches on an IP network.

MCC 7500 console equipment connects directly to the trunking system's IP transport network. It uses the IP packet protocols for passing call control data and call audio through the system. Figure 1-1 shows a high-level diagram of how MCC 7500 equipment fits into the ASTRO 25 system.

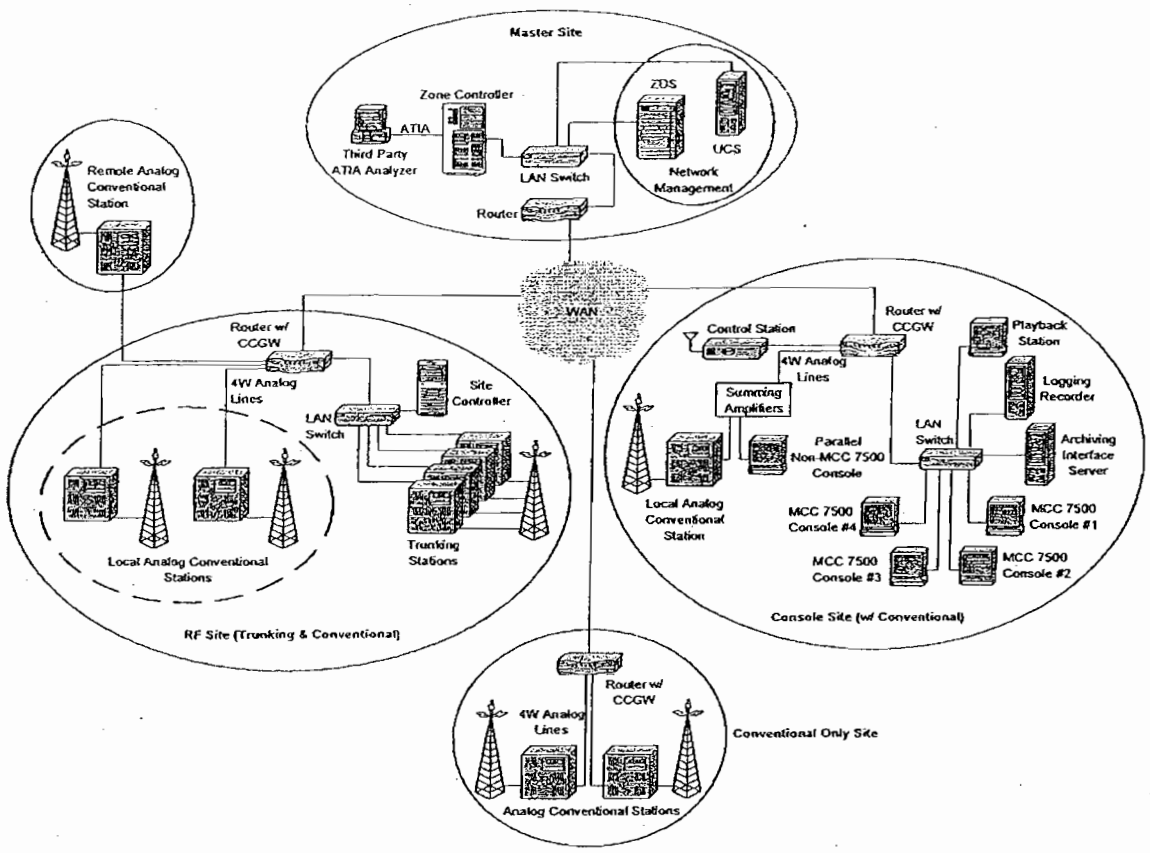


Figure 1-1: ASTRO 25 system with MCC 7500 consoles

Motorola's proposed solution for MDFR is our ASTRO 25 MCC 7500 Dispatch IP Console platform. This platform offers a seamless integration with the ASTRO 25 network, the foundation of the MOTOA4 Mission Critical Portfolio, providing your dispatchers and first responders with:

- Cost savings – reduces costs by integrating your voice, data and dispatch needs into a single solution.
- Interoperability– Compliant with APCO Project 25 standards, offering seamless interoperability with other compliant systems and radios, putting the highest level of interoperability in the end users' hands, without the need of gateways or console patches.
- Reliability – Pre-release software and upgrade testing, third party hardware and software certification process, fault tolerant architecture with multiple fall back modes, multiple levels of redundancy, and real-time network and security monitoring provide Mission Critical reliability.
- Increased security – Information Assurance (IA) enhances the confidentiality, integrity, and availability of the Radio Network Infrastructure (RNI). Multiple encryption algorithms keep end-to-end voice and data transmissions confidential.

- Enhanced productivity – Easy and intuitive interfaces to critical real-time information is delivered to the user when and where they need it.
- Flexibility – Scaleable, flexible design allows ASTRO 25 to dynamically adapt to the operational demands of any size organization - the IP-based design supports a unique mix of voice, data, and geographical requirements, permitting easy system enhancements as the users' needs evolve.

MCC 7500 consoles connect directly to the ASTRO 25 IP network without interface boxes, digital voice gateways, or backroom electronics for an integrated mission critical network. The MCC 7500 consoles offer seamless connectivity between the officer in the field and the dispatcher. A description of the features, benefits, system architecture, and hardware components are provided in this system description.

1.2 Proposed Solution

Our ASTRO 25 IP solution provides scalability, flexible system architecture, unparalleled network management, and easy migration to future capabilities.

Miami-Dade Fire Rescue has an operational communication system comprised of 17 conventional UHF channels detailed herein.

Channel	TX Freq. (MHz)	RX Freq. (MHz)
North Dispatch	453.3500	458.3500
North TAC	453.5250	458.5250
North Admin	460.4500	465.4500
Central Dispatch	460.5000	465.5000
Central TAC	453.3250	458.3250
Central Admin	460.4000	465.4000
West Dispatch	453.1000	458.1000
South Dispatch	453.1500	458.1500
South TAC	453.4250	458.4250
West TAC	453.8000	458.8000
Airport	453.5000	458.5000
County Admin	460.0625	465.0625
Air Rescue	460.3125	465.3125
Med 2	463.0250	468.0250
Med 4	463.0750	468.0750
Med 6	463.1250	468.1250
Med 8	463.1750	468.1750

All channels except County Admin are analog channels.

Each channel has a unique configuration of voting, receivers, and transmitters. The details are shown in the diagram below (assumes Air Rescue expansion has occurred).

There are currently 17 transmitter sites, 21 receive only sites, seven voting sites (also double as transmitter sites), and two dispatch sites (FAO and Annex). The system details are shown in the block diagram in subsection 1.8.

The new Dispatch Center includes the interfacing equipment to connect to the existing Radio system. The demarcation point is the existing Raven Audio Bridge. The new Dispatch Center will use MCC 7500 consoles as opposed to the existing MCC 5500s. This new consoles uses the newer IP based technology.

A logger interface (AIS) is included in the proposal. Logging recorders are to be provided by the customer.

Zetron Model 25s are provided to match the existing functionality at FAO. An additional TeNSr is included to route the Hospital audio traffic to the customers logging recorders to be located at the new Dispatch Building. A MOSCAD workstation at Lightspeed is included that interfaces to the existing MOSCAD system. Like FAO, and Annex, the new Dispatch Center is not part of the MOSCAD system. An overall system diagram is shown in section 1.8.

1.3 System Features

MCC 7500 is a feature-rich, modular platform that has been configured to maximize the utility of the system to your unique needs. The following sections provide discussion of the key MCC 7500 Dispatch IP Console features to include:

- Integrated with ASTRO 25 network.
- Proven GUI.
- Centralized network configuration and fault management.
- Mission critical audio and tones.
- Integrated logging recorder.
- Centralized system management.

1.3.1 Integrated with the ASTRO 25 Network

The MCC 7500 IP Dispatch Console is seamlessly integrated into the ASTRO 25 Mission Critical Trunking Network.

The console connects directly to the Master Site via an IP backbone. This modular IP approach eliminates the need for space-consuming backroom electronics. All dispatch activity is performed over IP. The physical space needed to accommodate the MCC 7500 console position is no more than required for a personal computer.

Inherent integration with the ASTRO 25 network means:

- Voice quality is optimized, eliminating the potential for audio degradation.
- Quality of service is maintained, regardless of the size of the system.
- Rapid call set up times that remain constant, regardless of the size of the system.
- Improved bandwidth efficiencies reduce transport costs.
- Flexibility in usage of the operator configuration – any operator can do their job from any position in the network.
- Inherent access to all system resources within the network by eliminating equipment and coverage constraints, providing dispatch priority to reach any user when needed.

1.3.2 Proven Graphical User Interface

The MCC 7500's intuitive GUI optimizes user efficiency. The MCC 7500 user interface is an enhanced version of Motorola's proven dispatch GUI. For existing Gold Elite users, the GUI allows a smooth transition and minimal training for radio dispatchers. For new users, the graphical icons and unsurpassed flexibility make the MCC 7500 IP console GUI easy to learn and operate.

The MCC 7500 GUI is highly configurable and customizable by agency or user to meet dynamic needs and requirements. The MCC 7500 GUI makes the most use of monitor space, maximizing the number of resources a dispatcher is able to easily view and control. Features include:

- Six screen configurations (folders) for added resource capacity, for shift changes, or for differing dispatch scenarios and/or responsibilities.
- Sixteen different radio patch configurations per MCC 7500 Console.
- Call history log for up 1000 calls.

An example of the Elite Dispatch GUI is shown in Figure 1-2.

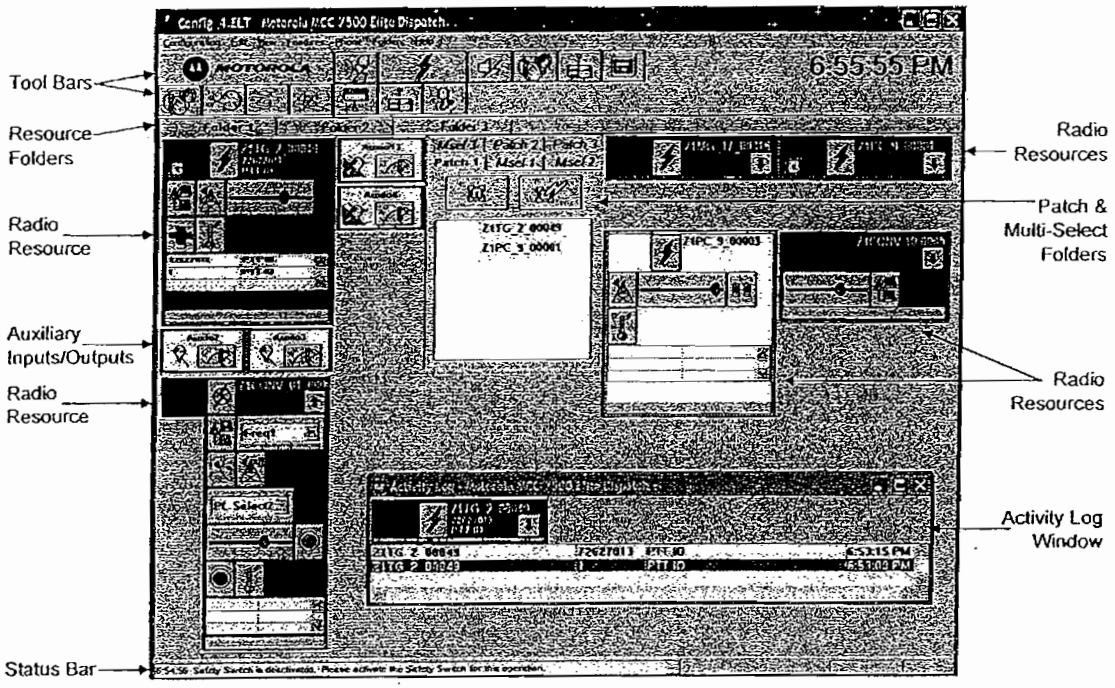


Figure 1-2: Elite Dispatch GUI

1.3.2.1 Elite Admin Application

The manner in which resources and audio are presented to the dispatch console user on the MCC 7500 dispatch console is managed by the Elite Admin application. The look and feel of the Elite Dispatch GUI, as well as how received audio is routed on the dispatch console, can be optimized to meet customers' needs.

1.3.3 Centralized Network Configuration and Fault Management

Centralized configuration is a unique MCC 7500 IP Console feature that speeds console set up, enhancement, or expansion efforts and makes the most efficient use of resources:

- Configuration of the MCC 7500 IP Console positions is accomplished via the User Configuration Manager (UCM).
- Console configuration changes are immediately and automatically distributed to dispatch positions.
- Centralized fault management allows reduced service times, and quicker resolution of issues.

The MCC 7500 IP console is designed to continuously monitor its application software and important hardware elements (PC, voice card, secure card, VPM) to make sure it is operating efficiently at all times. Network connections and control

paths between the consoles and various elements are also monitored to make sure they are operating efficiently.

If configuration, fault management, or report generating ability is desired at individual console sites, remote network management clients can be employed. This is beneficial for users who are sharing a system but have limited access to the Network Manager, or for users who desire expanded console management capabilities at console sites.

1.3.4 Mission Critical Audio and Tones

For conventional, the MCC 7500 uses an industry standard G.728 vocoder in place of the IMBE vocoder, which greatly improves the quality and accuracy of all tones used in conventional features. For added flexibility and comfort, tones can be configured so they do not appear in the MCC 7500 headset earpiece(s).

1.3.5 Integrated Logging Recorder

The MCC 7500 IP console features a highly flexible, configurable, and scalable logging solution with superior audio quality. The Logging subsystem consists of an Archiving Interface Server (AIS), Logging Recorder, and Playback Station. Recorders participate in Agency Partitioning, Centralized Configuration, Fault Management, and Network Security. The digital logging solution features high quality playback audio equal to that of the MCC 7500 console. Audio is recorded in its native vocoded format for optimal audio quality. Replay stations contain vocoders, so audio is devocoded only when it is played back. Avoiding the double vocoding typical of other logging solutions minimizes audio degradation.

The IP logging subsystem records conventional gateway resources. An additional feature of the IP logging subsystem is its ability to log events. An event is defined as something the dispatcher does, such as changing the frequency on a station and repeat on/off. This approach provides users with valuable information required to adequately re-create incident communications for analysis, investigation, and evidence.

1.3.6 Centralized System Management

The MCC 7500 console system is configured and managed by the ASTRO 25 network's system management applications, providing you with a single point for configuring and managing the entire radio system. The MCC 7500 console can be interfaced with conventional resources, which are controlled and configured via the management applications.

1.4 Operator Features

High-level descriptions for all the features supported by the MCC 7500 dispatch console are given in this section.

1.4.1 Gaining Access to Resources in the Communication System

The resource assignment feature works in conjunction with the security group feature of the radio system's network manager. The security group feature determines which radio resources a given dispatch console user has the right to access. Those radio resources are then eligible to be assigned on a dispatch console via the resource assignment feature.

The items that are managed by this aspect of security group features at the console include conventional resources. This functionality allows flexibility in the setup and operation of your consoles.

1.4.2 Operator Position Audio

A typical MCC 7500 console has two speakers, one for selected audio and the second for all remaining audio. Additional speakers can be added to the console, allowing dispatchers to choose a specific speaker for a set of designated audio sources. This simplifies multitasking between multiple audio sources, allowing flexibility in the way the audio is presented to the dispatcher.

1.4.3 Basic Audio (Talk/Listen) Functions

The MCC 7500 provides a robust set of capabilities that carry over traditional dispatch functionalities, including:

- Single Select – allows the dispatcher to select a single audio, which is then heard on the select audio speaker.
- Multi-Select – allows the dispatcher to define groups of selected radio resources. Multi-Selecting a group of resources allows the dispatcher to transmit to all resources simultaneously in the multi-select group. Inbound audio from individual radio users are grouped to the selected or designated audio speaker for dispatcher operations only. The audio is not transmitted to the other users in the multi-select group.
- Inbound Call Indication – Visually indicates audio activity on a radio resource.
- Individual Resource Volume Control – allows the dispatch console user to change the level at which each resource is mixed into a speaker.

- All Mute – used to mute all of the audio on resources that are not currently selected at a dispatch console. This feature is used when the dispatch console user does not want to be disturbed by the audio from the unselect resources; the volume is restored automatically when the All Mute feature is deactivated.
- Acoustic Cross Mute – prevents acoustic feedback from occurring when dispatch consoles are physically located near each other. This feature provides the means to specify groups of dispatch consoles, which mute parallel operator audio on all radio resources that they have in common.
- High Speed Mute – allows an external device to provide a dry contact closure to the dispatch console subsystem that, when activated, mutes the receive audio of a conventional radio resource at all dispatch consoles monitoring that resource. The receive audio remains muted as long as the closure is present and un-mutes when it is removed. The High Speed Mute feature provides the customer with the means to control what audio appears at the dispatch consoles for a given conventional radio resource.
- General Transmit – provides easy access to transmitting on the selected resources, and can be activated by multiple means including:
  - Footswitch.
  - Headset transmit button.
  - Microphone transmit button.
  - General Transmit API functions.
- Instant Transmit – allows a dispatch console user to initiate a transmission on a specific resource regardless of its select state by clicking on the instant transmit button of the desired resource.
- Instant Transmit Safety Switch – requires a dispatcher to press a "safety switch" before initiating an instant transmit on a specific resource.
- APB Transmit – APB (All Points Bulletin) Transmit is a feature that initiates a voice transmission on the resources of a Multi-Select group. The APB Transmit feature provides easy access for transmitting to a preselected group of resources. APB Transmit is commonly used to make an announcement to many radio users.
- Console Transmits While Receiving Audio – Allows a dispatch console to receive audio from other radio resources while transmitting on a particular radio resource. This allows a dispatch console user to hear audio from other resources while transmitting.

1.4.4 Resource Transmit Status

The Resource Transmit Status is a visual indication of a resource's current status to all users across the network.

- Transmitting – Transmitting feature is used on a per dispatch console basis to indicate when a dispatch console is transmitting on a resource. Each dispatch console uses the feature to display its own transmit status.
- Parallel MCC 7500 Op Busy – is used to indicate when a parallel MCC7500 dispatch console is transmitting on a resource. This feature provides the means for a dispatch console user to know if a particular resource is available for use. The dispatch console user can see the alias of the parallel MCC7500 dispatch console that is transmitting on conventional resources.
- Parallel Non-MCC 7500 Op Busy (LOBL) – This feature is used to indicate when a parallel dispatch console of another type is transmitting on a conventional resource. This feature provides the means for a dispatch console user to know if a particular resource is available for use. Transmissions on conventional resources by parallel CENTRACOM Gold Elite dispatch consoles are indicated on the MCC 7500.

1.4.5 Supported Types of Analog Conventional Base Stations

The MCC 7500 is capable of accessing and controlling various analog conventional base stations using the Conventional Channel Gateway (CCGW). The dispatch console processes audio received from the station, and control various features on the stations such as frequency selection, PL selection, repeater on/off, etc.

1.4.6 Voice Call Types on Radio Resources

Conventional PTT Call

Allows a dispatch console user to initiate and receive normal PTT calls on conventional radio resources. It is intended to be heard by all users listening to that radio resource.

1.5 Archiving Interface Server and Logging Recorder

1.5.1 Archiving Interface Server

The Archiving Interface Server (AIS) provides an interface between the radio system and the logging recorder. This allows calls on the radio system to be recorded together with information associated with the calls.

The AIS passes the call control information to the logging subsystem including channel identification. This information is available for display to the user upon playback, and can be used as search criteria allowing the user to search the recorded information for the desired calls.

The AIS is comprised of a personal computer with Voice Card(s) or Secure Card(s). Each Voice Card or Secure Card has a network connection to system transport network. Multiple AIS/recorder pairs may be deployed in a radio system (refer to Figure 1-3).

