SECTION 2

00318 EXHIBIT A-2 BIDDER PROFILE

EXHIBITA-2 – BIDDER'S PROFILE

Competitive Solicitation No.:	00318
Bidder:	Motorola Solutions, Inc.

BIDDER INFORMATION	
Legal name and address of Bidder: Note: This must match information from Business License	Motorola Solutions, Inc. Business Name 500 W Monroe Street, Ste 4400, Chicago, IL 60661-3781 Address City, State, Zip Code
Washington State Department of Revenue Registration Number: Note: This is the Unified Business Identifier (UBI)	600107184
Federal Tax ID No. (TIN): Note: Do not provide a Social Security number in whole or in part.	36-1115800
Is your firm certified as a minority or woman owned business with the Washington State Office of Minority & Women's Business Enterprises (OMWBE)?	☑ NO If yes, provide MWBE certification no.
Is your firm a self-certified Washington State small business? Note: See definitions of 'microbusiness,' 'minibusiness,' and 'small business," set forth in RCW 39.26.010.	☑ NO If yes, what is your business size? Small ☐ Mini ☐ Micro ☐

Is your firm certified as Veteran Owned with the Washington State Department of Veteran Affairs?	☑ NO If yes, provide WSDVA certification no.
CONTRACT MANAGEMENT POINTS OF CONTACT (MASTER AGREEMENT ONLY)	
Authorized Representative Name: Larsen Grabenkort Email: larsen@motorolasolutions.com Phone: (971) 227-2856	Contract Administrator Name: Larsen Grabenkort Email: larsen@motorolasolutions.com Phone: (971) 227-2856
Sales Reporting Representative Name: Kathy Klein-Wassink Email: kathy.klein-wassink@motorolasolutions.com Phone: (858) 368-3245	Sales Reporting Alternate Name: Larsen Grabenkort Email : larsen@motorolasolutions.com Phone: (971) 227-2856
Management Fee Representative Name: Nick Feldmaier Email: nick.feldmaier@motorolasolutions.com Phone: (312) 489-7814	Management Fee Contact Alternate Name: Larsen Grabenkort Email: larsen@motorolasolutions.com Phone: (971) 227-2856

PURCHASE CARDS (I.E., CREDIT CARDS)

Please indicate which types of purchasing (credit) cards are accepted (note: any card fees must be included in the unit price of the bid):

☑ Visa ☑ Master Card ☑ American Express ☑ Discover ☐ Other

Return this Bidder's Profile to Procurement Coordinator 00318 at:
DESContractsTeamCypress@des.wa.gov

SECTION 1

00318 EXHIBIT A-1 BIDDER CERTIFICATION

EXHIBIT A-1 – BIDDER CERTIFICATION

Competitive Solicitation:	No. 00318 Cooperative Purchasing Agreement Solicitation for Public Safety Communications Products, Services and Solutions		
Bidder:	Motorola Solutions. Inc. Type/print full legal name of Bidder		
Bidder's Address:	500 W Monroe Street, Ste 4400, Chicago, IL 60661-3781 Type/print Bidder's Address		
Bidder Organization Type: Check appropriate box	Corporation:	✓ Domestic	☐ Foreign
	Limited Liability Company (LLC):	☐ Domestic	☐ Foreign
	Partnership:	☐ Domestic	☐ Foreign
	Sole Proprietorship:	☐	
State of Formation:	Delaware Type/print the state where the corporation, LLC, or partnership is formed – e.g., 'Washington' if domestic and the name of the state if 'Foreign' (i.e., not Washington)		

Bidder, through the duly authorized undersigned, makes this certification as a required element of submitting a responsive bid.Bidder certifies, to the best of its knowledge and belief, that the following are true, complete, correct, and made in good faith:

1. UNDERSTANDING.Bidder certifies that Bidder has read, thoroughly examined, and fully understands all of the provisions in the Competitive Solicitation (including all exhibits) and the terms and conditions of the Cooperative Purchasing Master Agreement and any amendments or clarifications to the Competitive Solicitation, and agrees to abide by the same.

2. ACCURACY.Bidder certifies that Bidder has carefully prepared and reviewed its bid and fully supports the accuracy of the same.Bidder further understands and acknowledges that Enterprise Services shall not be responsible for any errors or omission on the part of Bidder in preparing its bid.Bidder certifies that the facts declared here are true and accurate.Bidder further understands

and acknowledges that the continuing compliance with these statements and all requirements of the Competitive Solicitation are conditions precedent to the award or continuation of the resulting Cooperative Purchasing Master Agreement.

3. NO COLLUSION OR ANTI-COMPETITIVE PRACTICES.Bidder certifies that Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this Competitive Solicitation.Bidder certifies that Bidder's bid prices have been arrived at independently, without engaging in collusion, bid rigging, or any other illegal activity, and without for the purpose of restricting competition any consultation, communication, or agreement with any other bidder or competitor relating to (a) those prices, (b) the intention to submit a bid, or (c) the methods or factors used to calculate the prices offered.Bidder certifies that Bidder has not been and will not knowingly disclose its bid prices, directly or indirectly, to any other bidder or competitor before award of a Cooperative Purchasing Master Agreement, unless otherwise required by law.Bidder certifies that Bidder has made no attempt and shall not make any attempt to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.Bidder, however, freely may join with other persons or organizations for the purpose of presenting a bid.

4. FIRM OFFER.Bidder certifies that its bid, attached hereto, is a firm offer which cannot be withdrawn for a period of one hundred twenty (120) days from and after the bid due date specified in the Competitive Solicitation.Enterprise Services may accept such bid, with or without further negotiation, at any time within such period.In the event of a protest, Bidder's bid shall remain valid for such period or until the protest and any related court action is resolved, whichever is later.

5. CONFLICT OF INTEREST.Bidder certifies that, in preparing this bid, Bidder has not been assisted by any current or former employee of the States of Washington, Oregon, California, Alaska, Montana, Tennessee, Colorado, or Nevada whose duties relate (or did relate) to this Competitive Solicitation, the prospective Cooperative Purchasing Master Agreement, or the existing cooperative purchasing agreement for public safety communications equipment, and who was assisting in other than his or her official, public capacity.

6. NO REIMBURSEMENT.Bidder certifies that Bidder understands that the State of Washington will not reimburse Bidder for any costs incurred in the preparation of this bid.All bids become the property of the State of Washington, and Bidder claims no proprietary right to the ideas, writings, items, or samples unless so stated in the bid.

7. PERFORMANCE.Bidder certifies that Bidder understands that its submittal of a bid and execution of this Bidder's Certification certifies bidder's willingness to comply with the Cooperative Purchasing Master Agreement, if awarded such.By submitting this bid, Bidder hereby offers to furnish the goods and/or services solicited pursuant to this Competitive Solicitation in compliance with all terms, conditions, and performance requirements contained in this Competitive Solicitation and the resulting Cooperative Purchasing Master Agreement or, if applicable, as detailed on a Master Agreement Issues List, if permitted, in this Competitive Solicitation.

8. Insurance.Bidder certifies as follows (must check one):

BIDDER HAS REQUIRED INSURANCE.Bidder has attached a current, valid Certificate of Insurance with each and all of the required insurance coverages as specified in the Cooperative Purchasing Master Agreement (note:Bidder must attach the Insurance Certificate).

OR

☑ Bidder Will Obtain Required Insurance.Bidder does not have a current, valid Certificate of Insurance with each and all of the required insurance coverages as specified in the Cooperative Purchasing Master Agreement but, if designated as the Apparent Successful Bidder, Bidder will provide such a Certificate of Insurance, without exception of any kind, to Enterprise Services within seventy-two (72) hours of such designation or notification by Enterprise Services or be deemed a nonresponsive bid.

OR

☐ *BIDDER DOES NOT HAVE REQUIRED INSURANCE*.As detailed on the attached explanation (Bidder to provide), Bidder does not have a current, valid Certificate of Insurance with each and all of the required insurance coverages as specified in the Cooperative Purchasing Master Agreement and, if designated as the Apparent Successful Bidder would not be able to provide such a Certificate of Insurance to Enterprise Services within seventy-two (72) hours of such designation.

9. DEBARMENT.Bidder certifies as follows (must check one):

☑ No Debarment.Bidder and/or its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from contracting with any federal, state, or local governmental entity.

OR

☐ *DEBARRED*.As detailed on the attached explanation (Bidder to provide), Bidder and/or its principals presently are debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from contracting with a federal, state, or local governmental entity.

10. CRIMINAL OFFENSE.Bidder certifies as follows (must check one):

☑ No Criminal Offense.Bidder has not, within the three (3) year period preceding the date of this Competitive Solicitation, been convicted or had a civil judgment rendered against Bidder for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a governmental contract; violation of any federal or state antitrust statute; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.Bidder further certifies that it is not presently indicted or otherwise criminally or civilly charged by a governmental entity with commission of any of the offenses enumerated in this paragraph.

OR

☐ *CRIMINAL OFFENSE*.As detailed on the attached explanation (Bidder to provide), within the three (3) year period preceding the date of this Competitive Solicitation, Bidder has been convicted or had a civil judgment rendered against Bidder for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a governmental contract; violation of any federal or state antitrust statute; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

11. WASHINGTON WAGE THEFT PREVENTION.Bidder certifies as follows (must check one):

☑ No Wage Violations.Bidder has NOT been determined by a final and binding citation and notice of assessment issued by the Washington Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of RCW chapters 49.46, 49.48, or 49.52 within three (3) years

prior to the date of the above-referenced Competitive Solicitation date.

OR

☐ *VIOLATIONS OF WAGE LAWS*.Bidder has been determined by a final and binding citation and notice of assessment issued by the Washington Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, a provision of RCW chapters 49.46, 49.48, or 49.52 within three (3) years prior to the date of the above-referenced Competitive Solicitation date.

12. PAY EQUALITY.Bidder certifies as follows (must check one):

☑ Pay Equality for Similarly Employed Workers. Bidder's similarly employed individuals are compensated as equals. For purposes of this provision, employees are similarly employed if the individuals work for the same employer, the performance of the job requires comparable skill, effort, and responsibility, and the jobs are performed under similar working conditions.Job titles alone are not determinative of whether employees are similarly employed.Bidder may allow differentials in compensation for its workers based in good faith on any of the following:a seniority system; a merit system; a system that measures earnings by quantity or quality of production; a bona fide job-related factor or factors; or a bona fide regional difference in compensation levels.A bona fide job-related factor or factors may include, but not be limited to, education, training, or experience that is: consistent with business necessity; not based on or derived from a gender-based differential; and accounts for the entire differential.A bona fide regional difference in compensation level must be consistent with business necessity; not based on or derived from a gender-based differential; and account for the entire differential.

OR

☐ *NO PAY EQUALITY FOR SIMILARLY EMPLOYED WORKERS*.Bidder's similarly employed individuals are NOT compensated as equals.

13. WORKERS' RIGHTS (EXECUTIVE ORDER 18-03).Bidder certifies as follows (must check one):

☑ No Mandatory Individual Arbitration Clauses and Class or Collective Action Waivers for *EMPLOYEES*.Bidder does NOT require its employees, as a condition of employment, to sign or agree to mandatory individual arbitration clauses or class or collective action waivers.

OR

☐ *MANDATORY INDIVIDUAL ARBITRATION CLAUSES AND CLASS OR COLLECTIVE ACTION WAIVERS FOR EMPLOYEES*.Bidder requires its employees, as a condition of employment, to sign or agree to mandatory individual arbitration clauses or class or collective action waivers.

14. TERMINATION FOR DEFAULT OR CAUSE.Bidder certifies as follows (must check one):

☑ No Termination for Default or Cause.Bidder has not, within the three (3) year period preceding the date of this Competitive Solicitation, had one (1) or more federal, state, or local governmental contracts terminated for cause or default.

OR

☐ *TERMINATION FOR DEFAULT OR CAUSE*.As detailed on the attached explanation (Bidder to provide), within the three (3) year period preceding the date of this Competitive Solicitation, Bidder has had one (1) or more federal, state, or local governmental contracts terminated for cause or default.

15. TAXES.Bidder certifies as follows (must check one):

☑ Taxes Paid.Except as validly contested, Bidder is not delinquent and has paid or has arranged for payment of all taxes due to the State of Washington and has filed all required returns and reports as applicable.

OR

☐ *DELINQUENT TAXES*.As detailed on the attached explanation (Bidder to provide), Bidder has not paid or arranged for payment of all taxes due to the State of Washington and/or has not timely filed all required returns and reports as applicable.

16. LAWFUL REGISTRATION.Bidder, if conducting business other than as a sole proprietorship (e.g., Bidder is a corporation, limited liability company, partnership) certifies as follows (must check one):

☑ Current Lawful Registration.Bidder is in good standing in the State of Washington and the jurisdiction where Bidder is organized, including having timely filed all required annual reports.

OR

☐ *DELINQUENT REGISTRATION*.As detailed on the attached explanation (Bidder to provide), Bidder currently is not in good standing in the State of Washington and/or the jurisdiction where Bidder is organized.

17. SUBCONTRACTORS.Bidder certifies as follows (must check one):

☐ *NO SUBCONTRACTORS*.If awarded a Cooperative Purchasing Master Agreement, Bidder will not utilize subcontractors to provide the goods and/or services subject to this Competitive Solicitation.

OR

☑ Subcontractors. As detailed on the attached explanation (Bidder to provide), If awarded a Cooperative Purchasing Master Agreement, Bidder will utilize subcontractors to provide the goods and/or services subject to this Competitive Solicitation.In such event, Bidder certifies that, as to the State, Bidder shall retain responsibility for its subcontractors, including, without limitation, liability for any subcontractor's acts or omissions.Note:Bidder must provide the precise legal name (including state of organization), business address, and federal tax identification number (TIN) for each subcontractor (do NOT provide any social security numbers in whole or in part).

Bidder further certifies that it shall provide immediate written notice to Enterprise Services if, at any time prior to a contract award, Bidder learns that any of its certifications set forth herein were erroneous when submitted or has become erroneous by reason of changed circumstances.

I hereby certify, under penalty of perjury under the laws of the State of Washington, that the certifications herein are true and correct and that I am duly authorized to make these certifications on behalf of the Bidder listed herein.

BIDDER NAME:MOTOROLA SOLUTIONS, INC.
Print Name of Bidder – Print full legal entity name of the firm submitting the Bid

By:

Signature of Bidder's authorized person

Micah Applewhite
Print Name of person making certifications for Bidder

Place: San Diego, California
Print city and state where signed

Title: Vice President MSSSI and Director of Sales
Title of person signing certificate

Date: February 8, 2021

Return this Bidder's Certification to Procurement Coordinator 00318 at:
DESContractsTeamCypress@des.wa.gov

1.1 ADDENDUM TO EXHIBIT A1 - BIDDER CERTIFICATION

1.1.1 #17 - Subcontractors

As detailed on the attached explanation (Bidder to provide), If awarded a Cooperative Purchasing Master Agreement, Bidder will utilize subcontractors to provide the goods and/or services subject to this Competitive Solicitation.In such event, Bidder certifies that, as to the State, Bidder shall retain responsibility for its subcontractors, including, without limitation, liability for any subcontractor's acts or omissions. Note:Bidder must provide the precise legal name (including state of organization), business address, and federal tax identification number (TIN) for each subcontractor (do NOT provide any social security numbers in whole or in part).

MOTOROLA SOLUTIONS RESPONSE

Motorola is providing the information for subcontractors for the State of Washington. Motorola will work with additional states to provide this information as required, as these individual agreements are finalized.

Legal Name: Day Management Corp.

- DBA: Name: Day Wireless Systems
- State of Incorporation: Oregon
- Tax ID: 93-0681623
- Street Address: 4700 SE International Way, Milwaukie, OR 97222
- Post Office Address: PO Box 22169, Milwaukie, OR 97269-2169

Legal Name: Idaho Communications, LLC

- DBA Name: Day Wireless Systems
- State of Incorporation: Oregon
- Tax ID: 82-2678508
- Street Address: 4700 SE International Way, Milwaukie, OR 97222
- Post Office Address: PO Box 22289, Milwaukie, OR 97269-2289

1.1.2 #6.3 - Polychlorinated Biphenyls (PCBs) Notice

6.3 Polychlorinated Biphenyls (PCBs) Notice. Polychlorinated biphenyls, commonly known as PCBs, have adverse effects on human health and the environment. Accordingly, the State of Washington, through its procurements of goods, is trying to minimize the purchase of PCBS and to incentivize its contractual vendors to sell and package without PCBs. Bidders certifying all products and packaging contain no PCBS will not be evaluated but may receive additional consideration when doing business with the State of Washington. Other states having the same or similar requirement and will be further defined in Participating Addendum.

MOTOROLA SOLUTIONS RESPONSE

Pursuant to Section 6.3 Polychlorinated Biphenyls (PCBs) Notice in the Competitive Solicitation document, Motorola certifies it does not sell and package its products with PCBs.

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Exhibit B-1 Mandatory Technical Requirements

BIDDER INSTRUCTIONS: *Bidders may choose to submit a response to any categories/sub-categories. Each category/sub-category will be evaluated and awarded separately. Each category/sub-category includes specifications for a sample product. Bidders must indicate in the space provided whether their sample product complies with the requirement. Bidder may provide clarification or comment in the space provided. Exhibit B-1 must not be altered. Bidders not submitting a bid in a category/sub-category must indicate "NO BID" for the relevant category/sub-category. Exhibit B-1 must be completed and submitted with Bidder's response.*

Bidders may offer additional products/services in the space below provided for each category/sub-category. Bidder will be required to submit a complete list of products/services in each category/sub-category for approval within fifteen (15) days of award.

Only Radio Manufacturers who receive an award in 1.7 Sub-Category: Base Station/Repeater and Category 3: Dispatch Console may have the opportunity to offer a turnkey (complete) radio solution and advance to the next evaluation phase. A radio solution may include an upgrade to existing system or a brand new system.

*"**P25**" or "**Project 25**" is defined as the suite of standards for digital radio communications for public safety as defined by the Department of Homeland Security.*

Exhibit B-1 Mandatory Technical Requirements

1. CATEGORY: RADIO

1.1 RADIO SUB-CATEGORY: SINGLE -BAND PORTABLE RADIO (P25)

Sub-Category Description: *Phase I 12.5 Digital Trunking capable, backwards compatible. Software – Defined Radio Architecture.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Single-BandPortableP25*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTSALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 900 Model 2 VHF **Product Number**: H92KDF9PW6AN

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link, https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz for interoperability, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 900	Single-band portable radio also available in the following band configurations: UHF R1, UHF R2, 7/800 and with full keypad (Model 3)
APX 1000	Single-band portable radio available in the following band configurations: VHF, UHF R1, UHF R2, 7/800 and with either no keypad (Model 1.5) limited keypad (Model 2) or full keypad (Model 3)
APX 3000	Covert single-band portable radio available in the following band configurations: VHF, UHF R1, UHF R2, 7/800
APX 4000	Single-band portable radio available in the following band configurations: VHF, UHF R1, UHF R2, 7/800, 900, and with either limited keypad (Model 2) or full keypad (Model 3)
APX 6000	Single-band portable radio available in the following band configurations: VHF, UHF R1, UHF R2, 7/800, with either no keypad (Model 1.5), limited keypad (Model 2.5) or full keypad (Model 3.5), and also in a ruggedized form factor (XE)
APX 8000	Multi-band (VHF, UHF and 7/800) portable radio available with no keypad (Model 1.5), limited keypad (Model 2.5) or full keypad (Model 3.5), and with a ruggedized form factor option (XE)
APX NEXT	Next-generation portable radio available with multiple Land Mobile Radio (LMR) bands available (VHF, UHF R1, UHF R2, 7/800), as well as touch display, LTE, and WiFi, and in a ruggedized form factor (XE)

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.2 RADIO SUB-CATEGORY: SINGLE -BAND MOBILE RADIO (P25)

Sub-Category Description: *Phase I Digital Trunking capable, backwards compatible. Software – Defined Radio Architecture.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Single-BandMobileP25*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 1500 VHF **Product Number**: M36KSS9PW1BN

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 1500	Single-band mobile radio also available in the following bands: UHF R1, UHF R2, 7/800
APX 4500	Single-band mobile radio available in the following bands: VHF, UHF R1, UHF R2, 7/800
APX 6500	Single-band mobile radio available in the following bands: VHF, UHF R1, UHF R2, 7/800
APX 8500	Multi-band (VHF, UHF R1, UHF R2, 7/800) mobile radio available in mid power and high power variants

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5..*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.3 RADIO SUB-CATEGORY: SINGLE-BAND DESKTOP RADIO (P25)

Sub-Category Description: *Phase I Digital Trunking capable, backwards compatible. Software – Defined Radio Architecture.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Single-BandDesktop-ConsoleRadioP25*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 1500 VHF **Product Number**: M36KSS9PW1BN

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 1500	Single-band desktop radio also available in other bands (UHF R1, UHF R2 and 7/800)
APX 4500	Single-band desktop radio available in multiple bands (VHF, UHF R1, UHF R2, 7/800)
APX 6500	Single-band desktop radio available in multiple bands (VHF, UHF R1, UHF R2, 7/800)
APX 8500	Multi-band (VHF, UHF R1, UHF R2, 7/800) desktop radio available in mid power and high power variants
APX CONSOLETTE	Desktop radio available with one or more bands enabled (VHF, UHF R1, UHF R2, 7/800)

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.4 Radio Sub-Category: Multi-Band Portable Radio (P25)

Sub-Category Description: *P25 Phase I FDMA 12.5 kHz and 6.25 kHz P25 Phase II TDMA capable, backwards compatible. Software – Defined Radio Architecture*.

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Multi-BandPortableP25"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 8000 Model 1.5 **Product Number**: H91TGD9PW5 N

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 8000	Multi-band (VHF, UHF R1, UHF R2 and 7/800) portable radio also available with limited keypad (Model 2.5) or full keypad (Model 3.5), and in a ruggedized form factor (XE).
APX NEXT	Next-generation portable radio available with multiple Land Mobile Radio (LMR) bands available (VHF, UHF R1, UHF R2, 7/800), as well as touch display, LTE, and WiFi, and in a ruggedized form factor (XE)

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.5 Radio Sub-Category: Multi-Band Mobile Radio (P25)

Sub-Category Description: *P P25 Phase I FDMA 12.5 kHz and 6.25 kHz P25 Phase II TDMA capable, backwards compatible. Software – Defined Radio Architecture.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Multi-BandMobileP25*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 8500 All Band MP Mobile **Product Number**: M37TSS9PW1 N

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 8500	Multi-band mobile radio also available in high power variant

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.6 RADIO SUB-CATEGORY: MULTI-BAND DESKTOP RADIO (P25)

Sub-Category Description: *P25 Phase I FDMA and P25 Phase II TDMA capable backwards compatible. Software – Defined Radio Architecture*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-Multi-BandDesktop-ConsoleRadio"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 8500 All Band MP Mobile **Product Number**: M37TSS9PW1 N

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and, and*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 136 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX CONSOLETTE	Desktop radio available with one or more bands enabled (VHF, UHF R1, UHF R2, 7/800)

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

1.7 RADIO SUB-CATEGORY: BASE STATION/REPEATER (P25)

Sub-Category Description: *P25 Phase I FDMA backwards compatible. Software – Defined Radio Architecture.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-BaseStation-Repeater*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: ASTRO 25 System GTR 8000 Trunked Base Station/Repeater **Product Number**: T7039

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA standards for Public Safety Radio systems, and*	Y	
2.	*Current P25 CAP compliance found at the following link,* https://www.dhs.gov/science-and-technology/approved-grant-eligible-equipment, *and,*	Y	
3.	*Capable of operating on P25 Phase I trunked and/ or conventional (analog/ P25) systems, and*	Y	
4.	*Capable of operating on Public Safety spectrum at 150 to 174 MHz, and*	Y	
5.	*Capable of operating using Encryption Standard (AES-256).*	Y	
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
GTR 8000 EXPANDABLE SITE SUBSYSTEM	A modular, integrated repeater system capable of housing up to six (6) base radios per rack and expandable up to three racks
G-SERIES COMPACT SITE	A complete self-contained radio site housed in an outdoor, environmentally controlled cabinet and capable of supporting up to three (3) base radios

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

Exhibit B-1 Mandatory Technical Requirements

2. Radio Category: Conventional Analog Portable (Non-P25)

2.1 Radio Sub-Category: Conventional Analog Portable (Non-P25)

Sub-Category Description: *Conventional Analog Portable radio. Minimum channel capacity of 4 transmit and 4 receive. Software – Defined Radio Architecture.*

IMPORTANT NOTE: *Products in this sub-category may not qualify for federal funding.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled "*RadioSubCategory-ConventionalAnalogPortable"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 1000 Model 1.5 **Product Number**: H84KDD9PW5 N

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder's Clarifications and Comments
1.	*Current TIA/EIA-603-C standards for Public Safety Radio systems*	Y	
2.	*Code of Federal Regulations Title 47 Telecommunications Chapter I Federal Communications Commission Rules and regulations,*	Y	
3.	*Part 15 Radio Frequency Devices (47CFR15) Part 90, Private Land Mobile Radio Service (47CFR90).*	Y	
4..	Output Power 1-5 Watts (adjustable minimum range)	Y	
5.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	
6.	**Warranty** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	

7.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
APX 1000	Single-band portable radio also available in the following bands: UHF R1, UHF R2, 7/800 and also with limited keypad (Model 2) or full keypad (Model 3)
APX 900	Single-band portable radio available in the following bands: VHF, UHF R1, UHF R2, 7/800 and with either limited keypad (Model 2) or full keypad (Model 3)
APX 3000	Covert single-band portable radio available in the following bands: VHF, UHF R1, UHF R2, 7/800
APX 4000	Single-band portable radio available in the following bands: VHF, UHF R1, UHF R2, 7/800, 900, and with either limited keypad (Model 2) or full keypad (Model 3)
APX 6000	Single-band portable radio available in the following bands: VHF, UHF R1, UHF R2, 7/800, with either no keypad (Model 1.5), limited keypad (Model 2.5) or full keypad (Model 3.5), and also in a ruggedized form factor (XE)
APX 8000	Multi-band (VHF, UHF and 7/800) portable radio available with no keypad (Model 1.5), limited keypad (Model 2.5) or full keypad (Model 3.5), and also in a ruggedized form factor (XE)
APX NEXT	Next-generation portable radio available with multiple Land Mobile Radio (LMR) bands available (VHF, UHF R1, UHF R2, 7/800), as well as touch display, LTE, and WiFi, and in a ruggedized form factor

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5..*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

2.2 Radio Sub-Category: Conventional Analog Mobile (Non-P25)

Sub-Category Description: *Conventional Analog Mobile Radio: Minimum channel capacity of 32 transmit and 32 receive. Software – Defined Radio Architecture.*

IMPORTANT NOTE: *Products in this sub-category may not qualify for federal funding.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled "*RadioSubCategory-ConventionalAnalogMobile"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.
PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 1500 **Product Number**: M36KSS9PW1BN

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder's Clarifications and Comments
1.	*Current TIA/EIA-603-C standards for Public Safety Radio systems*	Y	
2.	*Code of Federal Regulations Title 47 Telecommunications Chapter I Federal Communications Commission Rules and regulations,*	Y	
3.	*Part 15 Radio Frequency Devices (47CFR15) Part 90, Private Land Mobile Radio Service (47CFR90).*	Y	
4.	Output Power 2-30 Watts (adjustable minimum range)	Y	
5.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	
5.	**Warranty** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	

8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
APX 1500	Single-band mobile radio also available in other bands (UHF R1, UHF R2 and 7/800)
APX 4500	Single-band mobile radio available in multiple bands (VHF, UHF R1, UHF R2, 7/800)
APX 6500	Single-band mobile radio available in multiple bands (VHF, UHF R1, UHF R2, 7/800)
APX 8500	Multi-band (VHF, UHF R1, UHF R2, 7/800) mobile radio available in mid power and high power variants

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

2.3 RADIO SUB-CATEGORY: CONVENTIONAL ANALOG DESKTOP (NON-P25)

Sub-Category Description: *Conventional Analog Desktop Radio: Minimum channel capacity of 32 transmit and 32 receive. Software – Defined Radio Architecture.*

***IMPORTANT NOTE:** Products in this sub-category may not qualify for federal funding.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled [*"RadioSubCategory-ConventionalAnalogDesktop"*]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: APX 1500 **Product Number**: M36KSS9PW1BN

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	*Current TIA/EIA-603-C standards for Public Safety Radio systems*	Y	
2.	*Code of Federal Regulations Title 47 Telecommunications Chapter I Federal Communications Commission Rules and regulations,*	Y	
3.	*Part 15 Radio Frequency Devices (47CFR15) Part 90, Private Land Mobile Radio Service (47CFR90).*	Y	
4.	Output Power 2-30 Watts (adjustable minimum range)	Y	
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	

7.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
APX 1500	Single-band desktop radio also available in other bands (UHF R1, UHF R2 and 7/800)
APX 4500	Single-band desktop radio available in multiple bands (VHF, UHF R1, UHF R2 and 7/800)
APX 6500	Single-band desktop radio available in multiple bands (VHF, UHF R1, UHF R2 and 7/800)
APX 8500	Multi-band (VHF, UHF R1, UHF R2, 7/800) desktop radio available in mid power and high power variants
APX Consolette	Desktop radio available with one or more bands enabled (VHF, UHF R1, UHF R2, 7/800)

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

2.4 Radio Sub-Category: Conventional Analog Base Station/Repeater (Non-P25)

Sub-Category Description: *Conventional Analog Base Station/Repeater: Minimum channel capacity of 4 transmit and 4 receive. Software – Defined Radio Architecture.*

IMPORTANT NOTE: *Products in this sub-category may not qualify for federal funding.*

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"RadioSubCategory-ConventionalAnalogBaseStation-Repeater")*. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

PROPOSED PUBLIC SAFETY RADIO EQUIPMENT MUST MEET THE FOLLOWING MINIMUM REQUIREMENTS. ALL PROPOSED EQUIPMENT OF THE SUB-CATEGORY REQUIREMENTS BELOW ARE PASS/FAIL. PROPOSED EQUIPMENT NOT MEETING THE SUB-CATEGORY REQUIREMENTS WILL NOT BE FURTHER EVALUATED.

Manufacturer: Motorola Solutions, Inc..**Product Model Name**: ASTRO 25 System GTR 8000 Trunked Base Station/Repeater **Product Number**: T7039

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	*Current TIA/EIA-603-C standards for Public Safety Radio systems*	Y	
2.	*Code of Federal Regulations Title 47 Telecommunications Chapter I Federal Communications Commission Rules and regulations,*	Y	
3.	*Part 15 Radio Frequency Devices (47CFR15) Part 90, Private Land Mobile Radio Service (47CFR90).*	Y	
4.	Output Power 2-30 Watts (adjustable minimum range)	Y	
5.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	

6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
7.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION
GTR 8000 Expandable Site Subsystem	A modular, integrated repeater system capable of housing up to six (6) base radios per rack and expandable up to three racks
G-Series Compact Site	A complete self-contained radio site housed in an outdoor, environmentally controlled cabinet and capable of supporting up to three (3) base radios

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

3. CATEGORY: VEHICULAR REPEATER SYSTEMS (VRS) P25

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Category Description: *Radio / Subcategory Description: Vehicular Repeater Systems (VRS) P25 Trunking capable, backwards compatible, (to analog conventional) and encryption capable. Personnel, while out of their vehicles, will use their existing portable radios to operate the VRS in the vehicle and provide communications with dispatch. The portable radio will activate the VRS which will function as a repeater and control the existing mobile radio in the vehicle. The mobile will provide communications with dispatch through existing base stations.*

The following specifications are the minimum target product requirements for this category of public safety communication equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"VRS"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

For bidding purposes, Bidders are to offer a model for the VHF (136-174MHz) band.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**TRANSMITTER**		
1.1.	Frequency Range (MHz)		
1.1.1.	Bidder's model identified above must be capable of being ordered in any of the following bands: VHF (136-174MHz) UHF (380-470MHz) Range1 UHF (450-520MHz) Range2 (769-775MHz) (799-805MHz) (806-824MHZ) 851-869MHZ)		
1.2.	Rated RF Output Power minimum: adjustable range		
1.2.1.	VHF UHF 700/800 250 mW-2 Watts		

1.3.	Carrier Frequency Stability. (30° to +60° C) - ±1.5 PPM-		
1.4.	Modulation Limiting:		
1.4.1.	±2.5 kHz (12.5 kHz)		
1.4.2.	±4 kHz (NPSPAC)		
1.5.	FM Hum and Noise Ratio: 40 dB		
1.6.	Conducted Spurious Emissions: -50 dBc		
1.7.	Channel Spacing KHz: 12.5		
1.8.	Time-Out-Timer, factory adjusted for one minute. The electronic transmission timer shall limit the duration of each VRS transmission, whether initiated locally or remotely. The timer shall be adjustable to timeout over the minimum range of 1 to 4 minutes. Interruption of the transmitter circuit shall cause the timer to reset within 100 milliseconds-.		
2.	**RECEIVER**		
2.1.	Frequency Range (MHz) Simplex		
2.1.1.	Bidder's model identified above must be capable of being ordered in any of the following bands: VHF (136-174 MHz) UHF(380-470 MHz) Range 1 UHF(450-520 MHz) Range 2 (769-775 MHz) (799-805MHz) (806-824MHz) (851-869MHz)		
2.2.	Reference Sensitivity: 0.35 uV		
2.3.	Carrier Frequency Stability. (30° to +60° C) - ±1.5 PPM-		
2.4.	Adjacent Channel Rejection @ 30kHz: 60dB		
2.5.	Spurious Response Rejection: 70dB (12.5KHz		
2.6.	Intermodulation Rejection: 60dB		
3.	**USER MANUAL**		
3.1.	Operator Manual		
3.1.1.	Provide a hardcopy of the manual		
3.1.2.	Provide soft copy on digital media (CD, DVD or flash drive or web download).		

3.2.	Manual Contents		
3.2.1.	Location of all switches, controls and indicators.		
3.2.2.	Step-by-step instructions to operate all equipment features.		
4.	**GENERAL REQUIREMENTS**		
4.1.	The VRS shall include all necessary cables and connectors to interface with the mobile radio of choice. The make and model of the mobile radio acquired on a separate bid and required to interface with the VRS, will be supplied within two weeks of purchase order issuance.		
4.2.	When the VRS is turned on it shall not automatically be placed in repeat mode.		
4.3.	Operational Requirements		
4.3.1.	Repeater Prioritizing Logic		
4.3.2.	Control logic in the VRS shall exist to enable multiple VRS units within range of each other to negotiate which of the VRS units will be the Master repeater unit for the group in order to prevent interference from multiple repeaters transmitting simultaneously.		
4.3.3.	When the repeat mode is activated, the VRS shall automatically rebroadcast the received signal from the mobile to the portable radios.		
4.3.4.	When the repeat mode is activated, the VRS shall automatically route the signal received from the portable to the mobile radio. The mobile radio shall then retransmit the signal to the mountain top base station.		
4.3.5.	If no other units are on the scene, the VRS will assume master status and repeat radio traffic as described above.		
4.3.6.	When additional units arrive on the scene and are activated, one VRS shall assume master status and all other VRS's shall automatically cease repeating radio traffic.		
4.3.7.	When the master VRS leaves the scene or is disabled, the remaining VRS's shall select another master by a method that results in only one VRS assigned master status.		

4.3.8.	If a unit arrives on the scene that is still in master status, then there shall be a method that results in only one of the master status VRS's assigned master status.		
4.3.9.	If the mobile radio in the master unit is keyed locally, the transmission shall be repeated to portable radios and the status of all VRS's shall be preserved.		
5.	**PHYSICAL REQUIREMENTS**		
5.1.	The VRS configured for dash mount or trunk mount.		
5.2.	Controls		
5.2.1.	Controls mounted separately or included in the mobile control head as a user installable option.		
5.2.2.	Activate repeat mode.		
5.3.	Indicators		
5.3.1.	Indicators mounted separately or included in the mobile control head as a user installable option.		
5.3.2.	A repeat-mode-activated indicator.		
6.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.		
7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

Exhibit B-1 Mandatory Technical Requirements

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

Exhibit B-1 Mandatory Technical Requirements

4. CATEGORY: DISPATCH CONSOLES

Category Description: *Dispatch Consoles, Radio Dispatch Console Systems*

The following specifications are the minimum target product requirements for this category/subcategory of public safety communication equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"DispatchConsole"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: MCC 7500E Dispatch Console **Product Number**: B1948

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SOFTWARE-BASED DISPATCH CONSOLE SYSTEM**		
1.1.	Software-Only operator position;-system/hardware does not require an external interface sub-system; console positions are connected on an IP network to communicate with other console positions and communicate with digital radios and IP gateways to analog radios.	Y	
1.2.	Runs on current generation personal or desktop computer and current generation operating system.	Y	
1.3.	Support for multiple monitors.	Y	
1.4.	Programmable Graphical User Interface (GUI).	Y	
1.5.	Support for Project-25 Digital Fixed Station Interface (DFSI) to connect digital base radios to IP network.	Y	
1.6.	16-key keypad for DTMF and other paging functions.	Y	
1.7.	Per-line call history.	Y	
1.8.	Instant Recall Recorder of last 10 minutes of select and un-select audio received.	Y	
1.9.	Interface to speakers, microphones, headset adapter box, and foot switch.	Y	
1.10.	Intercom between dispatch console positions.	Y	
1.11.	Alert tones, multiple programmable.	Y	

1.12.	ANI display and signaling function interface.	Y	
1.13.	Display of selected functions or talkgroups on a dispatch console will be displayed on all associated consoles.	Y	
1.14.	Support for Project-25 Digital Fixed Station Interface (DFSI) to connect digital base radios to IP network.	Y	
1.15.	Radio to IP gateway device to connect analog base radios to IP network.	Y	
1.16.	Console system with minimum 2 or more operator positions.	Y	
1.17.	Console system with minimum 4 radio channels and/or 4call modules.	Y	
1.18.	Capable of cross patching call modules together.	Y	
2.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	Y	
3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.	Y	
4.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.	Y	

Exhibit B-1 Mandatory Technical Requirements

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
COMMAND CENTRAL AXS	Next-gen Dispatch Console with multi-system and cross-platform capabilities
MCC 7500 IP DISPATCH CONSOLE	Classic Voice Processor Module (VPM) Based High-Tier Dispatch Console
MCC 7500 ARCHIVING INTERFACE SERVER	IP and VPM Based Wireline radio traffic capture device
MCD 5000 DESKSET SYSTEM	VoIP-enabled Deskset for access to APX Consolettes
WAVE COMMUNICATOR	Carrier-independent broadband PTT application
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
THREE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FOUR-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*
FIVE-YEAR ADDITIONAL OPTION	*Yes, Optional Warranty Years are available for this product. Warranty Options have been provided in Section 5.*

5. CATEGORY: MICROWAVE RADIO

5.1 MICROWAVE SUB-CATEGORY: CARRIER GRADE, PACKET DATA (NATIVE IP)

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Description: *Includes: Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; available in all-indoor or split system , capable of space diversity, fixed or adaptive modulation,; providing native IP with minimum MTU size of 2048, capable of transporting emulated TDM, with high throughput capacity; supporting N+1 hot standby, and/or XPIC, and/or ring redundancy; along with required bandwidth management/ routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: 6 GHz microwave radio, all-indoor installation, space diversity, providing 150 Mbps data throughput, and 1+1 hot-standby. For evaluation purposes only, all antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"MicrowaveSubCategory-Carrier Grade-PacketData-NativeIP"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL DESCRIPTION**		
1.1.	Frequency Range: 5925 – 6425 MHz (Lower 6 GHz band) Plus 11 and 18 GHz Part 101 frequency bands		
1.2.	Radio Type: Packet Data (Native IP)		
1.3.	Link Throughput: 150 Mb per second data minimum		
1.4.	Operate on a 30MHz RF channel, at 128QAM.		

1.5.	Configuration: All-indoor or split system installation		
1.6.	Electrical Power: Customer Supplied -48 VDC		
1.7.	Licensing: Bidder to assume coordination and licensing successfully completed.		
2.	**TECHNICAL STANDARDS**		
2.1.	Frequency Tolerance: per FCC 101.107		
2.2.	Channel Bandwidth: per FCC 101.109		
2.3.	Emission limitations: per FCC 101.111		
2.4.	Transmit Power: per FCC 101.113		
2.5.	Operating Environment: per Telcordia GR-63 as applicable.		
3.	**OPERATIONAL PARAMETERS**		
3.1.	Transmit RF Power: < 22 dBm optional > 30 dBm.		
3.2.	Should be Capable of Automatic TX Power Control.		
3.3.	Minimum Receive Threshold Level at TX/RX Unit Port: <-65dBm.		
4.	**RESILIENCY AND PROTECTION**		
4.1.	1+1 Hot Standby TX/RX plus Space Diversity.		
5.	**NETWORK**		
5.1.	Interface: Copper Gig E Port or Optical Port.		
5.2.	Monitoring: SNMP Traps		
6.	**SERVICE MANUALS** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.		
7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

8.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

5.2 MICROWAVE SUB-CATEGORY: NETWORK GRADE

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Description: *Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; capable of fix or adaptive modulation, RF power above +15 dBm; providing native packet data with high throughput capacity supporting emulated TDM over packet data; minimum MTU size of 2048; integrated or non-integrated antenna systems; along with required bandwidth management/routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: 11 GHz microwave radio, split indoor-outdoor installation, providing 100 Mbps raw data throughput, non-integrated antenna system. For purposes of evaluation only, all antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for the example products above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font and labeled ["*MicrowaveSubcategory-NetworkGrade"*]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL DESCRIPTION**		
1.1.	Frequency Range: 5925-6425 MHz (6 GHz band) 10.7 – 11.7 GHz (11 GHz band).		
1.2.	Radio Type: IP Packet.		
1.3.	Link Throughput: 100 Mb per second raw data.		
1.4.	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput.		
1.5.	Configuration: Split Indoor-Outdoor Installation.		

1.6.	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison).		
1.7.	Electrical Power: Customer Supplied -48 VDC.		
1.8.	Licensing: Bidder to assume coordination and licensing successfully completed.		
2.	**TECHNICAL STANDARDS**		
2.1.	Frequency Tolerance: per FCC 101.107		
2.2.	Channel Bandwidth: per FCC 101.109		
2.3.	Emission limitations: per FCC 101.111		
2.4.	Transmit Power: per FCC 101.113		
2.5.	Operating Environment: per Telcordia GR-63 and IEC 60721 class 4M5 IP67 as applicable.		
3.	**OPERATIONAL PARAMETERS**		
3.1.	Transmit RF Power: >15 dBm minimum.		
3.2.	Should be Capable of Automatic TX Power Control.		
4.	**NETWORK**		
4.1.	Interface: Copper Gig E Port or Optical Port.		
4.2.	Monitoring: SNMP Traps.		
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

7.	**SHIPPING REQUIREMENTS -** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

5.3 Microwave Sub-Category: Native IP, Sub 5.925 GHz

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Description: *Point-to-Point digital microwave radio equipment to operate on Part 15 unlicensed frequencies and on Part 90 and Part 101 licensed frequencies above 1 GHz and below 5.925 GHz; capable of RF power above +20 dBm; providing native packet data and analog interfaces; with mid to high throughput capacity; minimum MTU size of 2048; along with required bandwidth management/routing equipment and software.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) Terminal – 4.9 GHz microwave radio, providing 20 Mbps data throughput.

The following specifications and equipment configuration describes requirements for the example product above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font and labeled ["*MicrowaveSubCategory-NativeIP-Sub5.925"*]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name:** Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**General Description**		
1.1.	Frequency Range: 4940 – 4990 MHz (4.9 GHz licensed public safety band).		
1.2.	Radio Type: Packet Data.		
1.3.	Link Throughput: >20 Mb per second data.		
1.4.	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput.		

1.5.	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison).		
1.6.	Electrical Power: Customer Supplied -48 VDC.		
2.	**TECHNICAL STANDARDS**		
2.1.	Frequency Tolerance: per FCC 90.1201 through 90.1217 or most current standards.		
2.2.	Channel Bandwidth: per FCC 90.1201 through 90.1217 or most current standards.		
2.3.	Emission limitations: per FCC 90.1201 through 90.1217 or most current standards.		
2.4.	Transmit Power: per FCC 90.1201 through 90.1217 or most current standards.		
2.5.	Operating Environment: per Telcordia GR-63 as applicable and IEC 60721 class 4M5 IP67.		
3.	**OPERATIONAL PARAMETERS**		
3.1.	Transmit RF Power: >15 dBm.		
3.2.	Manual Transmitter Power Adjustment.		
4.	**NETWORK**		
4.1.	Interface: Interface should be capable of supporting copper Ethernet or Optical interface supporting IP.		
4.2.	Monitoring: SNMP Traps.		
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

7.	**SHIPPING REQUIREMENTS:** F.O.B. All Destinations. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

5.4 MICROWAVE SUB-CATEGORY: NATIVE IP, 900 MHZ

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Description: *Point-to-Point digital radio equipment to operate on Part 90 and Part 101 licensed frequencies below 3 GHz; capable of RF power above +25 dBm; providing native packet data with low throughput capacity; minimum MTU size of 2048; with digital and analog interfaces; along with antennas and associated hardware.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) Terminal – 900 MHz digital radio, providing >300 Kbps data throughput.

The following specifications and equipment configuration describes requirements for the example products above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font and labeled ["*MicrowaveSubCategory-NativeIP-900"*]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL DESCRIPTION**		
1.1.	Frequency Range: 928 - 960 MHz (900 MHz licensed OFS band with 9 MHz T-R split).		
1.2.	Radio Type: Packet Data.		
1.3.	Link Throughput: >300 Kb per second data.		
1.4.	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput.		

1.5.	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison).		
1.6.	Electrical Power: Customer Supplied -48 VDC.		
2.	**TECHNICAL STANDARDS**		
2.1.	Frequency Tolerance: per FCC 101.107 or most current standards.		
2.2.	Channel Bandwidth: per FCC 101.109 or most current standards.		
2.3.	Emission limitations: per FCC 101.111 or most current standards.		
2.4.	Transmit Power: per FCC 101.113 or most current standards.		
2.5.	Operating Environment: per Telcordia GR-63 as applicable and IEC 60721 class 4M5 IP67 or most current Operating Environment standards.		
3.	**OPERATIONAL PARAMETERS**		
3.1.	Transmit RF Power: >25 dBm.		
3.2.	TX Power Control Range: >15 dB Capability of manual transmitter power adjustment.		
3.3.	Optional N+1 redundancy and receive diversity.		
4.	**NETWORK**		
4.1.	Interface: Capable of supporting copper Ethernet or Optical interface supporting IP.		
4.2.	Monitoring: SNMP Traps.		
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

7.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

5.5 Microwave Radio Sub-Category: Carrier Grade, Native Time Division Multiplex (TDM)

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Description: *Microwave Radios, Carrier Grade, TDM — includes: Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; available in all-indoor or split system , capable of space diversity, fix or adaptive modulation; providing native TDM interface with high throughput capacity; supporting N+1 hot standby, and/or XPIC, and/or ring redundancy; along with required bandwidth management / routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Lower 6 GHz microwave radio, all-indoor installation, space diversity, providing three (3) DS-3 throughput, and 1+1 hot-standby. All antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for the example product above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font and labeled ["*MicrowaveSubCategory-CarrierGrade-TDM*"]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**General Description**		
1.1.	Frequency Range: 5925 – 6425 MHz (Lower 6 GHz band) plus 11 and 18 GHz Part 101 frequency bands.		
1.2.	Radio Type: Native Time Division Multiplexed (TDM).		
1.3.	Link Throughput: Three(3) DS-3.		
1.4.	Operate on a 30MHz RF channel, at 128QAM.		

1.5.	Configuration: All-Indoor Installation.		
1.6.	Indoor Mounting: Customer supplied standard 19 inch wide — 84 inch tall equipment rack.		
1.7.	Electrical Power: Customer Supplied -48 VDC.		
1.8.	Licensing: Bidder to assume coordination and licensing successfully completed.		
2.	**TECHNICAL STANDARDS**		
2.1.	Frequency Tolerance: per FCC 101.107.		
2.2.	Channel Bandwidth: per FCC 101.109.		
2.3.	Emission limitations: per FCC 101.111.		
2.4.	Transmit Power: per FCC 101.113.		
2.5.	Operating Environment: per Telcordia GR-63 as applicable.		
3.	**OPERATIONAL PARAMETERS**		
3.1.	Transmit RF Power: >28 dBm, optional <30 dBm.		
3.2.	Should be Capable of Automatic TX Power Control.		
3.3.	Minimum Receive Threshold Level at TX/RX Unit Port: <-65dBm.		
4.	**RESILIENCY AND PROTECTION**		
4.1.	1+1 Hot Standby TX/RX plus Receive Diversity.		
5.	**NETWORK**		
5.1.	Interface: Copper DS-3.		
5.2.	Monitoring: SNMP Traps.		
5.3.	Optional DS-3 to T1 Multiplex.		
6.	**SERVICES MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.		

7.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
8.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

6. Category: Interoperability Gateway Devices

Motorola Solutions Response

Motorola is not bidding this category.

Category Definition: *Devices that interface multiple radios, of multiple makes and models, to analog telephones, to IP telephone networks, and to other devices; allowing multiple simultaneous voice communications to facilitate incident interoperability between respondents equipped with otherwise incompatible technologies; fixed, mobile, and portable devices; analog, digital, or IP-based devices; along with associated firmware and software, interface devices, connecting cables, and accessories.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) — IP Gateway Device Configured to Support a Mobile Command Post.

The following specifications and equipment configuration describes requirements for the example product above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled ["*Category-Interoperability-Gateway*"]. For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**General Features**		
1.1.	The device creates a Local Interoperability System, linking devices such as radios, telephones, or satellite phones into a unified communications system.		
1.2.	The device shall be configured with software control, supporting remote radios, SIP devices, and connections to other Local Interoperability Systems.		

1.3.	The device shall be capable of interfacing any standard radio, as described above, to any analog or digital public telephone network (PSTN) or private branch exchange (PBX).		
1.4.	The device shall allow a minimum of four (4) cross-connect nets at one time (Talk-groups).		
2.	**MOUNTING**		
2.1.	Customer supplied standard 19 inch equipment rack (84 inch tall).		
3.	**POWER**		
3.1.	~12 VDC from Customer supplied power system.		
3.2.	AC powered equipment shall be provided with an inverter to support operation on DC power.		
4.	**CONTROLLER / OPERATING SYSTEM**		
4.1.	The Operating System shall use a current version Windows-based operating system to provide a user-friendly interface depicting system operations, allowing programming of features, and providing password protection of features. (Customer supplied PC.).		
4.2.	The Operating System shall allow connection or disconnection of any channel to any other channel.		
4.3.	The Operating System shall provide for the programming of all interface features, such as public telephone interface, SATCOM interface, cellular interface, and two-way radio interface.		
4.4.	The Operating System shall provide the ability to create and store specific interoperability response combinations for pre-planning.		
4.5.	All Call: the Operating System shall provide for a quick and easy broadcast of emergency messages over all channels simultaneously.		
4.6.	IP (RoIP) Interface.		
4.7.	RJ-45 connector.		
4.8.	10/100 base-T Ethernet, 100 Mbps.		
4.9.	Audio delay and jitter buffers to handle network latency.		
4.10.	Embedded COR, PTT, and audio vocoder.		

5.	**LOCAL OPERATOR CONTROL**		
5.1.	Local control to modify configuration or select from available stored configurations.		
5.2.	Local speaker, with volume control and speaker on/off.		
5.3.	Microphone input with PTT.		
5.4.	Headphone connection.		
6.	**IP TELEPHONE (SIP) INTERFACE**		
6.1.	Standard: RFC 3261 or current modifications.		
6.2.	SIP Support Vocoders: GSM and G711u, with auto-detect/select if the primary codec is not available.		
7.	**TONE REMOTE INTERFACE** (analog)		
7.1.	Standard: EIA tone remote.		
7.2.	RJ-11 jack or terminals.		
7.3.	Interface: selectable 2-Wire or 4-Wire, with selectable 600 ohm termination or hi-Z for parallel operation.		
7.4.	Levels: -20 dBm to +10 dBM, with AGC and/or compression to compensate for variations.		
8.	**RADIO INTERFACES**		
8.1.	Bidder shall supply interface cables to connect a wide range of user radios to the Gateway system.		
9.	**CONFIGURATION**: Bidder shall provide the following configuration a hypothetical mobile command post for a multi-agency event. (***See illustration below***)		
9.1.	Interface to one (1) Kenwood TK-5710-G conventional mobile radio.		
9.2.	Interface to one (1) Motorola XLT 5000 conventional mobile radio.		
9.3.	Interface to one (1) ICOM 9511T conventional mobile radio.		
9.4.	Interface to one (1) Motorola APX 6500 trunked mobile radio.		
9.5.	Interface to one (1) Relm-BK KNG-P150 conventional portable radio.		
9.6.	Interface to one (1) Codan/Daniels MT-4E base radio, which links to tactical repeaters.		
9.7.	Interface to one (1) SIP telephone.		

9.8.	Interface to one (1) Tone Remote external dispatch console.		
10.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
11.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
12.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

Exhibit B-1 Mandatory Technical Requirements

7. CATEGORY: POWER SUPPLY PRODUCTS AND SOLUTIONS

Instructions: *Responses to the Power Systems Solutions 7.1 and 7.2 will be captured in Exhibit B-2 System Solution Narratives. Bidder may submit a solution for either of the categories below. Each category will be evaluated and awarded separately.*

7.1 DC POWER SYSTEM SOLUTIONS

7.2 VRLA (VALVE REGULATED LEAD ACID) BATTERY SYSTEMS SOLUTIONS

7.3 Rack-Mounted Distribution Panels

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Description: *Rack-Mounted Power Distribution Panels providing protected outputs.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) — Rack-Mounted Power Distribution panel with six (6) protected outputs.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**General Requirements**		
1.1	Rack mounting (19 in.)		
1.2	Circuit protection (breakers with alarming for tripped breakers)		
1.3	Buss bar power connections and returns		
1.4	Voltage (12, 24, or 48 VDC)		
2.	**Service Manual** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
3.	**Warranty** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
4.	**Shipping Requirements:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

7.4 CONVERTERS/INVERTERS

7.4.1 VOLTAGE CONVERTERS

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Description: *Rack mounted DC to DC converters.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) — Voltage Converter converting 48 VDC to 24 VDC output.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL REQUIREMENTS**		
1.1	Rack-mounted		
1.2	Capable of converting:		
1.2.1	12 VDC to 24 VDC or 48 VDC		
1.2.2	24 VDC to 12 VDC or 48 VDC		
1.2.3	48 VDC to 12 VDC or 24VDC		
1.3	Minimum output (10 amps)		
2.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

4.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

7.4.2 INVERTERS

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Description: *Rack mounted DC to AC inverters.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) — Voltage Inverter converting 48 VDC to 120 VAC output.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL REQUIREMENTS**		
1.1	Rack-mounted		
1.2	Capable of converting:		
1.2.1	12 VDC to 120 VAC or 240 VAC		
1.2.2	24 VDC to 120 VAC or 240 VAC		
1.2.3	48 VDC to 120 VAC or 240 VAC		
1.3	Minimum output (5 amps)		
2.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		

4.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

8. CATEGORY: TEST EQUIPMENT

8.1 TEST EQUIPMENT SUB-CATEGORY: MULTIFUNCTION RADIO TEST SET

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Specialized high-accuracy multi-function test instrument for the testing of two-way radios. Includes: portable instruments, rugged field service instruments, laboratory instruments, along with related test adapters and accessories.*

For evaluation purposes, all Bidders must offer a product meeting the following example product: Quantity one (1) — Compact multifunction instrument for testing and alignment of two-way radios (AKA: Radio Service Monitor).

The following specifications and equipment configuration describes requirements for the example products above. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled "*TestEquipSubCategory-Multifunction-Radio-Test-Set*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY OF FUNCTIONS**		
1.1.	AM/FM/P-25 Monitor		
1.2.	AM/FM/P-25 Generator		
1.3.	Duplex Generator		
1.4.	Signal Strength Meter		
1.5.	RF Power Meter		

1.6.	Spectrum Analyzer		
1.7.	Tracking Generator		
1.8.	RF Cable Fault Locator		
1.9.	RF Frequency Counter		
1.10.	Frequency Error Meter		
1.11.	AM Modulation Meter		
1.12.	FM Deviation Meter		
1.13.	SINAD/Distortion Meter		
1.14.	Audio Synthesizer		
1.15.	Oscilloscope		
1.16.	Digital Voltmeter		
2.	**TIME-BASE**		
2.1.	Temperature Stability = ±0.15 ppm at -20° C to 70° C		
2.2.	Aging = 0.5 ppm First Year / 0.3 ppm After First Year		
3.	**RF GENERATOR (RECEIVER TEST)**		
3.1.	Port Input Protection		
3.1.1.	GEN Port: +20 dBm (Input Power Alarm Typical)		
3.1.2.	T/R Port: +49 dBm CW (Input Power Alarm Typical)		
3.1.3.	T/R Port: >+90° C (Temperature Alarm Typical)		
3.2.	Frequency		
3.2.1.	Range = 2 MHz to 1000 MHz		
3.2.2.	Accuracy = Same as time-base		
3.3.3.	Resolution = 1 Hz		
3.3.	Output Level.		
3.3.1.	Range – T/R Port: -50 to -125 dBm – GEN Port: -5 to -65 dBm		
3.3.2.	Accuracy = +-2 dB or better.		
3.3.3.	Resolution = 1 dB		

3.4.	Signal Purity		
3.4.1.	Port VSWR < 1.5:1 (all ports)		
3.4.2.	SSB Phase Noise = -90 dBc/Hz at 20 kHz offset		
3.4.3.	Spurious – Harmonics = -20 dBc maximum, – Non-Harmonics = -35 dBc maximum (±20 kHz offset from carrier; 0 to 1 GHz)		
3.4.4.	Residual FM – <20 Hz rms in 300 Hz to 3 kHz BW		
3.4.5.	Residual AM <1% rms in 300 Hz to 3 kHz BW		
3.5.	Modulation Types		
3.5.1.	1 kHz Tone		
3.5.2.	Private Line		
3.5.3.	Digital Private Line (w/ DPL Invert)		
3.5.4.	Single Tone		
3.5.5.	DTMF		
3.5.6.	Paging - Two-Tone & 5/6 Tone		
3.5.7.	External microphone & input connector		
3.6.	FM Modulation		
3.6.1.	Deviation Range = 0 to 75 kHz		
3.6.2.	Total Harmonic Distortion < 3%		
3.6.3.	Resolution < 10 Hz		
3.6.4.	Accuracy < ±10% (2 kHz to 50 kHz deviation)		
3.7.	AM Modulation		
3.7.1.	Range = 0 to 90%		
3.7.2.	Resolution < 1%		
3.7.3.	Total Harmonic Distortion < 3% (20% to 90% mod)		
3.7.4.	Accuracy < 10% of setting (20% to 90% mod)		
4.	**RF RECEIVER (TRANSMITTER TEST)**		
4.1.	Port Input Protection		

4.1.1.	ANT Port: +20 dBm (Input Power Alarm Typical)		
4.1.2.	T/R Port: +49 dBm CW (Input Power Alarm Typical)		
4.1.3.	T/R Port: >+90° C (Temperature Alarm Typical)		
4.2.	Frequency		
4.2.1.	Range = 2 MHz to 1000 MHz		
4.2.2.	Accuracy = Same as Time-base		
4.2.3.	Resolution = 1 Hz		
4.3.	Input Amplitude		
4.3.1.	Sensitivity with pre-amplifier – ANT: -110 dBm for 10 dB SINAD – T/R: -40 dBm for 10 dB SINAD		
4.3.2.	Minimum Level Receiver Measurements with pre-amplifier – ANT: -80 dBm for RF Error Meter – T/R: -40 dBm for RF Error Meter		
4.3.3.	DEMOD Meters – Modulation – Distortion – SINAD – AF Counter		
4.4.	IF Bandwidth		
4.4.1.	FM: – 6.25 kHz to 25 kHz		
4.4.2.	AM: – 6.25 kHz to 25 kHz		
4.5.	RF Frequency Error Meter		
4.5.1.	Units = Hz, PPM		
4.5.2.	Range = ±200 kHz, ±1000 PPM		
4.5.3.	Resolution = 1 Hz		
4.5.4.	Accuracy = Time-base ±1 Hz		
4.6.	RF Power Meter (RF Power Into T/R Port)		
4.6.1.	Maximum Input Level = 50 Watts continuous		

4.6.2.	Input RF Power Alarm = +49 dBm		
4.6.3.	Temperature Alarm > +90° C		
4.6.4.	Meter Range = +20 to +53 dBm		
4.6.5.	Display Units = Watts, dBm		
4.6.6.	Resolution = 0.01 W, 0.1 dBm		
4.6.7.	Accuracy < 10% of reading		
4.7.	FM Deviation Meter		
4.7.1.	Range = ±500 Hz to +- 75 Hz		
4.7.2.	Meter Type = Peak+, Peak-, (Peak-Peak)/2, RMS		
4.7.3.	Resolution = 0.1 Hz		
4.7.4.	Accuracy < ±5% of reading, 1 kHz to 10 kHz Dev.		
4.8.	AM Percent Meter		
4.8.1.	Range = 5% to 100%		
4.8.2.	Meter Type = Peak+, Peak-, (Peak-Peak)/2, RMS		
4.8.3.	Resolution = 0.1%		
4.8.4.	Accuracy = ±5% of reading		
4.9.	SINAD Meter		
4.9.1.	Measurement Sources = Audio IN, DEMOD		
4.9.2.	Audio Frequency Notch = 1 kHz		
4.9.3.	Reading Range = 0 dB to 60 dB		
4.9.4.	Resolution = 0.1 dB to .0.1 dB		
4.9.5.	Accuracy < ±1.5 dB,		
4.10.	Distortion Meter		
4.10.1.	Measurement Sources = AUD IN, DEMOD		
4.10.2.	Audio Frequency Notch = 1 kHz		
4.10.3.	Reading Range = 0% to 100%		
4.10.4.	Resolution = 0.1%		
4.10.5	Accuracy = ±10% of reading		
4.11.	Audio Frequency Counter		

4.11.1.	Measurement Sources = AUD IN, DEMOD		
4.11.2.	Frequency Range = 15 Hz to 20 kHz		
4.11.3.	Resolution = 0.1 Hz		
4.11.4.	Accuracy < ± 1 Hz		
4.12.	Audio Frequency Level Meter		
4.12.1.	Measurement Sources = AUD IN, SCOPE		
4.12.2.	Input Range = – Audio In Range = 3 V, 30 V – Scope Range = 2 VDC, 40 VDC		
4.12.3.	Frequency Range = 200 Hz to <5 kHz		
4.12.5.	Accuracy < ±5% AUD IN Port		
4.13.	Oscilloscope		
4.13.1.	Source = SCOPE, AUD IN, DEMOD		
4.13.2.	Bandwidth = 5 kHz		
4.14.	Digital Multimeter (DMM)		
4.14.1.	Functions – AC/DC Voltmeter		
4.14.3.	Accuracy < ±5% AC, < ±2% DC		
4.15.	Power		
4.15.1.	AC adapter and/or a vehicle adapter.		
4.15.2.	DC Input Voltage Range = 12 to 32 VDC (12-24 nominal)		
4.15.3.	Battery Power, with full display backlight and field swappable.		
4.15.4	Battery Recharge, with unit on = 4 hours or less		
4.16.	Environmental — tested in accordance with MIL-PRF-28800F, Class 3		
4.16.1.	Storage Temperature = -20° C to +60° C with battery		
4.16.2.	Operating Temperature = 0°C to +40°C with battery		
4.16.3.	Operating Relative Humidity = 5% to 80%		
4.16.4.	Operating Altitude = up to 10,000 feet		
4.16.5.	Shock = 30 G (Functional Shock)		

4.16.6.	Vibration = 5 to 500 Hz random vibrations		
4.17.	Physical		
4.17.1.	Dimensions = less than 14 in x 12 in x 8 in (width x height, depth)		
4.17.2.	Weight = less than 20 pounds		
4.17.3.	Case = Hard transit case		
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment, the manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
7.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

8.2 Test Equipment Sub-Category: Specialized RF Instruments

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Definition: *Specialized high-accuracy radio frequency instrument for the analysis of radio systems. Includes: Signal generators, signal analyzers, spectrum analyzers, vector network analyzers, power meters, antenna measurement instruments; and related specialized instruments, configured as portable instruments, rugged field service instruments, laboratory instruments; along with related test adapters and required accessories.*

Example Product: Quantity one (1) — Portable & Spectrum Analyzer — a field instrument for the analysis of RF systems and the identification of interference.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12-point font labeled *"ExhibitB1-TestEquipment8.2").* For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**Physical /Environmental**		
1.1.	Dimensions: < 12" x 12" x 4"		
1.2.	Weight: < 8 lbs		
1.3.	Transit Shock/Drop: MIL-PRF-28800F Class 2		
1.4.	Operating Temperature: -10°C to +55°C		
1.5.	Operating Altitude: > 12,000 feet		
1.6.	RF Port Connectors: Type N, Female, 50 ohm		

1.7.	RF Input: > +20 dBm (100 mw)		
2.	**POWER**		
2.1.	External AC: 110/220 V nominal		
2.2.	External DC = 12 V nominal		
2.3.	Internal Battery > 3 hours run time		
3.	**USER INTERFACE**		
3.1.	Display: – > 6.5" flat panel, – Daylight viewable, – 99.999% good pixels.		
3.2.	Intuitive User menus		
3.3.	Help files accessible from the user screen		
3.4.	PC Interface to configure and access files		
3.5.	Output files in standard format (PDF, DOC, etc.)		
3.6.	Data Interface: USB port		
3.7.	Data Storage, Internal: > 150 traces & settings		
3.8.	Data Storage, External: USB device capacity > 16GB		
4.	**SPECTRUM ANALYZER**		
4.1.	Frequency Range: > 100 kHz to 3.0 GHz		
4.2.	Reference Aging: ±1 ppm / year		
4.3.	Tuning Resolution: 1 Hz		
4.4.	Spectral Purity: < –85 dBc @ 30 kHz		
4.5.	Sweep Time: 2.0 s, full span; 1 ms, zero span		
4.6.	Resolution Bandwidth: 100 Hz to 1 MHz RBW		
4.7.	Video Bandwidth: 10 Hz to 300 kHz VBW		
4.8.	Amplitude Accuracy: < ± 1.5 dB		
4.9.	Dynamic Range: > 60dB, intermod-free		
4.10.	Noise Floor: -135 dBm		
5.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		

6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
7.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

Exhibit B-1 Mandatory Technical Requirements

9. Category: Monitoring & Alarm Equipment

9.1 Monitoring & Alarm Sub-Category: Environmental

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Definition: *Automated communication systems for collecting and transmitting environmental data for emergency notification (fire, flood, volcanic eruption, tsunami, etc.), along with all associated hardware, software, and accessories to complete and maintain the system.*

Example Product: Quantity one (1) — Remote Automated Weather Station (RAWS) per NFDRS Standards

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled *"ExhibitB1-Monitoring-9.1").* For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	Remote Automatic Weather Station should include the following: National Fire Danger Rating System NFDRS Remote automated Weather Station (RAWS) per National Wildfire Coordination Group standard PMS 426-3.		
2.	Dedicated Data Acquisition System for AWS. (data logger).		

3.	The data logger should have battery-backed SRAM for CPU usage, program storage, and data storage for up to at least one million data values with upgradeable memory size at a later date without any hardware replacements and with inherent noise reducing facility. It should be compatible with 12VDC power supply and should have programming and math functions capability for deriving calculated parameters with high program execution rate of up to 100 Hz for making fast measurements. It should have ability to implement conditional statements in the data logger programming. The Histogram instruction is required to process input data as either a standard histogram (frequency distribution) or a weighted value histogram. It should be possible to calculate the standard deviation of the Source over the output interval and store the results in a Data Table. The data logger should have ability to reject the 50Hz noise for accurate measurements. Special Software with Data logger should be provided to monitor various sensors.		
4.	**SOFTWARE:** Special Software should be provided with Data logger to monitor various sensors.		
5.	**RANGE AND AUTO RANGING:** Support of +/-5VDC range and should have auto ranging facility apart from making measurements on following ranges specific to a channel: e.g., ±5000 mv, ±2500 mv, ±250 mv, ±25 mv, ±7.5 mv, ±2.5 mv, with resolution on the most sensitive range better than 0.5 microvolt.		
6.	**SWITCHED VOLTAGE EXCITATIONS:** The system should have switched outputs provided for precision excitation voltages.		
7.	**DIGITAL I/O PORTS:** Minimum eight ports should be provided for frequency measurements, digital control, and triggering.		
8.	**SWITCHED 12 VOLT:** Two independent 12 V unregulated sources switched on & off under program control.		
9.	**OPERATING TEMPERATURE RANGE:** -55° to +50°C		
10.	**ENCLOSURE:** The data logger should be housed in a weatherproof enclosure of NEMA-IV rating.		
11.	**POWER SUPPLY:** Charger/Regulator 12VDC		

12.	**WALL ADAPTOR:** AC-DC 120 VAC TO 18 VDC		
13.	**CORD WITH TYPE-C PLUG**		
14.	**BATTERY:** 12V 7AH (minimum)		
15.	**SENSORS:** (All sensors should be compatible with data logger, include mounting hardware and have a cable sufficient to allow mounting, and Operating Temperature: (40° to +60°C).		
16.	**AIR TEMPERATURE & RELATIVE HUMIDITY SENSOR COMBINED**		
16.1.	Relative Humidity Measurement Range:0 to 100% RH, non-condensing.		
16.2.	Output Signal Range: 0 to 2 V dc max.		
16.3.	Typical Long-Term Stability: Better than 1% RH per year		
16.4.	Voltage: 12 V dc Nominal or equivalent		
16.5.	Current Consumption: max 4 mA		
16.6.	PRT based Measurement Range: -40° to +60°C		
16.7.	Output signal range: 0 to 1.0 V		
17.	**ATMOSPHERIC PRESSURE SENSOR:**		
17.1.	Pressure Range 600 to 1100 hPa (mbar)		
17.2.	Operating Temperature -50 to +60°C Accuracy at least ±0.5 hPa (mbar) at -50 to +60°C.		
18.	**SOLAR RADIATION SENSOR:** - Pyranometer based		
18.1.	Light Spectrum Waveband: 400 to 1100 nm		
18.2.	Sensitivity: Typically 80 per1000		
18.3.	Wm-2 Linearity: Maximum deviation of 1% up to 3000 W m-2 Accuracy: ±5%		
18.4.	Tipping Bucket Rain Gauge		
18.5.	Tips at 0.1 mm increments (0.004 in) Orifice diameter is max 24.5 cm (9.66 in) Accuracy is ±1% at rates up to 1 in per hr.		
18.6.	Output: Momentary switch closure activated by tipping bucket mechanism.		

18.7.	Environmental Limits: Temperature: 0° to +50°C and Humidity: 0 to 100% The bucket should have leveling arrangement for horizontal mounting.		
19.	**WIND SPEED AND DIRECTION SENSOR:** (Identify type, i.e. propeller, ultrasonic, etc.) (The sensor should be made out of rigid UV-stabilized thermoplastic with corrosion proof stainless steel and anodized aluminum fittings. The sensor should have stainless steel precision-grade ball bearings for the propeller shaft and vertical shaft bearings).		
19.1.	Wind Speed Range: 0-100 m/s		
19.2.	Accuracy: ±0.3 m s		
19.3.	Starting threshold: 1.0 m/s		
19.4.	Wind Direction Range: 0-360°		
19.5.	Accuracy: ±3° Starting threshold: 1.1 m/s		
19.6.	Damping ratio: max 0.25 Output: Analog dc voltage from potentiometer linearity 0.25%		
20.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
21.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options below.		
22.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

9.2 Monitoring & Alarm Sub-Category: Radio Network

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Definition: *IP and analog radio network monitoring software & hardware, SCADA software & hardware, SNMP manager and agent software & hardware, remote terminal units (RTU), RF and radio site sensors.*

Example Product: Quantity one (1) — Hypothetical radio system monitoring (RSM) configuration.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled *"ExhibitB1-Monitoring9.2").* For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Motorola Solutions, Inc. **Product Model Name**: ASTRO 25 Unified Event Manager **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**Overall Specification**		
1.1.	The RSM shall provide indications, alarms and status of the equipment and systems being monitored that facilitate timely, precise interpretation of abnormal or failed conditions within the radio network		
1.2.	The RSM shall consist of (a) server software {physical or virtual servers}, (b) IP and analog transmission paths, and (c) interfaces to remote equipment and/or sensors.		

1.3.	The RSM shall integrate into a single unified system alarm and status messages from multiple types of equipment from multiple manufacturers — such as radio repeaters, microwave radios, IP switches, power supplies, solar controllers, generators, HVAC equipment, and access control systems.		
1.4.	The RSM shall be designed to minimize the loss of status, alarm, and event messages during transmission to the server.		
1.5.	The RSM shall easily configured and expanded to accommodate additional inputs and monitored sites.		
2.	**RSM SERVER**		
	The RSM server software shall operate on a virtual-server environment. (Customer supplied and managed server).		
	The RSM server shall operate within the network security and antivirus requirements of the customer agency. (Customer supplied and managed firewall and antivirus).		
2.3.	The RSM server shall support multiple simultaneous access to status and alarm information.		
2.3.1.	Interface via a PC client for configuration and monitoring.		
2.3.2.	Interface via web client for access to monitoring.		
2.3.3.	Interface via smart phone application for access to monitoring.		
2.4.	The RSM server shall support multiple password protected user accounts to manage system access.		
2.4.1.	Control access to (a) specific monitored equipment, (b) specific types of groups of equipment, or (c) specific sites, or (d) any combination.		
2.4.2.	Provide multiple levels of access: (a) view only, (b) view and remote control, (c) view, remote control, and configure.		
2.5.	The RSM server software shall record and process alarm and status data according to individualized and categorized scripts, which include: severity of alarm, time of day, season, and on-call duty assignments.		

2.5.1.	RSM software shall provide logs of monitored parameters, alarms, and alarm responses. (Log capacity not specified; assumed to be a server capacity issue).		
2.6.	The RSM server shall provide external messaging in response to alarm and status data:		
2.6.1.	Messaging via SMTP (email)		
2.6.2.	Messaging via SMS (text)		
2.6.3.	Messaging via SNMP traps (to other systems).		
2.6.4.	Messaging via SIP phone (voice messages).		
2.7.	The RSM server shall provide response escalation, sending additional messages and including additional recipients if the required acknowledgment is not received in the defined response time.		
2.8.	The RSM configuration shall be expandable to accommodate future additional sites and monitor inputs.		
3.	**HYPOTHETICAL RADIO SYSTEM —** The hypothetical radio system consists of a central dispatch center and two radio sites, with a separate radio shop that maintains the radio system.		
4.	**RADIO SHOP —** located on the same campus and with IP network connectivity to, the Dispatch Center. The radio shop has the following resources that shall be integrated into RSM:		
4.1.	PC workstation (customer supplied) dedicated to configuration and monitoring of RSM.		
4.2.	Test radio for evaluation and maintenance of the radio system. RSM shall be configured to provide off-site access to the test radio for radio system evaluation as follows:		
4.2.1.	Channel Change, via four separate contact closures to steer channel selection.		
4.2.2.	PTT, via contact closure		
4.2.3.	Transmit Indicator (TX)		
4.2.4.	Receive Signal Strength Indicator (RSSI)		

5.	**DISPATCH CENTER** — site is AC powered with backup generator, UPS, and DC power system. RSM shall monitor the following equipment and test points:		
5.1.	Backup Generator, which communicates using MODBUS protocol. RSM shall display the following: (all sensors provided as part of generator).		
5.1.1.	Fuel Level		
5.1.2.	Engine Temperature		
5.1.3.	Oil Pressure		
5.1.4.	Output Voltage		
5.1.5.	Output Current		
5.2.	Uninterruptible Power System, which communicates using SNMP. RSM shall display the following:		
5.2.1.	Incoming AC Line Voltage		
5.2.2.	Output AC line voltage		
5.2.3.	Output AC load		
5.3.	12VDC Power System with battery backup. RSM shall display the following:		
5.3.1.	Output DC voltage		
5.3.2.	Output DC current		
5.3.3.	Battery Load Current (0-30 A)		
5.4.	Equipment Room Sensors		
5.4.1.	Room Temperature Sensor		
5.4.2.	Door Alarm (contact closure, customer supplied)		
5.4.3.	Room smoke alarm (contact closure, customer supplied)		
5.5.	Codan MT-4E base radio, which provides analog link to radio #1 at site #1. RSM shall display the following:		
5.5.1.	Transmit Indicator (TX)		
5.5.2.	Receive Signal Strength Indicator (RSSI)		

5.5.3.	Forward & Reflected RF Power — taken from an antenna line sensor installed at the output of filter cavities and circulators.		
5.6.	IP Microwave to Radio Site #2, which communicates using SNMP. RSM shall report alarm indications provided by the SNMP.		
6.	**RADIO SITE #1 —** Site is a solar powered with 12 VDC power system. Site communicates with Dispatch Center via analog radio. RSM shall monitor the following equipment and test points:		
6.1.	MorningStar Pro-Star solar power controller. RSM shall display the following:		
6.1.1.	Solar Array Voltage (0-150 V)		
6.1.2.	Output Voltage (nominal 12 V)		
6.1.3.	Charge Current (0-30 A)		
6.1.4.	Battery Load Current (0-30 A)		
6.2.	Building Alarms		
6.2.1.	Room Temperature Sensor		
6.2.2.	Door Alarm (contact closure, customer supplied)		
6.2.3.	Smoke Alarm (contact closure, customer supplied)		
6.2.4.	Water Intrusion Alarm (contact closure, customer supplied)		
6.3.	Codan MT-4E repeater radio. RSM shall display the following:		
6.3.1.	Transmit Indicator (TX)		
6.3.2.	Receive Signal Strength Indicator (RSSI)		
6.3.3.	Forward & Reflected RF Power — antenna line sensor installed at the output of filter cavities and circulators, which provides RS232 and Ethernets port – UDP/IP or SNMP interfaces (customer supplied)		
6.4	RSM shall also provide capability to detect faults at remote site and to automatically reset, reboot or start backup site equipment without external user intervention.		

7.	**RADIO SITE #2** — Site is AC powered with 12 VDC and 48 VDC power systems. Site communicates with Dispatch Center via Ethernet microwave. RSM shall monitor the following equipment and test points:		
7.1.	Backup Generator, which communicates using MODBUS protocol. RSM shall display the following: (all sensors provided as part of generator)		
7.1.1.	Fuel Level		
7.1.2.	Engine Temperature		
7.1.3.	Oil Pressure		
7.1.4.	Output Voltage		
7.1.5.	Output Current		
7.2.	+12VDC Power System with battery backup. RSM shall display the following:		
7.2.1.	Output DC voltage		
7.2.2.	Output DC current		
7.2.3.	Battery Load Current (0-60 A)		
7.3.	-48VDC Power System with battery backup. RSM shall display the following:		
7.3.1.	Output DC voltage		
7.3.2.	Output DC current		
7.3.3.	Battery Load Current (0-60 A)		
7.4.	Building Alarms		
7.4.1.	Room Temperature Sensor		
7.4.2.	Door Alarm (contact closure, customer supplied)		
7.4.3.	Smoke Alarm (contact closure, customer supplied)		
7.4.4.	Water Intrusion Alarm (contact closure, customer supplied)		
7.5.	IP Microwave to Radio Site #1, which communicates using SNMP. RSM shall report alarm indications provided by the SNMP.		

7.6.	Quantity = 3, Motorola Quantar base radios, configured with RF *combiner* and receive multicoupler with one transmit and one receive antenna.		
7.6.1.	Transmit Indicator (TX) {one per radio}		
7.6.2.	Receive Signal Strength Indicator (RSSI) {one per radio}		
7.6.3.	Forward & Reflected RF Power — TX antenna line sensor installed at the output of filter cavities and circulators, which provides RS232 and Ethernets port – UDP/IP or SNMP interfaces (customer supplied)		
7.7.	RSM shall also provide capability to detect faults at remote site and to automatically reset, reboot or start backup site equipment without external user intervention.		
8.	**SERVICE MANUAL** - One (1) set system documentation, operations and service manuals, printed or electronic copy, for technician.		
9.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
10.	**SHIPPING REQUIREMENTS:** F.O.B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
CirrusCentral Management	
GenWatch	
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

10. Category: Furniture, Dispatch Console

Motorola Solutions Response

Motorola is not bidding this category.

Category Definition: *Specialized dispatch center workstations, CPU enclosures, and auxiliary furniture such as storage units, printer cabinets, files, and tables.*

Example Product: Quantity one (1) — 911-Center Dispatch Workstation with partitioned screens.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled *"ExhibitB1-ConsoleFurniture").* For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**Console Furniture**		
1.1.	Electric Height Adjustable Desks – This is for height adjustable desks specific to 24/7 environments.		
1.2.	Console furniture unit in a corner configuration, in a cockpit design. Monitor surface to accommodate up to Quantity and size of flat screen monitors for "Dispatch Consoles."		

1.3.	Work surfaces shall have lifting equipment weight capacity of 500 lbs. to prevent damage from users sitting / leaning on or using the surface as an aid in standing. Minimum which does not include weight of work surface. Console must demonstrate stability at full extension. Maximum deflection of ½" is allowed when a horizontal load of 100 lbs. is applied to the center of each work surface.		
1.4.	Adjustment speed to be minimum 1.5"/second.		
1.5	Safety finger clearance of 1½" minimum between stationary returns and moving surfaces.		
1.6	Controller shall not be located where it can be damaged by chair arms. Location under front edge of keyboard surface is unacceptable.		
1.7	Controller shall include collision detection technology which will detect sudden changes in load to identify obstructions in the path of the moving surface. Collision detection technology to cause work surface to stop on detection of obstruction and reverse direction approximately 10cm to avoid entrapment of obstruction. Collision detection shall function in both upward and downward directions, and on both surfaces.		
1.8	Surface must lower to 5th percentile seated female elbow height dimension (22.5") according to ANSI/HFES 100 -2007. Provide elevation drawing of both surfaces.		
1.9	Surface must raise to at least standing elbow height for 95th percentile male user (46.5") from the floor to the home row of keyboard. ANSI/HFES 100 -2007.		
1.10	All surfaces, moving and fixed height, must be non-glare, 3-D Laminate. Edges shall be continuous from top through to the bottom of the surface with chamfer style edge. No seams between laminate and edge will be acceptable due to buildup of germs.		
2.	**ADJUSTABLE MONITOR RACK -** 27/7 furniture usually has several monitors that are used by the dispatcher and need to be ergonomic for optimum health.		

2.1.	Parabolic monitor rack shall be curved to match the cockpit shape of the workstation and achieve as close to equal focal lengths from the user's eyes to the face of each monitor as possible and position monitors for a view angle perpendicular to the screen. ANSI/HFES 100 -2007.		
2.2.	Parabolic monitor rack shall be available in various sizes to accommodate up to 50" monitors and an individual weight of 70lbs on a single or dual level mount for future ready consoles.		
2.3.	Monitor rack platform shall be mounted on a movable platform which will permit a 10" focal length adjustment – from 19.7" to 29.7" with a maximum of 5lbs push/pull effort required to move all monitors simultaneously. ANSI/HFES100 -2007.		
2.4.	LCD mounts shall provide for all VESA monitor mount sizes.		
2.5	Monitor rack shall be designed to permit stacking of a single monitor up to a complete additional row without removal or disassembly of any existing monitors or any portion of the base unit.		
2.6	Vendor shall supply premium cable extensions as required to reach CPUs in CPU cabinets and provide adequate length to extend CPUs for service.		
3.	**DATA DOCK -** This is a quick connect and disconnect for keyboards, mice, etc. and must be done by the operator.		
3.1.	A data dock shall be located on the work surface to provide easy, instant operator accessible location to plug in keyboards, mice and USB charging ports.		
3.2.	Data dock shall have at least (8) locations for USB, two (2) powered USB locations for charging and two (2) locations for RJ11, RJ45 or DB9 ports.		
4.	**CPU ENCLOSURES** – Computers must be stored in cabinetry which keeps them off of the floor, cool, and lockable.		