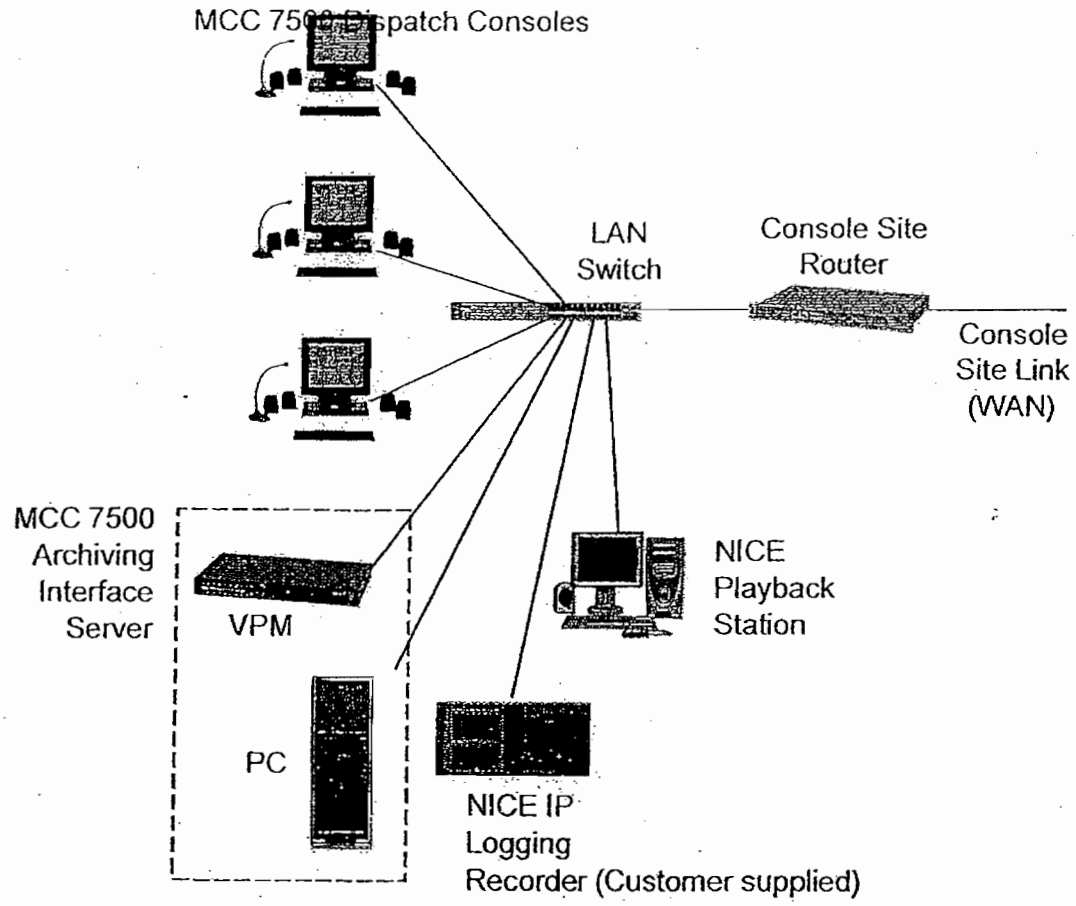


Figure 1-3: MCC 7500 VPM-based AIS hardware architecture

1.5.2 Logging Recorder

Motorola has selected NICE Systems to provide the recorder system on MCC 7500 console systems using an AIS. The NiceLog is the IP based recorder which records all IP traffic sent through the AIS. The customer will provide the NiceLog recorders.

The logging subsystem provides a user interface capable of allowing a user to identify actions/calls that occurred on the radio system, choose the desired call they wish to review, and play back the audio for that call through a logging playback station. The logging subsystem reconstructs the playback audio from the vocoded samples that had been sent to the logging subsystem when the call occurred.

1.5.3 Playback Stations

Audio and events that have been recorded by the NiceLog recorder(s) are accessed via the NICE Scenario Replay station. A replay station consists of a personal computer and the Scenario Replay software application.

The replay station is where the recorded audio is de-vocoded, converted to analog, and sent to a speaker. The replay station supports all the vocoders used in the radio system and uses the same error mitigation techniques as the MCC 7500 dispatch consoles. This ensures the audio being played back has the same level of audio quality as an MCC 7500 dispatch console.

A call can be saved on the replay station either as a complete call (audio and any information associated with the call) or as a simple .wav file. Files saved as complete calls must be played using the Scenario Replay application. Files saved as .wav files can be played on any application that supports them.

A replay station can access recordings on multiple NiceLog recorders, even ones that are not being used with AISs. This provides the user with a complete view of everything being recorded from a single point.

1.5.4 Logging Recorder and Playback Station Administration

The NICE logging recorders and playback stations used in the logging subsystem are configured and managed by a common administration application. This application is run on a playback station PC.

The types of services the administration application provides include the following:

- Configuring which conventional resources are to be recorded.
- Assigning access rights for replay station user accounts.

- Configuring various operational characteristics of the recorders (watermark limits for the recording media, what to do when the recording media fills up, etc.).

1.6 Conventional Channel Gateway (CCGW)

Conventional channels are now fully integrated into the system. Routers are fitted with 4-wire interface cards, which are connected to the conventional stations. This provides two key benefits:

- Use of the same transport network reduces total cost of ownership associated with dedicated backhaul requirements.
- Reduces hardware requirements for interoperability needs, potentially lowering fixed network equipment costs.

The CCGW provides direct access to conventional stations for dispatch users, allowing instant access to interoperable communications anywhere in the network.

1.7 Dispatch System Components

An MCC 7500 Dispatch IP Console consists of an operator position computer, Voice Processing Module (VPM), Auxiliary Input/Outputs, Logging equipment, Network Equipment, and Conventional Channel Interface Equipment. This section discusses the various components that make up the proposed system.

The MCC 7500's flexible IP architecture enables interfaces and components to be distributed where they are needed. Logging components can be centrally located at the zone core or distributed at console sites. CCGWs can be located at conventional-only RF sites, or they can be located at RF sites, the Master Site, or at console sites if that is where the conventional stations will reside.

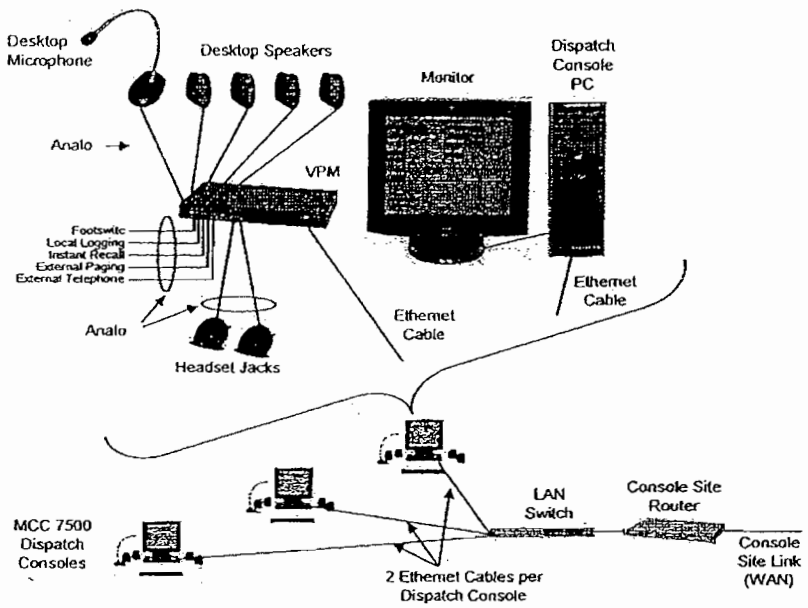


Figure 1-4: MCC 7500 dispatch console hardware architecture

1.7.1 Operator Position Components

The MCC 7500 IP Dispatch Console consists of a computer, a VPM, 1 select speaker, up to 3 unselect speakers, a desktop gooseneck microphone and/or headset jack box with in-line PTT amplifier and headset, and optional footswitch.

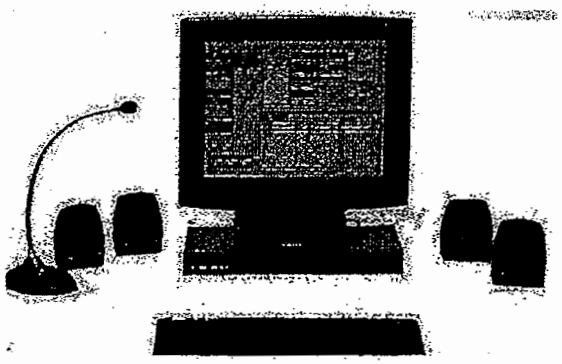


Figure 1-5: MCC 7500 operator position

1.7.1.1 Voice Processing Module

The VPM connects to the console site LAN switch and communicates with the dispatch console PC via Ethernet. While there is no direct physical connection between the VPM and the PC, there is a one-to-one relationship between the VPM and the PC. Each dispatch position has its own PC and its own VPM.

The VPM provides the vocoding and audio processing services for the dispatch console. The optional Secure card provides the encryption and decryption services for the dispatch console. It is capable of supporting multiple, simultaneous encryption/decryption sessions using multiple algorithms and multiple secure keys.

The VPM is designed so it can be mounted in furniture, placed on top of a writing surface, or mounted in an EIA 19-inch rack. It is also capable of supporting monitors weighing up to 80 pounds (36 kg) standing on top of it.

The VPM has connectors for the following devices:

- One desktop microphone.
- Two headset jacks.
- Eight desktop speakers (four speakers max supported in the initial releases).
- One logging recorder.
- One radio instant recall recorder.
- One telephone instant recall recorder (not supported in initial releases).
- One external telephone set.
- One external paging encoder.
- One footswitch.
- One generic transmit audio input.

Some of the connectors listed above may be used to provide audio inputs and outputs for connecting other types of dispatch consoles to the Motorola radio system in conjunction with the MCC 7500 Dispatch APIs.

The VPM uses an external power supply (similar to the power supplies used with laptop computers), which must be connected to an AC power source.

1.7.1.2 Personal Computer (PC)

The dispatch console uses a customized Motorola-certified PC running the Microsoft Windows operating system and containing Motorola-designed voice. The PCs used in ASTRO 25 systems have a mini-tower form factor.

The PCs are processed through Motorola factories in Schaumburg so that the application software, voice cards, and secure cards can be installed and tested to ensure they are operating properly.

1.7.1.3 Headset Jack

Each dispatch console is capable of supporting up to two headset jacks. A headset jack allows a dispatch console user to use a headset while operating the dispatch console. The headset jack supports headsets which use either PJ7 (six-wire) or PJ327 (four-wire) longframe connectors (six-wire headsets have a PTT button while four-wire headsets do not have a PTT button).

The headset jack contains two volume controls: one for adjusting the level of received radio audio and one for adjusting the level of received telephone audio. A small dimple is molded into the headset jack housing near the telephone volume control so the dispatch console user can tell them apart without having to look at them.

1.7.1.4 Desktop Speaker

Each dispatch console is supplied multiple speakers, through which audio is presented to a dispatch console user. Each speaker on a dispatch console contains unique audio; that is, an audio source cannot appear in multiple speakers at a single dispatch console.

The speaker is a self-contained unit that may be placed on a desktop, mounted in a rack/furniture, mounted on a wall, or mounted on a computer monitor. It contains an amplifier that provides a maximum of two watts of power output. Input power for the speaker is obtained from the GPIOM via the interconnect cable. A mounting bracket is included with the speaker.

1.7.1.5 Footswitch

Each dispatch console is supplied with a dual pedal footswitch.

1.7.1.6 Telephone/Headset Port

The telephone/headset port allows an external telephone set to be connected to the dispatch console. The dispatch console's headset can then be used to communicate on both the radio system and the telephone set.

When the dispatch console senses a dry closure on the Off Hook input buffer, it removes the selected radio audio from the headset earpiece and puts it back in the appropriate speaker(s). It then routes any audio appearing at the telephone/headset port's audio input to the headset earpiece. It also routes headset microphone audio to the telephone/headset port's audio output. This allows the dispatch console user to communicate hands-free on the telephone set.

When the dispatch console senses a dry closure on the Auxiliary Jack Sense input buffer, it ignores any closures on the Off Hook input buffer. This causes the headset to work with the radio system instead of the external telephone system. This allows the dispatch console headset to be used for radio operations when another person is staffing the telephone set.

If the dispatch console user transmits on any radio resources while the Off Hook signal is active, the headset microphone is re-routed to the radio system for the duration of the transmission. When the transmission ends, the headset microphone is

routed back to the telephone headset port's audio output. The headset earpiece audio routing is not changed during the transmission, so the dispatch console user can still hear the telephone's received audio.

The telephone/headset port allows a dispatch console user to use a single headset to communicate on both the radio system and a telephone system (e.g., a 911 system).

1.7.1.7 Instant Recall Recorder Port (for Radio)

The instant recall recorder port (for radio) allows an instant recall recorder to be connected to a dispatch console. The port provides an RJ45 connector with a balanced, 600 Ohm analog audio output containing the receive radio audio on the selected channels. Transmit audio of any type (from either this dispatch console or a parallel dispatch console) as well as tones generated by the dispatch console (emergency tones, callback tones, busy tones) are not included in the audio output.

If transmit audio is desired for the instant recall recorder, the long term logging port may be used instead of the instant recall recorder port. Both outputs have the same electrical characteristics; only the content of the audio is different. No playback speaker input or recording control line output are provided on the port.

Short-term, console-specific audio recording is a mechanism used to record a portion of the inbound audio present on a specific dispatch console and make it readily available to the dispatch console user. This recorded audio is retained by the recording system for a short period (typically about 60 minutes) and is easily played back by the dispatch console user. This allows the dispatch console user to replay received audio that the user may have missed.

1.7.1.8 Long Term Logging Port

The long term logging port allows an external logging recorder to be connected to a dispatch console. The port provides an RJ45 connector with a 600 Ohm balanced analog output. The audio that appears on this output is configurable, but is typically the audio that was transmitted and/or received at that dispatch console.

The configuration of audio to be presented at this port is tied to the physical dispatch console, so that no matter what user is logged into the console, the same type of audio is logged. This configuration is done as part of configuring the dispatch console at the radio system's network manager. The long term logging port can be configured to log any combination of the audio sources listed below:

- Audio received from the currently selected radio resources (note that the level of this audio is not affected by either the individual volume setting of the radio resource or the master volume control on the speaker or headset jack).
- Microphone audio being transmitted to the currently selected radio resources by this dispatch console user.

- Microphone audio being transmitted to unselected radio resources by this dispatch console user.
- Tones generated by the Zetron external paging encoder.

Note that this output may be used with an instant recall recorder as well as a long term logging recorder.

Long term, console-specific audio recording is a mechanism used to record a portion of the inbound and outbound audio present on a specific dispatch console. This is historically done by providing a logging port at the dispatch console, and wiring that port to a track of an audio recording device. These recordings are typically archived for long-term storage, and provide a historical record of the radio communications made at a given dispatch console.

1.7.2 Remote Site Router

The Site Router provides an interface that handles all of the IP Network Management traffic between the Master site and the MCC 7500 Dispatch center. The Site Router provides the following:

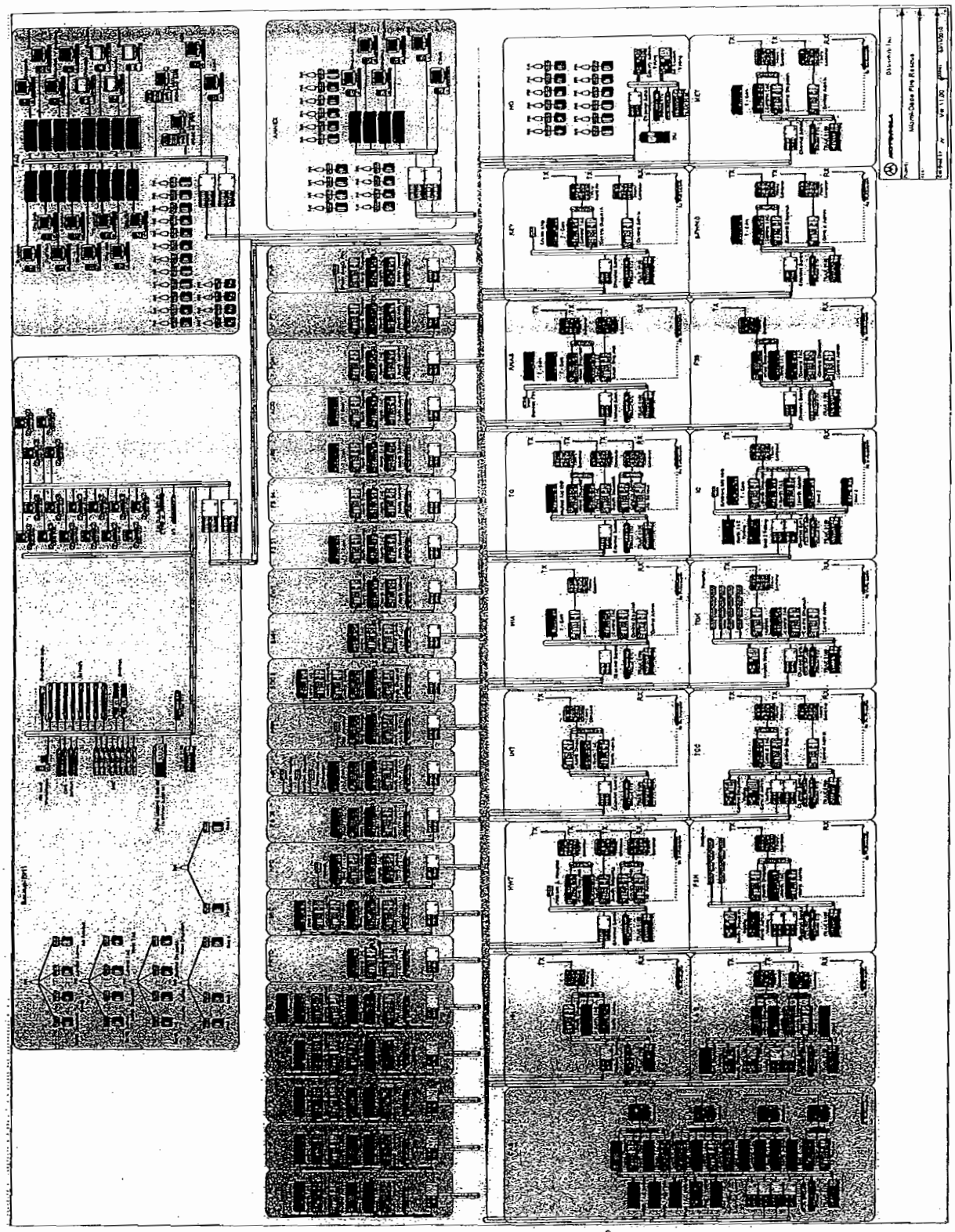
- Media conversion – the router converts Ethernet to the selected transport medium.
- Traffic prioritization – the router applies a prioritization marking to the packets leaving the site.
- Fragmentation – the router fragments large IP packets per industry standards.

1.7.3 Site LAN Switch

The site LAN Switch provides a LAN interface for dispatch site equipment and a LAN port for the site router. Through the switch, the service technicians gain access to service the site, and access the system's GUI.

1.8 System Drawings

Motorola has provided a block/system drawing on the following page. The diagram depicts 16 console positions.



1.9 Spares

The following spares are included in the proposal:

QTY	MODEL	DESCRIPTION
1	B1912	MCC SERIES DESKTOP SPEAKER
1	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE
1	B1913	MCC SERIES HEADSET JACK
1	DDN8493	FRU MCC 7500 OP PC & APP
1	B1934	MCC 7500 VOICE PROCESSOR MODULE FRU
1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD

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Section 2. Statement of Work

2.1 Introduction

This Statement of Work (SOW) describes the deliverables to be furnished to Miami-Dade Fire Rescue (MDFR) and the tasks to be performed by Motorola, its subcontractors, and by MDFR in order to supply and install 16 MCC 7500 Consoles, with back up UHF Radios, at the Lightspeed building as detailed in this proposal. This SOW provides the most current understanding of the work required by both parties to ensure a successful project implementation.

It is understood that this SOW may be revised through any other Change Orders that may occur during the execution of the project. This SOW will be an attachment to the Lightspeed Change Order to the existing MDFR UHF Radio Contract between Motorola and MDFR. Any Change Orders will require authorization by appropriate parties as determined by Miami-Dade County, up to and including the Board of County Commissioners.

2.2 Contract Management

2.2.1 Award (Milestone)

- The Customer and Motorola execute the contract Change Order and both parties receive all the necessary documentation.

2.2.2 Contract Administration

Motorola Responsibilities

- Align Lightspeed Console project with the existing UHF Radio Project Manager as the single point of contact with authority to make project decisions.
- Assign resources necessary for project implementation.
- Set up the project in the Motorola information system.

- Schedule the project kickoff meeting with the Customer.

Customer Responsibilities

- Assign a Project Manager as the single point of contact responsible for Customer signed approvals.
- Assign other resources necessary to ensure completion of project tasks for which the Customer is responsible.

Completion Criteria

- Motorola internal processes are set up for project management.
- Both Motorola and the Customer assign all required resources.
- Project kickoff meeting is scheduled.

2.3 Project Kickoff and Contract Design Review (CDR)

2.3.1 Review Contract Design

Motorola Responsibilities

- Meet with the Customer project team.
- Review the operational requirements and the impact of those requirements on various equipment configurations.
- Establish a defined baseline for the system design and identify any special product requirements and their impact on system implementation.
- Review the System Design, Statement of Work, Project Schedule, and Acceptance Test Plans, and update the contract documents accordingly.
- Discuss the proposed Cutover Plan and methods to document a detailed procedure.
- Submit design documents to the Customer for approval. These documents form the basis of the system, which Motorola will manufacture, assemble, stage, and install.
- Prepare equipment layout plans for staging and field.
- Provide minimum acceptable performance specifications for T1 links A/R.
- Establish demarcation point to define the connection point between the Motorola-supplied equipment and the Customer-supplied link(s) and external interfaces.
- Finalize site access and development plan.
- Conduct (updated) site evaluations to capture site details of the system design and to determine site readiness, including customer installed electrical and CAT5 or CAT 6 cables.

- Work with the MDFR to identify any radio interference concerns.
- Restrictions:
  - Motorola assumes no liability or responsibility for inadequate frequency availability or frequency licensing issues.
  - Motorola is not responsible for issues outside of its immediate control. Such issues include, but are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.
  - Motorola is not responsible for co-channel interference due to errors in frequency coordination by APCO or any other unlisted frequencies, or the improper design, installation, or operation of systems installed or operated by others.

Customer Responsibilities

- The Customer's key project team participants attend the meeting.
- Make timely decisions, according to the Project Schedule.
- Frequency Licensing and Interference:
  - As mandated by FCC, the Customer, as the licensee, has the ultimate responsibility for providing all required radio licensing or licensing modifications for the system prior to system staging. This responsibility includes paying for FCC licensing and frequency coordination fees.

Completion Criteria

- Complete Design Documentation, which may include updated System Description, Equipment List, system drawings, or other documents applicable to the project.
- The system design is "frozen" in preparation for subsequent project phases such as Order Processing and Manufacturing.
- A Change Order is executed in accordance with all material changes resulting from the Design Review (if applicable).

2.3.2 Design Approval (Milestone)

- The Customer executes a Design Approval milestone document.

2.4 Order Processing

2.4.1 Process Equipment List

Motorola Responsibilities

- Validate Equipment List by checking for valid model numbers, versions, compatible options to main equipment, and delivery data.
- Enter order into Motorola's Customer Order Fulfillment (COF) system.
- Create Ship Views, to confirm with the Customer the secure storage location(s) to which the equipment will ship. Ship Views are the mailing labels that carry complete equipment shipping information, which direct the timing, method of shipment, and ship path for ultimate destination receipt.
- Create equipment orders.
- Reconcile the equipment list(s) to the Contract.
- Procure third-party equipment if applicable.

Customer Responsibilities

- Approve shipping location(s).
- Complete and provide Tax Certificate information verifying tax status of shipping location.

Completion Criteria

- Verify that the Equipment List contains the correct model numbers, version, options, and delivery data.
- Trial validation completed.
- Bridge the equipment order to the manufacturing facility.

2.5 Manufacturing and Staging

2.5.1 Manufacture Motorola Fixed Network Equipment

Motorola Responsibilities

- Manufacture the Fixed Network Equipment (FNE) necessary for the system based on equipment order.

Customer Responsibilities

- None.

Completion Criteria

- FNE shipped to either the field or the staging facility.

2.5.2 Manufacture Non-Motorola Equipment

Motorola Responsibilities

- Manufacture (third-party equipment suppliers) non-Motorola equipment necessary for the system based on equipment order.

Customer Responsibilities

- None.

Completion Criteria

- Ship non-Motorola manufactured equipment to the field and/or the staging facility.

2.5.3 Develop Templates

Motorola Responsibilities

- Motorola assists the Customer in defining each console template.

Customer Responsibilities

- Evaluate sample console screen and provide feedback.
- Approve console template.

Completion Criteria

- Templates completed and approved by the Customer.

2.5.4 Ship to Staging (Milestone)

- Ship all equipment needed for staging to Motorola's factory staging facility (CCSi).

2.5.5 Stage System

Motorola Responsibilities

- Set up and rack the console system equipment as it will be configured in the field.
- Cut and label cables according to the approved CDR documentation.
- Label the cables with to/from information to specify interconnection for field installation and future servicing needs.
- Complete the cabling/connecting of the subsystems to each other ("connectorization" of the subsystems).
- Assemble required subsystems to assure system functionality.
- Power up, program, and test all staged equipment.
- Confirm system configuration and software compatibility to the existing system.
- Load application parameters on all equipment according to input from Systems Engineering.
- Complete programming of Consoles.
- Inventory the equipment with serial numbers and installation references.
- Complete system documentation.
- Provide a Factory Acceptance Test Plan.

Customer Responsibilities

- Provide information on existing system interfaces as may be required.
- Provide information on room layouts or other information necessary for the assembly to meet field conditions.
- Review and approve proposed Factory Acceptance Test Plan.

Completion Criteria

- System staging completed and ready for testing.

2.5.6 Perform Staging Acceptance Test Procedure

Motorola Responsibilities

- Test and validate system software and features.
- Functional testing of standard system features.
- Conduct site and system level testing.
- Power-up site equipment and perform standardized functionality tests.
- Perform system burn-in 24 hours a day during staging to isolate and capture any defects.
- Perform Customer-witnessed tests based upon Factory Acceptance Test Plan.

Customer Responsibilities

- Attend Factory Acceptance Testing if desired.
- Pay for travel, lodging, meals, and all incidental expenses for Customer personnel and representatives to witness the Factory Acceptance Testing.

Completion Criteria

- Approve Factory Acceptance Testing.

2.5.7 Ship Equipment to Field

Motorola Responsibilities

- Pack system for shipment to final destination.
- Arrange for shipment to the field.

Customer Responsibilities

- None.

Completion Criteria

- Equipment ready for shipment to the field.

2.5.8 CCSi Ship Acceptance (Milestone)

- All equipment shipped to the field.

2.6 Civil Work for Customer-Provided Facilities

Motorola Responsibilities

- Provide electrical requirements for each equipment rack to be installed in the Customer-provided facilities (maximum of 13.75 kW UPS load on 32 20 Amp breakers).
- Provide heat load for each equipment rack to be installed in the Customer-provided facilities (estimated 26,343 BTU maximum).
- Motorola will supply and install the equipment room Halo, (#2 bare), a Master ground bar, (4-inch x 24-inch x 1/4-inch copper), and a ground Buss wire above the racks, (#2 green insulated wire attached to the side of the cable tray). Additionally, Motorola will bond anything within six inches of the Halo, all metal conduits, boxes, door frames, etc. Motorola will connect each of the equipment racks that Motorola installs to the ground buss with #2 wire. It will be the responsibility of others to properly connect their equipment racks to the ground

buss. (If requested, Motorola will quote the grounding of "others" equipment racks).

Customer Responsibilities

- Secure site lease/ownership, Telco connections, and demark.
- Provide access to the sites for transporting electronics and other materials.
- Supply adequately sized electrical service, backup power (UPS, generator, batteries, etc.) including the installation of conduit, circuit breakers, outlets, etc., at each equipment location. Provide AC power (dedicated 20 Amp AC outlets - simplex with ground) for each major piece of equipment within six feet of the location of the Motorola-supplied equipment, including the associated electrical service and wiring (conduit, circuit breakers, etc.).
- Provide adequate HVAC, grounding, lighting, cable routing, and surge protection (also, among existing and Motorola-provided equipment) based upon Motorola's Standards and Guidelines for Communication Sites (R56). Ceiling (minimum nine feet) and 24-inch-wide cable tray with eight-foot minimum height in the equipment room in order to accommodate seven-foot, six-inch equipment racks.
- Provide floor space and desk space and console furniture for the Console equipment at the Lightspeed facility.
- Provide the standard equipment ground point on the furniture.
- Each rack shall be provided a minimum of 24-inch x 24-inch footprint with 36 inches clearance in the front and back.
- Console desktop layout shall be similar to FAO Dispatch Center.
- Relocate existing equipment, if needed, to provide required space for the installation of Motorola-supplied equipment.
- Pre-install all needed signal cables from console positions to Equipment room.
  - For each of the 16 console positions, install following:
    - One CAT-6 Shielded Plenum cable - Op (CAB) **Cable Terminated/Length** at operator RJ-45 block in CPU Cabinet, the other end at Motorola rack location plus 10 feet.
    - One CAT-5 Shielded Plenum cable - LAN (computer) **Cable Terminated/Length** at operator RJ-45 block in CPU Cabinet, the other end at Motorola rack location plus 10 feet.
    - One CAT-5 non-shielded Plenum – AC Set (backup remote radio) **Cable Terminated/Length** at operator RJ-45 block in CPU Cabinet, the other end at Motorola rack location plus 10feet.
  - For each of the **two FIN** (MOTOBRIDGE) install:
    - One CAT-5 Shielded Plenum cable - WSG (Op) **Cable Terminated/Length** at operator RJ-45 block in CPU Cabinet, the other end ATT T1 network to the outside world with surge equipment. FIN equipment is not included in this proposal, wiring is recommended for future ability to install. Including this wiring at the time other wiring work is being performed would be an effective and recommended

approach, therefore is pointed out for the benefit of Miami-Dade planning. FIN positions can be scoped outside this proposal.

- Bring grounding system up to Motorola's Standards and Guidelines for Communication Sites (R56) and supply a single point system ground, of five ohms or less, to be used on all FNE supplied. Supply grounding tie point within 10 feet from the Motorola-supplied equipment.
- Provide all necessary wall or roof penetrations, as required, on Lightspeed building for coax feedlines for the control station antennas.
- Provide Telco demarcation point within the communications equipment room.
- Arrange for roof space on the Lightspeed building for installation of new antenna mounts and antennas.
- Perform structural analysis of existing rooftops, as required, to confirm that the structure is capable of supporting proposed and antenna loads.
- Supply interior building 24-inch-wide cable trays, raceways, conduits, and wire supports, preferred. The Customer has installed 18 –inch cable trays and Motorola acknowledges and finds them acceptable.
- Complete all customer deliverables in accordance within the project schedule.
- Motorola has agreed to supply and install the equipment room Halo, (#2 bare), a Master ground bar, (4-inch x 24-inch x 1/4-inch copper), and a ground Buss wire above the racks, (#2 green insulated wire attached to the side of the cable tray). Additionally, Motorola will bond anything within six inches of the Halo, all metal conduits, boxes, door frames, etc. Motorola will connect each of the equipment racks that Motorola installs to the ground buss with #2 wire. It will be the responsibility of others to properly connect their equipment racks to the ground buss. (If requested, Motorola will quote the grounding of "others" equipment racks.)

Completion Criteria

- Site ready for equipment installations in compliance with Motorola's Standards and Guidelines for Communication Sites (R56).

2.7 System Installation

2.7.1 Install Fixed Network Equipment

Motorola Responsibilities

- Provide storage location for the Motorola-provided equipment for up to 90 days between shipment and installation.
- Receive and inventory all equipment.
- Install system equipment as specified by the Equipment List, System Description, and system drawings.

- Bond the supplied equipment to the site ground system in accordance with Motorola's Standards and Guidelines for Communication Sites (R56).
- Interface with the ATT Telco network connections.
- Motorola will not remove or dispose of any existing equipment.
- Interference:
  - Motorola will conduct basic IM analysis for MDFR UHF Control stations.
  - Motorola is not responsible for interference caused or received by the Motorola-provided equipment, except for interference that is directly caused by the Motorola-provided transmitter(s) to the Motorola-provided receiver(s).
  - Should MDFR experience interference, Motorola will assist MDFR to investigate the source and recommend solutions to mitigate the issue.

Customer Responsibilities

- Provide access to the Lightspeed building as necessary for equipment installation and setup.
- Provide access to the MDFR FNE Comparator Sites as needed for equipment installation.
- Relocate existing unused existing racks or equipment, as required.

Completion Criteria

- Fixed Network Equipment installation completed and ready for optimization.

2.7.2 Fixed Network Equipment Installation Complete

- All fixed network equipment installed and accepted by the Customer.

2.7.3 Console Installation

Motorola Responsibilities

- Install the console equipment in the space provided by the Customer.
- Connect the Customer-supplied, previously identified circuits into the console, to a demarcation point located within 25 feet of the console interface.
- Terminate the audio outputs for the logged audio onto a punchblock, and then terminate these outputs into the logging recorder as per customer provided tracks.
- Install a dedicated Local Area Network (LAN) at the dispatch center to connect the proposed console positions.
- Connect the appropriate equipment to the Customer supplied ground system in accordance with Motorola's R56 Site Installation Standards.

- Perform the console programming, based on the approved console templates.
- Miami-Dade has purchased or is purchasing 10.5 inch cabinets as part of the Watson furniture procurement. This furniture has 3 panels. There are 5 console positions that need Zetrons. Each of the 5 Console positions slated to have Zetron will have 2 units in a Master / Slave configuration. The Zetrons will be installed in 2 of the 3 panels in the Watson furniture.

Customer Responsibilities

- Provide demarcation point located within 25 feet of the console interface.
- Provide Watson Furniture ready for installation of Zetron equipment

Completion Criteria

- Console installation is complete.

2.7.4 Console Installation Complete

- Console installation completed and accepted by the Customer.

2.7.5 Control Station Installation

Motorola Responsibilities

- Properly connectorize and ground the cabling, which will be run to the outdoor antenna location using the least obtrusive method.
- Protect the cabling by providing and installing a bulkhead lightning surge protector.
- Survey the exact mounting locations and develop control station installation plan.
- Perform the following tasks for the local control stations installations:
  - Create installation plan.
  - Assist the Customer to determine the locations of control stations and desk sets at each site.
  - Install RF local control stations identified in the equipment list.
  - Install line and antenna system (connectors, coax grounding kit, antenna, and surge protection).
  - Connect to the Customer-supplied ground point.
- Program all control stations once, from the MDFR approved template.
- Supply antenna feedlines, and mounting hardware to attach to Miami-Dade mounting masts

Customer Responsibilities

- Provide cable entry into the building through wall feed-through and seal with silicone, or provide an entry plate and boot.

- Provide ground point within six cable feet of the control station.
- Provide necessary space for installation of the local control station.
- Miami-Dade GSA will provide 7 mounting masts which are elevated to extend above the air conditioning units, Motorola will provide antennas and will attach to these masts. Motorola is also providing the hardware needed to attach, as listed under Motorola responsibilities.
- Supply a dedicated 115 VAC grounded electrical outlet rated at 15 AMPS to power the control station and remote control device. Provide an outlet within six feet of the unit.
- Supply a ground point of five ohms or less located in the immediate vicinity (within six feet) of the finalized location of the antenna and control station.

Completion Criteria

- Completion of all the control station installations, and approval by the Customer.

2.7.6 Control Station Complete

- Control Station installation completed and accepted by the Customer.

2.7.7 System Installation Acceptance (Milestone)

- All equipment installations are completed and accepted by the Customer.

2.8 System Optimization

2.8.1 Optimize System FNE

Motorola Responsibilities

- Verify that all equipment is operating properly and that all electrical and signal levels are set accurately.
- Verify that all audio and data levels are at factory settings.
- Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances.
- Verify communication interfaces between devices for proper operation.
- Test features and functionality are in accordance with manufacturers' specifications and that they comply with the final configuration established during the CDR/system staging.
- Integrate the consoles and with the MDFR UHF radio system to ensure proper operation.

- Set up the consoles on the MDFR UHF radio system to perform the dispatching operation.

Customer Responsibilities

- Provide access to the Lightspeed building for Motorola and subcontractors.
- Provide console icon information as required to enable console setup.
- Define the logging recorder tracks for the consoles.
- Provide Telco and IT connectivity to each console as required.

Completion Criteria

- System FNE optimization is complete.

2.8.2 Link Verification

Motorola Responsibilities

- Perform test to verify ATT T1 link performance, prior to the interconnection of the Motorola-supplied equipment to the link equipment.

Customer Responsibilities

- Make available the required T1 links that meet the specifications supplied by Motorola at the CDR.

Completion Criteria

- Link verification successfully completed.

2.8.3 Optimization Complete

- System optimization is completed. Motorola and the Customer agree that the equipment is ready for acceptance testing.

2.9 Training

Overview

Motorola's Worldwide Learning Services organization dedicates itself exclusively to offering the most comprehensive training available for Motorola's advanced equipment to fully realize the equipment's potential. From sophisticated training needs analysis to ongoing training throughout the life cycle of your product or system, we can help ensure that your investment in training today is an investment for your future.

Our training methodology includes knowledgeable instructors, well-designed courseware, lab activities, and system hardware and software that closely parallels your operating environment and that is integrated with proper system documentation. This methodology is based upon several key criteria:

- Course design is driven by an analysis of learner needs and focuses on how-to rather than theory.
- Learning objectives are based upon what learners need to accomplish on the job and focus on specific applications.
- Hands-on lab opportunities using customer-specific job aids are incorporated into training to maximize the transfer of skills to the job and the retention/reuse of information.

Motorola offers both train-the-trainer and end-user training. Students can attend training at one of our training centers or instructors can come to your site. In conjunction with or in addition to instructor-led training, we can provide self-study/e-learning programs in which students follow a computer-based training module on CD-ROM or other media.

Courses Proposed

In the process of assessing your training needs, Motorola has identified the following course(s) that are necessary to achieve your training goals. Inserted within the matrix are course description files for your review or printing.

While the standard courses are encouraged, the class outline may be tailored for your quotation. Thus, the outline(s) below may not exactly match your quoted class length and content.

Course	Target Audience	No. of Sessions	Duration (days)	Location	Date	No. of Attendees
MCC7500 Console Supervisor and Operator Train-the-Trainers (Instructor-led) 5 training consoles (1x1 Ratio)	Dispatch Supervisors or Trainers	1 (8 hr session)	1	Miami, FL	Prior to Cut-over	5
Course Synopsis: This course provides participants with the knowledge and skills to manage and utilize the MCC7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. This session also includes the Operator course below. (refer to following pages)						
Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation, and hands-on activities, the participants learn how to perform common tasks associated with the console operation. (refer to following pages)						

Field classes are "tailored" to the customer's specific system allowing for various classes, which are not offered as standard Resident classes. System manuals, participant guides, and required pre-work are included in the pricing of the class per student. The students benefit from working on their own systems, at their home location, and within their schedules.

Dispatch Operator

Class Name	No. of Students	No. of Days	Price
MCC7500 Console Supervisor and Operator Train-the-Trainers	5	1	Included in Proposal Price

(Note: Motorola normally recommends Operator training for consoles, in lieu of the T-t-T approach.)

Materials to be Included in Training::

1 – IEUTK
5 – MCC7500 Admin Guides
10 – MCC7500 Operator Flipbooks (Tailored)

Classes must be scheduled for completion at the completion of installation and successful system testing.

Course Description

MCC7500 Dispatch Console Operator Training
Course No. EUT016

MOTOROLA

Duration

4 hours

Target Audience

Dispatch Console Operators, Supervisors, System Administrators, and Support Personnel

Course Description

This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Recommended Prerequisites

None

Key Topics

- Overview
- Communicating with Radios
- Advanced Signaling Features
- Resource Groups
- Working with Configurations
- Working with Aux IOs
- Troubleshooting

Course Description

MCC7500 Dispatch Console Administrator Training
Course No. EUT017

MOTOROLA

Duration

4 hours

Target Audience

Dispatch Supervisors, System Administrators

Course Description

This course provides participants with the knowledge and skills to manage and utilize the MCC 7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens.

Recommended Prerequisites

None

Key Topics

- Introduction
- Configurations
- Folders and Resource Setup
- Customizing Folders
- Auto Starting the MCC 7500 Dispatch Console
- Editing Preferences
- Configuring the Toolbar
- Setting Up Aux IOs
- Resource Groups

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Target Audience

Designated customer-training personnel.