4.1.	CPU cabinets, drawer pedestals and other caseworks must be made of a material and construction to withstand 500 pounds of weight when freestanding and not requiring a wall system to support it. Doors shall be a dent free material such as a laminate with continuous face through edge material.		
4.2.	CPU enclosures shall be available in a vertical tower or lower cabinet (29" standard work surface height) off to the side of the immediate user workspace. CPU enclosure shall be available in sizes to accommodate tower and mini-tower cases up to 8" wide x 18" high and available in 1, 2, 3, 4, 5, or 6 unit capacity depending on requirements.		
4.3	CPU enclosures shall not be located underneath a height adjustable surface due to potential crush zones.		
4.4	CPU enclosures shall be equipped as standard with active ventilation fans using quiet, 28db (decibel) 45 cfm fans to keep electronic equipment cool.		
4.5.	CPU enclosures shall have an internal motion sensing LED service light as standard equipment.		
5.	**DRAWERS AND OTHER STORAGE** – Same performance specification as 4.1		
5.1.	Drawer Configuration - 1 File drawer (12") and 1 File drawer (12"). Optional drawer configurations /depths to be available. Please list common sizes.		
5.2.	All drawers to have full extension 100 lb. rated - soft close - steel ball bearing drawer slides.		
5.3.	Mobile peds shall have a weighted base to keep it from tilting when drawers are open.		
6.	**SUPPORT ADJUSTMENT**		
6.1.	Adjustment speed shall not be less than 1.25" per second and not greater than 1.5" per second.		
6.2.	Adjustment controls to be flush mounted into surface or beneath work surface and have a smooth surface for easy cleaning.		
6.3.	Lifting system must operate quietly. Max sound level of 50 db.		

7.	**WIRING MANAGEMENT.** This is for both electrical and data cabling. All cabling must be well managed and clean with easy access when needed.		
7.1.	An appropriate vertical and horizontal cable management system will be essential to maintain the equipment cables to prevent cables from being pinched and damaged. Cable pathways must be easy for the tech to access from the front of the console. Consoles which require rear access will not be considered.		
7.2.	Monitor and Keyboard/Mouse cables must have separate pathways from the computer to the end point for easy access when needed.		
7.3.	Cable entry path from computer cabinet to the console must have an opening large enough for all cables and a hand to fit through.		
7.4.	Cabling shall be guided from CPU cabinet or panel enclosure to the monitor surface of the adjustable table in an energy chain with easy flip-up cable channel access.		
7.5.	Keyboard cabling shall be guided from cabinet through energy chain to keyboard surface without any exposed cables.		
7.6.	Cabling shall be guided through a 3rd energy chain from the back of the monitor surface to the focal depth platform to keep cables organized during focal depth adjustments.		
7.7.	Vendor shall supply 3-5 power bars with a total of about 45 outlets at each station. Power bar cords must be long enough to reach through the station and down into the floor to plug into a power receptacle. Two power bars shall be located close to the monitors to keep monitor power cords short. Colored labels shall be supplied to differentiate between UPS and building power circuits.		
7.8.	Station must have ability to mount power receptacles in cabinets or internal panel frame.		
8.	**HOUSING AND FRAMEWORK.** Any portion of the furniture must withstand the day to day abuse of a 24/7 room.		

8.1.	Housing and framework must be of enough strength to prevent sagging or deflection and capable of sustaining the accumulated weight of monitors, CPUs and associated hardware. All metal framework will be painted or powder coated, with a durable finish. Panel partitions must be attached to the console to assure unified construction for stability and grounding. Must meet ANSI/BIFMA X5.6 and X5.9. Provide test results.		
9.	**PANEL SYSTEM**. Specified to provide for minimal cable management, visual separation of tasks and both sound barrier and sound absorptive functions. Consoles without panel divider systems do not meet base bid requirements.		
9.1.	Internal Cable management within the panel frame system is required. Must have separate horizontal pathways to run electrical and cat5 type cabling from one station to another if needed.		
9.2.	Stackable panel frames - Panel heights shall be vertically modular - The system shall be constructed in a manner to allow additional segments to be "stacked" on base panel frames to change panel heights for future change or reconfiguration.		
9.3.	Panel Segments and Panel Top Caps are to be user removable/replaceable without tools.		
9.4.	Acoustical panel construction – all panels above work surface height shall be of acoustical construction. Panels shall have a minimum of .55 NRC (noise reduction coefficient) rating and Class A flame spread/smoke developed certification. Provide testing results.		
9.5.	Optional panel segment types shall be painted or powder coat paint durable finish, fabric over steel, airflow and clear or frosted glass. Please state which are available.		
10.	**PERSONAL ENVIRONMENT -** Each station shall have a fan, heater and task lights controllable by the operator through an easy to reach controller.		
10.1.	Fans shall be moveable to maximize cooling.		

10.2.	Heaters shall not exceed 500 watts of electrical to minimize total power draw of the station.		
10.3.	Task lights shall be LED and dimmable. Lights that just light the keyboard area are preferred.		
11.	**OPTIONAL EQUIPMENT AND ACCESSORIES**		
11.1.	R-56 Grounding		
11.2.	Cup holder which can be placed out of the way to prevent hitting knees.		
11.3.	Status indicator light with options between 1 and 4 total lights. Must be mountable in different places on the station to maximize viewing in the room depending on need.		
11.4.	Clear or smoked acrylic on top of the panel system.		
11.5.	Option of under lit with LED lights. Logo or descriptions can be etched into acrylic.		
12.	**WARRANTY AND CUSTOMER SERVICE**		
12.1.	Describe your warranty.		
12.2	Describe a typical call for customer service during normal work hours.		
12.3.	Describe a typical call for customer service during off work hours.		
12.4.	Where do parts ship from?		
12.5.	Manufacturer of consoles shall assume primary responsibility for warranty claims – deference to third party suppliers is not acceptable. Customer agrees to assist in troubleshooting procedure.		
13.	**DELIVERY, INSTALLATION AND TRAINING**		
13.1.	Based on the information provided, please identify vendor lead time for manufacturing and delivery of this product to the project location.		
13.2.	All bids to include delivery and installation charges.		

13.3.	Vendor shall schedule a delivery and installation timeline in the form of a GANTT chart.		
14.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

11. Category: Equipment Shelters

11.1 Equipment Shelter Sub-Category: Ballasted

Motorola Solutions Response

Motorola is not bidding this category.

Sub-Category Definition: *Equipment shelters of various sizes specifically designed and constructed for extreme installation locations and to be installed with minimal soil disruption and without site-build foundation; along with necessary accessories and appurtenances, including antenna mast, RF shielding, and grounding systems.*

Example Product: Quantity one (1) — 40 ft.² equipment shelter equipped for helicopter transport.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Shelters11.1-Ballasted*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

Item No.	Performance Requirement	Bidder Complies Y/N	Bidder Clarifications and Comments
1.	**General Requirements**		
1.1.	Shelter area: ~40 ft.² (±10%)		
1.2.	Shelter height: >7 ft		
1.3.	Temperature range: -50°F to +150°F		
1.4.	Rated Wind Velocity: (2" radial ice): >150 mph		

2.	DESIGN AND CONSTRUCTION		
2.1.	Shelter shall be impact resistant to flying debris at the rated wind velocity.		
2.2.	Shelter shall be installed without conventional foundation and with only minimal ground disruption – for installation in sensitive locations.		
2.3.	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.		
2.4.	Floor Load: >180 lbs-ft.^{2}		
2.5.	Roof Load: >100 lbs-ft.^{2}		
2.6.	Roof Impact Resistance: >100 lbs-ft.^{2} with no damage to exterior or interior of the roof or shelter.		
2.7.	Roof and wall exteriors shall be constructed to provide full weather resistance and resistance to flying embers from adjacent fire; asphalt roofing and other combustible materials shall not be used.		
2.8.	Screened Ventilation shall adequately provide to permit occupancy by persons in the event adverse weather prohibits travel.		
2.9.	Cable entry panel: two each, 4-inch ports		
2.10.	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.		
2.11.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.		

3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
4.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

11.2 EQUIPMENT SHELTER SUB-CATEGORY: CONCRETE

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Equipment shelters of various sizes constructed of precast concrete, specifically designed and constructed for extreme installation locations.*

Example Product = Quantity one (1) — 40 ft.² equipment shelter

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Shelters11.2-Concrete*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL REQUIREMENTS**		
1.1.	Shelter area: ~40 ft.² (±10%)		
1.2.	Shelter height: >7 ft		
1.3.	Temperature range: -50°F to +150°F		
1.4.	Rated Wind Velocity: (2" radial ice): >150 mph		
2.	**DESIGN AND CONSTRUCTION**		
2.1.	Shelter shall be impact resistant to flying debris at the rated wind velocity and bullet resistant (30:06 @ point-blank range)		

2.2.	Floor Load: >200 lbs-ft.^{2}		
2.3.	Roof Load: >100 lbs-ft.^{2}		
2.4.	Roof Impact Resistance: >200 lbs-ft.^{2} with no damage to exterior or interior of the roof or shelter.		
2.5.	Adequate Screened Ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.		
2.6.	The structure shall be of precast steel reinforced concrete (5000 psi) panels with welded connections.		
2.7.	All exterior metallic components and fasteners shall be stainless steel or hot-dipped galvanized.		
2.8.	Roof shall be coated/sealed with an elastomeric coating.		
2.9.	All joints shall be sealed inside and outside with an elastomeric caulking.		
2.10.	Flooring: commercial grade floor tile		
2.11.	Doors: galvanized steel primed & painted, 16-gauge door with 14-gauge frame.		
2.12.	Cable entry panel: six each, 4-inch ports		
2.13.	Shelter shall provide for Lightning Protection and grounding features that meet or exceed current industry applicable standards		
2.14.	Vendor shall supply Foundation Design based on customer supplied soils report.		
2.15.	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.		
2.16.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.		

3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
4.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

11.3 EQUIPMENT SHELTER SUB-CATEGORY: FIBERGLASS

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Equipment shelters of molded fiberglass construction, specifically designed and constructed for extreme installation locations.*

Example Product: Quantity one (1) — 40 ft.² equipment shelter equipped for helicopter transport.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Shelters11.3-Fiberglass*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**GENERAL REQUIREMENTS**		
1.1.	Shelter area: ~40 ft.² (±10%)		
1.2.	Shelter height: >7 ft		
1.3.	Temperature range: -50°F to +150°F		
1.4.	Rated wind velocity: (2" radial ice): >150 mph		
2.	**DESIGN AND CONSTRUCTION**		
2.1.	Shelter design and construction shall be impact resistant to flying debris at the rated wind velocity.		

2.2.	Adequate screened ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.		
2.3.	The primary structure shall be a one-piece Fiber Reinforce Plastic (FRP) structural laminate with foam insulating core.		
2.4.	All metallic components shall be stainless steel.		
2.5.	All doors and access panels will be locked.		
2.6.	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.		
2.7.	Vendor shall supply foundation design based on customer supplied soils report.		
2.8.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.		
3.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
4.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

11.4 EQUIPMENT SHELTER SUB-CATEGORY: FRAMED, LIGHT WEIGHT

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Equipment shelters of framed construction; with metal, cement board, or other composite exterior; specifically designed and constructed for extreme installation locations.*

Example Product: Quantity one (1) — 40 ft.² equipment shelter

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Shelters11.4-Framed-LightWeight*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	Shelter area: ~40 ft.² (±10%)		
2.	Shelter height: >7 ft.		
3.	Temperature range: -50°F to +150°F		
4.	Rated Wind Velocity (2" radial ice): >100 mph		
5.	**DESIGN AND CONSTRUCTION**		
5.1.	Shelter design and construction shall be impact resistant to flying debris at the rated wind velocity.		
5.2.	Floor Load: >180 lbs-ft.²		

5.3.	Roof Load: > 80 lbs-ft.^{2}		
5.4.	Roof Impact Resistance: 100 lbs-ft.^{2} with no damage to exterior or interior of the roof or shelter.		
5.5.	Adequate screened ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.		
5.6.	Insulation shall be installed between interior and exterior wall providing a value of >R13.		
5.7.	All exterior metallic components and fasteners shall be stainless steel or hot-dipped galvanized.		
5.8.	Roof and wall exteriors shall be constructed to provide full weather resistance and resistance to flying embers from adjacent fire; asphalt roofing and other combustible materials shall not be used.		
5.9.	All joints/seams shall be sealed and fully weather-tight.		
5.10.	Flooring: commercial grade floor tile		
5.11.	Doors: galvanized steel primed & painted, 16-gauge door with 14-gauge frame.		
5.12.	Cable entry panel: six each, 4-inch ports or equivalent grounded multiport entry panel.		
5.13.	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.		
5.14.	Vendor shall supply foundation design based on customer supplied soils report.		
5.15.	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.		
5.16.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.		

6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
7.	**SHIPPING REQUIREMENTS –** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

11.5 EQUIPMENT SHELTER SUB-CATEGORY: OUTDOOR CABINET

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Equipment cabinets of single and multiple widths of EIA standard 19" and 23" rack, in various depths and heights; specifically designed and constructed for extreme installation locations; providing protection conforming to NEMA-3R, UL50, and UL50E standards, along with associated components and hardware.*

Example Product: Quantity one (1) — Single width, 19" - 84 RU cabinet of 25 inch depth.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Shelters11.5-OutdoorCabinet*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**CABINET DIMENSIONS**		
1.1.	Width: EIA standard 19" rack, single width, ~25 inches		
1.2.	Height: 42 Rack Units (RU), ~ 78 inches		
1.3.	Depth: ~25 inches		
2.	**CONSTRUCTION** – resistant to impact and corrosion		
2.1.	Exterior: high strength aluminum		
2.2.	Hardware: stainless steel		

2.3.	Weather-tight: NEMA 3R standard		
3.	**RACK RAILS**: 2 pair, individually depth adjustable		
3.1.	Two pair		
3.2.	Fully drilled and tapped		
4.	**THERMAL PROTECTION**		
4.1.	Solar shield roof with air gap to dissipate radiant heat.		
4.2.	Solar shield vent and perimeter screened to prevent insect entry.		
4.3.	Insulation bonded to interior walls.		
4.4.	Exhaust fans: 12 VDC, with thermostat.		
4.5.	Cabinet shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.		
5.	**DOORS**		
5.1.	Two (2) doors, front and back.		
5.2.	Continuous hinge.		
5.3.	Three point locking mechanism.		
5.4.	Internal lock or external padlock.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
7.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

Exhibit B-1 Mandatory Technical Requirements

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12. Category: Towers

12.1 Tower Overall Specifications

Motorola Solutions Response

Motorola is not bidding this category.

The following overall specification shall apply to all sub-categories of tower product, as referenced within each specification below. ALL components must be new. ALL components, fabrication and construction must adhere to most recent industry standards as shown below.

NOTE: Individual states may have additional or more restrictive requirements.

Item No.	Description
1.	**Codes and Standards**
1.1.	The International Building Code (IBC) 2018
1.2.	The Operational Safety & Health Administration (OSHA)
1.3.	American Institute of Steel Construction (AISC) — Manual of Steel Construction 15th Edition
1.4.	Telecommunications Industries Association (TIA) Standard TIA-222-H — Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures; and all Addenda
1.5.	American Welding Society (AWS) D1.1 — Structural Welding Code
1.6.	FAA Advisory Circular #AC 70/7460 — Obstruction Marking and Lighting
1.7.	National Electric Code (NEC) — Tower Lighting Kits
1.8.	American Institute of Steel Construction (AISC) — Specification for Structural Joints using ASTMA325 or A490 Bolts
1.9.	Federal Communications Commission Rules and Regulations - Part 17
1.10.	American Concrete Institute ACI 318 — Building Code Requirements for Reinforced and Structural Concrete
1.11.	American Concrete Institute ACI 347 Recommended Practice for Concrete Framework
1.12.	Post-Tensioning Institute (PTI) Recommendations for Pre stressed Rock and Soil Anchors (at customer request)
1.13.	American Society for Testing and Materials (ASTM) for:
1.14.	A36, A441, A500, A572, A588 and A992 — Structural Steel
1.14.1.	A-123 — Zinc (hot-dipped galvanized coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips)

1.14.2.	A-153 — Zinc Coatings (hot-dip) on Iron and Steel Hardware
1.14.3.	B-695 — Coatings of Zinc Mechanically Deposited on Iron and Steel (minimum thickness 0.0026")
1.14.4.	A-385 — Zinc Coatings (hot-dip) on Assembled Steel Products
1.14.5.	A-307 — Low-Carbon Steel Externally and Internally Threaded Standard Fasteners
1.14.6.	A-325 — High Strength Steel Bolts
1.14.7.	A-615 and A-706 — Reinforcing Bars
1.10.8.	ASTM C-9— Ready-mixed Concrete
1.15.	The customer will arrange for building permits and advise the tower manufacturer of local codes and regulations that affect this specification.
1.16.	Where local ordinances specify higher standards than those represented in this specification, the local ordinances shall govern. Pertinent sections of those codes shall be provided by the customer to the tower manufacturer.
1.17.	The customer will report the results of special air navigational studies for marking and lighting towers. If special navigational reports are not a part of the contract, the tower vendor will apply the standards rules of the FAA, FCC and NEC when specified by the customer.
1.18.	Site work specifications on the roadway condition, access, concrete washout, leave no marking, no haz mat, no storage, staking, tower center point locate, no removal of any trees, erosion control. (At Customer Request)
2.	**ANALYSIS AND DESIGN**
2.1.	Towers shall be designed by or under the direct supervision of a registered professional engineer, specifically experienced in the design of radio and microwave towers.
2.2.	All design and analysis computations and installation drawings shall be certified and stamped by a licensed Professional Engineer.
2.3.	The structure shall be designed to support all specified antennas, including future antennas, and to hold all antennas on path within the twist, sway and displacement limits of TIA-222-H. Where multiple frequencies are specified, the most critical twist, sway and displacement limits shall govern.
2.4.	The tower, when fully loaded with antenna assemblies, waveguide, and other appurtenances, shall be designed for the minimum wind loads as specified by TIA-222-H, unless otherwise specified.
2.5.	When specified by the customer, tower designs shall consider the concurrent accumulation of radial ice to all parts of the tower, antennas, and accessories. Loadings shall take into account both the resultant added wind load and dead load.
2.6.	Under basic wind speeds up to 35 mph, all horizontal members shall be capable of supporting a 250 lb. vertical load at mid-span, in addition to all other design loads. A load factor of 1.5 shall be applied to this required load.
2.7.	Tower deflection limits are to be held both vertically and horizontally. Deflection must be determined at each specific point on the tower where an antenna is attached. The twist and sway of the tower at all antenna mounting elevations shall be determined by analytical methods and shall be noted on the formal stress analysis.
2.8.	The antenna loading (present and future) to be applied to the structure is as follows: (Customer to specify).

2.9.	The allowable unit stresses and the actual member stresses resulting from the specified design loads shall not exceed those given in the AISC specifications.
2.10.	All members of the structure shall be considered primary members for the purpose of establishing allowable compressive stresses per AISC, except those members whose sole function is to reduce the kl/r ratio of primary members.
2.11.	For self-supporting and guyed tower footings, the resistance factors for uplift shall be as described in TIA-222-H, latest edition.
2.12.	Foundations shall be designed with sufficient reserve capacity to match the least tower leg reserve capacity.
2.13.	Combined tower wind loads and antenna loads shall be applied in combination such that the maximum axial forces are produced in girts, diagonals, and legs. Multiple analyses may be necessary to ensure that worst case design conditions have been investigated.
2.14.	Provide One (1) set of complete as-built drawings including foundation, grounding, tower, cable bridge, transmission, qualifications of independent inspection individuals
3.	**TOWER PRODUCTS**
3.1.	*Fabrication*
3.1.1.	All fabrication, erection and identification of structural steel shall conform to AISC specifications.
3.1.2.	Under no circumstances shall "dissimilar metals" be used in contact with one another. All structural tower components shall be of steel construction. All steel components shall be fabricated in the United States of America from materials produced in the United States of America.
3.1.3.	Hot-dipped galvanizing of tubular sections shall be inside and outside per ASTM A123 or A153 as appropriate with no less than two (2) ounces of zinc per square foot of surface area throughout, including nuts and bolts.
3.1.4.	Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
3.1.5.	Properly mark and match-mark materials for field assembly. Fabricate for a delivery sequence which will expedite erection and minimize field handling of materials. Or Design/Build entity shall supply all equipment necessary to transport and erect the tower per all applicable laws, codes and standards.
3.1.6	If a round or tubular tower is provided vendor must supply a moisture weep hole at the base of the tower to ensure any accumulated moisture can drain from the bottom of the tower leg. Weep holes shall be at least 0.25 inches in diameter and 0.375 inches in diameter for tubes greater than 2 inches in diameter. Weep holes that are cast into grout placed below the tower baseplate shall be at least 0.75 inches in diameter.
3.1.7	Mill certificates shall be submitted to the State for all tower components BEFORE materials are delivered on site for approval. Any materials delivered on site without prior approval by the State may be rejected and shall be replaced at the Design/Build Entity's expense. A complete set of mill certificates shall be submitted in one package that clearly indicates where each component is used on the structure. Incomplete submittals will be rejected without review. Certificates shall, at a minimum, be supplied for the tower: 3.7.1. Legs; 3.7.2. Bracing; 3.7.3. Flanges and Tab Plates;

<table>
<tr><td></td><td>3.7.4. Bolt Assemblies;
3.7.5. Anchor Bolts;
3.7.6. Step Bolts;
3.7.7. Mounts;
3.7.8. Climbing and Waveguide Ladders; and
3.7.9. Threaded Rods and Associated Components for Rock Anchors.</td></tr>
<tr><td>3.2.</td><td>Connections and Locking Devices</td></tr>
<tr><td>3.2.1.</td><td>No field welding shall be permitted unless specifically approved in writing.</td></tr>
<tr><td>3.2.2.</td><td>All members shall be connected with galvanized ASTM A325 Type 1 high-strength structural bolts unless otherwise approved.</td></tr>
<tr><td>3.2.3.</td><td>The vendor shall provide bolts, nuts and lock-washers in a quantity in excess of the actual bolt count, for each size required for each tower site.
<table>
<tr><th>Bolt Count</th><th>Percentage Excess</th><th>Minimum Excess</th></tr>
<tr><td>0-200</td><td>5%</td><td>1</td></tr>
<tr><td>200-500</td><td>4 %</td><td>10</td></tr>
<tr><td>500-1000</td><td>3%</td><td>20</td></tr>
<tr><td>1000 and over</td><td>2 %</td><td>30</td></tr>
</table></td></tr>
<tr><td>3.2.4</td><td>If the bolts provided by the tower manufacturer are not sufficient length to accommodate all necessary hardware the vendor shall replace the bolts with ones of sufficient length at no cost to the State. All bolted connections shall be installed with a nut locking device. ANCO® style nuts or any other nut that damages the galvanization on the bolt will not be accepted. All bolts shall be installed nut-end-up. All bolts, washers and nuts shall be supplied from one vendor as a fastener assembly, as defined by RCSC. All tower leg members shall be fabricated from pipes or solid rounds. Tower leg members constructed from a lattice design will not be accepted. All self-supporting tower bracing shall be fabricated from angle members. All guyed tower bracing shall be fabricated from solid round members.</td></tr>
<tr><td>3.2.5.</td><td>All towers will be provided with the correct size and length of anchor bolts necessary to carry the anticipated tower loads.</td></tr>
<tr><td>3.2.6.</td><td>All threaded fasteners shall extend not less than 1-1/2 threads beyond nuts and locking devices.</td></tr>
<tr><td>3.3.</td><td>Climbing Ladders</td></tr>
<tr><td>3.3.1</td><td>Lattice self-supporting towers shall be equipped with a 16” outside climbing ladder with 7” toe clearance (for self-supporting towers only) spanning from the ground to the top of the tower structure. The ladder shall meet the requirements of TIA-222-H Section 12
Monopoles - shall be equipped with step bolts starting at 10’ AGL to the top of the tower in conformance with TIA-222-H.
Guyed towers shall have integrated climbing ladders pre-welded into the tower face that is in conformance with TIA-222-H.</td></tr>
<tr><td>3.3.2</td><td>The climbing ladders or climbing pegs shall be supplied with “Tuf-Tug Step Bolt Anchor Bracket – Flat”. The safety-climb system shall be installed at the ladder location and allow a climber to remain connected to the safety-climb for the entire length of the ladder. The safety climb cable shall be a 3/8 (0.375) inch diameter cable constructed from stainless steel and shall comply with the stated requirements.</td></tr>
<tr><td>3.4.</td><td>Rest Platforms</td></tr>
</table>

3.4.1.	For towers greater than 50 feet in height, rest platforms shall be placed at intervals no greater than 50 feet.
3.4.2.	A rest platform will consist of a level platform of grating which allows room for one person to sit or stand.
3.5.	*Work Platforms*
3.5.1.	When work platforms are required they shall consist of level platforms of grating. They shall be either walkways with a minimum width of 24 inches or full coverage platforms and they shall provide reasonable access to appropriate work areas.
3.5.2.	Safety handrails shall be provided around the perimeter of the platforms with the upper railing at 42 inches above the deck and the intermediate rail approximately halfway between the top rail and the deck with a 4" toe board around the outer edge of the platform deck.
3.5.3.	When platform access is via an inside climbing ladder, a hatch shall be provided to eliminate the hazard of an access opening in the work area.
3.5.4.	Work platforms shall be designed to support two concentrated live loads of 250 lbs. each. Live loads imposed by persons on the platform shall be considered to concentrate at such points that will cause maximum stress in the structural members being considered.
3.6.	*Finishes*
3.6.1.	All steel members and fasteners shall be galvanized (zinc coated) per standards in Section 2.0 of this specification.
3.6.2.	Under no circumstances shall any coating on any metal member or fastener be cathodic relative to the base material.
3.6.3.	Use "Devcon", or equivalent, zinc rich paint, or approved equal, to touch up damaged galvanizing. Touch up may be done by either a spray or brush application.
3.6.4.	When required, tower structures shall be painted per FAA specification AC70/7460.
3.6.5.	All painting shall be performed in the shop using an acrylic latex paint specifically formulated for application to galvanized material.
3.6.6.	Field painting shall be limited to touch-up of paint damaged during transportation and erection. Use the same paint as was used in the shop to touch up damaged paint and provide the same protection as original shop painting.
4.	**TOWER ACCESSORIES**
4.1.	*Tower Lighting*
4.1.1.	When required, an obstruction lighting system shall be supplied with the tower and installed as required by FAA.
4.1.2.	All obstruction lighting equipment shall be FAA approved.
4.1.3.	Lighting shall be activated and deactivated by photoelectric control for unattended stations, and the method of activation for attended stations is to be specified.
4.1.4.	All wire shall be SO cable. All electrical installation shall conform to the National Electric Code requirements for outdoor installation.
4.2.	*Lightning Protection*
4.2.1.	All towers shall be supplied with a complete grounding system which conforms to the minimum requirements of EIA RS-222, Section 12, and "Protective Grounding".
4.2.2.	Each tower with a height greater than 30 feet must be equipped with a lightning rod fastened at the extreme top of the tower.

4.2.3	A galvanized steel lightning rod, with minimum dimensions of 5/8 inch diameter by 4 feet long, shall be attached so as to extend a minimum of 36 inches above the highest point of the tower, including all attachments.
4.2.4.	Any and all equipment mounted on the tower shall be so fastened as to be effectively grounded.
4.2.5.	Testing of grounding systems are the responsibility of the radio installer or others, not that of the tower vendor.
4.3.	*Antenna Mounts*
4.3.1.	Pipe mounts shall be plumb in each axis unless specified otherwise.
4.3.2.	Pipe mounts shall be positioned to prevent the antenna feed horn assembly from being directly opposite a tower member. Pipe mount positioning should not prevent direct waveguide installation to any antenna.
4.3.3.	Mounts and stiff arm support locations shall meet or exceed the standards specified by the antenna manufacturer in their latest installation bulletin.
4.3.4.	Waveguide support shall be engineered to provide supports at intervals not greater than 4 feet O.C. This support can be in the form of leg clamps, waveguide ladders or horizontal bridges.
4.3.5.	Waveguide support capacity shall provide for one waveguide run for each present and future antenna, unless otherwise specified.
4.3.6.	The waveguide bridge shall provide support and protection of waveguide runs between the tower and building structures.
4.3.7.	Waveguide support structures shall be grounded in accordance with the tower grounding specification.
4.3.8.	Wall entries must be specified by the customer in terms of sizes and number of openings required. They shall be designed and installed to be completely weatherproof and to accommodate all present and future waveguide runs.
5.	**FOUNDATION DESIGN**
5.1.	The vendor will be required to develop foundation designs based on soil conditions reported by the customer.
5.2.	Foundation recommendations contained within soils reports are general in nature and are made without benefit of tower reaction information. The ultimate authority and responsibility for the foundation design rests with the vendor.
5.3.	In the absence of a customer furnished soils report, presumptive soil conditions as described in TIA Standard TIA-222-H will be assumed for the foundation design.
5.4.	Foundation designs should utilize, as a minimum, 4500 psi concrete and grade 60 reinforcing steel. When specified, a concrete mix design shall be submitted to the tower engineer to ensure that materials are proportioned by weight to produce concrete with a minimum compressive strength at 28 days of 4500 psi. Maximum w/cm 0.45, Slump 3”-5” Air Entrainment Per ACI 318-14 Table 19.3.3.1
5.5.	Where a soil investigation indicates that adequate rock conditions exist, grouted anchors may be designed. Field tension testing shall be done when specified.
5.6.	When abnormal soil conditions are encountered to the extent that additional charges may be incurred, the customer must verify said conditions. Soil tests shall be provided by the customer.

12.2 TOWERS SUB-CATEGORY: ACCESSORIES & APPURTENANCES

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Radio tower accessories, antenna stand-offs, antenna array mounts, ice shields, cable bridges, grounding materials, cable entry-panels, non-penetrating and ballasted antenna mounts, anti-climb panels, and related products.*

Example Product: Quantity one (1) — Non-penetrating/ballasted antenna mount.

For Bidding Purposes: vendor shall assume that (1) customer will resolve all the building structural capacity issues, (2) manage all permits, (3) provide ballast material, and (4) contract for erection services.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled *"ExhibitB1-Towers12.2-Accessories"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**DESCRIPTION**		
1.1.	Non-penetrating mount that provides a single mast.		
1.2.	Load = One (1) panel antenna.		
1.3.	Antenna Height = 10 feet.		
1.4.	Roof Protection pads (1/2" rubber mat) are required.		
2.	Conform to **"OVERALL SPECIFICATION"** requirements.		
3.	**SITE INFORMATION**		
3.1.	Location = 44 56 30.73N 122 56 33.77W / Marion County / Salem, OR 97317 Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		

3.2.	Building has a Flat roof 24' AGL.		
4.	**ANTENNA DETAILS – PANEL ANTENNA**		
4.1.	Dimensions: W x H x T = 10' x 3" omni antenna with one (1) 7/8" coax.		
5.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
6.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.3 TOWERS SUB-CATEGORY: DEPLOYABLE/TEMPORARY

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Deployable radio towers designed and constructed for temporary installation, fixed or transportable configurations, along with specially configured transport vehicles, accessories and appurtenances.*

Example Product: Quantity one (1) — 40-foot extendable tower mounted on 16 foot enclosed cargo trailer for rapid deployment to tactical events.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled *"ExhibitB1-Shelters12.3-Deployable-Temporary"*). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**TOWER**		
1.1.	Structure type: extendable guy wire supported.		
1.2.	Maximum height: 40 feet.		
1.3.	Maximum payload: > 120 pounds.		
1.4.	Maximum antenna load: >15 ft.^{2}.		
1.5.	Rated wind speed: 70 mph.		

1.6.	Antenna mount: 2 inch diameter pipe, with > 72" extending above the tower.		
2.	**TOWER MOUNTING / DEPLOYMENT**		
2.1.	When retracted the tower shall tilt to horizontal position for transport atop the trailer.		
2.2.	A carried mechanism shall allow the tower to move from the stored position to a position where it can be tilted for deployment.		
2.3.	When in the vertical position, the tower sections shall be extended by means of a 12 V DC electric winch, with manual override.		
2.4.	All guy wire materials shall be supplied with the tower.		
2.5.	Guy wire anchors for normal soil conditions shall be supplied with the tower. (Other anchor configurations shall be available as options.)		
3.	**TRAILER**		
3.1.	Gross vehicle weight rating (GCWR): > 6500 lbs.		
3.2.	Number of axles: 2 (tandem).		
3.3.	Overall width: < 102 inches.		
3.4.	Overall length, excluding coupler: <22 feet.		
3.5.	Coupler Size: Standard ball @ 2-5/16 inches.		
3.6.	Electrical connector: Standard 7-pin.		
3.7.	Electric brakes: all wheels.		
3.8.	All DOT required lighting (LED), safety change, and breakaway switch with battery shall be included.		
3.9.	The trailer interior shall be open space ready for customization.		
3.9.1.	Interior width: 96 inches.		
3.9.2.	Interior height: > 76 inches.		
3.9.3.	Interior length: > 200 inches.		
3.9.4.	Doors: rear = full width; right front equal 36 inch.		

4.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
5.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.4 TOWER SUB-CATEGORY: GUYED

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Guy wire supported type towers, tower engineering and design, foundation engineering and design, along with associated components and hardware.*

Example Product: Quantity one (1) — 140-foot guy-wire-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.4-Guyed*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSI/TIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Tower Type = Guy-Wire-Supported.		
1.3.	Overall height = 140 feet, excluding lightning rod.		
2.	Conform to **"OVERALL SPECIFICATION"** requirements.		
3.	Climb-Safety per "**OVERALL SPECIFICATIONS**".		
4.	Foundation design per "**OVERALL SPECIFICATION**" and identified site conditions.		

5.	PE stamped plans per "**OVERALL SPECIFICATIONS**".		
6.	**SITE INFORMATION**		
6.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
6.2.	Topographical Category 3, located at the top of a hill - Crest Height 2,063.		
6.3.	Exposure Classification C, open terrain without forest or significant structures.		
6.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
6.5.	Site Access = gravel road.		
6.6.	FAA Clearance = lighting not required.		
7.	**HEIGHT & LOAD INFORMATION** – includes future capacity – refer to antenna details (section 5)		
7.1.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per 5.1 below).		
7.2.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per 5.1 below).		
7.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per 5.4 below).		
7.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per 5.4 below).		
7.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 270° (per 5.4 below).		
7.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per 5.3 below).		
7.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per 5.3 below).		
7.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per 5.3 below).		
7.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per 5.2 below).		

7.10.	@110-feet = Panel antenna, with mounts – orientation = 160° (per 5.2 below).		
7.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per 5.3 below).		
7.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per 5.3 below).		
7.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per 5.3 below).		
7.14.	@140-feet = Lightning Rod > 10-feet, to extend above topmost antenna.		
8.	**ANTENNA DETAILS**		
8.1.	Microwave Antenna.		
8.2.	Antenna Diameter = 6’ HP microwave dish @ 6Ghz with (1) EW63.		
8.3.1	Mounting Pipe Diameter = 4.5 in.		
8.3.2	Net Weight = 254 lbs.		
8.4.	Panel Antenna.		
8.4.1	Mounting = Flush Mount.		
8.4.2	Dimensions: W x H x T = 3’x18”x6” Panel Antenna with one (1) 7/8” coax.		
8.5.	Base Radio Antenna (Open Dipole).		
8.5.1	Antenna Model # Decibel DB224 with one (1) 7/8” coax.		
8.5.2	Mounted on one (1) 3’ sidearm.		
8.6.	Enclosed Yagi Antenna.		
5.6.1	Antenna Model # Scala RY-900B w/ Radome and one (1) 7/8” coax.		
5.6.2	Mounted on Flush Mount.		

9.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
10.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.5 TOWER SUB-CATEGORY: GUYED, LIGHT

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Light duty lattice type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.*

Example Product: Quantity one (1) — Light duty 60-foot self-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.5Guyed-Light*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSITIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Tower Type = Self-Supported.		
1.3.	Overall height = 60 feet, excluding lightning rod.		
2.	Conform to "**Overall Specification**" requirements.		
3.	Climb-Safety per "**Overall Specifications**".		
4.	Foundation design per "**Overall Specification**" and identified site conditions.		

5.	PE stamped plans per "**Overall Specifications**".		
6.	**LIGHT DUTY DEFINITION**		
6.1.	Decreased height and loading requirements.		
6.2.	Component transport in units of 10-feet or less.		
6.3.	Erection can be accomplished without the use of heavy equipment.		
7.	**SITE INFORMATION**		
7.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
7.2.	Topographical Category 3, located at the top of a hill Crest Height 2,063.		
7.3.	Exposure Classification C, open terrain without forest or significant structures.		
7.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
7.5.	Site Access = gravel road.		
7.6.	FAA Clearance = lighting not required.		
8.	**HEIGHT & LOAD INFORMATION** – includes future capacity – refer to antenna details (refer to antenna details in section 6)		
8.1.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 100° (per 6.3 below).		
8.2.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 200° (per 6.3 below)		
8.3.	@40-feet = Panel antenna, with mounts – orientation = 40° (per 6.1 below).		
8.4.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per 6.2 below).		
8.5.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 180° (per 6.2 below).		
8.6.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per 6.2 below).		

9.	**ANTENNA DETAILS**		
9.1.	Panel Antenna.		
9.1.1	Mounting = Flush Mount.		
9.1.2.	Dimensions: W x H x T = 3'x18"x6" panel antenna with one (1) 7/8" coax.		
9.2.	Base Radio Antenna (Open Dipole).		
9.2.1.	Antenna Model # Decibel DB224 with one (1) 7/8" coax.		
9.2.2.	Mounted on one (1) 3' sidearm.		
9.3.	Enclosed Yagi Antenna.		
9.3.1.	Antenna Model # Scala RY-900B w/ Radome and one (1) 7/8" coax.		
9.3.2.	Mounted on Flush Mount.		
10.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
11.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.6 TOWER SUB-CATEGORY: LATTICE

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Self-supporting type towers (3-leg and 4 leg), tower engineering and design, foundation engineering and design, and associated components and hardware.*

Example Product: Quantity one (1) — 140-foot self-supporting communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are to be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.6-Lattice*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSITIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Tower Type = Self-Supporting, 3-Leg.		
1.3.	Overall height = 140 feet, excluding lightning rod.		
2.	Conform to **"Overall Specification"** requirements.		
3.	Climb-Safety per "**Overall Specifications**".		
4.	Foundation design per "**Overall Specification**" and identified site conditions.		

5.	PE stamped plans per "**Overall Specifications**".		
6.	**SITE INFORMATION**		
6.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
6.2.	Topographical Category 3, located at the top of a hill Crest Height 2,063'.		
6.3.	Exposure Classification C, open terrain without forest or significant structures.		
6.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
6.5.	Site Access = gravel road.		
6.6.	FAA Clearance = lighting not required.		
7.	**HEIGHT & LOAD INFORMATION** – includes future capacity – refer to antenna details (section 5)		
7.1.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per section 5.1 below).		
7.2.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per section 5.1 below).		
7.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per section 5.4 below).		
7.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per section 5.4 below).		
7.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 270° (per section 5.4 below).		
7.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per section 5.3 below).		
7.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per section 5.3 below).		
7.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per section 5.3 below).		
7.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per section 5.2 below).		

7.10.	@110-feet = Panel antenna, with mounts – orientation = 160° (per section 5.2 below).		
7.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 5.3 below).		
7.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per section 5.3 below).		
7.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 5.3 below)		
8.	**ANTENNA DETAILS**		
8.1.	Microwave Antenna.		
8.1.1.	Antenna Diameter = 6’ 6GHz HP microwave dish with one (1) EW63.		
8.1.2.	Mounting Pipe Diameter = 4.5 in.		
8.2.	Panel Antenna.		
8.2.1.	Mounting = Flush Mount.		
8.2.2.	Dimensions: W x H x T = 3’x18”x6” panel antenna with one (1) 7/8” coax.		
8.3.	Base Radio Antenna (Open Dipole).		
8.3.1.	Antenna Model Decibel DB224 with one (1) 7/8” coax.		
8.3.2.	Mounted on one (1) 3’ sidearm.		
8.4.	Enclosed Yagi Antenna.		
8.4.1.	Antenna Model # Scala RY-900Y with one (1) 7/8” coax.		
8.4.2.	Mounted to Flush Mount.		
9.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		

10.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.7 TOWER SUB-CATEGORY: LATTICE, LIGHT

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Light duty lattice type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.*

Example Product: Quantity one (1) — Light duty 60-foot self-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are to be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.7-Lattice-Light*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSI/TIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Tower Type = Self-Supported.		
1.3.	Overall height = 60 feet, excluding lightning rod.		
2.	Conform to "**Overall Specification**" requirements.		

3.	Climb-Safety per "**Overall Specifications**".		
4.	Foundation design per "**Overall Specification**" and identified site conditions.		
5.	PE stamped plans per "**Overall Specifications**".		
6.	**LIGHT DUTY DEFINITION**		
6.1.	Decreased height and loading requirements.		
6.2.	Component transport in units of 10-feet or less.		
6.3.	Erection can be accomplished without the use of heavy equipment.		
7.	**SITE INFORMATION**		
7.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
7.2.	Topographical Category 3, located at the top of a hill Crest Height 2,063'.		
7.3.	Exposure Classification C, open terrain without forest or significant structures.		
7.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
7.5.	Site Access = gravel road.		
7.6.	FAA Clearance = lighting not required.		
8.	**HEIGHT & LOAD INFORMATION** – includes future capacity – refer to antenna details (section 6)		
8.1.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 100° (per section 6.3 below).		
8.2.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 200° (per section 6.3 below).		
8.3.	@40-feet = Panel antenna, with mounts – orientation = 40° (per section 6.1 below).		
8.4.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 6.2 below).		
8.5.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 180° (per section 6.2 below).		

8.6.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 6.2 below).		
8.7.	@60-feet = Lightning Rod > 10-feet, to extend above topmost antenna.		
9.	**ANTENNA DETAILS**		
9.1.	Panel Antenna.		
9.1.1.	Mounting = Flush Mount.		
9.1.2.	Dimensions: W x H x T = 3'x18"x6" panel antenna with one (1) 7/8" coax.		
9.2.	Base Radio Antenna (Open Dipole).		
9.2.1.	Antenna Model # Decibel DB224 with one (1) 7/8" coax.		
9.2.2.	Mounting = one (1) 3' sidearm.		
9.3.	Enclosed Yagi Antenna.		
9.3.1.	Antenna Model # Scala RY-900B with one (1) 7/8" coax.		
9.3.2.	Antenna Mount = Flush Mount.		
10.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser.		
11.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.8 TOWER SUB-CATEGORY: MONOPOLE

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Monopole type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.*

Example Product: Quantity one (1) — 140-foot monopole communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.8-Monopole*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSI/TIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Tower Type = Monopole.		
1.3.	Overall height = 140 feet, excluding lightning rod.		
2.	Conform to **"Overall Specification"** requirements.		
3.	Climb-Safety per "**Overall Specifications**".		
4.	Foundation design per "**Overall Specification**" and identified site conditions.		

5.	PE stamped plans per "**Overall Specifications**".		
6.	**SITE INFORMATION**		
6.1	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
6.2.	Topographical Category 3, located at the top of a hill Crest Height 2,063'.		
6.3.	Exposure Classification C, open terrain without forest or significant structures.		
6.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
6.5.	Site Access = gravel road.		
6.6.	FAA Clearance = lighting not required.		
7.	**HEIGHT & LOAD INFORMATION** – includes future capacity – refer to antenna details (section 15)		
7.1.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per section 15.1 below).		
7.2.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per section 15.1 below).		
7.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per section 15.4 below).		
7.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per section 15.4 below).		
7.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 270° (per section 15.4 below).		
7.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per section 15.3 below).		
7.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per section 15.3 below).		
7.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per section 15.3 below).		

7.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per section 15.2 below).		
7.10.	@110-feet = Panel antenna, with mounts – orientation = 160° (per section 15.2 below).		
7.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 15.3 below).		
7.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per section 15.3 below).		
7.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 15.3 below).		
8.	**ANTENNA DETAILS**		
8.1.	Microwave Antenna.		
8.1.1.	Antenna Diameter = 6’ 6GHz HP microwave dish with one (1) EW63.		
8.1.2.	Mounting = One (1) 4.5” OD Dish Mount with tri-collar.		
8.2	Panel Antenna.		
8.2.1.	Mounting = Flush Mount with one (1) tri-collar.		
8.2.2.	Dimensions: W x H x T =3’x16”x6” panel antenna with one (1) 7/8” coax.		
8.3	Base Radio Antenna (Open Dipole).		
8.3.1.	Antenna Model # Decibel DB224 each with one (1) 7/8” coax.		
8.3.2.	Mounting = 3’ sidearm with tri-collar.		
8.4.	Enclosed Yagi Antenna.		
8.4.1.	Antenna Model # Scala RY-900B with Radome each with one (1) 7/8” coax.		
8.4.2.	Mount = Flush Mount with tri-collar.		

9.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options.		
10.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION

(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)

PRODUCT MODEL NAME/NUMBER	DESCRIPTION

WARRANTY OPTIONS

(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)

WARRANTY OPTION	DESCRIPTION
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

12.9 TOWER SUB-CATEGORY: PASSIVE MICROWAVE REPEATER

MOTOROLA SOLUTIONS RESPONSE

Motorola is not bidding this category.

Sub-Category Definition: *Passive microwave repeater (reflector) structures, structure engineering and design, foundation engineering and design, and associated components and hardware.*

Example Product: One - 20 foot by 32-foot passive microwave repeater.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder's responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font labeled "*ExhibitB1-Towers12.9-MicrowaveRepeater*"). For evaluation purposes, only one product may be offered to meet or exceed these specifications on a pass/fail basis. Bidders are encouraged to submit descriptive literature for the product offered confirming its compliance with specifications. Additional products may be offered for consideration upon award as identified below.

Manufacturer: Click or tap here to enter text. **Product Model Name**: Click or tap here to enter text. **Product Number**: Click or tap here to enter text.

ITEM NO.	PERFORMANCE REQUIREMENT	BIDDER COMPLIES Y/N	BIDDER CLARIFICATIONS AND COMMENTS
1.	**SUMMARY DESCRIPTION**		
1.1.	ANSI/TIA-222-H or current nationally approved standard, Risk Category III, Essential Communications.		
1.2.	Structure Type = Passive Microwave Repeater (Reflector).		
1.3.	Size = 20 feet by 32 feet.		
2.	Conform to **"Overall Specification"** requirements.		
3.	Foundation design per "**Overall Specification**" and identified site conditions.		

4.	PE stamped plans per "**Overall Specifications**"		
5.	**SITE INFORMATION**		
5.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills Wind and Ice 104 mph + 0" ice & 30 mph + 2" ice.		
5.2.	Topographical Category 3, located at the top of a hill Crest Height 2,063'.		
5.3.	Exposure Classification C, open terrain without forest or significant structures.		
5.4.	Geotechnical = TIA 222 - Rev H "Presumptive Soil".		
5.5.	Site Access = gravel road.		
6.	**WARRANTY** – Minimum one (1) year (standard warranty that includes all firmware and software updates within warranty period). Parts and related software will be free from defects in material and workmanship for one year. If equipment fails because of a defect in workmanship or materials within one year from the date of shipment manufacturer shall repair or replace the equipment or part without charge to purchaser. Provide additional warranty options.		
7.	**SHIPPING REQUIREMENTS:** F.O. B. Destination. Shipping charges may be negotiated and mutually agreed between the Purchaser and the Contractor. All shipping charges will be added as a separate line item to the invoice.		

ADDITIONAL PRODUCTS FOR CONSIDERATION *(For informational purposes ONLY. Listed items may be considered as additional option(s) upon award and included in Bidder's offering)*	
PRODUCT MODEL NAME/NUMBER	**DESCRIPTION**
WARRANTY OPTIONS *(Warranty options listed below and may be considered upon award and included in Bidder's offering. Costs for additional warranty options beyond the minimum one-year warranty will be captured in Exhibit C Bid Price.)*	
WARRANTY OPTION	**DESCRIPTION**
TWO-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryTwo-YearWarranty".*
THREE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryThree-YearWarranty".*
FOUR-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFour-YearWarranty".*
FIVE-YEAR ADDITIONAL OPTION	*Describe in the space provided or submit a separate document describing the two-year warranty option labeled, "Exhibit B-1Category/Sub-CategoryFive-YearWarranty".*

SECTION 4

00318 AMD 4 EXHIBIT B-2 SYSTEM SOLUTION NARRATIVE

4.1 INTRODUCTION

Motorola Solutions Inc. (Motorola) is proposing a Conventional P25 radio system solution. As the requirements dictate, the Solution will include repeaters (4), subscriber units (50), console positions (3), control stations (4), and control system (1).

Please refer to the Conventional System Solution diagram included in this section.

The equipment will be assembled and staged in Motorola's CCSi factory prior to field deployment.

4.2 SYSTEM OVERVIEW

This proposed P25 Conventional system includes the following items:

- Four (4) GTR 8000 VHF Base Radios
- One (1) Four-channel VHF RF distribution system, including:
- One (1) Receive Multicoupler
- Two (2) VHF Milled Window Filters
- Two (2) VHF Omnidirectional antennas
- One (1) 4-Channel VHF Transmit Combiner
- Two (2) RF Surge Protection Devices (SPDs)
- Transmission Line
- Fifty (50) APX 900 Model 2 Portable Subscribers
- One (1) K-1 (non-redundant) ASTRO conventional core
- Three (3) MCC 7500E Dispatch Consoles
- One (1) GGM 8000 Conventional Channel Gateway, Low Density
- Four (4) APX Consolettes (control stations)
- One (1) VHF control station RF distribution system

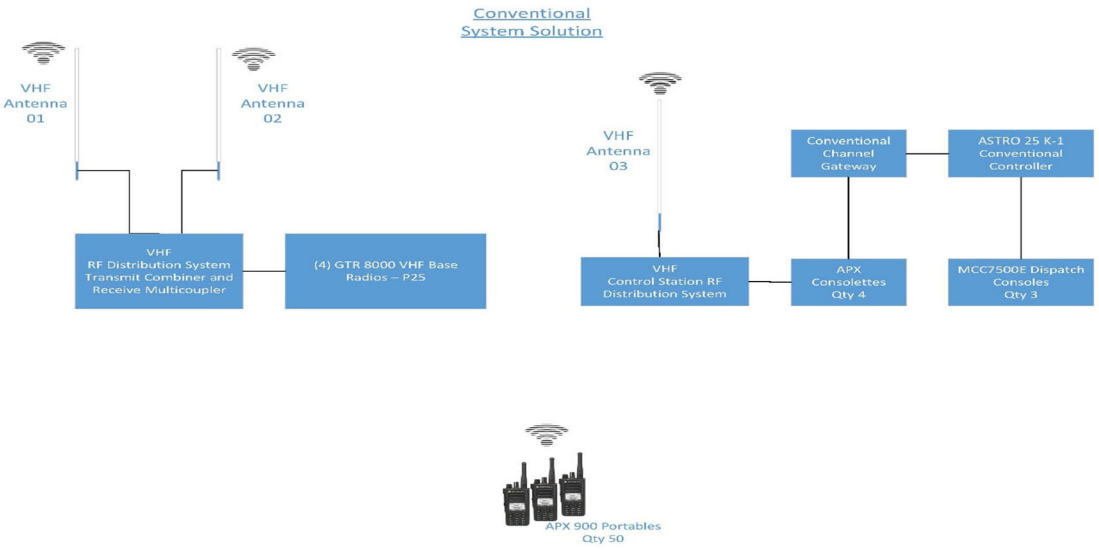
4.2.1 DESIGN ASSUMPTIONS

Statement of the proposed design is based on the following assumptions:

- Site antennas and cables not included.

- Backup power/ UPS not included.
- Changes to equipment due to future system design activity during later project phases will be the responsibility of Customer.
- Motorola Solutions is not responsible for interference caused or received by the Motorola Solutions provided equipment except for interference that is directly caused by the Motorola Solutions-provided transmitter(s) to the Motorola Solutions-provided receiver(s).
- Customer will provide:
  - Site AC power
  - Site DC power, if desired.
  - FCC Licensing
  - Site antennas and cables
  - Surge protection, overcurrent protection and backup power.

4.2.2 System Diagram



4.3 STATEMENT OF WORK

This Statement of Work (SOW) describes the deliverables associated with installing and integrating the system outlined in this submission. The tasks described herein will be performed by Motorola, its subcontractors, and the customer to implement the solution described in the Contract and its Exhibits. It describes the actual work involved in installation, identifies the installation

standards to be followed, and clarifies the responsibilities for both Motorola and Customer during the project implementation. Specifically, this SOW provides:

- A summary of the phases and tasks to be completed within the project lifecycle.
- A list of the deliverables associated with the project.
- A description of the responsibilities for both Motorola and Customer.
- The qualifications and assumptions taken into consideration during the development of this project.

This document is representational and will be customized in scope for each NASPO customer who requests a system proposal from Motorola.

4.3.1 MOTOROLA RESPONSIBILITIES

Motorola's general responsibilities include the following:

- Perform the installation of the Motorola supplied equipment described above.
- Schedule the implementation in agreement with the Customer
- Coordinate the activities of all Motorola subcontractors under this contract.
- Administer safe work procedures for installation.
  Provide Customer with the appropriate system interconnect specifications, including type, connectors, bandwidth, and latency requirements

4.3.2 CUSTOMER RESPONSIBILITIES

Customer will assume responsibility for the installation and performance of all other equipment and work necessary for completion of this project that is not provided by Motorola. General responsibilities for the Customer include the following:

- Provide all buildings, equipment shelters, and towers required for system installation
- Ensure communications sites meet space, grounding, power, and connectivity requirements for the installation of all equipment.
- Obtain all licensing, frequencies, site access, or permitting required for project implementation.
- Provide required system interconnections.
- Customer will provide a dedicated delivery point, such as a warehouse, for receipt, inventory and storage of equipment prior to delivery to the site(s).
- Coordinate the activities of all Customer vendors or other contractors.

4.3.3 ASSUMPTIONS

Motorola has based the system design on information provided by NASPO obtained during the RFP process regarding this sample system. As specific requirements and requests from a customer require deviation from our assumptions here, a revised proposal with the necessary changes and adjusted costs may be required. Changes to the equipment or scope of the project after contract may require a change order.

- All existing sites or equipment locations will have sufficient space available for the system described as required/specified by R56.
- All existing sites or equipment locations will have adequate electrical power in the proper phase and voltage and site grounding to support the requirements of the system described.
- All existing towers will have adequate space and size to support the antenna network requirements of the system described.
- Any site/location upgrades or modifications are the responsibility of the customer.
- Any tower stress analysis or tower upgrade requirements are the responsibility of the customer.
- Approved FCC licensing provided by the customer.
- Frequencies for the system shall be provided by the customer which meet the requirements provided by Motorola.
- Approved local, State or Federal permits as may be required for the installation and operation of the proposed equipment are the responsibility of the customer.
- Any required system interconnections not specifically outlined here will be provided by the Customer. These may include dedicated phone circuits, microwave links or other types of connectivity.
- No coverage guarantee is included in this proposal.
- 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 the Customer's system experience interference, Motorola can be contracted to investigate the source and recommend solutions to mitigate the issue.
- No coverage guarantee is included or implied for this proposal.
- Logging recorder and Archiving Interface Server (AIS) are not included in this design.
- Any third-party interfaces including paging, CAD, 911 and telephony (if applicable) are not included in this proposal.
- Performance bond is not required.
- Prevailing wage is not required.

- Contract terms to be mutually agreed upon.
- Work is performed on non-holidays during normal business hours, Monday – Friday, 8am – 5pm.

4.3.4 RESPONSIBILITIES & DELIVERABLES MATRIX

Motorola Solutions is providing to NASPO the installation and configuration of the equipment outlined in the System Description above. This section delineates the general responsibilities between Motorola Solutions and the customer.

4.3.5 Responsibility Matrix

Tasks	Motorola	Customer
PROJECT INITIATION		
Contract Finalization and Team Creation		
Execute contract and distribute contract documents.	X	X
Assign a Project Manager as a single point of contact.	X	X
Schedule project kickoff meeting.	X	X
Deliverable: Signed contract, defined project team, and scheduled project kickoff meeting.		
Project Kickoff and Design Review		
Present project scope and objectives.	X	
Review SOW responsibilities and project schedule.	X	X
Present the system design and operational requirements for the solution.	X	
Present installation plan.	X	
Assume responsibility for issues outside of Motorola Solutions' control.		X
Provide minimum acceptable performance as specified by Motorola for customer provided hardware, software, LAN, WAN and internet connectivity.		X
Deliverable: Finalized design documentation based upon "frozen" design, along with any relevant Change Order documentation.		
SYSTEM INSTALLATION		
Equipment Order and Manufacturing		
Create equipment order and reconcile to contract.	X	
Manufacture Motorola Solutions-provided equipment necessary for system based on equipment order.	X	

Procure non-Motorola Solutions equipment necessary for the system.	X	
Deliverable: Equipment procured and ready for shipment.		
System Staging		
Set up and rack the solution equipment.	X	
Power up, load application parameters, program, and test all staged equipment.	X	
Tasks	**Motorola**	**Customer**
Perform factory functional acceptance tests of system features	X	
Deliverable: System staged and ready for shipment.		
Equipment Shipment and Storage		
Provide secure location for solution equipment.		X
Pack and ship solution equipment to the identified, or site locations.	X	
Receive solution equipment.		X
Inventory solution equipment.	X	
Deliverable: Solution equipment received and ready for installation		
General RF Installation		
Deliver solution equipment to installation location.	X	
Coordinate receipt of and inventory solution equipment with designated contact.	X	
Install all proposed fixed equipment as outlined in the System Description based upon the agreed-upon floor plans, connecting audio, control, and radio transmission cables to connect equipment to the power panels or receptacles, and audio/control line connection points. Installation performed in accordance with R56 standards and state/local codes.	X	
Deliverable: Equipment installed.		
Console System Installation and Configuration		
Tasks	**Motorola**	**Customer**
Install three (3) MCC7500E consoles in the Dispatch Center on existing customer-provided desk space.	X	
Permanently install, cable, and ground equipment in the backroom in customer provided cabinet space.	X	
Perform console programming and configuration.	X	

Deliverable: Console system equipment installation completed.		
SYSTEM OPTIMIZATION AND TESTING		
Tasks	**Motorola**	**Customer**
Functional Acceptance Testing		
Acceptance Test Plan to be reviewed and agreed upon during CDR	X	X
Tasks	**Motorola**	**Customer**
Verify the operational functionality and features of the solution supplied by Motorola Solutions, as contracted.	X	
Witness the functional testing.		X
Document the results of the acceptance tests and present for review.	X	
Review and approve final acceptance test results.		X
Deliverable: Completion of functional testing and approval by Customer.		
PROJECT TRANSITION		
Cutover		
Finalize Cutover Plan.	X	X
Cut over Radio and Console system.	X	
Resolve punchlist items, documented during the Acceptance Testing phase, in order to meet all the criteria for final system acceptance.	X	
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 items.		X
Deliverable: Migration to new system completed, and punchlist items resolved.		
Finalize Documentation and System Acceptance		
Receive and approve documentation.		X
Execute Final Project Acceptance.	X	X
Deliverable: All required documents are provided and approved. Final Project Acceptance.		

4.4 WARRANTY

4.5 ESSENTIAL SERVICES-RF SITES

4.5.1 Essential Services Overview

The Essential service package includes the services described below, which will be provided during the 12-month warranty period. Thereafter, Motorola will work with the customer to modify the existing service agreement to include the assets contained in this proposal.

The services included during the warranty period are:

- Service Desk
- Technical Support.
- Network Hardware Repair.
- Self-Installed Security Patches.

These services will be delivered to the State through a centralized team within Motorola's Solutions Support Center (SSC), which operates on a 24 x 7 x 365 basis; and through Motorola's Repair Depot, which will ensure that equipment is repaired to the highest quality standards.

4.5.2 Essential Services Descriptions

4.5.2.1 Centralized Service Delivery

Centralized support will be provided by Motorola's support staff, located at our Service Desk and Solutions Support Center (SSC). These experienced personnel will provide direct service and technical support through a combination of Service Desk telephone support, technical consultation and troubleshooting through the SSC, and ongoing network monitoring of the State's system.

Motorola will provide Service Desk response as a single point of contact for all support issues, including communications between the State, third-party subcontractors and manufacturers, and Motorola. When State personnel call for support, the Service Desk will record, track, and update all Service Requests, Change Requests, Dispatch Requests, and Service Incidents using Motorola's Customer Relationship Management (CRM) system. The Service Desk is responsible for documenting the State's inquiries, requests, concerns, and related tickets; tracking and resolving issues; and ensuring timely communications with all stakeholders based on the nature of the incident.

As tickets are opened by the Service Desk, issues that require specific technical expertise and support will be routed to our Solutions Support Center (SSC) system technologists for Technical Support, who will provide telephone

consultation and troubleshooting capabilities to diagnose and resolve infrastructure performance and operational issues. Motorola's recording, escalating, and reporting process applies ISO 90001 and TL 9000-certified standards to the Technical Support calls from our contracted customers, reflecting our focus on maintaining mission-critical communications for the users of our systems.

4.5.2.2 Network Hardware Repair

Motorola's authorized Repair Depot will repair the equipment provided by Motorola, as well as select third-party infrastructure equipment supplied as part of the proposed solution. The Repair Depot will manage the logistics of equipment repair (including shipment and return of repaired equipment), repair Motorola equipment, and coordinate the repair of third-party solution components.

4.5.2.3 Security Management Operations

The proposed Self-Installed Security Patches Service will provide the State with security updates that are pre-tested by Motorola and installed by State personnel. Motorola's dedicated vetting lab will pre-test security updates for the proposed ASTRO 25 system release. When appropriate, Motorola will make these updates available to outside vendors in order to enable them to test each patch, and will incorporate the results of those third-party tests into the updates provided to the State. Once an update is fully tested and ready for deployment in the State's system, Motorola will post it to a secured extranet website and send an email notification to the State. If there are any recommended configuration changes, warnings, or workarounds, Motorola will provide detailed documentation for the State.

SECTION 5

00318 AMD 4 EXHIBIT B-3 EXPERIENCE, QUALIFICATIONS AND SERVICES

EXPERIENCE, QUALIFICATIONS, CERTIFICATIONS	WRITTEN RESPONSE
BIDDERS OFFERING PRODUCTS **Instructions:** *Bidders offering products for any category/sub-category must provide a written response to each item as instructed below.*	
1) List any factory trainings and certifications your company's staff has attended/acquired to support the proposed infrastructure network, and all related subsystem equipment.	[List all factory trainings and certifications here or submit a separate document labeled "ExhibitB3-TrainingsCertifications"] Key personnel who would support the implementation and support of Public Safety Communication system infrastructure products would include Project Managers, Engineers, System Technologists, Field Service Engineers, Service Delivery Managers, System Support Center, and other specialized staff depending on the scope of the system.Motorola Solutions has a full training curriculum as a requirement for each role.The complete training catalog with these external offerings can be found in the attachment "Exhibit B3-Services-Training" which can be found in Additonal Information: Section 9 of our proposal. The other portion of the training is conducted internally by product experts and includes both classroom and a lab environment with hands on training and would not be available for customers. Motorola tracks the following training and certifications for the staff tasked with supporting our Public Safety infrastructure in the field: **Training Classes to Track:** - Antenna System Analysis (SRV2012) - Astro Ethernet Testing

	- Astro Networking I - Astro Firewalls/CEN - End-to-End Audio - Link Verification - LMR Master Basics - Network+ Bootcamp - Passive Intermodulation - R56 Installer/Auditor (NST9257) - Security+ Bootcamp - Signal Investigation Techniques **CompTIA Certifications:** - CompTIA Network+ - CompTIA Security+ **ETA Certifications:** - Antenna System Analysis (ASA) - APX Radio Technician (APX) - Associate (CETa) - Astro 25 RF Site Preventative Maintenance (A25-SPM) - Certified Service Manager (CSM) - Communication Site Inspector / Auditor (CSIA) - Communication Site Installer (R56) - Computer Service Technician (CST) - Customer Service Specialist (CSS) - Data Cabling Installer (DCI) - Industrial Electronics (IND) - Information Technology Security (ITS) - General Communications Technician I (GCT1) - General Communications Technician II (GCT2) - GTR 8000 P25 RF Site Performance Verification (GTR-SPV) - GTR 8000 Repeater Site Technician (GTT) - Master CET (CETma) - Master Specialty (CETms(RF or IT)) - M Core Technician (MCT 7.x) - Microwave Radio Technician (MRT) - Mobile Communications and Electronics Installer (MCEI) - Network Computer Technician (NCT) - Network Systems Technician (NST) - PIM - RADAR (RAD) - RF Signal Investigation Techniques (RFSIT) - T1 Link Verification (T1LV) - Telecommunications (TCM) - Wireless (USMSS/TRN/WCN) - Wireless Network Technician (WNT)

2) Please disclose the cumulative years of experience your current company's Public Safety Communications Products Technical Experts have performing Radio programming/installation work.	Motorola's technical experts have the most cumulative years of experience in the industry, with over 1,000 years of current experience. The Field Services Organization "FSO" is a nationwide organization of over 500 trained and certified Motorola technicians. They are responsible for the sustainment of our government and commercial LMR systems and related applications. FSO provides onsite support, preventative maintenance and 24X7 support. They support our customers by providing best in class, highly qualified and trained service delivery. From the Service Shop perspective, Motorola has over 600 registered service locations across North America and our collective service presence remains significant in the industry. The Motorola Servicer Program is designed to recognize and reward a Servicer's level of commitment and investment in the quality of service provided to our customers. The Servicer program is founded on Motorola's key values and expectations from our Servicers.
3) Does your company utilize partners for providing products and services? If so, describe: • *process to qualify partners and sales personnel to represent the product, including any certifications* • *how partners are contractually bound to the Master Agreement terms and conditions,* • *how partner sales will be accurately tracked and reported, and* • *remedy plan if the partner or sales personnel are not in compliance.*	Please describe partner utilization here or submit a separate document labeled, "ExhibitB3-PartnerUtilization" Motorola has two types of Partners involved in sales to NASPO S&L customers. We do not utilize MSI dealers/resellers to sell to end customers on NASPO. 1. Manufacturer's Representatives (MR's) - provide sales activities to assigned S&L customers for MSI direct NASPO sales to S&L customers 2. Motorola Service Providers (MSP's) - MSI subcontractors for MSI sold Services; project management, system integration, installation, and maintenance & lifecycle agreements The **Manufacturers Representative (MR)** program is designed to improve Motorola Solutions market reach and account coverage by leveraging a single integrated distribution strategy to combine MSI's Go-to Market Resources with those of our MR Partners so as

	to deliver unparalleled value and ease of doing business to our Customers. The Motorola Field Team designates the accounts, develops or approves the strategy for the account, determines the products to be offered, and establishes the selling or contract price. The business is transacted in Motorola's name allowing the utilization of State and Local Purchasing contracts and sole source procurements and combines high touch customer consultation with ease of doing business all for the benefit of our Customers. The Manufacturer's Representative (MR) Sales Program requires its representatives to complete necessary training to ensure that our MRs are familiar with our products and how those products fit within the needs of our customers. There are 2 levels of certification for our Manufacturers Representatives (MR) participants which include P25 Sales Associate Certification and P25 Sales Professional Certification. Each level of certification comprises a set of courses, known as a "certification" bundle accessed via our Learning Experience Portal (LXP). To achieve a certain certification, students must complete all of the required training courses listed within the certification bundle. A student must obtain the P25 Sales Associates Certification in order to subsequently obtain a P25 Sales Professional Certification. To achieve certification, the applicant will go into the MSI Learning Experience Portal (LXP) and enroll in the corresponding program. Once the student has completed the training and passed the exams with a score of at least 80%, he/she is certified. The student will obtain a certificate that is valid for two years. If a certification expires, the student will lose their certification status. Once a certification expires, the student must complete all of the required training starting at the lowest certification level to become certified again.

	Members of the Service Partner Program are required to meet a number of requirements to be admitted into the Motorola Service Partner Program. Depending on the service partner level, each service partner is required to have individuals in their company with the following training and certifications: 1. CET certification, Associates Degree in Electronics Engineering Technology, or equivalent 2. Motorola R56 Certification 3. Motorola Service Specialist Program (Technical Associate) Certification: The Service Specialist Certification Program includes a wide selection of classes from our comprehensive technical training portfolio and includes the following certification and underlying training courses: P25 System Technical Associate Certification - ASTRO 25® Subscriber Portfolio Overview - ASTRO 25® IV&D System Overview - Introduction to R56 - Basic Radio 4. Motorola Service Specialist Technical Certification: This certification includes the following certifications which also include a wide selection of classes from our comprehensive technical training portfolio that must be completed to achieve these certifications. - APX Subscriber Technical Associate Certification - MCC7000 Console Maintenance Certification - ASTRO 25® Repeater Site Lifecycle Maintenance Certification - ASTRO 25® Simulcast Site Lifecycle Maintenance Certification - ASTRO 25® Master Site Lifecycle Maintenance Certification

	The Motorola specific training consists of a combination of both online and instructor led training. The instructor led training includes lab work where the technician gets hands on experience with our equipment. Once the training course has been completed, the technician is required to pass the corresponding course exam and the certification lasts for 2 years. After the 2 year period, the technician will need to recertify to keep their certification current. Please note that all technicians must also be certified in the underlying technology for the radio systems they support. With respect to the tracking of sales, Manufacturer's Representatives (MRs) serve as an extension of the MSI direct account sales team and perform sales functions on behalf of Motorola. Sales facilitated by MRs are considered MSI sales; the end customer would issue a purchase order to Motorola and Motorola would fulfill the order. In contrast, dealers and resellers work independently. We do not allow MSI dealers/resellers to sell to end customers through NASPO. All MSI sales, both direct and through MRs, to NASPO customers are tracked and reported by our Sales Operations Dept, as described in the current NASPO Master Contract #06913. With respect to compliance, all MSI sales activity to NASPO customers is based on account assignment. If our sales team is not in compliance, NASPO customers can communicate the issue to the MSI contract point of contact so that issues can be remedied. Remedies could include but not limited to customer communication & engagement, correction to customer quotes, account assignment adjustments, training on contract requirements, etc.

	If a service partner is not in compliance, we do have a support and/or escalation process to resolve the issue. The Motorola Field team works very closely with our customers to ensure that our systems are properly supported thus if a partner/subcontractor is not performing properly, we put the partner/contractor on a Performance Improvement Plan (PIP) in an attempt to remedy the situation. If the PIP does not resolve the situation, Motorola Solutions, at its discretion, may replace or terminate the service partner.
4) Please describe your company's ordering process. Include sub-contractors, authorized resellers/dealers/manufacturer representative's role in the ordering process.	Describe ordering process here or submit a separate document labeled, "ExhibitB3-OrderingProcess" Motorola employs the largest field sales organization in the public safety communications industry. Every NASPO customer is assigned a direct Motorola sales representative. The Motorola sales representative will be the first line of support for all of your equipment ordering and processing needs. In addition to the direct sales organization, NASPO customers will also be able to call upon our extensive nationwide Manufacturer Representative (MR) network. MRs serve as an extension of MSI direct account sales team and perform sales functions on behalf of Motorola. MSI Account Managers and MRs utilize our Motorola Online tool (MOL), Configure Price Quote tool (CPQ), and System Proposal presale tools to deliver quotes & proposals to NASPO customers. All sales of equipment, services, system integration, software, and video solutions are quoted and processed via these tools. As mentioned earlier, we do not allow MSI dealers / resellers to sell to end customers on NASPO. Motorola's NASPO customers also can simply login to motorolasolutions.com and instantly access our most popular services and resource center content: - Case Management - Software Downloads - Service Contracts - Repair Management

	▪ Learning Experience Portal
5) Please describe your company's escalation process for technical and billing issues.	Describe escalation process here or submit a separate document labeled, "ExhibitB3-EscalationProcess" **Technical Issues:** Motorola offers a 4 tiered approach to addressing technical issues from the field. When a support request is made to the Support Center, a case is raised and Tier 1 support is engaged.This front line, basic level of support handles around 80% of incoming issues.Common areas include basic troubleshooting, installation and configuration issues. If Tier 1 support is not able to resolve the issue, Advanced Level Tier 2 support is engaged for approximately 15% of the issues.The typical range of issues cover integration, interoperability, advanced features, system bugs and performance degradation. Tier 3 or Specialized Support will be called in for about 4% of the issues. Tier 3 will typically involve remote troubleshooting, test lab problem reproduction, and Engineering/Product group consultation. The final tier of support is Tier 4 which covers around 1% of all issues. In these cases, direct Development or Vendor support is required for problem resolution. If onsite support is required, Motorola Solutions will use either Motorola Field Service Technicians and/or certified partners/subcontractors to perform work on our customers' systems based on the geographic area and availability. For example, even though we may have a Motorola Field Service Technician in a geographic area, there may be a need to use a partner/subcontractor if that technician is unavailable due to circumstances such as a technician being at another location, paid time off (sick time or vacation) and/or after hours support. Please note that since our systems are mission critical, we do use a combination of Motorola

	technicians and partners\subcontractors to provide 24x7 support to our customers. **Billing Issues:** Please see Exhibit A-2 Bidder Profile Contract Management table. Please use our standard line for the Call Center: **Phone: (888) 919-6551, then press 2.** The Call Center team will work to quickly resolve the issue; however, if the issue needs to be addressed by another team member, a case will be documented in the Motorola system and escalated. The customer will receive a case number for future reference. Additionally, customers will have access to Motorola online (our customer extranet) where they can access their account information, make payments and create 'contact us' cases if they need additional help. Like an Email, these requests route to Customer Service and are responded to within 48-72 business hours.
6) Please describe your company's standard customer/technical support services during regular business hours and time zone support will be provided. (For example: Monday through Friday 8:00 am – 5:00 pm ET). **Provide a copy of your company's service level agreement (SLA) to include tiered support and response times for each tier and after hours support.**	Describe customer service support here or submit a separate document labeled "ExhibitB3-StandardSupport" Motorola understands that budgets must be adhered to, that downtime needs to be minimal, and that system and device availability must be maximized. Our customers need a technical support services program that protects mission-critical assets/technology from every angle. Customers require proactive technical support, security updates, ongoing maintenance, and on-site response and spares when operations-critical devices are malfunctioning—regardless of the cause. With Motorola's service program, NASPO participating agencies/states will have access to tiered support representatives. Support for non-emergency issues is offered during local business hours between 8 A.M. and 5 P.M in the continental United States, with emergency support available 24x7x365 through our Help Desk. For subscriber devices with Service-from-the Start, repairs are seen within 3 business days

	instead of the typical 10 business days with the standard warranty coverage. Alternatively, Motorola offers customized plans for support where even without the purchase of the technical support service, customers can have access to technical support on a time and material basis. Additionally, every Motorola customer also has the ability to engage the Customer Support Center (CSC) with any technical question or concern that may arise during the ordering, installation, or utilization of your new Radio equipment during normal business hours. Please see Section 9: Additional Information for ADVANCED PLUS SERVICES SOW for SLA information regarding tiers and response times.

BIDDERS OFFERING SYSTEM SOLUTIONS (RADIO, MICROWAVE OR POWER) **Instructions:** *In addition to the narratives above, Bidders offering a solution must provide a written narrative to each item listed below as instructed.*	
1) List any certifications or specialized training which makes your company best suited to offer complete Public Safety Communications or Power System Solutions.	List all certifications or specialized training here or submit a separate document labeled "ExhibitB3-SolutionCertifications" Motorola Solutions' has provided public safety solutions for over 70 years. Motorola is a leader in P25 standards-based systems with over 400 P25 trunked systems and over 2000 conventional P25 systems handling over 2 million P25 capable subscribers. Key personnel who would support the implementation of a complete Public Safety Communication system would include Project Managers, Engineers, System Technologists, Field Service Engineers, Service Delivery Managers, System Support Center, and other specialized staff depending on the scope of the system.Motorola Solutions has a full, robust training curriculum as a requirement for each role.The complete training catalog with the external offerings can be found in the Section 9 Additional Information "ExhibitB3-Services-Training". Supplemental training for key personnel is conducted internally by product experts. Key certifications would include ISO 9001, ISO 27001, NIST SP-800-53 and ITIL 4.
2) List the brands of products for which your company has factory trained and certified Installers.	List all brands of equipment your company's installers are trained and certified here or submit a separate document labeled "ExhibitB3-SolutionProducts" Motorola installation personnel are trained in classroom settings as well as lab environments to ensure they are prepared for field work covering both Motorola and third party branded products, such as: - Cisco - Fortinet - NICE - Extreme Networks Each new installer is paired up with an experienced and certified installer to provide practical training on these products.

	In some cases, Motorola will bring in third party vendors such as HP, Aviat, Microsoft, Aruba, NEC, etc. to provide the services and expertise required for those products during field deployment. Depending on the scope of the system solution, third parties may not be applicable.
3) Project Manager (PM). Please disclose the name and employment history of each project manager within your company and include how they meet the requirements below. The PM shall be an employee of the proposer at the time of the response submission. The PM shall have a proven record of experience in projects of similar size and scope. PM shall bear full responsibility for: • Supervising and coordinating the installation, and • Deployment of the communications system, and • Development and acceptance of the Project Management Plan (PMP), and • Manage the execution of the project against that plan, and • Oversee the day-to-day project activities. The State reserves the right to accept or reject the identified PM. If, during the term of the contract, it is necessary to replace the PM, State reserves the right to accept or reject the newly identified PM.	Please include project manager information here or submit a separate document labeled "ExhibitB3-ProjectManagers" Motorola's PM team is territory based with over 200 members nationwide. Each NASPO customer project would be assigned a PM based on the territory. Each PM will have a proven record of experience in order to comply with the NASPO requirements. All PM's are trained and certified in a cross functional suite of areas and have a variety of experience. Please see Section 10: Attachments Exhibit B3-Project Managers: We have included six PM's and their resumes. These six are responsible for the State of Washington and are representative of Motorola's Project Management capabilities. Motorola's Project Management teams use a fully aligned and integrated project management process. This Motorola Services Framework aligns PMP-certified personnel with a systems integration methodology and Six Sigma quality tools. The goal of Motorola's integrated project management processes and supporting tools is to manage the variables that can adversely affect our ability to successfully complete projects for our customers within budget and on schedule.
4) Reporting. Please provide report examples for a minimum of three (3) installed and fully operational systems that best emulate the proposed system. At a minimum, report should include a detailed description of the system and its significant operational features/components (e.g., number of sites, channels, and subscribers) as well as a current customer contact including name, address, and phone number, title, department and system responsibility.	[*Please include report examples here or submit a separate document labeled "ExhibitB3-Reports"*] Please see Section 9: Additional Information Exhibit B-3 Reports.

SERVICES **Instructions:** *Bidder will provide a written response for all services offered below as instructed. Services will not be evaluated, however; any services listed below will be included and available for use in Cooperative Purchasing Master Agreement upon award. Services may be added upon approval. Pricing for services must remain constant for the entire Master Agreement term or as mutually agreed in Participating Addendum.*	
Service	**Description**
Consultation	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "ExhibitB3-Services-Consultation". Motorola has deployed over 400 P25 trunked systems and over 2000 conventional P25 systems with 22 of these being statewide. Motorola monitors over 500 systems and over 4000 sites in our Network Operations Center to provide public safety agencies with the high performance required. See the MSI Services Whitepaper in Section 6 EXHIBIT B-3-OTHER MISSION-CRITICAL OPERATIONS for a summary of the variety of services Motorola offers in the areas of planning, implementation and ongoing operational support.
Project Management	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-ProjMgt*". Motorola has deployed over 400 P25 trunked systems and over 2000 conventional P25 systems with 22 of these being statewide. Motorola monitors over 500 systems and over 4000 sites in our Network Operations Center to provide public safety agencies with the high performance required. See the MSI Services Whitepaper in Section 6 EXHIBIT B-3-OTHER MISSION-CRITICAL OPERATIONS for a summary of the variety of services Motorola offers in the areas of planning, implementation and ongoing operational support.
Implementation	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-Implementation*". Motorola offers a full suite of Implementation Services to ensure any product or system procured is tested and verified to be working and meeting customer expectations.

	Motorola will go over in detail the Implementation timeline with the customer prior to the actual field work, ensure any questions are addressed and provide the professional resources to complete the project successfully in the agreed upon timeframe. Once the implementation is complete, Motorola will review all expectations and ensure the project and any action items are addressed and complete.
Installation	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-Installation*". Motorola has a fully trained and experienced installation staff across the US to provide the installation services for products and systems procured through NASPO. Services include cold install of hardware, software loading, configuration, and setup to ensure the software and hardware is ready for final cutover.
Configuration/Design	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-ConfirDesign*". Motorola has a staff of System Engineers and System Technologists across the US to ensure the needed configuration and design services are executed for products and systems procured through NASPO.The staff of experts will meet with the customer beforehand to go over the design and ensure all prerequisites are in place and the entire scope is understood.The experts will be directly involved in any staging that takes place prior to field implementation and then in the final field work.The staff assigned to the project will be involved for the duration to ensure consistency is maintained.
Radio Programming	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-Programming*". Motorola has an internal staff and its network of service shops to ensure the full suite of Radios offered through NASPO are programmed for the customer and ready for integration into the network. The assigned resources will ensure that all data for programming is collected ahead of time and the timeline is agreed upon with the customer.The resources will also provide training if this is part of the scope.

Product Recycling/Buy Back	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-RecyclingBuyBack*". Motorola Solutions offers takeback free of charge to the customer of MSI products in most regions of the world. Customers can log on to our Takeback Portal (located here on the MSI external website) and create a request for product takeback.They will be contacted by an approved recycler for pickup of the items. There is no charge for this service but the customer will need to create an account so the recycler has address, contact info, etc.
Training	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "ExhibitB3-Services-Training". Motorola Solutions Worldwide Education organization strives to enable each learner to acquire the knowledge and skills needed to enhance their performance and maximize the return on their learning investment. We have over 200 people dedicated to learning development and execution. Our instructors are subject matter experts in a wide range of categories and on average have 10 years of training experience. Our courses are divided to meet the needs of three distinct groups: 1. System Administration - For those who operate the system or network on an ongoing basis, our system management courses will ensure they have a full understanding of the features, functionality, and management applications to improve the ongoing operation of their system. 2. Maintenance – For those who have the responsibility to assure a network, device, or system is kept fully operational, we provide courses that focus on gathering and analyzing system information to implement appropriate actions that return a system to full operational status.

	3. End User - The successful implementation of your communications system depends on users that are confident in their use of the system. Users of your mobile and portable radios as well as your dispatchers using your consoles require training to understand its basic operation, features and functions. The MSI Education organization creates content to address the needs of the learner. A number of our courses are offered in multiple modalities to allow for the learner to have the option that best suits him or her. Our most common modalities are: **Online** - For those who learn best online, we have instructor lead online courses, whereby you have the ability to interact with both the instructor and other classroom participants. These courses are offered at set times. In addition, we have self-paced courses available at any time. **On Site** - Field class delivery is “tailored” to the customer’s specific system. The students benefit from working on their own systems, at their home location and within their schedules. Our onsite training solutions deliver a combination of online training and field based instructor-led training in classrooms at the customer’s location using operational equipment. Motorola Solutions employs knowledgeable and experienced instructors to deliver well designed courseware and integrated lab activities. **End User** - Training is based upon several key criteria. Course design is driven by an analysis of student needs. It focuses on specific application rather than theory. Learning objectives are based upon what students need to accomplish on the job. Hands-on lab opportunities using the customer’s specific job aids are incorporated to maximize learning and retention. **Resident** - Resident classes are open to all Motorola customers. These courses are comprehensive and are not tailored to any one customer’s system. Students benefit from other students’ experiences and are allowed to take systems out of service.

	These courses provide optimal “hands-on” training. Motorola Solutions Worldwide Education Website Our website (http://motorolasolutions.com/amlearn) is your portal to: - Find courses to meet your unique needs in our Course Catalog. - Keep up to date with the latest news about courses and certifications offered. - Watch videos or download flyers. - Login to register (Learning Experience Portal – LXP) to see the latest courses, descriptions, - requirements, dates and locations. (https://learning.motorolasolutions.com) - Use the “Contact Us” function for assistance in customizing your training program. In addition to the training that can be purchased by any NASPO customer – all equipment ordered through the NASPO contract will include detailed system manuals that will outline the basic features and functionality of your radio equipment. These manuals will be included in your equipment purchase and most manuals are also available on-line through Learning Experience Portal (LXP). Please see Section 10: Attachments Exhibit B-3 Training for the complete course catalog.
Maintenance/Repair	Describe in detail what is included in your company’s consultation services in the space provided or submit a separate document labeled xxx. Motorola offers the following services around Maintenance and Repair: **Subscriber Repair Service** Local Motorola’s Depots, and local MRs, are centralized repair facilities that provide expert subscriber radio maintenance and repair. State-of-the-art diagnostics equipment, repair tools, and an extensive inventory of replacement parts help us quickly analyze, isolate and provide expert repair on your Motorola portable and mobile subscriber radios. The Depots are also responsible for all repairs using only replacement parts manufactured for Motorola devices. We provide a standard 90-day warranty on all repairs.