Course Description

This course provides the customer's identified training personnel with the knowledge of, and practice applying training techniques that they will need to enable them to successfully train their students. Trainers will use video, facilitation, and hands-on activities to facilitate learning events supported by tailored or customized training materials and job aids. They will become proficient at discussing the common tasks associated with operation of the customer's radios or consoles as identified by the Customer Training Needs Analysis.

Note: Course given as customer specific, will cover options pertinent to customer equipment.

Prerequisites

Previous training experience and radio system knowledge preferred.

Course Objectives

The participant will be able to employ the resources needed to facilitate learning events.

Train-the-Trainer sessions for radio user/operator trainers will typically consist of a training event following the basic outline:

1. Present the provided system overview video (when applicable)
2. Discuss high-level overview of the customer's system configuration
3. Present the Radio or Console Overview Video as appropriate
4. Review pre-work material with students
5. Distribute the User Reference Materials
6. Proceed through the Instructor's Guide provided for the group and product being taught
7. Demonstrate technique for training using the end-user materials
8. Conduct practice sessions with trainers

Training Qualifications and Assumptions

1. A successful training event requires that the students have adequate time for hands-on intervention with their equipment. Motorola's Customer Training Center/The customer or project team shall supply product equipment. This includes all necessary test equipment, cables, card extenders, etc.

2. A successful training event requires that the students have adequate time for hands-on intervention with their subscriber units. Motorola's Customer Training Center/The customer or project team shall supply product equipment. Motorola's Customer Training Center recommends that there be one subscriber unit available per user present in the training session. In the case of console end user training, Motorola's Customer Training Center recommends that there be at least one console position for every two dispatch operators=

3. A successful training event also requires appropriate facilities in which to deliver training. The customer or project team will ensure that the necessary equipment (which can include but is not limited to chalkboard, projector, screens, student tables and chairs) is in place for the training event.

4. Student materials will be furnished by Motorola's Customer Training Center.

5. While it is important that Motorola meets, the customer's requested training dates, the final class dates are determined by instructor availability. This is especially important when training in a language other than English because of the limited resources available.

6. School dates will only be established once payment has been received by Motorola's Customer Training Center. Without payment, Motorola reserves the right to cancel a field school. By supplying agreed form of payment, Customer or project team accepts all terms and conditions.

7. Acknowledging there are costs associated with preparing a training program, the Customer agrees to notify Motorola immediately if Customer or project team requires a date change for a scheduled training program. Within 30 days of scheduled training, if a class is cancelled or postponed, the Customer will pay 100% of the instructor delivery rate and any additional costs which have been incurred, i.e. airfare cancellation, materials, shipping, etc. If Motorola is able to reschedule the instructor, then the instructor delivery rate will be waived accordingly.

2.10 Audit and Acceptance Testing

2.10.1 Perform R56 Audit

Motorola Responsibilities

- Perform R56 site installation quality audit, verifying proper physical installation and operational configurations.
- Create site evaluation report to verify site meets or exceeds requirements, as defined in Motorola's Standards and Guidelines for Communication Sites (R56).

Customer Responsibilities

- Provide access to the Lightspeed building.
- Witness R56 audit if desired.

Completion Criteria

- All R56 audits completed successfully.

2.10.2 Perform Functional Testing

Motorola Responsibilities

- Verify the operational functionality and features of the individual subsystems and the system supplied by Motorola, as contracted.
- If any major task as contractually described fails, repeat that particular task after Motorola determines that corrective action has been taken.
- Document all issues that arise during the acceptance tests.
- Document the results of the acceptance tests and present to the Customer for review.
- Resolve any minor task failures before Final System Acceptance.

Customer Responsibilities

- Witness the functional testing.

Completion Criteria

- Successful completion of the functional testing.
- Customer approval of the functional testing.

2.10.3 Perform Coverage Testing

Motorola Responsibilities

- No coverage testing is included.

2.10.4 System Acceptance Test Procedures (Milestone)

- Customer approves the completion of all the required tests.

2.11 Finalize

2.11.1 Cutover

Motorola Responsibilities

- Motorola and MDFR will finalize a mutually agreed upon cutover plan prior to cutover. Plan will minimize impact to the system users.
- Conduct cutover meeting with MDFR Dispatch to address both how to mitigate technical and communication issues that may impact the users during cutover.

Customer Responsibilities

- Attend cutover meetings and approve the cutover plan.
- Notify the user group(s) affected by the cutover (date and time).
- Conduct a roll call of all users working during the cutover, in an organized and methodical manner.
- Ensure that all Dispatchers are trained and activated on the new consoles.

Completion Criteria

- Successful start up and Dispatch from Lightspeed.
- Successful migration of Dispatch from FAO to Lightspeed, and back.

2.11.2 Resolve Punchlist

Motorola Responsibilities

- Work with MDFR to resolve any punchlist items documented during Installation and Testing.

Customer Responsibilities

- Assist Motorola with resolution of identified punchlist items by providing support, such as access to the sites, equipment and system, and approval of the resolved punchlist item(s).

Completion Criteria

- All punchlist items resolved and approved by the Customer.

2.11.3 Transition to Service/Project Transition Certificate

Motorola Responsibilities

- Review the items necessary for adding the new equipment to warranty support and service.
- Provide a Customer Support Plan detailing the warranty and post warranty support, if applicable, associated with the Contract equipment.

Customer Responsibilities

- Participate in the Transition Service/Project Transition Certificate (PTC) process.

Completion Criteria

- All service information has been delivered and approved by the Customer.

2.11.4 Finalize Documentation

Motorola Responsibilities

- Provide electronic as-built system documentations on a Compact Disk (CD). The documentation will include the following:
  - System Level Diagram.
  - Site Block Diagram.
  - Site Floor Plan.
  - Site Equipment Rack Configurations.
  - Antenna Network Drawing for console backup radios.
  - Equipment Inventory List.
  - Console Programming Template.

  Drawings are created utilizing AutoCAD design software and will be delivered in Adobe PDF format. All other system manual documents converted from native format to Adobe PDF format to be included on the System Manual CD.
- Provide five console operator manuals.

Customer Responsibilities

- Receive and approve all documentation provided by Motorola.

Completion Criteria

- All required documentation is provided and approved by the Customer.

2.11.5 Final Acceptance (Milestone)

- All deliverables completed, as contractually required.
- Console Milestone Acceptance Certificate received from the Customer.

2.12 Project Administration

2.12.1 Project Status Meetings

Motorola Responsibilities

- Console project will be incorporated in the Monthly MDFR Project Meeting.

Customer Responsibilities

- Attend meetings and respond to issues in a timely manner.

Completion Criteria

- Completion of the meetings and submission of monthly project report.

2.12.2 Progress Milestone Submittal

Motorola Responsibilities

- Submit progress (non-payment) Milestone completion certificate.

Customer Responsibilities

- Approve Milestone certificate to confirmation of completion of the work associated with the task.

Completion Criteria

- The Customer approval of the Milestone Completion Certificate.

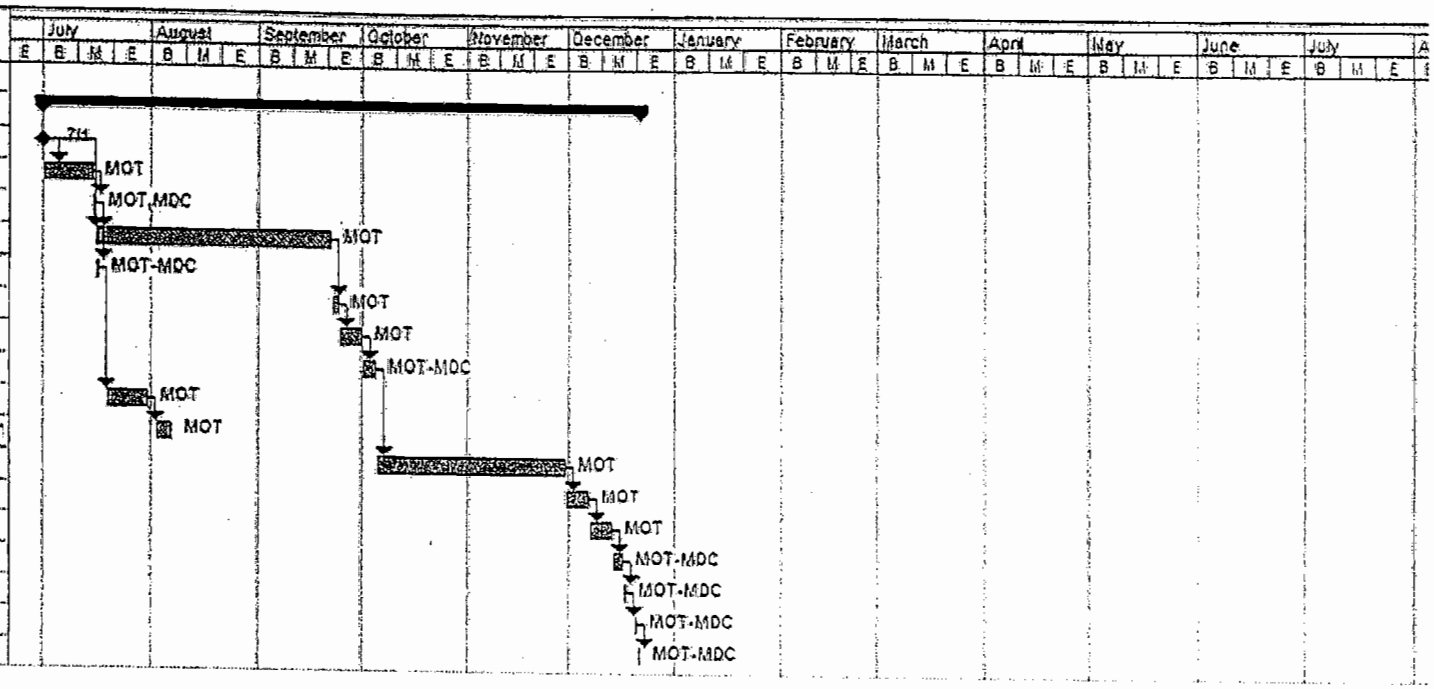
2.12.3 Change Order Process

- Either Party may request changes within the general scope of this Console Change Order as outlined within the existing MDFR UHF Radio Contract. Any Change Order would require mutual approval and execution by the authorized representatives of the contract parties. Miami-Dade approval authority for Change Orders is at the sole discretion of Miami-Dade County. Change Orders resulting in additional costs, will require approval up to and including the Board of County Commisioners, at the County's discretion.

2.13 Project Schedule

Refer to following pages

ID		Task Name
1		
2		**MDFR Lightspeed Dispatch**
3		Contract Award
4		Mobilize
5		Customer Design Review
6		Procurement - MFG cycle
7		Submit Building Permit
8		System Staging @ CCSI
9		Shipping to MDC
10		Receive and Inventory
11		Receive Building Permit
12		Ant., Line & Combiner installation
13		Equipment Installation
14		Final Optimization
15		Punch List
16		Acceptance Test
17		Training
18		Cutover
19		System Acceptance



Section 3. Acceptance Testing

3.1 MCC 7500 Features

3.1.1 Console Instant Transmit

1. DESCRIPTION

The instant transmit switch provides immediate operator access to a channel, independent of its select status (selected or unselected). It provides priority over other dispatcher transmit bars or optional footswitches.

SETUP

RADIO-1 - SITE 1

VERSION #1.04

2. TEST

Step 1. Depress the Instant Transmit button on the SITE 1 radio resource.

Step 2. Verify that the Transmit indicator is lit.

Step 3. Verify that outbound audio is heard on RADIO-1.

Pass____ Fail____

3.1.2 Channel Control Gateway (CCGW)

1. DESCRIPTION

A conventional station can be integrated into a trunking system by placing a conventional resource on the Elite consoles. This allows the user to dispatch and patch the conventional station with the desired talkgroups.

SETUP

Connect a transmission test set to the CCGW port that corresponds to a conventional channel in the Elite Op Position. Each RJ45 receptacle on the CCGW, pins 1 and 2 are for RX audio, and pins 4 and 5 are for TX audio.

VERSION #1.02

2. TEST

Step 1. Choose a conventional Radio Resource at the console.

Step 2. Connect a transmission test set to the output of the Channel Control Gateway (CCGW) port corresponding to the selected Radio Resource in the Elite operator position.

Step 3. Key up the console Radio Resource and verify Transmit audio for the conventional resource is heard through the transmission test set.

Step 4. Inject a test tone into the input of the Radio Resource selected.

Step 5. Verify the Radio Resource receives the tone in the appropriate speaker.

Step 6. Repeat Steps 1-5 for a random sample of the remaining channels as needed.

Pass____ Fail____

3.1.3 Transmission on IP-based Analog Conventional Voice Channel – Tone Remote Control (TRC)

1. DESCRIPTION

The IP-based analog conventional feature provides radio users /dispatchers capability to communicate with other radio users /dispatchers listening to the channel. This test will demonstrate the MCC 7500 dispatcher can communicate to other radios and MCC 7500 dispatchers who are listening to the channel.

SETUP

An operational CCGW with an analog conventional channel (CCH1) configured (via NM) to use TRC to key up the station. Note that the attached repeater/BS must be appropriately configured to work with TRC. The BS is tuned to F1 transmit/receive pair.
This test requires two radios (RADIO-1, RADIO-2) tuned to the transmit frequency of the conventional voice channel (CCH1). Two MCC 7500 Consoles CONSOLE-1 and CONSOLE-2, respectively. The CONSOLE-1 and CONSOLE-2 are both affiliated to the CCH1.

VERSION #1.02

2. TEST

Step 1. Initiate an analog conventional transmission from CONSOLE-1 on frequency F2 on CCH1.

Step 2. Observe that RADIO-1, RADIO-2, and CONSOLE-2 hear CONSOLE-1.

Step 3. Observe that CONSOLE-2 indicates the presence of transmission on the channel (transmit busy indication). Displays correct frequency.

Pass____ Fail____

3.1.4 Alert Tones (MCC 7500 Consoles – Conventional)

1. DESCRIPTION

Alert Tones are pre-defined alert tones that can be transmitted on the selected Radio Resource outbound to subscribers.

This test demonstrates the MCC 7500 Console ability to send an Alert-Tone signal on selected resources.

SETUP

RADIO-1 - CONVCH1
RADIO-1 - SITE - CONVSITE 1

CCGW-1 - CONVCH1
CCGW-1 - SITE - CONVSITE 1

CONSOLE-1 - CONVCH1
CONSOLE-2 - CONVCH1
CONSOLE-1- SITE - CONVSITE 1

VERSION #1.03

2. TEST

Step 1. On CONSOLE-1, select the CONVCH1 Radio Resource by moving the cursor over the Radio Resource's name and selecting.

Step 2. Select Tone 1 from the Alert Tone pull down menu.

Step 3. Transmit Alert Tone 1 by depressing the Alert Tone button. This selected resource will display a red lighting bolt transmit indicator.

Step 4. Verify the Alert Tone 1 is received by RADIO-1 and CONSOLE-2.

Step 5. Repeat the above procedure for Alert Tone 2 and Alert Tone 3.

Step 6. Repeat steps 1-5 for a sample of the remaining OPs as needed.

Pass____ Fail__

3.1.5 Intercom Operation (Console to Console)

1. DESCRIPTION

The intercom function allows console operators to communicate with other console operator positions without using a radio resource.

SETUP

CONSOLE-1 CONSOLE-2

VERSION #1.03

2. TEST

Step 1. At CONSOLE-1, press the "INTERCOM CALL" icon.

Step 2. Choose CONSOLE-2 to call and press the SEND button.

Step 3. Answer the call at the destination console by pressing the "INTERCOM CALL" icon and selecting ANSWER.

Step 4. Verify communications between the two consoles. The answering console will have a hot microphone, and the sending console must press the lightning bolt in the Intercom Window to transmit.

Step 5. End the intercom call by pressing the HANGUP icon on either console.

Pass____ Fail___

3.1.6 Link Failure between CCGW and Zone Controller (MCC 7500 System Only)

1. DESCRIPTION

This test verifies that the two communication paths between the CCGW and Zone Controller (ZC) are redundant and the system will continue uninterrupted if the main path fails. To accomplish this, a NIC connection is removed at the ZC.

SETUP

RADIO-1 - CCH1
RADIO-2 - CCH2
This test requires an operational system with a CCGW with CCH1 and CCH2 and MCC 7500 Console Site with CONSOLE-1 and CONSOLE-2. CONSOLE-1 and CONSOLE-2 are affiliated to CCH1 and CCH2.

VERSION #1.02

2. TEST

Step 1. Initiate an analog conventional Call with RADIO-1 on CCH1.

Step 2. Observe that only CONSOLE-1 and CONSOLE-2 will be able to monitor and respond to the call.

Step 3. Initiate an analog conventional call with RADIO-2 on CCH2.

Step 4. Observe that only CONSOLE-1and CONSOLE-2 will be able to monitor and respond to the call.

Step 5. Remove one ENET cable to Link1 from the NIC on the ZC; this will simulate a Zone Controller to Console Site Link failure.

Step 6. Observe that the calls on CCH1 and CCH2 continue.

Step 7. Repeat steps 1-6 for the other Zone Controller.

Step 8. Connect the ENET cables to normalize the system.

Pass____ Fail____

3.1.7 Tone Generation on Conventional Resource (MCC 7500 Consoles)

1. DESCRIPTION

This test will demonstrate that the dispatch console is able to transmit on a conventional resource during the tone generation period

SETUP

RADIO-1 - CH1

CCGW-1 - CH1
CCGW-1-SITE 1

CONSOLE-1 - CH1
CONSOLE-1 - SITE - CSITE 1

(Note: Use General Transmit by keying up CH1 via console microphone or footswitch)

VERSION #1.02

2. TEST

Step 1. Send an Alert tone from CONSOLE-1

Step 2. Verify that RADIO-1 hears Alert tone from CONSOLE-1

Step 3. Verify that RADIO-1 hears audio from CONSOLE-1 during the Alert Tone Talk Extend period.

Pass____ Fail____

3.1.8 Logging Analog Conventional Call

1. DESCRIPTION

The IP-based analog conventional feature provides radio users/dispatcher capability to communicate with other radio users/dispatchers listening to the channel. The control events/voice from the transmitting radio or MCC 7500 Console can be forwarded to the archiving device that can record the information. This test will demonstrate the Archiving Interface Server (AIS) can be used to log analog conventional call audio/events on given analog conventional channel. The audio is archived in a vocoded format (G.728 for analog conventional).

SETUP

This test requires an operational CCGW with an analog conventional channel (CCH1) and AIS/third party logging equipment. The attached BS, which is tuned to F1 transmit/receive pair, a radio, RADIO-1 is tuned to the CCH1 frequency, and a MCC 7500 Console (CONSOLE-1) affiliated to CCH1.
This test also requires an AIS affiliated to the CCH1. This is done via API commands from the third party logging system.

2. TEST

Step 1. Initiate PTT from RADIO-1 on CCH1.

Step 2. Observe that the call events are being sent to the logging system by the AIS.

Step 3. Using the playback station and logging recorder, verify the audio/events correspond to steps 1 and 2.

Step 4. Repeat Steps 1-3 using CONSOLE-1 to initiate the call

Pass____ Fail____

VERSION #1.01

3.1.9 Console Conventional Instant Transmit

1. DESCRIPTION

The instant transmit switch provides immediate operator access to a channel, independent of its select status (selected or unselected).

SETUP

RADIO-1 - CONVCH1
RADIO-1 - CONVSITE 1

VERSION #1.00

2. TEST

Step 1. Click the mouse anywhere in the CONVCH1 resource window.

Step 2. Depress the Instant Transmit button on the CONVCH1 resource window.

Step 3. Verify that the Transmit indicator is lit.

Step 4. Verify that outbound audio is heard on RADIO-1.

Pass____ Fail____

3.1.10 Conventional Radio Resource on the MCC 7500 Console (Clear)

1. DESCRIPTION

A Radio Resource is selected on the MCC 7500 consoles by placing the cursor over the Radio Resource (Channel Control Window), choosing an area, and selecting. The Radio Resource choice area is the region where the name of the Radio Resource is located (Top alphanumeric line of the Radio Resource). When selected, the background of the Radio Resource will turn white and the border will turn green. Choosing the PTT button will send keying commands to the station.