	Infrastructure Repair Infrastructure Repair service provides for the repair of all Motorola-manufactured equipment, as well as equipment from third-party infrastructure vendors. All repair management is handled through a central location eliminating your need to send equipment to multiple locations. Comprehensive test labs replicate your network to reproduce and analyze the issue. State-of-the-art, industry-standard repair tools enable our technicians to troubleshoot, analyze, test, and repair your equipment. Our ISO9001 and TL9000-certified processes and methodologies ensure that your equipment is quickly returned maintaining the highest quality standards. Service agreements allow you to budget your maintenance costs on an annual basis. Equipment covered under service agreements also receives higher service priority, which results in quicker repair times. **Infrastructure Repair 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 replaces it in our centralized inventory. **On-Site Infrastructure Response** Motorola On-Site Infrastructure Response provides local, trained and qualified technicians who arrive at your location to diagnose and restore your communications network. Following proven response and restore processes, 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 restores the system by performing first level troubleshooting on site.

	If the technician is unable to resolve the issue, the case is escalated to the System Support Center or product engineering teams as needed.
Encryption (AES-256) software upgrade, single-key	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "ExhibitB3-Services-SingleKeyEncryption". Motorola offers a complete turnkey solution and service offering with an AES-256 software upgrade implementation for single key. This offer would include staff to ensure the infrastructure and radio device side are set up and prepared for the upgrade. Once the preparation phase is complete, the encryption will be rolled out to the end user devices. Motorola offers the KVL5000 along with the optional KMF in implementing AES-256 security. The KVL 5000 is a P25 communications encryption device that delivers greater flexibility for programmers to secure their radio channels, leading to less interruption in the customers workflow. As the only key loader that employs a hardware protected keystore, the KVL 5000 is used to generate, transport, and load encryption keys to secure user programming and critical information with a physical encryption solution at the highest level. A large LCD color display, paired with an easy-to-use alphanumeric keypad, enables simple viewing and data entry. Built with Motorola Solutions standard quality and security, the KVL 5000 withstands everyday use in federal and public safety environments. If the customer is looking for the convenience of Over-the-Air-Rekeying (OTAR), the Key Management Facility (KMF) is an optional robust encryption key management solution that supports Motorola Solutions-specific and P25 features. Using the KMF Web-Based Thin Client, users can generate detailed reports, receive status updates, and monitor system data visualizations. This information can be created, inventoried, and distributed to encrypted endpoints, including consoles and radios.

Encryption (AES-256) software upgrade, multi-key	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "ExhibitB3-Services-MultiKeyEncryption". For a multi-key upgrade, the device would need to be flash programmed via a laptop initially to make it multi-key capable if it wasn't already. Then, the encryption would be added. Motorola offers a complete turnkey solution and service offering with an AES-256 software encryption upgrade. This offer would include staff to ensure the infrastructure and radio device side are set up and prepared for the upgrade. Once the preparation phase is complete, the encryption will be rolled out to the end user devices. Motorola offers the KVL5000 along with the optional KMF in implementing AES-256 security. The KVL 5000 is a P25 communications encryption device that delivers greater flexibility for programmers to secure their radio channels, leading to less interruption in the customer's workflow. As the only key loader that employs a hardware protected keystore, the KVL 5000 is used to generate, transport, and load encryption keys to secure user programming and critical information with a physical encryption solution at the highest level. A large LCD color display, paired with an easy-to-use alphanumeric keypad, enables simple viewing and data entry. Built with Motorola Solutions standard quality and security, the KVL 5000 withstands everyday use in federal and public safety environments. If the customer is looking for the convenience of Over-the-Air-Rekeying (OTAR), the Key Management Facility (KMF) is an optional robust encryption key management solution that supports Motorola Solutions-specific and P25 features. Using the KMF Web-Based Thin Client, users can generate detailed reports, receive status updates, and monitor system data visualizations. This information can be created, inventoried, and distributed to encrypted endpoints, including consoles and radios.

Other	Describe in detail what is included in your company's consultation services in the space provided or submit a separate document labeled "*ExhibitB3-Services-Other*". Motorola is a complete solutions provider for our customers. These services include the design, implementation, servicing and maintenance of mission-critical but also extend to managed services, lifecycle services, system management, device management, cyber security, data management, video services, and more. Please refer to the attached MSI Services Whitepaper for further details. Please see Section 10: Attachments Exhibit B-3 Other Mission-Critical Operations (White Paper) for a full suite of service offerings that Motorola provides.

SECTION 10

00318 AMD 4 ATTACHMENTS

Motorola Solutions has provided the following information in this section:

- 00318 AMD 4 Exhibit B3-Experience, Qualification and Services: Project Managers Project Managers (Resumes)
- 00318 AMD 4 Exhibit B3-Experience, Qualification and Services Exhibit B3-Training (Course Catalog)
- 00318 AMD 4 Exhibit B3-Experience, Qualification and Services Exhibit B3-Other Mission-Critical Operations (White Paper)

10.1 00318 AMD 4 EXHIBIT B3-EXPERIENCE, QUALIFICATION AND SERVICES: PROJECT MANAGERS (RESUMES)

Michael Daversa, Project Manager - Backup

PROJECT MANAGER

Day Wireless
2415 South 200th Street
SeaTac, WA 98188
Phone: 206-400-6111
Email: mdaversa@daywireless.com

Date of Hire: 2005

Biography:

As a member of the Day Wireless project team, Mike is assigned to various projects as needed and provides the capabilities for managing small and large projects.

Mike holds a variety of industry certifications and training awards include Project Management Professional (PMP). Per the Electronic Technicians Association, International (ETA) he is a Certified Service Manager (CSM) and he is a Microsoft Certified Professional (MCP).

His unique mix of wireless communication experience and IT communications technical expertise adds extra value to his role as project manager. This allows him to be especially effective in leading advanced telecommunication system implementations.

Mike has led numerous projects involving sophisticated digital RF and IP integrated solutions. Recent examples include deployments for:

Washington State Patrol 800 MHz Migration, WA State Department of Corrections Rebanding, VA Hospital BDA Installation and WA State DOC Digital Dispatch Console Deployments.

Expertise:

- Program Management
- Project Management
- Land Mobile Radio Technologies
- Information Technology
- Site Safety/OSHA Compliance

Education:

Bridgewater State College, BA History
US Army School of Information Technology
US Army Primary Leadership Development Course

Awards, Affiliations and Certifications:

- Project Management Professional (PMP)
- Microsoft Certified Professional (MCP)
- Certified Service Manager (CSM per ETA)

	Chris Lelli
Program Manager	**Motorola Solutions, Inc.** 7915 207th St. Ct E Spanaway, WA 98387 (253) 302-2667
Year of Hire:	2016
Motorola Solutions Professional Experience:	Program Manager, generally responsible for: Ensuring that all aspects of technology, architecture, and human resources are coordinated to support the initiation, planning, execution and services phases of the project. Experienced in the integration of various Motorola radio and data system projects in the public safety markets, including; site development; microwave, dispatch console and logging systems; subscriber installation, and functional acceptance testing. Recent Project Experience: • State of Montana System Upgrade. State-wide upgrade of 11 Dispatch Centers and 48 RF sites. • Butte – Silver Bow 800 MHz Upgrade. Implementation of a 2-site 800 MHz system integrated with the new Edge subsystem. • Ada County Sheriff's Office, Idaho. County-wide migration from circuit based Simulcast to 6-site IP Simulcast system • Montana Highway Patrol, Montana. Upgrade of 12 consoles from Gold Elite to MCC 7500 dispatch console system • Idaho State Police, Idaho. Upgrade of (25) MCC 7500 and (6) MCC 7100 consoles at 4 different sites from existing Gold Elite consoles • Kootenai County Sheriff's Office, Idaho. Integration of Spillman Integration Services on the customers' existing CAD mapping application by addition of 3 enhanced data channels at 3 different sites • Ada County Sheriff's Office, Idaho. Upgrade of backup dispatch center from Gold Elite Consoles to MCC 7500 consoles
Other Professional Experience:	Training and Operations Officer/Security Manager – U.S. Navy, NOSC Kitsap, Bremerton, WA. 2015-2016 • Security Manager for the largest reserve center in the Northwest, serving over 800 reservists, was responsible for the highest compliance percentage versus the lowest error rate. Managed more than 800 reservist's security clearances and personally initiated more than 200 investigations/reinvestigations for Top Secret/Secret clearances Operations/Chief Staff Officer – U.S. Navy, CTF-152/CDS-50, Manama, Bahrain. 2014-2015 • Served as the Chief Staff Officer for CTF-152, a position normally assigned to an individual 3 ranks higher • Responsible for the daily operations of CTF-152 and CDS-50 with zero errors despite the reduction of staff members of 23 to 4 to support the implementation of the Joint Coalition Planning Cell (JCPC) to manage instability in Yemen • Trained more than 320 gulf cooperation council officers and enlisted as Battle Watch Officers ensuring standardized protocols and procedures were developed and used amongst 40 coalition countries
Education, Training and Certificates	• MBA, Pacific Lutheran University, 2011 • BS, Workforce Education and Development, Southern Illinois University, 2002 • AS, Vincennes University, 2002 • AAS, Pierce College, 2003 • AT, Pierce College, 2003 • Certificate in Project Management, University of Washington, 2017

SEAN GRIER – PMP

Senior Project Manager

SENIOR TECHNOLOGY PROGRAM / PROJECT MANAGEMENT

SUMMARY OF QUALIFICATIONS

- PMP Certified Project Manager in good standing with PMI since 2005
- Able to lead large project teams
- Experienced in project scheduling and planning
- Highly skilled at job costing and subcontractor/client negotiations
- Accomplished at building strong customer relationships
- Capable of meeting and exceeding demanding time and performance requirements
- Skilled at containing and reducing costs without degrading performance
- Can communicate effectively at all management and client levels
- Comfortable with developing strong and effective cross-functional teams
- Excellent “outside-the-box” problem solving skills
- Take complete ownership of projects and tasks assigned to me
- Understand and use standard Project Management methodologies

ACHIEVEMENTS

Factory Implementation Lead Project Manager for Boeing Commercial Aircraft - Lead the implementation and testing in the Everett Factory for 777X Low-Rate Initial Production (LRIP).

Factory Implementation Lead Project Manager for Boeing Commercial Aircraft - Lead the planning and scheduling for production implementation for the 1.3M ft2 Composite Wing Center in Everett for the 777X wing build.

Factory Reconfiguration Project Manager for Boeing Commercial Aircraft – Supported the development of long-range Master Phasing Plan and schedule for reconfiguration of the Everett Factory in support of the new 777X derivative. Led the development of the Integrated Master Schedule for the Fixed Automated Upright Build project (FAUB) for 777 and 777X fuselage build.

Automation Project Manager for Boeing Commercial Aircraft – Led multi-disciplined team through completion of complex Planning Directive and Business Case for of cleaning, sanding and painting of twin-aisle aircraft in Everett Paint Hangars using Robotic Automation. Project showed savings of 25% of flow and 40% reduction in touch-time labor.

777 Helium-Test Project Manager for Boeing Commercial Aircraft – Successfully implemented new leak-detection methods in the factory using Helium. This project reduced factory flow by 4 hours and touch-time labor by 8 hours (~50%) as well as reducing flow in the fuel docks by 4 hours. Improved overall delivery quality by identifying leaks upstream in the value-stream, reducing rework costs substantially.

LEMS Project Manager for Boeing Commercial Aircraft – Provided project management support and leadership to bring state-of-the-art laser technology to the painting process for the Everett twin-aisle paint hangars. Through the LEMS project, laser projectors have replaced the need for Mylar tools for lay-up and masking of complex liveries on the 777 and 787 aircraft lines.

CDMA and GSM Overlay Manager for Wireless Facilities – Developed and managed a team of 25 direct-reports, and 10 contracting crews to implement a CDMA and GSM overlay for Western Wireless throughout 8 western states. Deployed over 200 sites in 12 months, including design, construction, installation, optimization and drive testing.

Program Manager and Bid and Quote Manager for Motorola - Managed team of 5 senior PMs. Developed goals and objectives for all team members. Mentored and recruited new project managers. Responsible for financial results and growth within the area with projects throughout Washington, Oregon, Alaska, Idaho, Wyoming and Montana.

Managed B&Q activities for all major wireless projects within Western US. Created job-costing templates that shaved 75% of time required to complete the Bid and Proposal cycle. Average yearly projects value $250M. Developed project timelines using Primavera, SureTrak and MS Project. Conducted initial contractor selection and negotiation and set project budgets.

Developed a system for qualifying and mentoring Women-owned / Minority-owned businesses (WBE, MBE) to be utilized by Motorola on required projects throughout the US.

WORK EXPERIENCE

Motorola – Senior Project Manager 2019 – Present

Lead Project Team on a County-wide trunked Astro 25 radio system, including site construction, microwave design and implementation. Full contract, finance, subcontracting, and client satisfaction responsibilities.

Boeing Commercial Aircraft – Project Manager September 2007 – 2019

Boeing Commercial Aircraft – Contract Project Manager (Volt Technical Services) November 2005 – September 2007

Alltel Communications – Contract Project Manager April 2005 – November 2005

TeleCommunication Systems – Manager E-911 July 2004 – April 2005

Wireless Facilities – Overlay Project Manager April 2003 – July 2004 Wireless Werks –

Contract Project Manager October 2002 – December 2002 AT&T Wireless – Manager

Fixed Base Deployment Dec. 1999 – Sep. 2001 Birch Telecom – Manager of Project

Management **June 1999 – Nov. 1999 Project**

Management Consultant **December, 1998 – June, 1999**

Motorola – Senior Project Manager & Group Leader July 1995 – Dec. 1998 Motorola –

Outsourcing & Bid and Quote Manager April 1991 – June 1995 Motorola – Project

Supervisor September 1986 – March 1991

OTHER CAREERS

Senior Field Technician, Motorola – Repair, installation and optimization of 2-way fixed, mobile and portable communications equipment, paging terminals and Computer Aided Dispatch systems.

Electronic Technician 1st Class, US Coast Guard – Repair of various communications, navigation and cryptographic equipment. Fisheries, drug interdiction and law enforcement at sea. Supervision of maintenance and repair personnel.

EDUCATION

Masters of Project Management (PMI) - George Washington University 1999

PMP Certification – PMI 2005 (current through 2021)

AWARDS AND CERTIFICATES

Federal Communications Commission License (General Class w/ Radar Endorsement)

TECHNICAL KNOWLEDGE

Operating Systems Windows (3.11 through Current) IBM OS/2

UNIX

Desktop Applications Primavera P3 – P6 and SureTrak Microsoft Word

Microsoft Excel

Microsoft Outlook/Exchange Microsoft Project

Microsoft PowerPoint Microsoft Visio

JONATHAN SIMIRICA

19102 20th DR SE G 101 BOTHELL, WA 98012 | 630.991.0378 | SIMIRICAJONATHAN@GMAIL

PROFESSIONAL EXPERIENCE

NOKIA – BELLEVUE, WA *04/2019 – 12/2019*

NATIONAL PROJECT MANAGER

Tasked with overseeing carrier small cell & FirstNet DAS deployments within 15+ national markets. Developed & owned full-scale project plans defining project scope, milestones, resource allocation, performance expectations and product delivery.

- Consulted customers on viable end to end model small cell solutions for data center, commercial, industrial, & medical facilities.
- Established end to end project workflow between sales, engineering, mobilization & commissioning
- Vendor management such as qualifying, SLA term negotiations, pricing, RFP generations, bid award & operations.
- Supported new market contracts utilizing local presence or 3rd party support.

E2 OPTICS – BELLEVUE, WA *06/2016 – 04/2019*

PROJECT MANAGER IV

Managed multiple projects for Carrier DAS, Small Cell, Wi-Fi, structured cabling for data center (greenfield & brownfield), medical, commercial, and industrial facilities nationwide.

- Key leader for all project phases including bidding, design, construction, commissioning, testing and close out.
- Created workflow processes of local and satellite branches between engineering, construction and commissioning.
- Managed vendor coordination including invitation to bid, vendor qualifying, RFP generation, pricing negotiations and award
- Financial control of projects such as estimating, budgeting, permitting, invoicing, change orders, and P&L reports

CCS INC – WILLOWBROOK, IL *09/2014 – 06/2016*

OPERATIONS MANAGER

Responsible for end to end project & operations management for underground utilities (fiber, power, water, gas) engineering drawings for permitting submittals.

- Managed end to end models for cell tower site acquisitions, engineering & permitting submittals.
- Led operational direction of project coordinators, permitting specialists, engineers, & field survey crew to complete deliverables.
- Attended sales calls, gathered customer requirements and provided recommended construction approaches.
- Developed & submitted progress reports, proposals, change orders, invoices, and other related submittals.

SAC WIRELESS – SCHAUMBURG, IL *06/2012 - 09/2014*

A&E PROJECT MANAGER

A&E designer for in building DAS deployment for AT&T, Verizon, Sprint, and T-Mobile for facilities nationwide including. Began as a project coordinator and within one year was promoted to A&E with a set goal to create new standards for low voltage construction drawings. Received mentorship & training from Sr. Architect on industry disciplines of drafting and design. Collaborated with project managers, engineers and sub-contractors on successfully completion of project tasks.

- Gathered requirements for small cell/DAS site acquisitions, permitting & engineering drawing furnishing
- Extensive knowledge of leading wireless telecommunications equipment such as; Alcatel-Lucent, CommScope, Ericsson, & Cisco
- In-depth experience with PIM/Sweep, fiber OTDR, fiber optic splicing, CW testing, and spectrum analyzing procedures

S-BUILDING SERVICES, INC. – CHICAGO, IL *04/2007 - 06/2012*

PROJECT MANAGER

Managed multiple construction projects of residential and commercial properties. Experienced in multiple fields of construction, city building code requirements, interpreting and executing Architect's plans according to industry standards.

- Daily construction tasks would include electrical, plumbing, HVAC, framing, tiling, concrete, and more.
- Purchase & coordinate delivery of construction materials requested by construction managers to job site
- Collaborated with Architects for construction drawing revisions and city building code requirements
- Assess permit needs and zoning conflicts in project developments

Cameron W. Burford

Kirkland, WA 98034 · Cell: (954) 297-5299 · Cwburford@gmail.com

EDUCATION

Purdue University, West Lafayette, IN — Graduated: August 2018
Major: Electrical and Computer Engineering-Technology — *Concentration:* **Digital Systems**
Minor: Technology Leadership Innovation (TLI)

Certifications

MIT - Certificate in Additive Manufacturing
Udemy - Code in Python3: Programming beginning to advanced

KEY SKILLS

C, Python (Backend Flask, GraphQL)**, Embedded C, SQL, Matlab**, **LabVIEW, X Code, Visual Studio Code, Atmel, 8-Bit Microcontroller** (Arduino Uno, STK 600, & Mega 2560), **16-Bit Microcontroller** (TMS320C5515 eZdsp), **32-Bit Microcontroller** (Beaglebone Green Wireless & ARM Cortex-M0+ SAM D20 & SAM D21)**, Ni Multisim, PLC programming** (Allen Bradley)**, Studio 5000, Studio 500, Visual Basic, Microsoft Office, Simulink, AutoCAD Electrical, Project Management, Program Management**

WORK EXPERIENCE

BLK Space (Start Up) — **Kirkland, WA**
Co – Founder (Full Stack Engineer/Social Media Marketing Specialist) — June 2020 – Present

- Web scrape large amount of data from websites and use GraphQL to query the data to the front end, to let the client specify exactly what data it needs.
- Create social media marketing plans that reinforce and support the company's marketing efforts in other channels.
- Provide reporting and analytics on campaigns; present strategic recommendations to team based on analysis of the data.
- Provide social media publishing and coverage (live tweeting) during key promotion, including some evenings and weekends.

The Boeing Company — **Seattle, WA**
Equipment Engineering Project Manager – 737/777 Program (BCA) — November 2018– August 2020

- Lead process improvement efforts to improve production rate by 36% for the 737 program which made the company over $1,000,000 in sales a month and reduced operating cost by $10,000 in wing production.
- Manage equipment used in maintenance training for equipment service personnel and engineers on the operation and maintenance of automated tools and equipment that support production.
- Present weekly reports to management outlining project deliverables, critical factors, and any variances to project.
- Lead supplier engagements to analyze technical proposals, negotiate bids, and monitor performance through project completion.
- Collect and analyze machine data using SQL for process improvement, root cause analysis, and preventative maintenance.
- Diagnose and correct equipment for system malfunctions to decrease down time and develop new maintenance plan.
- Modify, test, calibrate, and document system configuration to meet compliance requirements.
- Collaborate with cross-functional teams to implement innovative solutions for defective equipment and improve production flow.

Equipment Engineering IT (Temporary Assignment) - 737 Program (BCA) — October 2019 – March 2020

- Managed software data that allows technicians to pre-load line replacement units prior to installing them on a plane, so the aircraft can be ready for delivery.
- Provided documentation of software and how to upload/download it to the system for The Boeing Company and the FAA.
- Performed security analysis of operational and development environments, threats, vulnerabilities and internal interfaces to define and assess compliance with accepted industry and government standards.

ENGINEERING PROJECTS

Random Guessing Color Game — May 2020

- Created a program in Python that ask the users to pick a color from a predetermined list of colors. If the user guesses right the game is over. If the user guesses wrong, they are prompted to keep playing until the right color was guessed.

LEADERSHIP EXPERIENCE

National Society of Black Engineers – Purdue University — August 2013 - Present
Member/Conference Planning Chair/Region 4 Hospitality & Special Project Coordinator

- Responsible for coordinating all entertainment-related events for the Conference, including spiritual enrichment, study rooms and physical fitness activities for over 630 members.

ROBIN MCNETT

5636 44TH AVE SW
SEATTLE, WA 98136
253-632-6149
ROBIN.MCNETT@MOTOROLASOLUTIONS.COM

Profile:
Talented and driven project manager with an extraordinary ability to foster and manage relationships between clientele and project staff while staying focused on details.
I have a broad range of experience in client-facing roles which I draw on to build customer, vendor, and employee relations. I believe whole-heartedly that a positive work environment is key to a successful project and team management.

EMPLOYMENT HISTORY:

Motorola Solutions, Inc **Project Manager** **Sept 2016 – Present**
Seattle, WA

ArenaNet, LLC **Recruiting Coordinator** **May 2015 – Sept 2016** **Bellevue, WA**

- Support 2 Recruiters with Full Cycle Recruiting which involves scheduling and managing candidates.
- Maintained Recruiting and provided training of the system to over 25 hiring managers.
- Built relationships with candidates for a positive interview process, honest communication, and an enjoyable hiring experience.
- Coordinating and scheduling travel for all candidates.
- Assist HR Manager and Director on 90 onboarding processes for up to 10 new employees monthly.

Day Wireless Systems **Junior Project Manager** **June 2011 – May 2015** **SeaTac, WA**
Day Wireless provides innovative wireless communication technology solutions to Fortune 100 Companies in various sectors including healthcare, public safety, government agencies and academic institutions. In my current role I am lead Project Manager on projects up to $350,000 and support Senior Project Managers in projects up to $4 million dollars.

Core responsibilities include:

- Support Project Management Team with invoicing, time tracking, customer relations, scheduling, building, and maintaining project modules within the AS400 software environment.
- Responsible for reviewing and interpreting RFP's RFQ's, and bid packets with the goal of drafting and finalizing bid proposals.
- Pre-sale and post-sale project development strategy.
- Coordinating and scheduling travel for up to 10 Team Members.
- Maintaining project specific inventory working with vendors, purchasing and warehouse personnel to resolve all discrepancies or find suitable substitutes in time critical situations.
- Creating and maintaining project related reports including Gantt charts, Schedule of Values, Stakeholder roster, and Profit/Loss Report.
- Front line field PM responsible for interacting daily with customers and vendors to make real time, on the spot corrections and adjustments to ensure both project schedule and budget stay intact.
- Processing complex change order requests between end-customer, vendors, and additional project stakeholders throughout project lifecycle.
- Making real time, on the spot corrections and adjustments to ensure both project schedule and budget stay intact.

10.2 00318 AMD 4 EXHIBIT B3-EXPERIENCE, QUALIFICATION AND SERVICES: EXHIBIT B-3-TRAINING (COURSE CATALOG)

PRODUCT AND SYSTEM TECHNICAL TRAINING COURSE CATALOG

MOTOROLA SOLUTIONS - WORLDWIDE EDUCATION

2020 EDITION | PUBLISHED SEP-2020

MOTOROLA SOLUTIONS

2020 EDITION | NORTH AMERICA

WELCOME

Day in, and day out, governments and businesses around the world rely on effortless and reliable communication. Our customers call it their lifeline. To help businesses operate without interruption and to safeguard communities, workplaces, and ultimately, each one of us, we are determined to help keep the lifeline unbreakable.

With Motorola Solutions, Inc. Education Services, we help your two biggest lifeline investments - your personnel and your technology infrastructure - work together efficiently to maximize the value of your communication technologies.

Whether your organization is new to our latest innovations or has years of experience with us, our Education Services team helps expand your personnel's skills and knowledge for the full application of your technology investment.

Starting with professionally developed, real-world application and content, we always design your training with the learner in mind. Our experienced instructors average 20+ years in the communications industry and specialize in Motorola Solutions technologies and services. Immersive, hands-on experiences, expert lab environments, or online learning ensure we meet your learners with the right kind of learning at the right times.

Whether training is delivered virtually, at your location or in our state-of the-art facilities, we can help ensure that your personnel know how to amplify your investment, maximize operational efficiency, and ensure an unbreakable lifeline.

We look forward to working with you.

MOTOROLA SOLUTIONS

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GENERAL INFORMATION

OUR LEARNING EXPERIENCE PORTAL

AN INTERACTIVE PLATFORM… DESIGNED FOR YOU! THE LXP IS YOUR VALUABLE RESOURCE TO SEE THE LATEST COURSES, DESCRIPTIONS, REQUIREMENTS, DATES AND LOCATIONS.

Use the search box and filters feature to quickly and easily search for training or documentation.

View your history and upcoming training on your personalized dashboard.

Receive reminder notifications of upcoming training or changes to your training.

Easily locate and download documents plus stay up-to-date with training news and announcements.

HOW TO ACCESS THE LEARNING EXPERIENCE PORTAL

If you are a Motorola Solutions Customer who already has a Motorola Solutions Login ID, you can go to the "Enrol in a course" section for further instructions.

SET UP A NEW USER ACCOUNT AND PASSWORD

- Visit: **https://learning.motorolasolutions.com**
- Click "Register"
- Fill Out all the required information on the form (if you are a MSI Customer with an established 10-digit Motorola Customer Account Number, please enter your Company Name in the form)
- Click "Submit"
- You will receive a confirmation of your submission
- You will next receive further information to activate your account (Up to 5 business days)*

TO ENROLL IN A COURSE (ONCE YOU HAVE AN LXP ACCOUNT)

- Log in to the LXP: **https://learning.motorolasolutions.com**
- Click on "LOG IN"
- **Enter your Log In ID and Password and Click "LOG IN"**
- If you have forgotten your Log In or Password click on "Forgot Log In ID" or "Forgot Password"
- Find a training course by clicking "Browse Training" at the top of the screen Or use "Search Catalog" at the top of the screen

* If you are looking for FCC Narrowband training and you do not have an established 10-digit Motorola Customer Account Number with us, please visit businessonline.motorolasolutions.com for account set up and training access.

TRAINING OPTIONS

In this catalog you will find a wide range of learning initiatives; some of them have been developed to be completed at your own pace, and others are led by our Technical Instructors:

LIVE TRAINING

It consists of scheduled live sessions, delivered either in class or in a virtual environment by our Technical instructors. Participants can immerse themselves in the subject; they receive substantial time for hands-on training that enables them to develop creating solutions for unique problems. In both classes, the number of seats available is limited and advanced registration is required.

On the job training is also available, for those who prefer a more direct instruction.

ONLINE TRAINING

Online self-paced learning allows your team to gain foundational knowledge on a variety of topics using their computer, at their own schedule.

Where to start? Our training roadmaps will let you know the starting point and milestones of your development, so you can make sure you acquire the right knowledge to make the most of each step of your learning process.

UNDERSTANDING THE ICONS

LIVE TRAINING

ONLINE TRAINING

EXAM

POLICIES AND REQUIREMENTS

CANCELLATION AND RESCHEDULING BY THE STUDENT

Customer cancellation or rescheduling made less than 30 days prior to the class start date will be subject to the full course tuition.

CANCELLATION AND RESCHEDULING BY MOTOROLA SOLUTIONS

Motorola Solutions reserves the right to change or cancel classes up to 10 business days prior to the class start date. You will be notified at that time of such change or cancellation.

PROFESSIONALISM

Students are expected to maintain professional conduct and dress at all times. Class dress is casual, but smart. For safety and security reasons, we cannot permit shorts, thong type sandals, or tank tops in the classroom.

LAPTOP REQUIREMENTS

All our classes require students to bring their laptops to the classroom so that they may utilize an electronic copy of the class material. Please review your enrollment confirmation email for specific requirements for your class.

TRAINING CONTENT AND STRATEGY DISCLAIMER

All of Motorola Solutions training classes are designed to support and align with the Motorola Solutions Service strategy for each product. This strategy may include a combination of (but not limited to) processes, procedures, recommendations, and instructor experiential advice which may involve repair, replacement, and or recovery of hardware, software, or firmware of Motorola Solutions products. The repair, replacement, or recovery of these products may vary from product to product. Motorola Solutions reserves the right to change the structure and content of all courses at any time.

EDUCATION BUNDLES: ACCELERATE YOUR LEARNING JOURNEY

Worldwide Education understands your challenging needs during uncertain times. Travel limitations, the continued safety of your first responders that serve and protect your citizens, and assurance there is zero training downtime is critical. To meet these challenges, we offer course bundles that combine a virtual learning experience with traditional, hands-on learning.

Watch the video to learn more about how you can accelerate your training today.

THE TWO COMPONENTS OF OUR EDUCATION BUNDLES

The virtual component will focus on live discussions, application-based demonstrations, and various online activities using our virtual training hosted solutions and our lab environment.

The practical component will take place at either one of our facilities or, in case of buy-out sessions, at your location. This part of the training will focus on performing the tasks discussed in the virtual sessions. Once you have complete the two components, you will receive credit for the bundle and the equivalent traditional course.

Compared to our traditional full in-class offerings, you may be able to combine multiple practical components into one week or less. This will not only allow you to complete multiple courses (bundles) during that time, it will also help to reduce your overall travel costs and time investment.

BENEFITS FOR YOU

- Live training sessions led by our subject-matter expert certified instructors accessible from your computer
- Practice through demos and guided virtual lab environment
- Active participation and interaction assured, by limiting the number of participants per group
- Reduction of travel expenses and time away from home

READY TO GET STARTED?

Find your courses or email us at training.na@motorolasolutions.com

QUALITY ASSURANCE: THE TPMA FRAMEWORK

MOTOROLA SOLUTIONS WORLDWIDE EDUCATION COMMITS TO EXCELLENCE IN INSTRUCTOR-LED TRAINING

For 45+ years, our instructors continue to be laser-focused on your two lifeline investments - your personnel and your technology infrastructure. Our mission is to work together efficiently to maximize the value of your communication technologies.

Motorola Solutions is aware of the impact training experiences have on your team and your organization. When it comes to supporting the success of your employees and your technology infrastructure, we seek to continually deliver exceptional training to you.

For over 10 years, we have built and implemented the Training Performance Monitoring & Assessment (TPMA) framework in our organization. Our internal instructors are held to the highest level of training standards outlined within the Learning & Performance Institute (LPI). The TPMA certificate is widely-recognized and accepted as the premiere institute for learning, assessing and benchmarking trainer progress.

Anywhere in the world, those who hold a TPMA certificate demonstrate that they have reached or exceeded the highest standards demanded within the industry.

WHY DO TPMA CERTIFICATIONS MATTER?

Adopting TPMA standards is essential to meet industry trends and leading industry best practices to meet user needs, enhance instructor development and ultimately leads to a happy customer experience.

LPI ensures the quality of the instructors' training delivery is maintained and meets the highest quality standards, provides expert feedback on their performance and promotes the development of their facilitator skills.

Visit us at learning.motorolasolutions.com to register for our training courses.

ACHIEVING OPTIMAL PERFORMANCE MATTERS TO US

- We focus on the needs of the learner, not the trainer
- The personalized approach and structured consistency of standardized-requirements help win business

"The instructor did an outstanding job. Truly a professional and extremely knowledgeable. Never rushed and always listened. Provided feedback to all questions and allowed students to participate at their own level of expertise and speed."

"The Instructor was extremely helpful during the training. He has an excellent way of teaching and was very attentive to the students when asked questions. I liked that he went over each and every field of CPS. Excellent Instructor! I would recommend to anyone!"

"The instructor showed outstanding skills to combine theory, practice, actual cases and hands-on training. Great training."

"Exceptional course, no words to explain the instructor's commitment and professionalism. Vast experience, humbleness, patience and amazing teaching skills. A different and positive class."

"Excellent coach. Direct, precise, detailed. Explain everything in the right way. Honestly, the best coach I have ever had. They do not skip anything, explain everything in detail. My knowledge after this training is much better. During the entire training, he was fully committed to us."

"The best teacher I have ever had in any previous training courses. Very challenging and interactive teaching helping me to understand the system from the bottom to top with a lot of additional slides from the teacher with extremely good and clear explanations in the system networking for deeper understanding."

"One of the best instructors I had. Speaks clearly, responsive to the students; actions and very good at making the students stay alert and attentive."

"Amazing training, very glad to join it. Amazing trainer, very vibrant, very knowledgeable trainer. Looking forward to more training with him. Good trainer from a good company."

EDUCATION PACKAGES

Motorola Solutions Education Packages have been built by our technical education experts, to provide you a simpler way to select the right learning activities from our extensive training portfolio. These packages are all designed considering four vital aspects:

- Your Motorola Solutions Infrastructure & Devices
- The Level of Support provided by Motorola Solutions
- The tasks undertaken by your team, and
- The roles of the professionals in charge of those tasks

Behind these packages there are Education Services professionals whose aim is to fully prepare your team to achieve desired organizational efficiency and outcomes by ensuring that they have the knowledge, skill and competency needed to effectively interact with your Motorola Solutions technology investment.

If you wish to customize your Motorola Solutions training strategy, ask our Professional Education Services team to analyze your specific technical and end user training needs and gaps. Please work with your Motorola Solutions account representative to request this professional service.

Let Motorola Solutions Education Services help you ensure that your organization provides effortless and reliable communications, and keep your lifeline stronger than ever!

ASTRO® INFRASTRUCTURE EDUCATION PACKAGES

COMPLEMENT EDUCATION PACKAGE

Prepare your team to operate your ASTRO® Solution, achieving optimal organizational efficiency.

TOPICS

System Overview, Upgrade Differences, My View Portal, Device End User Best Practices, Dispatch End User Best Practices

SUPPLEMENT EDUCATION PACKAGE

Prepare your team to operate and administer your ASTRO® Solution, achieving optimal organizational efficiency.

TOPICS

System Overview, Administration, Secure Communications, Upgrade Differences, My View Portal, Device End User Best Practices, Dispatch End User Best Practices

SUPPORT EDUCATION PACKAGE

Prepare your team to operate, administer, and maintain your ASTRO® Solution, achieving optimal organizational efficiency.

TOPICS

System Overview, Core, RF-Subsystems, Transport, Administration, Dispatch, Secure Communications, Security Patch Management, Device End User Best Practices, Dispatch End User Best Practices

ASTRO® DEVICES EDUCATION PACKAGES

COMPLEMENT EDUCATION PACKAGE

Prepare your team to operate your APX™ devices.

TOPICS

Device Overview, My View Portal, Device End User Best Practices

SUPPLEMENT EDUCATION PACKAGE

Prepare your team to operate and administer your APX™ devices.

TOPICS

Device Overview, Programming and Radio Management, Device End User Best Practices

SUPPORT EDUCATION PACKAGE

Prepare your team to operate, administer, and maintain your APX™ devices.

TOPICS

Device Overview, Programming and Radio Management, Radio Maintenance, Device End User Best Practices

Talk with your Motorola Solutions contact for a quote, or email us at training.na@motorolasolutions.com for more information on how to sign your team up for one of our Education Services Packages.

SAMPLE PACKAGES

ASTRO® INFRASTRUCTURE SUPPLEMENT EDUCATION PACKAGE

This Education Package aligns with the Infrastructure ADVANCED Services Package

- ASTRO® 25 SYSTEM OVERVIEW
- MY VIEW PORTAL OVERVIEW
- ASTRO® FEATURES AND FUNCTIONALITY
- ASTRO® 25 SYSTEM FLEETMAPPING
- ASTRO® 25 IV&D RADIO SYSTEM ADMINISTRATOR
- MCC 7000 SERIES MANAGEMENT
- CONSOLE ADMINISTRATOR & DISPATCH END USER TRAINING
- RADIO END USER TRAIN-THE-TRAINER
- WAVE™ ADMINISTRATION & END USER
- IMW OPERATIONS AND ADMINISTRATION
- RADIO AUTHENTICATION
- EXECUTIVE OVERVIEW
- ASTRO® 25 IV&D SECURE COMMUNICATIONS

APX DEVICE SUPPORT EDUCATION PACKAGE

This Education Package aligns with the APX Device ESSENTIAL Services Package

- APX QUICK START
- APX RADIO MANAGEMENT OVERVIEW
- APX CPS PROGRAMMING & TEMPLATE BUILDING
- APX RADIO MANAGEMENT WORKSHOP
- APX TECHNICAL SUBSCRIBER ACADEMY
- RADIO END USER TRAIN-THE-TRAINER

LEGEND:
- – Foundation
- – Administration
- – Maintenance
- – Device & Console Best Practices
- – Optional

Talk with your Motorola Solutions contact for a quote, or email us at training.na@motorolasolutions.com for more information on how to sign your team up for one of our Education Services Packages.

PRICING AND HELPFUL INFORMATION

HOW TO MAKE PAYMENTS WHEN ENROLLING IN A COURSE

HOW TO MAKE PAYMENTS WHEN REGISTERING

For your convenience we accept the following methods of payment:

- Credit Card
- Purchase Order
- Company Check
- Training Banks

If prepayment is required to secure your registration, it must be received by Motorola Solutions 30 days prior to your attendance.

Contact the help desk above for assistance with payments and P.O. specifications.
All pricing listed is US dollars**.**

FOR QUESTIONS AND ASSISTANCE

Call the Education help desk at: 800-247-2346
Monday – Friday,
8:00 a.m. – 5:00 p.m. Central Time
or email us at:
training.na@motorolasolutions.com

TRAINING BANKS

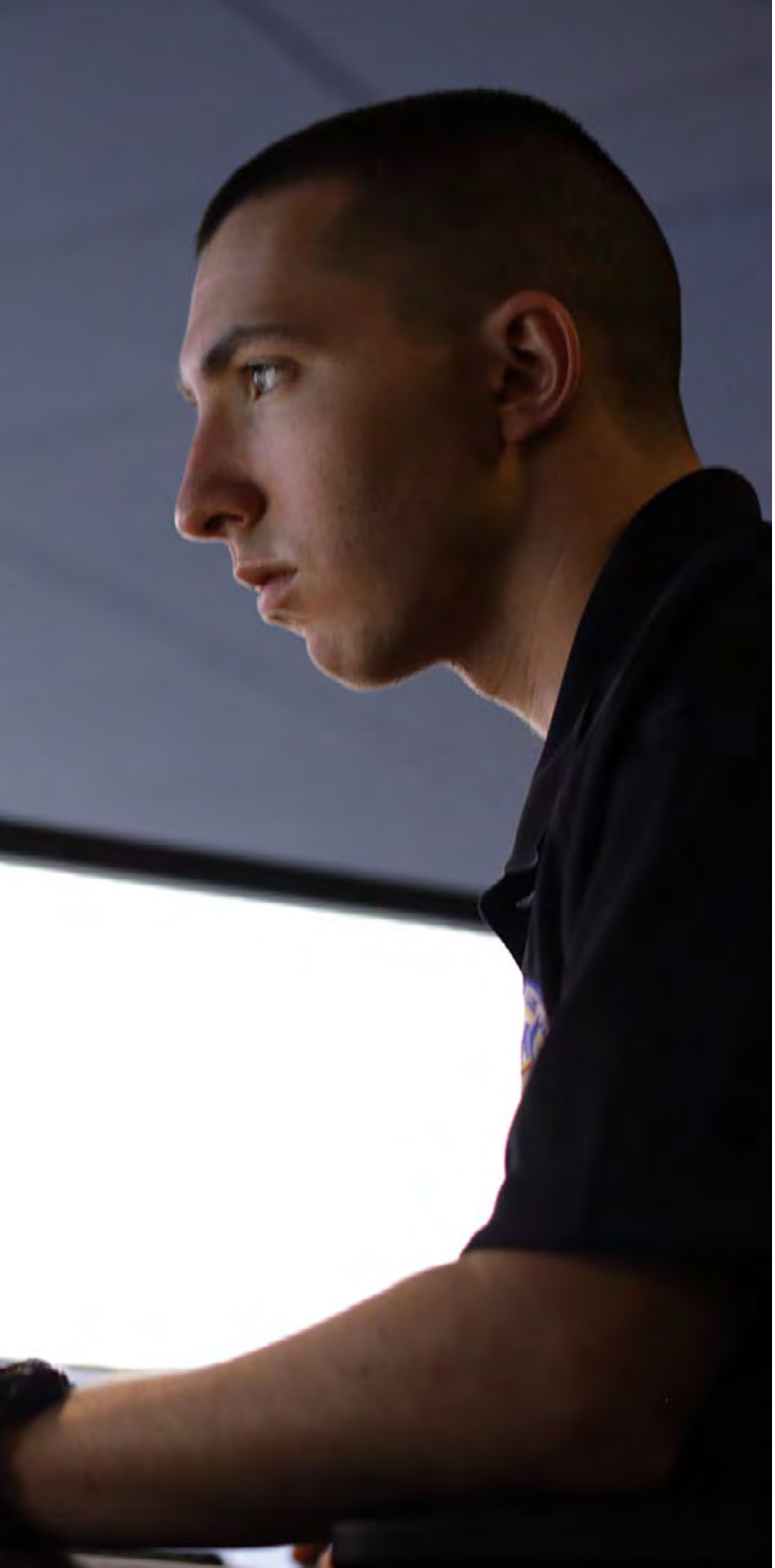
Whether you're a technician, system manager or radio user, you rely on Motorola Solutions Education Services to obtain the necessary knowledge to get the full potential out of your Motorola Solutions equipment. The Motorola Solutions Training Bank is a discounted, pre-paid, non-expiring debit account that allows you to budget up front for your training needs. Training Banks can be applied towards all training options including, Instructor-Led Tailored Field Courses.

There are several benefits to Training Banks including:

- Allows you to budget up front for training needs
- Provides cost savings through discounted pricing tiers to maximize your training investment
- Does not require multiple POs, thus reducing internal approval cycle time and paperwork
- Training Banks do not expire

For more information on Training Banks, please visit us on the web at https://www.motorolasolutions.com/en_us/products/training/training-bank.html or email us at training.na@motorolasolutions.com.

Note: Training Banks are only applicable to non-federal government customers.

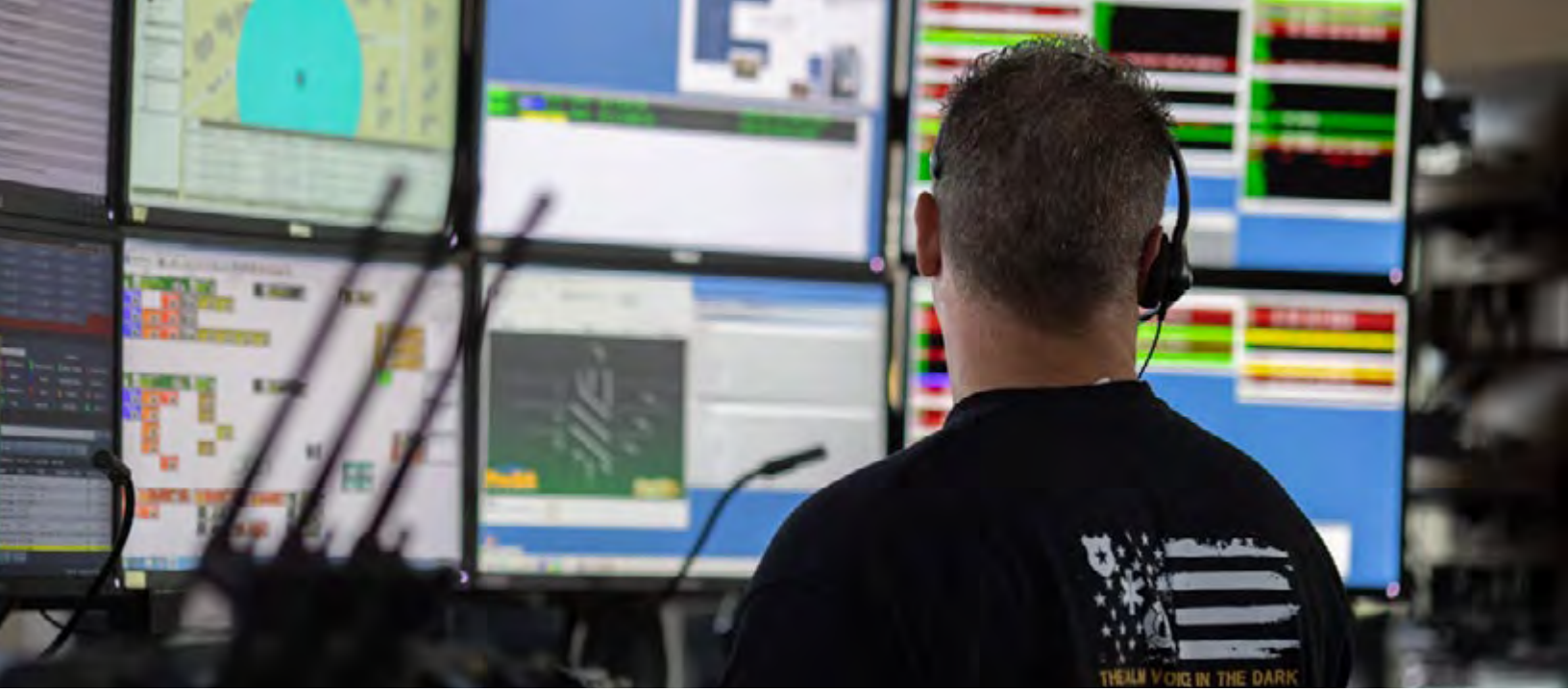


OPERATOR TRAINING

THE SUCCESSFUL IMPLEMENTATION OF YOUR COMMUNICATIONS SYSTEM DEPENDS ON ITS CONFIDENT USERS.

Users of your mobile and portable radios require training on their units to understand its basic operation, features and functions.

Dispatchers of your consoles require training to understand basic operation, features and functions; management personnel require training on the Motorola Solutions applications.



TRAIN THE TRAINER

With this option, Motorola Solutions trains people you have identified as qualified instructors so that they in turn can train each individual user in your organization. These classes are done on site using your equipment. The interactive End-User Toolkit (iEUTK) and/or tailored end user materials can be utilized.

AUDIENCE

This course is geared for customers who have an experienced, dedicated training staff in their organization. This course concentrates on specific product features and how it relates to the training process.

COURSE OVERVIEW

This course provides the customer's identified training personnel knowledge and practice applying training techniques that will enable them to successfully train their students. Trainers will use simulation, facilitation and hands-on activities to facilitate learning events supported by tailored training materials and job aides. Students will become proficient in discussing common tasks associated with the operation of the customer's radios and consoles as identified by the customer's needs analysis.
Note: This course is presented as customer specific and will cover pertinent information on customer equipment.

REQUISITE KNOWLEDGE

Previous training experience and radio system knowledge is a must.

OPERATOR TRAINING

With this option, the users within your organization are trained by a Motorola Solutions instructor. These classes are done on site using your equipment. The interactive End-User Toolkit (iEUTK) and/or tailored end user materials support this training option.

CONSOLES TRAINING

These courses provide operators and supervisors with an introduction to the basic operation, administration and feature functionality of the Console Systems. Through facilitation and hands-on practice, users learn to perform tasks that are associated with their organization's particular system.

- Overview of console configuration
- Console dispatcher and supervisor operation
- Alias Management
- Messaging

SUBSCRIBER TRAINING

These courses provide radio users with an introduction to their radios, a review of their radio's basic functionality by means of job aides tailored to exactly how they use their radios. Through facilitation and hands-on practice, users learn to perform common tasks associated with their radio configuration.

- Overview of radio configuration
- General radio operations

COURSES FOR CONSOLE PRODUCTS

- MCC 7000 Series Dispatch Console Administrator Training
- MCC 7000 Series Dispatch Console Operator Training
- MKM 7000 Console Alias Manager
- MOTOBRIDGE IP Interoperable Solution Dispatch Console Operator
- MOTOBRIDGE Administration Control Panel (ACP)
- MCD 5000 Operator

COURSES FOR MOBILES & PORTABLES

- APX™ Series
- MOTOTRBO™ Series
- XTL™/XTS Series

TO REQUEST FIELD TRAINING, PLEASE CONTACT YOUR ACCOUNT MANAGER.

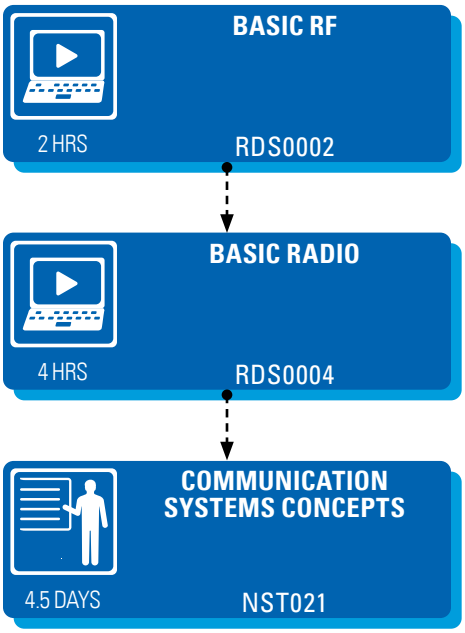
Note: The interactive End-User Toolkit (iEUTK) is not sold as a standalone product but included with our instructor-led, Train-The-Trainer or Operator Training.

FOUNDATIONAL COURSES

BASIC RF (RDS0002)	**17**
BASIC RADIO (RDS0004)	**17**
BASIC NETWORKING (RDS0003)	**17**
INTRO TO R56 (NST9252)	**18**
SITE INSTALLATION PRACTICES WORKSHOP R56 (NST925)	**18**
R56 STANDARDS UPDATE 2017 (NST9256)	**18**
SERVER & VIRTUALIZATION FOUNDATION (SRV1010)	**19**
COMMUNICATION SYSTEMS CONCEPTS (NST021)	**19**
NETWORKING ESSENTIALS IN MOTOROLA SOLUTIONS COMMUNICATIONS EQUIPMENT (NST762)	**19**
BRIDGING THE KNOWLEDGE GAP FOR ASTRO® 25 – TECHNICIAN (ACT100E)	**20**
BRIDGING THE KNOWLEDGE GAP FOR ASTRO® 25 – SYSTEM ADMINISTRATOR (ACT101E)	**20**
ASTRO® 25 SYSTEMS APPLIED NETWORKING (NWT003)	**20**
MOTOTRBO™ SYSTEMS APPLIED NETWORKING (PCT2007)	**21**

RF FUNDAMENTALS

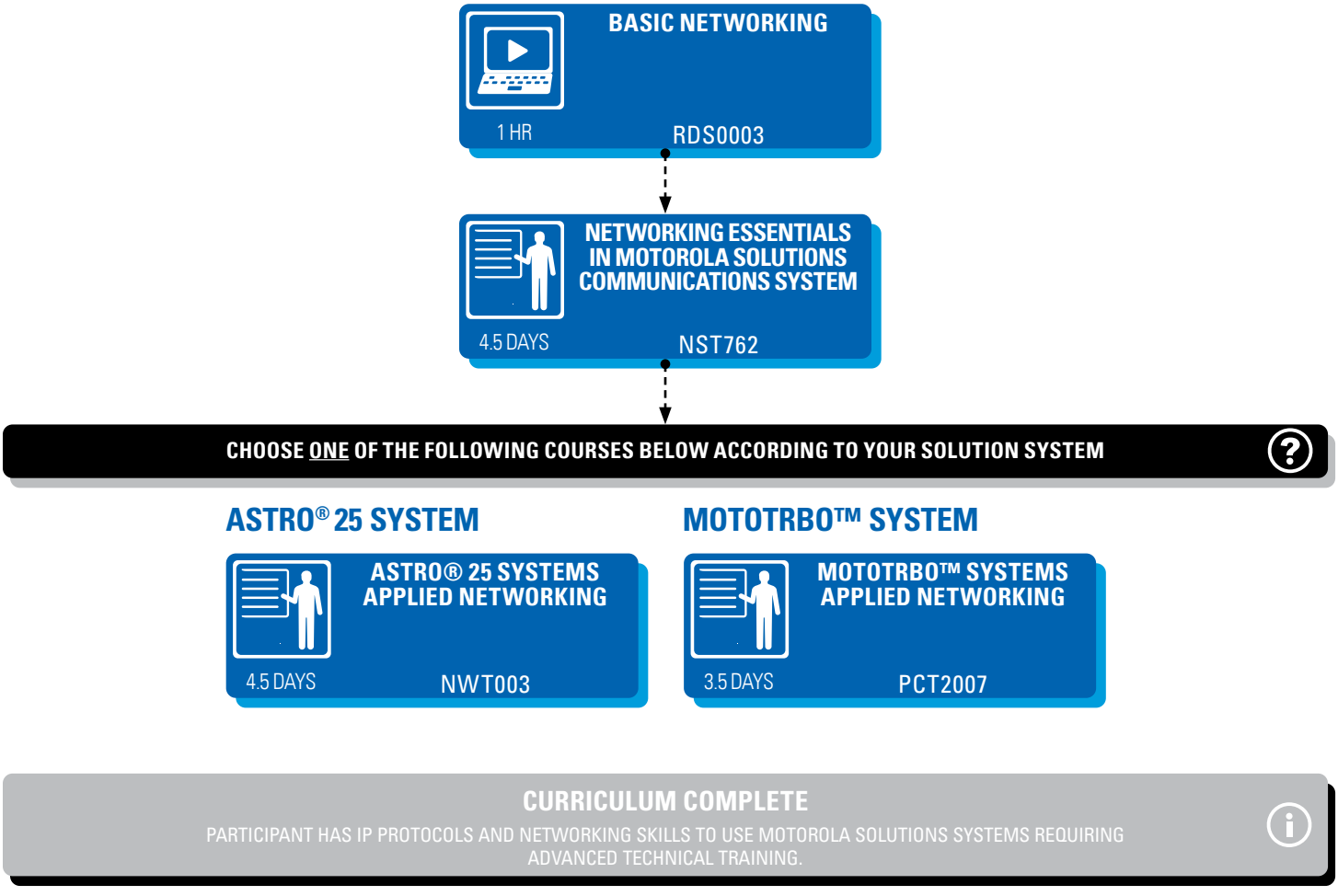
RF BASICS / RADIO SYSTEM BASICS



CURRICULUM COMPLETE

PARTICIPANT HAS RF KNOWLEDGE REQUIRED FOR ADVANCING TO MORE COMPLEX TECHNICAL TRAINING COURSES.

IP/NETWORKING FUNDAMENTALS



CLICK HERE TO GO TO PAGE 20 FOR MORE DETAILS ON ASTRO® 25

CLICK HERE TO GO TO PAGE 43 FOR MORE DETAILS ON MOTOTRBO™

COURSE OVERVIEW

This course emphasizes the concepts behind RF Systems theory and operation. Topics include basic radio transmitters and receivers, RF propagation, modulation, antenna systems, transmission lines and data-communications.

TARGET AUDIENCE

Technical staff who need to understand communication systems concepts.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Describe electrical principles, including direct and alternating current.
- Describe the basic structure of radio transmitters and receivers.
- Describe the operation of the antenna system.
- Identify different types of transmission media.
- Describe RF propagation and understand system gains in a link budget.

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

COURSE OVERVIEW

The purpose of this course is to provide the student with the basic, foundational land mobile two-way radio knowledge required when working with Motorola Solutions. This course is ideal for all people who sell or service land mobile two-way radios.

TARGET AUDIENCE

Individuals who need a foundational overview of two-way radios.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Define what a two-way radio is.
- Describe two-way radio components.
- Describe communication types.
- List and describe ways of expanding coverage.
- Describe analog and digital solutions.
- Describe how transmit and receive processes work in conventional and trunked two-way radio.
- Define system scalability.
- Identify the considerations to implementing a two-way radio.
- List the characteristics of single-site, single-zone and multi-zone systems.
- Explain the concept of two-way radio security.
- Describe the open standards for the following technologies: APCO P25, TETRA and DMR.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- RDS0002 Basic RF

PREREQUISITES

None

COURSE OVERVIEW

This course provides a detailed description of the fundamentals of system networking. Topics include the OSI seven layer model, bridges and switches, IP and routing, applications and security.

TARGET AUDIENCE

Engineers who need to understand the essentials of system networking.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Identify the elements and interconnectivity of a basic network
- Define the OSI and TCP/IP Models
- Define the advantages of different Network Layout Options
- List the Physical and Data-Link Layers of the OSI and TCP/IP Models
- Define the Network and Transport Layers of the OSI and TCP/IP Models
- Identify the Service Layers within the OSI and TCP/IP Model
- Define the concept of Network Security.
- Identify standards organizations

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

INTRODUCTION TO R56

1 HR | NST9252

COURSE OVERVIEW
The purpose of this course is to present a high level overview of the RF site design and construction process, in line with the guidelines listed in Motorola Solutions' Standards and Guidelines for Communication Sites (R56) manual.

TARGET AUDIENCE
Technicians who need an introduction to the R56 processes.

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Describe the site design and development tasks needed to meet R56 requirements.
- Describe the building and shelter design and installation tasks needed to meet R56 requirements.
- Identify the proper external and internal grounding tasks needed to meet R56 requirements.
- Identify transient voltage surge suppression needs that meet R56 requirements.
- Minimize the impact of RF Site Interference, in line with R56 requirements.
- Identify the equipment installation tasks needed to meet R56 requirements.

REQUISITE KNOWLEDGE
None

PREREQUISITES
None

SITE INSTALLATION PRACTICES WORKSHOP R56

3.5 DAYS | NST925

COURSE OVERVIEW
The Site Installation Practices Workshop R56 course is designed to present the standards and guidelines for installing a Motorola Solutions communication system. Participants will understand how a properly installed system can help to ensure a safe and efficient communications system, reducing system down time. All students are encouraged to download the Preparation Guide.

TARGET AUDIENCE
Technical System Managers and Technicians

COURSE OBJECTIVES
After completing this course, the student will be able to:
- List the purposes of grounding and evaluate their importance in terms of personal safety and effective system installation and protection
- Apply principles of basic electronics to the installation standards found in the R56 manual
- Determine how an effectively installed ground system provides protection for a communication system from a lightning strike or electrical anomalies
- List the minimum requirements and specifications for the external and internal ground system
- List the minimum requirements and specifications for installation equipment, cables and documentation for a reliable communication system installation
- Investigate sources for possible solutions to various installation scenarios

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- Graduate of a basic electronics course

PREREQUISITES
None

R56 STANDARDS UPDATE

1 DAY | NST9256

COURSE OVERVIEW
This course will cover all updates to the R56 Standards and Guidelines for Communication Sites and is intended for individuals who have recently completed, or need to re-certify their R56 certification. It will provide insight and understanding on the changes and their impact on the documented standard. This course is offered as Virtual Instructor sessions. Please ensure you have a computer with video enabled to participate in the course session and ask questions.

TARGET AUDIENCE
Electronics Equipment Technicians who are responsible for the installation or inspection of communications equipment. Communication Site Installers (R56) and Communication Site Inspectors/ Auditor (CSIA)

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Be familiar with a current glossary of terms
- Understand changes and their relationship to the manual and certification
- Be aware of high level R56 Standards manual updates by chapter

REQUISITE KNOWLEDGE
Individuals must hold a valid R56 or CSIA certification of have completed all necessary coursework prior to attending this course.

PREREQUISITES
None

COURSE OVERVIEW

This course will prepare students to install a server and understand the basics of supported virtualization application. The course covers BIOS configuration, installing supported virtualization applications, installing a client and server OS and verifying operations. The course includes hands-on lab exercises.

TARGET AUDIENCE

Technical Support Staff who need to understand virtual servers or install servers that utilize Virtual Machines (VM).

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Configure BIOS parameters for server hardware
- Demonstrate basic knowledge of supported virtualization application, including capacity
- Install supported virtualization application on a server platform
- Configure supported virtualization application parameters of supported server hardware
- Install a Client OS and Server OS in a virtual environment
- Verify Server/Client operations in a virtual environment

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- Comp-TIA Server+ Certification or equivalent

PREREQUISITES

None

COURSE OVERVIEW

This course emphasizes the concepts behind RF Systems theory and operation. Major topics covered include:

- RF System Operation, including talkaround, repeater operation, and types of signaling used in RF Systems
- A basic walkthrough of building a communication system from Simplex, to Half Duplex, Voting Systems, and Simulcast is done, emphasizing the improvements in communication obtained with each step.
- Trunking Operation, including Smartzone operation
- Types of modulation used in RF System operation, including ASTRO®
- Radio frequency path including the antenna and transmission line
- Decibels and their uses on the job
- RF Propagation/RF Interference
- Basic Troubleshooting practices from the system perspective

TARGET AUDIENCE

Individuals who are interested in the operational concepts driving modern communication systems.

COURSE OBJECTIVES

Upon completing this course, the student will be able to:

- Define terms commonly used in two--way communication systems
- Effectively use two--way radio communication systems knowledge to troubleshoot typical two-way communication radio systems
- Develop requirements for a two--way radio system by establishing programming and protocol requirements as requested
- Improve skills in the interpretation of typical two--way radio checks of the receiver, transmitter and the antenna system to troubleshoot a two-way radio communication system
- Use decibels to interpret the radio frequency path and antenna system to describe expected radio communication system performance and troubleshooting

REQUISITE KNOWLEDGE

- Knowledge of basic electronics
- Experience using standard communication test equipment

PREREQUISITES

None

COURSE OVERVIEW

The Networking Essentials in Motorola Solutions Communications Equipment course provides the technician with the essential elements of networking required for the installation and maintenance of most Motorola Solutions communications systems. The course includes ample hands-on and basic troubleshooting on network elements.

TARGET AUDIENCE

System Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Recall basic network terminology
- Compare basic configuration types, both logical and physical
- Describe the basic OSI (Open System Interconnect) model compared with the TCP/IP model
- Construct a basic LAN with a Windows Server Domain Controller and workstations
- Examine the interaction between the routers through their configurations
- Use common network commands to simulate traffic and validate connectivity and routing

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience is highly recommended:

- An understanding of basic Motorola Communications Systems
- Basic familiarization with computer operating systems
- Basic knowledge of networking (RDS0003 - Basic Networking)

PREREQUISITES

None

BRIDGING THE KNOWLEDGE GAP FOR ASTRO® 25 – TECHNICIAN

4 HRS ACT100E

COURSE OVERVIEW

This course is designed to bring Technicians from different technical backgrounds and experience levels to a common starting point for the ASTRO® 25 curriculum. This course provides seven modules from the basic concepts of radio communication systems and computer networking features, through the evolution that led to the ASTRO® 25 trunking system's architecture.

TARGET AUDIENCE

This course is intended for System Technicians, and other ASTRO® 25 system users who are new to trunked radio systems. Also those with experience in non-IP-based radio systems like SmartNet and SmartZone.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Explain the different radio system concepts as applied to conventional and trunked systems
- Compare analog radio communication signaling to ASTRO® 25 radio communications signaling
- Identify different communication concepts using representative block diagrams of the respective systems
- Compare radio system communication concepts using representative block diagrams of the respective systems
- Compare how voice and data, information flow through different radio communication system types and how the signaling information controls that flow of information
- Describe the features of each radio communication system in terms of advantages and disadvantages

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

BRIDGING THE KNOWLEDGE GAP FOR ASTRO® 25 – SYSTEM ADMINISTRATOR

4 HRS ACT101E

COURSE OVERVIEW

This course is designed to bring Administrators from different technical backgrounds and experience levels to a common starting point for the ASTRO® 25 curriculum. This course provides five modules from the basic concepts of radio communication systems and computer networking features, through the evolution that led to the ASTRO® 25 trunking system's architecture.

TARGET AUDIENCE

This is targeted for System Administrators and other ASTRO@ 25 system users who are new to trunked radio systems. Also those with experience in non-IP-based radio systems like SmartNet and SmartZone.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Identify different communication concepts using representative block diagrams of the respective systems
- Compare radio system communication concepts using representative block diagrams of the respective systems
- Compare how voice and data information flows through different radio communication system types, and how the signaling information controls that flow of information
- Describe the features of each radio communication system in terms of advantages and disadvantages
- Explain the Trunked Radio System Concepts

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

ASTRO® 25 SYSTEMS APPLIED NETWORKING

4.5 DAYS NWT003

COURSE OVERVIEW

The ASTRO® 25 Systems Applied Networking course provides technicians with the necessary networking information required for understanding the network components installed in modern Motorola communications systems. The course includes familiarization with basic networking concepts, and the networking components deployed in the ASTRO® 25 System.

TARGET AUDIENCE

Technical System Managers and Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Define basic IP network concepts, hardware and protocols.
- Describe the LAN topologies for the ASTRO® 25 system.
- Describe the WAN topologies for the ASTRO® 25 system.
- Identify the current and legacy network components such as switches and routers.
- Perform backup, restore, and recovery procedures of routers and LAN switches.
- Analyze basic IP network connectivity and addressing.
- Define ASTRO® 25 Master Site VLAN/VRRP operation.
- Define ASTRO® 25 Network Transport Subsystem.
- Describe the various ASTRO® 25 Network Management applications.
- Identify network security components and concepts in an ASTRO® 25 system.
- Diagram SNMP deployment throughout the system.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- NST762 Networking Essentials in Motorola Communications Systems

PREREQUISITES

None

COURSE OVERVIEW

The MOTOTRBO™ Systems Applied Networking provides technicians with the necessary information required for understanding the typical networking requirements for implementing a variety or MOTOTRBO™ solutions. The course includes familiarization/review of basic networking concepts and MOTOTRBO™-specific networking requirements. This course will focus on specific configurations for IP Site Connect, Linked Capacity Plus, and Connect Plus trunking systems.

TARGET AUDIENCE

Technical System Managers and Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Recall Basic Networking Concepts
- Indentify recommended network components for MOTOTRBO™ systems
- Define LAN/WAN topologies for MOTOTRBO™ systems
- Perform backup, restore and recovery of recommended network components
- Identify network security concepts for MOTOTRBO™ systems

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

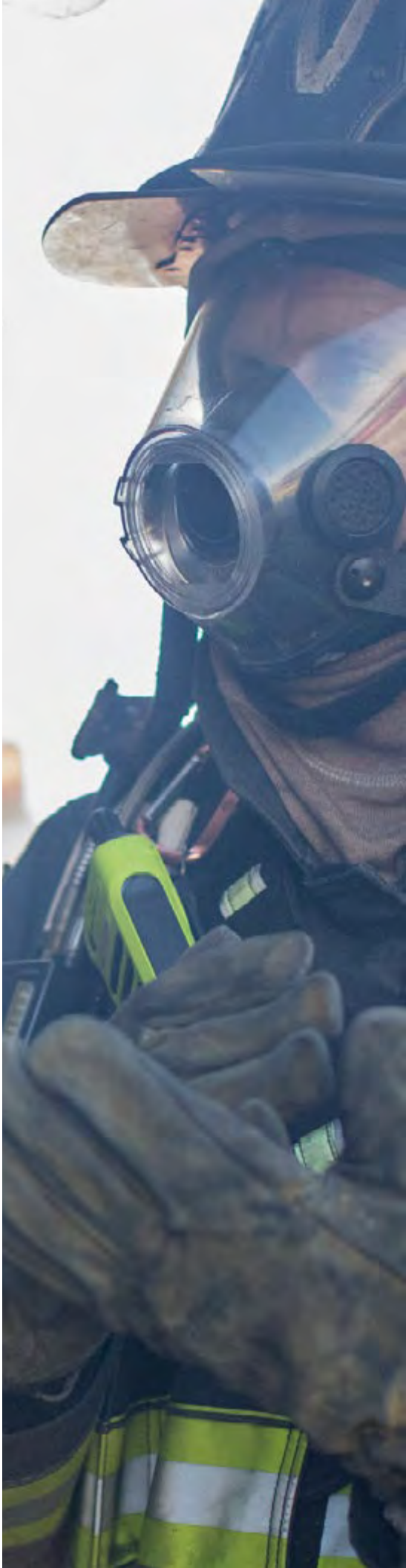
- NST762 Networking Essentials in Motorola Solutions Communications Equipment

PREREQUISITES

None

ASTRO® 25 IV&D SYSTEM COURSES

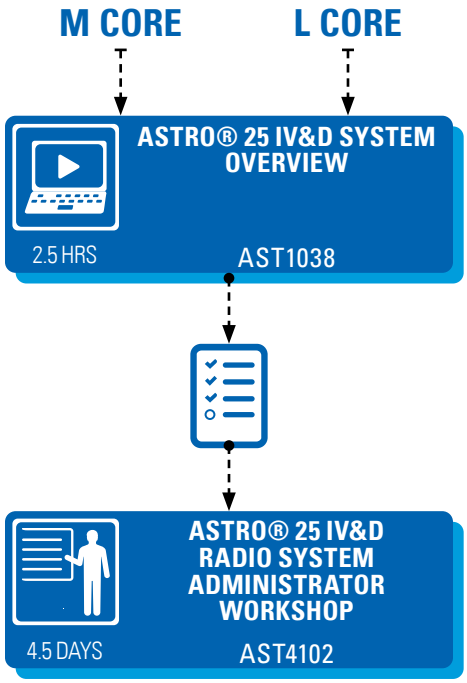
ASTRO® 25 IV&D SYSTEM OVERVIEW (AST1038)	**30**
ASTRO® 25 IV&D SYSTEM CORE WORKSHOP (AST4103)	**30**
ASTRO® 25 IV&D CONVENTIONAL RF SITE WORKSHOP (AST4440)	**30**
ASTRO® 25 IV&D CONVENTIONAL CORE WITH CONFIGURATION MANAGER WORKSHOP (AST4410)	**31**
ASTRO® 25 IV&D RADIO SYSTEM ADMINISTRATOR WORKSHOP (AST4102)	**31**
ASTRO® 25 SYSTEMS FLEETMAPPING (RDS1017V)	**31**
ASTRO® 25 SECURITY PATCH MANAGEMENT (AST2001V)	**32**
ASTRO® 25 RADIO AUTHENTICATION (AST2038)	**32**
ASTRO® 25 IV&D SECURE COMMUNICATIONS WORKSHOP (AST4207)	**32**
ASTRO® 25 IV&D IP BASED DIGITAL SIMULCAST WORKSHOP (AST4217)	**33**
ASTRO® 25 IV&D GTR 8000 REPEATER SITE WORKSHOP (AST4208)	**33**
STANDALONE GTR 8000 CONVENTIONAL BASE RADIO (AST2006)	**33**
ASTRO® 25 DOMAIN CONTROLLER ADMINISTRATION (AST2015)	**34**
INTELLIGENT MIDDLEWARE 5.2 OPERATION AND ADMINISTRATION (RDS2025)	**34**
ASTRO® 25 ISSI 8000 / CSSI 8000 FEATURE OVERVIEW (AST2005)	**34**
ASTRO® 25 IV&D DYNAMIC SYSTEM RESILIENCE (ACS715023)	**35**



ASTRO® 25 IV&D SYSTEM COURSES CONT

ASTRO® 25 IV&D ENHANCED TELEPHONE INTERCONNECT (ACS715480)	**35**
SYSTEM OVERVIEW FOR ASTRO® 25 IV&D INFORMATION ASSURANCE (ACS715211)	**35**
ASTRO® 25 INFORMATION ASSURANCE WORKSHOP (AST0071)	**36**
INTRODUCTION TO KVL 5000 (AST0067)	**36**
ASTRO® 25 CUSTOMER ENTERPRISE NETWORK WORKSHOP (AST0072)	**36**
MOSCAD NFM/SDM MAINTENANCE AND PROGRAMMING (FXD010)	**37**

ASTRO® 25 IV&D RADIO SYSTEM ADMINISTRATOR



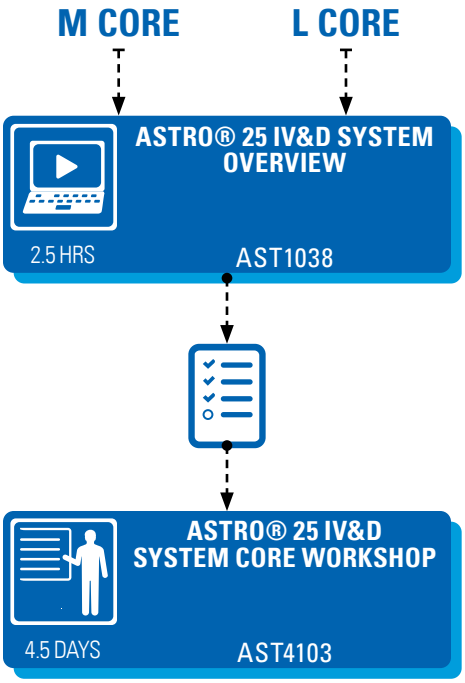
RECOMMENDED CURRICULUM IS COMPLETE

PARTICIPANT SHOULD BE ABLE TO CARRY OUT ADMINISTRATIVE TASKS IN THE ASTRO® 25 IV&D SYSTEM SUCH AS: PROVISIONING SUBSCRIBERS AND TALK GROUPS, GENERATING HISTORICAL REPORTS, CONTROLLING DEPLOYED SUBSCRIBERS AND MANAGING NETWORK ELEMENT CONFIGURATIONS. PARTICIPANT UNDERSTANDS FACTORS OF SYSTEM CONFIGURATION THAT IMPACT ASTRO® 25 SYSTEM MANAGEMENT.

OPTIONAL TRAINING ROADMAP

OPTIONAL TRAINING ROADMAP AVAILABLE.
CLICK ON THIS LINK TO GO TO PAGE 29
FOR ADDITIONAL DETAILS.

ASTRO® 25 IV&D M/L CORE TECHNICIAN



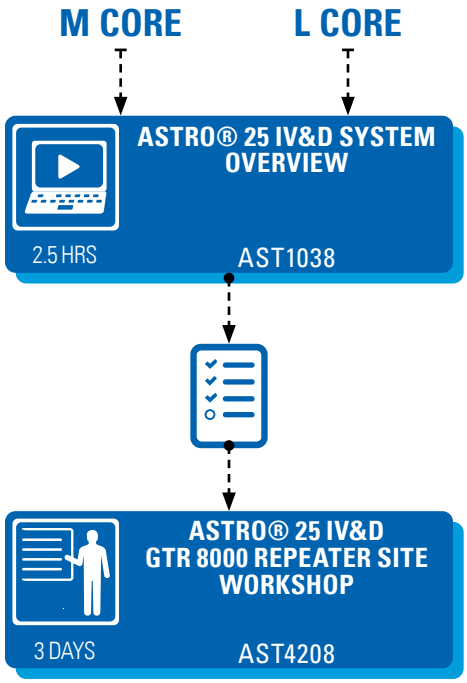
RECOMMENDED CURRICULUM IS COMPLETE

PARTICIPANT SHOULD UNDERSTAND ASTRO® 25 M CORE COMPONENTS, VIRTUAL SERVERS AND SERVICE STRATEGY. PARTICIPANT CAN INTERPRET SYSTEM ALARMS, PROPOSE SOLUTIONS FOR SYSTEM FAILURES, AND AS WELL AS RESTORING EQUIPMENT TO PROPER FUNCTIONALITY.

OPTIONAL TRAINING ROADMAP

OPTIONAL TRAINING ROADMAP AVAILABLE.
CLICK ON THIS LINK TO GO TO PAGE 29
FOR ADDITIONAL DETAILS.

ASTRO® 25 IV&D REPEATER SITE TECHNICIAN (GTR)



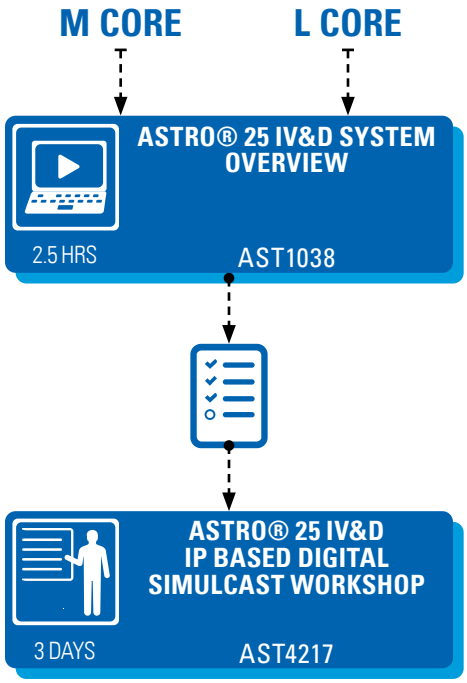
RECOMMENDED CURRICULUM IS COMPLETE

PARTICIPANT CAN MAINTAIN AN ASTRO® 25 REPEATER SITE INCLUDING: GTR 8000 BASE STATION, GCP8000 SITE CONTROLLER AND OTHER SITE EQUIPMENT.
*PARTICIPANT PERFORMS ALIGNMENTS TROUBLESHOOTING AND FIELD REPLACEMENT OF SITE DEVICES DURING COURSE.

OPTIONAL TRAINING ROADMAP

OPTIONAL TRAINING ROADMAP AVAILABLE.
CLICK ON THIS LINK TO GO TO PAGE 29
FOR ADDITIONAL DETAILS.

ASTRO® 25 IV&D IP SIMULCAST SITE TECHNICIAN



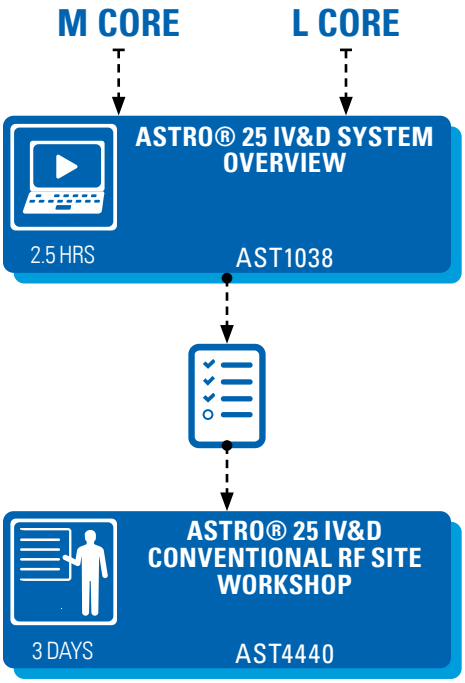
RECOMMENDED CURRICULUM IS COMPLETE

PARTICIPANT SHOULD BE ABLE TO MAINTAIN AN ASTRO® 25 REPEATER SITE INCLUDING THE GTR 8000 BASE STATION, GCP8000 SITE CONTROLLER, SITE COMPARATOR AND OTHER SITE EQUIPMENT.

OPTIONAL TRAINING ROADMAP

OPTIONAL TRAINING ROADMAP AVAILABLE.
CLICK ON THIS LINK TO GO TO PAGE 29
FOR ADDITIONAL DETAILS.

ASTRO® 25 IV&D CONVENTIONAL RF SITE TECHNICIAN



RECOMMENDED CURRICULUM IS COMPLETE

PARTICIPANT SHOULD BE ABLE TO MAINTAIN AN ASTRO® 25 REPEATER SITE INCLUDING THE GTR 8000 BASE STATION, GCP8000 SITE CONTROLLER, SITE COMPARATOR AND OTHER SITE EQUIPMENT.

OPTIONAL TRAINING ROADMAP

OPTIONAL TRAINING ROADMAP AVAILABLE.
CLICK ON THIS LINK TO GO TO PAGE 29
FOR ADDITIONAL DETAILS.

ASTRO® IV&D OPTIONAL TRAINING CURRICULUM

Motorola Solutions offers optional training for those participants who have completed their ASTRO® 25 curriculum and want to learn more about their system's infrastructure and/or features.
Select the training course below applicable to your system.

ASTRO® 25 IV&D DYNAMIC SYSTEM RESILIENCE
2 HRS ACS715023

ASTRO® 25 IV&D INFORMATION ASSURANCE
2 HRS ACS715211

ASTRO® 25 IV&D ENHANCED TELEPHONE INTERCONNECT
2 HRS ACS715480

ASTRO® 25 SECURITY PATCH MANAGEMENT
20 HRS AST2001V

ASTRO® 25 SYSTEMS FLEETMAPPING
15 HRS RDS1017V

ASTRO® 25 IV&D RADIO AUTHENTICATION
2 DAYS AST2038

ASTRO® 25 IV&D INFORMATION ASSURANCE WORKSHOP
4.5 DAYS AST0071

ASTRO® 25 IV&D DOMAIN CONTROLLER ADMINISTRATION
3 DAYS AST2015

SUBSCRIBER OPTIONAL TRAINING CURRICULUM

APX™ CPS PROGRAMMING AND TEMPLATE BUILDING
5X2.5 HRS/2 DAYS APX7001V

APX™ TECHNICAL SUBSCRIBER ACADEMY
4.5 DAYS APX010

ASTRO® 25 ISSI 8000 / CSSI 8000 FEATURE OVERVIEW
2 HRS AST2005

APX™ RADIO MANAGEMENT WORKSHOP
2.5 DAYS RDS2017

ASTRO® 25 IV&D SYSTEM OVERVIEW

2.5 HRS | AST1038

COURSE OVERVIEW

The ASTRO® 25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO® 25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO® 25 system will be provided.

TARGET AUDIENCE

Core Technicians, Site Technicians, Console Technicians, Core Managers.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Understand the general architecture of an ASTRO® 25 IV&D Radio System
- Understand key features of available in the ASTRO® 25 IV&D Radio System
- Understand the components of the ASTRO® 25 Zone Core
- Understand site components in the ASTRO® 25 system
- Understand the features, capabilities and components of the MCC7000 series dispatch consoles
- Understand concepts of Mobility and Call Processing in the ASTRO® 25
- Understand the applications for managing the ASTRO® 25 system

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

ASTRO® 25 IV&D SYSTEM CORE WORKSHOP

4.5 DAYS | AST4103

COURSE OVERVIEW

The ASTRO® 25 IV&D with ASTRO® 25 System Core course teaches advanced troubleshooting skills and best practices for the Trunked Large Systems. The course also focuses on gathering and analyzing system information to implement appropriate action(s) that return a system to full operational status.

TARGET AUDIENCE

ASTRO® 25 System Core Master Site Technicians

COURSE OBJECTIVES

After completing this course, the participant will be able to:

- Describe the ASTRO® 25 System architecture.
- Identify the functional and radio subsystems that comprise the ASTRO® 25 System.
- Explain and discuss call flow and data flow through Large System Core devices and their subsystems.
- Perform recommended routine maintenance procedures for the ASTRO® 25 Large System Core.
- Utilize the troubleshooting tools to diagnose a fault and restore the Large System Core to the level of the Motorola-supported service strategy.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- Bridging the Knowledge Gap (ACT100E or ACT101E)
- Networking Essentials in Communication Equipment (NST762)
- ASTRO® 25 Systems Applied Networking (NWT003)
- ASTRO® 25 IV&D System Overview (AST1038)

PREREQUISITES

None

ASTRO® 25 IV&D CONVENTIONAL RF SITE WORKSHOP

3 DAYS | AST4440

COURSE OVERVIEW

The ASTRO® 25 IV&D Conventional RF Site workshop describes the components in the different ASTRO® 25 IV&D Conventional RF Sites topologies. This course also presents how the different ASTRO® 25 IV&D Conventional RF Sites topologies operate and explains the tools and methods available for troubleshooting components within the different ASTRO® 25 IV&D Conventional RF Sites topologies.

TARGET AUDIENCE

System Technicians

COURSE OBJECTIVES

After completing this course, the participant will be able to:

- Understand key physical and functional characteristics of conventional site.
- Perform tasks necessary to install conventional site components.
- Perform configuration steps for conventional site components.
- Understand available maintenance tools and indicators in conventional site.

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- Bridging the Knowledge Gap – System Administrators (ACT101E)
- Networking Essentials in Motorola Communications Equipment (NST762)
- ASTRO® 25 System Applied Networking (NWT003)
- ASTRO® 25 IV&D System Overview (AST1038)

PREREQUISITES

None

ASTRO® 25 IV&D CONVENTIONAL CORE WITH CONFIGURATION MANAGER WORKSHOP

3 DAYS | AST4410

COURSE OVERVIEW

The ASTRO® 25 IV&D Conventional Core with Configuration Manager course teaches advanced troubleshooting skills and best practices for the ASTRO® 25 IV&D Conventional Core with Configuration Manager. It also focuses on administrator functions and how to use the ASTRO® 25 IV&D Configuration Manager applications.
A technical introduction to the MCC 7500 as used within the ASTRO® 25 IV&D Conventional Core with Configuration Manager, including some administrator functions, is also provided. Learning activities focus on gathering and analyzing system information to implement the appropriate actions that return a system to full operational status.

TARGET AUDIENCE

Master Site Technicians, System Administrators, Technical System Administrators, System Technicians, and other Application Users

COURSE OBJECTIVES

After completing this course, the participant will be able to:

- Understand the key physical and functional characteristics of the ASTRO® 25 Conventional Core with Configuration Manager system.
- Perform tasks necessary to install the ASTRO® 25 Conventional Core with Configuration Manager system components.
- Perform configuration steps for the ASTRO® 25 Conventional Core with Configuration Manager system components.
- Understand the available maintenance tools and indicators in the ASTRO® 25 Conventional Core with Configuration Manager system.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- Bridging the Knowledge Gap – System Administrators (ACT101E)
- Networking Essentials in Motorola Communications Equipment (NST762)
- ASTRO® 25 System Applied Networking (NWT003)
- ASTRO® 25 IV&D System Overview (AST1038)

PREREQUISITES

None

ASTRO® 25 IV&D RADIO SYSTEM ADMINISTRATOR WORKSHOP

4.5 DAYS | AST4102

COURSE OVERVIEW

This workshop covers administrator functions for an ASTRO® 25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO® 25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO® 25 IV&D system use.

TARGET AUDIENCE

System Administrators, Technical System Administrators, System Technicians, and other Application Users.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Describe the relationship between radio programming, console administration and system management, and the impact of this relationship on system planning.
- List the network management tools applicable at each phase of the system life cycle.
- Identify the advantages and disadvantages of options available for the configuration of system infrastructure and user parameters.
- Use the report and real-time data to monitor performance and make adjustments necessary to maintain acceptable system performance levels.

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- AST1038 ASTRO® 25 IV&D System Overview
- ACT101E Bridging the Knowledge Gap – System Administrators
- NST762 Networking Essentials in Communication Equipment
- NWT003 ASTRO® 25 Applied Networking

PREREQUISITES

None

ASTRO® 25 SYSTEMS FLEETMAPPING

15 HRS | RDS1017V

COURSE OVERVIEW

This virtual classroom training addresses topics necessary for the effective planning and mapping of an ASTRO® 25 IV&D radio system. During this course, the participants will learn about ASTRO® 25 features, capabilities, and restrictions in order to effectively plan and prepare for a new or upgraded ASTRO® 25 system.

TARGET AUDIENCE

Pre-sale customers, new system managers, system planning personnel

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Discuss what a fleetmap is and why one is needed.
- Discuss the methodologies used to configure radio users and groups with the goal of optimizing the system resources.
- Describe the content to assist with fleetmapping decisions.
- Discuss frequency band plan organization and management.
- Describe basic planning requirements and complete a simple Fleetmap information template.
- Complete worksheets required to create a Fleetmap based on sample operational requirement information.

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

ASTRO® 25 SECURITY PATCH MANAGEMENT

20 HRS | AST2001V

COURSE OVERVIEW
This virtual classroom training will provide Motorola ASTRO® 25 Land Mobile Radio (LMR) system administrators the information needed to access and patch their Radio Network Infrastructure, update Anti-Malware definitions and collect log files.

TARGET AUDIENCE
Zone Core Master Site Technicians

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Inventory LMR assets (Asset Inventory).
- Successfully access servers in the Zone Core.
- Successfully patch Radio Network Infrastructure.
- Update Anti-Malware Definitions for their Radio Network Infrastructure.
- Collect critical MS Windows and RHEL log files.

REQUISITE KNOWLEDGE
None

PREREQUISITES
AST4103 ASTRO® 25 IV&D System Core Workshop

ASTRO® 25 IV&D RADIO AUTHENTICATION

2 DAYS | AST2038

COURSE OVERVIEW
This course describes the Radio Authentication feature and defines the HW/SW components in the Radio Authentication system. In addition the course describes the Radio Authentication process, discusses the various Keys uses in Radio Authentication. The students will understand how to provision and distribute relevant Keys using the AuC Client GUI to access the AuC Server. Students will understand how to enable Radio Authentication in the System via the AuC Client and how to configure the KVL 4000 for Radio Authentication and manage subscribers from the AuC Client.

TARGET AUDIENCE
Customer Administrators or Technicians.

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Describe Radio Authentication features and HW/SW components
- Describe the Radio Authentication process. Discuss the Keys used in Radio Authentication
- Provision and Distribute relevant Keys. Describe the AuC Client GUI
- Enable Radio Authentication in the System. Configure the KVL 4000 for Radio Authentication
- Manage Subscribers from the AuC Client. Discuss Radio Authentication functionality in a DSR system

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- AAE1400 Radio Authentication e-learning course.
- Radio System Administration or equivalent knowledge of the Provisioning Manager, ZoneWatch, Historical Reports, ATIA Log Viewer, Unified Event Manager (UEM), Unified Network Configurator (UNC).

PREREQUISITES
Access to customer ASTRO® 25 Radio System, AuC Server/Client is required. Customer to provide working Motorola Solutions' portable radio(s) capable of placing calls on the System, access to working AuC client/server along with admin login credentials, access to a working KVL4000 key loader that can upload keys to the AuC server.

ASTRO® 25 IV&D SECURE COMMUNICATIONS WORKSHOP

5 DAYS | AST4207

COURSE OVERVIEW
This workshop describes planning, installation, configuration, operations, and troubleshooting of Secure Communications within the ASTRO® 25 IV&D System.

TARGET AUDIENCE
System Technicians, System Administrators, Technical System Managers

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Plan, organize, and implement Secure Communications in an ASTRO® 25 IV&D system.
- Install and configure a Key Management Facility (KMF) system and related components.
- Demonstrate centralized key management using Over-the-Air-Rekeying (OTAR).
- Perform System Administrator functions using the KMF server and KMF client.
- Troubleshoot installation and configuration problems for the KMF server, KMF client, and KMF database.

REQUISITE KNOWLEDGE
Completion of the following courses or equivalent experience:
- ACT100E Bridging the Knowledge Gap - Technicians
- NST762 Networking Essentials in Communication Equipment

PREREQUISITES
None

ASTRO® 25 IV&D IP BASED DIGITAL SIMULCAST WORKSHOP

3 DAYS | AST4217

COURSE OVERVIEW

The ASTRO® 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO® 25 IV&D IP Simulcast subsystem, and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

TARGET AUDIENCE

Simulcast Site Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Recognize the flow of message and control data within an ASTRO® 25 IV&D IP Digital Simulcast subsystem
- Identify the major components and connections within an ASTRO® 25 IV&D IP Digital Simulcast subsystem prime and remote sites
- Recognize how calls are processed within an ASTRO® 25 IV&D IP Digital Simulcast subsystem
- Perform maintenance and troubleshooting of select components in an ASTRO® 25 IV&D IP Digital Simulcast subsystem

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- AST1038 ASTRO® 25 IV&D System Overview
- ACT100E Bridging the Knowledge Gap for ASTRO® 25 – Technician
- NST762 Networking Essentials in Communication Equipment
- NWT003 ASTRO® 25 Systems Applied Networking

PREREQUISITES

None

ASTRO® 25 IV&D GTR 8000 REPEATER SITE WORKSHOP

3 DAYS | AST4208

COURSE OVERVIEW

This workshop describes the components in the ASTRO® 25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

TARGET AUDIENCE

GTR 8000 Site Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Describe the ASTRO® 25 IV&D Repeater Site with GTR 8000 Expandable Site Subsystem configurations and components.
- Identify the GCP 8000 Site Controller functions and configuration requirements.
- Describe the connections and interfaces to the GCP 8000.
- Diagnose and troubleshoot the GCP 8000.
- Describe the functionality of the GTR 8000 Expandable Site Subsystem.
- Configure and troubleshoot the ASTRO® 25 Repeater Site with GTR 8000 Expandable Site Subsystem.
- Configure and troubleshoot the Network Transport subsystem.

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- AST1038 ASTRO® 25 IV&D System Overview
- ACT101E Bridging the Knowledge Gap - Technicians
- NST762 Networking Essentials in Communication Equipment
- NWT003 ASTRO®25 Applied Networking

PREREQUISITES

None

STANDALONE GTR 8000 CONVENTIONAL BASE RADIO

2 DAYS | AST2006

COURSE OVERVIEW

This course is designed to give the participants the ability to align, troubleshoot and repair the Standalone GTR 8000 Base Station/Repeater to Motorola Solutions recommended service levels. Emphasis is placed on the use of Configuration Service Software (CSS) and its role in configuration, maintenance, diagnostics, alignments, and optimization of the Standalone GTR 8000 Base Radio/ Repeater.

TARGET AUDIENCE

Maintenance Technicians

COURSE OBJECTIVES

Upon completing this course, the participant will be able to:

- Understand basic concepts of the various radio systems supported by the GTR 8000 Conventional Base Radio
- Identify the equipment modules of the GTR 8000 Conventional Base Radio
- Operate and perform routine maintenance on the GTR 8000 Conventional Base Radio
- Understand basic operational theory of GTR 8000 Conventional Base Radio components
- Configure the GTR 8000 Conventional Base Radio using Configuration Service Software (CSS)
- Identify the different backplane connections on the GTR 8000 Conventional Base Radio
- Perform calibration and alignment adjustments for the GTR 8000 Conventional Base Radio
- Troubleshoot problems and identify/replace faulty modules in the GTR 8000 Conventional Base Radio

REQUISITE KNOWLEDGE

General RF Knowledge and Skills Basic Knowledge of Two-Way Radio systems

PREREQUISITES

None

ASTRO® 25 DOMAIN CONTROLLER ADMINISTRATION

3 DAYS | AST2015

COURSE OVERVIEW
This workshop covers the administrator and management functions in the ASTRO® 25 Domain Controller and how these functions affect both users and computers in the ASTRO® 25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer, and authorize users and devices in the ASTRO® 25 System. Group Policies and Organizational Units, RADIUS, and DNS structure will be addressed during this course.

TARGET AUDIENCE
System Administrators, Technical System Administrators and System Technicians

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Understand the Domain Controller server platform
- Understand the DNS Hierarchy in the ASTRO® 25 system
- Implement RADIUS authentication in applicable devices in an ASTRO® 25 system.
- Use Active Directory to control users in the ASTRO® 25 system.
- Understand Group Policy objects and how they impact users in the ASTRO® 25 Domain.

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- AST1038 ASTRO® 25 IV&D System Overview

PREREQUISITES
None

INTELLIGENT MIDDLEWARE 5.2 OPERATION AND ADMINISTRATION

2 DAYS | RDS2025

COURSE OVERVIEW
The purpose of this course is to provide the steps to operate and maintain a customer's IMW system within their Motorola system (ASTRO®, DIMETRA, LTE).

TARGET AUDIENCE
Professionals responsible for the operation and maintenance of a customer's IMW system within their Motorola systems (ASTRO®, DIMETRA, LTE).

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Describe IMW features.
- Perform installation of IMW.
- Configure an IMW system.
- Identify the IMW tools to administer the system.
- Perform routine administration.
- Perform troubleshooting.
- Understand system-specific considerations.

REQUISITE KNOWLEDGE
None

PREREQUISITES
None

ASTRO® 25 ISSI 8000 / CSSI 8000 FEATURE OVERVIEW

2 HRS | AST2005

COURSE OVERVIEW
The ISSI 8000 / CSSI 8000 Feature Overview self-paced course describes the optional Inter-RF Subsystem Interface available in an ASTRO® 25 IV&D System. It presents a description of the feature, its benefits and components, call processing scenarios, and an overview of the installation process.

TARGET AUDIENCE
System Managers, Technical System Managers, System Technicians, Application Users

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Describe the ISSI 8000 / CSSI 8000 feature
- Describe the components of the ISSI 8000 / CSSI 8000 feature
- Describe the communication scenarios if this feature is enabled
- Follow the installation and configuration process if this feature is added to an ASTRO® system

REQUISITE KNOWLEDGE
Completion of the following courses:
- ACT100E Bridging the Knowledge Gap - Technicians
- AST1038 ASTRO® 25 IV&D System Overview

PREREQUISITES
None

ASTRO® 25 IV&D DYNAMIC SYSTEM RESILIENCE

2 HRS ACS715023

COURSE OVERVIEW
The ASTRO® 25 IV&D Dynamic System Resilience (DSR) Overview is a self-study training course intended to provide a technical overview of DSR. The course describes how DSR adds a geographically separate backup for the Master Site to protect against a catastrophic failure.

TARGET AUDIENCE
System Administrators, System Technicians, Field Technicians

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Differentiate between a non-DSR Master Site and a DSR Master Site
- Describe the DSR components, operation and functionality of each of the following services:
  - Voice
  - Data
  - Network Management
  - Network Transport
  - IP Services

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- AST1038 ASTRO® 25 IV&D System Overview

PREREQUISITES
None

ASTRO® 25 IV&D ENHANCED TELEPHONE INTERCONNECT

2 HRS ACS715480

COURSE OVERVIEW
This web based course describes the functionality and the hardware and software associated with the Enhanced Telephone Interconnect feature in the ASTRO® 25 IV&D System.

TARGET AUDIENCE
System Technicians, System Administrators

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Identify the function and major components for the Enhanced Telephone Interconnect feature
- Define the operation of the Enhanced Telephone Interconnect feature within the system
- Configure the Enhanced Telephone Interconnect equipment
- Troubleshoot the Enhanced Telephone Interconnect equipment

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- ACT100E or ACT101E Bridging the Knowledge Gap for ASTRO® 25
- NST762 Networking Essentials in Communication Equipment

PREREQUISITES
None

SYSTEM OVERVIEW FOR ASTRO® 25 IV&D INFORMATION ASSURANCE

4 HRS ACS715211

COURSE OVERVIEW
This web based course describes the functionality and the hardware and software associated CNI Network Security in the ASTRO® 25 IV&D System.

TARGET AUDIENCE
System Administrators, System Technicians, Field Technicians

COURSE OBJECTIVES
After completing this course, the student will be able to:
- Define network security and its functions
- List the network security components of an ASTRO® 25 IV&D system
- Define the functions, components and operation of the Core Server Management Server (CSMS)
- Identify the functions, components and operation of the Interface Barrier (NIB)
- Identify the functions, components and operation of the border router and the peripheral network router

REQUISITE KNOWLEDGE
Completion of the following course(s) or equivalent experience:
- ACT100E or ACT101E Bridging the Knowledge Gap for ASTRO® 25
- NST762 Networking Essentials in Communication Equipment
- NWT003 ASTRO® 25 Systems Applied Networking

PREREQUISITES
None

ASTRO® 25 INFORMATION ASSURANCE WORKSHOP

4.5 DAYS | AST0071

COURSE OVERVIEW

Information Assurance (IA) refers to securing radio network access, protecting the privacy of network traffic using encryption, and assuring the integrity of data sent through the radio network or stored in the radio network. IA procedures and protocols offer FIPS-compliant techniques designed to harden the network. In this workshop, IA features are applied to network transport equipment by configuring switches, routers, and firewalls in the classroom. Site level, and zone core IA features are illustrated on the customer system or, by remotely accessing the Motorola Solutions ASTRO® 25 system.

TARGET AUDIENCE

This course is intended to those who need to learn the characteristics and capabilities of ASTRO® 25 Systems using Information Assurance Features - Technicians and Administrators who need to maintain or administer Information Assurance-enabled ASTRO® 25 Systems.

COURSE OBJECTIVES

After completing this course you should be able to:

- Identify and describe the various Information Assurance (IA) features available in the ASTRO® 25 IVD network.
- Identify the system locations and scope of protection offered by IA features.
- Harden ASTRO® 25 networks using Information Assurance (IA) features.
- Configure and restore IA features on ASTRO® switches and routers.
- Configure site level IA features using the CSS or UNC.
- Manage zone core level IA features.
- Manage and check the configuration of firewalls in the ASTRO® 25 network.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- NWT003 ASTRO® 25 Applied Networking
- AST4103 ASTRO® 25 IV&D System Core Workshop

PREREQUISITES

None

INTRODUCTION TO KVL 5000

1 DAY | AST0067

COURSE OVERVIEW

The purpose of this training is to provide an introduction to the Key Variable Loader 5000. The course covers procedures which help participants familiarize themselves with the device and guide them through its configuration process. Participants will learn about features of KVL 5000, managing of encryption keys, loading keys into target device, configuring target devices using KVL 5000, sharing keys between KVLs, using KVL in an OTAR system, and managing log records.

TARGET AUDIENCE

Technical Support Staff responsible for managing secure devices.

COURSE OBJECTIVES

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

- Perform initial configuration of the KVL 5000
- Manage encryption keys in the KVL 5000
- Load keys and key groups into target devices
- View or remove keys from target devices
- Share keys between KVLs
- Configure and use the KVL 5000 in an OTAR system
- Manage key records

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

ASTRO® 25 CUSTOMER ENTERPRISE NETWORK WORKSHOP

3 DAYS | AST0072

COURSE OVERVIEW

This course describes the Customer Network Interface (CNI) between the Motorola ASTRO® 25 Radio Network Infrastructure (RNI) and certified Customer Enterprise Network (CEN) Architectures and discusses the protocols and infrastructure components that support the RNI-DMZ CEN and the Control Room CEN.

TARGET AUDIENCE

This course is intended to those who need to learn the characteristics and capabilities of ASTRO® 25 Customer Enterprise Networks - Technicians and Administrators who need to maintain or administer Customer Enterprise Networks within ASTRO® 25 Systems.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Discuss ASTRO® 25 certified architectures used to support the interface between the Radio Network Infrastructure and the Customer Enterprise Network.
- Understand how to administer and configure FortiGate firewall objects and policies to support the CNI.
- Discuss NAT and how Network Address Translation is used to support the CNI.
- Understand Layer 2 and Layer 3 network protocols used to support the CNI.

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

COURSE OVERVIEW

The MOSCAD Network Fault Management (NFM) course covers the programming, maintenance and operation of the:

- Site Device Manager Unit (SDM)3000 Remote Terminal Unit (RTU)
- SDM3000 Network Translator (SNT)
- IP Gateway
- Graphic Master Computer (GMC)

The course focuses on a detailed discussion of the different types of Network Fault Management systems, SDM3000 RTU hardware, hands-on activities with programming the RTUs, Attach Site Builder Applications for Tag Generation, Generating Tags and Files, navigating with the web browser features and the Graphic Master Computer.

TARGET AUDIENCE

System Managers, Service Technicians, Motorola Service Center, End Users

COURSE OBJECTIVES

After completing this course, the participant will be able to:

- Install NFM SDM3000 builder software on students laptops
- Configure alarm points using SDM3000 builder
- Generate Tags and Files to import alarm tags
- Navigating and acknowledging alarms at the Graphic Master Computer
- Utilize the web browser features to view and configure the system
- Create Custom Tabs
- Create Custom Maps

REQUISITE KNOWLEDGE

- A basic understanding of Windows navigation
- Laptop computer with Windows XP
- Windows program files must be on the “C” directory

PREREQUISITES

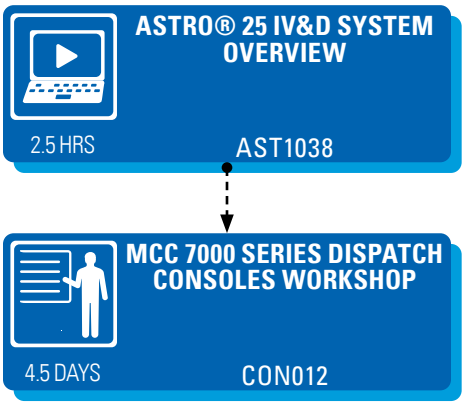
None

CONSOLE COURSES

ASTRO® 25 IV&D SYSTEM OVERVIEW (AST1038)	**40**
ASTRO® 25 IV&D DOMAIN CONTROLLER ADMINISTRATION (AST2015)	**40**
MCC 7000 SERIES DISPATCH CONSOLES WORKSHOP (CON012)	**40**
MCD 5000 TECHNICAL WORKSHOP (RDS1022)	**41**

MCC 7000 SERIES DISPATCH CONSOLES WORKSHOP (CON012) FOCUSES ON THE CONSOLES APPLICATION IN AN M- OR L-CORE SYSTEM.

CONSOLES TECHNICAL TRAINING CURRICULUM



CURRICULUM COMPLETE

PARTICIPANT CAN MAINTAIN A MCC 7000 DISPATCH CONSOLE SITE INCLUDING: CONSOLE PC, VPM, CC GW'S AND AUX I/O SERVERS.
*PARTICIPANT PERFORMS TROUBLESHOOTING AND REPLACEMENT OF SITE DEVICES DURING COURSE.

OPTIONAL CONSOLE TRAINING

COURSE OVERVIEW

The ASTRO® 25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO® 25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO® 25 system will be provided.

TARGET AUDIENCE

Core Technicians, Site Technicians, Console Technicians, Core Managers.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Understand the general architecture of an ASTRO® 25 IV&D Radio System
- Understand key features of available in the ASTRO® 25 IV&D Radio System
- Understand the components of the ASTRO® 25 Zone Core
- Understand site components in the ASTRO® 25 system
- Understand the features, capabilities and components of the MCC7000 series dispatch consoles
- Understand concepts of Mobility and Call Processing in the ASTRO® 25
- Understand the applications for managing the ASTRO® 25 system

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

COURSE OVERVIEW

This workshop covers the administrator and management functions in the ASTRO® 25 Domain Controller and how these functions affect both users and computers in the ASTRO® 25 system. Learning activities in this course focus on how to use the Domain Controllers to authenticate, administer, and authorize users and devices in the ASTRO® 25 System. Group Policies and Organizational Units, RADIUS, and DNS structure will be addressed during this course.

TARGET AUDIENCE

System Administrators, Technical System Administrators and System Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Understand the Domain Controller server platform
- Understand the DNS Hierarchy in the ASTRO® 25 system
- Implement RADIUS authentication in applicable devices in an ASTRO® 25 system.
- Use Active Directory to control users in the ASTRO® 25 system.
- Understand Group Policy objects and how they impact users in the ASTRO® 25 Domain.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- AST1038 ASTRO® 25 IV&D System Overview

PREREQUISITES

None

COURSE OVERVIEW

This course familiarizes participants in installation, configuration, management and repair of MCC 7000 Series Dispatch Consoles, Archiving Interface Servers, AUX I/O servers, and Conventional Channel Gateways. The focus is on a detailed discussion of console hardware and hands-on activities with the installation and configuration of the MCC 7000 Series Dispatch Consoles.

TARGET AUDIENCE

System Administrators, Console Technicians

COURSE OBJECTIVES

After completing this course, the participant will be able to:

- Understand key physical and functional characteristics of MCC 7000 Series Dispatch Consoles.
- Understand physical installation requirements of MCC 7000 Series Dispatch Consoles.
- Perform tasks necessary to install MCC 7000 Series Dispatch Consoles components.
- Perform configuration steps for MCC 7000 Series Dispatch Consoles components.
- Understand available maintenance tools and indicators in MCC 7000 Series Dispatch Consoles.
- Perform routine maintenance activities in MCC 7000 Series Dispatch Consoles components.
- Troubleshoot MCC 7000 Series Dispatch Consoles components to the Motorola Solutions recommended service level.
- Perform tasks necessary to provision users for MCC 7000 Series Dispatch Consoles.
- Configure the MCC 7000 Series Dispatch Consoles interface.
- Perform required administrative activities for MCC 7000 Series Dispatch Consoles.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- ACT100E or ACT101E Bridging the Knowledge Gap
- NST762 Networking Essentials in Communication Equipment
- NWT003 ASTRO® 25 Systems Applied Networking

PREREQUISITES

- AST1038 ASTRO® 25 IV&D System Overview

COURSE OVERVIEW

This workshop supports those that install, configure, or support the MCD 5000 Deskset. This three day training course will cover installation procedures for the MCD5000 Deskset, Radio Gateway Unit (RGU), and connectivity to different station types. Configuration and programming of the MCD5000 and its supporting equipment will be covered through discussion and hands- on lab activities. Troubleshooting and maintenance techniques will be addressed to the Motorola Solutions recommended service level.

TARGET AUDIENCE

MCD 5000 Technicians

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Identify the MCD 5000 System components and functions.
- Install MCD 5000 Deskset.
- Install Radio Gateway Units.
- Configure MCD 5000 subcomponents.
- Troubleshoot the MCD 5000 System to Motorola Solutions recommended service levels.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- NST021 Communication Systems Concepts

PREREQUISITES

None

APX™ SUBSCRIBER COURSES

APX™ CPS PROGRAMMING AND TEMPLATE BUILDING (APX7001V)	**43**
APX™ TECHNICAL SUBSCRIBER ACADEMY (APX010)	**43**
APX™ RADIO MANAGEMENT WORKSHOP (RDS2017)	**43**
APX™ RADIO MANAGEMENT OVERVIEW (AST2003)	**44**

COURSE OVERVIEW

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program the APX family of radios in the most efficient way possible. Supplemental videos for this VILT course can be seen by enrolling in RDS1018 and RDS1019 in the LXP.

TARGET AUDIENCE

Radio Technicians, System Managers

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Build the APX family of programming templates using the APX CPS programming Software
- Program the specific parameters related to the various system types in which the subscriber unit will operate: Conventional, Single Site trunking, Simulcast, SmartZone or ASTRO® 25 IV&D TDMA and ASTRO® 25 IV&D x2.
- Demonstrate knowledge of the APX CPS navigation, tools, options and features that make efficient programming of the radio possible.
- Demonstrate a complete understanding of the various APX CPS programming efficiency tools, such as: Cloning, drag and drop, Codeplug Comparison tool, radio Flashing, Advance System Key Administrator, Codeplug Merging and many others.

REQUISITE KNOWLEDGE

Knowledge of the basic features and options of two-way radios and the basic concepts of trunking.

PREREQUISITES

None

COURSE OVERVIEW

Participants will learn the capabilities, features, and functions of the APX family of radios as well as how to correctly complete performance checks, radio alignments, disassembly/reassembly, maintenance, and troubleshooting. This Academy will also focus on a Level 2 (block-level) theory of operation for the APX family of radios and provide a review of APX CPS and Radio Management programming. In addition to the lecture, large amounts of hands on with scenario-based lab work will be used to reinforce knowledge transfer.

TARGET AUDIENCE

This course is intended for who would like to get familiar with the features, operation principles, troubleshooting steps and disassembly and reassembly of the APX family of radios.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Distinguish between the features and specifications of APX Portable and Mobile radios
- Verify the correct operation of the various radios within the APX family of subscribers by completing Performance Checks and Alignment procedures
- Disassemble and reassemble APX radios using the documented procedures
- Maintain and troubleshoot radios within the APX family of subscribers

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- NST021 Communication Systems Concepts
- APX7001V APX CPS Programming and Template Building Overview

PREREQUISITES

None

COURSE OVERVIEW

Participants will learn the capabilities, features, and functions of the APX Radio Management Suite.
This course covers an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO® 25/CEN Networking and UNS Overview, and APX Radio Management Installation, Configuration, and Operations.
In addition, the course contains labs that focus on installation, configuration, and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.

TARGET AUDIENCE

Radio Technicians, System Managers, Radio Programmers

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Describe the APX Radio Management Suite operations and required software and hardware components
- Describe all deployment options for APX Radio Management Suite
- Configure a basic APX Radio Management system using a single PC, multiple PCs on a LAN, and multiple PCs on a WAN.
- Troubleshoot common APX Radio Management installation, configuration, and operation issues
- Use Best Practices to implement and optimize Radio Management Performance.

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- APX7001V APX CPS Programming and Template Building Overview

PREREQUISITES

None

COURSE OVERVIEW

This course provides an overview of the features and functions of the APX ™ series Radio Management software. Participants will learn what the Radio Management software is designed to do, and will also learn how to use it to program large and small groups of subscribers portfolio of systems.

TARGET AUDIENCE

Technicians and System Managers needing an understanding of the basics of the Radio Management application as well as database and fleet management.

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Identify the solution that Radio Management provides
- Differentiate between All-in-One PC needs and Distributed Use needs regarding Radio Management
- Locate the APX Radio Management
- Navigate the APX Radio Management screens
- Populate the database
- Schedule a Read job
- Manage multiple APX radios simultaneously
- Create, modify, and select programming templates
- Schedule a Write job
- Conduct a search
- Search, sort, and group radios
- Sort and manage information in the Table view
- Identify the function of the Job view

REQUISITE KNOWLEDGE

None

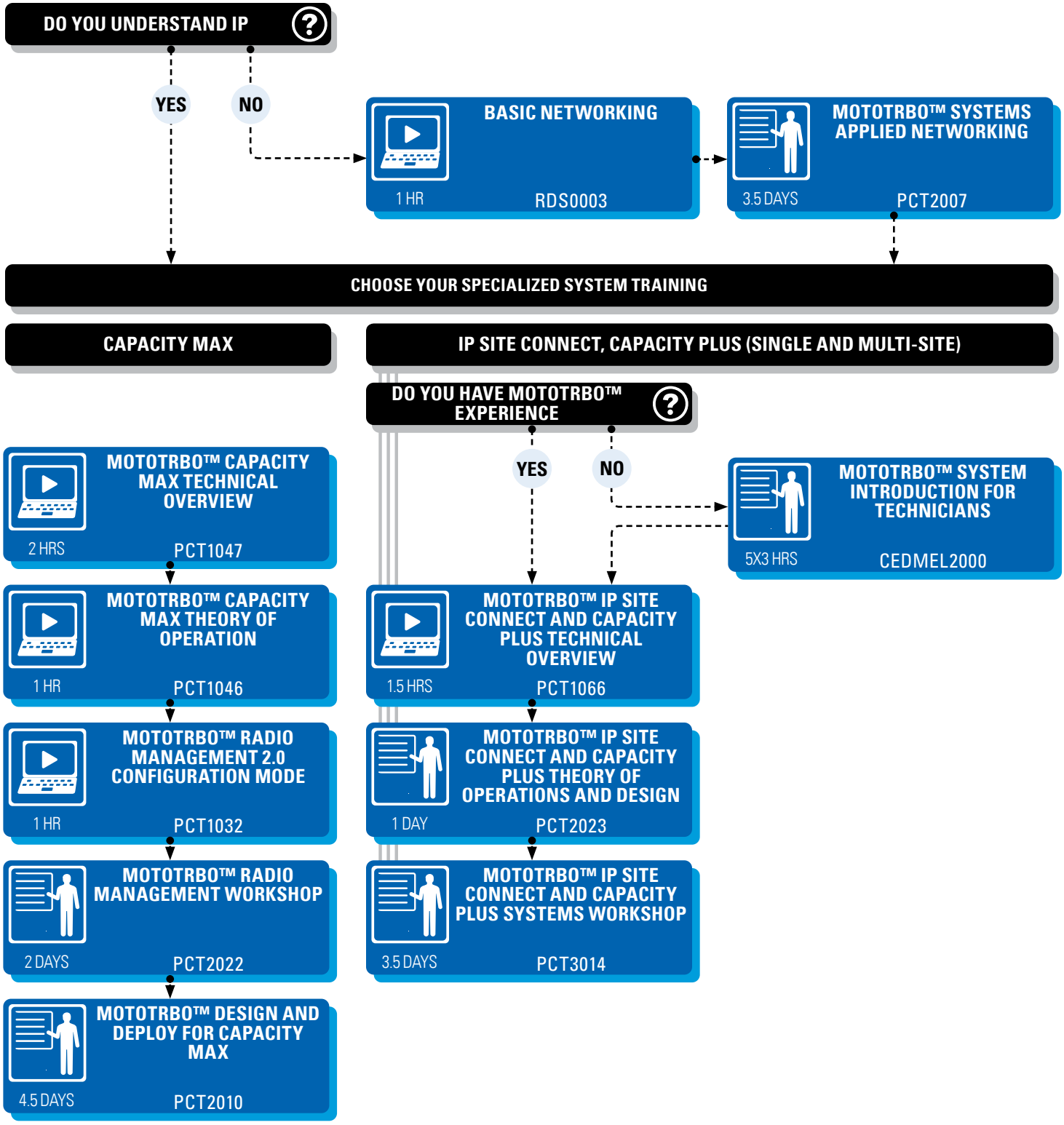
PREREQUISITES

None

MOTOTRBO™ COURSES

MOTOTRBO™ SYSTEM INTRODUCTION FOR TECHNICIANS (CEDMEL2000)	**48**
MOTOTRBO™ SYSTEMS APPLIED NETWORKING (PCT2007)	**48**
MOTOTRBO™ RADIO MANAGEMENT 2.0 TEMPLATE MODE (PCT1026)	**48**
MOTOTRBO™ RADIO MANAGEMENT 2.0 CONFIGURATION MODE (PCT1032)	**49**
MOTOTRBO™ RADIO MANAGEMENT WORKSHOP (PCT2022)	**49**
MOTOTRBO™ CPS 2.0 PROGRAMMING (PCT0115)	**49**
MOTOTRBO™ NITRO SLN 1000 OVERVIEW (PCT0118)	**50**
MOTOTRBO™ SUBSCRIBER AND REPEATER TECHNICAL SERVICE ACADEMY (TBO300)	**50**
MOTOTRBO™ CAPACITY MAX TECHNICAL OVERVIEW (PCT1047)	**50**
MOTOTRBO™ CAPACITY MAX THEORY OF OPERATION (PCT1046)	**51**
MOTOTRBO™ CAPACITY MAX DESIGN AND DEPLOY (PCT2010)	**51**
MOTOTRBO™ IP SITE CONNECT AND CAPACITY PLUS TECHNICAL OVERVIEW (PCT1066)	**51**
MOTOTRBO™ IP SITE CONNECT AND CAPACITY PLUS THEORY OF OPERATIONS AND DESIGN (PCT2023)	**52**
MOTOTRBO™ IP SITE CONNECT AND CAPACITY PLUS SYSTEMS WORKSHOP (PCT3014)	**52**

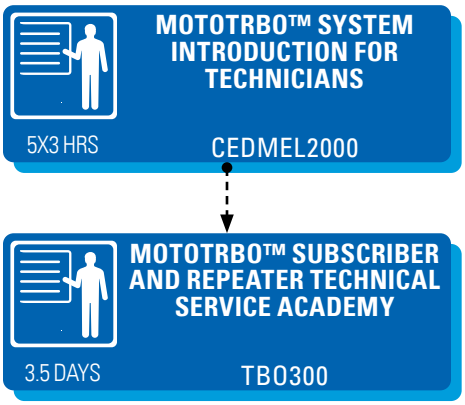
MOTOTRBO™ TECHNICAL TRAINING CURRICULUM



CURRICULUM COMPLETE

PARTICIPANT SHOULD BE ABLE TO DESCRIBE THE KEY CHARACTERISTICS OF THE SYSTEM, DESCRIBE THE KEY CONFIGURATION ITEMS IN BOTH SUBSCRIBERS AND REPEATERS, PROGRAM EFFECTIVE REPEATER AND SUBSCRIBER CODEPLUG TEMPLATES FOR THE SYSTEM, AND DESCRIBE THE APPLICABLE IP NETWORKING REQUIREMENTS WHEN DESIGNING A SYSTEM.

MOTOTRBO™ TECHNICAL TRAINING CURRICULUM
FOR SUBSCRIBER/REPEATER MAINTENANCE TECHNICIAN



CURRICULUM COMPLETE

PARTICIPANT WILL LEARN THE COMMON MOTOTRBO™ FEATURES AND CAPABILITIES TO DESIGN AND DEPLOY MOTOTRBO™ SYSTEMS. PARTICIPANT SHOULD BE ABLE TO COMPLETE PERFORMANCE CHECKS, RADIO ALIGNMENTS, DISASSEMBLY/REASSEMBLY, MAINTENANCE, AND TROUBLESHOOTING OF VARIOUS MOTOTRBO™ RADIO TYPES.

COURSE OVERVIEW

This is an introductory course to the MOTOTRBO system theory of operation, key components and topologies. MOTOTRBO System Introduction for Technicians provides all the basic information about common MOTOTRBO features and capabilities, along with system design and deploy principles. Upon successfully completing this course, individuals should be ready to take the more advanced Design and Deploy courses for IP Site Connect, Capacity Plus (Multi-Site and Single Site), Capacity Max and/ or Connect Plus.

TARGET AUDIENCE

Professionals responsible for selling, designing, configuring, deploying, or maintaining MOTOTRBO Digital Radio Systems.

COURSE OBJECTIVES

Upon completion of this course, you will be able to:

- Correctly categorize the different components available to build your MOTOTRBO system.
- Accurately explain the functional technology that MOTOTRBO systems employ
- Propose the MOTOTRBO topology that best fits the user requirements.
- Correctly describe MOTOTRBO's digital and analog features.
- Analyze the various data applications' capabilities and everyday uses within the MOTOTRBO systems.
- Refer to system and channel capacity considerations during system planning.
- Refer to MOTOTRBO IP network design considerations during system planning.
- Design a fleetmap in accordance with organizational requirements and resources.
- Select the right MOTOTRBO tool for your needs.
- Successfully purchase, register, and activate premium radio features.

REQUISITE KNOWLEDGE

Completion of the following optional courses or equivalent knowledge:

- RDS0003 Basic Networking
- RDS0002 Basic RF
- RDS0004 Basic Radio
- AAE1402 Professional and Commercial Radios (PCR) Portfolio Overview

PREREQUISITES

None

COURSE OVERVIEW

The MOTOTRBO™ Systems Applied Networking provides technicians with the necessary information required for understanding the typical networking requirements for implementing a variety or MOTOTRBO™ solutions. The course includes familiarization/review of basic networking concepts and MOTOTRBO™-specific networking requirements. This course will focus on specific configurations for IP Site Connect, Linked Capacity Plus, and Connect Plus trunking systems.

TARGET AUDIENCE

Technical System Managers and Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Recall Basic Networking Concepts
- Identify recommended network components for MOTOTRBO™ systems
- Define LAN/WAN topologies for MOTOTRBO™ systems
- Perform backup, restore and recovery of recommended network components
- Identify network security concepts for MOTOTRBO™ systems

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- NST762 Networking Essentials in Motorola Communication Systems

PREREQUISITES

None

COURSE OVERVIEW

This course is an introduction to MOTOTRBO's Radio Management (RM) 2.0 Template Mode software. You will learn how to install and use the enhancements of RM 2.0 Template Mode to program your fleet of radios.

TARGET AUDIENCE

This training is intended for individuals who are interested in learning MOTOTRBO's Radio Management (RM) 2.0 Template Mode software.

COURSE OBJECTIVES

Upon completion of this training, you will be able to:

- Describe MOTOTRBO™ Radio Management, its capabilities and functions.
- Set up Radio Management Template Mode.
- Manage your fleet using RM Template Mode.
- Manage the following functions:
  - Firmware
  - Language Packs
  - Voice Announcements
  - Text To Speech Packs
  - OTAP, Symmetric, RAS, & Privacy Keys
- Purchase and enable radio features using License Management.
- Create a group and assign radios.
- Sort groups.
- Search records.

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

MOTOTRBO™ RADIO MANAGEMENT 2.0 CONFIGURATION MODE

1 HR | PCT1032

COURSE OVERVIEW
This self-paced course is a basic tutorial of Radio Management (RM) 2.0 Configuration Mode. A set of short videos present installation and deployment of RM components, explain the concepts of sets and configurations, and demonstrate the user how to navigate through RM Client views and functionalities. The course also covers migration from template to configuration mode, backup and restores procedures, as well as user and machine authorization.

TARGET AUDIENCE
Professionals responsible for configuring, deploying, or maintaining MOTOTRBO™ radios and repeaters.

COURSE OBJECTIVES
By the end of the course, you will be able to:
- Explain the purpose of that Radio Management Configuration (RM) Mode.
- Explain the concept of sets and configurations.
- Set up Radio Management 2.0 for the first time.
- Name and navigate through major RM Client views.
- Perform basic RM Configuration Client operations: populate and manage radio database, edit sets and configurations, etc.
- Perform Server Utility operations.

REQUISITE KNOWLEDGE
None

PREREQUISITES
None

MOTOTRBO™ RADIO MANAGEMENT WORKSHOP

2 DAYS | PCT2022

COURSE OVERVIEW
The MOTOTRBO™ Radio Management 2.0 Workshop course provides technicians with the necessary information and practice to use the MOTOTRBO™ Radio Management 2.0 programming tool effectively.

TARGET AUDIENCE
System Managers and Technicians

COURSE OBJECTIVES
By the end of the course, you will be able to:
- Deploy and use RM 2.0 in a variety of real-world scenarios.
- Create and maintain configurations for basic MOTOTRBO™ Configurations (Connect Plus and Capacity Max excluded).
- Utilize Wi-Fi programming within RM 2.0.
- Use the RM Import and Export feature for database population.
- Convert existing radio templates and codeplugs to RM 2.0 Configurations.
- License and activate Radio and Application features.
- Use advanced features such as Data Mining.
- Use RM 2.0 to ease mass-deployments of subscribers.

REQUISITE KNOWLEDGE
Networking Essentials or Network + Certification.
- A high-level working knowledge of IP networking is important.

PREREQUISITES
PCT1032 MOTOTRBO™ Radio Management 2.0 Configuration Mode

MOTOTRBO™ CPS 2.0 PROGRAMMING

1 HR | PCT0115

COURSE OVERVIEW
This course is an introduction to MOTOTRBO™ Customer Programming Software (CPS) 2.0. You will learn how to install and use CPS 2.0 to program your equipment.

TARGET AUDIENCE
Communication System Technicians, Technical Support Personnel, Service Technicians and Radio Programmers.

COURSE OBJECTIVES
By the end of the course, you will be able to:
- Explain the purpose of CPS 2.0.
- Describe the key workflows of CPS 2.0.
- Update a codeplug using CPS 2.0 for specific system types.
- Demonstrate a good level of knowledge for the processes of managing licenses in CPS 2.0.

REQUISITE KNOWLEDGE
None

PREREQUISITES
None

COURSE OVERVIEW

This course will provide information and an overview of the MOTOTRBO Nitro SLN 1000 Portable 2 way Radio. Basic Operations and warranty information will also be covered.

TARGET AUDIENCE

This course is intended for users that would like to learn about the MOTOTRBO Nitro SLN 1000 Portable 2 way Radio.

COURSE OBJECTIVES

After completing this training course you will be able to:

- Identify the SLN 1000 Radio
- Identify radio controls of the SLN1000 radio.
- Identify Status Indicators and what they represent
- Identify different types of call, which of them to use in a given situation, and how to make them quickly and easily.
- Identify the features of the radio and how to use them
- Understand the warranty of the radio

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

COURSE OVERVIEW

Participants will learn the capabilities, features and functions of the MOTOTRBO™ family of radios and repeaters as well as how to correctly complete performance checks, radio alignments, disassembly/reassembly, maintenance, and troubleshooting. This Academy will also focus on the detailed theory of operation. In addition to lecture, large amounts of hands on, scenario based lab work will be used to reinforce knowledge transfer. This Academy will cover in detail different models within the MOTOTRBO™ family of radios and repeaters.

TARGET AUDIENCE

Radio Technicians

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Distinguish between the features and specifications of the MOTOTRBO™ portable and mobile radios and repeaters
- Verify the correct operations of the MOTOTRBO™ radios and repeaters by completing Performance Checks and Alignment procedures
- Maintain and troubleshoot MOTOTRBO™ radios and repeaters
- Disassemble and reassemble the radios using the documented procedures

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- CEDMEL2000 Introduction to MOTOTRBO™ Systems for Technicians

PREREQUISITES

None

COURSE OVERVIEW

This self-study course is designed to help you learn the fundamentals of Capacity Max.

Whether you have a sales or technical background, this training will give you the information that you need to gain a basic understanding of Capacity Max. Begin by exploring the DMR standard and Capacity Max's positioning within the MOTOTRBO™ portfolio of systems.

Learn about the different hardware and software components that make up a Capacity Max system and gain an understanding of its logical and physical topology. Features, redundancy, design tools and warranty will also be addressed.

TARGET AUDIENCE

Professionals responsible for selling, designing, configuring, deploying, or maintaining MOTOTRBO™ radio systems.

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Explain Digital Mobile Radio (DMR)
- Describe a basic Capacity Max system and where it fits in the MOTOTRBO™ Portfolio
- Describe the Capacity Max's system physical and logical topologies
- List the minimum hardware and software requirements for a Capacity Max system
- Distinguish the three different types of Capacity Max Operating Modes
- Identify the different features and license types available for a Capacity Max system

REQUISITE KNOWLEDGE

Basic Radio knowledge

PREREQUISITES

None

MOTOTRBO™ CAPACITY MAX THEORY OF OPERATION

1 HR | PCT1046

COURSE OVERVIEW

This foundational self-study course is designed to help you understand the theory of how a Capacity Max system functions. It describes the life cycle of a call, which includes: call initiation, call queuing, call grant or rejection, call transmission(s), and call termination. This knowledge is important for system troubleshooting and maintenance purposes.

TARGET AUDIENCE

Professionals responsible for selling, designing, configuring, deploying, or maintaining MOTOTRBO™ radio systems.

COURSE OBJECTIVES

Upon completion of this course, you will be able to describe and explain the functions of:

- Control Channel
- Roaming
- Radio Registration
- Call Request
- Call Setup
- Busy Queue
- Channel Allocation
- Call Termination

REQUISITE KNOWLEDGE

Basic Radio knowledge

PREREQUISITES

PCT1047 MOTOTRBO™ Capacity Max Technical Overview

MOTOTRBO™ DESIGN AND DEPLOY FOR CAPACITY MAX

4.5 DAYS | PCT2010

COURSE OVERVIEW

MOTOTRBO™ Capacity Max Design and Deploy begins by covering the design process for a Capacity Max Radio system. Participants will have the opportunity to practice designing and deploying a small scale, 2 Site/3 Channel, Capacity Max system in a safe classroom environment. This course will also cover how to configure Capacity Max using Radio Management 2.0 Configuration Mode.

TARGET AUDIENCE

This training is intended for professionals responsible for designing, configuring, or deploying MOTOTRBO™ radio systems.

COURSE OBJECTIVES

Upon completion of this course, you will be able to:

- Design a simple a 1-System 2 Site/3 Channel Capacity Max system
- Calculate Capacity Max capacity and bandwidth using a Case Scenario and System Design tools.
- Using Radio Management Configuration Mode, configure your radios and infrastructure.
- Deploy a 1-System 2 Site/3 Channel Capacity Max system.
- Using System Advisor, learn the fundamentals of troubleshooting and -maintaining a Capacity Max system.
- Execute Radio Management database backup and restore.
- Describe how to optimize a Capacity Max system.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- Understanding IP Network Addressing.
- Knowledge of RF Propagation modeling tools

PREREQUISITES

- PCT1032 MOTOTRBO™ Radio Management 2.0 Configuration Mode
- PCT1046 MOTOTRBO™ Capacity Max Theory of Operation
- PCT1047 MOTOTRBO™ Capacity Max Technical Overview

MOTOTRBO™ IP SITE CONNECT AND CAPACITY PLUS TECHNICAL OVERVIEW

1.5 HRS | PCT1066

COURSE OVERVIEW

This course is designed to help you understand the basics of a MOTOTRBO™ IP Site Connect and a MOTOTRBO™ Capacity Plus system. We'll begin by exploring their capabilities, features and positioning within the MOTOTRBO™ system solutions. You will also learn about the different system components and their general topology. The course will also review available MOTOTRBO™ services packages.

TARGET AUDIENCE

Professionals responsible for selling, designing, configuring, deploying, or maintaining MOTOTRBO™ radio systems.

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Describe a MOTOTRBO™ IP Site Connect and Capacity Plus system.
- Explain the capabilities of the MOTOTRBO™ IP Site Connect and Capacity Plus system.
- Identify the MOTOTRBO™ IP Site Connect and Capacity Plus system components.
- Identify a MOTOTRBO™ IP Site Connect and Capacity Plus topology.
- Explain the difference in service plans between these systems.

REQUISITE KNOWLEDGE

Completion of the following course(s) or equivalent experience:

- Basic Radio knowledge
- CEDMEL2000 MOTOTRBO™ Systems Introduction for Technicians

PREREQUISITES

None

COURSE OVERVIEW

This course is designed to help you gain a solid foundation and understanding of the theory behind how an IPSC and Capacity Plus system functions. It describes the life cycle of a call, repeater arbitration and Motorola's proprietary Enhanced Channel Access (ECA) feature. In addition, you will learn about the different IPSC and Capacity Plus system design options, fleetmapping and the MOTORBO System Design Tool.

TARGET AUDIENCE

Professionals responsible for designing and deploying MOTOTRBO™ radio systems.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Explain the call processing methods.
- Define repeater arbitration, Enhanced Channel Access (ECA) and All Start.
- List the considerations that must be taken into account when designing a MOTOTRBO™ IP Site Connect, Capacity Plus Single-Site or Capacity Plus Multi-Site system.
- Use the MOTOTRBO™ System Design Tool to size the system.
- Explain the purpose of Fleetmapping, how to conduct a fleetmap and its importance in system design.
- Illustrate possible system deployment topologies based on options selected.
- Describe the roaming process which helps to optimize User coverage.
- Describe Data capabilities.
- Understand the purpose and intent of voting repeaters and receivers.

REQUISITE KNOWLEDGE

- Basic Radio knowledge
- CEDMEL2000 MOTOTRBO™ Systems Introduction for Technicians
- PCT1066 MOTOTRBO™ IP Site Connect and Capacity Plus Technical Overview

PREREQUISITES

None

COURSE OVERVIEW

This course allows the participant to acquire in-depth hands-on experience in planning, configuring, and deploying the following MOTOTRBO™ systems: Digital Conventional, IP Site Connect, Capacity Plus Single and Multi-Site. Under the Instructor's guidance, participants will have the opportunity to practise designing and deploying the systems in a safe classroom environment. The course also provides information on the fleetmapping considerations together with exercises for each system type.

TARGET AUDIENCE

Professionals responsible for deploying MOTOTRBO™ radio systems.

COURSE OBJECTIVES

Upon completion of this course, the participant will be able to:

- Describe the MOTOTRBO™ IP Site Connect and Capacity Plus (Single and Multi-Site) systems, their capabilities, system components, and data application.
- Describe the MOTOTRBO™ IP Site Connect and Capacity Plus (Single and Multi-Site) theory of operation.
- Describe the available MOTOTRBO™ IP Site Connect and Capacity Plus (Single and Multi-Site) topologies.
- Take the steps needed to configure IP Site Connect and Capacity Plus (Single and Multi-Site) systems using MOTOTRBO™ CPS to program the subscribers and repeaters.

REQUISITE KNOWLEDGE

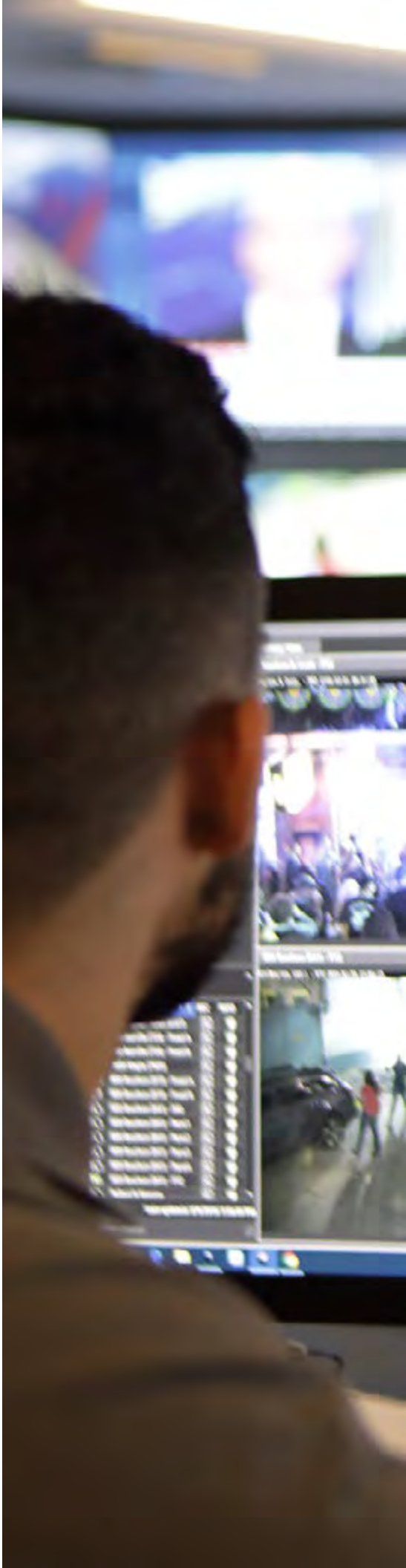
Basic Radio knowledge

PREREQUISITES

- CEDMEL2000 MOTOTRBO™ System Introduction for Technicians
- PCT1066 MOTOTRBO™ IP Site Connect and Capacity Plus Technical Overview
- PCT2023 MOTOTRBO™ IP Site Connect and Capacity Plus Theory of Operations and Design

SOFTWARE & APPLICATIONS

WAVE™ CERTIFIED INTEGRATION ENGINEER (AST3001)	**54**
WAVE™ ASTRO® 25 INTEGRATION WORKSHOP (AST2039)	**54**
INTELLIGENT MIDDLEWARE 5.2 OPERATION AND ADMINISTRATION (RDS2025)	**54**



COURSE OVERVIEW

The WAVE™ Certified Integration Engineer course provides instruction in designing, integrating, and troubleshooting WAVE™ systems. It also provides the groundwork for a basic understanding of how WAVE™ delivers a Radio-over-IP solution. The training scope covers WAVE™ integration to MOTOTRBO™, ASTRO®, and DIMETRA systems.

TARGET AUDIENCE

Sales/Systems Engineers who will design and implement WAVE™ solutions.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Understand and identify WAVE™ components.
- Install and configure the WAVE™ Management Server, Media Server, Proxy Server, Desktop Communicator, Advanced Desktop Communicator, and Mobile Communicators.
- Identify radio systems compatible with WAVE™ and list integration steps.
- Maintain and support a WAVE™ domain.

REQUISITE KNOWLEDGE

General knowledge of IP Networking, IP Telephony, Server-class Operating Systems.

PREREQUISITES

None

COURSE OVERVIEW

This workshop describes the components and settings required to configure shared talkgroups between ASTRO® 25 and WAVE™ 5000 networks using ISSI 8000. Beginning with installed ASTRO® and WAVE™ networks, the course covers the specific information required to map ASTRO® talkgroups to WAVE™ standard channels. Shared talkgroup operation is verified using ASTRO® and WAVE™ applications and tools.

TARGET AUDIENCE

Technical Support staff who configure, maintain, and troubleshoot WAVE™-to-ASTRO® integrated networks.

COURSE OBJECTIVES

After completing this course, the student will be able to:

- Describe WAVE™ TM to ASTRO® 25 integration.
- Document IP address plans for ASTRO® 25, WAVE™, ISSI and Internet connections.
- List ASTRO® 25 components for integration.
- Configure and verify ASTRO® 25 settings for WAVE™ integration.
- Configure and verify ISGW and ISSI Firewall settings.
- Configure WAVE™ standard channels, Radio System and WAVE™ Radio Gateway settings.
- Verify and troubleshoot shared talkgroup operation.

REQUISITE KNOWLEDGE

Completion of the following courses or equivalent experience:

- AST3001 WAVE™ 5000 Certified Integration Engineer
- AST4103 ASTRO® 25 IV&D System Core Workshop

PREREQUISITES

None

COURSE OVERVIEW

The purpose of this course is to provide the steps to operate and maintain a customer's IMW system within their Motorola system (ASTRO®, DIMETRA, LTE).

TARGET AUDIENCE

Professionals responsible for the operation and maintenance of a customer's IMW system within their Motorola systems (ASTRO®, DIMETRA, LTE).

COURSE OBJECTIVES

By the end of the course, you will be able to:

- Describe IMW features.
- Configure an IMW system.
- Identify the IMW tools to administer the system.
- Perform routine administration.
- Perform troubleshooting.
- Understand system-specific considerations.

REQUISITE KNOWLEDGE

None

PREREQUISITES

None

CONTACT US

VISIT OUR WORLDWIDE EDUCATION WEBSITE:

MOTOROLASOLUTIONS.COM/LEARNING

Our website is your portal to find help to meet your organizational training needs. Keep up to date with the latest version of this catalog, our training schedule, or simply use the Contact Us function for additional questions or assistance.

Motorola Solutions, Inc.
2000 Progress Parkway - Door 50
Schaumburg, Illinois 60196 U.S.A.

Telephone Number: 800-247-2346

Learning & Performance Institute
Authorised Qualification & Assessment Centre

MOTOROLA SOLUTIONS

Motorola Solutions, Inc.
500 West Monroe Street, Chicago, Il 60661 U.S.A.
motorolasolutions.com

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10.3 00318 AMD 4 EXHIBIT B3-EXPERIENCE, QUALIFICATION AND SERVICES: EXHIBIT B-3-OTHER MISSION-CRITICAL OPERATIONS (WHITE PAPER)

SERVICES FOR MISSION-CRITICAL OPERATIONS

MAXIMIZE THE VALUE OF YOUR TECHNOLOGY ECOSYSTEM

WHITE PAPER

MOTOROLA SOLUTIONS

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For public safety agencies tasked with mission-critical operations, assuring peak system performance is critical. Efficient and cost-effective management of an ever-evolving technology ecosystem is complex, requiring the right set of expertise and tool sets.

DEALING WITH COMPLEXITY IS A 24/7/365 MANDATE

Many traditional communications and mission-critical systems are transitioning from being hardware to software-centric, expanding the IT footprint far beyond where it was even a few years ago. In addition, public safety agencies have experienced a rapid infusion of new technologies such as body-worn cameras, new software platforms and video analytics.

Agencies are saddled with legacy, outdated systems and insufficient IT resources, including both staff and budget. 40% of an agency's computers may be over seven years old and running decades old software.[1]

Add it all up and agencies are struggling with increasing technology complexity, without the means to adequately manage it. The stakes for public safety organizations trying to keep up are only getting higher.

Natural disasters. Terrorism. Cyber attacks. In 2018 alone, there were 315 natural disasters globally that each caused billions of US dollars in damages.[2] In just one recent hurricane, Motorola Solutions tallied 500,000 system events in 48 hours from our customers' public safety systems that were in the path of the storm. In 2019, there were hundreds of mass shootings across the globe, with that number increasing at a rapid pace each year. Recent cyberattacks have held city governments' data hostage, costing them millions of dollars to get their systems up and running again. This is just a small sample of the threat environment public safety agencies must operate in.

When lives are at stake, you need to overcome these challenges and ensure the uninterrupted availability and peak effectiveness of mission-critical communication systems.

AGENCIES ARE SADDLED WITH LEGACY, OUTDATED SYSTEMS AND INSUFFICIENT IT RESOURCES, INCLUDING BOTH STAFF AND BUDGET.

OVERCOME COMPLEXITY. ACCELERATE PERFORMANCE. MANAGE COSTS.

Complexity, performance, and cost. Any plan to ensure mission-critical performance must start with managing these three critical factors. To do so, you need a unified management platform across your entire public safety technology ecosystem including networks, radios, software applications and video intelligence.

OVERCOME COMPLEXITY

Today's mission-critical ecosystem is a set of sophisticated IT-interdependent technologies, including command center software, video cameras, two-way radios, site controllers, routers, LAN switches, servers, dispatch consoles and more. Each component has its own unique level of complexity and lifespan.

When this ecosystem is comprised of disjointed pieces with differing management needs, it creates inefficiencies, makes updating overly complex and introduces multiple points of failure. Gaining operational efficiency and increased visibility into an ever-evolving technology ecosystem requires an integrated approach to system management.

70% of complex technology implementations fail or are challenged.[3]

Disconnected systems and multiple touchpoints create inefficiencies and multiple points of failure.

ACCELERATE PERFORMANCE

For mission-critical public safety agencies tasked with saving lives, accelerating performance starts with ensuring system availability, resiliency and responsiveness. Any downtime is simply too great a risk to the public and agency personnel.

As public safety systems become more software-centric and IP-based, downtime can be caused by any number of issues, including cyberattacks, software bugs, manual configuration problems and outdated software. Add in the possibility of physical harm to systems from storms or attacks and an "always-on, always-secure system" becomes an increasingly difficult task.

53% of network outages are caused by natural disasters.[4]

Increasing number and intensity of natural disasters are putting stress on the network like never before.

MANAGE COSTS

Overcoming system complexity and availability are essential, requiring the right skill set and expertise. Developing the right capabilities also requires budget levels that many agencies are challenged to meet. Increasing cost pressure continues to put relentless pressure on existing resources.

The budget constraints are driving the need for a predictable cost model to support and sustain the technology ecosystem. Not to forget, that lowering the total cost of ownership continues to be one of the top priorities for agencies.

40% of city CIOs cite insufficient budgets and IT resources as a significant barrier to their objectives.[5]

Agencies are facing relentless pressure to do more with less.

Given these obstacles, what's the best path forward for you to ensure peak performance for your mission-critical technology ecosystem?

The answer is clear. Your agency needs access to end-to-end mission-critical capabilities and expertise, from technical support, to system monitoring and management services, to cybersecurity solutions that span the entire technology ecosystem including radios, software applications, video analytics and security. You may already have mission-critical best-in-class technologies. However, the real value of your investments can only be unlocked with the right combination of in-house skills, managed and support services. Today, this combination of the right technology solution, paired with the right service delivery model, is the foundation of successful technology implementations.

HIRING AN EXTERNAL SERVICE PROVIDER CAN EMPOWER YOUR TEAM WITH HIGHLY SPECIALIZED TALENT, INDUSTRY-LEADING PROCESSES, ONGOING TRAINING AND CUTTING-EDGE TOOLS.

PARTNER WITH A TRUSTED SERVICE PROVIDER

The potential benefits of pairing your mission-critical technology ecosystem with end-to-end services can only be achieved by selecting the right provider—one that can demonstrate the value of seamless orchestration of people, processes and tools to successfully deliver on these capabilities. While it's possible to institute the right processes, hire the right people and secure the right tools in-house at your agency, it can be highly challenging and costly.

Your agency is rightly focused on its core mission, not the detailed upkeep of IT and mission-critical systems. Hiring an external service provider can empower your team with highly specialized talent, industry-leading processes, ongoing training and cutting-edge tools. Plus, partnering with the right service provider can help reduce the total cost of ownership for your mission-critical systems. There are key factors to consider when selecting a service provider.

DEEP MISSION-CRITICAL SKILLS AND EXPERIENCE

Having domain expertise around traditional two-way radio systems is a baseline requirement for any service provider. That expertise should extend to managing change, cloud-based solutions, new machine-learning and artificial intelligence technologies, security, software and video solutions and most importantly successfully managing integration across all of these platforms. The service provider should be constantly investing in knowledge sharing, training and communication of best practices to ensure that their skill set stays sharp and is always relevant.

ALIGNMENT WITH INDUSTRY-LEADING ITIL FRAMEWORK

Like any other IT system, your mission-critical ecosystem requires adoption of an ITIL-based approach to service management that focuses on aligning mission-critical services with the needs of an organization and adopts an agile approach to change management. Leveraging the principles of the ITIL framework your service provider should follow detailed processes, procedures, tasks, and checklists that can be applied towards service design, service transition, service operations and continual service improvement.

FLEXIBLE CONSUMPTION MODELS

A one-size-fits-all approach simply doesn't work for today's agencies. A service provider must have deep expertise across all delivery models, including in-house, managed services, and cloud-based or hybrid as-a-service consumption models. They should structure that expertise to uniquely meet your specific business needs.

VISIBILITY AND CONTROL

Working with a service provider does not have to mean losing control or visibility. The right service provider will partner with you to define and execute service-level agreements (SLAs) that align with your business outcomes. These can range from response times to system availability and capacity. Any provider should always allow you to have granular visibility into your system health including networks, radios, software applications and security. Service providers can offer this access through a secure web-based portal, giving you an easy to access, end-to-end view of your system.

AUTOMATION FOR SYSTEM MANAGEMENT

A forward-looking service provider understands that it is important to transition from a break/fix methodology to a proactive approach that emphasizes problem prevention and continuous improvement. Investing in sophisticated automation and analytics technologies can make system and security management more predictive and prescriptive, driving faster and more efficient resolution of system issues.

CENTRALIZED DELIVERY COUPLED WITH LOCAL EXPERTISE

A service provider with global capabilities can learn from diverse customers across the globe, constantly improving service delivery governance, platforms and processes. At the same time, local expertise and community presence ensures compliance with specific regulatory and legal requirements. You are best serviced by providers offering a combination of both. Global coverage also lays the foundation of a rich data lake that constantly helps improve machine-learning models driving automation.

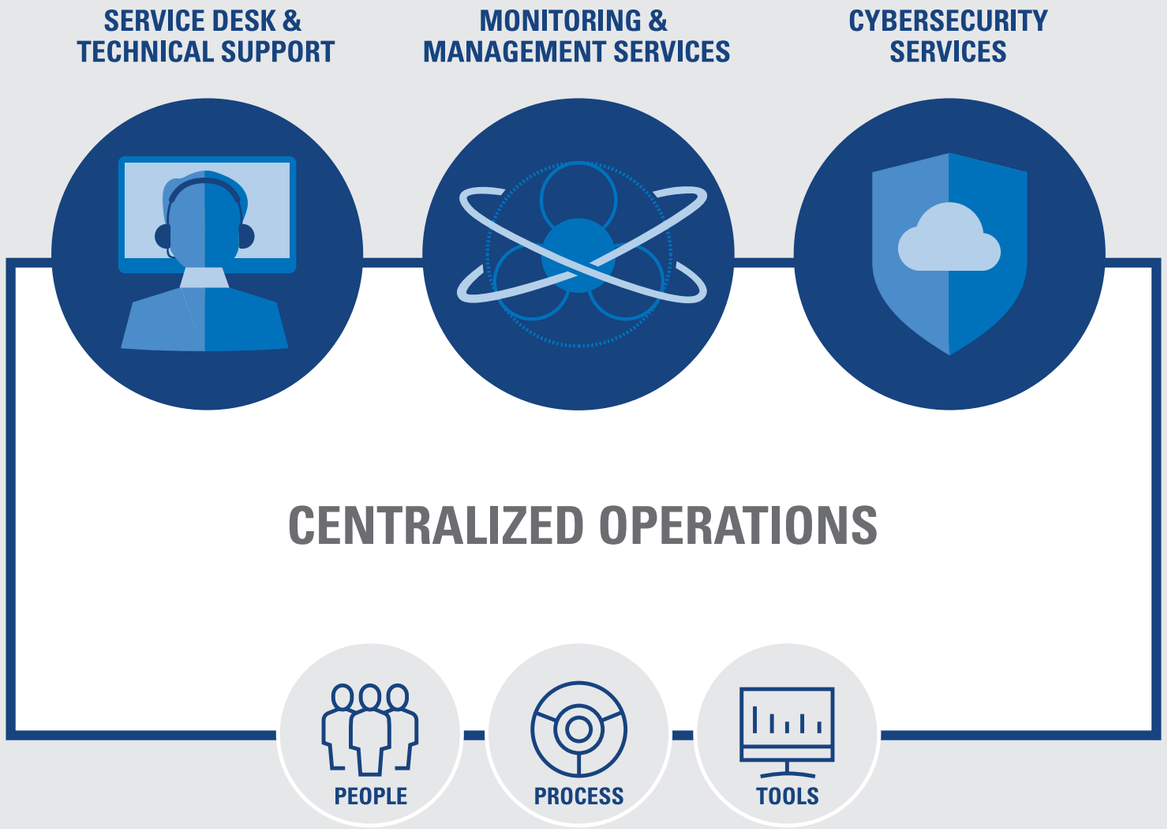
RESEARCH AND DEVELOPMENT DRIVING INNOVATION

Working with a service provider should be a long-term strategic partnership. You need a forward looking partner that continuously makes informed investments in new technologies and transformative strategies. These investments are what allow them to deliver the most innovative solutions that align to your business needs.

PARTNERING WITH THE RIGHT SERVICE PROVIDER CAN HELP REDUCE THE TOTAL COST OF OWNERSHIP FOR YOUR MISSION-CRITICAL SYSTEMS.

TRUSTED MISSION-CRITICAL SERVICES FROM MOTOROLA SOLUTIONS

Motorola Solutions manages your entire mission-critical ecosystem, with technical support, monitoring and management, and cybersecurity services, centrally delivered with the right combination of people, process and tools.



SERVICE DESK AND TECHNICAL SUPPORT

Motorola Solutions Technical Support services provide on-site and remote support for technical issues arising from devices, infrastructure, applications and video cameras. Our specialists offer specific troubleshooting capabilities, leverage a rich knowledge base and are skilled in diagnosis and swift resolution of system performance and operational issues. We provide industry-leading tools and have well-defined processes to record, monitor, escalate and report technical service issues.

With state-of-the-art diagnostic equipment, repair tools and replacement parts, you can receive the peace of mind that all of your agency's radio and infrastructure components are protected in the event of an unexpected failure and are back in operation as soon as possible. When serviced, all system components are returned to you with original factory specifications and updated with the latest firmware. Plus, our service centers are certified to comply with ISO9001, ensuring the highest quality repairs. We also offer accidental damage coverage, so damage from water, chemicals or physical abuse are never a concern and your repair and replacement costs are fixed and predictable.

Preventive maintenance on your system components, including two-way radios and network equipment, ensures you can extend the life of your systems. From physical inspection and cleaning of radios to component alignment of the network equipment, we ensure that the system components remain in top condition with the latest firmware and updates.

MONITORING AND MANAGEMENT SERVICES

Motorola Solutions Monitoring and Management services include a wide range of capabilities that help you ensure mission-critical availability, responsiveness and resiliency.

To prevent network outages, we offer robust and proactive network infrastructure monitoring and incident management services from our Network Operations Center. Our network management capabilities can automatically detect and identify network issues in minutes. Our automated network monitoring, coupled with a seasoned team of network engineers and technicians, ensure that complex network issues are resolved as quickly as possible. Advanced reporting services provide near real-time visibility into network performance and capacity while continuous data analysis improves ongoing system management, preventing issues by addressing their root causes before they impact network performance and end users. We are looking to adopt a similar approach for monitoring the health of video cameras and two-way radios.

Our Network Operations Center plays a critical role during an emergency or disaster-related major event, such as political conventions, natural disasters and catastrophes that have a direct or potential impact on customers' systems. In these instances, multiple teams within Motorola Solutions are activated for real-time, hands-on support and communication.

We also specialize in Lifecycle Management services that help you maintain and secure your systems. These services address technology refreshes, while enabling security and ongoing system availability and resilience. They include software maintenance, system upgrades and ongoing lifecycle management. Periodic technology updates are provided for base stations, site controllers, routers, LAN switches, servers, dispatch consoles, operating system software and more, so your system stays current and future-proof.

In addition, our Device services ensure all your two-way radio communication needs are met, with a full range of device programming and provisioning services. These services include radio management software licensing, on-site set up and training, database hosting and access to a management portal that helps you maintain visibility into your devices. With constant technology, software and security feature updates, you maximize the performance of your radios.

Our expert teams of field service engineers are always ready for all on-site incident restoration efforts utilizing sophisticated service fault diagnostics and resource management tools to manage service restoration. Our technicians will ensure that the network performance sustains operational standards, with guaranteed restoration times adhering to established service level agreements.

OUR NETWORK MONITORING CAPABILITIES CAN AUTOMATICALLY DETECT AND IDENTIFY NETWORK ISSUES IN MINUTES.

CYBERSECURITY SERVICES

Our Cybersecurity services approach follows the National Institute of Standards and Technology (NIST) Cybersecurity Framework, to help you manage your cyber risk awareness, detection, response and recovery. We closely follow leading governance and oversight strategies throughout the product development, implementation and operational support lifecycle.

We help your agency assess risk by inventorying critical assets and systems, then providing a thorough risk analysis and vulnerability assessment. Next, we develop a roadmap and strategy to deploy new policies and procedures, introduce protective tools and implement appropriate access and auditing controls.

It is well known that security patching is the first and best defense against cyber attacks. We work with you to identify the gaps around your system patches. All hardware and software assets, network and communication flows and dependencies are identified, mapped, classified and managed according to criticality. As new patching needs arise, they are tested and deployed within the network.

WE CLOSELY FOLLOW LEADING GOVERNANCE AND OVERSIGHT STRATEGIES THROUGHOUT THE PRODUCT DEVELOPMENT, IMPLEMENTATION AND OPERATIONAL SUPPORT LIFECYCLE.

Our continuous 24x7x365 security monitoring capabilities can automatically detect system abnormalities, allowing you to take action faster. Our security experts assist in restoring functionality with recovery plans uniquely tailored to your organization and use lessons learned to inform the process from the start.

INDUSTRY-LEADING NIST CYBERSECURITY FRAMEWORK

IDENTIFY	PROTECT	DETECT	RESPOND	RECOVER
Assess risks	**Develop safeguards**	**Make timely discoveries**	**Take action**	**Restore functionality**
Inventory critical assets and systems	Develop policies and procedures, introduce protective tools	Continuous monitoring 24/7/365	Establish a robust response plan	Institute a recovery plan
Provide a thorough risk analysis	Implement appropriate access and auditing controls	Enable auditing capabilities	Create, analyze, triage and respond to detected events	Create improvements to prevent future attacks

EXPERTS TO HELP BUILD IT RIGHT - TOOLS TO PROTECT THE MISSION - SERVICES TO SUPPORT THE LIFECYCLE

CENTRALIZED OPERATIONS

Our service delivery model is enabled by seamless orchestration of people, process and tools.

PEOPLE

We bring years of mission-critical expertise with personnel that stay sharp through comprehensive, ongoing training, knowledge sharing and communication of best practices. Project Managers, Service Delivery Managers, System Technologists, Network Engineers, Security Specialists, Data Analysts and Field Service Managers hold top industry certifications and work hand-in-hand to ensure system availability, performance and security.

PROCESS

We have unparalleled experience working with agencies around the globe to design service delivery strategies that successfully support mission-critical operations. We are aligned with the principles of industry recognized ITIL management practices, Service Design, Service Transition and Service Operations within our public safety service delivery framework. This methodology further brings a culture of continuous improvement to service delivery and performance.

TOOLS

We have invested in industry-leading tools that apply analytics, accelerate machine learning and drive automation. These tools, together with a rich data set, make the management system more predictive and proactive while augmenting decision making. From network operations, to system updates or security operations, automation and analytics accelerates service response and scales operations so they can manage the peak load of a catastrophic event such as a hurricane.

INDUSTRY-DEFINING TALENT

"Our job is to ensure that the first responders are able to respond and rescue to minimize any damage to life and property. We prepare our field teams with the right ammunition to face the next big thing during a crisis. And when the next big thing does not happen, is when we know that we were well-prepared."

Kevin Sweet
Motorola Solutions NOC Manager

With 15 years of experience developing and managing mission-critical systems, Sweet supported Hurricanes Katrina, Harvey, Barry, Irma and Sandy, California Wildfires, Las Vegas and San Bernadino Shootings.

INDUSTRY LEADING ITIL FRAMEWORK

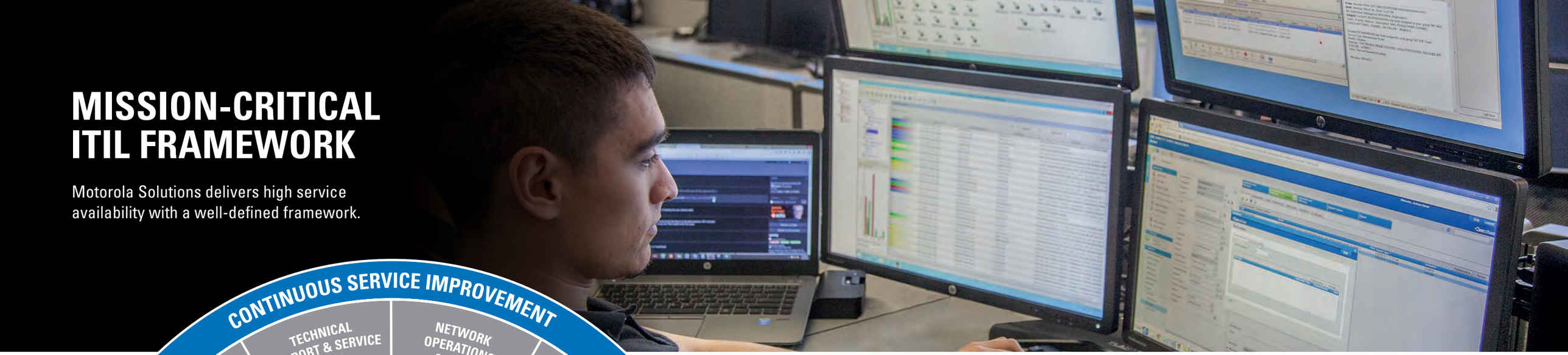
- Fully managed operational risk and service performance
- High service availability meeting mission-critical requirements
- Centralized service management across the entire technology ecosystem
- Intelligent performance analytics for proactive troubleshooting
- Predictable, cost-effective methods of maintaining and evolving the system

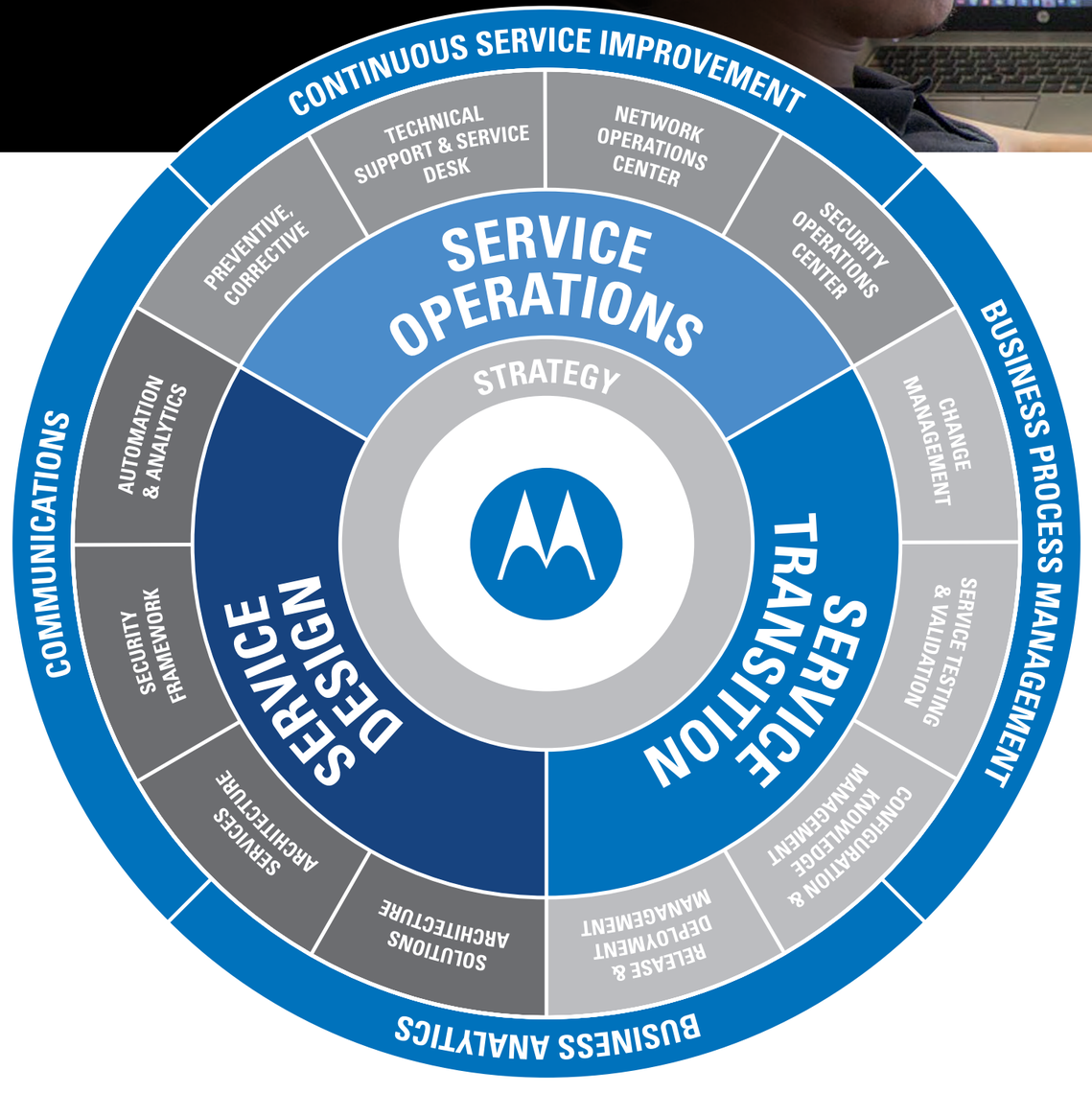
AUTOMATION AND ANALYTICS

- Predictive and prescriptive analytics for system monitoring
- Machine learning to continuously optimize system performance
- Chatbot for self-service and enhanced end-user experience
- Sensor-based diagnostics to proactively monitor ecosystem health and resolve issues

MISSION-CRITICAL ITIL FRAMEWORK

Motorola Solutions delivers high service availability with a well-defined framework.





ITIL process has various stages each focused on a specific phase of the service lifecycle.

STRATEGY

We develop a deep understanding of our customers' operating procedures that directly informs our service strategy. Our experienced team draws on intimate knowledge from our customers to develop the service delivery model, ensuring that the service architecture, policies and processes meet your needs. A robust governance model ensures secure data management and information flows.

SERVICE DESIGN

Motorola Solutions designs and implements a comprehensive solutions and services architecture with built-in security. Automation, analytics and other leading-edge technologies are included as a part of the service design.

SERVICE OPERATIONS

Well-defined procedures and processes ensure that all the day-to-day management and support activities are running smoothly, such as network and security operations and service desk. Escalation handling processes are also documented.

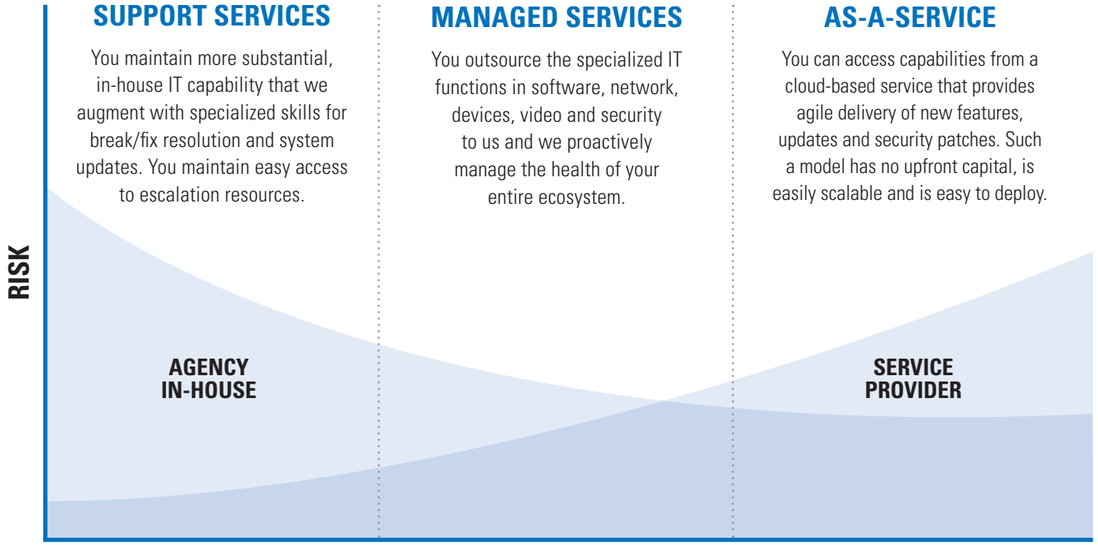
SERVICE TRANSITION

We help you with onboarding, documenting SLAs while ensuring you are comfortable with the processes, procedures and changes. All services are tested and validated before release. With change management, we control any changes to configurable assets or system activities, ensuring that they are implemented with minimal disruption and risk. Configuration management verifies that system change requests are expeditiously fulfilled while managing comprehensive records and accurate views of release information.