SETUP

RADIO-1 - CONVCH1
RADIO-1 - SITE - CONVSITE 1
CONSOLE-1 - CONVCH1
CONSOLE-1 - SITE - CONSITE 1

VERSION #1.01

2. TEST

Step 1. Select the CONVCH1 Radio Resource by moving the cursor over the Radio Resource's name and selecting.

Step 2. Begin an outbound console transmission using the PTT Button on the newly selected Radio Resource, in clear mode.

Step 3. Verify that console's outbound audio can be monitored by RADIO-1.

Step 4. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1 audio can be monitored at the console Select speaker.

Step 5. Depress any of the other available Radio Resources to "deselect" the present Radio Resource.

Step 6. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1's audio can be monitored at the unselect speaker.

Step 7. Repeat steps 1-6 for a sample of the remaining channels as needed.

Step 8. Repeat steps 1-7 for a sample of the remaining OPs as needed.

Pass____ Fail____

3.1.11 Alarm Input / Outputs (Aux I/O Option)

1. DESCRIPTION

The alarm inputs of the Aux I/O can be connected to almost any device that requires or can detect a relay closure. These signals can be simulated and monitored in the factory.

SETUP

Connect a multi-meter capable of monitoring closures to the proper pins of the punch block cabled to the Aux I/O. One momentary input and one momentary output should be configured on at least one MCC 7500 console.
CONSOLE-1 -
CONSOLE-1 - SITE - CONSITE 1
Aux I/O punch block pinout:

Aux I/O 1 - pins 26,1
Aux I/O 2 - pins 27,2
Aux I/O 3 - pins 28,3
Aux I/O 4 - pins 29,4

VERSION #1.01

2. TEST

Step 1. Using a shorting wire, simulate a relay closure on an input via the punch block.

Step 2. Verify that CONSOLE-1 momentary input displays the icon designated for an ON_STATE.

Step 3. Remove the shorting wire and verify that CONSOLE-1 displays the icon designated for an OFF_STATE.

Step 4. Connect the meter to the pins to monitor a relay output.

Step 5. Verify that the meter reads an open circuit.

Step 6. Depress the momentary input button on the console to initiate a relay closure.

Step 7. Verify that the meter displays a closed circuit.

Pass____ Fail____

3.2 System Management Tests

3.2.1 Current Status and Diagnostics for MCC 7500 Console (UEM)

1. DESCRIPTION

This test verifies that the Unified Event Manager (UEM) can change the state of sites and the status shows up in the UEM. To accomplish this, the current state of a Console site will be displayed and using the UEM - "Issue Command" feature, it will be changed.

SETUP

Select the Physical Sites object in the UEM tree for the site to be tested.

VERSION #1.00

2. TEST

Step 1. In the Unified Event Manager (UEM) Physical Sites screen, verify the Console Site is green (No alarms).

Step 2. Through the UEM, open the devices under the site container by right clicking and selecting "View Devices".

Step 3. Choose the Console position to disable by highlighting the correct device, right clicking, and selecting "Issue Command".

Step 4. Disable the Application Platform for the Console from the window and select "Apply".

Step 5. Observe that the UEM shows that the Application Platform is now Disabled and is User Requested. Verify that the Console Site container shows WARNING.

Step 6. Choose the Console position and enable by highlighting the correct device, right clicking and selecting "Issue Command".

Step 7. Enable the Application Platform for the Console from the window and select "Apply".

Step 8. Observe that the UEM shows that the Application Platform is now Enabled and is User Requested. Verify that the Console Site container returns to a green status.

Step 9. Close the open windows.

Pass____ Fail____

3.2.2 Configuration Management – Console User (MCC 7500 Systems Only)

1. DESCRIPTION

The User Configuration Manager (UCM) controls the parameters for all radio users and dispatchers on the system. Within the Subscriber section, the Console Talkgroup Capability profile enables the network manager to tailor a Console's Talkgroup capabilities. Note: The parameter changes affect the console user profile only after the logged-in dispatchers log out and then back in to the dispatch application.

SETUP

Console User1 is logged on and has the "External Paging Capability Enabled" set to YES in the appropriate Console User Capability Profile. The console has affiliated to analog conventional voice channel CCH11 and this channel is Selected.

VERSION #1.03

2. TEST

Step 1. Verify that the console is able to initiate paging Tones on the Selected channel.

Step 2. Change the "External Paging Capability Enabled" flag to NO in this Console User's Capability Profile via the User Configuration Manager.

Step 3. Verify that an indication is provided via the console's Elite GUI status bar indicating to the dispatcher that new configuration information is available.

Step 4. Verify that even after the above indication the console dispatcher is still able to initiate paging tones.

Step 5. Verify that after the console dispatcher logs out of the Elite GUI application and then logs back in that the console dispatcher is no longer able to initiate paging Tones on the Selected channel.

Step 6. Change the "External Paging Capability Enabled" flag back to YES in this Console User's Capability Profile via the User Configuration Manager.

Step 7. Verify that an indication is provided via the console's Elite GUI status bar indicating to the dispatcher that new configuration information is available.

Step 8. Verify that even after the above indication the console dispatcher is still unable to initiate paging tones.

Step 9. Verify that after the console dispatcher logs out of the Elite GUI application and then logs back in that the console dispatcher is now able once again to initiate paging Tones on the Selected channel.

Pass____ Fail____

3.2.3 Affiliation Display for Analog Conventional (MCC 7500 Systems Only)

1. DESCRIPTION

The Affiliation Display for Analog Conventional is divided into two sections: Conventional Channel Viewer and Console Site Conventional Viewer.

-The Conventional Channel Viewer displays the consoles affiliated to a given conventional channel and the console sites with consoles affiliated to the conventional channel.

-The Console Site Conventional Viewer displays the conventional channels affiliated to this console site and the consoles at this console site affiliated to the selected channel.

SETUP

CONSOLE-1 CONVCH1
CONSOLE-1 - SITE - CONSITE-1
CONSOLE-2 CONVCH2
CONSOLE-2 - SITE - CONSITE-2
Two consoles, each capable of performing calls on two unique conventional channels, are required to perform this test.

VERSION #1.04

2. TEST

Step 1. Verify that the Conventional Channel View shows CONVCH1 to be affiliated with CONSOLE-1 and CONVCH2 to be affiliated with CONSOLE-2.

Step 2. Verify that the Console Site Conventional View shows that CONSITE-1 has CONVCH1 and CONSITE-2 has CONVCH2 affiliated.

Step 3. Logoff CONSOLE-1 and CONSOLE-2.

Step 4. Log into CONSOLE-1 and affiliate to CONVCH2. Log into CONSOLE-2 and affiliate to CONVCH1.

Step 5. Verify that the Conventional Channel View shows CONVCH1 to be affiliated with CONSOLE-2 and CONVCH2 to be affiliated with CONSOLE-1. Also for CONVCH1 CONSITE-2 and for CONVCH2 CONSITE-1 shall show up in the viewer.

Step 6. Verify that the Console Site Conventional View shows that CONSITE-1 has CONVCH2 and CONSITE-2 has CONVCH2 affiliated.

Pass____ Fail____

3.2.4 Zone Controller Database Backup

1. DESCRIPTION

This feature allows the infrastructure database to be stored onto a CD for backup. The database can be backed up or restored without affecting system operation.

SETUP

No setup required.

VERSION #1.06

2. TEST

Step 1. Login onto the Zone Controller admin menu via the NM Client.

Step 2. Select "Backup Database" from the menu.

Step 3. Read the prompts and enter the required information to backup database onto a CD.

Step 4. Verify the successful completion of the database backup from the menu.

Pass____ Fail____

3.2.5 UEM: Diagnostics – CCGW

1. DESCRIPTION

The purpose of this test is to confirm diagnostic commands are sent to a Conventional Channel GateWay (CCGW) and the proper status is reported at the Unified Event Manager (UEM).

All commands are initiated from the UEM.

SETUP

RADIO-1 CCH1
RADIO-2 CCH1
CONSOLE-1 CCH1

NMclient01 - UEM session up and running in the Network View.

VERSION #1.03

2. TEST

Step 1. From the UEM, right click on a CCGW managed resource and select SNMP-Node then the Issue Command option.

Step 2. The command window opens for the CCGW managed resource with the following commands available: Disable and Enable.

Step 3. Verify the conventional channel is operational using the two radios programmed to the channel.

Step 4. Select Disable and click the Apply button.

Step 5. The command execution status is displayed in the command window. After the command is executed, the CCGW is disabled. The event is displayed in the Network Event Browser. An alarm is displayed in the Alarm Browser.

Step 6. Attempt to place a conventional call using the two radios. The call audio will not be heard at the console. The resource at Console-1 will show that the resource is unavailable.

Step 7. Select Enabled and click the Apply button.

Step 8. The command execution status is displayed in the command window. After the command is executed, the CCGW is enabled. The event is displayed in the Network Event Browser.

Step 9. Attempt to place a conventional call using the two radios. The call should work.

Pass____ Fail____

3.3 System Reliability Features

3.3.1 Redundant Zone Controller Switching/Automatic Switchover

1. DESCRIPTION

The Zone Controller (ZC) subsystem uses two Zone Controllers in a redundant configuration. The backup Zone Controller is made active either upon the loss of the active ZC or upon a user-initiated command from the Zone Configuration Manager (ZCM).

SETUP

RADIO-1 -
RADIO-1 - SITE - SITE 1
RADIO-2 -
RADIO-2 - SITE -
RADIO-3 -
RADIO-3 - SITE -

VERSION #1.05

2. TEST

Step 1. Set the switchover mode to automatic through the Zone Configuration Manager (ZCM).

Step 2. Verify in the ZCM that the idle Zone Controller is in "Standby" state prior to switching.

Step 3. Disable the active Zone Controller via the Unified Event Manager (UEM) (Right click the Zone Controller to be disabled, then SNMP Node>Issue Command>Disable).

Step 4. Verify that the backup Zone Controller becomes active and brings all sites back wide. Wait for the Radios to settle out the site affiliations.

Step 5. Key RADIO-1 and verifying that RADIO-2 and RADIO-3 hear the audio.

Step 6. End the call from RADIO-1.

Step 7. Enable the Zone Controller disabled in step 3.

Pass____ Fail____

3.3.2Redundant Zone Controller Switching/User Initiated Switchover

1. DESCRIPTION

The Zone Controller subsystem uses two Zone Controllers in a redundant configuration. The backup Zone Controller is made active either upon the loss of the active ZC or upon a user-initiated command from the Zone Configuration Manager.

SETUP

RADIO-1 -
RADIO-1 - SITE - SITE 1
RADIO-2 -
RADIO-2 - SITE -
RADIO-3 -
RADIO-3 - SITE -

VERSION #1.03

2. TEST

Step 1. Verify in the Zone Configuration Manager (ZCM) that the switchover mode is user-initiated.

Step 2. Verify in the ZCM under Zone object that the Standby Zone Controller is in "Synchronization Complete" state prior to switching.

Step 3. Switch the Zone Controllers from the ZCM.

Step 4. Verify that the backup Zone Controller becomes active and brings all sites back wide. Wait for the Radios to settle out the site affiliations.

Step 5. Key RADIO-1 and verify that RADIO-2 and RADIO-3 hear the audio.

Step 6. End the call from RADIO-1.

Pass____ Fail____

3.4.1 Analog Conventional Voice Channel Failure (MCC 7500 Systems Only)

1. DESCRIPTION

This test verifies that the User Event Manager (UEM) event browser is able to capture information about various failures at the system and zone level. An analog conventional voice channel will be disabled and the alerts will be monitored.

SETUP

RADIO-1 CONVCH1
CCGW1 is in service and all four of its channels are operational.
CONSOLE-1 - CONVCH1

VERSION #1.05

2. TEST

Step 1. Observe that the CCGW1 container is GREEN in the User Event Manager (UEM).

Step 2. Disable CONVCH1 on CCGW1.

Step 3. Observe the appropriate alert appears on the UEM Event Browser and that the CCGW1 container changes color.

Step 4. Observe that CONSOLE-1 is no longer able to contact RADIO-1.

Step 5. Disable the rest of the Analog Conventional Channels on CCGW1. Observe the appropriate alerts appear in the UEM.

Step 6. Bring each of the Channels on CCGW1 back into service.

Step 7. Observe the color for the CCGW1 container turns to GREEN (normal) in the UEM.

Step 8. Observe that CONSOLE-1 is now able to contact RADIO-1 on CONVCH1.

Pass____ Fail____

3.4.2 UEM Fault Management/Core Router Failure

1. DESCRIPTION

This test verifies that the Unified Event Manager (UEM) alarms view is able to capture information about various failures at the system and zone level.

A Core Router will be turned off to simulate a failure. The system health will be monitored on UEM.

SETUP

NMclient01 - UEM session up and running.

VERSION #1.03

2. TEST

Step 1. Verify that the Core Router to be tested shows up without failures (normal) on UEM. The core router is contained in the specific subnet that it is physically located in the network.

Step 2. Power down the Core Router.

Step 3. Observe that an alarm indicating a Core Router failure appears on the UEM alarms view.

Step 4. Restore power to the Core Router.

Step 5. Observe that the changes to the alarm in UEM, indicating the Core Router is Enabling.

Step 6. Observe that alarm view updates in the UEM, indicating the Core Router is Enabled.

Pass____ Fail___

3.4.3 Unified Event Manager (UEM) Fault Management Sun Netra™ Hardware

1. DESCRIPTION

This feature allows the user to monitor the health of the Network Management hardware. It also provides a method to list installed applications.

SETUP

NMclient01 – UEM session up and running with alarms view and the event view both open

VERSION #1.00

2. TEST

Step 1. Disconnect the redundant power supply on the Air Traffic Router (ATR).

Step 2. Observe the alarm for the gas platform in the alarm view.

Step 3. Observer the event containing additional details for the alarm in the event view.

Step 4. From the alarm view, right-click on the gas platform alarm. Select the menu option Application View.

Step 5. Observe the listing for the ATR server including its zone number, IP address, and application version.

Step 6. Reconnect the redundant power supply on the ATR.

Step 7. Observe that the gas platform alarm clears.

Step 8. Observe the event containing additional details in the event view.

Pass____ Fail____

3.4.4 Unified Fault Management Ethernet Site Link Round Trip Delay Fault

1. DESCRIPTION

When the average round-trip IPTD (delay) statistic exceeds the IPTD Fault Threshold for an Ethernet Site/Interzone Link, an event is sent to the Unified Event Manager (UEM).

NOTE: This test is only valid if it is executed on a real Ethernet Site/Interzone Link that has 10ms or more of round trip delay. 10ms is the minimum configurable value.

SETUP

No prior setup is necessary.

VERSION #1.00

2. TEST

Step 1. On both routers at each end of the Ethernet Site/Interzone Link (i.e., Core and Site Router for a site link), configure the IPTD (delay) threshold for the minimum value of 10ms. (Follow step 2 procedure)

Step 2. In UNC, right-click on each router and select Set IPTD Stats Threshold from the Saved Commands. NOTE: After selecting the Saved Commands option, the tester will have to navigate to the location of the saved commands using the Up button and double clicking on folders within the folder list to get to the following location Library Manager>System > Motorola > MNR

Step 3. After the end of next full measurement interval (approximately 30 minutes), check for the event reporting. In UEM, select Fault Management > Events.

Step 4. Verify Unified Event Manager displays an event for the configured routers indicating that the IPTD Fault Threshold has been exceeded, including the IPTD (delay) value.

Step 5. Using the procedure in Step #1, set the trap threshold to the appropriate value for the Ethernet Site/Interzone link. This value is determined during system planning and provisioning of the customer backhaul network. The default value is 40ms.

Pass____ Fail____

3.4.5 Unified Event Manager (UEM) Fault Management Console PC-VPM Link Failure

1. DESCRIPTION

This test verifies that the Unified Event Manager (UEM) alarms view is able to capture information about various failures at the system and zone level.

This test simulates a Console PC to Voice Processing Module (VPM) link failure.

SETUP

Voice Processing Module (VPM) device with two headsets connected.

VERSION #1.00

2. TEST

Step 1. Remove the Ethernet cable from the VPM to the Console Site Ethernet Switch.

Step 2. Observe the UEM reports CommFailure alarms for the VPM

Step 3. In addition, observe that the Console PC reports the link to the VPM as Down.

Step 4. Verify both headsets connected to the VPM are able to communicate to the external telephone system.

Step 5. Reconnect the VPM to the Console Site Ethernet Switch.

Step 6. Observe that UEM regains communication with the VPM and the Console PC to VPM link recovers.

Pass____ Fail____

3.4.6 Unified Event Manager (UEM) VPM "No Console IP Address" Fault

1. DESCRIPTION

This test verifies that the VPM reports the condition when it does not have an IP address for the Console PC configured. This event is viewable in the Unified Event Manager (UEM).

SETUP

Voice Processing Module (VPM) configured without a valid Console IP address.

VERSION #1.00

2. TEST

Step 1. From the Unified Network Configurator (UNC), prepare the configuration file for the VPM.

Step 2. Push the configuration to the VPM.

Step 3. From Unified Event Manager (UEM), observe that the Console PC reports the link to the VPM as Down.

Step 4. From UEM, observe that the VPM reports a CRITICAL alarm "Console IP address is not configured".

Step 5. From the UNC, prepare and push a new configuration that includes the valid IP address of the Console PC

Step 6. From UEM, observe that the Console PC reports the link to the VPM as Up, and that the CRITICAL alarm reported by the VPM is cleared.

Pass____ Fail____

3.5 Network Security Tests

3.5.1 SNMPv3

1. DESCRIPTION

The SNMPv3 feature provides secured network management traffic between network managers (NM) and network elements (NE). When a system is installed or migrated, the SNMPv3 communications between above NMs and NEs are "clear" that is the system initial default mode, i.e. No Authentication and No Privacy. The system can be configured for Authentication w/o Privacy, or Authentication w/ Privacy.

This test demonstrates that the NMs and NEs cannot communicate unless both are configured properly.

UEM - Unified Event Manager
CSS- Configuration Service Software
UNC - Unified Network Configurator
VPM - Voice Processing Module

SETUP

Note: Not all systems will include all devices.

VERSION #1.10

2. TEST

Step 1. The initial v3 communication should be functioning as "Clear" mode when network managers (UEM, UNC, InfoVista, and MOSCAD permanent manager) and SNMPv3 devices (Summit site elements, MNR Routers, HP LAN switch, VPM devices, and MOSCAD RTU) are initially installed and configured.

Step 2. Choose a SNMPv3 device and change the MotoMaster v3 user credentials. Use CSS for summit site elements, and VPM devices use Router User Interface for router, and use MOSCAD permanent manager for MOSCAD RTU.

Step 3. Verify that the UEM will raise a "Comm Loss" alarm when UEM detect it is unable to perform SNMPv3 operation to this SNMPv3 device. From UNC, use "Test Credentials" command to verify that the v3 communication to this device fails. From InfoVista, the statistic graph will not show collected data because of this v3 communication failure.

Step 4. Make the same MotoMaster v3 credentials change in UEM, UNC, and InfoVista.

Step 5. Verify that fault management, configuration management, and performance management functions from UEM, UNC, and InfoVista to this SNMPv3 device are become normal again. UEM will also clear the "Comm loss" alarm.

Pass____ Fail____

3.5.2 Virus Detection

1. DESCRIPTION

The network clients in the system are protected by anti-virus software. In this test, a mock virus will be introduced to the system. This test virus was developed by the European Institute for Computer Anti-Virus Research (EICAR) to provide an easy and safe way to test whether the anti-virus software is working, and see how it reacts when a virus is detected. This is a 70-byte file, which if executed, simply displays the message: "EICAR-STANDARD-ANTIVIRUS-TEST-FILE!"

SETUP

Acquire the EICAR test virus file (http://www.eicar.org/anti_virus_test_file.htm), and place it on a write-enabled media (a floppy disk).

VERSION #1.02

2. TEST

Step 1. Using the Symantec System Center (SSC) on the CSMS server, select <AMS:view log> to display the SSC log.

Step 2. Attempt to execute the EICAR test virus on a dispatch or network client.

Step 3. Verify that the client and server will almost immediately report the discovery of the virus.

Step 4. Verify that the triggered virus event information is stored in the log.