OUR EXPERIENCED TEAM DRAWS ON INTIMATE KNOWLEDGE FROM OUR CUSTOMERS TO DEVELOP THE SERVICE DELIVERY MODEL, ENSURING THAT THE SERVICE ARCHITECTURE, POLICIES AND PROCESSES MEET YOUR NEEDS.

SERVICE CONSUMPTION MODELS

We provide flexible options in-line with your business and IT needs.



SERVICE MANAGEMENT PORTAL

Get visibility into your system with a web-based portal.

We understand that it is critical for you to have full visibility into the performance of your entire technology ecosystem. Our web-based management portal, MyView, provides actionable insights into your system status and health, allowing you to keep an eye on the health of your mission-critical ecosystem. MyView provides quick, easy insight into your network, devices, security, software and services delivery status.

MyView Portal provides technical support details on your open cases and repairs, available software updates, and recent orders. You can view proactive notifications on upcoming events, and secure messages between you and your Motorola Solutions contact.

With a friendly user interface you can get access to graphical reports showing your current and historical data for network availability, coverage, capacity, security and network monitoring cases, average resolution time for all cases and more. Graphical case reports are also available for technical support, returned material authorizations and on-site dispatch.

GLOBAL SCALE AND EXPERIENCE

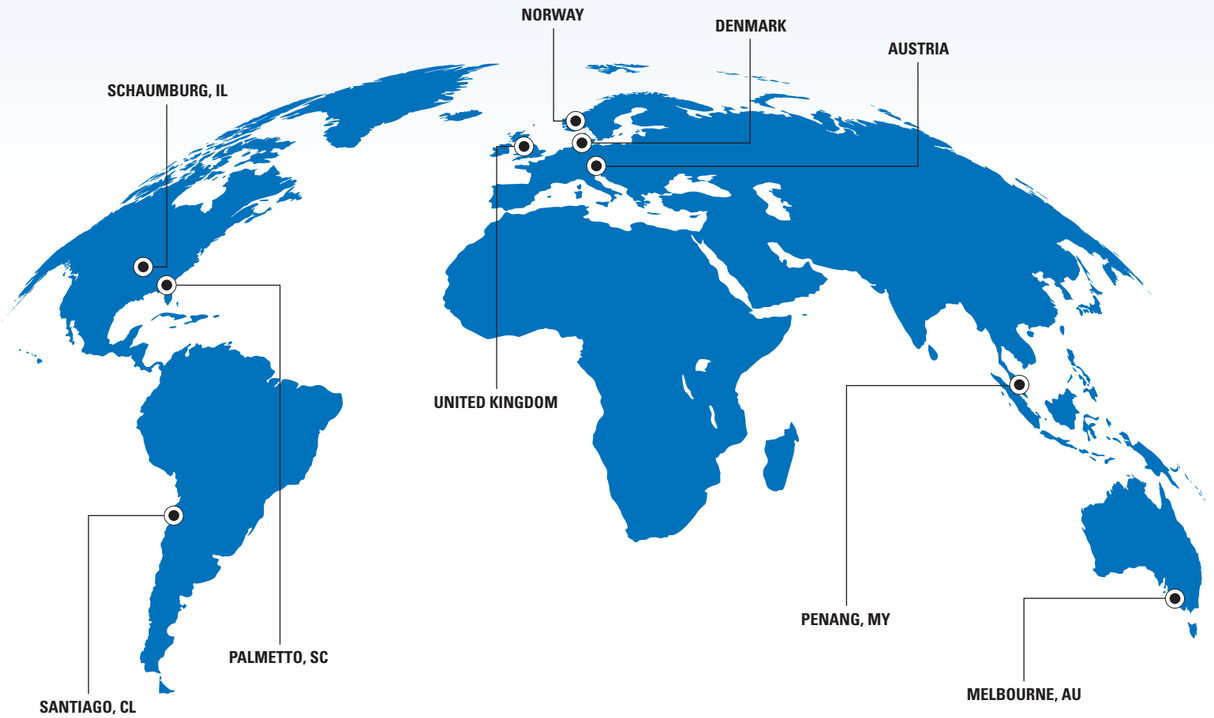
4M
USERS UNDER OUR MANAGED SERVICE

20M
EVENTS PROACTIVELY MONITORED EACH DAY

13K
SYSTEMS INSTALLED

100K
CUSTOMERS ACROSS 100 COUNTRIES

90+
YEARS OF EXPERIENCE



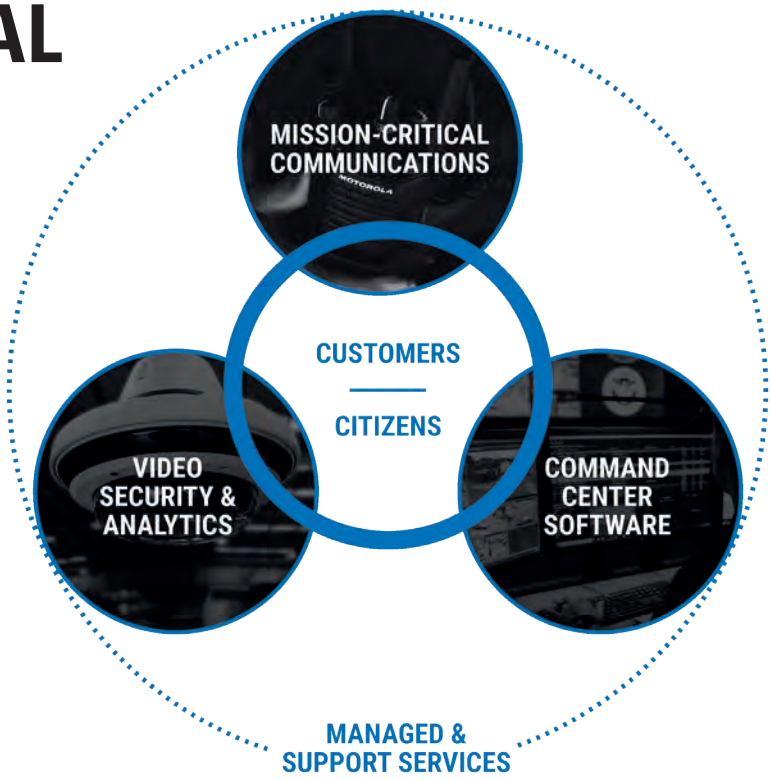
MISSION-CRITICAL ECOSYSTEM

Complexity managed.
So your technology is ‘always on’.

Whether managing everyday routines or major disasters, your technology must be ready. Our mission-critical rigor to people, process and tools centralizes operations so you can stay focused on your mission and not the technology.

From everyday technical support, to 24/7 monitoring and management, and cybersecurity, your technology ecosystem is assured for resiliency, availability and responsiveness, secure from threats and always current with technology advancements.

The complexity of managing networks, devices, software, video and security is unified, and your total cost of ownership is predictable. And in an environment of sophisticated threats, you can shield your operations to identify, prevent and respond to cyber attacks, and make sure your system is always on and never failing.



AT MOTOROLA SOLUTIONS, WE CONNECT AND CREATE A SAFER WORLD.

NOTES

1 Bloomberg Businessweek, 2-28-19
2 Reliefweb, 6-21-19
3 https://pmiwdc.org/sites/default/files/presentations/201703/PMIW_LocalCommunity_Tysons_presentation_2017-02.pdf
4 https://ussignal.com/uploads/general/Documents/General/misc/IT-Resiliency-Infographic.pdf
5 2019 CIO Agenda: A Government Perspective, Gartner

For more information, visit **www.motorolasolutions.com/services**

MOTOROLA SOLUTIONS

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A. 800-367-2346 **motorolasolutions.com**

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MOTOROLA SOLUTIONS

APX™ 8000 ALL-BAND P25 PORTABLE RADIO

UNLIMITED MOBILITY. UNCOMPROMISING PERFORMANCE.

Take command with a 4-in-1 radio that offers limitless interoperability, the clearest, loudest audio and seamless Wi-Fi® connectivity. The compact, rugged and secure APX 8000 redefines mission critical communications.

ALL BANDS, NO BOUNDARIES

With four RF bands and multi-mode system access, the APX 8000 knows no limits when it comes to interoperability. Communicate across borders using a single device. Use analog MDC 1200 or digital P25 mode, conventional or trunked operation, SmartNet or SmartZone legacy systems, clear or secure - all across 7/800MHz, VHF and UHF Range 1 & 2 bands.

HEAR AND BE HEARD MORE CLEARLY

Whether it's loud or windy, whether you whisper or yell, the APX 8000 adaptive audio engine and ultra-loud speaker brings clarity into every conversation. The radio dynamically changes the level of noise suppression, microphone gain, windporting and speaker equalization on the fly to consistently produce the loudest, clearest audio in any environment.

VOICE AND DATA, ALL AT ONCE

With Wi-Fi® access, the APX 8000 can quickly receive new codeplugs, firmware and software features in order to redeploy the radio fleet with ease as users keep talking without interruption. Mission Critical Wireless Bluetooth® connects quickly and securely with remote speaker microphones, surveillance kits and the LEX L10 Mission Critical LTE Handheld for radio remote control.

FIT FOR THE MISSION

Intuitively designed with a familiar look and feel, the compact APX 8000 is always comfortable to use, from your holster to your grip. It contains 4 radio bands packaged into the award-winning design of the APX 6000. The all-band antenna is flexible so it doesn't get in the way.

RUGGED, ROBUST & RELIABLE

With a water-tight seal, drop-resistant dual battery latch, pressure-tested tempered glass display and a shock-absorbing aluminum alloy endoskeleton, the APX 8000 is ready for unpredictable environments. It can survive 2 meter water submersion for 2 hours (IP68) and Motorola's renowned Accelerated Life Test.

DESIGNED TO SECURE & PROTECT

The APX 8000's voice and data is secured by multiple hardware encryption algorithms (256-bit AES, DES, ADP), up to 128 keys and the ability to re-key over the air so that sensitive information stays protected from scanners and eavesdroppers. P25 Radio Authentication ensures only valid users can access the system while two-factor authentication allows users to securely log in to databases.

RF BANDS:
700/800 MHz, VHF, UHF Range 1 & 2

OPERATION MODES:
9600 Baud Digital APCO P25 Phase 1 FDMA and Phase 2 TDMA Trunking

3600 Baud SmartNet®, SmartZone®, SmartZone, Omnilink Trunking

Digital APCO 25, Conventional, Analog MDC 1200, Quick Call II System Configurations

Narrow and wide bandwidth digital receiver

(6.25 kHz equivalent/25/20/12.5 KHz)

STANDARD FEATURES:
Mission Critical Wireless Bluetooth*

ASTRO 25 Integrated Voice & Data

Integrated GPS/GLONASS for outdoor location tracking

Software Key

Text-Messaging

Voice Announcements

ISSI 8000 Roaming

Radio Profiles, Dynamic Zone

Intelligent Lighting

Single-key ADP Encryption

IP68 submersion (2 meters, 2 hours)

IMPRES Battery

ADAPTIVE AUDIO ENGINE:
3 Watt Speaker with Adaptive Equalization

Adaptive Dual-sided Operation

Adaptive Noise Suppression Intensity

Adaptive Gain Control

Adaptive Windporting

PROGRAMMING:
Utilizes Windows 7 & 8 Customer Programming Software (CPS) with Radio Management

OPTIONAL FEATURES:
Wi-Fi® 802.11 b/g/n

RFID Volume Knob

Multi-key for 128 keys and multi-algorithm

Programming Over Project 25 (OTAP)

Over the Air Rekey (OTAR)

Digital Tone Signaling

LEX L10 Collaboration

P25 Authentication

Man Down Sensor

IP68 (2m/4hr), Mil Std 512.X Delta - T

* Compatible with BT 2.1, HSP, PAN, DUN and SPP Profiles found in off-the-shelf BT accessories and BT 4.x

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits		764-776, 794-806 MHz 806-825, 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj[1]		700 MHz: 1-2.5 Watts 800 MHz: 1-3 Watts	1-6 Watts	1-5 Watts	1-5 Watts
Frequency Stability[1] (–30°C to +60°C; +25°C Ref.)		+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm
Modulation Limiting[1]		±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz
Emissions (Conducted and Radiated)[1]		-75 dBc	-75 dBc	-75 dBc	-75 dBc
Audio Response[1]		+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum & Noise (25kHz / 12.5kHz)[1]	700 MHz 800 MHz	-49 dB/-47 dB -49 dB/-46 dB	-51 dB/-51 dB	-51 dB/-51 dB	-51 dB/-47 dB
Audio Distortion (25kHz / 12.5kHz)[1]	700 MHz 800 MHz	0.90 % / 0.90 % 0.60 % / 0.90 %	0.50 % / 0.90 %	0.50 % / 0.90 %	0.60 % / 0.90 %

BATTERIES FOR APX 8000

Battery Capacity / Type	Dimensions (HxWxD)	Weight	Battery Part Number	Battery Capacity
Li-Ion IMPRES 2, 3400 mAh**	3.4" x 2.3" x 1.7"	6.5 oz	PMNN4486	3400 mAh
Li-Ion IMPRES 2, 4850 mAh	5.0" x 2.3" x 1.7"	11.0 oz	PMNN4487	4850 mAh
Li-Ion IMPRES 2, 5100 mAh	5.0" x 2.3" x 1.7"	11 oz	PMNN4494	5100 mAh

KEY AUDIO ACCESSORIES

Name	Type	Part Number	Features
Extreme Policing (XP) RSM	Wired	NMN6271	Dual-Mic Noise Suppression, Emergency, Volume Control, Prog Button, IP68
Mission Critical Wireless (MCW) RSM	Bluetooth	RLN6554	Windporting, Audio Jack, Emergency, Volume Control, Task Light, IP55, 12 hour 5/35/60 Duty Cycle

**Ships standard with radio

RADIO MODELS

	MODEL 1.5	MODEL 2.5	MODEL 3.5
Display	Full bitmap monochromatic LCD top display 1 line text x 8 characters 1 line of icons No menu support Multi-color backlight	**Top display plus:** Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight	**Top display plus:** Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight
Keypad	none	Backlit keypad 3 soft keys 4 direction Navigation key Home and Data buttons	Backlit keypad 3 soft keys 4 direction navigation key 4x3 keypad Home and Data buttons
Channel Capacity	1200	3000	3000
FLASHport Memory	2 GB	2 GB	2 GB
700/800 MHz (764-870 MHz) VHF (136-174 MHz) UHF Range 1 (380-470 MHz) UHF Range 2 (450-520 MHz)	H91TGD9PW5AN	H91TGD9PW6AN	H91TGD9PW7AN
Buttons & Switches	Large PTT button ■ Angled On/Off volume control ■ Orange emergency button ■ 16 position top-mounted rotary switch ■ 2-position concentric switch ■ Multi-color backlight ■ 3-position toggle switch ■ 3 programmable side buttons		
Regulatory Information			
FCC ID	AZ489FT7061		
Industry Canada	109U-89FT7061		
Emission Designators	LMR: 8K10F1D, 8K10F1E, 8K10F1W, 11K0F3E, 16K0F3E***, 20K0F1E*** Bluetooth: 852KF1D, 1M17F1D, 1M19F1D WLAN (Wi-Fi ®): 13M7G1D, 17M0D1D, 18M1D1D		

*** In accordance with FCC mandate, the APX 8000 all band radio is restricted to 12.5kHz operation only and does NOT support 25kHz in the VHF and UHF Bands (excluding T-Band). This applies to customers under Rule Part 90.

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

		700	800	VHF	UHF
Frequency Range/Bandsplits		764-776 MHz	851-870 MHz	136-174 MHz	380-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated[1]		1 Watt	1 Watt	1 Watt	1 Watt
Frequency Stability[1] (–30°C to +60°C; +25°C Ref.)		+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm	+/- 1.0 ppm
Analog Sensitivity[1] Digital Sensitivity[2]	12 dB SINAD 1% BER 5% BER 5% BER Faded	0.224 uV 0.316 uV 0.211 uV 0.562uV	0.224 uV 0.316 uV 0.211 uV 0.562 uV	0.168 uV 0.251 uV 0.149 uV 0.562 uV	0.199 uV 0.282 uV 0.158 uV 0.530 uV
Selectivity (25 kHz / 12.5 kHz)[1, 5]		79 dB / 72 dB	78 dB / 72 dB	82 dB / 77 dB	80 dB / 74 dB
Intermodulation Rejection[1]		81 dB	80 dB	82 dB	80 dB
Spurious Rejection[1]		98 dB	98 dB	92 dB	98 dB
FM Hum and Noise (25 kHz / 12.5 kHz)[1]		-55 dB / -53 dB	-54 dB / -52 dB	-57 dB / -55 dB	-56 dB / -54 dB
Audio Distortion[1]		0.9 %	0.9 %	0.9 %	0.9 %

PORTABLE MILITARY STANDARDS 810 C, D, E , F & G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.5	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Submersion[6]	512.1	I	512.2	I	512.3	I	512.4	I	512.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

DIMENSIONS OF THE RADIOS WITHOUT BATTERY

	Inches	Millimeters
Length	5.47	139
Width Push-To-Talk button	2.39	60.7
Depth Push-To-Talk button	1.40	35.6
Width Top	2.98	75.7
Depth Top	1.58	40.1
Depth Bottom of Battery	1.24	31.5
Weight of the radios without battery	11.25 oz	319 g

ENCRYPTION

Supported Encryption Algorithms	ADP, 256-bit AES, DES, DES-XL, DES-OFB, DVP-XL, Localized Algorithm
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 360 mSec
Encryption Keying	Key Loader and Over the Air Rekeying (OTAR)
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital and SecureNet
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3 FIPS 197

GPS/GNSS SPECIFICATIONS

Constellations	GPS & GLONASS
Tracking Sensitivity	–164 dBm
Accuracy[3]	<5 meters (95%)
Cold Start[3]	<60 seconds (95%)
Hot Start[3]	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature[4]	-30ºC / +60ºC
Storage Temperature[4]	-40ºC / +85ºC
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water and Dust Intrusion	IP68 (2 meters, 2 hours)

RUGGED OPTION SPECIFICATIONS

Leakage (submersion)[6]	MIL-STD-810 C, D, E, F and G Method 512.X Procedure I, IP68 (2 meters, 4 hours)

HOUSING COLOR

Black (Standard), Public Safety Yellow, and High Impact Green

[1] Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
[2] Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.
[3] Measured conductively with >6 satellites visible at a nominal –130 dBm signal strength. Specs provided are 95th percentile values.
[4] Temperatures listed are for radio specifications. Battery storage is recommended at 25°C, ±5°C to ensure best performance.
[5] Measured using the TIA-603 single-tone method.
[6] Rugged option only. Specifications subject to change without notice.

All specifications shown are typical.
Radio meets applicable regulatory requirements.

WIRELESS CONNECTIVITY & SECURITY

Frequency Range/Bandsplits:
Bluetooth: 2402 - 2480 MHz, WLAN (Wi-Fi®): 2400 - 2483.5 MHz

WLAN (Wi-Fi®) 802.11 b/g/n supports WPA-2, WPA, WEP security protocols; radio can be pre-provisioned with up to 20 SSIDs

Mission Critical Wireless Bluetooth 2.1 uses 96 bit encryption for pairing & 128 bit encryption for voice, signaling and data. The radio BT supports up to 6 data connections and 1 audio connection.

Bluetooth Low Energy uses 128-bit AES-CCM encryption

Motorola Solutions, Inc. 1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346 **www.motorolasolutions.com/APX8000**

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MOTOROLA SOLUTIONS

MOTOROLA SOLUTIONS

APX™ 6000 SINGLE-BAND PORTABLE RADIO

From day one, the single-band APX 6000 P25 portable radio has delivered legendary APX ruggedness and reliability, without compromising on the form factor or features required for routine activities and extreme emergencies. Now, as the ever-increasing needs of public safety personnel grow, we are evolving the APX 6000 to support newer technologies like Wi-Fi®, Adaptive Audio Engine, and Bluetooth® 4.0 wireless technology. These advances help improve the operational efficiency and response time of public safety agencies while enhancing the safety of personnel and communities.

VOICE AND DATA, ALL AT ONCE

Update your radio fleet without interrupting voice communications with secure Wi-Fi. This dramatically improves the speed of configuring new codeplugs, firmware and software features over-the-air via Radio Management*. Agencies can pre-provision up to 20 secure Wi-Fi hotspots so personnel can easily access updates at the facility or in the field.

HEAR AND BE HEARD

The APX 6000 is equipped with a 3-watt speaker, 3 integrated microphones and the Adaptive Audio Engine. This changes the level of noise suppression, microphone gain, windporting and speaker equalization to produce clear and loud audio in any environment.

SEAMLESS ON-SCENE COMMUNICATION

Ensure fast and seamless communication and collaboration across all responders arriving on a scene. Mission Critical Geofence automatically changes a radio's active talkgroup based on its GPS location and an agency-defined virtual barrier. For example, an incident commander can create a geofence around the 3-block radius of a burning building so that all arriving personnel are automatically placed in the same talkgroup.

EMERGENCY FIND ME

Bluetooth 4.0 places a wide range of wireless accessories at your disposal and provides personnel with an added level of security by improving response time in emergencies. With Emergency Find Me, a Bluetooth-enabled beacon signal guides other Bluetooth-enabled APX radios within range to assist the user in distress.

*Radio Management application simplifies APX radio configuration and management by programming up to 16 radios at one time and tracking which radios have been successfully programmed, providing a clear view of the entire radio fleet and a codeplug history for each radio.

SPECIFICATIONS

RF BANDS

- 700/800 MHz, VHF, UHF Range 1 & UHF Range 2
- 9600 Baud Digital APCO P25 Phase 1 FDMA and Phase 2 TDMA Trunking
- 3600 Baud SmartNet®, SmartZone®, SmartZone, Omnilink Trunking
- Digital APCO 25, Conventional, Analog MDC 1200, Quick Call II System Configurations Narrow and Wide Bandwidth Digital Receiver (6.25 kHz Equivalent/25/20/12.5 kHz)[1]

STANDARD FEATURES

- Mission Critical Wireless Bluetooth® 4.0 (LE)[2]
- Emergency Find Me[2]
- ASTRO® 25 Integrated Voice & Data
- Integrated GPS/GLONASS for Outdoor Location Tracking
- Voice Announcements
- ISSI 8000 Roaming
- Radio Profiles
- Dynamic Zone
- Intelligent Lighting
- Single-Key ADP Encryption
- IP68 submersion (2 meters, 2 hours)
- IMPRES 2 Battery (PMNN4485)
- Text Message
- Software Key

PROGRAMMING

- Utilizes Windows 7 & 8 Customer Programming Software (CPS) with Radio Management[3]

ADAPTIVE AUDIO ENGINE (OPTIONAL)

- 3-W Speaker with Adaptive Equalization
- Adaptive Dual-Sided Operation
- Adaptive Noise Suppression Intensity
- Adaptive Gain Control
- Adaptive Windporting

OPTIONAL FEATURES

- Wi-Fi 802.11 b/g/n
- LEX L10 Collaboration
- RFID Volume Knob
- Multi-key for 128 keys and Multi-Algorithm
- Programming Over Project 25 (OTAP)
- Over the Air Rekey (OTAR)
- Digital Tone Signaling
- Mission Critical Geofence
- P25 Authentication
- Man Down Capability
- High Impact Green and Public Safety Yellow Colored Housing Options
- Rugged Option: IP68 (2m/4hr), Mil Std 512.X Delta - T[4]
- Listed by UL to the standards ANSI/TIA 4950-A and CAN/CSA C22.2 NO. 157-92 Classification Rating: Class I, Division 1, Groups C, D; Class II, Division 1, Group E, F, G; Class III, Hazardous (Classified) Locations. ANSI/ISA 12.12.01-2015 and CAN/CSA C22.2 No. 213-15; Class I, Division 2, Groups A, B, C, D; T3C. Tamb = -25° C to +60° C. when used with Motorola Battery: NNTN8921A NNTN8930A 7.4V

1 Per the FCC Narrowbanding rules, new products (APX6000 UHFR1, UHFR2) submitted for FCC certification after January 1, 2011 are restricted from being granted certification at 25 KHz for United States - State & Local Markets only.

2 Compatible with BT 2.1, HSP, PAN, DUN and SPP Profiles found in off-the-shelf Bluetooth accessories and Bluetooth 4.x

3 CPS version R12.00.00 and greater ordered after June 2014 will only support Windows 7 and 8

4 Radios meet industry standards (IPx7) for submersion.

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits	700 MHz 800 MHz	763-776, 793-806 MHz 806-824, 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj[1]		1-3 Watts Max	1-6 Watts Max	1-5 Watts Max	1-5 Watts
Frequency Stability[1] (–30°C to +60°C; +25°C Ref.)		±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %
Modulation Limiting[1]		±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz
Emissions (Conducted and Radiated)[1]		-75 dB	-75 dB	-75 dB	-75 dB
Audio Response[1]		+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum & Noise	25k 25.5k	-52 dB -47 dB	-55 dB -50 dB	-52 dB -47 dB	-52 dB -46 dB
Audio Distortion[1]	700 MHz 800 MHz	1.00 %	1.00 %	1.00 %	1.00 %

BATTERIES FOR APX 6000

Battery Capacity / Type	Dimensions (HxWxD)	Weight	Battery Part Number	Battery Capacity
Li-Ion IMPRES 2 2550mAh[1]	3.4" x 2.3" x 1.5"	5.0 oz	PMNN4485	2550 mAh
Li-Ion IMPRES 2 3400mAh	3.4" x 2.3" x 1.7"	6.5 oz	PMNN4486	3400 mAh
Li-Ion IMPRES 2 4850mAh	5" x 2.3" x 1.7"	11.0 oz	PMNN4487	4850 mAh
Li-Ion IMPRES 2 5100mAh	5" x 2.3" x 1.7"	11.0 oz	PMNN4494	5100 mAh
Li-Ion IMPRES 2 2650 mAh[2]	3.4" x 2.3" x 1.7"	5.7 oz	NNTN8930	2650 mAh
Li-Ion IMPRES 2 4500mAh[2]	5" x 2.3" x 1.7"	11.0 oz	NNTN8921	4500 mAh

1 The standard shipping battery for the APX6000
2 HAZLOC approved.

RADIO MODELS

	MODEL 1.5	MODEL 2.5	MODEL 3.5
Display	Full bitmap monochromatic LCD top display 1 line text x 8 characters 1 line of icons No menu support Multi-color backlight	Top display plus: Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight	Top display plus: Full bitmap color LCD display 4 lines of text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight
Keypad	none	Backlit keypad 3 soft keys 4 direction Navigation key Home and Data buttons	Backlit keypad 3 soft keys 4 direction Navigation key 4x3 keypad Home and Data buttons
Channel Capacity[1]	96	1000	1000
FLASHport Memory	64 MB	64 MB	64 MB
700/800 MHz (763-870 MHz)	H98UCD9PW5BN	H98UCF9PW6BN	H98UCH9PW7BN
VHF (136-174 MHz)	H98KGD9PW5BN	H98KGF9PW6BN	H98KGH9PW7BN
UHF Range 1 (380-470 MHz)	H98QDD9PW5BN	H98QDF9PW6BN	H98QDH9PW7BN
UHF Range 2 (450-520 MHz)	H98SDD9PW5BN	H98SDF9PW6BN	H98SDH9PW7BN
Buttons & Switches	Large PTT button ■ Angled On/Off volume control ■ Orange emergency button ■ 16 position top-mounted rotary switch ■ 2-position concentric switch ■ Multi-color backlight ■ 3-position toggle switch ■ 3 programmable side buttons		

Regulatory Information

	FCC ID	Industry Canada
700/800 (764-869 MHz)	AZ489FT7086	109U-89FT7086
VHF (136-174 MHz)	AZ489FT7087	109U-89FT7087
UHF Range 1 (380-470 MHz)	AZ489FT7077	109U-89FT7077
UHF Range 2 (420-520 MHz)	AZ489FT7085	109U-89FT7085

FCC Emissions Designators

FCC Emissions Designators	11K0F3E, 16K0F3E, 8K10F1D, 8K10F1E, 8K10F1W, 20K0F1E[2]

Power Supply

Power Supply	One rechargeable Li-Ion IMPRES 2 2550mAh battery standard (PMNN4485), with alternate battery options available.

1 Enhancement package available
2 Per the FCC Narrowbanding rules, new products (APX6000 UHFR1, UHFR2) submitted for FCC certification after January 1, 2011 are restricted from being granted certification at 25 kHz for United States - State & Local Markets only.

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits	700 MHz 800 MHz	763-776 MHz 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing		25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated[1]		500 mW	500 mW	500 mW	500 mW
Analog Sensitivity[2] Digital Sensitivity[3]	12 dB SINAD 1% BER (800 MHz) 5% BER	0.25 µV 0.375 µV 0.24 µV	0.17 µV 0.243 µV 0.15 µV	0.224 µV 0.298 µV 0.200 µV	0.203 µV 0.296 µV 0.204 µV
Selectivity[1]	25 kHz channel 12.5 kHz channel	-76 dB -70 dB	-78 dB -73 dB	-77 dB -67 dB	-76 dB -67 dB
Intermodulation		-80.1 dB	-80.2 dB	-80.3 dB	-80.2 dB
Spurious Rejection		-75 dB	-78 dB	-80.5 dB	-80.8 dB
FM Hum and Noise	25 kHz 12.5 kHz	-54 dB -79 dB	-54.3 dB -50.1 dB	-53.5 dB -47.5 dB	-52.5 dB -47.3 dB
Audio Distortion at Rated[1]		0.90%	0.90%	0.70%	0.70%

1 Measured in the analog mode per TIA / EIA 603 under nominal conditions
2 Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
3 Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.

PORTABLE MILITARY STANDARDS 810 C, D, E , F & G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Basic Hot	501.5	I/A1, II/A2
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Immersion	512.1	I	512.2	I	512.3	I	512.4	I	512.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

DIMENSIONS OF THE RADIOS WITHOUT BATTERY		
Length	5.47 in	139 mm
Width Push-To-Talk button	2.39 in	60.7 mm
Depth Push-To-Talk button	1.40 in	35.6 mm
Width Top	2.98 in	75.7 mm
Depth Top	1.58 in	40.1 mm
Depth Bottom of Battery	1.24 in	31.5 mm
Weight of the radios without battery	10.9 oz	309 g

ENCRYPTION	
Supported Encryption Algorithms	ADP, 256-bit AES, DES, DES-XL, DES-OFB, DVP-XL
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 64 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3 FIPS 197

GPS/GPS/GNSS SPECIFICATIONS	
Constellations	GPS & GLONASS
Tracking Sensitivity	-164 dBm
Accuracy[2]	<5 meters (95%)
Cold Start	<60 seconds (95%)
Hot Start	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted)

RUGGED SPECIFICATIONS	
Leakage (submersion)	MIL-STD-810 C, D, E, F and G Method 512.X Procedure I, IP68 (2 meters, 4 hours)

HOUSING COLOR

Black (Standard), Public Safety Yellow, and High Impact Green

ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature[1]	-30 °C to +60 °C
Storage Temperature[1]	-50 °C to +85 °C
Humidity Per MIL-STD	ESD IEC 801-2 KV
Water and Dust Intrusion	IP68 (2 meters, 4 hours)

1 Temperatures listed are for radio specifications. Battery storage is recommended at 25 °C, ±5 °C to ensure best performance.

2 Measured conductively with >6 satellites visible at a nominal -130 dBm signal strength. Specs provided are 95th percentile values.

EMISSION DESIGNATORS

LMR:	8K10F1D, 8K10F1E, 8K10F1W, 11K0F3E, 16K0F3E, 20K0F1E
Bluetooth:	852KF1D, 1M17F1D, 1M19F1D, 1M04F1D
WLAN (Wi-Fi):	13M7G1D, 17M0D1D, 18M1D1D

WIRELESS CONNECTIVITY AND SECURITY

Frequency Range/Bandsplits: Bluetooth: 2402 - 2480 MHz, WLAN (Wi-Fi): 2400 - 2483.5 MHz
WLAN (Wi-Fi) 802.11 b/g/n supports WPA-2, WPA, WEP security protocols; radio can be pre-provisioned with up to 20 SSIDs[1]
Mission Critical Wireless Bluetooth 2.1 uses 96 bit encryption for pairing & 128 bit encryption for voice, signaling and data. The radio BT supports up to 6 data connections and 1 audio connection
Bluetooth 4.0 Low Energy uses 128-bit AES-CCM encryption

1 2400 - 2483.5 MHz for EMEA region and includes guardband.
Channels 1 – 11 used for FCC/IC region.

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MOTOROLA SOLUTIONS

MISSION READY WHEN IT MATTERS MOST

APX™ 4000 PROJECT 25 PORTABLE RADIO

Chemical spill. Catastrophic storm. Power outage. When every minute matters, you must communicate instantly with other agencies and responders. But how do you prepare for a disaster and keep control of operating costs? That's where the APX 4000 P25 portable radio answers the call, expertly and affordably.

The APX 4000 delivers all the benefits of TDMA technology in the smallest P25 capable portable in the industry. Easy to use, tough as nails, a hard value to beat, it seamlessly connects agencies throughout your city for fast, interoperable communications.

TRUSTED APX QUALITY

The APX 4000 leverages the leading attributes of the APX family of P25 TDMA portables. From the 2-microphone design that reduces background noise so you can speak and hear clearly over heavy equipment, diesel engines and sirens to the high-spec RF performance for excellent coverage in challenging environments.

With its easy-to-use interface, color display, intelligent lighting and radio profiles, you get all the power of APX in a compact radio. Plus, you can extend the performance of your radio with a complete portfolio of industry-leading IMPRES™ smart energy and audio accessories.

COMPACT AND UNCOMPROMISING

A compact P25 Phase 2 capable portable, the APX 4000 gets the job done without getting in the way. With two dedicated knobs for volume and channel control, the APX 4000 provides readiness for any type of work setting. And its standard IP67 and MIL-STD certified to withstand dust, heat, shock, drops and water immersion, so you can count on it wherever you need it – at the factory line, power line or fire line.

P25 PERFORMANCE, INSIDE AND OUT

Loaded with key P25 features to increase safety, the APX 4000 features Mission Critical Wireless. This unique Bluetooth® solution provides an encrypted link to a high performance earpiece, GPS for quickly locating personnel outdoors, 256-bit AES encryption for improved security, and over-the-air programming to program radios in the field without interrupting voice operation.

IMPROVE RESPONSE AND EXPENSES

The APX 4000 is P25 Phase 2 capable for twice the voice capacity so you can add more users without adding more frequencies or infrastructure. And it's backwards and forwards compatible with all Motorola mission critical radio systems, so you can interoperate with confidence while you improve operating expenses.

POWER UP WITH APX 4000 ACCESSORIES

- Designed, tested and certified for optimum performance with your radio.
- Complete portfolio of remote speaker microphones, headsets and Mission Critical Wireless Bluetooth® accessories.
- High-powered IMPRES™ batteries that have a slim design to fit the compact radio size.

FEATURES AND BENEFITS

Available in 700/800 MHz, VHF, UHF R1, UHF R2 and 900 MHz bands

- Trunking standards supported:
  - Clear or digital encrypted ASTRO®25 Trunked Operation
  - Capable of SmartZone®, SmartZone Omnilink, SmartNet®
- Analog MDC-1200 and Digital APCO P25 Conventional
- System Configurations
- Narrow and wide bandwidth digital receiver (6.25 kHz equivalent / 12.5 kHz / 30 kHz / 25 kHz)[1]
- Standard with 2 dedicated control knobs for volume and channel changes
- Embedded digital signaling (ASTRO & ASTRO 25)
- Man Down
- Available in 2 models
- Lightbar with Intelligent Lighting
- Radio Profiles
- Unified Call List
- Software Key
- ASTRO 25 Integrated Voice & Data
- User programmable Voice Announcement
- Meets Applicable MIL-STD-810C, D, E, F and G
- IP67 standard
- Rugged Submersible housing (2 meters for 2 hours)[2]
- Superior Audio Features:
  - 0.5 W high audio speaker
  - 2-mic noise canceling technolog
- GPS Outdoor Location Tracking
- Utilizes Windows XP, Vista and Windows 7 and 8 Customer Programming Software (CPS)
  - Supports USB communications
  - Built in FLASHport™ support
- Full portfolio of accessories including IMPRES batteries, chargers and audio devices[1]
- Mission Critical Wireless Bluetooth[2]

OPTIONAL FEATURES

- 256-bit AES Encryption
- Programming Over Project 25
- Text Messaging
- Man Down
- Site Selectable Alert Tones
- P25 Link Layer Authentication
- Enhanced Data
- Rugged Option: Mil Std 512.X, Delta - T

[1] Chargers and batteries for the APX 4000 radios are not compatible with other APX radios.
[2] Compatible with BT 2.1 HSP, PAN, DUN and SPP BT Profiles.
[3] When used with a Hazardous Location tested radio.

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2	900 MHz[6]
Frequency Range/ Bandsplits	700 MHz 800 MHz	763-776, 793-806 MHz 806-824, 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz	896-901, 935-940 MHz
Channel Spacing		25/12.5 kHz	30/25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj[1]		1-3 Watts Max	1-5 Watts Max	1-5 Watts Max	1-5 Watts Max	1-2.5 Watts Max
Frequency Stability[1] (-30°C to +60°C; +25°C Ref.)		±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %
Modulation Limiting[1]		±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±2.5 kHz
Emissions (Conducted and Radiated)[1]		-75 dB	-75 dB	-75 dB	-75 dB	-75 dB
Audio Response[1]		+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum & Noise	25 kHz 12.5 kHz	-47 dB -45 dB	-47 dB -47 dB	-47 dB -45 dB	-47 dB -45 dB	-45 dB
Audio Distortion[1]	25 kHz 12.5 kHz	1.00%	1.00%	1.00%	1.00%	1.00%

BATTERIES FOR APX 4000

Battery Capacity / Type	Dimensions (HxWxD)	Weight	Battery Part Number	Battery Capacity
Li-Ion IMPRES 1900 mAh IP67	114.5x55.04x17.85	150 grams	NNTN8128A	1900 mAh
Li-Ion IMPRES 2300 mAh IP67 Non-HazLoc	114.5x55.04x23.15	160 grams	PMNN4424AR	2300 mAh
Li-Ion IMPRES 2300 mAh IP67 HazLoc[3]	114.5x55.04x23.15	210 grams	NNTN8560A	2500 mAh
Li-Ion IMPRES 2700 mAh IP54 Non-HazLoc[3]	114.5 x 55.04 x 23.15	160 grams	PMNN4448AR	2700 mAh

RADIO MODELS

	MODEL 2	MODEL 3
Display	Full bitmap color LCD display 3 lines of text x 14 characters 1 line of icons 1 menu line x 3 menus White backlight	Full bitmap color LCD display 3 lines of text x 14 characters 1 line of icons 1 menu line x 3 menus White backlight
Keypad	Backlight keypad 3 soft keys 4 direction Navigation key Home and Data buttons	Backlight keypad 3 soft keys 4 direction navigation key 4x3 keypad Home and Data buttons
Channel Capacity	512	512
FLASHport Memory	64 MB	64 MB
700/800 MHz (763-870 MHz)	H51UCF9PW6AN Q360GK	H51UCH9PW7AN Q360GK
VHF (136-174 MHz)	H51KDF9PW6AN Q360GX	H51KDH9PW7AN Q360GX
UHF Range 1 (380-470 MHz)	H51QDF9PW6AN Q360GL	H51QDH9PW7AN Q360GL
UHF Range 2 (450-520 MHz)	H51SDF9PW6AN Q360HA	H51SDH9PW7AN Q360HA
900 MHz (896-940 MHz)	H51WCF9PW6AN Q360JF	H51WCH9PW7AN Q360JE
Buttons & Switches	Large PTT button ■ Angled On/Off Volume Control ■ 16 position top-mounted rotary switch ■ Orange emergency button ■ 3 programmable side buttons	

TRANSMITTER CERTIFICATION

700/800 (764-869 MHz)	AZ489FT7049
VHF (136-174 MHz)	AZ489FT3828
UHF Range 1 (380-470 MHz)	AZ489FT4905
UHF Range 2 (450-520 MHz)	AZ489FT4910
900 MHz (896-901, 935-940 MHz)	AZ489FT5864

FCC EMISSIONS DESIGNATORS

FCC Emissions Designators	11K0F3E, 16K0F3E, 8K10F1D, 8K10F1E, 8K10F1W, 20K0F1E*
FCC Emissions Designators for 900 MHz	11K0F3E, 8K10F1D, 8K10F1E, 8K10F1W

POWER SUPPLY

Power Supply	One rechargeable Li-Ion 1900 mAh battery standard, or 2300 mAh/2700 mAh high cap Li-Ion.

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

		700/800	VHF	UHF Range 1	UHF Range 2	900 MHz
Frequency Range/Bandsplits	700 MHz 800 MHz	763-776 MHz 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz	935-940 MHz
Channel Spacing		25/12.5 kHz	30/25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated[1]		500mW	500mW	500mW	500mW	500mW
Frequency Stability[1] (-30°C to +60°C; +25°C Ref.)		±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %
Analog Sensitivity[3] Digital Sensitivity[4]	12 dB SINAD 1% BER (800 MHz) 5% BER	0.250µV 0.400µV 0.250µV	0.216µV 0.277µV 0.188µV	0.234µV 0.307µV 0.207µV	0.234µV 0.307µV 0.207µV	0.236µV 0.33µV 0.222µV
Selectivity[1]	25 kHz channel 12.5 kHz channel	-76 dB -67 dB	-76 dB -70 dB	-76 dB -67 dB	-76 dB -67 dB	-67 dB
Intermodulation		-75 dB	-79 dB	-77 dB	-77 dB	-75 dB
Spurious Rejection		-76.6 dB	-80.5 dB	-80.3 dB	-80.3 dB	-80 dB
FM Hum and Noise	25 kHz 12.5 kHz	-53 dB -47 dB	-51 dB -45 dB	-50 dB -45 dB	-50 dB -45 dB	-47 dB
Audio Distortion[1]		1.00%	1.00%	1.00%	1.00%	1.00%

PORTABLE MILITARY STANDARDS 810 C, D, E , F & G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Basic Hot	501.5	I/A1, II/A2
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

DIMENSIONS OF THE RADIOS WITHOUT BATTERY

	Inches	Millimeters
Length	5.42	137.7
Width Push-To-Talk button	2.42	61.4
Depth Push-To-Talk button	1.41	35.75
Width Top	2.62	66.55
Depth Top	1.84	46.7
Weight of the radios without battery	10.05 oz	285 g

GPS SPECIFICATIONS

Channels	12
Tracking Sensitivity	–159 dBm
Accuracy[5]	<10 meters (95%)
Cold Start	<60 seconds (95%)
Hot Start	<10 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GPS

ENCRYPTION

Supported Encryption Algorithms	256-bit AES, ADP
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 48 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3; FIPS 197

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature[6]	-30°C / +60°C
Storage Temperature[6]	-40°C / +85°C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water and Dust Intrusion	IP67
Submersion	MIL-STD 512.X

[1] Measured in the analog mode per TIA / EIA 603 under nominal conditions
[2] When used with an UL approved intrinsically safe radio
[3] Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
[4] Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.
[5] Accuracy specs are for long-term tracking (95th percentile values >5 satellites visible at a nominal –130 dBm signal strength).
[6] Temperatures listed are for radio specifications. Battery storage is recommended at 25°C, ±5°C to ensure best performance.

Specifications subject to change without notice. All specifications shown are typical. Radio meets applicable regulatory requirements.

Motorola Solutions, Inc. 1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346
motorolasolutions.com

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MOTOROLA SOLUTIONS

APX™ 900

SINGLE-BAND P25 PORTABLE TWO-WAY RADIO

FEATURES AND BENEFITS

- Dual-Knob Solution
- Available in VHF, UHF (R1 and R2), 700/800 MHz, and 900 MHz bands
- Modes of Operation:
  - Clear or digital-encrypted ASTRO® 25 Trunked Operation
  - Analog MDC-1200 and Digital P25
  - Conventional System Configurations
- Narrow and wide bandwidth digital receiver (6.25 kHz equivalent / 12.5 kHz / 25 kHz)[1]
- Embedded digital signaling (ASTRO and ASTRO 25)
- Intelligent Priority Scan
- Available in models 2 and 3
- Radio Profiles
- Unified Call List
- User-programmable Voice Announcement
- Instant Recall
- Meets Applicable MIL-STD-810C, D, E, F and G
- Full Portfolio of Accessories, including IMPRES batteries, chargers and audio devices[2]

STANDARD FEATURES

- Operational-Critical Wireless Bluetooth® 4.0 (LE)[3]
- Emergency Find Me
- ASTRO 25 Integrated Voice & Data
- Integrated GPS/GLONASS for Outdoor Location-Tracking
- Single-Key Advanced Digital Privacy (ADP) Encryption
- IP68 submersion (2 meters, 2 hours)
- IMPRES Battery (PMNN4491B)
- Embedded digital signaling (ASTRO and ASTRO 25)
- Text Messaging
- Software key

PROGRAMMING

- Utilizes Windows 7, 8 and 10 Customer Programming Software (CPS) with Radio Management

OPTIONAL FEATURES

- AES 256-bit Software Encryption (AES-256)
- Enhanced Data
- Enhanced Noise Suppressor (Highly Recommended)
- Multi-Key
- Programming Over Project 25 (OTAP)
- RFID Volume Knob (Accessory only)
- Mission Critical Geofence
- P25 Authentication
- Digital Tone Signaling
- UL-certified

Product shown with optional stubby antenna

MOTOROLA SOLUTIONS

TRANSMITTER- TYPICAL PERFORMANCE SPECIFICATIONS

	VHF	UHF Range 1	UHF Range 2	700/800 MHz	900 MHz
Frequency Range/Bandsplits	136-174 MHz	380-480 MHz	450-520 MHz	764-776 MHz 794-806 MHz 806-824 MHz 851-870 MHz	896-902 MHz 935-941 MHz
Channel Spacing[4]	12.5/20/25 kHz	12.5/20/25 kHz	12.5/20/25 kHz	12.5/20/25 kHz	12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power (Adjustable)[5]	1-5 W	1-5 W	1-5 W	700 MHz: 1-2.5 W 800 MHz: 1-3 W	1-2.5 W
Frequency Stability[5] (-30 °C to +85 °C; +25 °C Ref.)	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm
Modulation Limiting (12.5/20/25 kHz)	± 2.5/4/5 kHz	± 2.5/4/5 kHz	± 2.5/4/5 kHz	± 2.5/4/5 kHz	± 2.5 kHz
Audio Response[5]	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
Emissions[5] (conducted and radiated)	-75 dBc	-75 dBc	-75 dBc	-75 dBc	-75 dBc
FM Hum & Noise (12.5/25 kHz)	-45/-47 dB	-45/-47 dB	-45/-47 dB	-45/-47 dB	-45 dB
Audio Distortion[5]	1.00%	1.00%	1.00%	1.00%	1.00%

RECEIVER- TYPICAL PERFORMANCE SPECIFICATIONS

		VHF	UHF Range 1	UHF Range 2	700/800 MHz	900 MHz
Frequency Range/Bandsplits		136-174 MHz	380-480 MHz	450-520 MHz	764-776 MHz 851-870 MHz	935-941 MHz
Channel Spacing[4]		12.5/20/25 kHz	12.5/20/25 kHz	12.5/20/25 kHz	12.5/20/25 kHz	12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated[5]		500 mW	500 mW	500 mW	500 mW	500 mW
Frequency Stability (-30 °C to +85 °C; +25 °C Ref.)		±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm
Analog Sensitivity[7]	12 dB SINAD	0.216 µV	0.234 µV	0.234 µV	0.250 µV	0.237 µV
Digital Sensitivity[8]	1% BER	0.277 µV	0.307 µV	0.307 µV	0.400 µV	0.330 µV
	5% BER	0.188 µV	0.207 µV	0.207 µV	0.250 µV	0.224 µV
Selectivity[5] (12.5/25 kHz)		-70/-76 dB	-67/-76 dB	-67/-76 dB	-67/-76 dB	-67 dB
Intermodulation		79.5 dB	77.0 dB	77.0 dB	75.0 dB	75.0 dB
Spurious Rejection		-79.3 dB	-80.3 dB	-80.3 dB	-76.6 dB	-76.0 dB
FM Hum & Noise (12.5/25 kHz)		-45/-51 dB	-45/-50 dB	-46/-52 dB	-47/-53 dB	-47 dB
Audio Distortion[4]		1.00%	1.00%	1.00%	1.00%	1.00%

FCC EMISSION DESIGNATORS

FCC Emission Designators	11K0F3E, 16K0F3E, 8K10F1D, 8K10F1E, 8K10F1W

REGULATORY INFORMATION

	FCC ID	Industry Canada
VHF	AZ489FT7098	109U-89FT7098
UHF Range 1	AZ489FT7097	109U-89FT7097
UHF Range 2	AZ489FT7099	109U-89FT7099
700/800 MHz	AZ489FT7096	109U-89FT7096
900 MHz	AZ489FT7100	109U-89FT7100

RADIO MODEL

	MODEL 2	MODEL 3
Display	Full bitmap color LCD display, 3 lines of text x 14 characters, 1 line of icons, 1 menu line x 2 menus, White backlight	
Keypad	Backlit keypad, 2 soft keys, 4-direction navigation key, Home and Back buttons	Backlit keypad, 2 soft keys, 4-direction navigation key, 4x3 keypad, Home and Back buttons
Channel Capacity	512	
FLASHport Memory	2 GB	
VHF	H92KDF9PW6AN	H92KDH9PW7AN
UHF Range 1	H92QDF9PW6AN	H92QDH9PW7AN
UHF Range 2	H92SDF9PW6AN	H92SDH9PW7AN
700/800 MHz	H92UCF9PW6AN	H92UCH9PW7AN
900 MHz	H92WCF9PW6AN	H92WCH9PW7AN
Buttons & Switches	PTT button • Two-knob (volume + channel/talkgroup) • Orange emergency button • 3 programmable side buttons	

POWER SUPPLY

One rechargeable IMPRES Li-Ion 2100 mAh, slim high density battery IP68 (PMNN4491B), with alternate battery options available.

BATTERIES FOR APX 900

BATTERY CAPACITY / TYPE	DIMENSIONS (H X W X D)	WEIGHT	BATTERY PART NUMBER	BATTERY CAPACITY
IMPRES Standard Li-Ion 2100 mAh, slim high density battery (IP68)	113 x 52 x 18 mm	135 g	PMNN4491B	2100 mAh
IMPRES Hi-Cap Li-Ion 3000 mAh battery, low voltage (IP68)	113 x 52 x 23 mm	155 g	PMNN4493A	3000 mAh
IMPRES Hi-Cap Li-Ion 2900 mAh low voltage battery (IP68, UL-rated[6])	113 x 52 x 23 mm	210 g	PMNN4489A	2900 mAh

PORTABLE MILITARY STANDARDS 810 C, D, E, F AND G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Basic Hot	501.5	I/A1, II/A2
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III	516.3	I, VI	516.4	I, VI	516.5	I, VI	516.6	I, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

BLUETOOTH

Version	Bluetooth 4.0 (LE)
Encryption	SSP Pairing 128-bit AES-CDM Encryption for voice, data and signaling
Connections	Up to 6 data + 1 audio

DIMENSIONS: RADIO WITH BATTERY

	STD BATTERY	HI-CAP BATTERY
Length	5.1 in (130 mm)	5.1 in (130 mm)
Width	2.2 in (55 mm)	2.2 in (55 mm)
Thickness	1.4 in (36 mm)	1.6 in (41 mm)
Weight	11 oz (315 g)	12 oz (347 g)

GPS/GNSS SPECIFICATIONS

Constellations	GPS and GLONASS
Tracking Sensitivity	-154 dBm
Accuracy[9]	<10 m (95%)
Cold / Hot Start	<60 / <5 s (95%)
Mode of Operation	Autonomous (non-assisted) GPS

ENCRYPTION

Supported Encryption Algorithms	Advanced Digital Privacy (ADP) AES 256-bit Software Encryption (AES-256)
Encryption Keys per Radio	48
Encryption Frame Re-sync Interval	P25 CAI 360 ms
Encryption Keying	Key Loader
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Non-volatile Memory
Key Erasure	Keyboard Command
Standards	FIP 140-2 Level 1; FIPS 197

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30 °C to +60 °C
Storage Temperature[10]	-40 °C to +85 °C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water and Dust Intrusion	IP68 (2 meters, 2 hours)
Housing Color Availability	Black only

1 Per the FCC Narrowbanding rules, new products submitted for FCC certification after January 1, 2011 are restricted from being granted certification at 25 kHz for United States - State and Local Markets only.
2 Chargers and batteries for APX 1000 will interoperate with APX 900
3 Compatible with BT 2.1, HSP, PAN, DUN and SPP Profiles in off-the-shelf Bluetooth accessories and Bluetooth 4.x
4 Check your regional regulatory agency for availability of different channels bandwidths
5 Measured in the analog mode per TIA / EIA 603 under nominal conditions
6 When used with an UL-approved intrinsically safe radio
7 Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
8 Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.
9 Accuracy specs are for long-term tracking (95th percentile, >5 satellites visible at a nominal -130 dBm signal strength).
10 Temperatures listed are for radio. Battery storage is recommended at 25 °C, ±5 °C to ensure best performance.

Specifications subject to change without notice.
All specifications shown are typical.
Radio meets applicable regulatory requirements.

For more information, please visit motorolasolutions.com/apx

MOTOROLA SOLUTIONS

Motorola Solutions Inc., 500 West Monroe St, Chicago, IL 60661 U.S.A. **motorolasolutions.com**

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APX NEXT

PROTECT YOUR FOCUS

IN PUBLIC SAFETY, FOCUS IS YOUR GREATEST RESOURCE. MAKE SURE IT'S PROTECTED WITH APX NEXT®.

A MASSIVE ADVANCE IN MISSION-CRITICAL VOICE AND DATA

Your radio is your lifeline. APX NEXT is our next step in advancing it. It's designed to military standards for extreme ruggedness. The touchscreen works with or without gloves—in rain, dirt, and dust. Digital mics and high-power speakers deliver our best audio ever, while SmartConnect keeps you connected even beyond your P25 system. The result is a radio that works when you need it, without pause, distraction or doubt.

EFFORTLESS IS ALWAYS IN REACH

APX NEXT is designed for effortless usability when everything is on the line. Intuitive knobs and buttons are easily distinguished by touch. A mission-critical touchscreen makes it fast and easy to operate your radio. ViQi understands a huge range of natural language voice commands, so you can operate the radio with eyes-up awareness. Every interaction is simple, fast and logical. You stay focused on what matters—your mission and your safety.

BRING NEW INTELLIGENCE TO THE POINT OF ENGAGEMENT

APX NEXT mission-critical apps bring new intelligence to the field. ViQi enables natural language database queries, rapidly giving vital information, and letting dispatchers stay focused on critical situations. And as part of our unique, end-to-end public safety ecosystem, APX NEXT data and operations are secure, and new capabilities can be seamlessly added as your needs evolve.

UPDATE YOUR FLEET IN MINUTES, NOT MONTHS

APX NEXT gives you back time: a cloud-based provisioning system prepares radios before they arrive. Remote updating keeps radios in the field, with zero touch and zero downtime. MyView Portal provides direct access to subscriptions, warranties and licenses, and a range of services helps you manage your operation. With APX NEXT, your ownership experience is streamlined, so your valuable resources stay focused and ready.

MOTOROLA SOLUTIONS

MISSION-CRITICAL DESIGN

New antenna technology improves comfort and wearability

Large color top screen, for glanceable status updates

Intuitive hard controls, protected against accidental activation

Mission-critical touchscreen: rugged, usable with gloves, readable in all lighting conditions

Digital microphones, for outstanding audio capture

Large, distinctive buttons for PTT, emergency and ViQi, and two additional programmable side buttons

Standard 4400 mAh battery, with 5650 mAh high-capacity option

FEATURES

OPERATION MODES

Digital Trunking: 9600 Baud APCO P25 Phase 1 FDMA and Phase 2 TDMA

Digital Conventional: APCO 25

Analog Trunking: 3600 Baud SmartNet®, SmartZone®, Omnilink®

Analog Conventional: MDC 1200

ASTRO® 25 Integrated Voice and Data

SmartConnect Multi-net Connectivity*

FREQUENCY BANDS

All-band: Simultaneous Operation in VHF, UHF Range 1, UHF Range 2, 700 and 800 MHz Bands

Available in Multi-band and Single-band Configurations

Up to 3000 Channels

Up to 125 Zones

ADDITIONAL CONNECTIVITY

Bluetooth (Version 5.0)

WiFi (802.11a/b/g/n/ac), 2.4 and 5 GHz Bands

LTE (FirstNet®, Verizon, & Bell Mobility - certified)

NFC (Near-Field Communications)**

AUDIO FEATURES

3 W Speaker with Adaptive Equalization

2 Internal Digital Microphones

Adaptive Dual-sided Operation

Adaptive Noise Suppression Intensity

Adaptive Gain Control

Adaptive Windporting

IMPRES™ Audio Accessory Compatibility

MANAGEMENT

RadioCentral™

SmartProgramming*

SmartInsight* Preview

LOCATION-TRACKING

Built-in GNSS (GPS and GLONASS)

SmartLocate and Indoor Positioning*

Mission-critical Geofence**

SmartMapping*

SECURITY

256-bit AES*

Single-key ADP Encryption*

Software Key

P25 Authentication*

Multikey for 128 Keys and Multi-algorithm*

Over-The-Air Key Loading***

Over-The-Air Rekeying (OTAR)*

INGRESS PROTECTION

IP6x Dust

IPx8 Submersion (2 m, 4 hr)

MIL-STD Delta-T, 512.X Procedure 1

MESSAGING

Text Messaging

Freeform or Canned Messages

SmartMessaging*

USER INTERFACE

3.6" Mission-critical Touchscreen: 800x480 TFT 24-bit Full Color Transflective Display, 1 mm Toughened Glass Lens

Capacitive Touch Technology: Usable with Gloves Up to 4 mm Thick, Resistant to False Actuation from Fresh or Salt Water, Snow, Ice, Dirt or Grease

High Velocity User Interface: Large Touch Targets, Shallow Menu Hierarchy, Home Screen Information at a Glance, Integrated Applications

1.2" Top Display: 200x112 TFT 18-bit Color Transflective Screen, 1 Line of Icons, 2 Lines of Text, 14 Characters per Line, 2 mm Toughened Glass Lens

PTT Button: 1.32 x 0.54 in (33.5 x 13.8 mm)

16-position Channel Selector

Angled Power/Volume Knob

Large Orange Emergency Button

3 Programmable Side Buttons (1-dot, 2-dot, purple)

Concentric 2-position Switch

ABC Zone Switch

ViQi Button (3-dot)

Display On/Off/Home Button

ViQi VOICE INTERACTION

Customizable Voice Announcements

Voice Control: 13 Actions with Intuitive Commands*

Virtual Partner Service*

ENERGY

Standard 4400 mAh Battery

Optional High Capacity 5650 mAh Battery*

IMPRES 2 Smart Battery Technology

SENSORS

Ambient Light

Accelerometer x2 (Display Orientation, Man Down)

Magnetometer (eCompass)

OTHER FEATURES

Radio Profiles

Enhanced Data*

Multicast Voting Scan*

Man Down*

DVRS PSU*

Digital Tone Signaling*

DIMENSIONS

Radio with Standard Battery, no Antenna

Height: 5.4 in (138 mm)

Width: 2.5 in (63 mm)

Depth: 1.7 in (43 mm)

Weight: 18.5 oz (525 g)

Radio with High Capacity Battery, no Antenna

Height: 7.1 in (180 mm)

Width: 2.5 in (63 mm)

Depth: 1.7 in (43 mm)

Weight: 22.8 oz (647 g)

*Optional Feature **Hardware-ready ***Included with OTAR

PERFORMANCE

TRANSMITTER

	Footnote	VHF	UHF Range 1	UHF Range 2	700 MHz	800 MHz
Frequency Range / Bandsplits	-	136-174 MHz	380-470 MHz	450-520 MHz	762-776, 792-806 MHz	806-825, 851-870 MHz
Channel Spacing	1	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz
Maximum Frequency Separation	-	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power (Adjustable)	2	1-6 W	1-5 W	1-5 W	1-2.5 W	1-3 W
Frequency Stability (-30 °C to +60 °C; +25 °C Ref.)	2	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm
Modulation Limiting (12.5 / 20 / 25 kHz Channel)	2	±2.5 / ±4 / ±5 kHz	±2.5 / ±4 / ±5 kHz	±2.5 / ±4 / ±5 kHz	±2.5 / ±4 / ±5 kHz	±2.5 / ±4 / ±5 kHz
Emissions (Conducted and Radiated)	2	-75 dBc	-75 dBc	-75 dBc	-75 dBc	-75 dBc
Audio Response	2	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum and Noise (12.5 / 25 kHz Channel)	2	-53 / -55 dB	-52 / -54 dB	-51 / -54 dB	-50 / -55 dB	-49 / -53 dB
Audio Distortion (12.5 / 25 kHz Channel)	2	0.75% / 0.75%	0.75% / 0.75%	0.75% / 0.75%	0.85% / 0.85%	0.85% / 0.85%

RECEIVER

	Footnote	VHF	UHF Range 1	UHF Range 2	700 MHz	800 MHz
Frequency Range / Bandsplits	-	136-174 MHz	380-470 MHz	450-520 MHz	762-776, 799-806 MHz	851-870 MHz
Channel Spacing	1	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz	12.5 / 20 / 25 kHz
Maximum Frequency Separation	-	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Frequency Stability (-30 °C to +60 °C; +25 °C Ref.)	2	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm	±1.0 ppm
Analog Sensitivity (12 dB SINAD)	2	0.178 µV (-122.0 dBm)	0.211 µV (-120.5 dBm)	0.211 µV (-120.5 dBm)	0.224 µV (-120.0 dBm)	0.237 µV (-119.5 dBm)
Digital Sensitivity (1% BER)	3	0.266 µV (-118.5 dBm)	0.298 µV (-117.5 dBm)	0.298 uV (-117.5 dBm)	0.335 µV (-116.5 dBm)	0.335 µV (-116.5 dBm)
Digital Sensitivity (5% BER)	3	0.158 µV (-123.0 dBm)	0.178 µV (-122.0 dBm)	0.178 µV (-122.0 dBm)	0.224 µV (-120.0 dBm)	0.224 µV (-120.0 dBm)
Selectivity (12.5 / 25 kHz Channel)	2	77 / 84 dB	74 / 81 dB	74 / 81 dB	72 / 80 dB	72 / 79 dB
Intermodulation Rejection	2	82 dB	80 dB	80 dB	80 dB	80 dB
Spurious Rejection	2	98 dB	95 dB	95 dB	98 dB	98 dB
FM Hum and Noise (12.5 / 25 kHz Channel)	2	55 / 59 dB	54 / 58 dB	54 / 58 dB	53 / 57 dB	52 / 56 dB
Audio Distortion	2	0.90%	0.90%	0.90%	0.90%	0.90%

IMPRES™ 2 BATTERIES

	Footnote	Part No	Capacity	Availability
Standard	-	NNTN9216	4400 mAh	Included
High Capacity	-	NNTN9089	5650 mAh	Optional
Standard HazLoc	4	NNTN9217	4400 mAh	Optional
High Capacity HazLoc	4	NNTN9090	5650 mAh	Optional

ENCRYPTION

Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL, Localized Algorithm
Encryption Algorithm Capacity	8
Encryption Keys per Radio	1024 Keys, Programmable for 128 Common Key References (CKR) or 16 Physical Identifiers (PID)
Encryption Keying	Local Key Loader and Over-the-Air Rekeying (OTAR)
Synchronization	XL - Counter Addressing OFB - Output Feedback
Vector Generator	NIST-Approved Random Number Generator
Encryption Type	Digital and SecureNet, TLS1.2, SRTP
Key Storage	Tamper-protected Volatile or Non-volatile Memory
Key Erasure	Keyboard Command and Tamper Detection
Standards	FIPS 140-2 Level 1 and Level 3, FIPS 197
Device Certificates	x.509v3 ECC-P384, x.509v3 RSA-2048
Cipher Suites	ECDHE_ECDSA_WITH_AES256_GCM_SHA384 TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA TLS_RSA_WITH_AES_256_GCM_SHA384 SRTP_AEAD_AES_256_GCM1

COLOR

Standard Color	Black/Gray
Optional Side Panel Colors (Supplied as Retro-fit Kits)	Red, Blue, Orange, Public Safety Yellow, High Impact Green, Coyote Brown

WIRELESS

LTE	
Bands Supported	2, 4, 12, 13, 14
Bands (Hardware Ready)	5, 17
Device Category	4
Certifications	FirstNet®, Verizon, Bell Mobility
WiFi	
Standards Supported	802.11a/b/g/n/ac
Frequency Range	2400-2472, 5180-5825 MHz
Security	Supports WPA-2, WPA, WEP
Capacity	Up to 20 SSIDs
Bluetooth	
Version	5.0
Frequency Range	2402 - 2480 MHz
Security	128-bit AES-CCM Encryption

AUDIO

Audio Output Power at Rated	3 W
Audio Output Power at Max	5 W
Audio Response (EIA)	+1, -3 dB
Speech Loudness at 12 in (300 mm)	105 Phon
Audio Features	Adaptive Equalization Adaptive Dual-sided Operation Adaptive Noise Suppression Intensity Adaptive Gain Control Adaptive Windporting IMPRES Audio

LOCATION-TRACKING

	Footnote	
Constellations	-	GNSS (GPS and GLONASS)
Tracking Sensitivity	-	-159 dBm
Accuracy	5	<5m (95%)
Cold Start	5	<60 Seconds (95%)
Hot Start	5	<5 Seconds (95%)
Mode	-	Autonomous (Assisted only with LTE service)

ENVIRONMENTAL AND REGULATORY

MIL-STD 810

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G/H	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.5	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1, C3	503.3	I/A1, C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Submersion	512.1	I	512.2	I	512.3	I	512.4	I	512.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI
Shock (Drop)	516.2	II	516.3	IV	516.4	IV	516.5	IV	516.6	IV

ENVIRONMENTAL

	Footnote	
Operating Temperature	6	-30 to +60 °C (-22 to +140 °F)
Storage Temperature	6	-40 to +85 °C (-40 to +185 °F)
Humidity	-	Per MIL-STD 810
ESD	-	IEC 801 - 2 kV
Dust Resistance	-	IP6X
Water Resistance (Submersion)	-	IPX8 (2 meters, 4 hours) MIL-STD Delta-T, 512.X Procedure 1

REGULATORY

FCC ID	AZ489FT7119
IC ID	109U-89FT7119
LMR	8K10F1D, 8K10F1E, 8K10F1W, 11K0F3E, 16K0F3E, 20K0F1E
Bluetooth	1M18G1D, 1M1F1D, 2M1F1D
WiFi	12M9G1D, 16M7D1D, 17M9D1D, 36M2D1D, 17M5D1D, 18M4D1D, 36M8D1D, 76M1D1D
LTE	Band 2 (1850.7 - 1900 MHz), Modulation: *G7D, *D7W Band 4 (1710.7 - 1745 MHz), Modulation: *G7D, *D7W Band 12 (699.7 - 711 MHz), Modulation: *G7D, *D7W Band 14 (790.5 - 793 MHz), Modulation: *G7D, *D7W
All-band Model Number	H55TGT9PW8AN
Single-band Model Number	H45TGT9PW8AN

FOOTNOTES:

1. Please refer to local regulations for available channel bandwidths.
2. Measured conductively in analog mode per TIA / EIA 603 under nominal conditions, and at 1 W Rated Audio for Rx. Selectivity measured using the TIA-603 single-tone method.
3. Measured conductively in digital mode per TIA / EIA IS 102.
4. Listed by UL to non-incendive standards: UL 121201 and CAN/CSA C22.2 No. 213-17 as safe for use in Class I, Division 2, Groups A,B,C,D; Class II, Division 2, Groups F,G; Class III Hazardous Locations.
5. Measured conductively with >6 satellites visible at a nominal -130 dBm signal strength. Specs provided are 95th percentile values.
6. LMR only. Front display, LTE, WiFi, Bluetooth and GPS not available when radio internal temperature is below -20 °C (-4 °F). Hi-capacity battery required for operation between -20 °C (-4 °F) and -30 °C (-22 °F). Batteries should be charged at 0 to +45 °C (+32 to +113 °F) and stored at +20 to +25 °C (+68 to +77 °F) . Reference motorolasolutions.com/batterycare

All specifications are subject to change without notice. For full details consult product service manual, document no. MN005643A01.

ACCESSORIES

EXPAND AND CUSTOMIZE YOUR RADIO'S FUNCTIONALITY WITH BEST-IN-CLASS ACCESSORIES.

AUDIO

HEAR AND BE HEARD LIKE NEVER BEFORE

XV Remote Speaker Microphone

PMMN4123

- Loudest, clearest speaker
- Four digital microphones
- Enhanced windporting
- New adaptive noise suppression
- Dedicated ViQi button

ANTENNAS

DESIGNED FOR WEARABILITY

7/800 MHz Stubby Antenna 65 mm (760-870 MHz)

AN000296A01

Whip All-band Antenna 200 mm (V,U,7/800 MHz)

AN000297A01

Colored antenna ID bands are available for easy customization and come in packs of 10.

- 32012144001 Gray
- 32012144002 Yellow
- 32012144003 Green
- 32012144004 Blue
- 32012144005 Purple

CARRY

SECURE, EASY ACCESS

Classic Holster

PMLN7947

Hybrid Leather Carry Case

PMLN7948
Standard Capacity

PMLN7964
High Capacity

ENERGY

MAXIMIZED POWER, LIFE AND MANAGEMENT

IMPRES 2 Multi-Unit Charger

NNTN9115

IMPRES 2 Single-Unit Charger

NNTN9199

IMPRES 2 Standard Capacity Battery

NNTN9126
4400 mAh

NNTN9127
4400 mAh UL Div 2 (see footnote 4)

IMPRES 2 High Capacity Battery

NNTN9089
5650 mAh

NNTN9090
5650 mAh UL Div 2 (see footnote 4)

For a complete list of accessories, please visit **motorolasolutions.com/apxnext**

MANAGED AND SUPPORT SERVICES

ACHIEVE MISSION CRITICAL PERFORMANCE

IN PUBLIC SAFETY, FOCUS IS YOUR GREATEST RESOURCE. APX NEXT PROTECTS YOUR FOCUS WHEN IT MATTERS MOST. YOUR MISSION-CRITICAL COMMUNICATIONS DEPEND ON THE CONSISTENT AVAILABILITY OF YOUR RADIOS.

Essential and Advanced Services provide the tools and expert support needed to efficiently manage your radio fleet. With Premier Services, you transfer your APX NEXT two-way radio operations to our managed services professionals who are focused on maximizing performance.

Rely on us to help you achieve your performance targets with the right service level you need for systems, devices and applications. Each package provides a higher level of support, transferring the risk and responsibility to Motorola Solutions.

SERVICES AT - A - GLANCE

	ESSENTIAL	ADVANCED	PREMIER
Device Preventive Maintenance			
Accidental Damage			
RadioCentral™ (full-service programming)			
RadioCentral(batch configuration and programming)			
RadioCentral (single radio programming)			
Hardware Repair			
Software Maintenance			
Device and RadioCentral Technical Support			
MyView Portal			

Note:
- Accidental damage can be offered as an add-on service with Essential and Advanced packages.
- Device management training can be offered as an add-on service with all three packages.

PROTECT YOUR FOCUS WHEN IT MATTERS MOST

For more information, please visit
motorolasolutions.com/apxnext

MOTOROLA SOLUTIONS

APX NEXT

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A. 800-367-2346 motorolasolutions.com

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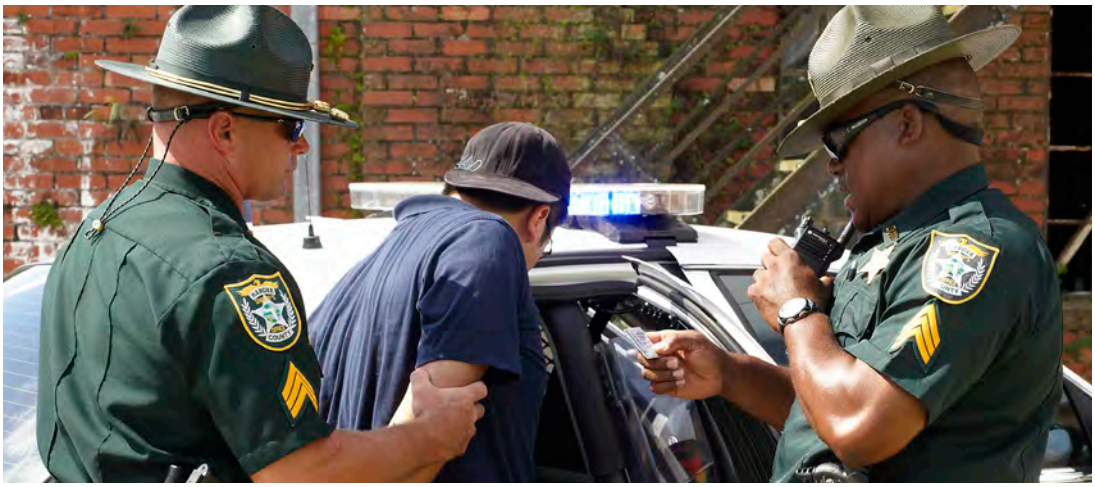


ASTRO® 25 TRUNKED SYSTEMS

PROJECT 25 TDMA WITH DYNAMIC DUAL MODE

Improving spectrum efficiency is a critical issue facing government organizations. Agencies want to do more with the spectrum that they have assigned. And government spectrum bodies are mandating that equipment become more spectrum efficient. Project 25 has addressed this new requirement with the Phase 2 TDMA standard.

ASTRO 25 trunked systems are now available with Project 25 standards-based TDMA. This capability provides organizations with the flexibility required to maximize current frequency allocations with a standards-based solution while maintaining interoperability with other Project 25 systems.

PROJECT 25 TDMA STANDARD

The TIA-102 suite of standards defines Project 25 (P25) TDMA, adding spectrum-efficient TDMA voice service to the existing P25 FDMA trunked voice and packet data services.

P25 TDMA capable systems use the P25 FDMA control channel for all call requests, which allows systems to support FDMA calls as well as TDMA calls.

ENHANCED INTEROPERABILITY

At the cornerstone of all government communications is the need to interoperate with other users to support emergency response. As the new standard was created, interoperability with existing radios was one of the critical requirements. ASTRO 25 systems and APX subscribers support both P25 FDMA and P25 TDMA for interoperability.

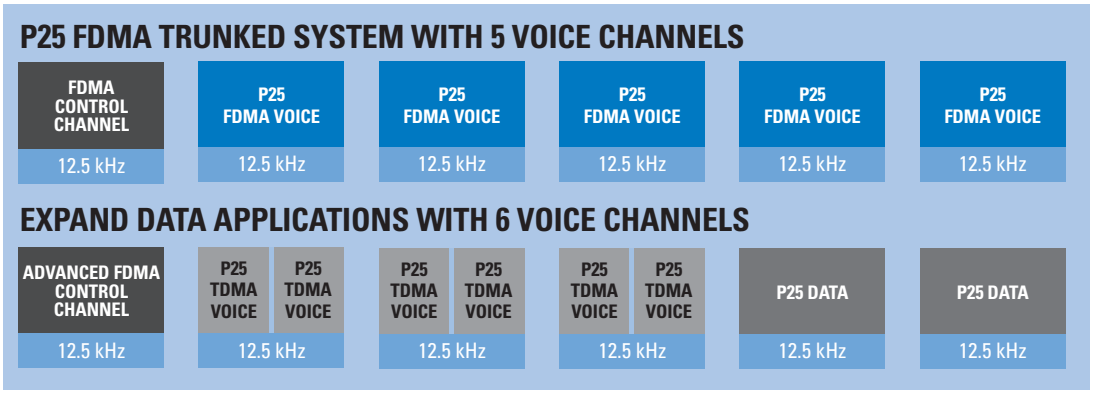
In addition to a manual method for supporting interoperability, which requires the user to manually switch talkgroups on the radio, Motorola delivers seamless interoperability with a software feature called Dynamic Dual Mode that automatically selects what protocol is used based on the resources participating in the call.

SPECTRUM MANDATES

As part of the ongoing efforts to maximize spectrum, governing bodies are mandating that radio systems must move to 6.25e spectrum-efficient methods. For example, by 2017 the FCC will require 6.25 kHz equivalent operations for 700 MHz band plans.

INCREASED VOICE CAPACITY

With P25 TDMA, organizations can double their voice capacity within their fixed allocation of frequencies. For example, they can go from having 5 simultaneous voice calls using P25 FDMA trunked operation to the ability to have up to 10 simultaneous voice calls using P25 TDMA trunked operation. ASTRO 25 TDMA provides the additional advantage of increasing the potential voice path capacity of your system by offering up to 30 voice paths at a site.



ADDITIONAL CAPACITY FOR APPLICATIONS

Use additional channel capacity afforded by P25 TDMA trunked operation to provide data applications such as OTAR, location service, OTAP and text messaging.

ASTRO 25 is a robust solution for government agencies. P25 TDMA functionality can be added to ASTRO 25 systems along with P25 FDMA trunking and conventional, 3600 trunking, analog conventional, and integrated data operation for total flexiblity.

DYNAMIC DUAL MODE

Dynamic Dual Mode, an optional feature, allows users to interoperate between P25 FDMA and P25 TDMA services. It is part of the call processing application and uses an advanced control channel that dynamically switches call assignments between FDMA and TDMA.

Dynamic Dual Mode is seamless to users and requires no intervention from users or network operators. For example, if a user in an active P25 TDMA talkgroup call, roams onto a P25 FDMA-only site, the system automatically initiates P25 FDMA mode at the next push-to-talk (PTT). Or if an active P25 TDMA talkgroup call is underway at a site and a P25 FDMA-only member of the talkgroup joins (or "affiliates") with the call, the system automatically switches the call to P25 FDMA mode at the next PTT. The FDMA-only user is now included in the call, and the call switched without any user intervention or awareness.

As an added benefit in encrypted systems, the call set-up automatically switches between FDMA and TDMA while maintaining end-to-end encryption. This provides a high level of assurance that the system remains secure from dispatcher to radio user.

IMPROVED SYSTEM OPERATION

Dynamic Dual Mode improves ease of use in ASTRO 25 systems with a mixed fleet of P25 FDMA and P25 TDMA radios.

- Radio users have seamless interoperability regardless of the operations mode.
- Dispatch operators can automatically coordinate between P25 TDMA radio users and P25 FDMA radio users with no need to track or patch users together.
- System administrators do not need to preassign base stations as P25 TDMA or P25 FDMA; the system automatically assigns the appropriate station mode based on the needs of the user.

IMPLEMENTATION CONSIDERATIONS

Starting with ASTRO 25 System Release 7.11, P25 TDMA and Dynamic Dual Mode are available in trunked, simulcast and standalone repeater configurations operating in the VHF, UHF, 700 MHz and 800 MHz bands.

On fielded ASTRO 25 systems, key system components including G-series stations, controllers and comparators, the MCC 7500 IP Dispatch Console, and APX™ radios can be software upgraded to P25 TDMA.

The APX series of trunked radios is available with P25 FDMA and P25 TDMA in the same radio. Dynamic Dual Mode automatically switches between the capabilities.

Motorola Solutions, Inc. 1301 E. Algonquin Road, Schaumburg, Illinois 60196 U.S.A. **motorola.com/ASTRO25**

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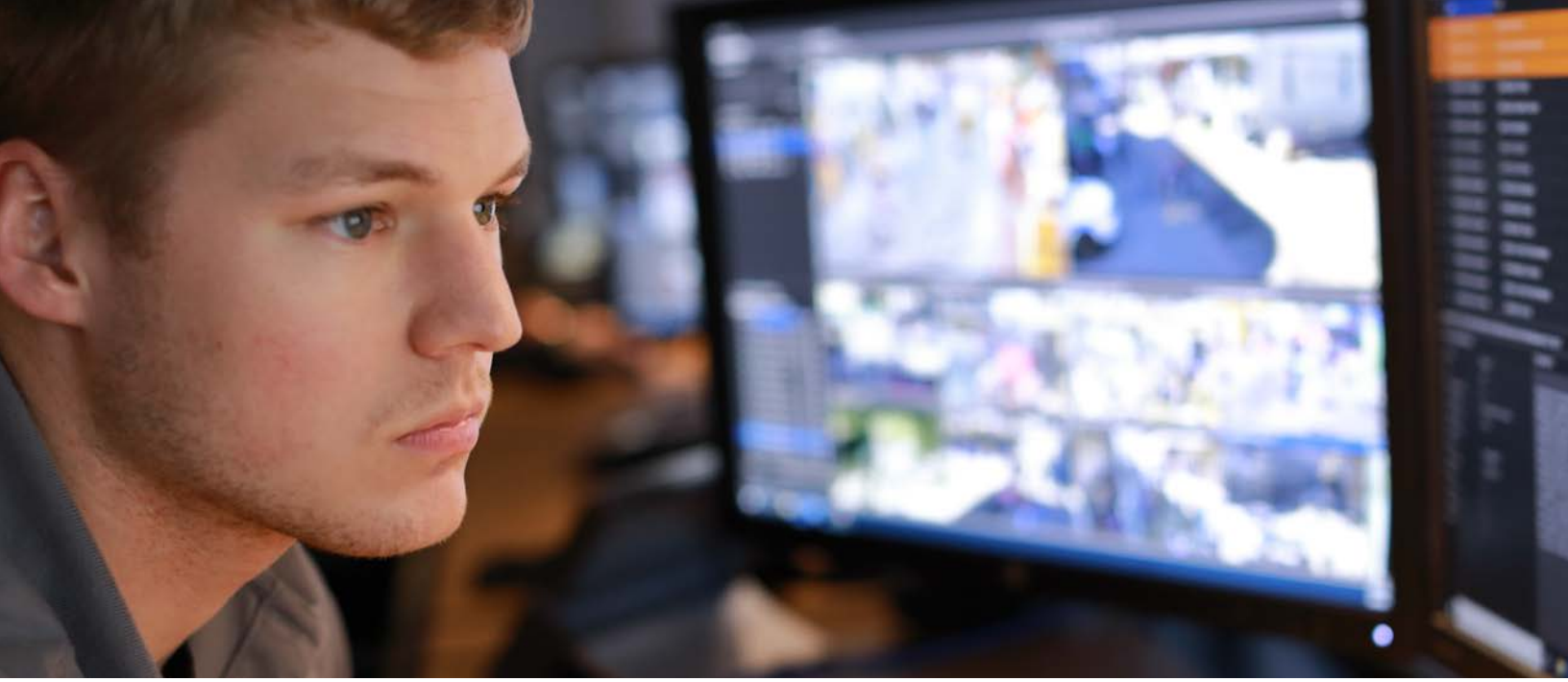
MOTOROLA



APX® ALL-BAND CONSOLETTE

Racing to an emergency or repairing a power outage, every moment matters as you mount a response. The right control station can make all the difference in making sure communications are clear, continuous and coordinated – across multiple users, agencies and miles.

The APX All-Band Consolette is the ideal complement to your dispatch console. It's the low cost, mid-power wireless control station for an ASTRO® 25 system. You can use it as an emergency backup station when infrastructure is off-line, or for wireless access to different system types for increased interoperability between agencies.

MOTOROLA SOLUTIONS

CONNECT WITH CONFIDENCE

Designed around proven APX technology, the Consolette combines forward-thinking technology with time-tested functionality. Project 25 Phase 2 technology delivers twice the voice capacity so you can add more users without adding more frequencies or infrastructure. Talk with confidence to a squad car or desk station, a job site across town or an incident in the next county.

And with Wi-Fi, the Consolette keeps your team in touch and within reach of over-the-air updates. Receive new codeplugs, firmware updates and software features at the speed of Wi-Fi—without interruptions to voice communication.

MIGRATE AT YOUR OWN PACE

The APX All-Band Consolette is backwards and forwards compatible, developed to meet current P25 standards and future-ready to support new technology and data applications. Now you can achieve your interoperability objectives—whether upgrading an existing system or designing a new one—based on your dollars and deadlines.

BUILT FOR THE TOUGHEST TASKS

Innovative design and skillful engineering make the APX All-Band Consolette a tireless performer. The robust metal housing assures extra durability, but allows for easy servicing and programming without removing the lid. An integrated front panel numeric keypad gives you fast access to radio controls. And it meets stringent FCC and UL certifications for exceptional safety.

ROBUST AND MISSION-READY

When you lose power, count on the automatic battery revert feature to keep your people connected. All you need is a DC source, such as a marine battery, and the Consolette will switch over automatically to keep communications strong.

Rich in features, the APX All-Band Consolette gives you the largest number of interface connections to a wide variety of consoles and desk sets, and easy access to contact information with one unified call list. What's more, an ACIM wireless interface provides back-up dispatch if your console's link to the ASTRO 25 trunked system is ever lost.

STANDARD FEATURES

Available in 700/800 MHz, VHF or UHF (R1/R2) bands

Optional multiband operation

2000 Channels

Trunking Standards supported:

- Clear or digitally encrypted ASTRO® 25 Trunked Operation
- Capable of SmartZone®, SmartZone Omnilink, SmartNet®

Analog MDC-1200 and Digital APCO P25

Conventional System Configurations

Narrow and wide bandwidth digital receiver (6.25 kHz equivalent/12.5 kHz/30 kHz/25 kHz)*

Embedded digital signaling (ASTRO and ASTRO 25)

Integrated Encryption Hardware

Seamless Wideband Scan

Intelligent Priority Scan

Intelligent Lighting

Interfaces supported:

- Recorder
- Wireline
- Vehicle Interface Port
- Crosspatch
- Headsets (2)**

110/220 VAC operation with battery revert capability

VU Meter and Clock

Expansion Slot Standard

2 configurations available:

- Full featured front panel
- Limited front panel

Radio Profiles

Unified Call List

Tone remote control

Tactical Inhibit

Instant Recall

ACIM/CCGW interface including:

- ID decode
- Call alert encode

* Per the FCC Narrowbanding rules, new products submitted for FCC certification after January 1, 2011 are restricted from being granted certification at 25KHz for United States – State & Local Markets only.

** Available on full featured models only.

AUXILIARY DISPLAY FEATURES

LCD display

3 soft menu buttons to activate or control the following Consolette features:

- Clock
- Volume Units Meter (VU)
- Crosspatch Linking
- Auxiliary Controls/VIP Activation
- Over-the-air Audible TX Alert Tones

OPTIONAL FEATURES

Enhanced Encryption Software Options

Programming over Project 25 (POP25)

Text Messaging

Over the Air Rekeying (OTAR)

Wi-Fi connectivity

Extended Dispatch Operation including:

- Emergency Alarm ACK Encode
- Radio Inhibit/Uninhibit Encode
- Radio Monitor Encode
- Radio Check Encode
- Status Query Encode
- Status Query Response Decode
- Status Update Decode
- Message Update Decode

E5 CONTROL HEAD FEATURES

Bright color display

- Easy to read 3 line display in various lighting conditions - day or night
- Large tactile knobs and navigation buttons
- 5 programmable menu soft keys and 1 programmable button

SIGNALING (ASTRO MODE)

Signaling Rate	9.6 kbps
Digital ID Capacity	10,000,000 Conventional / 48,000 Trunking
Digital Network Access Codes	4,096 network site addresses
ASTRO Digital User Group Addresses	4,096 network site addresses
Project 25 – CAI Digital User Group Addresses	65,000 Conventional / 4,094 Trunking
Error Correction Techniques	Golay, BCH, Reed-Solomon codes
Data Access Control	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions.

DIMENSIONS

W x D x H	Limited Front Panel Configuration 16" x 18" x 4.2" (406 x 457 x 107mm) Full Featured Front Panel Configuration 16" x 18.75" x 4.2" (406 x 476 x 107mm)
Weight	Limited Front Panel Configuration 18.9 lbs (8.6 kg) Full Featured Front Panel Configuration 19.9 lbs (9.0 kg)

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

	700 MHz	800 MHz	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits	764-776 MHz, 794-806 MHz	806-825 MHz, 851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing	25/20/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power[1] (Adjustable)	1-30 Watts	1-35 Watts	1-50 Watts	1-40 Watts (380-470 MHz)	1-45 Watts (450-485 MHz) 1-40 Watts (485-512 MHz) 1-25 Watts (512-520 MHz)
Frequency Stability[1] (–30°C to +85°C; +25°C Ref.)	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM
Modulation Limiting[1]	±5/±2.5 kHz	±5/±4 kHz (NPSPAC) /±2.5 kHz	±5/±2.5 kHz	±5/±2.5 kHz	±5/±2.5 kHz
Modulation Fidelity (C4FM) 12.5kHz Digital Channel	1.10%	1.10%	1.10%	1.10%	1.10%
Emissions[1]	Conducted –75/–85 dBc Radiated –20/–40 dBm	Conducted –75 dBc Radiated –20 dBm	Conducted –85 dBc Radiated –20 dBm	Conducted –85 dBc Radiated –20 dBm	Conducted –85 dBc Radiated –20 dBm
Audio Response[1]	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)
FM Hum & Noise[1] 25 kHz 12.5 kHz	50 dB 48 dB	50 dB 48 dB	53 dB 52 dB	53 dB 50 dB	53 dB 50 dB
Audio Distortion[1] 20 & 25 kHz 12.5 kHz	0.50 % 0.50 %	0.50 % 0.50 %	0.50 % 0.50 %	0.50 % 0.50 %	0.50 % 0.50 %

RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

	700 MHz	800 MHz	VHF	UHF Range 1	UHF Range 2
Frequency Range/Bandsplits	764-776 MHz	851-870 MHz	136-174 MHz	380-470 MHz	450-520 MHz
Channel Spacing	25/20/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power (Speaker) at 3% distortion	2.5 W (20 Ω internal) 7.5 W (7.5 Ω) 15 W (2.3 Ω)	2.5 W (20 Ω internal) 7.5 W (7.5 Ω) 15 W (2.3 Ω)	2.5 W (20 Ω internal) 7.5 W (7.5 Ω) 15 W (2.3 Ω)	2.5 W (20 Ω internal) 7.5 W (7.5 Ω) 15 W (2.3 Ω)	2.5 W (20 Ω internal) 7.5 W (7.5 Ω) 15 W (2.3 Ω)
Frequency Stability[1] (–30°C to +85°C; +25°C Ref.)	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM
Analog Sensitivity[1] 12 dB SINAD Digital Sensitivity 5% BER	-121 dBm -120 dBm -121.5 dBm -120 dBm	-121 dBm -121.5 dBm	Pre-Amp -123 dBm Standard -119 dBm -123 dBm -119 dBm	Pre-Amp -123 dBm Standard -119 dBm -123 dBm -119 dBm	Pre-Amp -123 dBm Standard -119 dBm -123 dBm -119 dBm
Intermodulation 25 kHz 12.5 kHz	85 dB 85 dB	85 dB 85 dB	84 dB 85 dB 86 dB 86 dB	82 dB 83 dB 86 dB 86 dB	82 dB 83 dB 86 dB 86 dB
Spurious Rejection	100 dB	100 dB	90 dB	90 dB	90 dB
Audio Response[1]	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)	+1, –3 dB (EIA)
Audio Distortion at rated[1]	1.20 %	1.20 %	1.20 %	1.20 %	1.20 %
Selectivity[1] 25 kHz 12.5 kHz 30 kHz	82.5 dB 72 dB —	82.5 dB 72 dB —	87 dB 76 dB 90 dB	82 dB 76 dB —	82 dB 76dB —

POWER AND BATTERY DRAIN

Model Type	136-174 MHz, 380-470 MHz, 450-520 MHz, 764-870 MHz					
Minimum RF Power Output	1-35W (764-870 MHz), 1-50W (136-174MHz), 1-40W (380-470 MHz), 1-45W (450-485 MHz), 1-40W (485-512 MHz), 1-25 (512-520 MHz)					
AC Operation	110 to 220VAC 50-60Hz					
AC Current	110VAC: 0.85A (Idle/Rx) 1.7A (Tx) 220VAC: 0.42A (Idle/Rx) 0.85A (Tx)					
AC Surge Spec	EN6100-4-5 Level 5					
DC Operation	13.8V DC ±20% Negative Ground					
Standby at 13.8V	1.4A (764-870 MHz), 1.4A (136-174 MHz), 1.4A (380-470 MHz), 1.4A (450-520 MHz)					
Receive Current at Rated Audio at 13.8V	3.2A (764-870 MHz), 3.2A (136-174 MHz), 3.2A (380-470 MHz), 3.2A (450-520 MHz)					
Transmit Current (A) at Rated Power	136-174 MHz (1-50 W) 380-470 MHz (1-40 W) 450-520 MHz (1-45 W)	15A (50W) 15A (40W) 13A (45W)	8A (15W) 8A (15W) 8A (15W)	764-870 MHz (1-35 Watt)	13A (50W)	8A (15W)

ENCRYPTION

Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3 FIPS 197

WIRELESS CONNECTIVITY

WLAN (Wi-Fi®)	802.11 b/g/n supports WPA-2, WPA, WEP security protocols; radio can be pre-provisioned with up to 20 SSIDs

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30°C / +60°C
Storage Temperature	-40°C / +85°C
Humidity	95% relative humidity
ESD	IEC 61000-4-2
Duty Cycle	EIA/TIA Intermittent Duty Cycle

FCC/IC TYPE ACCEPTANCE ID

FCC/IC ID	BAND AND POWER LEVEL
FCC ID: AZ492FT7089	764-776 MHz (10-30 W)
IC ID: 109U-92FT7089	794-806 MHz (10-30 W)
	806-824 MHz (10-35 W)
	851-870 MHz (10-35 W)
	136-174 MHz (10-50 W and 25-110 W)
	380-470 MHz (10-40 W and 25-110 W)
	450-485 MHz (10-45 W)
	485-512 MHz (10-40 W)
	512-520 MHz (10-25 W)

[1] Measured in the analog mode per TIA/EIA 603 under nominal conditions

Specifications subject to change without notice. All specifications shown are typical.

Radio meets applicable regulatory requirements.

The All Band Consolette is J/F 12 11207 and SPS 22237 certified.

For more information, visit motorolasolutions.com/apx

MOTOROLA SOLUTIONS

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APX 8500

ALL-BAND P25 MOBILE RADIO

UNLIMITED MOBILITY. MAXIMUM CONNECTIVITY.

Your next incident doesn't care about frequencies and neither should your first responders. Give them the communication tools to stay connected and stay safe wherever the call takes them. Give them the APX 8500 all-band mobile radio.

The APX 8500 radio enables you to exchange critical voice and data seamlessly with multiple agencies and jurisdictions operating on different radio bands. The available high-power transmitter gives you extraordinary P25 range while the integrated Wi-Fi or tethered in-vehicle broadband modem can extend communication beyond P25 radio service areas. Offload data to a broadband connection and create a data ecosystem in and around your vehicle. Or, use your broadband connection to send and receive P25 voice and data when outside of P25 coverage. And when your vehicle sustains a high impact, the radio can automatically send an alert to dispatch.

Stay connected and stay safe in more ways than ever with the all-band APX 8500 mobile radio.

MOTOROLA SOLUTIONS

ALL-BAND CONNECTIVITY

ALL BANDS. NO BOUNDARIES.
With a 4-in-1 mobile radio and an all-band antenna, you now have the ability to stay connected and expand communications across multiple agencies with one device. Extend your reach further with an available high-power transmitter and communicate with widely dispersed teams across different bands.

BUILT-IN Wi-Fi

VOICE AND DATA, ALL AT ONCE
Packed with all the connections you need, the APX 8500 keeps your team in touch and within reach of over-the-air updates. Receive new codeplugs, firmware updates and software features at the speed of Wi-Fi— without interruptions to voice communications.

SMARTCONNECT

GET CONNECTED AND STAY CONNECTED
When the mission takes you out of range, you risk being left in the dark. The APX 8500, equipped with SmartConnect, can reroute P25 voice and data communication over broadband via built-in Wi-Fi or a tethered LTE/satellite router. Stay connected to your P25 radio system, even when outside of P25 coverage.

ViQi VIRTUAL PARTNER

FAST INFORMATION RETRIEVAL
Running routine database queries doesn't need to slow you down. Simply press a button on the keypad microphone and ask ViQi for the information you need. Keep your eyes on the situation and free up dispatchers to focus on more critical events. Move intelligence faster than ever with ViQi.

DESIGNED TO SECURE AND PROTECT

KEEP VOICE AND DATA PROTECTED
The APX 8500 secures voice and data using multiple hardware encryption algorithms and the ability to rekey over the air, so it's protected from scanners and eavesdroppers. What's more, P25 Radio Authentication ensures only valid users can access the system while the available two-factor authentication secures database logins.

DEVICE MANAGEMENT SERVICES

ALL THE SUPPORT YOU NEED
Motorola Solutions offers three levels of service plans – Essential, Advanced and Premier. From simple support for technical troubleshooting to a complete transfer of optimization and maintenance services to Motorola Solutions, you choose the level of support that suits you best.

02 CONTROL HEAD

EXTREME USABILITY

The 02 control head provides rugged simplicity for efficient and confident communication. Extreme controls with easy to read color display and a built-in 7.5 watt speaker provides clear visual and audible user experiences. Available in high impact green or black.

03 HANDHELD CONTROL HEAD

HANDHELD FLEXIBILITY

The 03 corded control head fits all your mobile controls in your hand. With the 03 your radio controls are never out of reach.

APX 8500 CONTROL HEADS*

E5 CONTROL HEAD

UNMATCHED READABILTY. OPTIMIZED USABILITY.

A bright color display and intelligent lighting makes the E5 easy to read under any condition while the optimized tactility and button placement reduces inadvertent actuations.

07 CONTROL HEAD

INTEGRATED MULTI-FUNCTIONALITY

The 07 is a sophisticated control head with a color display and built-in keypad. It can integrate your radio vehicle control into a single ergonomic interface and supports dual radio installations.

* Compatible 09 and 05 control heads not shown.

FEATURES

OPERATION MODES

Digital Trunking: 9600 Baud APCO P25 Phase 1 FDMA and Phase 2 TDMA

Digital Conventional: APCO 25

Analog Trunking: 3600 Baud SmartNet, SmartZone, Omnilink

Analog Conventional: MDC 1200

ASTRO® 25 Integrated Voice and Data

SmartConnect Multi-net Connectivity*

FREQUENCY BANDS

All-band: Simultaneous Operation in VHF, UHF Range 1, UHF Range 2, 700 and 800 MHz Bands

100 Watt High-Power available in VHF and UHF Range 1 bands (High-Power model only)

Up to 3,000 Channels

ADDITIONAL CONNECTIVITY

Wi-Fi 802.11 b/g/n*

Data Modem Tethering*

SmartConnect*

MANAGEMENT

Radio Management

Customer Programming Software

LOCATION-TRACKING

Integrated GPS/GLONASS for Outdoor Location Tracking

Mission-Critical Geofence*

SECURITY

265-bit AES, ADP, DES, DVP*

FIPS 140-2 Level 3, FIPS 197

P25 Authentication*

Multikey for 128 keys and Multi-algorithm*

Over-The-Air-Rekeying (OTAR)*

USER INTERFACE

O7 Multi Functional Control Head

E5 Enhanced Control Head

O3 Handheld Control Head

O2 Extreme Usability Control Head

Supports the discontinued O9 Control Head and the O5 Control Head

OTHER FEATURES

Intelligent Priority Scan

Instant Recall

Impact Detection*

Intelligent Lighting

Tactical Inhibit*

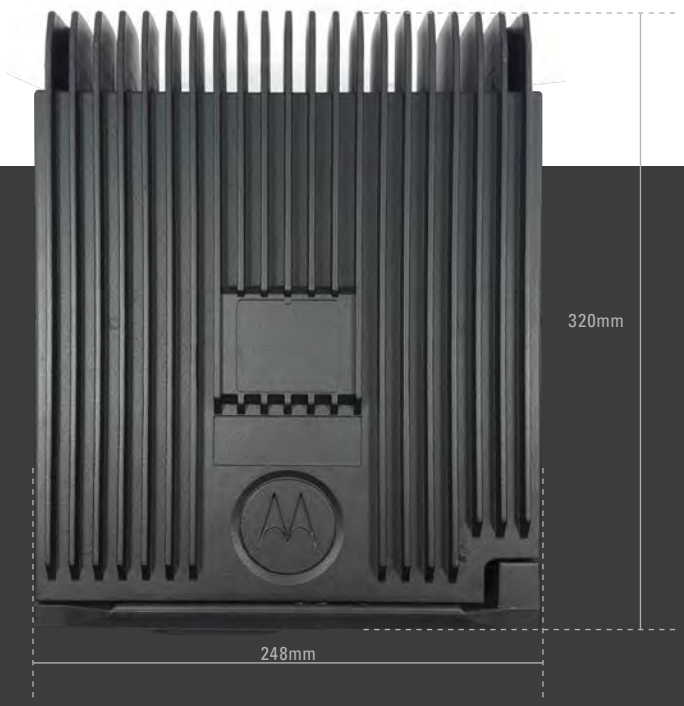
Digital Tone Signaling*

12 Character RFID Asset Tracking*

ViQi Virtual Partner*

*Optional Feature

DIMENSIONS AND WEIGHT		
	Dimensions (H x W x D)	Weight
O7 Control Head - Remote Mount	51 x 178 x 81mm (2.0 x 7.0 x 3.2 in)	-
E5 Control Head - Remote Mount	51 x 178 x 79 mm (2.0 x 7.0 x 3.1 in)	-
O5 Control Head - Remote Mount	51 x 178 x 74 mm (2.0 x 7.0 x 2.9 in)	-
O2 Control Head - Remote Mount	68 x 206 x 96 mm (2.7 x 8.1 x 3.8 in)	-
Mid Power Radio Transceiver and O7 Control Head - Dash Mount	51 x 178 x 256 mm (2.0 x 7.0 x 10.1 in)	3.1 kg (6.8 lbs)
Mid Power Radio Transceiver and E5 Control Head - Dash Mount	51 x 178 x 255 mm (2.0 x 7.0 x 10.0 in)	3.1 kg (6.8 lbs)
Mid Power Radio Transceiver and O5 Control Head - Dash Mount	51 x 178 x 250 mm (2.0 x 7.0 x 9.8 in)	3.1 kg (6.8 lbs)
Mid Power Radio Transceiver and O2 Control Head - Dash Mount	68 x 206 x 271 mm (2.7 x 8.1 x 10.7 in)	3.3 kg (7.23 lbs)
Mid Power Radio Transceiver and Remote Mount	51 x 178 x 232 mm (2.0 x 7.0 x 9.1 in)	2.9 kg (6.4 lbs)
High Power Radio Transceiver and Remote Mount	88 x 248 x 320 mm (3.4 x 9.7 x 12.6 in)	8.0 kg (17.6 lbs)



APX 8500 High-Power Model Shown

PERFORMANCE AND REGULATORY

TRANSMITTER- TYPICAL PERFORMANCE SPECIFICATIONS

	VHF	UHF R1	UHF R2	700 MHz	800 MHz
Frequency Range Band Splits	136-174 MHz	380-470 MHz	450-520 MHz	764-776, 794-806 MHz 806-825, 851-870 MHz	764-776, 794-806 MHz 806-825, 851-870 MHz
Channel Spacing	30/25/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power1 (Adjustable)	1-50 W (Mid Power) 1-100 W (High Power)	1-40 W (Mid Power) 1-100 W (High Power)	1-45 W (450-485 MHz) 1-40 W (485-512 MHz) 1-25 W (512-520 MHz)	1-30 W	1-35 W
Frequency Stability[1] (-30°C to +85°C; +25°C Ref.)	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM
Modulation Limiting	±5/±2.5 kHz	±5/±2.5 kHz	±5/±2.5 kHz	±5/±2.5 kHz	±5/±4 (NPSPAC) /±2.5 kHz
Modulation Fidelity (C4FM) 12.5 kHz Digital Channel	1.10%	1.10%	1.10%	1.10%	1.10%
Emissions[1]	Conducted -85 dBc / Radiated -20 dBm	Conducted -85 dBc / Radiated -20 dBm	Conducted -85 dBc / Radiated -20 dBm	Conducted -75/-85 dBc / Radiated -20/-40 dBm	Conducted -75 dBc / Radiated -20 dBm
Audio Response[1]	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)
FM Hum & Noise[1] (25 kHz / 12.5 kHz)	53 dB/ 52 dB	53 dB/ 50 dB	53 dB/ 50 dB	50 dB/ 48 dB	50 dB/ 48 dB
Audio Distortion[1] (25 & 20 kHz / 12.5 kHz)	0.50% / 0.50%	0.50% / 0.50%	0.50% / 0.50%	0.50% / 0.50%	0.50% / 0.50%

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

	VHF	UHF R1	UHF R2	700 MHz	800 MHz
Frequency Range Band Splits	136-174 MHz	380-470 MHz	450-520 MHz	764-776 MHz / 799-806 MHz	851-870 MHz
Channel Spacing	30/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz	25/20/12.5 kHz
Minimum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power 3% distortion, 8/3.2 Ohm speakers	7.5 W/15 W	7.5 W/15 W	7.5 W/15 W	7.5 W/15 W	7.5 W/15 W
Frequency Stability1 (-30 °C to +85 °C; +25 °C Ref.)	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM	±0.8 PPM
Analog Sensitivity[1] (12 dB SINAD)	Pre-Amp -123 dBm (0.158 µV) / Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV) / Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV) / Standard -119 dBm (0.251 µV)	-121 dBm (0.199 µV) / -120 dBm (0.224 µV)	-121 dBm (0.199 µV)
Digital Sensitivity (5% BER)	-123 dBm (0.158 µV) / -119 dBm (0.251 µV)	-123 dBm (0.158 µV) / -119 dBm (0.251 µV)	-123 dBm (0.158 µV) / -119 dBm (0.251 µV)	-123 dBm (0.158 µV) / -120 dBm (0.224 µV)	-121.5 dBm (0.188 µV)
Intermodulation Rejection (12.5 kHz / 25 kHz)	Pre-Amp 84 dB / 85 dB / Standard 86 dB / 96 dB	Pre-Amp 82 dB / 83 dB / Standard 86 dB / 86 dB	Pre-Amp 82 dB / 83 dB / Standard 86 dB / 86 dB	85 dB / 85 dB	85 dB / 85 d
Spurious Rejection	90 dB	90 dB	90 dB	100 dB	100 dB
Audio Response[1]	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)
Audio Distortion at rated[1]	1.20%	1.20%	1.20%	1.20%	1.20%
Selectivity[1] (12.5 kHz / 25 kHz / 30 kHz)	76 dB 87 dB 90 dB	76 dB 82 dB -	76 dB 82 dB -	72 dB 82.5 dB -	72 dB 82.5 dB -

POWER AND BATTERY DRAIN

	VHF	UHF R1	UHF R2	700 MHz	800 MHz
Frequency Range Band Splits	136-174 MHz	380-470 MHz	450-520 MHz	764-775, 794-806 MHz	806-825, 851-870 MHz
RF Power Output	1-50 W (mid-power) 1-100 W (high-power)	10-40 W (mid-power) 1-100 W (high-power)	1-45 W (450-485 MHz) 1-40 W (485-512 MHz) 1-25 W (512-520 MHz)	1-33 W	1-35 W
Operation	13.8 V DC ±20% Negative Ground	13.8 V DC ±20% Negative Ground	13.8 V DC ±20% Negative Ground	13.8 V DC ±20% Negative Ground	13.8 V DC ±20% Negative Ground
Standby at 13.8 V	1.4 A	1.4 A	1.4 A	1.4 A	1.4 A
Receive Current at Radio Audio at 13.8 V	3.2 A	3.2 A	3.2 A	3.2 A	3.2 A
Transmit Current at Rated Power (mid-power)	8 A @ 15 W 15 A @ 50 W	8 A @ 15 W 15 A @ 40 W	8 A @ 15 W 13 A @ 45 W	8 A @ 15 W 13 A @ 33 W	8 A @ 15 W 13 A @ 33 W
Transmit Current at Rated Power (high-power)	8 A @ 15 W 30 A @ 100 W	8 A @ 15 W 30 A @ 100 W	-	-	-

LOCATION - TRACKING	
Channels	12
Tracking Sensitivity	-164 dBm
Accuracy[2]	<5 meters (95%)
Cold Start	<60 seconds (95%)
Hot Start	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GNSS or SBAS

FCC/IC TYPE ACCEPTANCE	
FCC/IC ID	Band and Power Level
FCC ID: AZ492FT7089 IC ID: 109U-92FT7089	764-776 MHz (10-30 W)
	794-806 MHz (10-30 W)
	806-824 MHz (10-35 W)
	851-870 MHz (10-35 W)
	136-174 MHz (10-50 W)
	380-470 MHz (10-40 W)
	450-485 MHz (10-45 W)
	485-512 MHz (10-40 W)
	512-520 MHz (10-25 W)
FCC ID: AZ492FT7118 IC: N/A	136-174 MHz (1-100 W)
	380-470 MHz (1-100 W)

ENCRYPTION	
Supported Encryption Algorithms	256-bit AES, ADP, DES, DES-XL,DES-OFB, DVP-XL
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3, FIPS 197

ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature	-30°C/+60°C
Storage Temperature	-40°C/+85°C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water & Dust Intrusion	IP56

[1] Measured in the analog mode per TIA / EIA 603 single-tone method under nominal conditions
[2] Measured conductivity with >6 satellites visible at a nominal -130 dBm signal strength.

MOBILE MILITARY STANDARDS 810, C, D, E, F & G										
	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	I/II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.5	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I Proc	503.2	1/A1C3	503.3	1/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	I Proc	507.5	II/Aggravated
Salt Fog	509.1	I Proc	509.2	I Proc	509.3	I Proc	509.4	I Proc	509.5	I Proc
Blowing Dust	510.1	I	510.2	I, II	510.3	I, II	510.4	I, II	510.5	I, II
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.6	I, V, VI

For more information, please visit us on the web at: www.motorolasolutions.com/APX

MOTOROLA SOLUTIONS

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APX 6500

SINGLE-BAND P25 MOBILE RADIO

STAY INFORMED. STAY SAFE.

You may not know what the next call will entail, but you do know that your team needs communication they can count on. Whether on a motorcycle, in a squad car or a fire truck, the rugged and compact design of the evolved APX™ 6500 mobile radio is designed to maximize the real estate in your vehicle and keep your entire agency safely connected. Now with integrated Wi-Fi and SmartConnect, the APX 6500 gives you more ways to manage your radio and stay connected. And when your vehicle sustains a high impact, the radio can automatically alert dispatch.

Security is more important than ever. Criminals are testing you on the streets and over the air. Fight back with multiple levels of protection to encrypt and secure your voice and data communication against eavesdropping.

Stay connected, keep safe and secure your communications with the APX 6500 single-band mobile radio.

MOTOROLA SOLUTIONS

SMARTCONNECT

GET CONNECTED AND STAY CONNECTED

When the mission takes you out of range, you risk being left in the dark. The APX 6500, equipped with SmartConnect, can reroute P25 voice and data communication over broadband via built-in Wi-Fi or a tethered LTE/satellite router. Stay connected to your P25 radio system, even when outside of P25 coverage.

BUILT-IN Wi-Fi

VOICE AND DATA, ALL AT ONCE

Packed with all the connections you need, the APX 6500 keeps your team in touch and within reach of over-the-air updates. Receive new codeplugs, firmware updates and software features at the speed of Wi-Fi— without interruptions to voice communications.

ViQi VIRTUAL PARTNER

FAST INFORMATION RETRIEVAL

Running a routine database queries doesn't need to slow you down. Simply press a button on the keypad microphone and ask ViQi for the information you need. Keep your eyes on the situation and free up dispatchers to focus on more critical events. Move intelligence faster than ever with ViQi.

DESIGNED TO SECURE AND PROTECT

KEEP VOICE AND DATA PROTECTED

The APX 6500 secures voice and data using multiple hardware encryption algorithms and the ability to rekey over the air, so it's protected from scanners and eavesdroppers. What's more, P25 Radio Authentication ensures only valid users can access the system while the available two-factor authentication secures database logins.

LIGHTWEIGHT, COMPACT DESIGN

FLEXIBLE, EASY INSTALLATION

The small and light form-factor of the APX 6500 allows for easy installation across a growing ecosystem of vehicles and installations. Users can choose one of several interchangeable control heads to best fit their need. Dual control head configuration enables radio operation from multiple locations within the same vehicle, such as a large fire truck.

DEVICE MANAGEMENT SERVICES

ALL THE SUPPORT YOU NEED

Motorola Solutions offers three levels of service plans – Essential, Advanced and Premier. From simple support for technical troubleshooting to a complete transfer of optimization and maintenance services to Motorola Solutions, you choose the level of support that suits you best.

02 CONTROL HEAD

EXTREME USABILITY

The 02 control head provides rugged simplicity for efficient and confident communication. Extreme controls with easy to read color display and a built-in 7.5 watt speaker provides clear visual and audible user experiences. Available in high impact green or black.

03 HANDHELD CONTROL HEAD

HANDHELD FLEXIBILITY

The 03 corded control head fits all your mobile controls in your hand. With the 03 your radio controls are never out of reach.

APX 6500 COMPATIBLE CONTROL HEADS*

E5 CONTROL HEAD

UNMATCHED READABILTY. OPTIMIZED USABILITY.

A bright color display and intelligent lighting makes the E5 easy to read under any condition while the optimized tactility and button placement reduces inadvertent actuations.

07 CONTROL HEAD

INTEGRATED MULTI-FUNCTIONALITY

The 07 is a sophisticated control head with a color display and built-in keypad. It can integrate your radio vehicle control into a single ergonomic interface and supports dual radio installations.

* Compatible 05 control head is not shown.

FEATURES

GENERAL FEATURES	
Channel Capacity	1,000 channels standard, expandable to 3,000 channels
Wireless Connectivity	GPS/GLONASS, Wi-Fi
WLAN (Wi-Fi) Protocols	802.11 b/g/n (2.4GHz) 802.11 a/n/ac (5GHz)
Encryption Algorithms	256-bit AES, ADP, DES, DES-XL, DES-OFB, DVP-XL

OPERATING MODES
Digital Trunking: 9600 Baud APCO P25 Phase 1 FDMA and Phase 2 TDMA
Analog Trunking: 3600 Baud SmartNet®, SmartZone®, Omnilink
Digital Conventional: APCO 25
Analog Conventional: Analog MDC 1200, Quik Call II System Configurations
SmartConnect Connectivity

INTEGRATED WI-FI, GPS AND DATA CONNECTIVITY
Wi-Fi 802.11 b/g/n with up to 20 Wi-Fi networks provisioned in the radio[1]
Data Modem Tethering[1]
ASTRO 25 Integrated Voice and Data
Enhanced Data[1]
Integrated GPS/GLONASS for Outdoor Location Tracking
Mission Critical Geofence[1]
Personnel Accountability[1]
SmartConnect[1]
ViQi Virtual Partner[1]

MANAGEMENT
Customer Programming Software (CPS)
Radio Management
Over-the-air Programming (OTAP)[1]

SECURITY
Tactical Inhibit[1]
P25 Authentication[1]
Software Key[1]
Single-key ADP Encryption[1]
Multikey for 128 keys and multi-algorithm[1]
Over-the-air Rekeying (OTAR)[1]

GPS/GNSS SPECIFICATIONS	
Channels	12
Tracking Sensitivity	-164 dBm
Accuracy[2]	<5 meters (95%)
Cold Start[2]	<60 seconds (95%)
Hot Start[2]	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GNSS or SBAS

[1] Optional [2] Measured conductively with >6 satellites visible at a nominal -130 dBm signal strength

ENCRYPTION	
Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common KeY Reference (CKR) or 16 PhysicalIdentifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing | OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3, FIPS 197

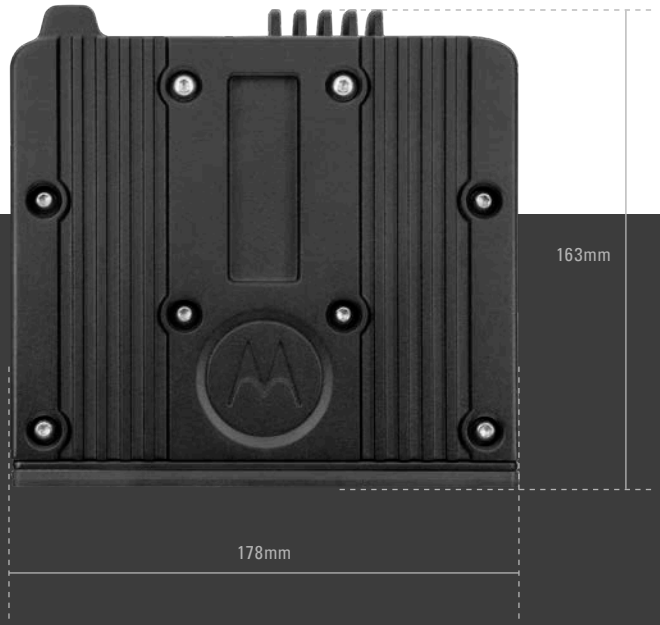
OTHER FEATURES
Text Messaging
Radio Profiles
Dynamic Zone
Intelligent Priority Scan
Unified Call List
Instant Recall
Data Modem Connection (wired or Wi-Fi)[1]
12 Character RFID Asset Tracking[1]
Digital Tone Signaling[1]

INTEGRATED WI-FI, GPS AND DATA CONNECTIVITY		
Frequency Range/Band splits	WLAN (Wi-Fi): 2412 - 2472 MHz; 5180 - 5320 MHz; 5500 - 5825 MHz	
WLAN (WiFi) 802.11 b/g/n (2.4GHz) 802.11 a/n/ac (5GHz)	Security protocols	WPA-2, WPA, WEP
	SSIDs	Up to 20 pre-provisioned
Integrated GPS/GLONASS for outdoor location tracking		
Data Modem Tethering[1]		

SIGNALING (ASTRO 25 MODE)	
Signalling Rate	9.6 kbps
Digital ID Capacity	10,000,000 Conventional / 48,000 Trunking
Digital Network Access Codes	4,096 network site addresses
ASTRO Digital User Group Addresses	4,096 network site addresses
Project 25 – CAI Digital User Group Addresses	65,000 Conventional / 4,094 Trunking
Error Correction Techniques	Golay, BCH, Reed-Solomon codes
Data Access Control	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions

[1] Optional

DIMENSIONS AND WEIGHT		
Radio Transceiver	51 x 178 x 163 mm (2.0 x 7.0 x 6.4 in)	2.18 kg (4.80 lbs)
Radio Transceiver and O2 Control Head - Dash Mount	69 x 207 x 223 mm (2.7 x 8.1 x 8.8 in)	2.43 kg (5.36 lbs)
Radio Transceiver and O5 Control Head - Dash Mount	51 x 178 x 202 mm (2 x 7 x 8.0 in)	2.24 kg (4.94 lbs)
Radio Transceiver and E5 Control Head - Dash Mount	51 x 178 x 209 mm (2.0 x 7.0 x 8.2 in)	2.24 kg (4.94 lbs)
Radio Transceiver and O7 Control Head - Dash Mount	51x 178 x 208 mm (2 x 7 x 8.2 in)	2.24 kg (4.94 lbs)
Radio Transceiver and Remote Mount	51 x 178 x 193.6 mm (2 x 7 x 7.6 in)	2.18 kg (4.80 lbs)
O2 Control Head Remote Mount	68 x 206 x 53 mm (2.7 x 8.1 x 2.1 in)	-
O5 Control Head Remote Mount	51 x 180.3 x 64 mm (2.0 x 7.0 x 2.5 in)	-
E5 Control Head Remote Mount	51 x 178.5 x 64 mm (2.0 x 7.0 x 2.5 in)	-
O7 Control Head Remote Mount	51 x 178 x 40 mm (2.0 x 7.0 x 1.5 in)	-



PERFORMANCE AND REGULATORY

TRANSMITTER

	VHF		UHF R1		700 MHz		800 MHz	
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776, 794-806 MHz		806-825, 851-870 MHz	
Rated RF Output Power (Adjustable)	1-50 W		1-40 W		3-30 W		3-35 W	
Frequency Stability (-30°C to +60°C; +25°C Ref.)	± 0.8 PPM		±0.8 PPM		±0.8 PPM		±0.8 PPM	
Emissions	Conducted -85 dBc	Radiated -10 dBm	Conducted -85 dBc	Radiated -20 dBm	Conducted -75/-85 dBc	Radiated -20/-40 dBm	Conducted -75 dBc	Radiated -20 dBm
Modulation Limiting (12.5/20/25 kHz)	±5/±2.5 kHz		±5/±2.5kHz		±5/±2.5 kHz		±5/±2.5 kHz	
Modulation Fidelity (C4FM) 12.5 kHz Digital Channel	2.5%		1.50%		1.50%		1.50%	
Audio Response	+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)	
FM Hum & Noise (12.5 kHz/25 kHz)	-52 dB / -53 dB		-50 dB/ -53 dB		-48 dB / -50 dB		-48 dB / -50 dB	
Audio Distortion (12.5 kHz/25 kHz)	0.50%		0.50%		0.50% / 0.50%		0.50% / 0.50%	

RECEIVER

	VHF		UHF R1		700 MHz	800 MHz
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776 MHz	851-870 MHz
Channel Spacing	12.5/25 kHz		12.5/25 kHz		12.5/25 kHz	12.5/25 kHz
Maximum Frequency Separation	Full Bandsplit		Full Bandsplit		Full Bandsplit	Full Bandsplit
Audio Output Power at Rated/Max	7.5 / 15 W		7.5 / 15 W		7.5 / 15 W	7.5 / 15 W
Frequency Stability (-30 °C to +60 °C; +25 °C Ref.)	±0.8 PPM		±0.8 ppm		±0.8 ppm	±0.8 ppm
Analog Sensitivity (12db SINAD)	Pre-Amp -123 dBm (0.158µV)	Standard -119 dBm (0.251µV)	Pre-Amp -123 dBm (0.158µV)	Standard -119 dBm (0.251µV)	-121 dB (0.199 µV)	-121 dB (0.199 µV)
5% BER	Pre-Amp -123 dBm (0.158µV)	Standard -119 dBm (0.251µV)	Pre-Amp -123 dBm (0.158µV)	Standard -119 dBm (0.251µV)	-121.5 dB (0.188 µV)	-121.5 dB (0.188 µV)
Selectivity (12.5 kHz / 25 kHz / 30 kHz)	77 dB / 89 dB / 90 dB		72 dB / 83 dB / -		75 dB / 85 dB / -	75 dB / 85 dB / -
Intermodulation Rejection	Pre-Amp 84dB / 84 dB	Standard 86 dB / 86 dB	Pre-Amp 82 dB / 82dB	Standard 86 dB / 86 dB	82 dB / 82 dB	82 dB / 82 dB
Spurious Rejection	95 dB		93 dB		91 dB	91 dB
FM Hum & Noise (12.5 kHz / 25 kHz)	-50 dB / -59 dB		-50 dB / -55 dB		-50 dB / -59 dB	-50 dB / -59 dB
Audio Distortion (12.5 kHz / 25 kHz)	1.2 %		1.5%		1.2 %	1.2 %

POWER AND BATTERY DRAIN

	VHF	UHF R1	700 MHz	800 MHz
Frequency Range / Bandsplits	136-174 MHz	380-470 MHz	764-775, 794-806 MHz	806-825, 851-870 MHz
RF Power Output	1-50 W	1-40 W	3-30 W	3-35 W
Operation	13.8V DC ±20% Negative Ground	13.8V DC ±20% Negative Ground	13.9V DC ±20% Negative Ground	13.9V DC ±20% Negative Ground
Standby at 13.8V	0.85A	0.85A	0.85A	0.85A
Receive Current at Rated Audio at 13.8V	3.2A	3.2A	3.2A	3.2A
Transmit Current (A) at Rated Power	8 A @ 15 W 13 A @ 50 W	11 A @ 40 W 8A @ 15 W	8 A @ 15 W	8 A @ 15 W 12 A @ 35 W

ENVIRONMENTAL

Operating Temperature	-30°C/+60°C
Storage Temperature	-40°C/+85°C
Humidity	Per MIL-STD
ESD	IEC 61000-4-2
Water and Dust Intrusion (w/ O2 control head)	IP56, MIL-STD

RADIO MODEL NUMBER

700/800 MHz	M25URS9PW1BN
VHF	M25KSS9PW1BN
UHF R1	M25QSS9PW1BN

FCC/IC TYPE ACCEPTANCE ID

FCC/IC ID	Band and Power Level
FCC ID: AZ492FT7124 IC ID: 109U-92FT7124	764-776 MHz (3-30 W)
	794-806 MHz (3-30 W)
	806-824 MHz (3-35 W)
	851-870 MHz (3-35 W)
FCC ID: AZ492FT7130 IC ID: 109U-92FT7130	136-174 MHz (1-50 W)
FCC ID: AZ492FT7129 IC ID: 109U-92FT7129	380-470 MHz (1-40 W)

MOBILE MILITARY STANDARDS 810, C, D, E, F, G & H

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G		MIL-STD 810H	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	I/II	500.6	II	500.6	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.6	I/A1, II/A1	501.7	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.6	I/C3, II/C1	502.7	I/C3, II/C1
Temperature Shock	503.1	I	503.2	1/A1C3	503.3	1/A1C3	503.4	I	503.6	I/C	503.7	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.6	I/A1	505.7	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.6	I, III	506.6	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-	507.6	II/Aggravated	507.6	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	-	509.6	-	509.7	-
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.6	I	510.7	I
Blowing Sand	-	-	510.2	II	510.3	II		II	510.6	II	510.7	II
Vibration	514.2	VIII, F, W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.7	I/24	514.8	I/24, II/5
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.7	I, V, VI	516.8	I, V, VI

For more information, please visit
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MOTOROLA SOLUTIONS

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A. 800-367-2346 motorolasolutions.com

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APX 4500

SINGLE-BAND P25 MOBILE RADIO

UNCOMPROMISING PERFORMANCE. EFFECTIVE RESPONSE.

You need a P25 radio to communicate and collaborate effectively with other P25 radio users. And, you need the performance and reliability of an APX™ radio. That is why we built the APX 4500 single-band mobile radio.

Everyone has something to like with the APX 4500. We've paired it with our rugged O2 Control Head for confident, reliable radio communication that can stand up to everyday use.

The compact form factor simplifies vehicle installation. Integrated hardware encryption protects your mission-critical communication. Impact detection automatically alerts dispatch to keep its users safer and integrated Wi-Fi helps to keep you current with fast and easy software updates.

Improve your operational efficiency with the performance and reliability of the APX 4500 mobile radio.

MOTOROLA SOLUTIONS

RUGGED AND RELIABLE

RESPOND WITH CONFIDENCE

When out in the field, you face all types of conditions. Your radio shouldn't hold you back. Whether it be getting caught in a storm or undergoing extreme temperature shock, you can remain confident in the APX 4500 and know that it won't let you down in the moments that matter.

BUILT-IN Wi-Fi

VOICE AND DATA, ALL AT ONCE

Integrated Wi-Fi helps to keep your radio update to date with over-the-air updates. Receive new codeplugs, firmware updates and software features at the speed of Wi-Fi— without interruptions to voice communications.

LIGHTWEIGHT, COMPACT DESIGN

FLEXIBLE, EASY INSTALLATION

The APX 4500 is ideal for a growing ecosystem of vehicle installations. Its small and lightweight form factor simplifies installation and its IP56 rating provides ample protection from dust and water intrusion.

P25 COLLABORATION

COLLABORATE SEAMLESSLY

Although you are out of the office, you still need to communicate with others to get the job done. As a P25 mobile radio, the APX 4500 allows you to communicate with other P25 radio users. Seamlessly collaborate within your department or with other departments and organizations using the APX 4500 P25 mobile radio.

DEVICE MANAGEMENT SERVICES

ALL THE SUPPORT YOU NEED

Motorola Solutions offers three levels of service plans – Essential, Advanced and Premier. From simple support for technical troubleshooting to a complete transfer of optimization and maintenance services to Motorola Solutions, you choose the level of support that suits you best.

APX 4500 COMPATIBLE CONTROL HEAD

O2 CONTROL HEAD

EXTREME USABILITY

The O2 control head provides rugged simplicity for efficient and confident communication. Oversized controls with an easy to read color display and a built-in 7.5 watt speaker provides clear visual and audible user experiences. Available in high impact green or black.

FEATURES

GENERAL SPECIFICATIONS	
Channel Capacity	512 standard, expandable to 1,000 channels
Wireless Connectivity	GPS/GLONASS, Wi-Fi
WLAN (Wi-Fi) Protocols	802.11 b/g/n (2.4GHz) / 802.11 a/n/ac (5GHz)
Encryption Algorithms	ADP, 256-bit AES

OPERATING MODES
Digital Trunking: 9600 Baud APCO P25 Phase 1 FDMA and Phase 2 TDMA
Analog Trunking: 3600 Baud SmartNet®, SmartZone®, Omnilink
Digital Conventional: APCO 25
Analog Conventional: Analog MDC 1200, Quik Call II System Configurations

INTEGRATED Wi-Fi AND DATA CONNECTIVITY
Wi-Fi (2.4GHz), 802.11 a/n/ac (5GHz) with up to 20 Wi-Fi networks provisioned in the radio[1]
Data Modem Tethering[1]
ASTRO 25 Integrated Voice and Data
Enhanced Data[1]
Integrated GPS/GLONASS for Outdoor Location Tracking
Mission Critical Geofence[1]
Personnel Accountability[1]

MANAGEMENT
Customer Programming Software (CPS)
Radio Management
Over-the-air Programming (OTAP)[1]

SECURITY
P25 Authentication[1]
Software Key
Single-key ADP Encryption[1]
Multikey for 128 keys[1]

GPS/GNSS SPECIFICATIONS	
Channels	12
Tracking Sensitivity	-164 dBm
Accuracy[2]	<5 meters (95%)
Cold Start[2]	<60 seconds (95%)
Hot Start[2]	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GNSS or SBAS

[1] Optional [2] Measured conductively with >6 satellites visible at a nominal -130 dBm signal strength

ENCRYPTION	
Supported Encryption Algorithms	ADP, AES 256
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 128 Common KeY Reference (CKR) or 16 PhysicalIdentifier (PID)
Encryption Frame Re-sync Interval	P25 CAI 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing | OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 Level 3, FIPS 197

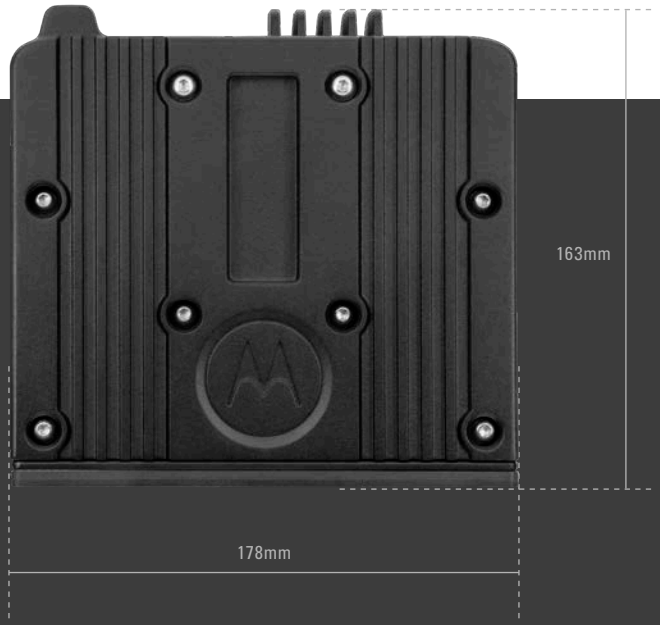
OTHER FEATURES
Text Messaging
Radio Profiles
Dynamic Zone
Intelligent Priority Scan
Unified Call List
Instant Recall
Data Modem Connection (wired or Wi-Fi)[1]
12 Character RFID Asset Tracking[1]
Digital Tone Signaling[1]

INTEGRATED WI-FI, GPS AND DATA CONNECTIVITY		
Frequency Range/Band splits	WLAN (WiFi): 2412 - 2472 MHz; 5180 - 5320 MHz; 5500 - 5825 MHz	
WLAN (WiFi) 802.11 b/g/n	Security protocols	WPA-2, WPA, WEP
	SSIDs	Up to 20 pre-provisioned
Integrated GPS/GLONASS for outdoor location tracking		
Data Modem Tethering[1]		

[1] Optional

SIGNALING (ASTRO 25 MODE)	
Signalling Rate	9.6 kbps
Digital ID Capacity	10,000,000 Conventional / 48,000 Trunking
Digital Network Access Codes	4,096 network site addresses
ASTRO Digital User Group Addresses	4,096 network site addresses
Project 25 – CAI Digital User Group Addresses	65,000 Conventional / 4,094 Trunking
Error Correction Techniques	Golay, BCH, Reed-Solomon codes
Data Access Control	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions

DIMENSIONS AND WEIGHT		
Mid Power Radio Transceiver	51 x 178 x 163 mm (2.0 x 7.0 x 6.4 in)	2.18 kg (4.80 lbs)
Radio Transceiver and O2 Control Head - Dash Mount	69 x 207 x 223 mm (2.7 x 8.1 x 8.8 in)	2.43 kg (5.36 lbs)
Mid Power Radio Transceiver and Remote Mount	51 x 178 x 193 mm (2.0 x 7.0 x 7.6 in)	2.18 kg (4.80 lbs)



PERFORMANCE AND REGULATORY

TRANSMITTER	VHF		UHF R1		700 MHz		800 MHz	
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776, 794-806 MHz		806-825, 851-870 MHz	
Rated RF Output Power (Adjustable)	1-50 W		1-40 W		3-30 W		3-35 W	
Frequency Stability (-30°C to +60°C; +25°C Ref.)	±0.8 PPM		±0.8 PPM		±0.8 PPM		±0.8 PPM	
Emissions	Conducted -85 dBc	Radiated -20 dBm	Conducted -85 dBc	Radiated -20 dBm	Conducted -75/-85 dBc	Radiated -20/-40 dBm	Conducted -75 dBc	Radiated -20 dBm
Modulation Limiting (12.5/20/25 kHz)	±5/±2.5 kHz		±5/±2.5kHz		±5/±2.5 kHz		±5/±2.5 kHz	
Modulation Fidelity (C4FM) 12.5 kHz Digital Channel	2.50%		1.50%		1.50%		1.50%	
Audio Response	+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)	
FM Hum & Noise (12.5 kHz/25 kHz)	-52 dB / -53 dB		-50 dB / -53 dB		-48 dB / -50 dB		-48 dB / -50 dB	
Audio Distortion (12.5 kHz/25 kHz)	0.50%		0.50%		0.50% / 0.50%		0.50% / 0.50%	

RECEIVER	VHF		UHF R1		700 MHz	800 MHz
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776 MHz	851-870 MHz
Channel Spacing	12.5/25 kHz		12.5/25 kHz		12.5/25 kHz	12.5/25 kHz
Maximum Frequency Separation	Full Bandsplit		Full Bandsplit		Full Bandsplit	Full Bandsplit
Audio Output Power at Rated/Max	7.5 / 15 W		7.5 / 15 W		7.5 / 15 W	7.5 / 15 W
Frequency Stability (-30 °C to +60 °C; +25 °C Ref.)	±0.8ppm		±0.8ppm		±0.8 ppm	±0.8 ppm
Analog Sensitivity (12 dB SINAD)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	-121 dB (0.199 µV)	-121 dB (0.199 µV)
5% BER	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	-121.5 dB (0.188 µV)	-121.5 dB (0.188 µV)
Selectivity (12.5 kHz / 25 kHz / 30 kHz)	77 dB / 89 dB / 90 dB		72 dB / 83 dB / -		75 dB / 85 dB / -	75 dB / 85 dB / -
Intermodulation Rejection (12.5 kHz / 25 kHz)	Pre-Amp 84 dB / 84 dB	Standard 86 dB / 86 dB	Pre-Amp 82 dB / 82 dB	Standard 86 dB / 86 dB	82 dB / 82 dB	82 dB / 82 dB
Spurious Rejection	95 dB		93 dB		91 dB	91 dB
FM Hum & Noise (12.5 kHz / 25 kHz)	-50 dB / -59 dB		-50 dB / -55 dB		-50 dB / -59 dB	-50 dB / -59 dB
Audio Distortion (12.5 kHz / 25 kHz)	1.20%		1.50%		1.20%	1.20%

POWER AND BATTERY DRAIN	VHF	UHF R1	700/800 MHz
Model Type	136-174 MHz	380-470 MHz	764-870 MHz
Minimum RF Power Output	1-50 W	1-40 W	3-30 W (764-776 MHz) 3-30 W (794-806 MHz) 3-35 W (806-824 MHz) 3-35 W (851-870 MHz)
Operation	13.8V DC ±20% Negative Ground	13.8V DC ±20% Negative Ground	13.9V DC ±20% Negative Ground
Standby at 13.8 V	0.85A	0.85A	0.85A (764-870 MHz)
Receive Current at Rated Audio at 13.8 V	3.2A	3.2A	3.2A (764-870 MHz)
Transmit Current (A) at Rated Power	13A (50 W) 8A (15 W)	11A (40 W) 8A (15 W)	12A (35W) 8A (15 W)

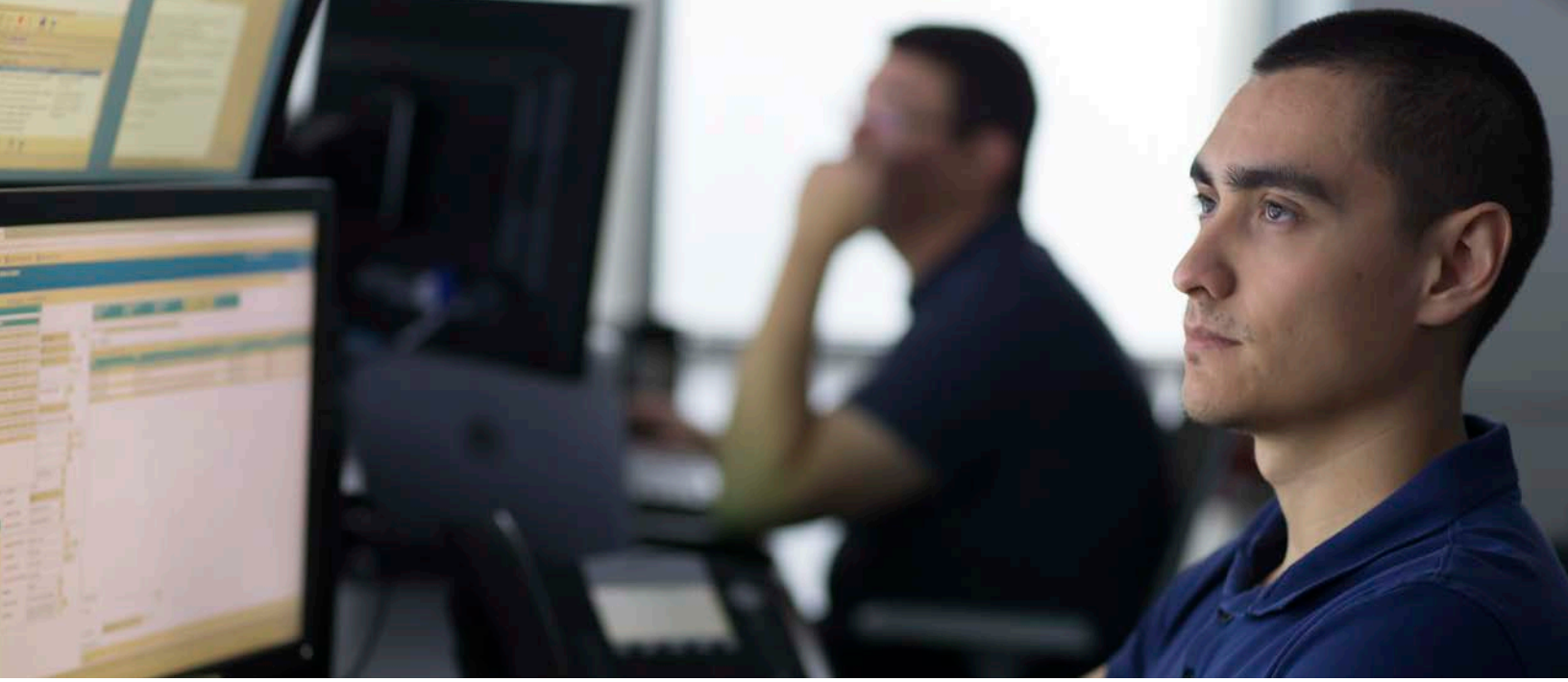
ENVIRONMENTAL	
Operating Temperature	-30°C/+60°C
Storage Temperature	-40°C/+85°C
Humidity	Per MIL-STD
ESD	IEC 61000-4-2
Water and Dust Intrusion	IP56, MIL-STD

RADIO MODEL NUMBER	
VHF	M22KSS9PW1BN
UHF R1	M22QSS9PW1BN
700/800 MHz	M22URS9PW1BN

FCC/IC TYPE ACCEPTANCE ID	
FCC/IC ID	**Band and Power Level**
FCC ID: AZ492FT7130 IC ID: 109U-92FT7130	136-174 MHz (1-50 W)
FCC ID: AZ492FT7129 IC ID: 109U-92FT7129	380-470 MHz (1-40 W)
FCC ID: AZ492FT7124 IC ID: 109U-92FT7124	764-776 MHz (3-30 W)
	794-806 MHz (3-30 W)
	806-824 MHz (3-35 W)
	851-870 MHz (3-35 W)

MOBILE MILITARY STANDARDS 810, C, D, E, F, G & H

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G		MIL-STD 810H	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	I/II	500.6	II	500.6	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.6	I/A1, II/A1	501.7	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.6	I/C3, II/C1	502.7	I/C3, II/C1
Temperature Shock	503.1	I	503.2	1/A1C3	503.3	1/A1C3	503.4	I	503.6	I/C	503.7	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.6	I/A1	505.7	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.6	I, III	506.6	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-	507.6	II/Aggravated	507.6	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	-	509.6	-	509.7	-
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.6	I	510.7	I
Blowing Sand	-	-	510.2	II	510.3	II		II	510.6	II	510.7	II
Vibration	514.2	VIII, F, W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.7	I/24	514.8	I/24, II/5
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.7	I, V, VI	516.8	I, V, VI



ACHIEVE MISSION CRITICAL PERFORMANCE
WITH MANAGED AND SUPPORT SERVICES

ENSURE CONTINUITY • ENHANCE PRODUCTIVITY • REDUCE RISK

ESSENTIAL
Only Support When You Need It

When the unpredictable happens to your network, Essential Services provide you access to Motorola Solutions Technical Support teams and resources for troubleshooting and maintenance.

ADVANCED
Improve Response and Continuity

Motorola Solutions expert service teams help mitigate downtime and ensure network continuity. Get fast response to network issues by our qualified technicians who analyze and diagnose your network as well as deliver routine maintenance.

PREMIER
Maximize Performance and Reduce Risk

Motorola Solutions Managed Services team helps operate and optimize your mission critical system. With Premier Services, you fully transfer the risk to Motorola Soultions and ensure your system operates at maximum performance levels, allowing your team to keep focus on its primary responsibilities.

For more information, please visit
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MOTOROLA SOLUTIONS

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APX 1500

SINGLE-BAND P25 MOBILE RADIO

P25 CONNECTIVITY. EXCEPTIONAL PRICE.

Your city infrastructure represents a large investment and its users depend on that investment every day. Why not protect it by giving your team the tools they need to operate and maintain it efficiently? Equip them with the affordable APX™ 1500 P25 mobile radio so they can get work done.

The APX 1500 mobile is designed to provide reliable P25 radio communication at an affordable price while standing up to the riggers of every day work. The rugged simplicity of the O2 control head includes an easy to read color display and a built-in 7.5 watt speaker for efficient and confident communication. P25 radio capability enables seamless interoperability with first responders and other P25 radio users.

Communicate with ease and confidence at an affordable price on the APX 1500 mobile radio.

MOTOROLA SOLUTIONS

GREAT VALUE

DO MORE, DON'T PAY MORE

Just because you have a limited budget doesn't mean you have to limit your communication. The APX 1500 gives you dependable voice and data communication, P25 collaboration and all the features you need to connect your team - all at a great price.

RUGGED AND RELIABLE

RESPOND WITH CONFIDENCE

The APX 1500 is purpose-built for those who get things done. Get efficient and confident communication with the rugged simplicity of an oversized knob, easy-to-read color screen and a loud high-density speaker.

P25 COLLABORATION

COLLABORATE SEAMLESSLY

Although you are out of the office, you still need to communicate with others to get the job done. As a P25 mobile radio, the APX 1500 allows you to seamlessly collaborate with other P25 radio uses in other departments and organizations.

DEVICE MANAGEMENT SERVICES

ALL THE SUPPORT YOU NEED

Motorola Solutions offers three levels of service plans – Essential, Advanced and Premier. From simple support for technical troubleshooting to a complete transfer of optimization and maintenance services to Motorola Solutions, you choose the level of support that suits you best.

APX 1500 CONTROL HEAD

O2 CONTROL HEAD

EXTREME USABILITY

The O2 control head provides rugged simplicity for efficient and confident communication. Oversized controls with an easy to read color display and a built-in 7.5 watt speaker provides clear visual and audible user experiences.

FEATURES

GENERAL FEATURES	
Channel Capacity	512 channels
Wireless Connectivity	GPS/GLONASS
Digital Encryption	256-bit AES SW, ADP, Programmable for 8 Common Key Reference

OPERATING MODES
Digital Trunking: 9600 Baud APCO P25 Phase 1 FDMA and Phase 2 TDMA
Digital Conventional: APCO 25

DATA CONNECTIVITY
ASTRO 25 Integrated Voice and Data
Enhanced Data[1]
Integrated GPS/GLONASS for Outdoor Location Tracking
Mission Critical Geofence[1]

MANAGEMENT
Customer Programming Software (CPS)
Radio Management
Over-the-air Programming (OTAP)[1]

SECURITY
P25 Authentication
Software Key
Single-key ADP Encryption[1]
Multikey for 8 keys

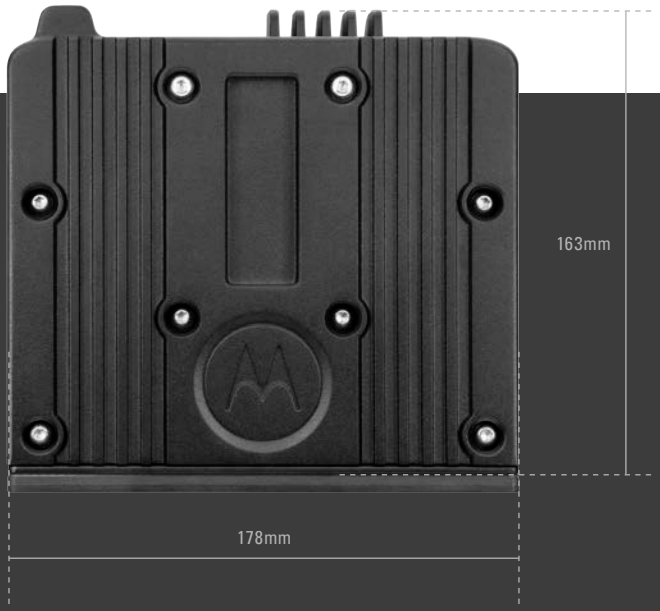
GPS/GNSS SPECIFICATIONS	
Channels	12
Tracking Sensitivity	-164 dBm
Accuracy[2]	<5 meters (95%)
Cold Start[2]	<60 seconds (95%)
Hot Start[2]	<5 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GNSS or SBAS

[1] Optional [2] Measured conductively with >6 satellites visible at a nominal -130 dBm signal strength

OTHER FEATURES
Text Messaging[1]
Radio Profiles
Dynamic Zone
Intelligent Priority Scan
Unified Call List
Instant Recall
12 Character RFID Asset Tracking[1]
Digital Tone Signaling[1]

SIGNALING (ASTRO 25 MODE)	
Signalling Rate	9.6 kbps
Digital ID Capacity	10,000,000 Conventional / 48,000 Trunking
Digital Network Access Codes	4,096 network site addresses
ASTRO Digital User Group Addresses	4,096 network site addresses
Project 25 – CAI Digital User Group Addresses	65,000 Conventional / 4,094 Trunking
Error Correction Techniques	Golay, BCH, Reed-Solomon codes
Data Access Control	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions

DIMENSIONS AND WEIGHT		
Radio Transceiver	51 x 178 x 163 mm (2.0 x 7.0 x 6.4 in)	2.18 kg (4.80 lbs)
Radio Transceiver and O2 Control Head - Dash Mount	69 x 207 x 223 mm (2.7 x 8.1 x 8.8 in)	2.43 kg (5.36 lbs)



[1] Optional

PERFORMANCE AND REGULATORY

TRANSMITTER

	VHF		UHF R1		700 MHz		800 MHz	
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776, 794-806 MHz		806-825, 851-870 MHz	
Rated RF Output Power (Adjustable)	1-50 W		1-40 W		3-30 W		3-35 W	
Frequency Stability (-30°C to +60°C; +25°C Ref.)	±0.8 PPM		±0.8 PPM		±0.8 PPM		±0.8 PPM	
Emissions	Conducted -85 dBc	Radiated -20 dBm	Conducted -85 dBc	Radiated -20 dBm	Conducted -75/-85 dBc	Radiated -20/-40 dBm	Conducted -75 dBc	Radiated -20 dBm
Modulation Limiting (12.5 kHz / 20 kHz / 25 kHz)	±5/±2.5 kHz		±5/±2.5kHz		±5/±2.5 kHz		±5/±2.5 kHz	
Modulation Fidelity (C4FM) 12.5 kHz Digital Channel	2.5%		1.50%		1.50%		1.50%	
Audio Response	+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)		+1, -3 dB (EIA)	
FM Hum & Noise (12.5 kHz / 25 kHz)	-52 dB / -53 dB		-50 dB/ -53 dB		-48 dB / -50 dB		-48 dB / -50 dB	
Audio Distortion (12.5 kHz / 25 kHz)	0.50%		0.50%		0.50% / 0.50%		0.50% / 0.50%	

RECEIVER

	VHF		UHF R1		700 MHz	800 MHz
Frequency Range/Bandsplits	136-174 MHz		380-470 MHz		764-776 MHz	851-870 MHz
Channel Spacing	12.5/25 kHz		12.5/25 kHz		12.5/25 kHz	12.5/25 kHz
Maximum Frequency Separation	Full Bandsplit		Full Bandsplit		Full Bandsplit	Full Bandsplit
Audio Output Power at Rated/Max	7.5/15 W		7.5/15 W		7.5/15 W	7.5/15 W
Frequency Stability (-30°C to +60°C; +25°C Ref.)	±0.8ppm		±0.8ppm		±0.8 ppm	±0.8 ppm
Analog Sensitivity (12 dB SINAD)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	-121 dB (0.211 µV)	-121 dB (0.199 µV)
5% BER	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	Pre-Amp -123 dBm (0.158 µV)	Standard -119 dBm (0.251 µV)	-121.5 dB (0.188 µV)	-121.5 dB (0.188 µV)
Selectivity (12.5 kHz / 25 kHz / 30 kHz)	77 dB / 89 dB / 90 dB		72 dB / 83 dB / -		75 dB / 85 dB / -	75 dB / 85 dB / -
Intermodulation Rejection (12.5 kHz / 25 kHz)	Pre-Amp 84 dB / 84 dB	Standard 86 dB / 86 dB	Pre-Amp 82 dB / 82 dB	Standard 86 dB / 86 dB	82 dB / 82 dB	82 dB / 82 dB
Spurious Rejection	95 dB		93 dB		91 dB	91 dB
FM Hum & Noise (12.5 kHz / 25 kHz)	-50 dB / -59 dB		-50 dB / -55 dB		-50 dB / -59 dB	-50 dB / -59 dB
Audio Distortion (12.5 kHz / 25 kHz)	1.20%		1.50%		1.20%	1.20%

POWER AND BATTERY DRAIN

	VHF	UHF R1	700/800 MHz
Model Type	136-174 MHz	380-470 MHz	764-870 MHz
Minimum RF Power Output	1-50 W	1-40 W	3-30 W (764-776 MHz) 3-30 W (794-806 MHz) 3-35 W (806-824 MHz) 3-35 W (851-870 MHz)
Operation	13.8V DC ±20% Negative Ground	13.8V DC ±20% Negative Ground	13.9V DC ±20% Negative Ground
Standby at 13.8 V	0.85A	0.85A	0.85A (764-870 MHz)
Receive Current at Rated Audio at 13.8 V	3.2A	3.2A	3.2A (764-870 MHz)
Transmit Current (A) at Rated Power	13A (50 W) 8A (15 W)	11A (40 W) 8A (15 W)	12A (35W) 8A (15 W)

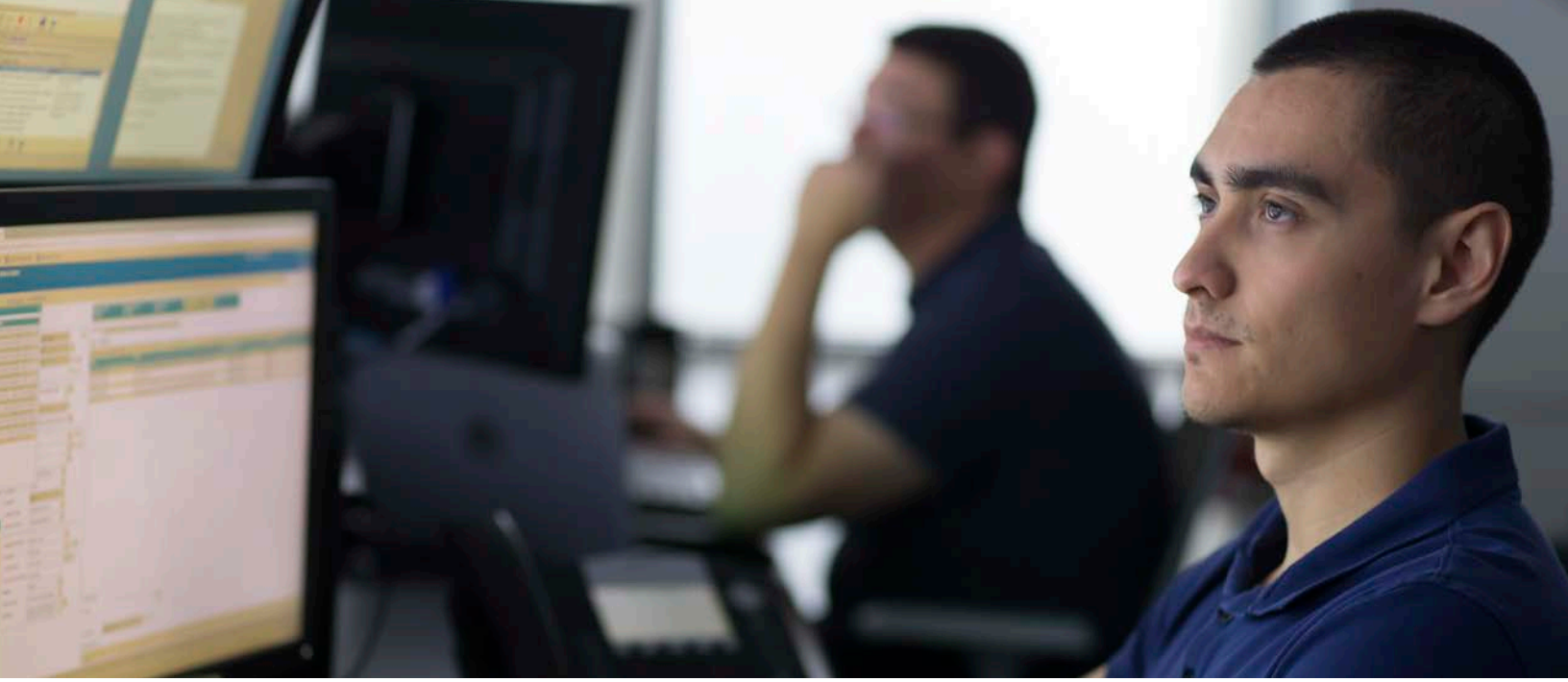
ENVIRONMENTAL	
Operating Temperature	-30°C/+60°C
Storage Temperature	-40°C/+85°C
Humidity	Per MIL-STD
ESD	IEC 61000-4-2
Water and Dust Intrusion	IP56, MIL-STD

RADIO MODEL NUMBER	
VHF	M36KSS9PW1BN
UHF R1	M36QSS9PW1BN
700/800 MHz	M36URS9PW1BN

FCC/IC TYPE ACCEPTANCE ID	
FCC/IC ID	**Band and Power Level**
FCC ID: AZ492FT7130 IC ID: 109U-92FT7130	136-174 MHz (1-50 W)
FCC ID: AZ492FT7129 IC ID: 109U-92FT7129	380-470 MHz (1-40 W)
FCC ID: AZ492FT7124 IC ID: 109U-92FT7124	764-776 MHz (3-30 W)
	794-806 MHz (3-30 W)
	806-824 MHz (3-35 W)
	851-870 MHz (3-35 W)

MOBILE MILITARY STANDARDS 810, C, D, E, F, G & H

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G		MIL-STD 810H	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	I/II	500.6	II	500.6	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.6	I/A1, II/A1	501.7	I/A1, II/A1
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.6	I/C3, II/C1	502.7	I/C3, II/C1
Temperature Shock	503.1	I	503.2	1/A1C3	503.3	1/A1C3	503.4	I	503.6	I/C	503.7	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.6	I/A1	505.7	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.6	I, III	506.6	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-	507.6	II/Aggravated	507.6	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	-	509.6	-	509.7	-
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.6	I	510.7	I
Blowing Sand	-	-	510.2	II	510.3	II		II	510.6	II	510.7	II
Vibration	514.2	VIII, F, W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.7	I/24	514.8	I/24, II/5
Shock	516.2	I, III, V	516.3	I, V, VI	516.4	I, V, VI	516.5	I, V, VI	516.7	I, V, VI	516.8	I, V, VI



ACHIEVE MISSION CRITICAL PERFORMANCE
WITH MANAGED AND SUPPORT SERVICES

ENSURE CONTINUITY • ENHANCE PRODUCTIVITY • REDUCE RISK

ESSENTIAL
Only Support When You Need It

When the unpredictable happens to your network, Essential Services provide you access to Motorola Solutions Technical Support teams and resources for troubleshooting and maintenance.

ADVANCED
Improve Response and Continuity

Motorola Solutions expert service teams help mitigate downtime and ensure network continuity. Get fast response to network issues by our qualified technicians who analyze and diagnose your network as well as deliver routine maintenance.

PREMIER
Maximize Performance and Reduce Risk

Motorola Solutions Managed Services team helps operate and optimize your mission critical system. With Premier Services, you fully transfer the risk to Motorola Soultions and ensure your system operates at maximum performance levels, allowing your team to keep focus on its primary responsibilities.

For more information, please visit
www.motorolasolutions.com/apx

MOTOROLA SOLUTIONS

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A. 800-367-2346 motorolasolutions.com

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MANAGED AND SUPPORT SERVICES FOR APX TWO-WAY RADIOS

For public safety agencies tasked with mission-critical communications, assuring peak radio performance is critical. Efficient and cost-effective management of an ever-evolving radio technology ecosystem is complex, requiring the right set of expertise and tool sets.

YOUR NEEDS

Maintaining and supporting a large inventory of two-way radios can be complex, expensive and time-consuming. Today radio managers need the right set of people expertise, processes and tools to manage increasing programming complexities, fleet performance issues, budget and IT skill constraints.

As technology evolves, hardware repair and technical support capabilities are some of the critical service capabilities that are needed for your mission-critical communication systems to work optimally. Maintaining and programming radios is vital to keep your radio fleet current and secure. Without streamlined processes and tools you can spend countless hours managing radio configuration files, making firmware updates and going through distributed radio fleet databases.

Having a well-defined approach to tracking, managing and updating all the connected radios, together with applying the latest functionality and security features can help optimize fleet performance.

INCREASING COMPLEXITY

59%

Of radio managers cite increased programming complexities as a major challenge.[1]

PERFORMANCE ISSUES

70%

Of radio managers wait until something breaks to perform maintenance.[2]

CHALLENGED RESOURCES

55%

Of public-safety organizations cite maintaining in-house talent as a challenge for radio management.[3]

MOTOROLA SOLUTIONS

THE SOLUTION: SERVICE CAPABILITIES

You can rely on us to help you maximize the value of your radio investments with the right level of services designed specifically for your needs. We bring a range of service capabilities that you can choose through our Essential, Advanced and Premier service packages.

KEY SERVICE FEATURES

TECHNICAL SUPPORT

Our experienced technologists are available to help isolate and resolve any issues you may have with your radios. With an extensive knowledge base, trained and certified technical engineers and leading standards for escalation procedures, this team can troubleshoot and provide prompt resolution to your technical device issues. Motorola Solutions understands the importance of maintaining the radio fleet to its optimal performance. That's why we apply leading industry standards to record, monitor, escalate and report technical service calls from our customers.

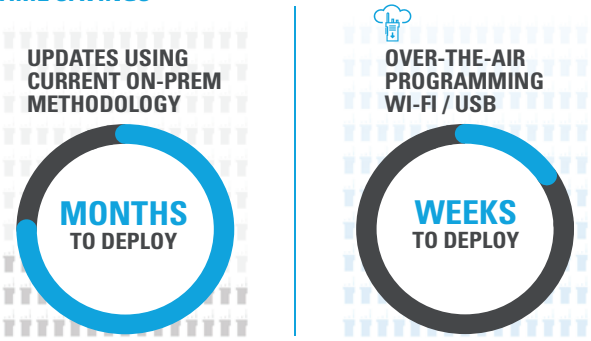
HARDWARE REPAIR

With state-of-the-art diagnostic equipment, repair tools and replacement parts, your radio fleet components are protected in the event of an unexpected failure and are back in operation as soon as possible. When serviced, all device components are returned to you with original factory specifications and updated with the latest firmware. Plus, our service centers are certified to comply with ISO 9001, ensuring the highest quality repairs.

BATCH PROGRAMMING WITH DATABASE HOSTING

Radio management allows you to manage and program multiple radios at a time. Database hosting enables radio codeplugs to be stored in a central database server allowing for remote configuration of data and remote programming of radios. Centralized database allows efficient organization of codeplugs and makes it a one-stop shop for edits or changes to specific devices. A single codeplug can be used as a template, which can then be shared across multiple radios. Template edits may then be easily applied to all affected radios. Changes to a template or to an individual radio's parameters can be scheduled as a programming job. With batch programming, programming jobs may be scheduled through an Over-The-Air-Programming (OTAP) connection, or USB or via Wi-Fi connection.Batch programming allows for simultaneous programming and software upgrading of up to 16 radios.

TIME SAVINGS



FULL SERVICE PROGRAMMING

With end-to-end device programming and provisioning services, we ensure all your two-way radio communication needs are met. These services include programming and provisioning, on-site set up and training, database hosting and access to a management portal that helps you maintain visibility into your devices. Device programming allows us to push specific information and features from the customer codeplug template to the radio itself. Provisioning is a way to add unique device identifiers to the devices, so the network is aware of the device and its feature set. This service is designed to reduce risks, optimize costs and provide end users a better experience with up-to-date and fully operational devices.

ACCIDENTAL DAMAGE

While our two-way radios are built for superior performance, accidents happen. If required, we offer extended accidental damage coverage and support that includes repair and restoration of the device back to original factory specifications and a quick turnaround of the device back to you.

PREVENTIVE MAINTENANCE

With preventive maintenance on your radio components we can help extend the life of your devices. From physical inspection and cleaning of radios to component alignment, we ensure that the device components remain in top condition with the latest firmware and updates. Our certified technicians conduct annual maintenance checks to help extend the useful life of your radios, reducing repair and replacement costs.

ON-SITE SETUP AND DEVICE MANAGEMENT TRAINING

With on-site setup and device management training, our technical teams can help your organization set-up provisioning and programming processes to make you more effective in managing your fleet of devices. We will train your staff on the radio management and radio commissioning in the management database, enabling your team to configure radio channels, set up talkgroups, provide site access and establish user IDs.

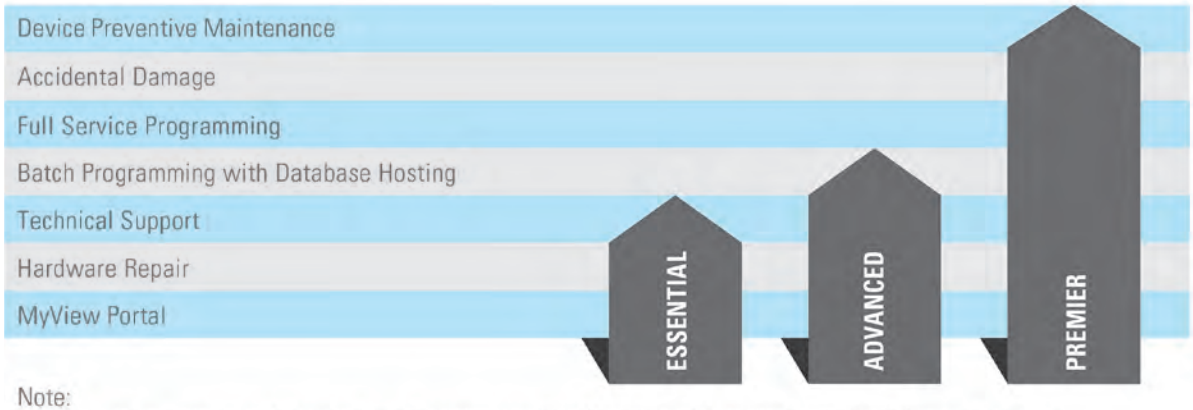
MYVIEW PORTAL

MyView is a web-based platform that gives you a transparent, single source view of fleet status and service delivery information to help make smarter, faster and more proactive decisions. With MyView portal you can view your radio data, service case history, firmware and software status information to ensure smooth running of your radios.

CHOOSE THE RIGHT LEVEL OF MANAGED AND SUPPORT SERVICES

With Essential services, we offer the tools and the expert support needed to efficiently manage your radio fleet. With Advanced services, batch programming enables you to manage and program your radio fleet efficiently, saving you precious time for efficient radio fleet management. With Premier services, you transfer your APX two-way radio operations, including full service programming, to our managed services professionals, allowing your team to focus on its primary responsibilities.

SERVICES AT - A - GLANCE



Note:
- Device management training and on-site setup can be offered as add-on services with Advanced package.
- Accidental damage can be offered as an add-on service with Essential and Advanced packages.

WE DELIVER ON RESULTS THAT MATTER

Reduced Management Complexity

Drive efficiency of maintaining your device fleet while addressing technology evolution, time and cost savings.

Optimized Fleet Performance

Superior first responder experience with ongoing software and security updates for fully operational radios.

Optimized Costs

Subscription service that helps with a more predictable opex model, help save staff hours for cost optimization.

MOTOROLA SOLUTIONS YOUR TRUSTED PARTNER

We believe that our set of highly knowledgeable people with industry certifications and mission-critical expertise, industry-leading ITIL process for centralized service delivery and governance, and state-of-the-art tools allow us to provide superior Device Services that address your needs today and in the future.

For more information, please visit
www.motorolasolutions.com/apx

Resources
1, 2, 3 https://www.motorolasolutions.com/content/static/flipbook/mobile/index.html#p=1

MOTOROLA SOLUTIONS

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AirLink® RV55 Rugged LTE-A Pro Router

BENEFITS

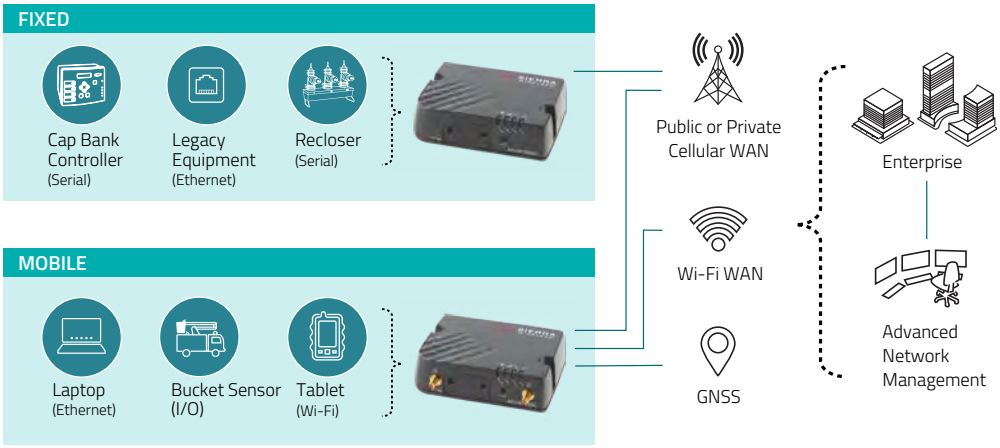
- Centrally managed, secure LTE broadband connectivity for both remote fixed or vehicle applications in harsh environments
- Ultra-Low Power consumption, ideal for solar or battery powered installations.
- Connect your field workers and devices with flexible dual Wi-Fi, and ethernet
- Reduces complexity in connecting legacy equipment with dual-serial, ethernet, and multi-protocol support
- Powerful remote cloud-based or on-premises management solutions
- Proven reliability and over 3 million AirLink routers and gateways deployed
- Peace of mind - included 3-year warranty, direct 24/7 support, and device management access[1]

Compact, Industrial Grade, Low Power LTE-Advanced Connectivity

The AirLink® RV55 is the industry's most rugged, compact, LTE-Advanced Pro router. Simple to install, and easy to manage, the RV55 router is designed for connecting critical remote assets, infrastructure, and vehicle fleets. The RV55 is especially well suited for applications in energy, utilities, smart city and public safety. The RV55 provides real-time remote connectivity for SCADA, distribution management systems and metering.