Pass____ Fail____

3.5.3 Centralized Logging – Log the Successful Login to NM Client

1. DESCRIPTION

The Centralized Logging Feature is an optional component . When installed, it collects the Operating System logs of network clients in the system. Events captured include System Startup and Shutdown Events,
Login Failures & Successes, Logouts, Elevation of privileges, Hardware Failures, Software Failures, and Resource Taxation.

SETUP

No prior setup is required for this test.

VERSION #1.10

2. TEST

Step 1. Log into the syslog server, loghost01, as syslog_mgr with the appropriate password.

Step 2. Enter the following command, in lowercase: "tail -f" /var/log/messages".

Step 3. Log onto the nmclient01.

Step 4. Verify that log messages are being received from the syslog clients [i.e., nmclient01] on the syslog server [i.e., loghost01].

Step 5. To close out the session, hit cntl-c and then logout.

Pass____ Fail____

3.5.4 Ethernet Switch Port Security MAC Port Lockdown (MPL)

1. DESCRIPTION

The MAC Port Lockdown (MPL) is an optional feature of the ASTRO system. This feature assigns a MAC address to each port of the switch and prevents another computer from communicating with the network, if it has not been authorized in advance.

SETUP

Two Network Management Clients nmclient01 operational
nmclient02 operational

*MAC Port lockdown must be enabled on the network devices.

VERSION #1.12

2. TEST

Step 1. Login to nmclient01 and verify that the operator can perform actions.

Step 2. Login to nmclient02 and verify that the operator can perform operations.

Step 3. Swap the network cables at the switch for nmclient01 and nmclient02.

Step 4. Verify that neither operator at nmclient01 and nmclient02 can perform any network operations.

Step 5. Swap the nmclient01 and nmclient02 network cables back to original locations.

Step 6. If an HP switch is being tested, the ports must be reactivated prior to Step 7 by running the configlet.

Step 7. Verify that both operators can perform network operations.

Pass____ Fail___

3.5.5 MAC Port Lockdown (MPL)

1. DESCRIPTION

The MAC Port Lockdown (MPL) is an optional feature of the ASTRO 7.1.1 system. This feature assigns a MAC address to each port of the switch and prevents another computer from communicating with the network, if it has not been authorized in advance.

SETUP

No prior setup is required for this test.

VERSION #1.02

2. TEST

Step 1. Login to nmclient01 and verify that the operator can perform actions.

Step 2. Login to nmclient02 and verify that the operator can perform operations.

Step 3. Swap the network cables at the switch for nmclient01 and nmclient02.

Step 4. Verify that neither operator at nmclient01 and nmclient02 can perform any network operations.

Step 5. Swap the nmclient01 and nmclient02 network cables back and Verify that both operators are still prevented from performing network operations.

Step 6. May be able to unlock the ports with out resetting the switch. Additional info to be added here. Need to update this step so we do not need to reset the switch. -Otherwise- Reset the switch above and Verify that both operators can perform network

Pass____ Fail____

3.5.6 Centralized Logging: Voice Processor Module Events – Authentication Services Enabled

1. DESCRIPTION

The Centralized Logging Feature is an optional component . When installed, it collects the Operating System logs of network clients in the system. Events captured include System Startup and Shutdown Events,
Login Failures & Successes, Logouts, Elevation of privileges, Hardware Failures, Software Failures, and Resource Taxation.

SETUP

VPM CONSOLE-1 Configured

VERSION #1.02

2. TEST

Step 1. Log into the syslog server, loghost01, as root with the appropriate password.

Step 2. Enter the following command, in lowercase: "tail -f /var/log/messages".

Step 3. Connect to the Voice Processing Module (VPM) of a VPM based console serially via CSS using the valid user name and password. Observe that the syslog server contains the VPM device's successful login event message.

Step 4. Issue the command to reset the VPM.

Step 5. Once the VPM is online, observe that the syslog server contains the VPM device's startup event message. Verify that log messages are being received from the syslog clients [i.e., VPM clients] on the syslog server [i.e., loghost01].

Step 6. Close CSS application.

Step 7. Launch CSS application. Login to the VPM of a VPM based console serially via CSS with an invalid username and password..

Step 8. Observe that the syslog server contains the VPM device's unsuccessful login event message.

Step 9. To close out the session, hit cntl-c and then logout.

Pass____ Fail____

3.6 MCC 7500 Digital Conventional Features

3.6.1 Console Conventional Instant Transmit

1. DESCRIPTION

The instant transmit switch provides immediate operator access to a channel, independent of its select status (selected or unselected).

SETUP

RADIO-1 - CONVCH1
RADIO-1 - CONVSITE 1

VERSION #1.00

2. TEST

Step 1. Click the mouse anywhere in the CONVCH1 resource window.

Step 2. Depress the Instant Transmit button on the CONVCH1 resource window.

Step 3. Verify that the Transmit indicator is lit.

Step 4. Verify that outbound audio is heard on RADIO-1.

Pass____ Fail____

3.6.2 Conventional Radio Resource on the MCC 7500 Console (Clear)

1. DESCRIPTION

A Radio Resource is selected on the MCC 7500 consoles by placing the cursor over the Radio Resource (Channel Control Window), choosing an area, and selecting. The Radio Resource choice area is the region where the name of the Radio Resource is located (Top alphanumeric line of the Radio Resource). When selected, the background of the Radio Resource will turn white and the border will turn green. Choosing the PTT button will send keying commands to the station.

SETUP

RADIO-1 - CONVCH1
RADIO-1 - SITE - CONVSITE 1
CONSOLE-1 - CONVCH1
CONSOLE-1 - SITE - CONSITE 1

VERSION #1.01

2. TEST

Step 1. Select the CONVCH1 Radio Resource by moving the cursor over the Radio Resource's name and selecting.

Step 2. Begin an outbound console transmission using the PTT Button on the newly selected Radio Resource, in clear mode.

Step 3. Verify that console's outbound audio can be monitored by RADIO-1.

Step 4. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1 audio can be monitored at the console Select speaker.

Step 5. Depress any of the other available Radio Resources to "deselect" the present Radio Resource.

Step 6. Respond to the console outbound transmission from RADIO-1. Verify that RADIO-1's audio can be monitored at the unselect speaker.

Step 7. Repeat steps 1-6 for a sample of the remaining channels as needed.

Step 8. Repeat steps 1-7 for a sample of the remaining OPs as needed.

Pass____ Fail____

3.6.3 Digital Conventional Clear Receive Indication

1. DESCRIPTION

A call from a subscriber unit to a MCC 7500 console is indicated on each dispatch operator position that has a Radio Resource associated with the channel the subscriber unit is transmitting on.. If the current mode of operation for the Radio Resource is clear mode the coded icon will not be displayed.

SETUP

RADIO-1 - CONVCH1
RADIO-1 - SITE - CONVSITE 1
CONSOLE-1 CONVCH1
CONSOLE-1 - SITE - CONSITE 1

VERSION #1.01

2. TEST

Step 1. Resource by moving the cursor over the Radio Resource's name and clicking the left mouse button.

Step 2. Verify that the resource is set for clear. A "pad lock" icon represents the clear/coded option. If the pad lock icon is open, the outbound transmission is in the clear mode.

Step 3. In addition to the call indication, a clear/coded indication, an open or closed 'pad lock' respectively, is displayed.

Pass____ Fail____

3.7 Digital Conventional Tests

3.7.1 Conventional Radio Resource Call – Clear Mode

1. DESCRIPTION

Subscribers can communicate to each other through the repeater that they are selected on via the channel selector on the individual radio.

The signals that are received by the subscriber radio are repeated so that other radios on that channel will be able to hear and participate in the conversation.

SETUP

RADIO-1 - SITE 1
RADIO-2 - SITE 1

VERSION #1.03

2. TEST

Step 1. Initiate a call on RADIO-1.

Step 2. Verify communications on RADIO-2.

Step 3. Initiate a call on RADIO-2.

Step 4. Verify communications with RADIO-1.

Step 5. Repeat above tests for each repeater channel.

Pass____ Fail____

3.7.2 Digital Conventional Patch Operation

1. DESCRIPTION

The Patch feature allows more than one Radio Resource to be grouped simultaneously. This can be used for temporarily merging two or more channels/frequencies together to act as one larger group. Telephones and radio resources can be patched together. In a patch group, the members can receive messages from the console and they can transmit to all other members of the patch group.

SETUP

RADIO-1 - CONVCH1
RADIO-2 - CONVCH2
CONSOLE-1 - CONVCH1 and CONVCH2

2. TEST

Step 1. Select patch 1, 2, or 3 from the Patch/MSel button.

Step 2. Select the "Patch Edit" icon. The selected patch will turn blue.

Step 3. Select the CONVCH1 and CONVCH2 Radio Resource by moving the cursor over the Radio Resources' names and selecting them.

Step 4. Verify that the selected Radio Resources display a "Patch Edit" icon.

Step 5. Press and hold the "Patch Transmit" icon to initiate the patch transmission.

Step 6. Verify that the RADIO-1 and RADIO-2 monitor the console outbound audio.

Step 7. Verify that RADIO-1 can communicate with RADIO-2 even though they are on separate channels.

Step 8. To knock down the patch, select the Radio Resources by moving the mouse cursor over the resource window and clicking over the patch icon. Repeat this process until all the resources have been removed from the Patch window.

Step 9. Finally, click on the Patch Edit icon and idle the current patch.

Step 10. Repeat steps 1-9 for a sample of the remaining OPs as needed.

VERSION #1.01

Pass____ Fail____

3.7.3 Dual Dispatch Operation

1. DESCRIPTION

Verify that the new Dispatch Center can operate simultaneously with the existing Dispatch Center. (Field only – non CCSI)

SETUP

RADIO-1 - CONVCH1

RADIO - 2 – CONVCH2

CONSOLE-1 - CONVCH1 (New Dispatch Center)

CONSOLE -2 – CONVCH2 (Existing Dispatch Center)

2. TEST

Step 1. Initiate a clear conventional call from RADIO-1 on CONVCH1.

Step 2. Verify that the CONSOLE-1 user is able to monitor the call on CONVCH1.

Step 3. Initiate a clear conventional call from RADIO-2 on CONVCH 2.

Step 4. Verify that the CONSOLE -2 user is able to monitor the call on CONVCH2.

Step 5. Switch CONSOLE-2 user to CONVCH1 and verify the user is able to monitor the call on CONVCH1.

VERSION #1.01

Pass____ Fail____

3.8 Miami-Dade specific tests

3.8.1 Hospital Channel Recording

1. DESCRIPTION

Verify that the new Hospitals audio from the field radios is present at the new Dispatch Center (Field Only – non-CCSI)

SETUP

RADIO-1 - CONVCH1 – Site HWT (Jackson South)

RADIO - 2 – CONVCH1 – Near HWT

CONSOLE-1 - CONVCH1 (New Dispatch Center)

VERSION #1.01
2. TEST

Step 1. Initiate a clear conventional call from RADIO-1 on CONVCH1.

Step 2. Verify that the CONSOLE-1 user is able to monitor the call on CONVCH1.

Step 3. Initiate a clear conventional call from RADIO-2 on CONVCH 1.

Step 4. Verify that the CONSOLE -1 user is able to monitor the call on CONVCH1 and that the customer supplied IP logging recorder logs the call correctly.

Pass____ Fail____

3.8.2 Zetron Encoding

1. DESCRIPTION

Verify that the new Dispatch Center can generate tones through a Zetron unit and be monitored at a fire station. (Field only – non CCSI)

SETUP

RADIO-1 - CONVCH1 – at Fire Station #9

CONSOLE-1 - CONVCH1 (New Dispatch Center)

CONSOLE -2 – CONVCH1 (Existing Dispatch Center)

2. TEST

Step 1. Initiate tones from Zetron device from existing Dispatch Center on CONVCH1.

Step 2. Verify that the RADIO-1 at Fire Station #9 receives and decodes the tones.

Step 3. Initiate tones from Zetron device from existing Dispatch Center on CONVCH1.

Step 4. Verify that the RADIO-1 at Fire Station #9 receives and decodes the tones.

Pass____ Fail____

VERSION #1.01

3.8.3 MOSCAD functionality

1. DESCRIPTION

Verify that the new Dispatch Center can generate alarms from the new TENSR at the new Dispatch Center. (Field only – non CCSI)

SETUP

TENSR1 – new Dispatch Center

MOSCAD unit at New Dispatch Center

2. TEST

Step 1. Cause a failure at TENSR #1 in the new Dispatch Center by disconnecting a T1 cable and causing a WAN failure.

Step 2. Verify that the MOSCAD unit receives the alarm.

Step 3. Verify that the MOSCAD workstation reports the failure from TENSR #1 at the new Dispatch Center.

Pass____ Fail____

Punch List

Brief Description	Owner (Required)	Target Date

Check here if there are additional punch-list items attached.

Signoff Certificate

By their signatures below, the following witnesses certify they have observed the In-Plant System Acceptance Test Procedures.

Signatures

WITNESS: _____ Date: _____

Please Print Name: _____ _____

Initials

WITNESS: _____ Date: _____

Please Print Name: _____ _____

Initials

WITNESS: _____ Date: _____

Please Print Name: _____ _____

Initials

Section 4. Warranty and Maintenance

4.1 Introduction

Motorola places great emphasis to ensure that communications systems, such as the one proposed for Miami-Dade Fire Rescue (MDFR) meet high standards for design, manufacturing, and performance. To enhance the value of the proposed communications system, Motorola offers customized warranty services as outlined in this section.

Table 4-1: Warranty Services Overview

Warranty Services	Included Warranty Year
Warranty: Standard	✓
Dispatch Service	✓
OnSite Infrastructure Response	✓
Network Preventative Maintenance	✓
Technical Support	✓
Infrastructure Repair Service with Advanced Replacement	✓

4.2 Warranty Services

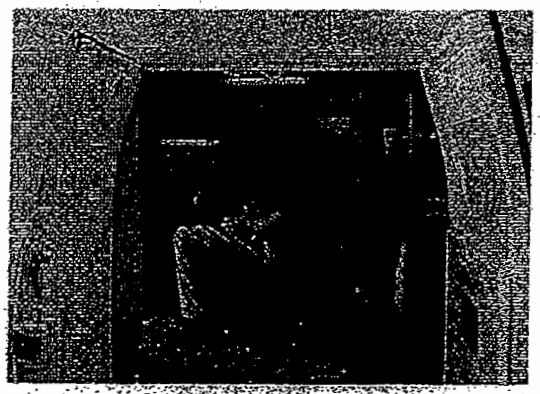
Motorola's proposal includes a warranty and maintenance program for the new equipment, which will provide state-of-the-art system service focused on achieving responsive service, maximum system operation, and optimum reliability from all vendors involved. The program will consist of a one-year parts and labor warranty, and preventive and emergency maintenance services, which are detailed in this proposal. This program combines the services of our local system service team, our local subcontractor team, and the national service team for the most efficient technical and administrative support of your system.

4.2.1 Dispatch Service

Motorola's System Support Center (SSC) is your single point of contact for service issues. A phone call to this operation's toll free phone number initiates an electronic customer service request (case) and begins the response process to the appropriate degree required. If a technician is required to respond to an issue for resolution, the SSC identifies the appropriate technician and tracks that technician's response to the on-site point of failure. The SSC tracks the technician's progress in effecting the repair and restoration, and notifies the customer of the status. In the event that a system engineer or other system specialist is required, the SSC escalates the case to the appropriate level and assigns the required personnel. Once the case has been resolved, the SSC will contact the customer to advise that the issue has been resolved and that the case is ready to be closed with the customer's concurrence.

4.2.2 OnSite Infrastructure Response

OnSite Infrastructure Response provides local, trained, and qualified technicians who arrive on location to diagnose and restore your communications network. Motorola Dispatch contacts the local authorized service center in your area and dispatches a qualified technician to your site. An automated escalation and case management process ensures that technician site arrival and system restoration comply with contracted response times.



The field technician performs first level troubleshooting, provides information regarding the system condition, removes any failed components for repair, and reinstalls new or reconditioned components. If the technician is unable to resolve the issue, the case is escalated to the SSC or product engineering teams as needed.

4.2.3 Network Preventative Maintenance

Motorola's Network Preventative Maintenance minimizes premature repairs by providing operational test and alignment on the infrastructure or fixed network equipment to ensure all components are operating consistent to manufacturers' specifications.

4.2.4 Technical Support

Motorola Technical Support service provides an additional layer of support through centralized, telephone consultation for issues that require a high level of communications network expertise and troubleshooting capabilities. Technical Support is delivered by the SSC and is staffed 24 hours per day, 365 days a year. The SSC is staffed with trained, skilled technologists specializing in the diagnosis and swift resolution of network performance issues. These technologists have access to a solutions database as well as in house test labs and development engineers. Technical Support cases are continuously monitored against stringent inbound call management and case management standards to ensure rapid and consistent issue resolution. Technical Support service translates into measurable, customer-specific metrics for assured network performance and system availability.

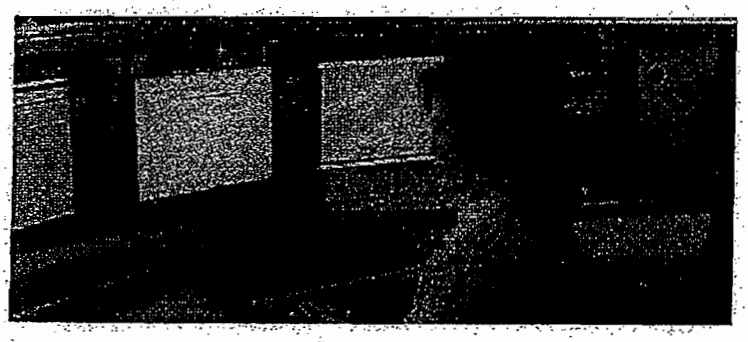
4.2.5 Infrastructure Repair Service with Advanced Replacement

Infrastructure Repair with our Advanced Replacement upgrade supplements your spares inventory with Motorola's centralized inventory of critical equipment. In advance of Motorola repairing the malfunctioning unit, a replacement unit is sent to you within 24 hours to ensure a spare unit is available. Upon receipt of the malfunctioning unit, Motorola repairs the unit and replace it in our centralized inventory.

4.3 Summary

Motorola's Support Services ensure peak network and operational performance by offering a diverse portfolio of scalable support services. Motorola has an extensive service organization to provide local, trained, and qualified service personnel to manage your communications network. Motorola's Support Services focuses on performance, both technological and operational, to maximize the efficiency and security of your communications network. These services can help you increase both the availability and the operating efficiency of your network, while effectively managing costs and ensuring the safety of your employees and the citizens they protect.

Motorola's in-depth and first-hand knowledge of mobility – communications processes, technologies and integrated solutions is invaluable. We have more than 80 years of experience in designing, building, maintaining and managing large, complex mobile networks. Our 6,500 Motorola Services professionals and over 8,000 world-class partners and certified subcontractors, have the support of a global network of R&D centers and test labs, as well as Motorola service and support centers at local, regional and national levels. Few organizations claim to offer such a complete range of professional services within the communications industry. Even fewer are prepared to deliver.



Section 5. Pricing Summary

5.1 Pricing

16 Consoles Firm	List	Discounted
Equipment	$1,909,613.00	$1,585,130.00
Services		$1,011,993.00
TOTAL		$2,597,123.00

Pricing per Contract BW7514-15/24 -2

Payment Terms

Except for a payment that is due on the Effective Date, Customer will make payments to Motorola within forty-five (45) days after the date of each invoice. Customer will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution and in accordance with the following milestones.

1. 10% of the Contract Price upon contract execution;
2. 15% of the Contract Price upon Contract Design Review;
3. 35% of the Contract Price upon Delivery Acceptance of equipment;
4. 15% of the Contract Price upon completion of installation
5. 15% of the Contract Price upon completion of Acceptance Test Plan;
6. 10% of the Contract Price upon final acceptance

Motorola reserves the right to make partial shipments of equipment and to request payment upon delivery acceptance of such equipment. In addition, Motorola reserves the right to invoice for installations or civil work completed on a site-by-site basis, when applicable.

Delivery Acceptance shall not be unreasonably withheld. The County shall inventory and accept the equipment within 5 days of delivery. All equipment shipments will be to Miami-Dade Lightspeed building, or other Miami Dade County location as specified, prior to shipment.

Table 1 – Equipment List

LINE ITEM		APC	QTY	NOMENCLATURE	DESCRIPTION	UNIT LIST PRICE	EXTENDED LIST PRICE	DISCOUNT	DISCOUNTED EXTENDED PRICE
1	-	877	1	SQM01SUM0192	MASTER SITE CONFIGURATION 7.7	$0	$0	20%	$0
1	a	877	1	CA01414AA	ADD: ZC/NM HARDWARE 25-100 SITES	$120,000	$120,000	20%	$96,000
1	b	877	1	CA01415AA	ADD: USER CONFIGURATION SERVER (UCS)	$40,000	$40,000	20%	$32,000
1	c	877	2	CA01469AA	ADD: COMMON PLATFORM HARDWARE	$20,000	$40,000	20%	$32,000
1	d	877	1	CA01471AA	ADD: WINDOWS SUPPLEMENTAL TRANS CONFIG	$0	$0	20%	$0
1	e	877	1	CA01472AA	ADD: WINDOWS SUPPLEMENTAL FULL CONFIG	$0	$0	20%	$0
1	f	280	1	CA01207AA	ADD: ASTRO 25 CONVENTIONAL	$15,000	$15,000	20%	$12,000
1	g	877	4	CA01225AB	ENH: MCC 7500 CONSOLE LICENSES (QTY 5)	$5,000	$20,000	20%	$16,000
1	h	877	1	CA01316AA	ADD: UNC ADDTL DEVICE LIC (QTY 10)	$500	$500	20%	$400
1	i	280	6	CA01208AA	ENH: 500 RADIO USER LICENSES	$5,000	$30,000	20%	$24,000
1	j	877	1	Z13AG	ENH: UNIFIED NETWORK CONFIGURATOR (UNC)	$20,000	$20,000	20%	$16,000
1	k	877	1	Z802AF	ENH: USER CONFIGURATION MANAGER (UCM)	$5,000	$5,000	20%	$4,000
1	l	877	1	CA01224AB	ENH: UNIFIED EVENT MANAGER (UEM)	$20,000	$20,000	20%	$16,000
1	m	877	1	D52AJ	ENH: ZONEWATCH	$20,000	$20,000	20%	$16,000
1	n	280	1	CA01219AA	ENH: Conventional Port Licenses (Qty 25)	$1,000	$1,000	20%	$800
2	-	147	1	SQM01SUM0189	SRC7500 SWG ROUTING CENTER	$1,000	$1,000	20%	$800
2	a	147	1	CA01342AA	ADD: HIGH TIER CORE LAN 96	$24,100	$24,100	20%	$19,280

					PORTS				
2	b	147	1	CA01345AA	ADD: DUAL GATEWAY ROUTERS STANDARD	$31,400	$31,400	20%	$25,12(
2	c	147	1	CA01346AA	ADD: QTY 1 PAIR CORE ROUTERS CWR	$70,000	$70,000	20%	$56,00(
2	d	147	1	CA01354AA	ADD: DUAL LINK 1 PAIR CWR	$7,500	$7,500	20%	$6,00(
3	-	708	2	DDN9629	CERTIFIED NETWORK MANAGEMENT ASTRO 7.5/7.6 WORKSTATION	$5,950	$11,900	8%	$10,948
4	-	877	2	T7486	ASTRO 7.7 CLIENT APPLICATION SOFTWARE	$700	$1,400	20%	$1,12(
5	-	708	3	DS019BLK	19" LCD, BLACK, NON-TOUCH	$1,520	$4,560	8%	$4,19:
6	-	877	1	DLN6692	HP LASERJET PRINTER CP3525DN 110V	$4,500	$4,500	20%	$3,60(
7	-	708	1	DDN9182	CERTIFIED CORE SECURITY MANAGEMENT SERVER FOR 6.9/7.2	$16,800	$16,800	8%	$15,456
8	-	708	1	T7401	CSMS SUPPLEMENTARY DISK A7.1.1	$50	$50	8%	$46
9	-	708	7	DDN9607	SYMANTEC ANTI VIRUS 10.2.1 CORP ED LIC & MEDIA SINGLE COPY	$75	$525	8%	$483
10	-	708	1	TT1969	RSA AUTH. MGMT V. 6.1 WITH 25 CLIENT ACCESS LICENSES	$6,669	$6,669	8%	$6,135
10	a	708	1	TT04523AA	ADD: RSA ACE SERVER MAINTENANCE FOR 25 CLIENT ACCESS LICENSES	$0	$0	8%	$0
11	-	708	5	DDN8653	RSA 5 YEAR HARD TOKEN	$80	$400	8%	$368
12	-	708	4	L3539	MCC7500 DOMAIN CONTROLLER	$12,700	$50,800	8%	$46,736
13	-	708	4	T7400	DOMAIN CONTROLLER SOFTWARE	$500	$2,000	8%	$1,840

14	-	708	1	TT2022	LX4000T 8 PORT TERMINAL SERVER	$2,700	$2,700	8%	$2,48
15	-	877	7	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG	$50	$350	20%	$28
16	-	877	1	T7535	NM/ZC BACK-UP APPLICATION	$500	$500	20%	$40
17	-	708	1	DDN9590	SSG140 FIREWALL W/ 2 YEARS SUPPORT	$6,500	$6,500	8%	$5,98
			0			$0	$0	20%	$
18	-	207	1	DSTRAK91009	REMOTE SITE CONFIG AC POWER	$30,066	$30,066	8%	$27,661
19	-	207	1	DSTRAK91071	FOUR PORT IRIG B TIME CODE FDM	$963	$963	8%	$88
20	-	207	50	L1700	CABLE: 1/4" SUPERFLEX POLY JKT PER FOOT	$2	$95	8%	$87
21	-	207	4	DSF1PNMH	1/4" TYPE N MALE CONNECTOR FOR SUPERFLEX	$27	$109	8%	$10
			0			$0	$0	20%	$
22	-	708	13	DSJ4900B	HP PROCURVE SWITCH 2626B	$2,250	$29,250	8%	$26,91
23	-	147	26	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	$3,100	$80,600	20%	$64,480
24	-	147	26	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$800	$20,800	20%	$16,640
25	-	147	26	ST2513	S2500 ANALOG CONV TO IP IF KIT	$800	$20,800	20%	$16,640
26	-	147	2	SQM01SUM0183	DIG CONVENTIONAL CHANNEL GATEWAY	$18,325	$36,650	20%	$29,320
27	-	276	16	L20SSS9PW1 N	10-40W UHF R2 450-520MHZ XTL 5000 C	$3,180	$50,880	20%	$40,704
27	a	276	16	G806	ENH: SOFTWARE ASTRO DIGITAL CAI OPE	$515	$8,240	20%	$6,592
27	b	500	16	G48	ENH: CONVENTIONAL OPERATION	$800	$12,800	20%	$10,240
27	c	276	16	G81	ADD: W9 HW SETUP CONSOLETTE	$380	$6,080	20%	$4,864
27	d	500	16	G799	ADD: PRINTED TEST RESULTS	$0	$0	20%	$0

27	e	276	16	L791	ADD: AUDIO INTFC BD XTL5000	$150	$2,400	20%	$1,92
28	-	581	10	YKN4256	CABLE, FRONT CONTROL HEAD 150 FEET	$481	$4,810	20%	$3,84
29	-	581	6	YKN4255A	CABLE, FRONT CONTROL HEAD 150 FEET	$333	$1,998	20%	$1,59
30	-	500	16	HPN4007C	POWER SUPPLY 14V DC 10 AMP 117/240	$296	$4,736	20%	$3,78
31	-	412	16	HKN4191	POWER CABLE, 10 FT. (LOW/MID POWER)	$18	$288	20%	$23
32	-	371	16	RVN4185	RSS, SPECTRA	$265	$4,240	20%	$3,39
33	-	721	16	HKN6155	PROGRAMMING/FLASH CABLE, ASTRO SPEC	$105	$1,680	20%	$1,34
34	-	404	32	BLN7074	HEADSET JACK, COMPACT, GREY	$142	$4,544	20%	$3,63
35	-	228	32	BLN6732	FOOT, SWITCH TRADITIONAL	$106	$3,392	20%	$2,71
36	-	374	16	TRN7466	MOUNTING BRACKET EIA 19 INCH	$100	$1,600	20%	$1,28
37	-	207	10	TDE7200	ANTENNA 3 DB OMNI	$628	$6,280	8%	$5,77
38	-	207	2400	L1705	1/2" LDF HELIAX POLY JKT PER FT	$3	$7,200	8%	$6,62
38	a	207	7	TT05059AA	ADD: 7-16 DIN MALE, PS, ANTENNA END	$26	$182	8%	$16
38	b	207	7	TT04967AA	ADD: CONNECTOR ATTACHMENT LDF4 ANTENNA END	$14	$100	8%	$9
38	c	207	7	TT05059AA	ADD: 7-16 DIN MALE, PS, STATION END	$26	$182	8%	$16
38	d	207	7	TT04936AA	ADD: CONNECTOR ATTACHMENT FEE FOR LDF4 STATION END	$14	$100	8%	$9
39	-	207	14	TDN9289	CABLE WRAP WEATHERPROOFING	$22	$308	8%	$28
40	-	207	84	TDN6673	1/2" CABLE GROUND CLAMP KIT	$20	$1,680	8%	$1,54
41	-	207	0	DSL5SGRIP	7/8" SUPPORT HOIST GRIP	$46	$0	8%	$0

42	-	207	70	MDN6816	1/2" CABLE HANGER KIT STAINLESS	$20	$1,400	8%	$1,28
43	-	207	7	DS1050125AA	CABLE LIGHTENING ARRESTOR	$205	$1,435	8%	$1,32
44	-	124	16	L3223	MC3000 DIGITAL DESKET	$876	$14,016	20%	$11,21
45	-	124	16	DDN6516	AUDIO ACCESSORY JACK BOX	$110	$1,760	20%	$1,40
46	-	124	16	L3208	DIGITAL JUNCTION BOX - MCS2000 & AS	$632	$10,112	20%	$8,090
46	a	124	16	ZA00225AA	ADD: CABLE, JUNCTION BOX, ASTRO CON	$24	$384	20%	$307
47	-	124	16	DDN6333	CABLE, JUNCTION BOX, ASTRO	$26	$416	20%	$333
						$0			$0
48	-	443	16	B1933	MOTOROLA VOICE PROCESSOR MODULE	$11,920	$190,720	20%	$152,576
48	a	443	16	CA01221AB	ADD: MCC 7500 DISPATCH CONSOLE HIGH CAPACITY SOFTWARE LICENSE	$19,580	$313,280	20%	$250,624
48	b	443	16	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN	$0	$0	20%	$0
49	-	708	16	DS22WBLKTS	22" WIDE FORMAT LCD MONITOR BLACK, TOUCH	$4,099	$65,584	8%	$60,337
50	-	708	16	DDN9650	MCC 7500 WORKSTATION PC (FOR USE WITH VPM ONLY) VISTA	$2,710	$43,360	8%	$39,891
51	-	708	16	L3225A	CERTIFIED KEYBOARD FOR RSD SERVERS AND WORKSTATIONS	$42	$672	8%	$618
52	-	708	16	L3226A	CERTIFIED OPTICAL WHEEL MOUSE FOR RSD SERVERS AND WORKSTATIONS	$30	$480	8%	$442
53	-	207	16	DSSL	120VAC, 15AMP SIMPLEX NEMA 5-15 PLUG/RECEPTACL	$236	$3,776	8%	$3,474

					E				
54	-	443	32	B1912	MCC SERIES DESKTOP SPEAKER	$450	$14,400	20%	$11,52(
55	-	443	16	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE	$250	$4,000	20%	$3,20(
56	-	443	32	B1913	MCC SERIES HEADSET JACK	$200	$6,400	20%	$5,12(
57	-	706	32	RLN6099A	HDST MODULE BASE W/PTT, 25' CBL	$242	$7,744	20%	$6,195
58	-	706	32	RMN5079A	SUPRAPLUS DUAL MUFF HEADSET	$117	$3,744	20%	$2,995
59	-	207	32	DSVPR3MCC	PROTECTION MODULE FOR MCC 5500/5700 OPERATOR HEADSET INTERFACE	$238	$7,616	8%	$7,007
60	-	708	16	DSTWIN6328A	PROVIDES ONE DUAL PEDAL FOOTSWITCH FOR USE WITH MOTOROLA MCC 7500 DISP	$273	$4,368	8%	$4,019
61	-	708	16	DDN9607	SYMANTEC ANTI VIRUS 10.2.1 CORP ED LIC & MEDIA SINGLE COPY	$75	$1,200	8%	$1,104
62	-	229	16	DDN9617	SW BASED DUAL IRR USB HASP WITH LICENSE FOR XP / VISTA	$2,648	$42,368	20%	$33,894
63	-	708	16	DDN6493	SOUND CARD AUDIGY SE	$159	$2,544	8%	$2,340
64	-	708	16	CDN6673	SET OF LABTEC SPIN 95	$46	$736	8%	$677
65	-	443	1	B1905	MCC 7500 ASTRO 25 SOFTWARE	$250	$250	20%	$200
66	-	443	1	B1933	MOTOROLA VOICE PROCESSOR MODULE	$11,920	$11,920	20%	$9,536
66	a	443	1	CA00288AB	ADD: MCC 7500 ARCHIVING INTERFACE SERVER SOFTWARE LICENSE	$15,060	$15,060	20%	$12,048

66	b	443	1	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN	$0	$0	20%	$(
67	-	708	1	DDN9607	SYMANTEC ANTI VIRUS 10.2.1 CORP ED LIC & MEDIA SINGLE COPY	$75	$75	8%	$69
68	-	708	1	DDN9650	MCC 7500 WORKSTATION PC (FOR USE WITH VPM ONLY) VISTA	$2,710	$2,710	8%	$2,49
69	-	229	0	TT1092	MCC7500 30 CALL IP RECORDER	$76,000	$0	20%	$(
69	a	229	0	TT05229AA	ADD: IP LOGGING RECORDER FOR USE ON 7.7 SYSTEMS	$0	$0	20%	$(
70	-	229	1	DDN9589	VISTA PLAYBACK WORKSTATION W/ 17" LCD, KEYBOARD, & MOUSE	$3,295	$3,295	20%	$2,636
71	-	708	2	DDN9607	SYMANTEC ANTI VIRUS 10.2.1 CORP ED LIC & MEDIA SINGLE COPY	$75	$150	8%	$138
			0						
72	-	443	1	B1912	MCC SERIES DESKTOP SPEAKER	$450	$450	20%	$360
73	-	443	1	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE	$250	$250	20%	$200
74	-	443	1	B1913	MCC SERIES HEADSET JACK	$200	$200	20%	$160
75	-	708	1	DDN8493	FRU MCC 7500 OP PC & APP	$5,000	$5,000	8%	$4,600
76	-	443	1	B1934	MCC 7500 VOICE PROCESSOR MODULE FRU	$11,830	$11,830	20%	$9,464
77	-	147	1	ST2512	S2500 ROUTER T1/E1 DAUGHTER BOARD	$800	$800	20%	$640
78	-	207	5	DS9019019	ZETRON UNITS	$5,911	$29,555	8%	$27,191
			0			$0	$0	20%	$0
79	-	469	8	F4543	SITE MANAGER BASIC	$1,855	$14,840	20%	$11,872
79	a	469	8	VA00369	SDM3000 MCC7500 AUX IO F/W FOR A7.7	$175	$1,400	20%	$1,120

79	b	469	8	V266	ADD: 90VAC TO 260VAC PS TO SM	$120	$960	20%	$768
79	c	469	8	V592	AAD TERM BLCK & CONN WI	$90	$720	20%	$576
80	-	117	1	TT2031	CERTIFIED MOSCAD WORKSTATION WITH W	$7,676	$7,676	20%	$6,141
81	-	708	1	DSFA1980BLK	19" PVA LCD, (NO-TOUCH), BLACK, W/A	$1,520	$1,520	8%	$1,398
82	-	117	1	CDN1213	LASERJET 1300	$850	$850	20%	$680
83	-	117	1	TT2032	INTOUCH RUNTIME WITH I/O V10.0 SW	$10,900	$10,900	20%	$8,720
84	-	131	0	DSACDXMOTO004	16 PORT DS1 DIGITAL X-CONN SWITCH 1:N PROT SWITCHING V2.5.13	$53,500	$0	8%	$0
85	-	131	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSR 800	$1,650	$1,650	8%	$1,518
86	-	131	2	DSPREM8901	AC POWER SUPPLY 110/220VAC	$963	$1,926	8%	$1,772
87	-	131	1	DSPREM880160	CPU 8 T1 E1 CROSS CONNT	$6,188	$6,188	8%	$5,693
88	-	131	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	$2,475	$2,475	8%	$2,277
89	-	131	4	DSPREM801065	DUAL T1 E1 WAN CARD	$2,338	$9,352	8%	$8,604
90	-	131	8	DSPREM81230	CSU PLUG IN MODULE	$1,375	$11,000	8%	$10,120
91	-	131	8	DSPREM811960	8 PORT 4W E M TO EXT RANGE CRD	$2,063	$16,504	8%	$15,184
92	-	207	3	0182643X12	DS1 INTERFACE PANEL	$826	$2,478	8%	$2,280
93	-	454	3	0182643X13	DSM2 INTERFACE PANEL	$2,114	$6,342	20%	$5,074
94	-	454	3	0182643X14	4 WIRE/ENM INTERFACE PANEL	$591	$1,773	20%	$1,418
95	-	509	2	TRN7343	SEVEN AND A HALF FOOT RACK	$495	$990	20%	$792
96	-	207	8	DSOP820B	POWER DIST. UNIT SURGE PROTECT	$990	$7,920	8%	$7,286
97	-	207	5	DS1101378	RACK MOUNTING PLATE ADAPTER, DSOP820A & DSNSOP820A 19	$101	$505	8%	$465

					INCH RACK				
98	-	207	36	DSTSJ100BT	EIGHT WIRE PROTECTION MODULE WITH RJ-48 PASS THROUGH & MECH GRD CONN	$154	$5,544	8%	$5,10
99	-	207	35	DSTSJADP	HORIZONTAL RACK BUS BAR FOR TSJ AND WPH SERIES NETWORK PROTECTOR	$88	$3,080	8%	$2,83
100	-	708	1	DDN9607	SYMANTEC ANTI VIRUS 10.2.1 CORP ED LIC & MEDIA SINGLE COPY	$75	$75	8%	$69
101	-	117	1	DDN9047	HYPERACCESS FOR WINDOWS 95/98/2000/2003/NT/ME/XP	$225	$225	20%	$18
102	-	708	1	DDN9657	CRYSTAL REPORTS 2008 (VISTA COMPATIBLE ;FOR A7.5 & BEYOND)	$994	$994	8%	$914
103	-	207	5	DS4357A0104	CONTROL STATION COMBINER, 380-450 MHZ, 4 CHANNEL	$10,619	$53,095	8%	$48,847
104	-	207	2	DSDASHYNMNF01S	DAS-HY-NMNF-01S - 800-2500MHZ, RJ45 DC PASS PROTECTOR	$660	$1,320	8%	$1,214
105	-	207	255	L1702	CABLE: 1/2" SUPERFLEX POLY JKT PER FOOT	$4	$1,084	8%	$997
105	a	207	17	E704AP	ADD: 1/2" N MALE PLATED ANTENNA END CONNECTOR	$55	$935	8%	$860
105	b	207	17	TT04962AA	ADD: CONNECTOR ATTACHMENT FEE FOR FSJ4 ANT END	$13	$213	8%	$196
105	c	207	17	E705AM	ADD: 1/2"(PLTD)N JACK, STATION END CONNECTOR	$31	$519	8%	$477

105	d	207	17	TT04931AA	ADD: CONNECTOR ATTACHMENT FEE FOR FSJ4 STA END	$13	$213	8%	$19
106	-	276	1	L20SSS9PW1 N	10-40W UHF R2 450-520MHZ XTL 5000 CONSOLETTE	$3,180	$3,180	20%	$2,54
106	a	276	1	G806	ENH: IMBE ASTRO DIGITAL CAI OP	$515	$515	20%	$41
106	b	276	1	G48	ENH: CONVENTIONAL OPERATION	$800	$800	20%	$64
106	c	276	1	G81	ADD: W9 HW SETUP CONSOLETTE	$380	$380	20%	$30
106	d	276	1	G799	ADD: PRINTED TEST RESULTS	$0	$0	20%	$
106	e	276	1	L791	ADD: AUDIO INTFC BD XTL5000	$150	$150	20%	$12
107	-	570	1	YKN4255A	CABLE, FRONT CONTROL HEAD 115 FOOT	$333	$333	20%	$26
108	-	500	1	HPN4007C	PS 14V 10A 117/240 VAC	$296	$296	20%	$237
109	-	412	1	HKN4191	POWER CABLE, 10 FT. (LOW/MID POWER) 30 & 35 WATT	$18	$18	20%	$14
110	-	371	1	RVN4185AF	CPS R12.00.00 ASTRO 25 MOBILE	$265	$265	20%	$212
111	-	721	1	HKN6155	PROGRAMMING/FLASH CABLE, ASTRO SPECTRA PLUS	$105	$105	20%	$84
112	-	404	2	BLN7074	HEADSET JACK, COMPACT, GREY	$142	$284	20%	$227
113	-	454	2	BLN6732	FOOT, SWITCH TRADITIONAL	$106	$212	20%	$170
114	-	374	1	TRN7466	MOUNTING BRACKET EIA 19 INCH	$100	$100	20%	$80
115	-	124	1	L3223	MC3000 DIGITAL DESKSET	$876	$876	20%	$701
116	-	124	1	DDN6516	AUDIO ACCESSORY JACK BOX	$110	$110	20%	$88
117	-	124	1	L3208	DIGITAL JUNCTION BOX - MCS2000 & ASTRO CONSOLETTE	$632	$632	20%	$506

117	a	124	1	ZA00225AA	ADD: CABLE, JUNCTION BOX, ASTRO CONSOLETTE	$24	$24	20%	$1
118	-	124	1	DDN6333	CABLE, JUNCTION BOX, ASTRO	$26	$26	20%	$2

	EXTENDED LIST PRICE	DISCOUNTED EXTENDED PRICE
TOTAL EQUIPMENT LIST AS OF 6/1/2010	**$1,925,837**	**$1,598,110**
TOTAL PROPOSED 3/24/2010 AND VALID THROUGH 6/30/2010	**$1,909,613**	**$1,585,130**

Table 2 – Services Breakdown

SERVICE CATEGORY	DISCOUNTED PRICE
Project Management	$176,000
Project Engineering and Documentation	$130,000
Cutover and Acceptance Testing	$73,000
Installation, Integration, Optimization	$488,993
System configuration programming and Staging	$122,000
Professional services for permits and associated documentation	$22,000
TOTAL SERVICES	**$1,011,993**
All Services are detailed in Sections 1 and 2.	