The RV55 high-performance LTE-Advanced Pro connectivity, Wi-Fi and GNSS and location-based applications and dual connectivity for vehicle fleets and mobile workforce. An LTE-M/NB-IoT variant is perfectly suited for hard to reach conditions.

The RV55 supports an extensive range of LTE bands worldwide, and its LTE-Advanced Pro capabilities deliver up to 600 Mbps downlink speeds. The RV55 also supports new unlicensed LTE bands (eg. CBRS) to support dedicated Private LTE service.



1 1st year of 24/7 Direct Technical Support and device management access included in purchase at no additional charge.

AirLink® RV55
Rugged LTE-A Pro Router

	RV55		
	North America	Global	Global
	LTE-A Pro		LTE-M/ NB-IoT
LTE CATEGORY	Cat 12		Cat M1/NB1
Peak D/L	(Up to 600 Mbps DL)		Cat-M1: 300kbps Cat-NB1: 27kbps
Peak U/L	(Up to 150 Mbps UL)		Cat-M1: 375kbps Cat-NB1: 65kbps
4G LTE Frequency Bands	2100(B1), 1900(B2),1800(B3), AWS(B4), 850(B5), 2600(B7), 900(B8), 1800(B9), 700(B12), 700(B13), 700(B14), 850(B18), 850(B19), 800(B20), 850(B26), 700(B29), 2300(B30), 1500(B32), TDD B41, TDD B42, TDD B43, TDD B46, CBRS B48, 1700(B66)	2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 2600(B7), 900(B8), 1800(B9), 700(B12), 700(B13), 850(B18), 850(B19), 800(B20), 850(B26), 700(B28), 700(B29), 2300(B30), 1500(B32), TDD B41, TDD B42, TDD B43, TDD B46, CBRS B48, 1700(B66)	2100(B1), 1900(B2), 1800(B3), AWS(B4), 850(B5), 900(B8), 700(B12), 700(B13), 700(B17), 850 (B18), 850(B19), 800(B20), 850(B26),700(B28)
3G HSPA/HSPA+ Frequency Bands*	2100(B1), 1900(B2), AWS(B4), 850(B5), 800(B6), 900(B8), 1700(B9), 850(B19)	2100(B1), 1900(B2), AWS(B4), 850(B5), 800(B6), 900(B8), 1700(B9), 850(B19)	
2G EDGE/GSM/GPRS Frequency Bands			850, 900, 1800, 1900
APPROVALS			
Regulatory	FCC, IC, PTCRB	GCF, CE, RCM	FCC, IC, PTCRB, GCF, CE, RCM
Carrier	Verizon, AT&T	Planned: Telstra	Planned: Verizon, AT&T
PART NUMBER	1104303	1104332	1104333
Regulatory	1104302 (Wi-Fi)	1104331 (Wi-Fi)	

	Specification
HOST INTERFACES	10/100/1000 Ethernet (RJ45)
	RS-232 serial port (DB-9)
	USB 2.0 Micro-B Connector
	3 SMA antenna (cellular, diversity, Active GNSS)
	2 RP-SMA antenna (1x1 Wi-Fi, Optional)
	LTE-M/NB-IoT: 1 SMA (cellular) only, no GNSS or Wi-Fi
	Active GPS antenna support
WI-FI (Optional)	Dual Band 2.4/5GHz Wi-Fi
	Dual Radio, 802.11 b/g/n/ac (Wave2 Client Mode)
	Support for 10 clients, WPA2 Enterprise per radio
	Output power 16dBm
	Configurable as Dual Band Access Point (AP) or AP+Client Mode
	Single SSID Support per radio
	Captive Portal
INPUT/OUTPUT	Configurable I/O pin on power connector • Digital Input ON Voltage: 2.7 to 36 VDC • Configurable Pull-up for dry contact input • Digital Open Collector Output > sinking 500 mA • Analog Input: 0.5-36 VDC
LAN (ETHERNET/USB)	DHCP Server
	IP Passthrough
	VLAN
	Host Interface Watchdog
	PPPoE
SERIAL	TCP/UDP PAD Mode
	Modbus (ASCII, RTU, Variable)
	PPP
	DNP3 Interoperability
	Dual Serial option (with an accessory)
NETWORK AND ROUTING	Network Address Translation (NAT)
	Port Forwarding
	Policy Routing
	NEMO/DMNR
	VRRP
	Reliable Static Route
	Dynamic DNS
	Verizon PNTM
	IPV6 Gateway

	Specification
SATELLITE NAVIGATION (GNSS)	30 Channel GPS and GLONASS Receiver
	Acquisition Time: 1 s Hot Start
	Accuracy: <2 m (50%), <5 m (90%), <0.2 m/s
	Tracking Sensitivity: -160 dBm
	Reports: NMEA 0183 V3.0, TAIP, RAP, XORA
	Multiple Redundant Servers
	Reliable Store and Forward
SECURITY	Remote Authentication (LDAP, RADIUS, TACACS+, DMZ)
	Inbound and Outbound Port filtering
	Inbound and Outbound Trusted IP
	MAC Address Filtering
	PCI compatible
	Secure Firmware Update
NETWORK MANAGEMENT	Secure mobile network & asset management application available in the cloud or licensed platform in the enterprise data center
	Fleet wide firmware upgrade delivery
	Router configuration and template management
	Router staging over the air and local Ethernet connection
	Over-the-air software and radio module firmware updates
	Device Configuration Templates
	Configurable monitoring and alerting
	Remote provisioning and airtime activation (where applicable)
ROUTER MANAGEMENT	ALMS
	Local web user interface
	AT Command Line Interface (Telnet/SSH/Serial)
	SMS Commands
	SNMP
EVENTS ENGINE	Custom event triggers and reports
	Configurable interface, no programming
	Event Types: Digital Input, Network Parameters, Data Usage, Timer, Power, Device Temperature and Voltage
	Report Types: RAP, SMS, Email, SNMP Trap, TCP (Binary, XML, CSV)
	Event Actions: Drive Relay Output

SIERRA WIRELESS®

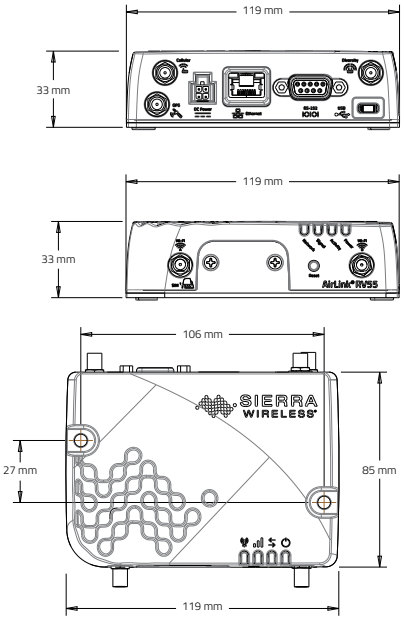
AirLink® RV55
Rugged LTE-A Pro Router

VPN	IPsec, GRE, and OpenVPN Client Up to 5 concurrent tunnels Split Tunnel Dead Peer Detection (DPD) FIPS 140-2 compatible
APPLICATION FRAMEWORK	ALEOS Application Framework (AAF) LUA Scripting Language
POWER	Input Voltage: 7 to 36 VDC LTE Idle Power: 900mW (75 mA @ 12VDC) Standby Mode Power: 53 mW (4.4 mA @ 12 VDC) triggered on low voltage, I/O or periodic timer Low voltage disconnect to prevent battery drain Built-in protection against voltage transients including 5 VDC engine cranking and +200 VDC load dump Ignition Sense with time delay shutdown Configurable features and ports to optimize power consumption
DIMENSIONS	119 mm x 33 mm x 85 mm (102 mm including wi-fi connectors) 4.69 in x 1.34 in x 3.35 in (3.70 in including connectors) Weight: 320 g

ENVIRONMENTAL	Operating Temperature: -40°C to +70°C / -40°F to +158°F Operating Temperature (Wi-Fi variant): -30°C to +70°C / -22°F to +158°F Storage Temperature: -40°C to +85°C / -40°F to +185°F Humidity: 95% RH @ 60°C Military Spec MIL-STD-810G conformance to shock, vibration, thermal shock, and humidity IP64 rated ingress protection
INDUSTRY CERTIFICATIONS	Safety: IECEE Certification Bodies Scheme (CB Scheme), UL 60950 Vehicle Usage: E-Mark (UN ECE Regulation 10.04), ISO7637-2, SAE J1455 (Shock & Vibration) Hazardous Environments: Class 1 Div 2 Environmental: RoHS, REACH, WEEE
SUPPORT AND WARRANTY	Includes 1st Year AirLink Complete: • AirLink Management Service (ALMS) • Direct 24/7 Technical Support • 3-year standard warranty; optional 2-year warranty extension 1-day Accelerated Hardware Replacement available through participating resellers
ACCESSORIES	In the Box: DC Power Cable, and Quick Start Guide 2000579 AC Adapter, 12VDC 6000659 DIN Rail Mounting Brackets 6001110 Cellular Paddle Antenna 6001111 Wi-Fi 2.4/5GHz Paddle Antenna See website for more antenna options.

**For carrier specific band support please refer to the hardware user guide.*

DIMENSIONS



AirLink Networking Solution - Related Products

AIRLINK NETWORK MANAGEMENT SOLUTIONS

AIRLINK MANAGEMENT SERVICE (ALMS)

- Secure, Cloud-based network and asset management
- Remotely deploy, configure, monitor and manage AirLink devices
- Carrier-grade, high availability, secure, global infrastructure

AIRLINK MANAGER / MOBILITY MANAGER (AM/AMM)

- Deployable in the enterprise data center (on-premises) or in the cloud
- Advanced, end-to-end network and asset management for both fixed and mobile networks.
- Remote, real-time configuration, control and troubleshooting of AirLink devices

AIRLINK VPN APPLIANCE

AIRLINK CONNECTION MANAGER

- VPN appliance built from the ground up for Airlink routers & gateways
- Simplify deployment and management of your VPN solution, extending the enterprise to the network edge for fixed and mobile endpoints
- Carrier agnostic – ACM doesn't require fixed and/or public IP
- Compatible with FIPS 140-2, and always-onVPN capability

About Sierra Wireless

Sierra Wireless (NASDAQ: SWIR) (TSX: SW) is an IoT pioneer, empowering businesses and industries to transform and thrive in the connected economy. Customers Start with Sierra because we offer a device-to-cloud solution, comprised of embedded and networking solutions seamlessly integrated with our IoT services. OEMs and enterprises worldwide rely on our expertise in delivering fully integrated solutions to reduce complexity, turn data into intelligence and get their connected products and services to market faster. Sierra Wireless has more than 1,400 employees globally and operates R&D centers in North America, Europe and Asia. For more information, visit www.sierrawireless.com.

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SIERRA WIRELESS

MCD 5000 DESKSET SYSTEM

VoIP TECHNOLOGY FOR OUR CONVENTIONAL AND TRUNKED COMMUNICATIONS

MOTOROLA SOLUTIONS

EXPAND COMMUNICATIONS WITH VoIP TECHNOLOGY

The MCD 5000 Deskset brings you VoIP technology for your conventional and trunked communications. Ideal for dispatch environments, back-up sites, alternate locations, special events and call monitoring, the MCD 5000 Deskset is a powerful and easy-to-deploy VoIP solution for your radio system. With IP technology, you have the flexibility to quickly install desksets where you need them using your IP network infrastructure. And you can easily expand communication capabilities throughout your organization for increased safety, awareness and coordination.

ADVANCE TECHNOLOGY TO POWER YOUR DISPATCH COMMUNICATIONS

Take full advantage of VoIP technology and enable communication across your network when and where you need it most. The MCD 5000 Deskset connects over your IP network to MCD 5000 Radio Gateway Units (RGUs), each of which supports up to four radios. The MCD 5000 Deskset emulates the buttons and display of the connected radio and performs all the functions of the radio control head. The inherent flexibility of this solution allows you to tailor configurations from a single deskset and a single radio to multiple desksets and multiple radios. Further increasing your capabilities, the MCD 5000 Deskset allows deskset users to dynamically switch between MCD 5000 RGUs, giving you access to additional radios for expanded communications. Each MCD 5000 Deskset can connect and monitor up to four radios (channels) at a time.

DESIGNED FOR THE WAY YOU AND YOUR TEAMS WORK

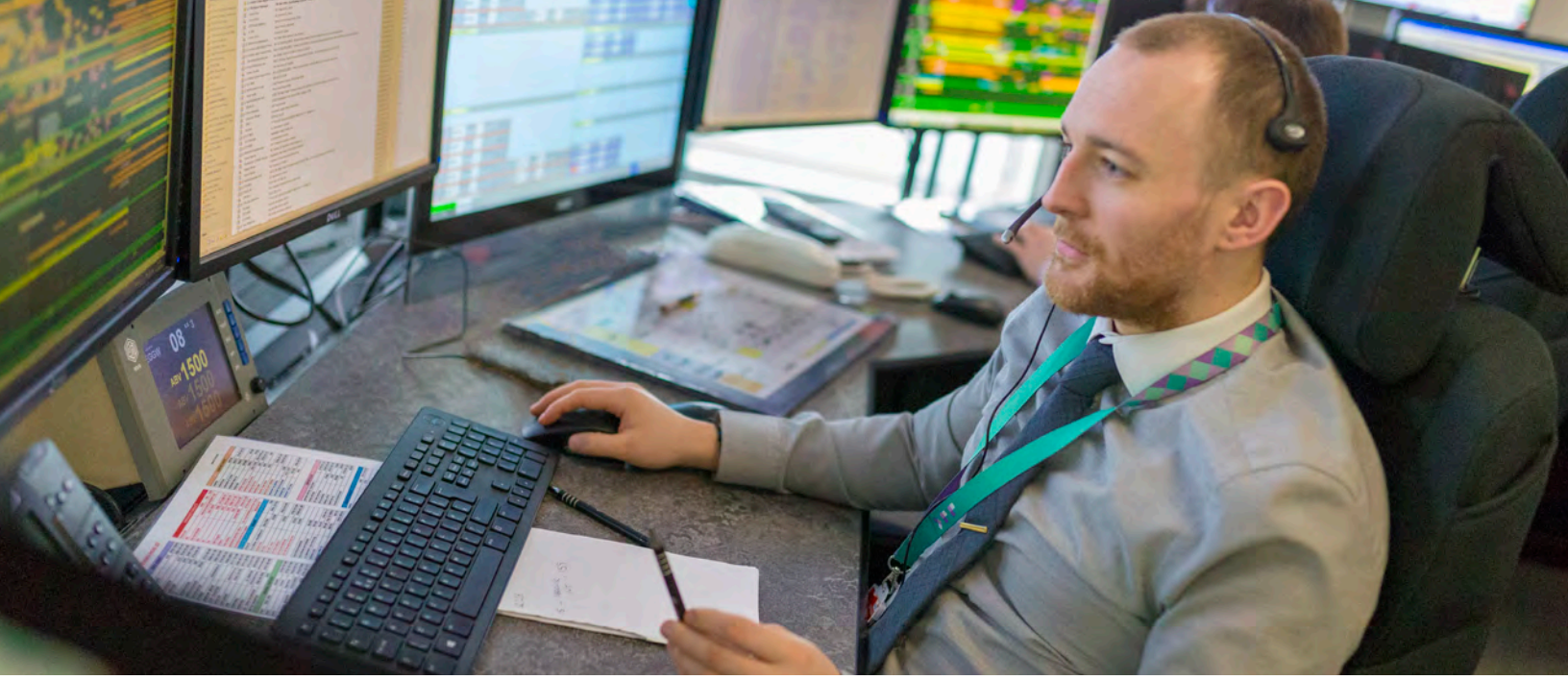
With maximum usability in mind, the MCD 5000 Deskset is ergonomically designed with a highly intuitive layout and an adjustable viewing angle for both occasional and constant everyday use. The large and easy-to-read color LCD screen gives at-a-glance access to all of the critical information you need, including messages, channel status, and names along with emergency and user IDs. You can further customize the programmable softkeys to meet the needs of your personnel.

INCREASE THE SAFETY OF YOUR PERSONNEL

Emergencies can take many shapes and can happen anytime, anywhere, the MCD 5000 Deskset includes the orange emergency activation button familiar on so many radios from Motorola Solution. Your staff will have peace of mind knowing that in an emergency, help can be summoned immediately with the simple push of a button.

EMERGENCY NOTIFICATIONS

The MCD 5000 Deskset allows you to manage all of your inbound field unit emergency activations across many system types, including ASTRO® 25 systems. Additionally, the ASTRO 25 radio emergency function allows external alarms to be triggered to notify the MCD 5000 Deskset user of an emergency situation, improving response levels.



GIVE SUPERVISORS PRIORITY TRAFFIC

When a supervisor logs into any MCD 5000 Deskset, their communications take first priority over all other MCD 5000 Desksets, allowing their critical voice traffic to get through immediately.

FREE UP AIRTIME

The intercom facilitates conversation and information exchange between MCD 5000 Deskset users with no need to key a radio channel, preserving airtime and keeping conversations off the air.

SAVE TIME AND PROVIDE ADDITIONAL SUPPORT WITH ROBUST REPORTING TOOLS

Provide timely support and save travel time when you remotely access your system to configure and troubleshoot the MCD 5000 Deskset and RGU using the MCD 5000 Deskset System Configuration Tool application. Run reports and perform queries for information you need to make real-time decisions. Supervisor reporting tools allow monitoring of each MCD 5000 Deskset System devices (MCD 5000 Deskset/MCD 5000 RGU) to enhance training and operational efficiencies.

SECURITY BUILT IN

Secure your communications in locations that are not staffed continuously, have public access or access sensitive channels. Select the individual desksets which need this additional level of security and with the MCD 5000 Deskset's security time lock, you configure the duration of time the deskset remains active, after which an authorized user name and PIN are required to reactivate the device. For increased security, user profiles can establish which radio resources are allowed to be seen and accessed. An activity log on each MCD 5000 Deskset displays the last operations performed by the user as well as received transmissions. Flexible communication options allow the use of the handset, Push-To-Talk (PTT) switch and built-in condenser microphone, or headset, footswitch and desk microphone accessories.

ADAPTS TO YOUR EVOLVING NEEDS

Scalable from small operations to complex control centers and geographically dispersed operations, you can depend on the modular MCD 5000 Deskset system to handle your communications and grow with you as your operational needs evolve and change.

OPTIONAL OPERATIONS MANAGEMENT CENTER SERVER

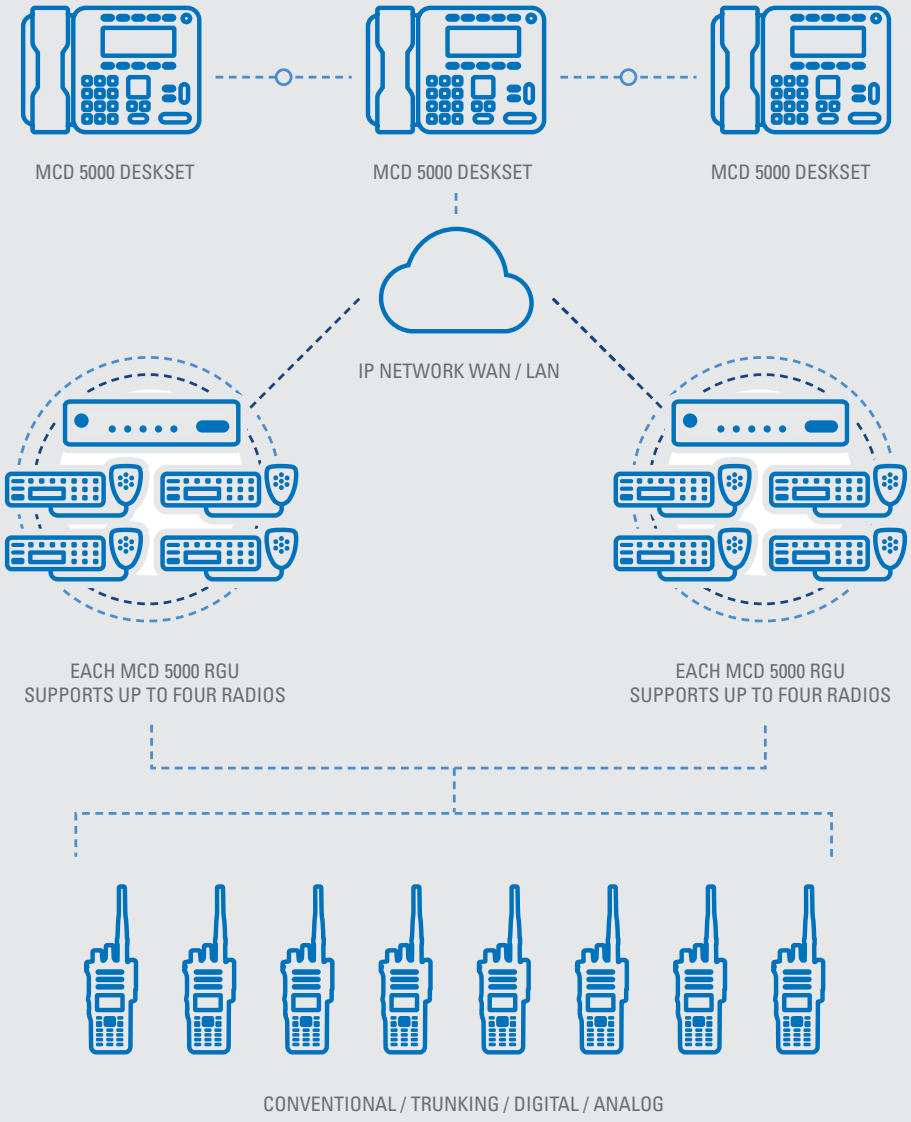
The Operations Management Center (OMC) is an optional main management server for the MCD 5000 Deskset system, enabling system operation, maintenance, provisioning, and control for larger installations as well as for customers with information assurance (IA) needs. This central repository is where all system users, MCD 5000 Desksets and radio resources are registered and where system-wide information including alarms, logs and audits is stored. The OMC server runs on the Red Hat® LINUX® operating system.

TWO-WAY RADIO SUPPORT

- XPR5550e
- APX All-Band Consolette-05 CH
- APX All-Band Consolette-E5 CH
- APX 7500 Multiband Consolette
- ASTRO CONSOLETTE (W9)
- ASTRO Spectra
- ASTRO Spectra Plus
- MTM5400
- MTM800E
- TRC Radios / Base-Stations / Adaptors
- 4-Wire E&M Radios

MCD 5000 DESKSET SHOWING 3 OPERATOR POSITIONS CONTROLLING UP TO 8 RADIOS

The MCD 5000 allows multiple desksets to dynamically switch to different MCD 5000 RGUs, giving you access to additional radios for expanded communications. Each MCD 5000 Deskset can connect and monitor up to four radios (channels) at one time.



To learn more about how the MCD 5000 Deskset solution can help you implement a flexible VoIP communications on your network, contact your Motorola Solutions representative or visit www.motorolasolutions.com/dispatch

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MCD 5000 DESKSET SYSTEM

POWERFUL AND FLEXIBLE VoIP COMMUNICATIONS

Expand your communications with VoIP technology. Scalable from small operations to complex control centers and geographically dispersed operations, you can depend on the new modular MCD 5000 Deskset System with VoIP technology for your conventional and trunked communications. Whether used in dispatch environments, back-up sites, special events or call monitoring, you can easily expand communication capabilities throughout your organization using your IP network. This easy-to-deploy solution enables communications across your network when and where you need it most, increasing safety, awareness and coordination.

MCD 5000 DESKSET

A flexible desktop console, the MCD 5000 Deskset provides digital control for a variety of Motorola two-way radios, and can connect directly to a radio or over an IP network using the MCD 5000 Radio Gateway Unit (RGU).

The MCD 5000 Deskset digital control link emulates the buttons and display of the connected radio and performs all the functions of the radio control head.

And with a large and easy-to-read color LCD screen, intuitive layout and an adjustable viewing angle, the MCD 5000 Deskset is ergonomically designed for both occasional and constant everyday use.

MCD 5000 RADIO GATEWAY UNIT

Connect the MCD 5000 Deskset to radios over your IP network using the MCD 5000 RGU. The MCD 5000 Deskset allows users to dynamically switch between MCD 5000 RGUs, giving access to additional radios across the network and expanding communications. Each MCD 5000 RGU can connect up to four radios and each MCD 5000 Deskset can connect and monitor up to four radios (channels) at a time.

DESKSET AUDIO ACCESSORIES

With flexible communication options, you can use the handset, Push-To-Talk (PTT) switch and built-in condenser microphone, or add the optional headset, footswitch and desk microphone accessories for user convenience.

IP NETWORK

Take full advantage of VoIP technology and deploy the MCD 5000 Deskset when and where you need it on your IP network.

CONFIGURATION AND REPORTING TOOLS

Our configuration tool offers the convenience of remote use from anywhere on the network or local use with an Ethernet connection. And you can provide timely support and save travel time when you remotely access your system to configure the MCD 5000 Deskset and MCD 5000 RGU. You can also remotely run reports and perform queries for information you need to make real-time decisions. Additional supervisor reporting tools allow monitoring of each MCD 5000 Deskset System devices (MCD 5000 Deskset/ MCD 5000 RGU) to enhance training and operational efficiencies.

The MCD 5000 RGU connects radios to the MCD 5000 Deskset over your IP network

OPERATIONS MANAGEMENT CENTER (OMC) SERVER

An optional main management server for the MCD 5000 Deskset System, the Operations Management Center (OMC) enables system operation, maintenance, provisioning, and control for larger installations, as well as for customers with information assurance (IA) needs.

This central repository stores registration for all system users, MCD 5000 Desksets and radio resources, along with system-wide information including alarms, logs and audits. The OMC server runs on the Red Hat® LINUX® operating system.

Providing user-level interface to the OMC, the Administrator Control Panel Client (ACP) PC allows local and remote administration access for system management activities. The ACP Client PC runs on Microsoft Windows® 7 (64-bit) OR Windows 10 Professional (64 Bit) OR Windows IoT Enterprise LTSB 2015/2016 (64 Bit) Operating System. The ACP is required for systems with an OMC.

TWO-WAY RADIO DEVICES

The MCD 5000 Deskset lets you control a wide variety of digital radios:

APX All-Band Consolette-O5 CH

APX All-Band Consolette-E5 CH

APX™ 7500 Multiband Consolette

ASTRO® Consolette (W9):
ASTRO® Spectra™
ASTRO® Spectra Plus™

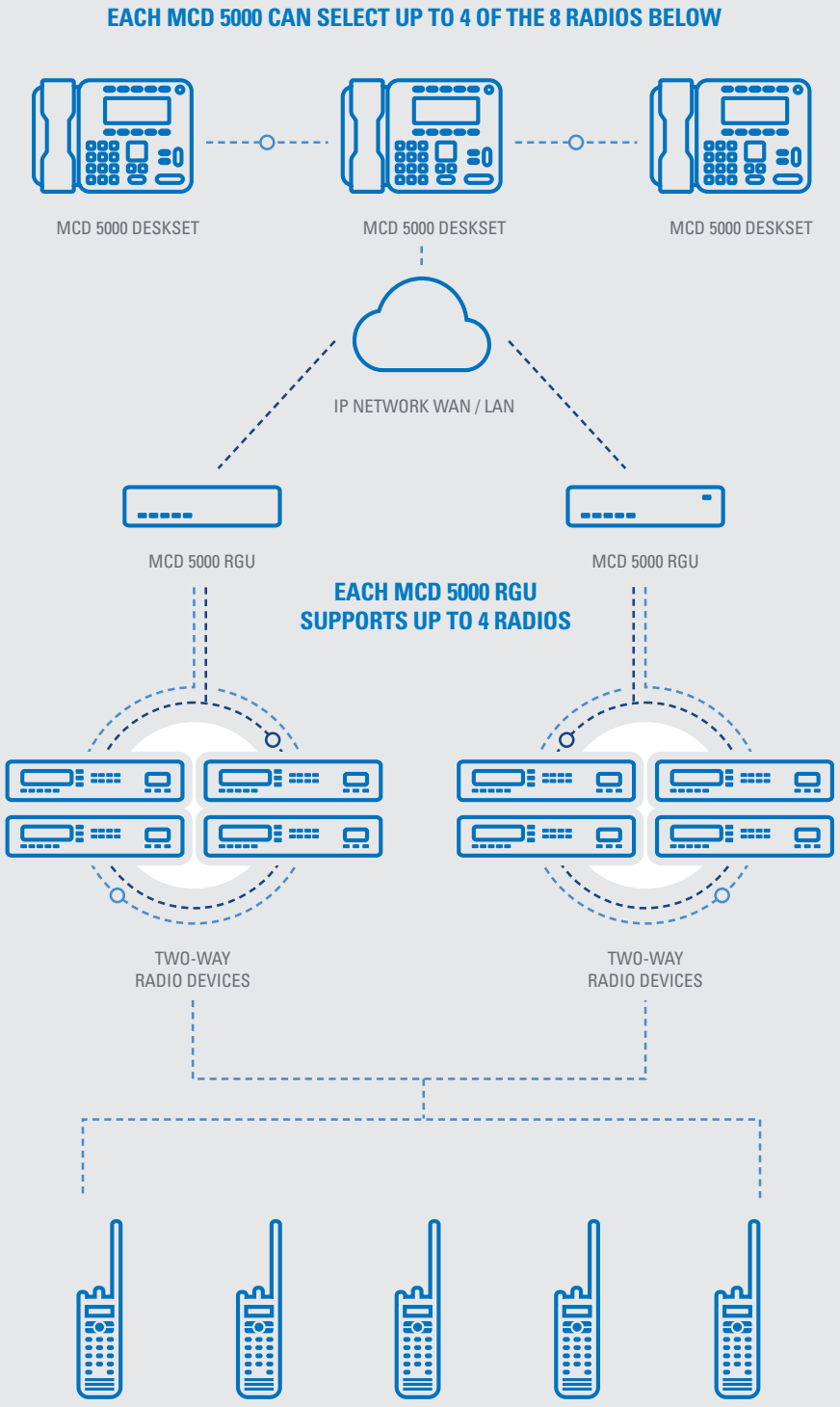
Dimetra TETRA Mobile Radios:
MTM5400
MTM800E

TRC Radios/Base-Stations/Adaptors

4-Wire E&M Radios

EXAMPLE MCD 5000 DESKSET SYSTEM SHOWING 3 OPERATOR POSITIONS CONTROLLING UP TO 8 RADIOS

The MCD 5000 Deskset system allows multiple desksets to dynamically switch to different MCD 5000 RGUs, giving you access to additional radios for expanded communications. Each MCD 5000 Deskset can connect and monitor up to four radios (channels) at one time.



SPECIFICATIONS

MCD 5000 DESKSET	
Dimensions	Height: 1.65 in (42 mm) Width: 8.58 in (218 mm) Depth: 10.39 in (264 mm) Weight: 5.73 lbs (2.6 kg)
Environmental	Operating temperature: -30 °C to 60 °C (-22 °F to 140 °F) Storage temperature: -40 °C to 80 °C (-40 °F to 176 °F) Humidity: 5% to 95% @ +50° C (122° F), Non-Condensing
Power	Input power:+10.8 to +14VDC, (+12 V nominal) Dispassion: 9W Max. 37VDC to 57VDC. Powered via POE-PD; meeting 802.3af Standard for Powered Desksets class 0
Audio	The end-to-end distortion is no more than 3% THD The generated audio is no more than -50 dBm of Hum and Noise below the rate audio output The crosstalk between any audio signals is no more than -65 dBm at 0 dBm transmit audio power
Supported Radio Protocols	RS-232 TTL, SB9600, IP, 4W-E&M, TRC
Regulatory-EMC	FCC part 15 class A
Safety	EN60950-1
Green Product	RoHS, WEEE Mark
Certified Standard Compliance Requirements	CE Mark, FCC part 15 A Mark, UL Mark (for P.S. only) US federal government Environmentally Preferable Specification (EPP) Program
Non-certified Standard Compliance Requirements	CSA, UL, MOTOROLA W18 certification, CMM
Vocoders	G.711 and G.729

MCD 5000 RADIO GATEWAY UNIT	
Dimensions	Height: 1.65 in (42 mm) Width: 8.58 in (218 mm) Depth: 10.39 in (264 mm) Weight: 5.73 lbs (2.6 kg)
Environmental	Operating temperature: -30 °C to 60 °C (-22 °F to 140 °F) Storage temperature: -40 °C to 80 °C (-40 °F to 176 °F) Humidity: 5% to 95% @ +50° C (122° F), Non-Condensing
Power	Input power:+10.8 to +14VDC, (+12 V nominal) Dispassion: 9W Max. 37VDC to 57VDC. Powered via POE-PD; meeting 802.3af Standard for Powered Desksets class 0
Audio	The end-to-end distortion is no more than 3% THD The generated audio is no more than -50 dBm of Hum and Noise below the rate audio output The crosstalk between any audio signals is no more than -65 dBm at 0 dBm transmit audio power
Supported Radio Protocols	RS-232 TTL, SB9600, IP, 4W-E&M, TRC
Regulatory-EMC	FCC part 15 class A
Safety	EN60950-1
Green Product	RoHS, WEEE Mark
Certified Standard Compliance Requirements	CE Mark, FCC part 15 A Mark, UL Mark (for P.S. only) US federal government Environmentally Preferable Specification (EPP) Program
Non-certified Standard Compliance Requirements	CSA, UL, MOTOROLA W18 certification, CMM
Vocoders	G.711 and G.729

MCD 5000 DESKSET SYSTEM CAPACITIES	
Maximum Number of Radio Resources	512
Maximum Number of MCD 5000 Radio Gateway Units (RGUs)	128
Maximum Number of Radios per MCD 5000 Radio Gateway Unit (RGU)	4
Maximum Number of MCD 5000 Desksets	100
Maximum Number of Groups per MCD 5000 Deskset	20
Maximum Number of Users per MCD 5000 Deskset	8 (Non-OMC System) 1,000 (OMC System)

To learn more about how the MCD 5000 Deskset System can help you implement powerful and flexible VoIP communications on your network, contact your Motorola representative or visit **www.motorolasolutions.com/dispatch**

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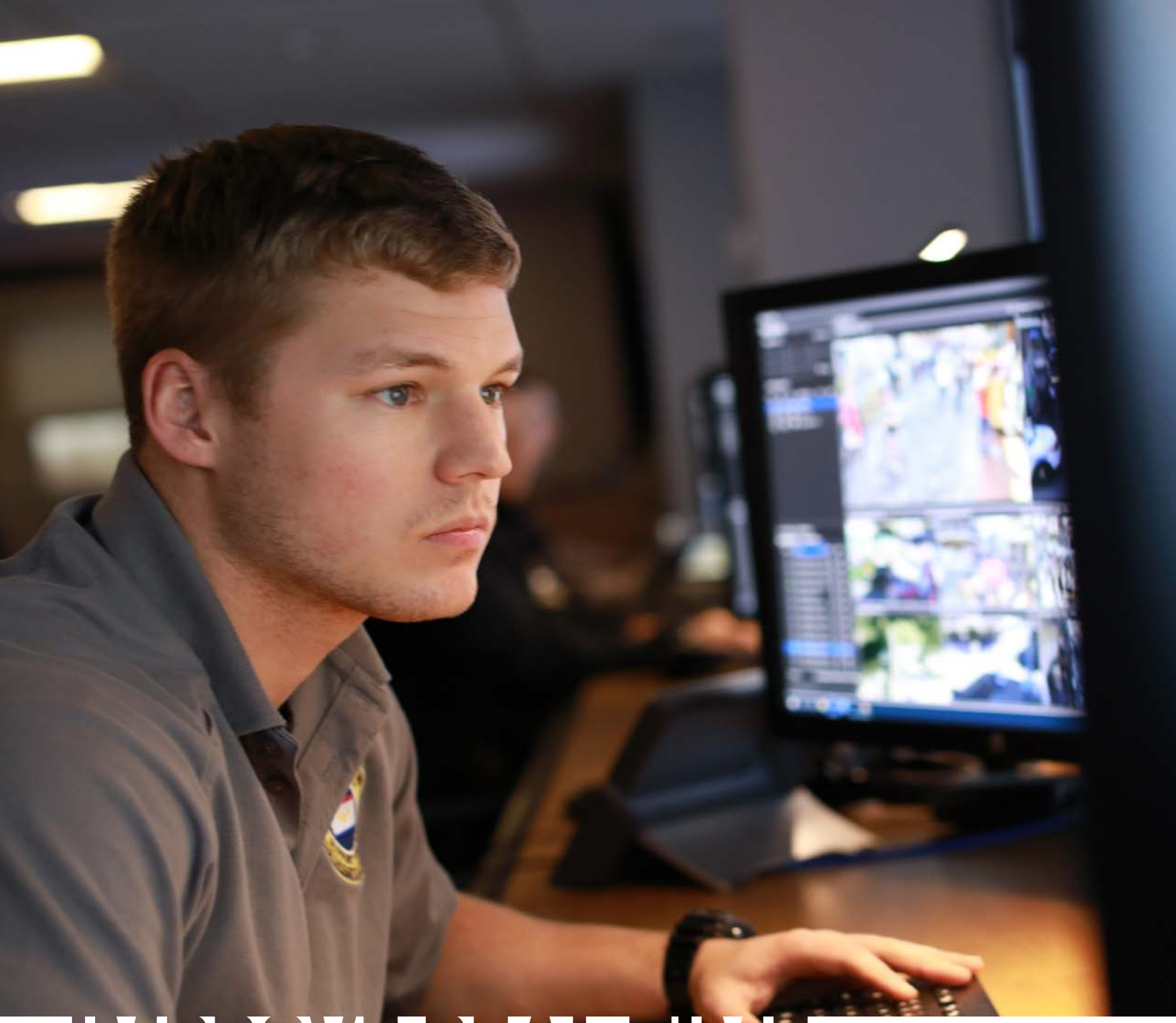


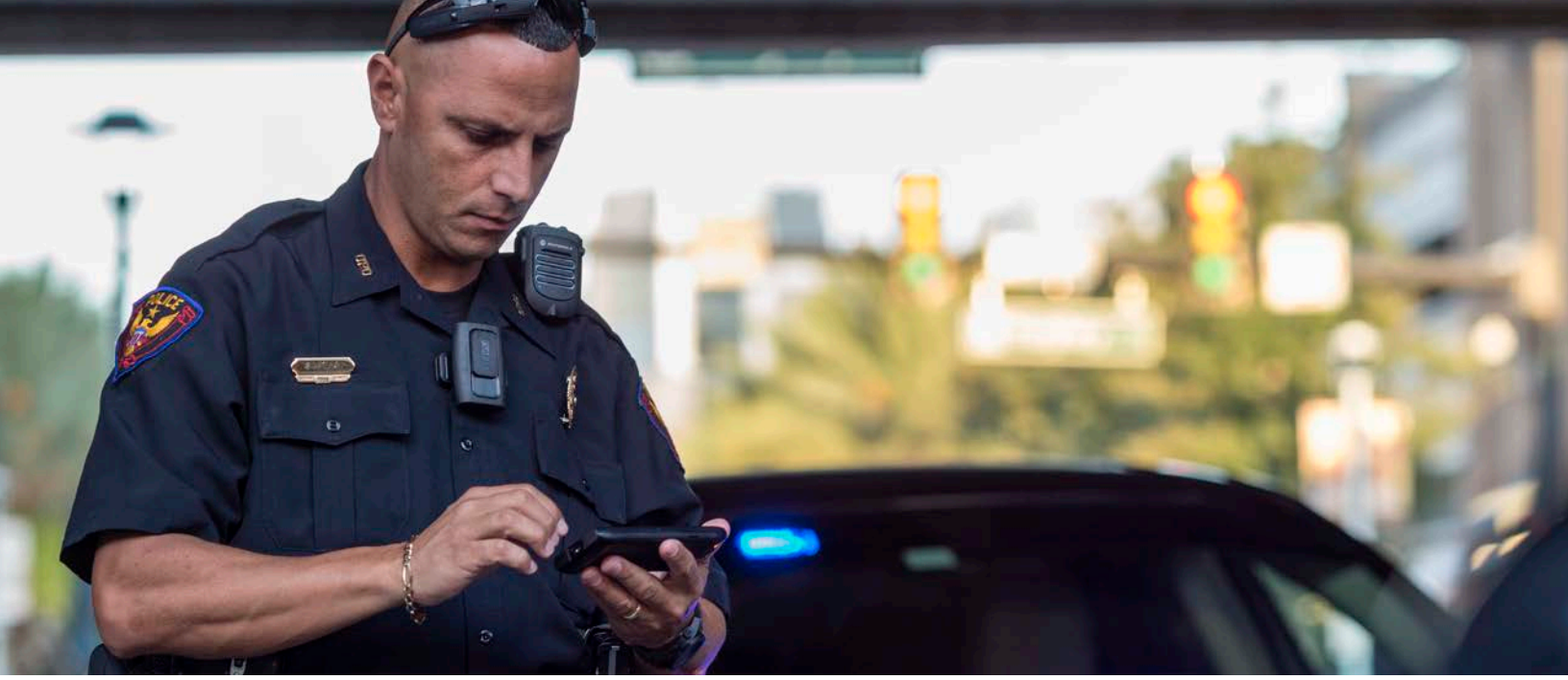
IMPROVE REAL-TIME SITUATIONAL INTELLIGENCE

COMMANDCENTRAL AWARE
REAL-TIME INTELLIGENCE OPERATIONS

MOTOROLA SOLUTIONS

REAL-TIME SITUATIONAL INTELLIGENCE

CommandCentral Aware provides a complete operating picture, integrating real-time intelligence in the command center to remotely assist officers in the field. Simplify your operational view by consolidating your resources into one single pane of glass. Support officer safety by monitoring real-time alerts and accessing nearby video feeds when incidents occur.



LOCATION & MAPPING

SIMPLIFY INFORMATION. MAKE BETTER DECISIONS.

MONITOR ACTIVITY FROM ANYWHERE

View all of your location-based data together, in real-time, on a single map display. This common operating picture can be accessed anywhere, from any internet-connected device.

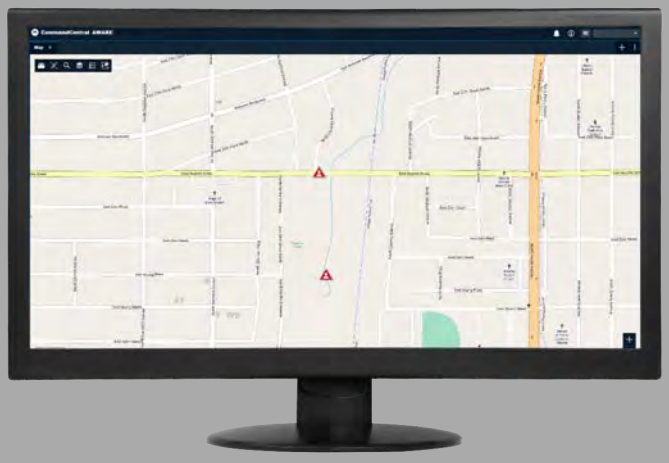
ACT WITH THE NECESSARY CONTEXT

Communicate a more informed response to a critical incident and enhance responder safety for those in the field by accessing a common operating picture through CommandCentral Aware — directly from your agency's map.

COLLABORATE WITHOUT DISTRACTION

Control specific viewing permissions based on groups of users to ensure a focused response from every team member during a critical event. Filter your view to only the datasets you need in the moment.

ACCESS DATA FROM CAD THROUGH COMMANDCENTRAL AWARE, ENHANCING THE COMMON OPERATING PICTURE.



FEATURES:

Unified Mapping: Utilizing a common Esri base map, geographically locate real-time events such as CAD incidents, device and unit location, alert and alarms, tactical decision data and camera locations. Incorporate other Esri-based map layers from your agency for enriched spatial orientation such as property boundaries, landmarks, buildings and asset locations. In addition, streaming and stationary weather layers are provided to enhance visual situational awareness. Organize your devices through group management to further refine ownership to adhere to logical inter agency and intra agency configurations. Manage the content seen by these agencies via groups of users provisioned and authorized to see specific mapping layers.

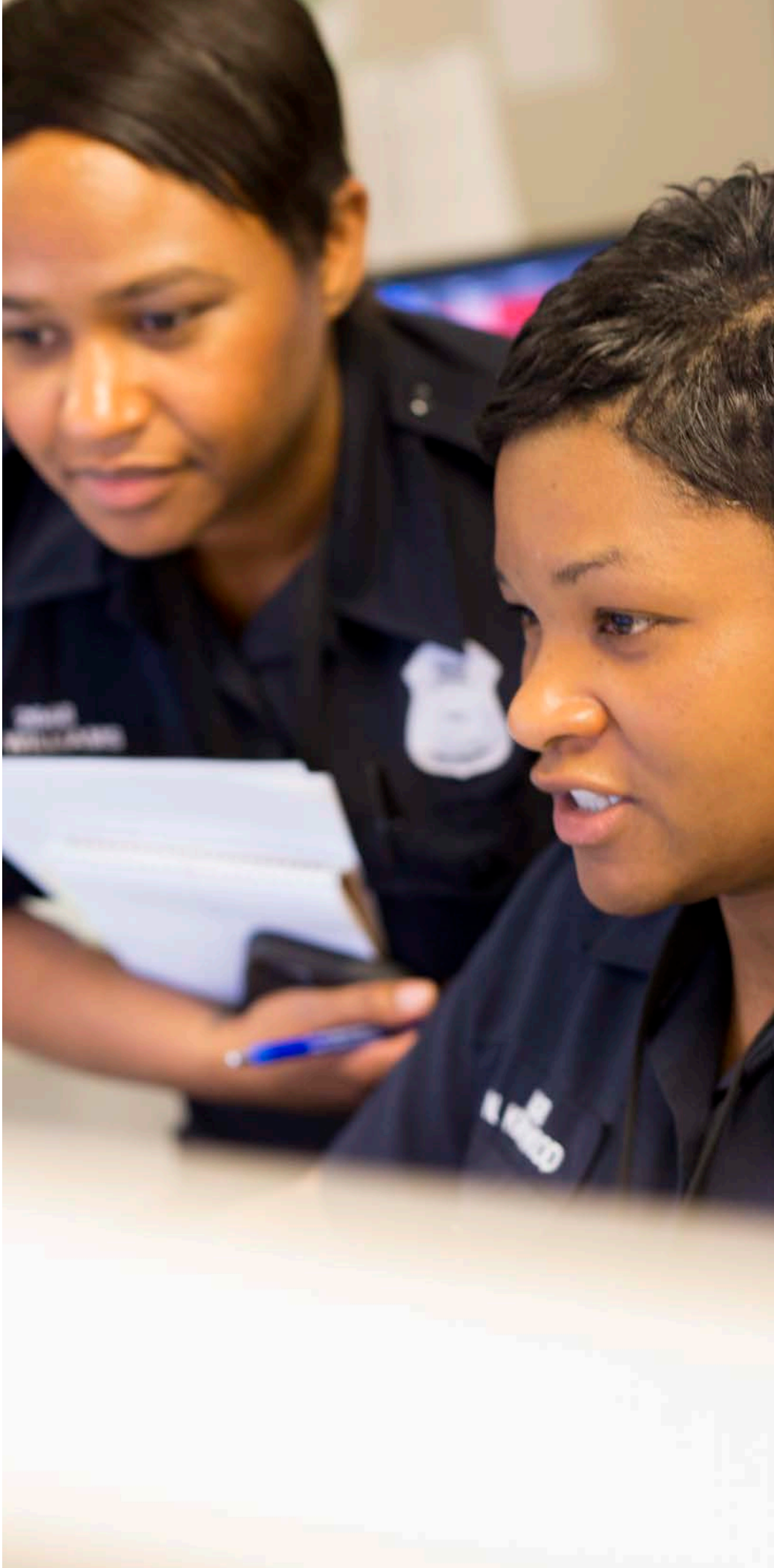
Desktop & Mobile Accessibility: Work seamlessly from desktop to mobile. CommandCentral Aware is accessible via web browser on any computer as well as from any tablet or smartphone with an internet connection.

Data Layer Filtering: Show or hide data layers, such as CAD incidents, by selecting or deselecting them in the data layer panel, ensuring your teams are seeing only what they need in that moment. Data layers can also be prioritized to ensure certain information takes visual precedence on the map.

Critical Information Display: Associate critical information with each event or resource on the map display.

Team-Based Permissions: Restrict what personnel see based on what their team needs to be most effective, while still ensuring that consistent and relevant information is being referenced from a shared common operating picture.

"View-Only" Information Access: Ensure workflows are unhindered by access to information in the simplest form possible.



LOCATION, MAPPING & ALERTS

KEEP OFFICERS AND CITIZENS SAFE ON THE STREETS

RESPOND QUICKLY TO ESCALATING INCIDENTS

Responder alerts automatically show the command center what's happening to officers during an incident, whether that be an emergency, vest pierce, man down alerts and more. Alerts showing the location and type of incident on the consolidated map help personnel enhance situational awareness and improve officer and citizen safety.

FEATURES:

CommandCentral Aware automatically informs the command center that a situation has escalated without further action by the officer. Alerts indicating weapon fired, vest pierce or other emergency display the location and type of incident in real time on the consolidated map, helping dispatchers provide immediate support and improving officer and citizen safety.

Weapon Fired Alert (Handguns Only): This sensor can be retrofitted to certain handguns to send an alert that the weapon has been discharged. The sensor is located in the grip of the handgun.

Vehicle Impact Alert: When a responder vehicle, equipped with APX radios, experiences significant impact, an emergency alert will notify the command center of the situation and location.

Man Down Alert: A man down emergency alert generated by all enabled APX portable radios appears as a notification when the radio is at an angle and there is no movement based on user parameters.

Vest Pierce Alert: When a piercing event is detected, such as a shot or stab, an emergency alert is transmitted to notify command staff that a responder may be incapacitated and needs help. Insert sensors into existing body armor.

Emergency Button Press: When the emergency button is pressed on an APX radio, an alert will appear on the consolidated map that an emergency needs to be addressed.

VIDEO INTELLIGENCE

HAVE EYES ON A SCENE WITHIN SECONDS

ENHANCE RESPONSE THROUGH REAL-TIME VIDEO

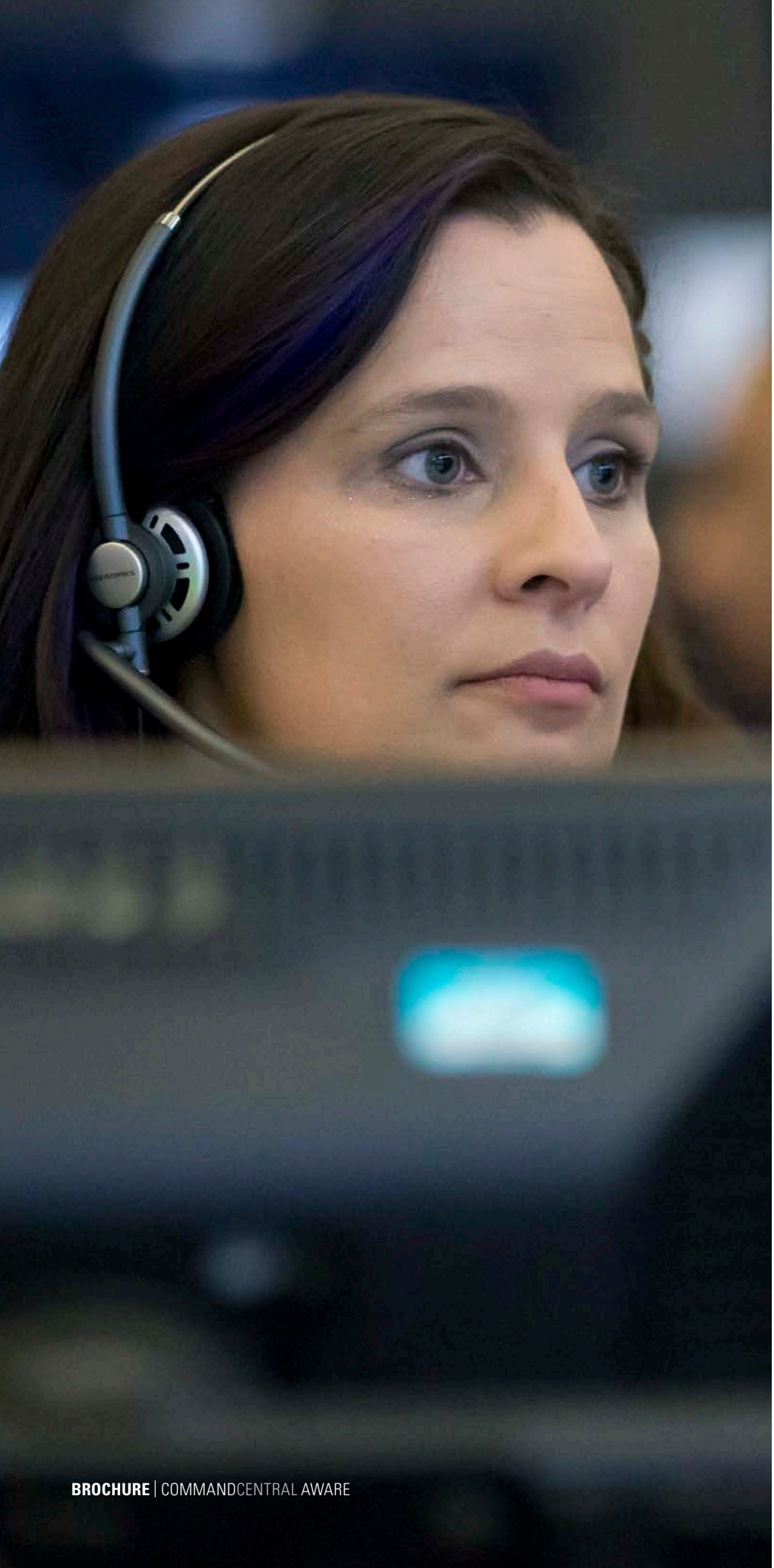
Shape your response more appropriately with CommandCentral Aware's real-time video access and notifications, which allow PSAP fusion operators or intelligence analysts to access nearby video feeds from within the consolidated map for greater visibility into an escalating situation. CommandCentral Aware brings users' attention to key video content, enhancing officer safety and boosting productivity.

STREAMLINE AGENCY WORKFLOWS

Improve productivity and easily manage evidentiary files by only storing and tagging incident-related video through CommandCentral Vault.

SIMPLIFY VIDEO MANAGEMENT

Simplify your operational view by bringing all disparate video solutions into one single, consolidated screen.



FEATURES:

Geospatial Event Mapping: Include camera locations, CAD incidents, personnel status and location, open-source data alerts, sensors and more on a single map that can be customized with any of your agency's other data layers.

Activity Monitor: View a real-time feed of alerts and incident occurrences as they populate on the map. Each event can be viewed in detail with information drawn from additional data sources pertaining to that specific event.

Workflow Configuration: Automate workflows by associating related data together from disparate systems to get a comprehensive picture of the incident or threat occurrence. This can include video sources, related open-source data alerts, a CAD incident, sensor alarms and more.

Real-Time Video Streaming: Virtually patrol your community and quickly get eyes on the scene of an event by viewing cameras simultaneously from fixed or mobile video feeds via any video management system. Easily reference the video source, date, time and location as well as customize camera groups for quicker access to particular locations.

Security Compliance: Rely on applications secured and compliant to CJIS security standards.

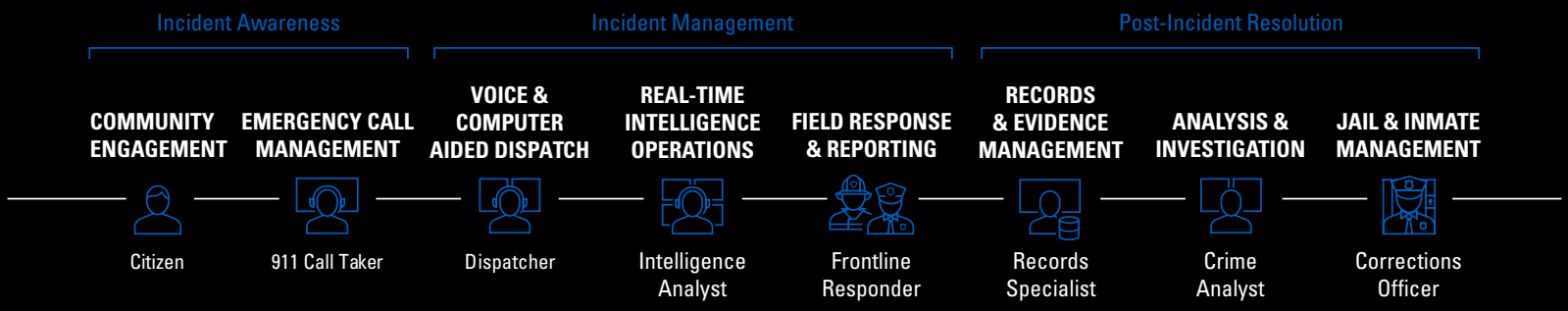
Improve situational awareness by accessing video feeds to nearby alerts on CommandCentral Aware's consolidated map. Save seconds in your response and improve responder safety.

NEXT-GENERATION EVOLUTION WITH A DEDICATED TECHNOLOGY LEADER

We build software for mission-critical environments where every second matters. CommandCentral Aware and other applications in our CommandCentral software suite unify data and streamline workflows from call to case closure in order to put your information to better use, improve safety for critical personnel and restore your focus on the communities you serve. Backed by a trusted, 90-year industry expert with proven public safety leadership, our suite is transforming the public safety experience with a focus on evolution, not revolution, in order to help you digitally transform your operation.

COMMANDCENTRAL

The industry's most integrated public safety software suite from call to case closure.



For more information about CommandCentral Aware, visit www.motorolasolutions.com/aware

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APX RADIO ACCESSORIES

RESILIENCE WITHOUT COMPROMISE

MOTOROLA SOLUTIONS

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MISSION CRITICAL PERFORMANCE FOCUSED ON DURABILITY AND FLEXIBILITY TO KEEP YOU SAFER

Motorola P25 APX radios deliver what first responders need to increase their safety and improve their situational awareness. Get the most out of your APX radio by extending its power and reliability with resilient APX accessories. They are the only accessories tested and certified for use with APX radios. Our accessories endure rigorous testing to last longer and help keep you safer. There's simply no substitute for Motorola APX accessories.

MOTOROLA'S EXCLUSIVE ENERGY AND AUDIO FEATURES ARE MADE FOR MISSION CRITICAL MOMENTS

IMPRES™ 2 ENERGY: YOUR RADIO IS YOUR LIFELINE. IF YOUR BATTERY DIES, IT JEOPARDIZES EVERYTHING.

That's why we introduced the IMPRES 2 for APX series radios. It's a next-generation energy system that's safer and smarter, while keeping you powered for even longer. With IMPRES 2 chargers, you can charge batteries up to 40% faster. Customize your charging to extend the life of batteries in storage. And manage power more intelligently with enhanced diagnostics, so you get the most from each battery.

IMPRES AUDIO: I HEAR YOU, EVEN WHEN YOU CAN'T HEAR YOURSELF.

Motorola's exclusive IMPRES audio accessories help suppress ambient noise, amplify loudness and improve voice intelligibility. IMPRES audio can virtually block out all background noise in any extreme environment with windporting and noise-cancelling technology. Ensure your voice is heard loud and clear no matter what direction you speak with an advanced microphone system. IMPRES audio will make sure you are heard in any demanding environment.

APX PORTABLE RADIO ACCESSORIES

APX 8000

APX 8000XE

APX 7000

APX 7000XE

APX 6000

APX 6000XE

APX 4000
(1-KNOB)

APX 4000
(2-KNOB)

APX 3000

APX 1000

APX 900

SRX 2200

DESIGNED FOR THE MISSION. ENGINEERED FOR THE EXTREME.

APX XE500 Remote Speaker Microphones (RSMs) are designed by firefighters for firefighters. Ergonomic, rugged and reliable, the XE500 RSM is built with the user's extreme environment in mind. Designed to withstand heat exposure of 500˚F for up to five minutes and an IP68 submersibility rating, it will perform in extreme conditions. Your lifeline needs to be as tough as your radio. That's why the XE500 RSM is the perfect companion to your APX radio.

XE500 RSM KEY FEATURES

- Available With and Without a Channel Knob
- High Visibility Strobe Light
- Adaptive Audio Engine
- IP68, 2 Meters, 4 Hours Submersion
- Heat Resistant Housing and Cable
- Orange Illuminated Emergency Button
- Transmit / Receive LED

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES								
XE500 REMOTE SPEAKER MICROPHONES (RSM)												
PORTABLE RADIOS		**DESCRIPTION**	**PART NUMBER**	**IMPRES AUDIO**	**MICROPHONE NOISE SUPPRESSION**	**VOLUME CONTROL**	**ORANGE PROGRAMMABLE BUTTON**	**CHANNEL CONTROL**	**PROGRAMMABLE BUTTON**	**IP RATING**	**HAZLOC-CAPABLE†**	**SIZE (WITHOUT CLIP) (MM)**
APX 8000		XE500 High Impact Green, Channel Knob, Xtreme Temperature Cable	PMMN4106	●	Multi-Mic Noise Suppression	Step			1	IP68	UL	75 x 98 x 33
APX 8000XE **APX 7000**		XE500 Black Housing, Channel Knob, Xtreme Temperature Cable	PMMN4106_BLK	●	Multi-Mic Noise Suppression	Step			1	IP68	UL	75 x 98 x 33
APX 7000XE **APX 6000**		XE500 High Impact Green, No Channel Knob, Xtreme Temperature Cable	PMMN4107	●	Multi-Mic Noise Suppression	Step			1	IP68	UL	75 x 98 x 33
APX 6000XE		XE500 Black Housing, No Channel Knob, Xtreme Temperature Cable	PMMN4107_BLK	●	Multi-Mic Noise Suppression	Step			1	IP68	UL	75 x 98 x 33

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

ENHANCED CONTROLS
DESIGNED FOR THE MISSION

The XE500 RSM is an evolution of the XE RSM platform and like its predecessor was designed with the user's extreme environment in mind. From the exaggerated knobs and controls, that are easy to operate with bulky gloves to the asymmetrical shape that makes it easier to find the controls without looking.

ADAPTIVE AUDIO ENGINE
HEAR AND BE HEARD

XE500 RSM utilizes 5 integrated microphones and an Adaptive Audio Engine. Similar to the radio, it automatically changes the level of noise suppression, microphone gain, Windporting and speaker equalization to produce clear and loud audio in any environment.

FLEXIBLE WEARING
WEAR IT ANYWAY YOU WANT

The strategic placement of the microphones and enhanced water drainage provide users with the flexibility to wear it straight, upside down and even sideways while still delivering loud and clear audio.

EXTREME PERFORMANCE
RUGGED, ROBUST, RELIABLE

Whether you are in the heat of a fire or exposed to extreme weather conditions the XE500 will keep you connected to your team. This RSM was designed to withstand heat exposure of 500˚F (260˚C) for up to 5 minutes. Built as a system, the APX 8000XE and the XE500 have been tested to meet IP68 (2 meter, 4 hours) submersibility specifications.

APX™ XP REMOTE SPEAKER MICROPHONE

DUAL MIC NOISE SUPPRESSION

This Remote Speaker Microphone with its thin design and optimized ergonomics is ideal for police officers and other public safety users. With Dual Mic Noise Suppression, you will be heard despite traffic noise and sirens in the background. When it gets dirty, just wash the microphone head to ensure your communication is not compromised.

WIRELESS REMOTE SPEAKER MICROPHONE

Secure pairing is easier than ever with voice prompts as there is no need to navigate menus or enter codes.

Removing the cord from the RSM makes getting ready for work quicker than ever. No more worrying about getting tangled with the seatbelt or other equipment.

This wireless RSM features large but recessed push-to-talk and emergency buttons to ensure that users have easy access to controls but don't have to worry about accidental activation. Additional features include volume control, an audio jack, 360 degree rotatable clip, as well as a task light that allows you to read in the dark.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES										VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.							
REMOTE SPEAKER MICROPHONES (RSM) Our robust portfolio includes Remote Speaker Microphones and secondary audio accessories engineered to give you clearer communications even in loud environments.									All remote speaker microphones are built with top quality materials including durable **Kevlar®** cables that survive tough working conditions.												
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES AUDIO	MICROPHONE NOISE SUPPRESSION	VOLUME CONTROL	ORANGE PROGRAMMABLE BUTTON	DISPLAY	CHANNEL CONTROL	PROGRAMMABLE BUTTON	AUDIO JACK	IP RATING	SIZE (WITHOUT CLIP) (MM)	POLICE	FIRE	EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **SRX 2200**		IMPRES XP RSM with Dual Mic Noise Suppression, Volume Control, 1-Programmable Button and Orange Button. Rugged, Submersible (IP68)	NMN6271	●	Dual-Mic Noise Suppression	Step			1			IP68 Rugged	95 x 69 x 27	●		●	●	●		●
		IMPRES XP RSM with Dual Mic Noise Suppression, 3.5mm threaded jack, Volume Control, 1-Programmable Button and Orange Button (IP55)	NMN6274	●	Dual-Mic Noise Suppression	Step			1		3.5 mm	IP55	95 x 69 x 27	●		●	●	●		●
		XP RSM Replacement Cable with Audio Jack	PMKN4222																		
		XP RSM Replacement Cable without Audio Jack	NKN6611																		
APX 8000 **APX8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **SRX 2200**		Wireless RSM with Battery, Clip (RLN6544) and Dual Unit Charger (PMLN7120)	RLN6554		Windporting	Step			1		3.5 mm	IP55	88 x 63 x 26	●		●	●	●	●		●
		Wireless RSM with Battery and Clip. No Charger.	RLN6544		Windporting	Step			1		3.5 mm	IP55	8 x 63 x 26	●		●	●	●	●		●

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY | **ACCESSORY** | **FEATURES** | **VERTICAL MARKETS:** Recommendations based on typical use case for each of verticals listed.

REMOTE SPEAKER MICROPHONES (RSM) Our robust portfolio includes Remote Speaker Microphones and secondary audio accessories engineered to give you clearer communications even in loud environments.

All remote speaker microphones are built with top quality materials including durable **Kevlar®** cables that survive tough working conditions.

PORTABLE RADIOS	DESCRIPTION	PART NUMBER	IMPRES	MICROPHONE NOISE SUPPRESSION	VOLUME CONTROL	ORANGE PROGRAMMABLE BUTTON	DISPLAY	CHANNEL CONTROL	PROGRAMMABLE BUTTON	AUDIO JACK	IP RATING	HAZLOC-CAPABLE†	SIZE (WITHOUT CLIP) (MM)	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 900 SRX 2200	IMPRES Display RSM with Audio Jack, Channel Selector, Volume Control, 2-Programmable Buttons and Orange Button. Windporting, Rugged, Submersible (IP68)	HMN4104	●	Windporting	Step		●		2	8-Pin	IP68 Rugged	FM UL	68 x 106 x 31	●	●	●	●	●	●	●
	IMPRES Display RSM with Audio Jack, Volume Control, 2-Programmable Buttons and Orange Button. Windporting, Rugged, Submersible (IP68)	HMN4103	●	Windporting	Step		●		2	8-Pin	IP68 Rugged	FM UL	68 x 106 x 31	●	●	●	●	●	●	●
	IMPRES RSM with Audio Jack, Volume Control, 2-Programmable Buttons and Orange Button. Windporting, Rugged, Submersible (IP68)	HMN4101	●	Windporting	Step				2	8-Pin	IP68 Rugged	FM UL	68 x 106 x 31	●	●	●	●	●	●	●
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200	IMPRES RSM Windporting, Rugged (IP68)	PMMN4083	●	Windporting							IP68 Rugged	FM	60 x 78 x 28	●	●	●	●	●	●	●
	IMPRES RSM with 3.5mm Threaded and NON-Threaded Audio Jack and Orange Button. Noise-Cancelling (IP54) NOT INTENDED FOR FIRE MARKETS	PMMN4084	●	Noise-Cancelling						3.5 mm	IP54	FM	60 x 78 x 28	●		●	●	●	●	●
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 1000 APX 900	IMPRES Windporting RSM with Volume Toggle Switch, Orange Button, 3.5mm NON-Threaded Jack (IP68)	PMMN4099	●	Windporting	High/Low				1	3.5 mm	IP68	UL	60 x 78 x 28	●	●	●	●	●	●	●
SRX 2200	Windporting RSM, Coyote Brown, (IP57)	NNTN8235		Windporting							IP57	FM UL	55 x 60 x 27			●				
	Windporting RSM with NON-Threaded 3.5mm Audio Jack, Coyote Brown, (IP54)	NNTN8236		Windporting						3.5 mm	IP54	FM UL	55 x 60 x 27			●				
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200	IMPRES RSM with NON-Threaded Audio Jack, Orange Button, Noise-Cancelling (IP54) NOT INTENDED FOR FIRE MARKETS	PMMN4062	●	Noise-Cancelling						3.5 mm	IP54	FM UL	60 x 78 x 28	●		●	●	●	●	●
	IMPRES RSM with Volume Toggle Switch, Orange Button and 1-Programmable Button, Windporting (IP57)	PMMN4065	●	Windporting	High/Low				1		IP57	FM UL	60 x 78 x 28	●		●	●	●	●	●
	IMPRES RSM with NON-Threaded Audio Jack, Windporting (IP55)	PMMN4069	●	Windporting						3.5 mm	IP55	FM UL	60 x 78 x 28	●		●	●	●	●	●

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
REMOTE SPEAKER MICROPHONE ACCESSORIES AND REPLACEMENT PARTS			
PORTABLE RADIOS		DESCRIPTION	PART NUMBER
XE RSM REPLACEMENT PARTS			
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE		Xtreme Temperature Replacement Cable for XE RSM (NNTN8203 and NNTN8575 series)	30009402002
		Xtreme Temperature Replacement Cable for XE500 RSM	30009402007
		XE RSM Clip Assembly with brass insert designed to work with the Boston Leather Straps (AY000223A01, AY000229A01) requires Clip Button NNTN8749	NNTN8271
		XE500 RSM Clip Assembly with brass insert designed to work with the Boston Leather Straps (AY000223A01, AY000229A01) requires Clip Button NNTN8749	PMLN7633
		Clip Button	NNTN8749
WIRELESS RSM ACCESSORIES AND REPLACEMENT PARTS			
		Dual Unit Charger, rapid rate charger, 120V (US Plug)	PMLN7120
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		Vehicular Charger	PMLN6716
		Wireless RSM with Battery and Clip, No Charger	RLN6544
		Wireless RSM Battery, 1750 mA Li-Ion	PMNN4461
		D Ring Swivel Clip (12 pack) Compatible with all XP RSMs and Wireless RSMs	NNTN4990

FIRE MARKET SOLUTION

The XE and XE500 RSM clip paired with a clip button allows easy and secure access to your RSM when used with a Boston Radio Strap with Button Back Holder.

APX WIRELESS RSM

Every feature on this RSM has been purposefully designed. Large, yet recessed push-to-talk and emergency buttons are easy to access and designed to prevent accidental activation. Additional features include a volume control, audio jack and task light that allows you to read items such as a driver's license in the dark. This RSM features all of the advanced capabilities of Mission Critical Wireless including enhanced security, fast push-to-talk and quick touch pairing with voice prompts that confirm pairing actions. This RSM also features a removable and rechargeable battery. Charge the RSM on the go with the vehicular charger or in the office with the dual-unit desk charger.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES		
REMOTE SPEAKER MICROPHONE ACCESSORIES AND REPLACEMENT PARTS						
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	CONNECTOR TYPE	HAZLOC-CAPABLE†
APX 8000		Receive-Only Earpiece with Comfort Eartube, FM and UL approved	RLN4941	Clear Rubber Eartip	3.5mm	FM UL
		Receive-Only Earpiece with Comfort Eartube. Extra loud audio output	RLN4941_XL	Clear Rubber Eartip	3.5mm	
APX 8000XE		Receive-Only Earpiece with Comfort Eartube	PMLN7560	Clear Rubber Eartip	3.5mm	
APX 7000		Receive-Only Earbud, FM and UL approved	AARLN4885	Foam Earbud	3.5mm	FM UL
APX 7000XE		Receive-Only Earpiece, Loud Version. Required BDN6783 or NMN6274	RLN5313_XL	Clear Rubber Eartip	3.5mm	
APX 6000		EP7 Sonic Defender, use with RLN4941	RLN6511 RLN6512 RLN6513			
APX 6000XE		Adjustable D-Style Earpiece	PMLN7396	Over-the-Ear	3.5mm	
APX 4000		D-Shell Rx-Only Earpiece	PMLN4620	Over-the-Ear	3.5mm	FM UL
APX 3000		Receive-Only Flexible Earpiece	WADN4190	Over-the-Ear	3.5mm	FM UL
APX 1000		Receive and Transmit Boomless Temple Transducer (for HMN4104, HMN4103 and HMN4101 only)	RMN5116	Over-the-Head	8-Pin	FM UL
APX 900		Receive-Only Extra Loud Earpiece with Translucent Tube and Rubber Eartip (for HMN4104, HMN4103 and HMN4101 only)	RLN6424_XL	Clear Rubber Eartip	8-Pin	FM UL
SRX 2200		Replacement Foam Plugs for RLN5887 and RLN6242. Noise reduction = 25dB.* (Pack of 50 pairs)	5080384F72	Foam Eartip		
		Replacement Rubber Eartip for RLN6424 (Pack of 25)	5080370E97			
		D Ring Swivel Clip (12 pack). Compatible with all XP RSMs and wireless RSMs	NNTN4990			

* For High Noise Kit solution - combine RLN6242 Low Noise Kit with translucent tube and clear rubber eartip and RLN6281 Replacement Foam Plugs for RLN6242. Noise reduction = 25dB.

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

WHICH MICROPHONES ARE 50% LOUDER AND CLEARER?

APX Remote Speaker Microphones and Public Safety Microphones deliver audio that is clearer, easier to understand, and up to 50% louder. That's because they have the same speaker found in APX portable radios for the best-in-class accessory audio available.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES
REMOTE SPEAKER MICROPHONE ACCESSORIES AND REPLACEMENT PARTS				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	CONNECTOR TYPE
APX 8000XE **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 1000** **APX 900** **SRX 2200**		Interface Cable, 5-Pin Nexus Female Receptacle for HMN4104, HMN4103 and HMN4101	PMKN4107	5-Pin Nexus Female
		Interface Cable 4-Pin Nexus Male Plug for HMN4104, HMN4103 and HMN4101	PMKN4112	4-Pin Nexus Male
		Interface Cable, 12-Pin Hirose Male Connector for HMN4104, HMN4103 and HMN4101	PMKN4113	12-Pin Hirose Male
		Replacement Coil Cord Kit for HMN4104, 4103 and 4101	3075336B17	
		Replacement Coil Cord Kit for PMMN4062, PMMN4065, PMMN4069, PMMN4083 and PMMN4099.	RLN6075	

WHICH MICROPHONE IS RIGHT FOR ME?

WINDPORTING AUDIO: I HEAR YOU, NOT THE WIND
If you work outdoors in demanding weather, a Windporting microphone is right for you. It reduces the effects of wind and other sounds whenever you use the microphone. It also prevents water from clogging the microphone for clear transmissions.

NOISE-CANCELLING AUDIO: I HEAR YOU, NOT THE NOISE
Talking in a crowd or near heavy equipment? A Noise-Cancelling microphone reduces background sounds. To optimize noise reduction, hold the microphone in the correct position directly in front of your mouth, facing the source of the noise.

DUAL MIC NOISE SUPPRESSION: I HEAR YOU, EVEN WHEN YOU CAN'T HEAR YOURSELF
Virtually blocks out all background noise in demanding and extreme noise environments so you can always communicate clearly.

COMPATIBILITY	ACCESSORY	FEATURES	VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.

PUBLIC SAFETY MICROPHONES Our robust portfolio includes Public Safety Microphones and secondary audio accessories engineered to give you clearer communications even in loud environments.

PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES AUDIO	MICROPHONE NOISE SUPPRESSION	VOLUME CONTROL	ORANGE PROGRAMMABLE BUTTON	PROGRAMMABLE BUTTON	AUDIO JACK	IP RATING	HAZLOC-CAPABLE†	SIZE (MM)	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 7000 700/800 MHz only **APX 6000** 700/800 MHz only **APX 3000** 700/800 MHz only		Public Safety Microphone (30 inch cable) PSM Antenna required. VHF not supported.	PMMN4061	●	Windporting	High/Low		1	3.5 mm	IP55	FM UL	60 x 78 x 28	●				●		
		Public Safety Microphone (24 inch cable) PSM Antenna required. VHF not supported. Recommended for use with UHF radios.	PMMN4060	●	Windporting	High/Low		1	3.5 mm	IP55	FM UL	60 x 78 x 28	●				●		
		Public Safety Microphone (24 inch cable) PSM Antenna required. VHF not supported. Recommended for use with 7/800MHz radios.	PMMN4060_ SP01	●	Windporting	High/Low		1	3.5 mm	IP55	FM UL	60 x 78 x 28	●				●		
		Public Safety Microphone (18 inch cable) PSM Antenna required. VHF not supported.	PMMN4059	●	Windporting	High/Low		1	3.5 mm	IP55	FM UL	60 x 78 x 28	●				●		

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

HOW DOES COMMPORT™ WORK?

The miniature microphone and receiver connect to your APX radio and fasten securely and comfortably to your ear. Unlike bone conduction or boom mic technology, the CommPort System picks up sound waves as they cross the face so you hear and can be heard virtually in any environment.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
COMMPORT™ Integrated microphone/receiver lets you talk discreetly and hear clearly and still be aware of everything around you, from traffic noise to other responders.			
PORTABLE RADIOS	DESCRIPTION		PART NUMBER
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **SRX 2200**		Replacement Palm PTT for RLN6480	NKN6510
		Replacement Cable for RLN6481	NKN6508
		Replacement Snap-On-Side PTT for RLN6482	NKN6525

COMPATIBILITY	ACCESSORY		
COMMPORT™			
PORTABLE RADIOS	DESCRIPTION		PART NUMBER
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **SRX 2200**		Replacement Ring PTT for RLN6483	NKN6512
		Replacement Remote Body PTT for RLN6484	NNTN4188
		CommPort Maintenance Kit (Includes 10 replacement ear tubes, 10 microphone seals and 2 windscreens)	NTN8821
		Ear Straps for secure attachment to ear (pack of 10)	NTN8988
		Replacement Ear Tubes (pack of 10)	RLN5037
		Replacement Collar Clip	4285838B01

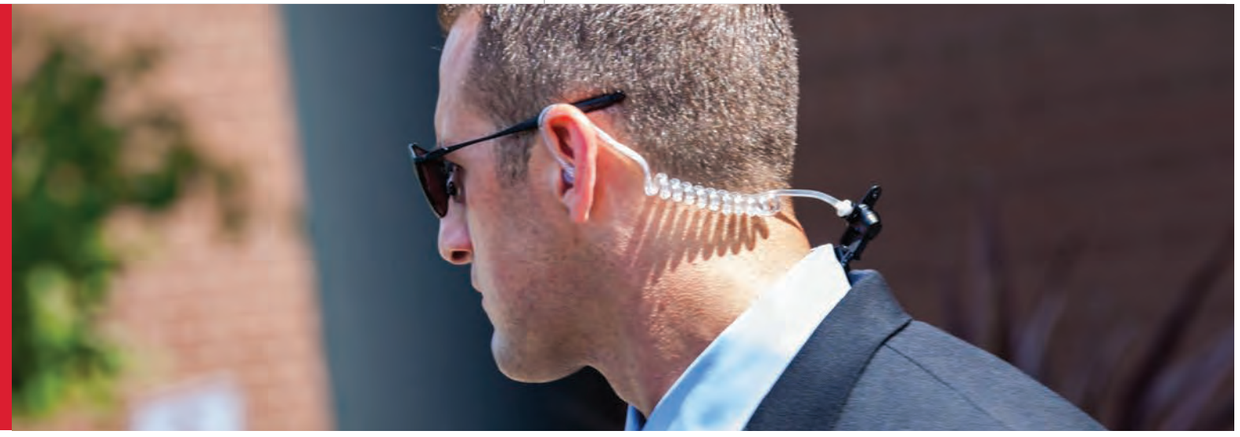
APX PORTABLE RADIO ACCESSORIES

EAR MICROPHONE SYSTEM

COMPATIBILITY	ACCESSORY			FEATURES						VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	EARPIECE TYPE	MICROPHONE	PTT	PROGRAMMABLE BUTTON	HAZLOC- CAPABLE†	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		IMPRES Ear Microphone with Bone Conduction and programmable button, black	PMLN5653	●	In-Ear Mic	In-Ear Mic	Large, Ring-guarded, Recessed		FM APPROVED FOR APX 7000, APX 7000XE, APX 6000, APX 6000XE	●		●	●			
		Earguard with Adjustable Loop	0180300E25													
		Earholder, Black, Small	0180358B32													
		Earholder, Clear, Large	0180358B37													

HOW DOES IMPRES IMPROVE AUDIO PERFORMANCE?

IMPRES enhances the clarity and audio quality of Motorola accessories by reducing ambient noise and improving voice intelligibility. If you speak quietly or normally, but not directly into a microphone, IMPRES Audio detects changes in your voice and automatically adjusts the transmitted volume so your listener won't have to adjust volume up and down.



SURVEILLANCE KITS

Transmit and receive discreetly with a variety of surveillance kits that feature a streamlined design and rugged cables that withstand tough conditions. A quick-disconnect, durable and comfortable translucent tube enables easy sharing between shifts.

Two-wire kits have one wire for receiving transmissions and one wire with a combined microphone and push-to-talk. Three-wire kits feature separate wires for receiving transmissions, push-to-talk and microphone.

COMPATIBILITY	ACCESSORY			FEATURES						VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	EARPIECE TYPE	MICROPHONE	PTT	PROGRAMMABLE BUTTON	HAZLOC- CAPABLE†	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 SRX 2200		1-Wire Receive-only Earpiece, Black	PMLN6125	●	Ear Hanger				FM UL	●		●	●			
		1-Wire Receive-only Earpiece, Beige	PMLN6126	●	Ear Hanger				FM UL	●		●	●			
		IMPRES 2-Wire Surveillance Kit, Programmable Button, Black	PMLN6127	●	Ear Hanger	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire		FM UL	●		●	●			
		IMPRES 2-Wire Surveillance Kit, Programmable Button, Beige	PMLN6128	●	Ear Hanger				FM UL	●		●	●			

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES						VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
SURVEILLANCE KITS																
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	EARPIECE TYPE	MICROPHONE	PTT	PROGRAMMABLE BUTTON	HAZLOC-CAPABLE†	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		IMPRES 2-Wire Surveillance Kit with Translucent Tube, Programmable Button, Black	PMLN6129	●	Clear Rubber Eartip	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire		FM UL	●		●	●			
		IMPRES 2-Wire Surveillance Kit with Translucent Tube, Programmable Button, Beige	PMLN6130	●	Clear Rubber Eartip				FM UL	●		●	●			
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		IMPRES 3-Wire Surveillance Kit with Translucent Tube, Programmable Button, Black	PMLN6123	●	Clear Rubber Eartip	Separate Wire	Separate Wire		FM UL	●		●	●			
		IMPRES 3-Wire Surveillance Kit with Translucent Tube, Programmable Button, Beige	PMLN6124	●	Clear Rubber Eartip				FM UL	●		●	●			
		1-Wire Receive-Only Surveillance Kit with Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6726		Ear Hanger				FM approved with APX6000/6000XE APX7000/7000XE UL	●		●	●			
		1-Wire Receive-Only Surveillance Kit with Extra-Loud Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6727		Ear Hanger				FM approved with APX6000/6000XE APX7000/7000XE UL	●		●	●			

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY | **ACCESSORY** | **VERTICAL MARKETS:** Recommendations based on typical use case for each of verticals listed.