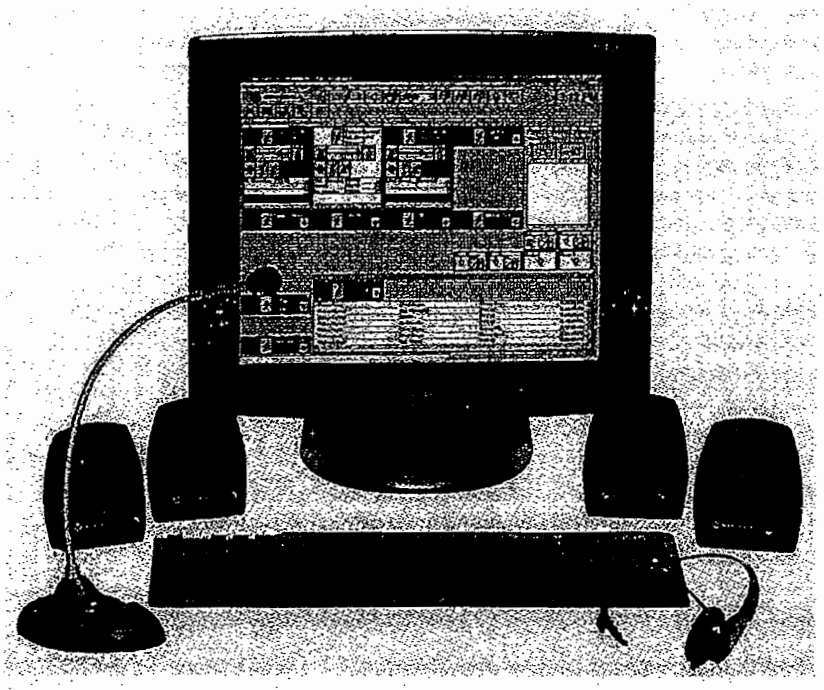
Table 3 – Maintenance Pricing

MAINTENANCE FOR IP MASTER SITE AND 16 CONSOLES				
RECOMMENDED SERVICES				
IP Master Site plus 16 consoles	**Year 2**	**Year 3**	**Year 4**	**Total Yr 2 - 4**
Dispatch Service	$5,223	$5,484	$5,758	**$16,465**
Monitoring and Security Services (note 1)				
Network Monitoring Component	$12,369	$12,988	$13,637	**$38,994**
Astro 25 Security Monitoring Component	$12,777	$13,416	$14,087	**$40,279**
Pre-tested Software subscription	$14,523	$15,249	$16,012	**$45,784**
Technical Support	$36,712	$38,548	$40,475	**$115,736**
IDO				
Infrastructure Repair with Adv Replace Service	$42,499	$44,624	$46,855	**$133,977**
Onsite Infrastructure Support Service				
Premier	$54,400	$57,120	$59,976	**$171,496**
Network Preventive Maintenance	$4,000	$4,200	$4,410	**$12,610**
Optional Software Subscription Agreement (note 2)	$97,500	$97,500	$97,500	**$292,500**
TOTAL	**$280,003**	**$289,128**	**$298,710**	**$867,841**

Note 1 Monitoring of system for IP Master Site and IP Consoles, ensures system is monitored and secured.
Note 2 Software Subscription Agreement is highly recommended, SSA Purchase if bought after year 2 requires purchase for missing years.

MCC 7500

IP Dispatch Console



The Motorola MCC 7500 IP Dispatch Console is designed to ease the complex job of a mission critical radio system dispatcher.

Easy to Use, Flexible, and Customizable User Interface

Features the Elite Graphical User Interface (GUI) that has been refined and proven through years of use in mission critical dispatch operations. This eases migration and minimizes user training requirements.

Intuitive and familiar GUI is based on Microsoft Windows® and uses easily recognized icons and aliases.

Flexible and customizable GUI provides multiple screen layouts (folders) to organize resources by agency, shift, or any criteria that meets the needs of the console user(s).

Trunked and conventional radio channels are customizable with various controls, such as patch status, frequency select, coded/clear select, and individual volume control, based on user preferences. Per-channel controls can be fully or partially shown, or hidden to save space on the screen.

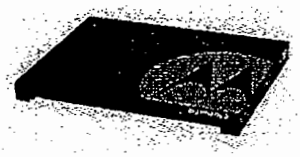
Busy dispatchers can respond to a missed call by simply clicking on an entry in the Activity Log.

The number of calls and call information displayed in the Activity Log is customizable to suit the needs of the user(s).

The status of auxiliary inputs and outputs is conveniently interpreted from the GUI with the use of familiar graphical icons, such as a door shown open or closed.

The MCC 7500 Dispatch Console is a Mission Critical IP command and control solution designed to ensure optimal quality audio and reliable communication. Console positions are connected directly to the IP network which supports communication with both trunked and conventional radios and all other dispatch activity. Integration of the MCC 7500 positions with the radio system enables full participation in end-to-end voice encryption for secure communication, priority handling of emergency calls, and Agency Partitioning. Each console is centrally configured and managed from the network manager, providing vital efficiency.

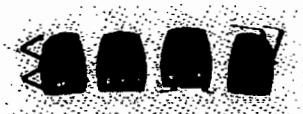
Operator Position Components



Voice Processor Module

Gooseneck Microphone

Recommended Plantronics SupraPlus headset pictured. Two headsets are accommodated by the MCC 7500 Headset Jack box (not shown), which is useful for supervisory applications.



Standalone Speakers provide ample flexibility.

Optional Footswitch not pictured

Key Interoperability Features

Works with CENTRACOM Gold Elite™: The MCC 7500 console can be combined in the same dispatch center with CENTRACOM Gold Elite, with robust feature interaction.

Agency Partitioning: Allows multiple agencies to share a system to gain interoperability and cost savings benefits, while still maintaining control of their own channels, encryption keys, console configuration, etc.

Priority for Emergencies: Transmit Priority Levels provide an orderly and consistent method for ensuring higher priority transmissions are able to take over resources from lower priority transmissions.

Optimized Patch Functionality: MCC 7500 console users can patch communication between trunked and/or conventional radios that are normally unable to communicate with each other.

Patched radio users see the ID or alias of the other patched radio(s), as opposed to that of the console. This minimizes confusion and the need for the dispatcher to intervene in the call.

Patches are automatically re-established if interrupted so the MCC 7500 user can concentrate on continuing operations.

Enhanced Secure Operation: Encryption and decryption services within each dispatch operation position enable dispatchers to fully participate in secure communications while keeping the sensitive, vital information completely encrypted between the dispatcher and the radio users.

Dispatchers can interface with agencies that have different encryption configurations without any manual intervention or delay. Up to 60 calls using up to four different algorithms and multiple secure keys can be supported simultaneously.

To help reduce dispatcher stress and potential errors when managing encrypted audio situations, indicators and alerts are provided when the console mode does not match that of a received call; or when a patch or multi-select group is being set up between a mix of clear and secure channels.

Integrates with Motorola PremierOne™ CAD: The MCC 7500 can be integrated with the Motorola PremierOne CAD common platform and intuitive user interface to simplify dispatch operations, improve data accuracy and enhance operational efficiencies.

The MCC 7500 dispatch solution consists of the following:

MCC 7500 Dispatch Console Operator Position

MCC 7500 operator positions connect directly to the radio system's IP transport network without gateways or interface boxes. Audio processing, encryption, and switching intelligence for dispatch is performed within each software-based operator position, without additional centralized electronics. Consoles function as integrated components of the total radio system, enabling full participation in system level features such as end-to-end encryption and agency partitioning.

Operator position hardware consists of a monitor, personal computer, keyboard and mouse/trackball/ touchscreen, speakers, audio accessories, and a Voice Processor Module (VPM). The VPM provides connections for analog devices to be connected to the digital console. The low-profile VPM can be rack mounted, furniture mounted, or placed on the desktop.

The MCC 7500 console system does not require separate configuration or performance management equipment. The MCC 7500 console system is configured and managed by the radio system's configuration manager, fault manager and performance reporting applications. This provides the customer with a single point for configuring and managing the entire radio system. Changes are automatically distributed throughout the system. This centralized approach saves valuable time and efforts for system administrators and technicians.

Conventional Channel Gateway (CCGW)

The CCGW enables trunked system users to incorporate analog conventional channels into their dispatch operations without a separate hardware network and channel banks. Conventional audio is transported between the dispatch consoles and the CCGWs by the same IP network that is used for the trunked audio. The CCGW provides E&M and tone remote station control and supports the 4-wire analog connections for conventional. Each CCGW in a system can support up to four analog channels.

Digital CCGW (DCCGW)

The DCCGW enables trunked system users to incorporate ASTRO 25 conventional channels into their dispatch operations without a separate hardware network and channel banks. ASTRO 25 conventional audio is transported by the same IP network used for the trunked radio. The DCCGW provides digital control of the station via a V.24 connection. Each DCCGW can support up to two ASTRO 25 conventional channels.

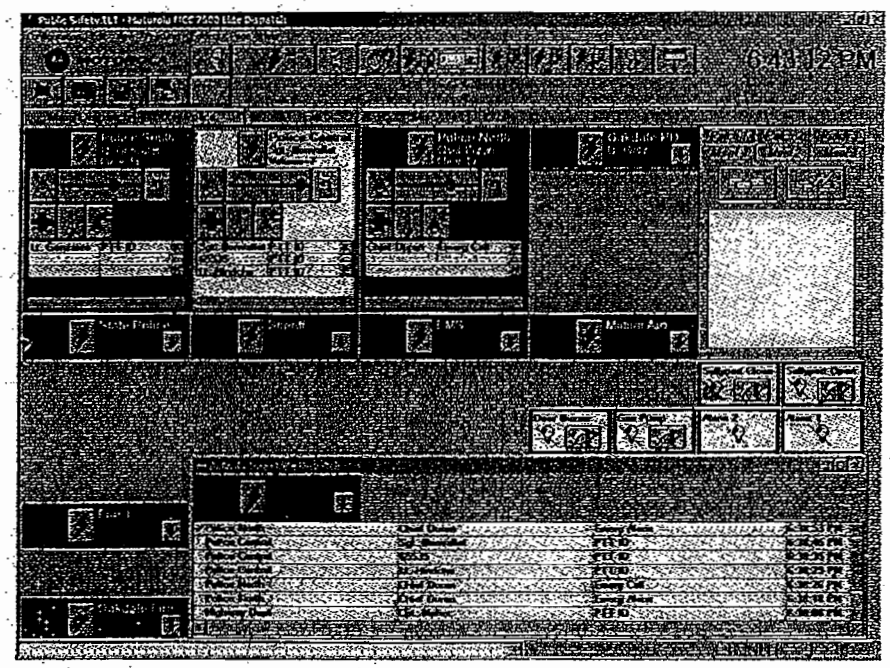
Auxiliary Input/Output Server

The Auxiliary Input/Output server enables console operators to control and monitor external devices, such as doors and lights, from the console user interface. Since the MCC 7500 Dispatch Console does not rely on centralized electronics, contact closures and input buffers required to interface to these devices are housed in Remote Terminal Units (RTUs). These RTUs can be physically located close to where they are needed, at any console site or RF site. The dispatch consoles and RTUs communicate with each other across the radio system's IP transport network.

Archiving Interface Server (AIS)

The AIS is a digital logging interface, comprised of a personal computer and a VPM. Each AIS works with an IP-based logging recorder. Audio and call control information is sent across the IP network between the AIS and recorder. Highly configurable, the MCC 7500 logging solution includes:

- Recorded audio quality equivalent to audio heard at console position
- Information associated with radio calls recorded in addition to the call audio.
- Dispatcher and radio initiated events on radio channels (such as changing the frequency, sending an alarm) are recorded.
- Recorder capacity based on the number of radio transmissions it will need to record simultaneously, not on the number of channels it may record.
- Supports Agency Partitioning, enhancing control over which resources are recorded by which agency or department.
- Security and fault management centralized at the radio system's network manager.



The MCC 7500 Dispatch Console connects directly to the IP network without interface boxes, digital voice gateways, or backroom electronics, providing your organization with important interoperability and cost savings for today's Mission Critical operations.

SPECIFICATIONS

System Compatibility	ASTRO® 25 System and PremierOne™ CAD Application	
Vocoder Algorithms supported	AMBE, IMBE, ACELP, G.728 (for Analog Conventional)	
Encryption Algorithms supported	AES (256 bit), DES-OFB, DVI-XL, ADP (Advanced Digital Privacy)	
Monitor requirements		
With Mouse or Trackball	17" minimum, 20" recommended	
Touchscreen	20" minimum	
Voice Processor Module (VPM) connections	Device	Connector type
	One desktop microphone	RJ45
	Two headset jacks connectors	DB15
	Four desktop speakers	RJ45
	One local logging recorder	RJ45
	One radio instant recall recorder	RJ45
	One external telephone set	RJ45
	One external paging encoder	RJ45
	One footswitch	RJ45
VPM mounting options	EIA 19" rack mount, console furniture mount, Desktop – supports monitor up to 80 lbs	
VPM audio inputs and outputs	600 Ohm, balanced and transformer coupled (except for microphone which is 2000 Ohm, balanced, and does not use a transformer)	
Speaker Mounting Options	Desktop, furniture mount, or wall mount (with bracket accessory)	
Dispatch Console Cable Lengths	VPM to Speaker cable	10.1 feet (3.09 meters) standard
	VPM to Headset Jack cable	6 feet (1.8 meters) standard
	Headset Jack Extension cable	6 feet (1.8 meters) standard
	VPM to Microphone cable	10 feet (3.05 meters) standard
	VPM to Footswitch cable	10 feet (3.05 meters) standard
Supported Console Site Link types	Fractional T1/E1, Single T1/E1, Multiple T1/E1s Redundant and non-redundant versions are supported IP site links	
MCC 7500 Dispatch Console Capacities	Up to 60 simultaneous audio sessions per console Up to 60 simultaneous encryption/decryption sessions per secure capable console Up to 3 Multi-Select groups per dispatch console (with up to 20 members per Multi-Select group) Up to 16 Patch groups per dispatch console (with up to 20 members per Patch group) 160 resources per operator position	
Conventional Channel Gateway (CCGW)	Rack mountable, 1 rack unit high T1R1, T2R2, T4R4, T8R8, T12R12, T14R14 channels Each CCGW provides four RJ45 connector ports for interfacing to analog conventional base stations. Each port contains the following inputs and outputs: • 600 Ohm, balanced analog audio input – To accept radio audio from the station • 600 Ohm, balanced analog audio output – To send console transmit audio to the station • Input buffer – To detect Carrier Operated Relay (COR) closure in the station • 1 Amp, 24 VDC relay output – For relay keying of the station Can be configured to support AGC, DLM, or no input conditioning	
Digital Conventional Channel Gateway (DCCGW)	Rack mountable, 1 rack unit high T1R1, T2R2, T4R4, T8R8, T12R12, T14R14 Each DCCGW provides two RJ45 connector ports for interfacing to ASTRO 25 conventional base stations V.24 to station or comparator. No Digital Interface Unit (DIU) required	

SPECIFICATIONS *(cont'd)*

Auxiliary Input/Output

Server Hardware

A simplified, user-friendly version of the MOSCAD SDM 3000 RTU is used to support most MCC 7500 dispatch console Aux I/O needs.

The output relays are capable of switching 1A @ 24VDC or 1A @ 24VAC.

Input buffers are capable of sensing a dry closure through 1000 feet or less (round trip) of 24 AWG wire.

The RTU provides single pole Form A relay outputs. (Double pole, Form B or Form C relays must be implemented using external relays which are controlled by the RTU relays.)

Auxiliary Input/Output Capacities	Number of Output Relays	Number of Input Buffers
Single SDM 3000 RTU	16	48
Single SDM 3000 RTU with 1 expansion chassis	32	96
Single SDM 3000 RTU with 2 expansion chassis	48	144

Auxiliary Input/Output Mounting

Each SDM 3000 RTU and each SDM 3000 RTU Expansion Chassis is rack mountable in a standard 19 inch rack and is one rack unit high.

SIZE AND WEIGHT	DEVICE	HEIGHT	WIDTH	DEPTH	WEIGHT
	VPM	1.75 inches 44.5 millimeters	16.9 inches 430 millimeters	12.3 inches 312 millimeters	3.6 lbs 1.6 kg
	Speaker	4.9 inches 124 millimeters	4 inches 102 millimeters	*Without bracket:* 3.5 inches 89 millimeters *With bracket:* 5.8 inches 146 millimeters	0.7 lbs 0.3 kg
	Headset Jack	1.6 inches 41 millimeters	5 inches 127 millimeters	6 inches 152 millimeters	1.2 lbs 0.5 kg
	Microphone	*Gooseneck at 90°:* 4.5 inches 114 millimeters *Gooseneck at 180°:* 21.8 inches 552 millimeters	4.8 inches 121 millimeters	6.6 inches 168 millimeters	2.4 lbs 1.1 kg

POWER CONSUMPTION AND THERMAL

Device	Power Input	Thermal Output
VPM	0.4 Amps at 120VAC 0.2 Amps at 240VAC	171 BTUs/hour
Speaker	Add 0.05 Amps per speaker to VPM power Input at 120VAC (0.025 Amps at 240VAC)	Add 15 BTUs/hour per speaker to VPM thermal output
Headset Jack	negligible	negligible
Microphone	negligible	negligible

CERTIFICATIONS

	The various hardware elements of the Motorola MCC 7500 dispatch console product line are certified to meet the requirements for UL, CSA and CE.
Safety	CSA 60950-1-03 / UL 60950-1 EN60950-1 2001
EMC Emissions & Immunity	FCC part 15 Class A ICES-003 EN55022 1998 + A1: 2001 + A2:2003 (CISPR-22 Class A) EN55024 + A1:2001 + A2:2003 EN61000-3-2 2000 EN61000-3-3 1995 + A1:2001

MOTOROLA

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