SURVEILLANCE KITS

PORTABLE RADIOS	DESCRIPTION	PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT	HAZLOC-CAPABLE†	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200	1-Wire Receive-Only Surveillance Kit with Translucent Tube, Black, 3.5mm Threaded. Requires BDN6783.	RLN5313	Clear Rubber Eartip			UL	●		●	●			
	1-Wire Receive-Only Surveillance Kit with Translucent Tube, Black, Loud version, 3.5mm Threaded. Requires BDN6783 or NMN6274.	RLN5313_XL	Clear Rubber Eartip				●		●	●			
	2-Wire Surveillance Kit with Translucent Tube, Black, 3.5mm Threaded. Requires BDN6783.	RLN5312	Clear Rubber Eartip	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire		●		●	●			
	2-Wire Surveillance Kit with Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6729	Ear Hanger	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire	UL FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	2-Wire Surveillance Kit with Extra-Loud Earpiece, Beige, 3.5mm Threaded. Requires BDN6783.	BDN6669	Ear Hanger	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire	FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	2-Wire Surveillance Kit with Extra-Loud Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6731	Ear Hanger	Mic and PTT Combined on a Single Wire	Mic and PTT Combined on a Single Wire	UL FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	3-Wire Surveillance Kit with Earpiece, Beige, 3.5mm Threaded. Requires BDN6783.	BDN6668	Ear Hanger	Separate Wire	Separate Wire	UL FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	3-Wire Surveillance Kit with Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6730	Ear Hanger	Separate Wire	Separate Wire	UL FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	3-Wire Surveillance Kit with Extra-Loud Earpiece, Beige, 3.5mm Threaded. Requires BDN6783.	BDN6670	Ear Hanger	Separate Wire	Separate Wire	FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			
	3-Wire Surveillance Kit with Extra-Loud Earpiece, Black, 3.5mm Threaded. Requires BDN6783.	BDN6732	Ear Hanger	Separate Wire	Separate Wire	UL FM approved with APX6000/6000XE APX7000/7000XE	●		●	●			

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES	
SURVEILLANCE KIT ACCESSORIES AND REPLACEMENT PARTS					
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	COMPATIBLE SURVEILLANCE KITS
		Completely Discreet Earpiece Kit with Neckloop, Beige, Includes GMLN5261, RLN4920 and RNN4005	PMLN7696		
APX 8000XE		Phonak Nano Ear Receiver, Beige (Neckloop must be ordered separately)	GMLN5261		
APX 7000		Phonak Nano Ear Receiver, Brown (Neckloop must be ordered separately)	GMLN5262		
APX 7000XE		Replacement Earwax Guards. 5 per pack. Compatible with PMLN7696	RLN4919		
		Optional Retention Hooks, Pack of 10	NNTN8457		
APX 6000		Phonak Inductive Neckloop Included in the PMLN7696	RLN4920		
APX 6000XE		1.4 Volt Battery – Pack of 6	RNN4005		
		Low Noise Kit with Quick Disconnect Translucent Tube and Clear Rubber Eartip	RLN6242	Clear Rubber Eartip	PMLN6123, PMLN6124, PMLN6129, PMLN6130
APX 4000		Replacement Standard Clear Rubber Eartip, Pack of 50	RLN6282	Clear Rubber Eartip	PMLN6123, PMLN6124, PMLN6125, PMLN6126, PMLN6127, PMLN6128, PMLN6129, PMLN6130
APX 3000		Replacement Foam Plugs for RLN5887 and RLN6242. Noise reduction = 25dB.* Pack of 50 pairs.	5080384F72	Foam Eartip	PMLN6123, PMLN6124, PMLN6129, PMLN6130
APX 1000		Low Noise Kit with 1 Clear Rubber Eartip	RLN5886	Clear Rubber Eartip	RLN5882, RLN5883, PMLN5111, PMLN5112, PMLN6125, PMLN6126
		High Noise Kit* with 2 Foam Earplugs	RLN5887	Foam Eartip	
APX 900		Clear EP7-Small Hearing Protectors [Sonic Defenders] Ultra Earplugs Noise reduction = 28dB	RLN6511	Comply™ Foam Eartip	RLN5882, RLN5883, PMLN5111, PMLN5112, PMLN6123, PMLN6124, PMLN6125, PMLN6126, PMLN6127, PMLN6128, PMLN6129, PMLN6130
SRX 2200		Clear EP7-Medium Hearing Protectors [Sonic Defenders] Ultra Earplugs Noise reduction = 28dB	RLN6512	Comply™ Foam Eartip	
		Clear EP7-Large Hearing Protectors [Sonic Defenders] Ultra Earplugs Noise reduction = 28dB	RLN6513	Comply™ Foam Eartip	

* For High Noise Kit solution - combine RLN6242 Low Noise Kit with translucent tube and clear rubber eartip and RLN6281 Replacement Foam Plugs for RLN6242. Noise reduction = 25dB.

COMPATIBILITY	ACCESSORY			FEATURES
SURVEILLANCE KIT ACCESSORIES AND REPLACEMENT PARTS				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 1000** **APX 900** **SRX 2200**		Small Clear Comfortable Earpiece, Right Ear	RLN4760	Clear comfortable earpiece
		Medium Clear Comfortable Earpiece, Right Ear	RLN4761	Clear comfortable earpiece
		Large Clear Comfortable Earpiece, Right Ear	RLN4762	Clear comfortable earpiece
		Small Clear Comfortable Earpiece, Left Ear	RLN4763	Clear comfortable earpiece
		Medium Clear Comfortable Earpiece, Left Ear	RLN4764	Clear comfortable earpiece
		Large Clear Comfortable Earpiece, Left Ear	RLN4765	Clear comfortable earpiece
SURVEILLANCE KIT AUDIO ADAPTERS				
APX 7000 **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 1000** **APX 900** **SRX 2200**		3.5mm Threaded Audio Adapter	BDN6783†	UL Approved: BDN6667, BDN6668, BDN6669, BDN6728, BDN6729, BDN6730, BDN6731, BDN6670 Other: BDN6664, BDN6665, BDN6666, BDN6726, BDN6727, BDN6732
		6 Pin Hirose Keyload and Audio Adapter, FM/IS rated	NNTN7869	ZMN6031, ZMN6032, ZMN6038, ZMN6039

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

XBT HEAVY-DUTY WIRELESS HEADSET IN USE

It's the middle of a shift and with machinery running at full speed, your workplace is a noisy place to be. You need to communicate on your radio while still being aware of everything around you. XBT heavy-duty headsets connect wirelessly to your radio, suppressing noise for clearer communications. With patented SENS™ situational awareness technology, these headsets ensure you'll hear critical communications from co-workers in the field with you.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES								VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
HEADSETS																		
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	HEADSET TYPE	SPEAKER	NOISE-CANCELLING / NOISE-REDUCTION	MICROPHONE	PTT	HAZLOC-CAPABLE†	WEIGHT	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		IMPRES Temple Transducer with Boom Microphone and In-line Push-To-Talk Replacement Rubber Temple Cover (1 Pair) 7580384M19	PMLN5101	●	Behind-the-Head	Bone Conduction		Boom	In-line	FM UL	Lightweight	●		●		●	●	●
		Earset D-Shell	PMLN5096		Over-the-Ear	Single-Ear		Boom	In-line	UL	Lightweight							●
		Ultra Lite Headset	PMLN5102		Over-the-Head	Single-Ear		Boom	In-line	UL	Lightweight							●
		Heavy-Duty Behind-the-Head Headset with Noise-Cancelling Boom Microphone, Noise Reduction = 24dB	PMLN6852		Behind-the-Head	Dual-Ear	●	Boom	On Ear Cup		Heavy-Duty					●	●	●
		Heavy-Duty Behind-the-Head Headset with Noise-Cancelling Boom Microphone, Noise Reduction = 24dB	PMLN6853		Behind-the-Head	Dual-Ear	●	Boom	On Ear Cup	UL	Heavy-Duty					●	●	●
		Heavy-Duty Over-the-Head Headset with Noise-Cancelling boom Microphone, Noise Reduction = 24dB	PMLN7466		Over-the-Head	Dual-Ear	●	Boom	On Ear Cup		Heavy-Duty					●	●	●
		Heavy-Duty Over-the-Head Headset with Noise-Cancelling Boom Microphone, Noise Reduction = 24dB	PMLN7467		Over-the-Head	Dual-Ear	●	Boom	On Ear Cup	UL	Heavy-Duty					●	●	●
APX 8000 APX 6000XE APX 8000XE APX 4000 APX 7000 APX 1000 APX 7000XE APX 900 APX 6000 SRX 2200		Lightweight Over-the-Head Headset Single Muff with in-Line Push-To-Talk & Boom Mic REX4648 - Replacement Foam Earpad and Microphone Cover Kit	RMN5058		Over-the-Head	Single-Ear		Boom	In-line	FM UL	Lightweight			●		●	●	●
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 900 SRX 2200		XBT Operations Critical Wireless Behind-the-Neck Headset	RLN6490		Behind-the-Neck	Dual-Ear	●	Boom	Radio, Headset or Wireless PTT Pod		Heavy-Duty					●		●
		XBT Operations Critical Wireless Headband Style Headset	RLN6491		Over-the-Head	Dual-Ear	●	Boom	Radio, Headset or Wireless PTT Pod		Heavy-Duty					●		●

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

3M PELTOR HEAVY DUTY HEADSETS

COMPATIBILITY	ACCESSORY				FEATURES						
PORTABLE RADIOS		DESCRIPTION AND ADAPTER TYPE	PART NUMBER	PELTOR PART NUMBER	HEADSET TYPE	CONNECTOR TYPE	SPEAKER	NOISE REDUCTION RATING (NRR)	NOISE-CANCELLING MICROPHONE	PTT (APX)	HAZLOC-CAPABLE†
DIRECT CONNECT											
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		MT Series Over-the-Head Headset, Direct Radio Connect	RMN5137	MT7H79A-C5063-34	Over-the-Head	Connects directly to Radio	Dual-Ear	25dB	Boom	On Ear Cup	UL
		MT Series Neckband Headset, Direct Radio Connect	RMN5138	MT7H79B-C5063-34	Neckband	Connects directly to Radio	Dual-Ear	24dB	Boom	On Ear Cup	UL
		MT Series Hard Hat Attached Headset, Direct Radio Connect	RMN5139	MT7H79P3E-C5063-34	Hard Hat Attached	Connects directly to Radio	Dual-Ear	21dB	Boom	On Ear Cup	UL
PTT ADAPTER CONFIGURATIONS											
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		MT Series Over-the-Head Headset with Nexus Connector	PMLN6088	MT7H79A-34	Over-the-Head	Nexus	Dual-Ear	25dB	Boom	Requires PTT Adapter PMLN6095	
		MT Series Neckband Headset with Nexus Connector	RLN6477	MT7H79B-34	Neckband	Nexus	Dual-Ear	24dB	Boom	Requires PTT Adapter PMLN6095	
		MT Series Hard Hat Attached with Nexus Connector	RMN4051	MT7H79P3E-34	Hard Hat Attached	Nexus	Dual-Ear	21dB	Boom	Requires PTT Adapter PMLN6095	
		TacticalPro Series Over-the-Head Headset with Nexus Connector	RMN4052	MT15H7A-34	Over-the-Head	Nexus	Dual-Ear	26dB	Boom	Requires PTT Adapter PMLN6095	
		TacticalPro Series Neckband Headset with Nexus Connector	RMN5135	MT15H7B-07-34	Neckband	Nexus	Dual-Ear	25dB	Boom	Requires PTT Adapter PMLN6095	
		TacticalPro Series Hard Hat Attached with Nexus Connector	RMN4053	MT15H7P3E-34	Hard Hat Attached	Nexus	Dual-Ear	22dB	Boom	Requires PTT Adapter PMLN6095	
		PTT Nexus Adapter. Requires one of the six headsets listed directly above	PMLN6095	FL5063-34							
RSM CONFIGURATIONS											
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		HT Series Listen Only Over-the-Head Headset with 3.5mm NON Threaded Connector	RMN4055	HTM79A-34	Over-the-Head	3.5mm NON threaded	Dual-Ear	25dB	(Listen-Only)	APX radio requires RSM: PMMN4062, PMMN4069 or PMMN4084	
		HT Series Listen Only Neckband Headset with 3.5mm NON Threaded Connector	RMN5132	HTM79B-34	Neckband	3.5mm NON threaded	Dual-Ear	24dB	(Listen-Only)		
		HT Series Listen Only Hard Hat Attached Headset with 3.5mm NON Threaded Connector	RMN5133	HTM79P3E-34	Hard Hat Attached	3.5mm NON threaded	Dual-Ear	23dB	(Listen-Only)		

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

COMPATIBILITY	ACCESSORY			
HEADSET REPLACEMENT PARTS				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	PELTOR PART NUMBER
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		Earmuff Hygiene Kit Black Earseals	RLN4923	HY79
		Boom Microphone Wind Screen	RLN6543	M40/1

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES				VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
HEARING PROTECTION														
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	HEADSET TYPE	SPEAKER	NOISE-CANCELLING / NOISE-REDUCTION	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		Clear EP7-Small Hearing Protectors [Sonic Defenders] Ultra Earplugs, noise reduction = 28dB	RLN6511		Comply™ Foam Ear tip		Noise-Reduction					●	●	●
		Clear EP7-Medium Hearing Protectors [Sonic Defenders] Ultra Earplugs, noise reduction = 28dB	RLN6512		Comply™ Foam Ear tip		Noise-Reduction					●	●	●
		Clear EP7-Large Hearing Protectors [Sonic Defenders] Ultra Earplugs, noise reduction = 28dB	RLN6513		Comply™ Foam Ear tip		Noise-Reduction					●	●	●
TACTICAL SOLUTIONS														
APX 8000		Tactical PTT/VOX Interface Module	PMLN6765					●	●	●	●	●		●
APX 8000XE		Tactical PTT Only Interface Module	PMLN6827					●	●	●	●	●		●
APX 7000		Tactical Boomless Temple Transducer Requires Interface Module PMLN6765 or PMLN6827.	PMLN6766		Over-the-Head	Bone Conduction	Noise-Cancelling	●		●	●	●		●
APX 7000XE		Tactical Throat Microphone Requires Interface Module PMLN6765 or PMLN6827.	PMLN6828		Neckband	Earbud	Noise-Cancelling	●		●	●	●		●
APX 6000		Tactical Ear Microphone Requires Interface Module PMLN6765 or PMLN6827.	PMLN6829		In-Ear	In-Ear	Noise-Cancelling	●	●			●		●
APX 6000XE														
APX 4000		Tactical Temple Transducer / Boom Mic Requires Interface Module PMLN6765 or PMLN6827.	PMLN6833		Over-the-Head	Bone Conduction	Noise-Cancelling	●			●	●		●
APX 3000		Tactical Remote Body PTT For use with Interface Module PMLN6765 or PMLN6827.	PMLN6767					●	●	●	●	●		●
SRX 2200		Tactical Remote Ring PTT For use with Interface Module PMLN6765 or PMLN6827.	PMLN6830						●		●			●

WHAT ARE THE EP7 SONIC DEFENDERS ULTRA EARPLUGS?

RLN6511, RLN6512, RLN6513

The EP7 Sonic Defenders Ultra Earplugs provide extra comfort and/or noise protection for users wearing surveillance accessories or users wearing heavy duty headsets / helmets. With a foam-tipped stem design and soft memory-foam Comply™ Canal Tips, these comfortable earplugs protect your hearing without blocking your ability to hear routine sounds or conversations. Safe sounds are allowed to pass through into the ear canal, while potentially harmful noises (above 85dB) are reduced through a filter.

Filter caps are included and can be inserted for additional hearing protection or removed for use with surveillance kits.* With a patented EarLock® technology to hold them in place, all-day comfort, and a low-profile design, these earplugs can be worn while wearing a helmet or mask, or while using a phone or heavy duty headset. Lanyard is included in each earplug kit.

*EP7 earpiece will not provide full 28dB Noise Reduction when the noise-reducing filter is removed.

Motorola's Tactical Solution offers a high performance interface enhanced by high speed DSP (Digital Signal Processor) which only detects the human voice.

Providing steady and trouble free transmission without clipping your message even in the noisiest environments.

Combined with various headsets assures efficient and safer operation in a variety of work environments.

HOW DO MISSION CRITICAL WIRELESS ACCESSORIES HELP ME?

They free you from being physically connected to the radio and are ideal for surveillance operations. They look CONSUMER, but are mission critical in performance and provide exceptional flexibility, high security, superior audio performance and a new dimension of freedom. Carry your radio in a backpack, bag or purse without being constrained by wires. YOUR RADIO, UNLEASHED.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		FEATURES										VERTICAL MARKETS: Recommendations based on typical use case for each of verticals listed.						
MISSION CRITICAL WIRELESS (MCW) ACCESSORIES This portfolio is a game changer, giving you the flexibility to remove the radio from your belt and stay connected within 30 feet.																			
PORTABLE RADIOS	DESCRIPTION	PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT	TALK TIME (HOURS) 5/5/90 DUTY CYCLE	CHARGE TIME (HOURS)	WEIGHT (GRAMS)	SIZE (MM)	RANGE (FEET LINE OF SIGHT)	IP RATING	HAZLOC-CAPABLE†	POLICE	FIRE / EMS	MILITARY	FEDERAL AGENCIES	UTILITIES AND PUBLIC WORKS	OIL, GAS AND MINING	TRANSPORTATION
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200	Mission Critical Wireless Earpiece with 12" Cable and Push-To-Talk Pod	NTN2570	Over-the-Ear (CommPort™)	Directional, above the Earpiece	●	10	3	43	70 x 41 x 25	30	IP54	FM	●	●	●	●	●		●
	Mission Critical Wireless Push-To-Talk Pod	NTN2571			●	10	3	43	70 x 41 x 25	30	IP54	FM	●	●	●	●	●		●
	Mission Critical Wireless Remote Control Keyfob with Programmable Buttons	NNTN8442			●	10	3	26	67 x 32 x 16	30	IP54		●			●			

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX PORTABLE RADIO ACCESSORIES

MISSION CRITICAL WIRELESS (MCW) ACCESSORIES This portfolio is a game changer, giving you the flexibility to remove the radio from your belt and stay connected within 30 feet.

COMPATIBILITY	ACCESSORY			FEATURES		
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		Single-wire Surveillance Kit With Quick Disconnect Translucent Tube for Wireless Push-to-Talk Pod	PMLN7052	Clear Rubber Eartip	In-line	On Pod, ordered separately
		Single-wire Earbud with 11.5" Cable for Wireless Push-to-Talk Pod, Black	NNTN8294	Earbud	In-line	On Pod, ordered separately
		Single-wire Earbud with 45" Cable for Wireless Push-to-Talk Pod, Black	NNTN8295	Earbud	In-line	On Pod, ordered separately
		Covert Audio Kit for Mission Critical Wireless PTT Pod	NNTN8296	1 Earbud and 2 Earbud Headsets	In-line	On Pod, ordered separately
		Y-Adapter and Retention Hook for Mission Critical Wireless Push-to-Talk Pod	NNTN8385		Directional, on Separate Wire	On Pod, ordered separately
		Neckloop for Discreet Earpiece Kit	RLN4920			
		Accessory Kit for Completely Discreet Wireless Surveillance Kit. Includes: Wireless Neckloop, Y-adapter and Retention Hook (NNTN8385), Completely Discreet Earpiece Kit (PMLN7696) and Mission Critical Wireless Push-To-Talk Pod (NTN2571)	NNTN8434			
		Commercial 3.5mm Earbud Headset Adapter, 10 per pack	NNTN8737			
		Replacement Wireless Earpiece Cable, 12 inch	NTN2572	Over-the-Ear (CommPort™)	Directional above the Ear CommPort	On Pod, ordered separately
		Mission Critical Wireless Covert Pack-N-Go Kit, Basic. Kit includes: NNTN8296 Basic Mission Critical Wireless Covert Kit, NTN2571 Mission Critical Wireless Push-to-Talk (PTT) Pod and NNTN8442 Mission Critical Wireless Remote Control Unit	RLN6489	Earbud and Earbud Headset	On Y-Adapter or In-line on Earbuds	On PTT and MCW Keyfob
		Mission Critical Wireless Covert Pack-N-Go Kit, Advanced. Kit includes: All contents of Covert Pack-n-Go Kit plus PMLN7696 Completely Discreet Earpiece Kit and NNTN8385 Wireless Neckloop Y-adapter	RLN6501	Completely Discreet Earpiece, Earbud and Earbud Headset	On Y-Adapter or In-line on Earbuds	On PTT and MCW Keyfob

MISSION CRITICAL WIRELESS (MCW) ACCESSORIES This portfolio is a game changer, giving you the flexibility to remove the radio from your belt and stay connected within 30 feet.

COMPATIBILITY	ACCESSORY			FEATURES		
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		Wireless Earpiece Maintenance Kit with 10 Silicone Ear Tubes, 10 Microphone Seal Strips and 2 Foam Windscreens for NTN2572 Over-the-Ear Earpiece	NTN8821	Over-the-Ear (CommPort™)		
		Ear Strap for CommPort™ Earpiece to Secure Earpiece to Ear (10 per pack)	NTN8988	Over-the-Ear (CommPort™)		
		Eartubes for CommPort™ Earpiece (10 per pack)	RLN5037	Over-the-Ear (CommPort™)		
		Replacement Ear Tips Kit for Wireless Ear Buds (20 Small, 20 Medium, 20 Large and 10 Clips)	NNTN8361	Earbud		
		Replacement Swivel Clip for Wireless PTT Pod	PMLN6246			
		Replacement or Spare Micro-USB Plug-In Charger (US)	PMPN4027			

WHAT MAKES THE COVERT PACK-AND-GO KIT A MUST-HAVE?

Organize and stow all your APX wireless accessories on the go, all in one place. Keep this durable kit in a backpack or messenger bag and you'll always have the right accessories on hand. With a dozen secure straps and deep mesh pockets, you can access exactly what you need when an operation happens.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES		
OPERATIONS CRITICAL WIRELESS (OCW) ACCESSORIES This portfolio is a game changer, giving you the flexibility to remove the radio from your belt and stay connected within 30 feet.						
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT
APX 900		EP900W Opertions Critical Wireless Earpiece with PTT	PMLN7851	Over-the-Ear (Swivel)	In-line	On Pod
		Bluetooth Accessory Kit with Flexible Earpiece, Bluetooth Pod, and Charging Cradle with Power Supply	RLN6500	Over-the-Ear (Swivel)	Boom	On Earpiece
		Flexible Earpiece With Boom Microphone for RLN6500	PMLN7203	Over-the-Ear (Swivel)	Boom	On Pod, ordered separately
		Operations Critical Wireless Earpiece with 12 inch Cable	NNTN8125	Over-the-Ear (CommPort™)	Directional, above the Earpiece	On Pod
		Operations Critical Wireless Push-to-Talk Pod with Charger	NNTN8127			On Pod
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 900** **SRX 2200**		Accessory Kit for Completely Discreet Wireless Surveillance Kit. Includes: Wireless Neckloop, Y-adapter and Retention Hook (NNTN8385), Completely Discreet Earpiece Kit (PMLN7696) and Mission Critical Wireless Push-To-Talk Pod (NTN2571)	NNTN8434			
		Single-wire Surveillance Kit With Quick Disconnect Translucent Tube for Wireless Push-to-Talk Pod for Pod	PMLN7052	Clear Rubber Eartip	In-line	On Pod, NNTN8127 ordered separately
		Single-wire Earbud with 11.5" Cable for Wireless Push-to-Talk Pod, Black	NNTN8294	Earbud	In-line	On Pod, NNTN8127 ordered separately
		Single-wire Earbud with 45" Cable for Wireless Push-to-Talk Pod, Black	NNTN8295	Earbud	In-line	On Pod, NNTN8127 ordered separately
		XBT Operations Critical Wireless Behind-the-Neck Headset	RLN6490	Headset	Boom	Headset or On Pod NNTN8127 ordered separately

COMPATIBILITY	ACCESSORY			FEATURES		
OPERATIONS CRITICAL WIRELESS (OCW) ACCESSORIES						
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	EARPIECE TYPE	MICROPHONE	PTT
		XBT Operations Critical Wireless Headband Style Headset	RLN6491	Headset	Boom	Headset or On Pod NNTN8127 ordered separately
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 900** **SRX 2200**		Replacement Wireless Earpiece Cable, 12 inch	NTN2572	Over-the-Ear (CommPort™)	Directional above the Ear CommPort	On Pod, NNTN8127 ordered separately
		Covert Audio Kit for Operations Critical Wireless PTT Pod	NNTN8296			
		CommPort Maintenance Kit (Includes 10 replacement ear tubes, 10 microphone seals and 2 windscreens)	NTN8821	Over-the-Ear (CommPort™)		
		Ear Strap for CommPort™ Earpiece to Secure Earpiece to Ear (10 per pack)	NTN8988	Over-the-Ear (CommPort™)		
		Eartubes for CommPort™ Earpiece (10 per pack)	RLN5037	Over-the-Ear (CommPort™)		

APX PORTABLE RADIO ACCESSORIES

MOTOROLA IMPRES 2 BATTERIES

COMPATIBILITY	ACCESSORY		FEATURES						
PORTABLE RADIOS	DESCRIPTION	PART NUMBER	IMPRES	CHEMISTRY	TYPICAL RATED CAPACITY (mAh)	DIMENSIONS (MILLIMETERS) (H x W x D)	WEIGHT (MAX. GRAMS)	HAZLOC-CAPABLE†	IP RATING
APX 8000 APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200	IMPRES 2 Li-Ion 3400 mAh Battery, IP68 Rugged	PMNN4486	●	Li-Ion	3400	86 x 59 x 42	185		IP68 Rugged
	IMPRES 2 Li-Ion 2550 mAh Battery, IP68 Rugged	PMNN4485	●	Li-Ion	2550	86 x 59 x 37	150		IP68 Rugged
	IMPRES 2 Li-Ion 4850 mAh Battery, IP68 Rugged, -30ºC Rated	PMNN4487	●	Li-Ion	4850	130 x 59 x 42	320		IP68 Rugged
	IMPRES 2 Li-Ion 5100 mAh Battery, IP68 Rugged	PMNN4494	●	Li-Ion	5100	130 x 59 x 42	320		IP68 Rugged
APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200	IMPRES 2 Li-Ion 3100 mAh Battery, IP68 Rugged	PMNN4547	●	Li-Ion	3100	86 x 59 x 45	200	UL	IP68 Rugged
	IMPRES 2 Li-Ion 4600 mAh Battery, IP68 Rugged	PMNN4573	●	Li-Ion	4600	130 x 59 x 42	320	UL	IP68 Rugged
APX 8000XE	IMPRES 2 Li-Ion 3400 mAh Battery, IP68 Rugged	PMNN4504	●	Li-Ion	3400	86 x 59 x 42	185	UL	IP68 Rugged
	IMPRES 2 Li-Ion 4850 mAh Battery, IP68 Rugged, -30ºC Rated	PMNN4505	●	Li-Ion	4850	130 x 59 x 42	320	UL	IP68 Rugged

MOTOROLA IMPRES BATTERIES The only batteries developed, tested and certified for optimal performance with your APX radio.
APX batteries are Proven Tough, in lab test after lab test, to withstand shocks, knocks, drops and shakes and outperform the other brands.

APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200	IMPRES Li-Ion 2350 mAh Battery, IP68 Rugged	NNTN8092	●	Li-Ion	2350	86 x 59 x 42	160	FM	IP68 Rugged
	IMPRES Li-Ion 4300 mAh Battery IP68 Rugged	NNTN7033	●	Li-Ion	4300	130 x 59 x 42	285	FM	IP68 Rugged

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

IMPRES 2 – A NEW GENERATION. COMPLETELY RE-ENERGIZED.

With IMPRES 2 chargers, you can charge IMPRES 2 batteries up to 40% faster. Customize your charging to extend the life of batteries in storage. And manage power more intelligently with enhanced diagnostics, so you get the most from each battery. IMPRES 2 batteries have been improved inside and out, so your team can tackle whatever the day brings. With higher capacity, you'll get more talk time. With better water resistance, you'll never think twice about submersion. And with the ability to charge up to 60% more times than standard Lithium Ion batteries, you'll reduce costs.

APX PORTABLE RADIO ACCESSORIES

MOTOROLA IMPRES BATTERIES The only batteries developed, tested and certified for optimal performance with your APX radio.
APX batteries are Proven Tough, in lab test after lab test, to withstand shocks, knocks, drops and shakes and outperform the other brands.

COMPATIBILITY	ACCESSORY		FEATURES							
PORTABLE RADIOS	DESCRIPTION	PART NUMBER	IMPRES	CHEMISTRY	TYPICAL RATED CAPACITY (mAh)	DIMENSIONS (MILLIMETERS) (H x W x D)	WEIGHT (MAX. GRAMS)	HAZLOC-CAPABLE†	IP RATING
APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200	IMPRES NiMH 2200 mAh Battery IP68 Rugged	NNTN7035	●	NiMH	2200	136 x 59 x 40	335	FM	IP68 Rugged
	APX Clamshell Battery Pack, IP57 Requires 12 AA Alkaline batteries (not included).	PMNN4439		AA Alkaline/ Li-Ion	Alkaline: 2700 Li-Ion: 6100	165 x 60 x 60	Alkaline: 476 Li-Ion: 380		IP57
SRX 2200	Military, Li-Ion 3100 mAh, Battery IP68 Rugged, Coyote Brown	NNTN8182		Li-Ion	3100	86 x 59 x 42	185		IP68 Rugged
APX 4000 APX 3000 APX 1000 APX 900	IMPRES Li-Ion 2000 mAh Slim Battery, IP67	NNTN8128	●	Li-Ion	2000	115 x 52 x 18	160		IP67
	IMPRES Li-Ion 2350 mAh Battery, IP67	PMNN4424	●	Li-Ion	2350	115 x 52 x 23	170		IP67
	IMPRES Li-Ion 2800 mAh Battery, IP67	PMNN4448	●	Li-Ion	2800	115 x 52 x 23	170		IP67
APX 900	IMPRES Li-Ion 2900 mAh Battery, IP68	PMNN4489	●	Li-Ion	2900	115 x 52 x 23	170	UL	IP68
	IMPRES Li-Ion 2100 mAh Battery, IP68	PMNN4491	●	Li-Ion	2100	115 x 52 x 18	160		IP68
	IMPRES Li-Ion 3000 mAh Battery, IP68	PMNN4493	●	Li-Ion	3000	115 x 52 x 23	170		IP68
APX 4000 APX 3000 APX 1000	IMPRES Hi-Cap Li-Ion 2500 mAh Battery, IP57	NNTN8560	●	Li-Ion	2500	113 x 52 x 23	195	UL	IP57
	IMPRES Li-Ion 2350 mAh Battery, IP67	NNTN8129	●	Li-Ion	2350	115 x 52 x 23	170	FM	IP67
APX 3000	IMPRES Li-Ion 1300 mAh Slim Battery, IP67	NNTN8305	●	Li-Ion	1300	115 x 52 x 14	98		IP67

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

INCREASED CAPACITY

DO MORE WITHOUT THE BULK.

First responders, public works employees, and other professionals know that shifts aren't getting any shorter. Thankfully, you can keep your people connected even longer. IMPRES 2 batteries deliver higher capacity without an increase in size.

DURABLE DESIGN

TACKLE THE TOUGHEST CONDITIONS.

Wherever the job takes you, be confident your battery will be up to the challenge. All IMPRES 2 batteries share the same IP68 rating as APX radios, which means they can be fully submersed in two meters of water for up to four hours. Designed with a rugged housing, they're as tough as the radios they charge. And in test after test, IMPRES 2 batteries continually withstand shocks, knocks, drops and shakes, outperforming the competition every time.

EXTENDED BATTERY LIFE

EXTENDED LIFE. BUILT TO LAST.

You face challenges every day. Battery life shouldn't be one of them. IMPRES 2 batteries, when combined with an IMPRES 2 charger, deliver up to 60% more charging cycles than traditional Lithium Ion batteries, so they're on the job longer. Which means you can stock fewer spares, and replace fewer batteries. We've also extended our capacity warranty from 18 to 24 months*, while backing all IMPRES batteries with a long 48 month workmanship warranty. IMPRES 2 batteries are compatible with all existing IMPRES chargers, so your upgrade will be a smooth one.

*IMPRES 2 batteries not charged exclusively in IMPRES 2 chargers receive a 6 month capacity warranty reduction to 18 months instead of 24 months.

APX PORTABLE RADIO ACCESSORIES

CHARGER SOLUTIONS Choose from a variety of solutions including single-unit, unique dual-unit, multi-unit, travel and vehicular chargers and be confident your radio is charged and ready to go the moment you need it.

COMPATIBILITY	ACCESSORY			FEATURES							
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	IMPRES	CHEMISTRY	POWER SOURCE	DIMENSIONS (MILLIMETERS) (H x W x D)	NUMBER OF POCKETS	RECONDITIONING CAPABLE	CHARGING CURRENT (MAX.)	NUMBER OF DISPLAYS
SINGLE AND MULTI-UNIT CHARGERS											
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200		IMPRES 2 Single-Unit Fast Charger, 115V	NNTN8860	●	Li-Ion, NiMH	115VAC	60 x 97 x 163	1	●	Fast	
		IMPRES 2 Single-Unit Fast Charger, 115V, TAA compliant	NNTN8860_ TAA	●	Li-Ion, NiMH	115VAC	60 x 97 x 163	1	●	Fast	
		IMPRES 2 Single-Unit Fast Charger, 100-240V	NNTN8863	●	Li-Ion, NiMH	100-240VAC	60 x 97 x 163	1	●	Fast	
APX 4000 APX 3000 APX 1000 APX 900		IMPRES Single-Unit Charger, 115V	PMPN4174	●	Li-Ion, NiMH	115VAC	61 x 97 x 163	1	●	Rapid Rate	
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200		IMPRES 2 Multi-Unit Fast Charger with 6 Displays and 6 Integrated USB Charging Ports, 100-240V	NNTN8844	●	Li-Ion, NiMH	100-240VAC	153 x 445 x 292	6	●	Fast	6
APX 4000 APX 3000 APX 1000 APX 900		IMPRES Multi-Unit Charger, 115V	PMPN4284	●	Li-Ion, NiMH	115VAC	117 x 444 x 170	6	●	Rapid Rate	1
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE SRX 2200		Wall Mount Bracket for IMPRES Multi-Unit Chargers NNTN8844	NLN7967								
APX 4000 APX 3000 APX 1000 APX 900		Wall mount bracket for PMPN4284 Charger	BR000272A01								

CHARGE FAST. RESPOND FASTER.

With IMPRES 2 chargers, you can charge IMPRES 2 batteries up to 40% faster. Customize your charging to extend the life of batteries in storage. And manage power more intelligently with enhanced diagnostics, so you get the most from each battery.

Get a detailed look at performance while your batteries charge. A built-in diagnostic tool, integrated in the multi-unit charger, provides important usage data, such as a battery's ability to hold a charge and its time in service. Use the information to manage your fleet more efficiently, and replace low capacity batteries before it's too late.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		FEATURES						
CHARGER SOLUTIONS Choose from a variety of solutions including single-unit, unique dual-unit, multi-unit, travel and vehicular chargers and be confident your radio is charged and ready to go the moment you need it.									
PORTABLE RADIOS	**DESCRIPTION**	**PART NUMBER**	**IMPRES**	**CHEMISTRY**	**POWER SOURCE**	**DIMENSIONS (MILLIMETERS) (H x W x D)**	**NUMBER OF POCKETS**	**CHARGING CURRENT (MAX.)**	
VEHICULAR, TRAVEL CHARGERS AND VEHICULAR ADAPTER									
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **SRX 2200**		IMPRES Single-Unit Rapid Rate Vehicular Charger	NNTN7624	●	Li-Ion, NiMH	12VDC Hardwire	82 x 97 x 200	1	Rapid Rate
APX 4000 **APX 3000** **APX 1000** **APX 900**		IMPRES Single-Unit Rapid Rate Vehicular Charger	NNTN7616	●	Li-Ion, NiMH	12VDC Hardwire	82 x 97 x 200	1	Rapid Rate
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **SRX 2200**		Travel Charger with Voltage Regulated Vehicular Charger Adapter, Custom Charger Base, Mounting Bracket, and Coil Cord	RLN6434		Li-Ion, NiMH	12VDC Cigarette Lighter Adapter	67 x 67 x 70	1	
APX 4000 **APX 3000** **APX 1000** **APX 900**		Travel Charger with Voltage Regulated Vehicular Charger Adapter, Custom Charger Base, Mounting Bracket, and Coil Cord	NNTN8525		Li-Ion, NiMH	12VDC Cigarette Lighter Adapter	64 x 67 x 57	1	
APX 8000 **APX 8000XE** **APX 6000** **APX 6000XE** **SRX 2200**		APX Vehicular Adapter includes Fused Power Cable, 2 Keys for the Lock, Screws for Attaching Vehicular Adapter to the Trunnion Mounting Bracket & Quick Start Guide. Trunnion mounting bracket NTN8940 ordered separately.	NNTN8527		Li-Ion	12VDC Hardwire	254 x 137 x 84	1	Rapid Rate
		Trunnion Mounting Bracket	NTN8940						

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
CHARGER SOLUTIONS			
PORTABLE RADIOS	DESCRIPTION		PART NUMBER
IMPRES BATTERY MANAGEMENT TOOLS			
APX 8000 **APX 8000XE** **APX 7000** **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **APX 1000** **APX 900** **SRX 2200**		IMPRES Battery Fleet Management Software	https://www.motorolasolutions.com/en_us/products/two-way-radio-accessories/batteries/impres.html
		IMPRES Battery Fleet Management License Key	HKVN4036
		IMPRES 2 single unit charger (NNTN8860, NNTN8860_TAA, NNTN8863) reprogramming and Battery Fleet Management interface cable	NNTN8870
KEYLOAD CABLES			
APX 8000 **APX 8000XE**		Keyload RS-232 Cable	WPLN6905
APX 7000 **APX 7000XE** **APX 6000** **APX 6000XE** **APX 4000** **APX 3000** **SRX 2200**		Keyloader Cable, KVL3000 and KVL4000	WPLN6904

HOW DO I KNOW MY BATTERIES WILL LAST AN ENTIRE SHIFT?

With the unique IMPRES Battery Reader and IMPRES Battery Fleet Management systems, you can efficiently manage batteries with real-time data not available from other manufacturers.

These easy-to-use software applications show you if there is enough capacity for a full shift, alert you to low capacity batteries, prevent downtime and eliminate throwing batteries out prematurely.

CARRY SOLUTIONS

Motorola Carry Solutions were developed to meet the demands of public safety and other users who operate in the most rigorous of environments. A variety of carrying accessories are available for comfort and convenience.

LEATHER CARRY CASES

Motorola Leather Carry Cases constructed of top-grain leather are designed to withstand the harsh conditions of public safety users.

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY				FEATURES				
CARRY SOLUTIONS Carry cases and holders are available in sizes designed to fit your radio and battery and permit audio to be heard clearly. Our carry accessories keep your hands-free, so you can concentrate on the task at hand.									
PORTABLE RADIOS		**DESCRIPTION**	**PART NUMBER**	**MATERIAL**	**BELT LOOP/CLIP DIMENSION (INCHES)**	**SWIVEL / FIXED**	**D-RINGS**	**COMPATIBLE BATTERIES**
APX 7000		Carry Holder for 1.5, 2.5 and 3.5 Model Radios	PMLN5331	Plastic	3	Fixed		
APX 7000XE		Carry Holder for 1.5, 2.5 and 3.5 Model Radios	PMLN6102	Plastic	3	Fixed		
APX 8000 **APX 6000**		Carry Holder for 1.5, 2.5 and 3.5 Model Radios	PMLN7901	Plastic	2.5	Fixed		
APX 8000XE **APX 6000XE**		Carry Holder for 1.5, 2.5 and 3.5 Model Radios	PMLN7902	Plastic	2.5	Fixed		
APX 3000		Covert Carry Holster	PMLN6327	Plastic	3	Fixed		
APX 7000		Leather Carry Case with 3" Fixed Belt Loop	PMLN5323	Hard Leather	3	Fixed	●	NNTN7038 NNTN8092 NNTN8930 PMMN4403 PMNN4485 PMNN4486
		Leather Carry Case with 3" Fixed Belt Loop	PMLN5326	Hard Leather	3	Fixed	●	NNTN7033 NNTN7034 NNTN8921 PMNN4487 PMNN4494
		Leather Carry Case with 3" Fixed Belt Loop	PMLN5329	Hard Leather	3	Fixed	●	NNTN7035 NNTN7036 NNTN7037 NNTN7573

COMPATIBILITY	ACCESSORY			FEATURES				
CARRY SOLUTIONS								
PORTABLE RADIOS		**DESCRIPTION**	**PART NUMBER**	**MATERIAL**	**BELT LOOP/CLIP DIMENSION (INCHES)**	**SWIVEL / FIXED**	**D-RINGS**	**COMPATIBLE BATTERIES**
APX 7000		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN5324	Hard Leather	2.75	Swivel	●	NNTN7038 NNTN8092 NNTN8930 PMMN4403 PMNN4485 PMNN4486
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN5327	Hard Leather	2.75	Swivel	●	NNTN7033 NNTN7034
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN5330	Hard Leather	2.75	Swivel	●	NNTN7035 NNTN7036 NNTN7037 NNTN7573
		Dual Display Radio Flip Leather Carry Case with 2.75" Swivel Belt Loop	PMLN5560	Hard Leather	2.75	Swivel	●	NNTN7038 NNTN8092 PMMN4403
APX 8000 **APX 6000** **APX 8000XE** **APX 6000XE** **APX 7000** **APX 7000XE**		Molded Nylon Carry Case with Quick Disconnect Swivel and Adjustable Lanyard	PMLN6802	Nylon		Swivel		
APX 7000XE		Leather Carry Case with 3" Fixed Belt Loop	NNTN8112	Hard Leather	3	Fixed	●	NNTN7038 NNTN8092 PMMN4403
		Leather Carry Case with 3" Fixed Belt Loop	NNTN8114	Hard Leather	3	Fixed	●	NNTN7033 NNTN7034
		Leather Carry Case with 3" Fixed Belt Loop	NNTN8116	Hard Leather	3	Fixed	●	NNTN7035 NNTN7036 NNTN7037 NNTN7573

APX PORTABLE RADIO ACCESSORIES

CARRY SOLUTIONS

COMPATIBILITY	ACCESSORY			FEATURES				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	MATERIAL	BELT LOOP/CLIP DIMENSION (INCHES)	SWIVEL / FIXED	D-RINGS	COMPATIBLE BATTERIES
APX 7000XE		Leather Carry Case with 2.75" Swivel Belt Loop	NNTN8111	Hard Leather	2.75	Swivel		NNTN7038 NNTN8092 PMMN4403
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	NNTN8113	Hard Leather	2.75	Swivel	●	NNTN7033 NNTN7034 PMNN4487 PMNN4494 NNTN8921
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	NNTN8115	Hard Leather	2.75	Swivel	●	NNTN7035 NNTN7036 NNTN7037 NNTN7573
		Boston Leather Carry Case with D Rings – Requires an Audio Accessory, Radio strap holds down radio by strapping over the Audio Accessory connector, used with Boston Leather radio straps	AY000222A01	Hard Leather			●	
APX 8000 APX 6000		Leather Carry Case with 3" Fixed Belt Loop	PMLN7903	Hard Leather	3	Fixed	●	NNTN7038 NNTN8092 PMMN4403 PMNN4485 PMNN4486 PMNN4547 NNTN8930 (for APX 6000)
		Leather Carry Case with 3" Fixed Belt Loop	PMLN5660	Hard Leather	3	Fixed	●	NNTN7033 NNTN7034 PMNN4487 PMNN4494 NNTN8921 (for APX 6000)
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN7904	Hard Leather	2.75	Swivel	●	NNTN8092 PMNN4485 PMNN4486 PMNN4547 NNTN8930 (for APX 6000)
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN5659	Hard Leather	2.75	Swivel	●	NNTN7033 NNTN7034 PMNN4487 PMNN4494 NNTN8921 (for APX 6000)
APX 8000XE APX 6000XE		Leather Carry Case with 3" Fixed Belt Loop	PMLN7905	Hard Leather	3	Fixed	●	NNTN7038 NNTN8092 PMMN4403 PMNN4547 PMNN4485 (for APX 6000XE) PMNN4486 (for APX 6000XE) NNTN8930 (for APX 6000XE) PMNN4504 (for APX 8000XE)

CARRY SOLUTIONS

COMPATIBILITY	ACCESSORY			FEATURES				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	MATERIAL	BELT LOOP/CLIP DIMENSION (INCHES)	SWIVEL / FIXED	D-RINGS	COMPATIBLE BATTERIES
APX 8000XE APX 6000XE		Leather Carry Case with 3" Fixed Belt Loop	PMLN5879	Hard Leather	3	Fixed	●	NNTN7033 NNTN7034 PMNN4487 (for APX 6000XE) PMNN4494 (for APX 6000XE) NNTN8921 (for APX 6000XE) PMNN4505 (for APX 8000XE)
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN7906	Hard Leather	2.75	Swivel	●	NNTN7038 NNTN8092 PMMN4403 PMNN4547 PMNN4485 (for APX 6000XE) PMNN4486 (for APX 6000XE) NNTN8930 (for APX 6000XE) PMNN4504 (for APX 8000XE)
		Leather Carry Case with D-Rings and 2.75" Swivel Belt Loop	PMLN5877	Hard Leather	2.75	Swivel	●	NNTN7033 NNTN7034 PMNN4487 (for APX 6000XE) PMNN4494 (for APX 6000XE) NNTN8921 (for APX 6000XE) PMNN4505 (for APX 8000XE)
APX 4000 APX 1000		Leather Carry Case with 2.5" Swivel Belt Loop	PMLN6085	Hard Leather	2.5	Swivel		
		Carry Case for APX 4000 Two Knob Radios	PMLN7182	Hard Leather	2.5	Swivel	●	
		Replacement Belt Loop for PMLN7182	PMLN7229					
SRX 2200		Nylon, Coyote Brown Carry Pouch designed to fit Elite Special Ops "Molle" Vest (sold separately)	NNTN8269	Nylon	Up to 5	Fixed		
		Coyote Brown Carry Case	RLN6253	Nylon	Up to 5	Fixed		
APX 7000		Nylon Carry Case with 3" Fixed Belt Loop	PMLN5322	Nylon	3	Fixed	●	NNTN7038 PMMN4403 NNTN8092
		Nylon Carry Case with 3" Fixed Belt Loop	PMLN5325	Nylon	3	Fixed	●	NNTN7033 NNTN7034
		Nylon Carry Case with 3" Fixed Belt Loop	PMLN5328	Nylon	3	Fixed	●	NNTN7035 NNTN7036 NNTN7037 NNTN7573

APX PORTABLE RADIO ACCESSORIES

CARRY SOLUTIONS

COMPATIBILITY	ACCESSORY			FEATURES				
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	MATERIAL	BELT LOOP/CLIP DIMENSION (INCHES)	SWIVEL / FIXED	D-RINGS	COMPATIBLE BATTERIES
APX 900		Leather Carry Case with 3" Fixed Belt Loop	PMLN5838	Hard Leather	3	Fixed		PMNN4424 PMNN4491 PMNN4493 PMNN4489 PMNN4448 NNTN8128
		Leather Carry Case with 2.5" Swivel Belt Loop	PMLN5842	Hard Leather	2.5	Swivel		
		Leather Carry Case with 3" Swivel Belt Loop	PMLN5840	Hard Leather	3	Swivel		
		Nylon Carry Case with 3" Fixed Belt Loop.	PMLN5844	Nylon	3	Fixed		
APX 8000 APX 7000		Carry Case for APX Radio with Clamshell Battery	PMLN6712	Nylon	Up to 5	Fixed	●	
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE		2.5" Hard Plastic Belt Clip (not compatible with APX 7000 UHF Radios)	NTN8266	Plastic	2.5			
		3" Hard Plastic Belt Clip	HLN6875	Plastic	3			
		Universal Chest Pack with Radio Holder, Pen Holder and Velcro Secured Pouch	HLN6602	Nylon				
		Break-a-Way Chest Pack with Radio Holder Pen Holder and Velcro Secured Pouch	RLN4570	Nylon				
		Replacement Strap for HLN6602 and RLN4570	1505596Z02	Nylon				
APX 4000 APX 1000 APX 900		2" Hard Plastic Belt Clip	PMLN4651	Plastic				
		2.5" Hard Plastic Belt Clip	PMLN7008	Plastic				
		Accessory Connector Dust Cover	15012157001					

COMPATIBILITY	ACCESSORY			FEATURES
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	MATERIAL
APX 900		Replacement 2.5" Leather Swivel Belt Loop	PMLN5610	Hard Leather
		Replacement 3" Leather Swivel Belt Loop	PMLN5611	Hard Leather
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 1000		Replacement 2.5" Leather Swivel Belt Loop	PMLN5407	Hard Leather
		Replacement 2.75" Leather Swivel Belt Loop	PMLN5408	Hard Leather
		Replacement 3" Leather Swivel Belt Loop	PMLN5409	Hard Leather
APX 7000XE		Replacement Carry Case Strap with Snaps, Long. Used with NNTN8111, NNTN8112, NNTN8113, NNTN8114, NNTN8115 and NNTN8116	PMLN5800	Leather
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 SRX 2200		1.75" Wide Leather Belt	4200865599	Leather
		Adjustable Nylon Carrying Strap	NTN5243	Nylon
APX 8000 APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 SRX 2200		Boston Leather Fireman's Radio Strap	RLN6486	Leather
		Boston Leather Fireman's Radio Strap - XL	RLN6487	Leather
		Boston Leather Fireman's Radio Strap with button back holder	AY000223A01	Leather
		Boston Leather Fireman's Radio Strap with button back holder - XL	AY000229A01	Leather
		Boston Leather Anti-Sway Strap for Boston Leather Fireman's Radio Strap	RLN6488	Leather

APX PORTABLE RADIO ACCESSORIES

ANTENNAS

COMPATIBILITY	ACCESSORY			FEATURES					
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	INTEGRATED GPS	LENGTH (CM)	TYPE	HAZLOC-CAPABLE[1]
APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 SRX 2200		700/800 MHz, GPS Whip Antenna	NAF5085	700/800	764-870	●	20	Whip	UL
		UHF, GPS Whip Antenna	PMAE4065	UHF	380-520	●	14.2	Whip	UL
APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 SRX 2200		VHF, GPS Whip Antenna	NAR6593	VHF	136-174	●	20	Whip	UL
APX 4000		900 MHz, GPS Antenna	PMAF4008	800/900	896-941	●	6	Whip	
		800/900 MHz, GPS Combination Helical Antenna	PMAF4003	800/900	806-941	●	18	Helical	UL
APX 8000 APX 8000XE APX 7000 APX 6000 APX 6000XE APX 4000 APX 1000		1/4 Wave, 700/800 MHz, GPS Stubby Antenna	NAR6595	700/800	764-870	●	9.8	Stubby	UL
APX 8000		VHF, 700/800, UHF Range 1, UHF Range 2 GPS (radio only)	KT000026A01	VHF 700/800		●		Whip	UL
APX 8000 APX 8000XE APX 7000 APX 7000XE		VHF, 700/800 MHz Dual Band, GPS Whip Antenna	NAR6594	VHF 700/800	136-174 764-870	●	20	Whip	UL
		VHF, UHF Dual Band, GPS Whip Antenna	PMAT4001	VHF UHF	136-174 380-520	●	21.8	Whip	UL
		UHF 700/800 MHz Dual Band, GPS Whip Antenna	PMAS4001	UHF 700/800	380-520 764-870	●	19.7	Whip	UL

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

ANTENNAS

COMPATIBILITY	ACCESSORY			FEATURES					
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	INTEGRATED GPS	LENGTH (CM)	TYPE	HAZLOC-CAPABLE[1]
APX 900		UHF, Flexible Whip Antenna	PMAE4022	UHF	403-470		16	Flexible Whip	UL
		VHF, 136-147 MHz, Stubby Antenna	PMAD4093	VHF	136-147		11	Stubby	UL
		VHF, 147-160 MHz, Stubby Antenna	PMAD4094	VHF	147-160		11	Stubby	UL
		VHF, 160-174 MHz, Stubby Antenna	PMAD4095	VHF	160-174		11	Stubby	UL
		700/800 MHz Flexible Whip Antenna	NAF5080	700/800	764-870		6.5	Flexible Whip	
		Coaxial Flexible Whip Antenna, 896-941 MHz	NAF5088	900	896-941		7	Flexible Whip	
		VHF, 136-174 MHz, Flexible Whip Wideband Antenna,	PMAD4088	VHF	136-174		8.3	Flexible Whip	UL
		700/800 MHz Stubby Antenna	PMAF4022	700/800	764-870		9	Stubby	
		UHF, 380-470 MHz, Stubby Antenna	PMAE4100	UHF	380-470		9	Stubby	UL
		UHF, 450-527 MHz, Stubby Antenna	PMAE4102	UHF	450-527		9	Stubby	UL
		UHF, 420-445Mhz, Stubby Antenna	PMAE4094	UHF	420-445		4.5	Stubby	

APX PORTABLE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES					
ANTENNAS									
PORTABLE RADIOS	DESCRIPTION		PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	INTEGRATED GPS	LENGTH (CM)	TYPE	HAZLOC-CAPABLE†
APX 6000 APX 6000XE APX 4000 APX 1000		UHF Range 1, GPS Stubby Antenna	FAF5259	UHF	380-470	●	9.3	Stubby	UL
		UHF Range 2, GPS Stubby Antenna	FAF5260	UHF	470-520	●	9.3	Stubby	UL
APX 7000 (700/800 MHz only) APX 6000 (700/800 MHz only)		GPS Antenna (Directly connected to radio when a public safety microphone is used)	NAG4000	700/800		●	7	Stubby	
		700/800 Public Safety Microphone Only Stubby Antenna	PMAF4002	700/800	764-870		9	Stubby	
APX 3000		Flexible Antenna with one flexible antenna spacer, 700/800 MHz	PMAF4006	700/800	764-870	●	41	Flexible	
		Flexible Antenna with three flexible antenna spacers, UHF	PMAE4080	UHF	308-470	●	77	Flexible	
		Flexible Antenna with two flexible antenna spacers, VHF	PMAD4125	VHF	136-174		44	Flexible	
PROGRAMMING CABLES									
APX 8000XE APX 7000 APX 7000XE APX 6000 APX 6000XE APX 4000 APX 3000 APX 1000 APX 900 SRX 2200		Programming and Test Cable	PMKN4013						
		Programming Cable (Not compatible with APX 900)	PMKN4012						

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

APX MOBILE RADIOS ACCESSORIES

COMMUNICATE SAFELY AND EASILY WHEREVER YOU GO

You count on your mobile radio to function clearly and easily so you can concentrate on the mission and communicate safely.

Get the most out of your APX radio by extending its power and reliability with APX accessories. Every mobile microphone, speaker, alarm and control station accessory is best-in-class technology, designed and optimized specifically for your APX mobile. There's simply no substitute for APX accessories.

APX 8500 WITH 03 CONTROL HEAD

APX 7500 WITH 07 CONTROL HEAD

APX 6500 WITH 05 CONTROL HEAD

APX 4500 WITH 02 CONTROL HEAD

APX 1500 WITH 02 CONTROL HEAD

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
LONG RANGE WIRELESS get ready in seconds without having to worry about the wires getting in the way. No more getting tangled with your seatbelt. Work, safer, smarter and more comfortable in demanding environments.			
PORTABLE RADIOS	DESCRIPTION		PART NUMBER
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		Long Range Wireless Mobile Accessory Kit, includes Wireless Remote Speaker Microphone (RLN6544), Mobile Microphone Bluetooth Gateway (PMMN4097C), Vehicular Charger (PMMN6716)	RLN6551
		Long Range Wireless Mobile Accessory Kit (No Power Charger), includes Wireless Remote Speaker Microphone (RLN6544), Mobile Microphone Bluetooth Gateway (PMMN4097C), Charger must be purchased separately	RLN6552
ACCESSORIES AND REPLACEMENT PARTS			
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		Dual Unit Charger, Rapid Rate Charger, 120V	PMLN7120
		Vehicular Charger	PMLN6716
		Wireless RSM with Battery and Clip	RLN6544
		Mobile Microphone with Bluetooth Gateway	PMMN4097
		Wireless RSM Battery, 1750 mA Li-Ion	PMNN4461
		D Ring Swivel Clip (12 pack)	NNTN4990
		Receive-Only Earpiece with Comfort Eartube, FM and UL approved†	RLN4941
		Receive-Only Earpiece with Comfort Eartube	PMLN7560
		Receive-Only Earbud, FM and UL approved	AARLN4885
		EP7 Sonic Defender, use with RLN4941	RLN6511 RLN6512 RLN6513

† HazLoc Details: For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable.

LONG RANGE WIRELESS REMOTE SPEAKER MICROPHONE (RSM)

The Long Range Wireless Remote Speaker Microphone (RSM) pairs instantly with touch pairing to the mobile microphone with Bluetooth gateway. The Long Range Wireless RSM works up to 100 meters away line-of-sight from the mobile radio, keeping you in communication where you never thought possible. Plug and play – Just attach the mobile gateway microphone to your radio, align the two devices where indicated by the blue dot and you are ready to go. Voice prompts will walk you through pairing quickly.

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES	
MICROPHONES Access critical features directly on the Keypad microphone. Navigational buttons and a full keypad allow users to navigate radio menus, dial phone numbers and send text messages. Three programmable buttons are available for additional customization.					
MOBILE RADIOS	DESCRIPTION		PART NUMBER	MICROPHONE STYLE	IMPRES
APX 8500 SERIES APX 7500 SERIES		Water Resistant Palm Microphone for Motorcycle Mounted Mobiles	HMN1079	Standard	
APX 8500 SERIES APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Keypad Microphone	HMN4079	Keypad + Navigation	
		Standard Palm Microphone	HMN1090	Standard	
		Water Resistant Palm Microphone	HMN1089	Standard	
		Telephone Keypad Handset with Hang-Up Cup	HMN4097	Telephone + Keypad	
		Hang-Up Handset with Armored Cable	HKN1018	Telephone	
		Handset with Hang-Up Cup	HLN1457	Telephone	
		Desktop Microphone	RMN5070	Desktop	
		IMPRES Visor Microphone, requires PTT Switch GLN7278 or RLN5926	RMN5054	Visor	●

IMPRES AUDIO ACCESSORIES

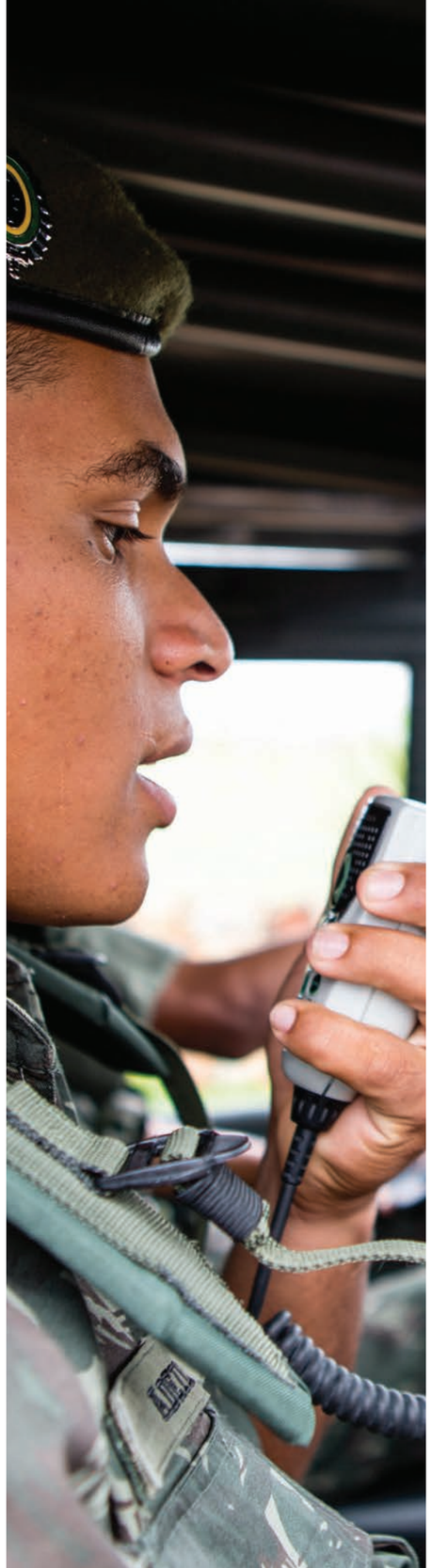
Mission critical voice transmissions have to be heard over engine, siren, road and wind noise. Fortunately, Motorola's exclusive IMPRES audio accessories are designed to optimize its output based on the accessory in use. IMPRES Visor Microphones are able to pick up and transmit the user's voice consistently to the receiving user regardless of how close they are speaking into the microphone.

COMPATIBILITY	ACCESSORY		
MOBILE MICROPHONE ACCESSORIES			
MOBILE RADIOS	DESCRIPTION		PART NUMBER
APX 8500 SERIES APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Microphone Hang-Up Clip	HLN5391
		Microphone Extension Cable, 2-Feet. Not compatible with HMN4097 handset or HMN4079 Keypad	PMKN4093
		Microphone Extension Cable, 10-Feet. Not compatible with HMN4097 handset or HMN4079 Keypad	PMKN4033
		Microphone Extension Cable, 20-Feet. Not compatible with HMN4097 handset or HMN4079 Keypad	PMKN4034
		Emergency Push Button, can be used with the Visor Microphone	HLN5131
		Emergency Footswitch, can be used with the Visor Microphone	HLN5113
		Footswitch Push-To-Talk, can be used with the Visor Microphone	GLN7278
		Push Button Push-To-Talk, can be used with the Visor Microphone	RLN5926
		Replacement Cable for HMN4079	3075336B10
CONTROL STATION ACCESSORIES			
APX 8500 SERIES		Power Supply for APX 8500 Mid Power Mobile Radio	KT000254A01
APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Power Supply for APX Mid Power Mobile Radios	HPN4007
APX 8500 SERIES APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Desktop Tray with Speaker	HLN6042
		110V Line Cord, Replacement Cable for HPN4007	3060665A04

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
INSTALLATION AND MOUNTING ACCESSORIES Mount your radio in your vehicle without compromising safety. Trunnion kits give you the flexibility to mount the radio under your dash, in your dash, between the seats or on the floor. Remote mount kits allow the radio to be mounted in the trunk when dash space is limited.			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		High Power Trunnion Kit; Quick Release with Lock-	HLN7003
		Mid Power Trunnion Kit; Standard Installation Bracket APX 6500 Enhanced requires KT000053A01 screws	HLN7002
		Mid Power Trunnion Lock	HLN6372
		Remote Mount Control Head Trunnion Compatible with 02/05 and 07 control heads	HKN6186
		Low Profile Remote Mount Control Head Trunnion Kit	HLN7031
		Dual Trunnion To be used with APX 8500 MP, APX 6500 and APX 6500 Enhanced	HLN7045B
		Motorcycle Enclosure, Black	HLN7022

COMPATIBILITY	ACCESSORY		
EXTERNAL ALARM ACCESSORIES External alarm accessories enable additional switching power when external accessories are attached.			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		External Alarm Relays	HLN6969



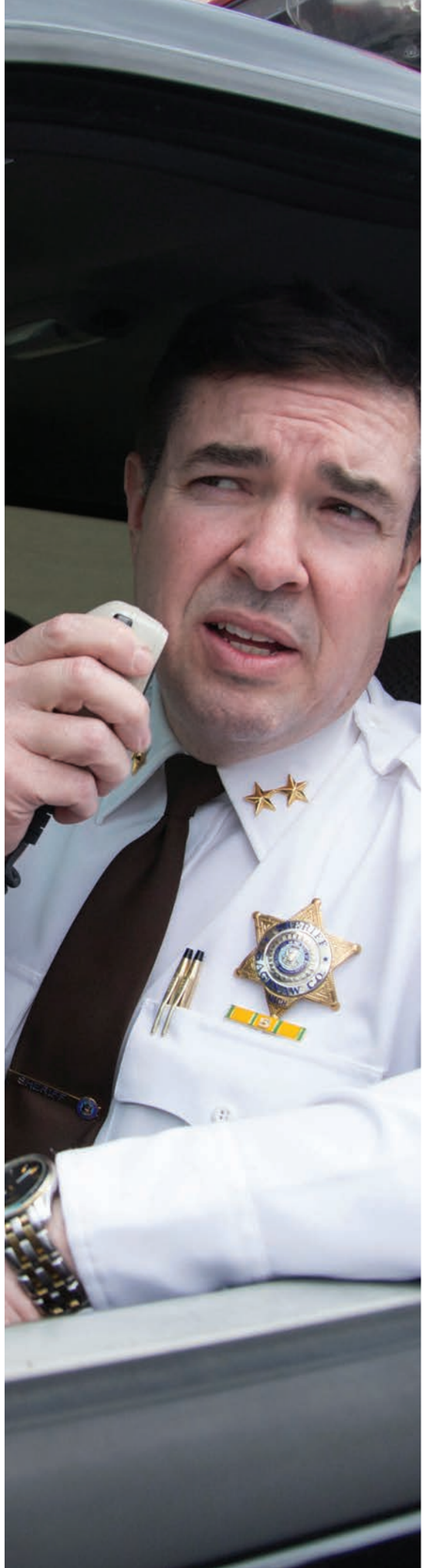
COMPATIBILITY	ACCESSORY		
SPEAKERS Boost audio at your control station on your desk or in your vehicle with external speakers.			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		Remote Mount, Water Resistant Speaker, 7.5 Watt Rated Audio	HSN4038
		Remote Mount, Water Resistant Speaker, 15 Watt Rated Audio	HSN4040
		Non-Water Resistant Speaker, 13 Watt Rated Audio	HSN4032
		Covert 10 Watt Rated Audio Speaker	HSN4042
		Siren Speaker, Round with Chrome Finish	TDN6251
		Siren Speaker, Rectangular with White Finish	TDN6252
		Siren Speaker, Round with Grey Finish	TDN6254
		Siren Speaker, Under Hood with Grey Finish	TDN6253

COMPATIBILITY	ACCESSORY		
UNIVERSAL RELAY CONTROLLER			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
APX 8500 SERIES **APX 7500 SERIES** **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		Universal Relay Controller for O9 Control Head, 10 DC Outputs, 15 Amps per Channel	PMUN1046
		Universal Relay Controller to Transceiver Cable	3064153H05

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
MOBILE SIREN			
MOBILE RADIOS	DESCRIPTION		PART NUMBER
APX 7500 SERIES **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		Siren	DDN1542
		Siren Install Hardware	DDN1543
		Siren to Radio Cable	DDN1883
		O3 Siren to DEK Cable	DDN1545

COMPATIBILITY	ACCESSORY		
SIREN ACCESSORIES			
MOBILE RADIOS	DESCRIPTION		PART NUMBER
		Siren Switchbox	HLN6819
		Wire Harness for Siren Switchbox. Needed to connect HLN6819 to DDN1774	DDN1886
APX 7500 SERIES		Mode Direct Entry Keypad, 8-Buttons	H1835
APX 6500 SERIES		Siren Cable, O3 Siren to Switchbox	HKN6146
APX 4500 SERIES		Siren Cable, O5 Siren to Switchbox	HKN4363
APX 1500 SERIES		Siren Cable, Direct Keypad for O3 Control Head	HKN6145



COMPATIBILITY	ACCESSORY		
SLIM (SIREN LIGHT INTERFACE MODULE)			
MOBILE RADIOS	DESCRIPTION		PART NUMBER
		SLIM (Siren Light Interface Module)	DDN1774
		Power Harness for SLIM	DDN1775
		Radio to SLIM Cable	DDN1776
		Programming Kit for SLIM	DDN1777
		Interface Kit IK-A1	DDN1778
APX 7500 SERIES		Interface Kit IK-A4	DDN1779
APX 6500 SERIES		Interface Kit IK-C1	DDN1780
APX 4500 SERIES		Interface Kit IK-D3	DDN1781
APX 1500 SERIES		Interface Kit IK-E2	DDN1782
		Interface Kit IK-F5	DDN1783
		Interface Kit IK-A1WA	DDN1896
		Interface Kit IK-A1WB	DDN1897
		Interface Kit IK-C1F	DDN1898
		Interface Kit IK-C1C	DDN1899
		Interface Kit IK-A4WC	DDN1937

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY		
CABLES			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
CONTROL HEAD CABLES			
APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		O3 Handheld Control Head Extension Cable, 17-Feet	PMLN4958
		O3 Handheld Control Head Accessory Cable	PMLN4959
		Control Head Cable with Connections for Power, Speaker and Headset Jack	HKN6187
		Control Head Cable with Connections for Power and Speaker	HKN6188
REMOTE MOUNT CABLES			
 APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Remote Mount Cable, 131-Feet	HKN6164
		Remote Mount Cable, 115-Feet	HKN6165
		Remote Mount Cable, 75-Feet	HKN6166
		Remote Mount Cable, 50-Feet	HKN6167
		Remote Mount Cable, 30-Feet	HKN6168
		Remote Mount Cable, 17-Feet	HKN6169
		Remote Mount Cable, 10-Feet	HKN6170
		Cable, Remote Control Head Vehicular Interface Port Connector for O5 Control Head	HKN6196
		Cable, Remote Control Head Mobile Accessory Port Connector for O5 Control Head	HKN6961
APX 7500 SERIES		Motorcycle Remote Cable for O5 Control Head	3075217A02
KEYLOAD CABLES			
APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Keyloader Cable, KVL3000 and KVL4000	TKN8531
		Keyload Adapter for Mobile Microphone Port	HKN6182

COMPATIBILITY	ACCESSORY		
CABLES			
MOBILE RADIOS	**DESCRIPTION**		**PART NUMBER**
POWER CABLES			
 APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		Mid Power, Dash Mount Power Cable, 10-Feet	HKN4191
		Mid Power, Remote Mount Power Cable, 20-Feet	HKN4192
		Mid Power, Rear Ignition Cable, Dash Mount	HLN6863
		High Power, Remote Mount Power Cable 20-Feet	HKN6110
		Motorcycle Power Cable	HKN6032
DATA CABLES			
APX 8500 SERIES		Data Cable connects APX 8500 to Siren and DVRS MSU support with J600 port adapter	CB000409A01
APX 8500 SERIES APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES		Data Tethering Cable, required to connect to VML or certified data modem	KT000252A01
APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		RS232 Cable for Rear Accessory Port, Dash Mount Only, 6-Feet	HKN6160
		RS232 Cable for Rear Accessory Port, Remote Mount Only, 20-Feet	HKN6161
		RS232 Cable for Mobile Microphone Port	HKN6183
		RS232 Cable for J600 Transceiver Interconnect Board, 22-Feet	HKN6122
PROGRAMMING CABLES			
APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		USB Cable, Rear Accessory Port, Remote Mount, 15-Feet (for use with customer program software)	HKN6172
		USB Cable, Rear Accessory Port, Dash Mount, 6-Feet (for use with customer program software)	HKN6163
APX 7500 SERIES APX 6500 SERIES		Programming Cable	HKN6184

ANTENNAS

For optimum range and quality, it is important to match the mobile radio's frequency with the proper Motorola antenna. These are available as standard 1/4 wave models or can include 3dB, 3.5dB or 5dB signal gain.

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES		
ANTENNAS A variety of antennas ensure the best possible reception wherever you operate. Choose from antennas with integrated GPS to standalone RF antennas.						
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 800/900 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 MOTORCYCLE ANTENNAS					
APX 8500 SERIES	All Band Mobile Antenna	AN000131A01			Through-hole
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 136-144 MHz, No Tuning Required	AN000197A01	VHF	136-144	Motorcycle
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector,144-150.8 MHz, No Tuning Required		VHF	144-150.8	Motorcycle
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 150.8-162 MHz, No Tuning Required	AN000197A03	VHF	150.8-162	Motorcycle

COMPATIBILITY	ACCESSORY			FEATURES		
ANTENNAS						
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 800/900 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 MOTORCYCLE ANTENNAS					
APX 8500 SERIES	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 162-174 MHz, No Tuning Required	AN000197A04	VHF	162-174	Motorcycle
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 380-433 MHz, No Tuning Required	AN000197A05	UHF	380-433	Motorcycle
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 425-470 MHz, No Tuning Required	AN000197A06	UHF	425-470	Motorcycle
	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 450-482 MHz, No Tuning Required	AN000197A07	UHF	450-482	Motorcycle

APX MOBILE RADIO ACCESSORIES

ANTENNAS

APX 8500 MOTORCYCLE ANTENNAS

COMPATIBILITY	ACCESSORY		FEATURES		
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 800/900 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 SERIES	Motorcycle Mount, 1/4 Wave Whip Antenna with QMA Connector, 482-520 MHz, No Tuning Required	AN000197A08	UHF	482-520	Motorcycle
	Motorcycle Mount, Low Profile, Unity Gain Antenna with QMA Connector, 450-512 MHz, No Tuning Required	AN000197A09	UHF	450-512	Motorcycle
	Motorcycle Mount Antenna with QMA Connector, 3dB Gain, 762-870 MHz	AN000197A10	800/900	762-870	Motorcycle
	Motorcycle Mount, Low Profile Antenna with QMA Connector, 3dB Gain, 762-870 MHz	AN000197A11	800/900	762-870	Motorcycle

APX 8500 ANTENNA MULTIPLEXERS AND ADAPTERS

COMPATIBILITY	ACCESSORY	
MOBILE RADIOS	DESCRIPTION	PART NUMBER
APX 8500 SERIES	Vehicle Multiplexer (supports HP)	EQ000103A02
	Motorcycle Multiplexer (low power)	EQ000103A01
	Mini U To QMA Adapter 12"	CB000091A03
	QMA to QMA Adapter 12"	CB000091A02
	SMA to QMA Adapter 12"	CB000091A04

ANTENNAS

VHF ANTENNAS (RF ONLY)

COMPATIBILITY	ACCESSORY		FEATURES		
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 800/900 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 SERIES* APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES	VHF 1/4 Wave Antenna, 136-144 MHz	HAD4006	VHF	136-144	Through-hole
	VHF 1/4 Wave Antenna, 144-150.8 MHz	HAD4007	VHF	144-150.8	Through-hole
	VHF 1/4 Wave Antenna, 150.8-162 MHz	HAD4008	VHF	150.8-162	Through-hole
	VHF 1/4 Wave Antenna, 162-174 MHz	HAD4009	VHF	162-174	Through-hole
	VHF 1/4 Wave Antenna, 136-162 MHz	HAD4016	VHF	136-162	Through-hole
	VHF 1/4 Wave Antenna, 146-174 MHz	HAD4017	VHF	146-174	Through-hole
	VHF Wideband Antenna, 136-174 MHz	HAD4021	VHF	136-174	Through-hole
	VHF Wideband Antenna 3.0 dB Gain, 136-174 MHz	HAD4022	VHF	136-174	Through-hole

UHF ANTENNAS (RF ONLY)

MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 800/900 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 SERIES* APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES	UHF 1/4 Wave Antenna, 380-433 MHz	HAE6012	UHF	380-433	Through-hole
	UHF 1/4 Wave Antenna, 450-470 MHz	HAE4003	UHF	450-470	Through-hole
	UHF 1/4 Wave Antenna, 470-512 MHz	HAE4004	UHF	470-512	Through-hole

*CB000091A03 - Mini-U to QMA adapter required for APX 8500 to antenna connection.

APX MOBILE RADIO ACCESSORIES

ANTENNAS

UHF ANTENNAS (RF ONLY)

COMPATIBILITY	ACCESSORY			FEATURES		
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 SERIES* APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		UHF 3 dB Gain Antenna, 494-512 MHz	HAE4013	UHF	494-512	Through-hole
		UHF 3.5 dB Gain Antenna, 380-420 MHz MAXRAD	HAE6010	UHF	380-420	Through-hole
		UHF 3.5 dB Gain Antenna, 470-495 MHz	HAE4011	UHF	470-495	Through-hole
		UHF 3.5 dB Gain Antenna, 450-470 MHz	HAE4012	UHF	450-470	Through-hole
		UHF 5 dB Gain Antenna, 380-420 MHz MAXRAD	HAE6011	UHF	380-420	Through-hole
		UHF 5 dB Gain Antenna, 455-470 MHz	RAE4014	UHF	455-470	Through-hole
		UHF 5 dB Gain Antenna, 470-494 MHz	RAE4015	UHF	470-494	Through-hole
		UHF 5 dB Gain Antenna, 494-512 MHz	RAE4016	UHF	494-512	Through-hole
		UHF 2 dB Gain Wideband Antenna, 380-470 MHz, MAXRAD	HAE6013	UHF	380-470	Through-hole
		UHF 2 dB Gain Wideband Antenna, 450-512 MHz	HAE6015	UHF	450-512	Through-hole
		UHF 2 dB Gain Wideband Antenna, 380-520 MHz	HAE6031	UHF	380-520	Through-hole
		UHF Wideband Low Profile Antenna, 450-512 MHz	HAE6016	UHF	450-512	Through-hole

*CB000091A03 - Mini-U to QMA adapter required for APX 8500 to antenna connection.

ANTENNAS.

700/800 MHZ ANTENNAS (RF ONLY)

COMPATIBILITY	ACCESSORY			FEATURES		
MOBILE RADIOS	DESCRIPTION	PART NUMBER	UHF / VHF / 700/800 MHz	FREQUENCY BAND (MHz)	MOUNTING STYLE
APX 8500 SERIES* APX 7500 SERIES APX 6500 SERIES APX 4500 SERIES APX 1500 SERIES		1/4 Wave Antenna, 762-870 MHz	HAF4016	700/800	762-870	Through-hole
		3 dB Gain Low Profile Antenna, 762-870 MHz	HAF4013	700/800	762-870	Through-hole
		3 dB Gain Elevated Feed Antenna, 762-870 MHz	HAF4014	700/800	762-870	Through-hole
		3 dB Gain Collinear Antenna, 762-870 MHz	HAF4017	700/800	762-870	Through-hole

*CB000091A03 - Mini-U to QMA adapter required for APX 8500 to antenna connection.

APX MOBILE RADIO ACCESSORIES

COMPATIBILITY	ACCESSORY			FEATURES		
ANTENNAS						
MOBILE RADIOS	DESCRIPTION		PART NUMBER	GPS / WI-FI	FREQUENCY BAND (MHz)	MOUNTING STYLE
GPS / WI-FI ANTENNAS						
APX 7500 SERIES **APX 6500 SERIES** **APX 4500 SERIES** **APX 1500 SERIES**		GPS Roof Mount Antenna SMA Male connector with RG-174 17ft cable	HAG4000	GPS Only		Roof Mount
		GPS Glass Mount Antenna SMA Male connector with RG-174 17ft cable	PMAN4001	GPS Only		Glass Mount
APX 8500 SERIES*		Convert glass-mount motorcycle antenna with Wi-Fi 5GHz	PMAN5101	Wi-Fi Only		Glass Mount
APX 7500 SERIES		Convert glass-mount motorcycle antenna with GPS GNSS	PMAN4109	GPS Only		Glass Mount
APX 6500 SERIES		Wi-Fi/GPS Combination Vehicle Antenna	AN000163A01	GPS Wi-Fi		Through-hole
APX 4500 SERIES						
APX 1500 SERIES		Wi-Fi/GPS Combination Motorcycle Antenna	AN000163A02	GPS Wi-Fi		Motorcycle
APX 7500 SERIES		GPS Motorcycle Antenna	HAG4001	GPS Only		Motorcycle

*CB000091A03 - Mini-U to QMA adapter required for APX 8500 to antenna connection.

GLOSSARY

HAZLOC-CAPABLE

For more information on which accessories are approved by Factory Mutual (FM) or Underwriters' Laboratory (UL) with certain APX models, please consult the manual provided with each FM- or UL-approved APX portable. Motorola-approved accessories are a critical part of the overall radio system intrinsic safety certification. Non-Motorola approved accessories may not be certified for APX and if used, could result in equipment that is NOT approved and unsafe in a hazardous environment.

IP RATING

International Protection (IP) is a global standard for rating dust and water protection. The first digit IP5x or IP6x represents increased levels of dust protection. The second digit, IPx7 or IPx8 represents increased levels of water protection.

- **IPx7** represents withstanding submersion in 1 meter of fresh water for 30 minutes.
- **IPx8** represents heating accessory to 27°C higher than the water temperature for 2 hours then immediately immersing it to a depth of 1 meter for another 2 hours.
- **IPx8+Rugged** represents exceeding industry specs by heating accessory to 27°C higher than the water temperature for 2 hours then immediately immersing it to a depth of 2 meters for another 4 hours.

MICROPHONE NOISE SUPPRESSION

Multi Mic Noise Suppression: Five integrated microphones and Adaptive Audio Engine automatically change the level of noise suppression, microphone gain, Windporting and speaker equalization to produce clear and loud audio in any environment.

Dual Mic Noise Suppression: Dual-microphone design tracks your voice so that you can keep your eye on what's in front of you while speaking. A digital signal processor (DSP) algorithm helps suppress background noise so you can be heard clearly regardless of the noise around you.

Windporting (Motorola Exclusive): Windporting reduces the effect of wind and other outdoor noises on your microphone performance and prevents water from clogging the microphone and distorting your transmission.

Noise-cancelling microphones negate crowd or machinery noise so your voice comes through loud and clear anytime you speak directly into the microphone.

SWIVEL OR FIXED LOOP

Secure to a belt loop and the case swings freely from side to side. The swivel latch system also allows the radio and case to be removed from the belt loop by simply inverting, lifting it up and out of the belt loop. Fixed loops provide a sturdy attachment to your belt.

For more information on Motorola mission critical accessories,
visit **motorolasolutions.com/apx**.

MOTOROLA SOLUTIONS

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A. **motorolasolutions.com**

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RELIABILITY MEETS P25 PORTABILITY

APX™ 1000 PROJECT 25 PORTABLE RADIO

If you are racing to respond to an electrical outage or monitor a highway construction build, you need a radio that keeps you connected, instantly and continuously no matter the situation, background noise, weather, or duration. You expect a reliable radio where every word is heard and every message understood when it counts most.

Public safety, utilities, and government service users require a P25 radio that can stand up to the toughest tasks while keeping them connected to surrounding agencies and first responders. The APX 1000 is engineered to give you the capabilities you need at the budget you can afford. It combines uncompromising durability, simplified controls and excellent audio quality in a compact P25 TDMA capable portable radio.

EVERYTHING YOU WANT IN A RADIO, FOR LESS

With the APX 1000, you pay for only the functionality you need at the level you can afford without giving up the exceptional quality and reliability you expect from APX. The APX 1000 provides you with a radio that meets and fits your budget needs.

MISSION READY VOICE TECHNOLOGY

The APX 1000 is P25 TDMA capable for twice the voice capacity so you can add more users without adding more frequencies or infrastructure. And it's backwards and forwards compatible with all Motorola mission critical radio systems, so you can interoperate with surrounding agencies and first responders with confidence.

POWER UP WITH APX 1000 ACCESSORIES

- Designed, tested and certified for optimum performance with your radio
- Complete portfolio of remote speaker microphones, headsets
- High-powered IMPRES™ batteries that have a slim design to fit the compact radio size

APX 1000 PROJECT 25 PORTABLE RADIO

FEATURES AND BENEFITS

- Available in 700/800 MHz, 900 MHz, VHF, UHF R1 and UHF R2 bands
- Trunking standards supported:
  - Clear or digital ASTRO® 25 Trunked Operation Analog MDC-1200 and Digital APCO P25 Conventional System Configurations
- Narrow and wide bandwidth digital receiver (6.25 kHz equivalent / 12.5 kHz / 20 kHz / 25 kHz)[1]
- Embedded digital signaling (ASTRO and ASTRO 25)
- Available in models 1.5, 2 and 3
- Lightbar with Intelligent Lighting
- Radio Profiles
- Unified Call List
- User programmable Voice Announcement
- Meets Applicable MIL-STD-810C, D, E, F and G
- Meets IP54 Environmental Specifications
- Superior Audio Features:
  - 0.5 W high audio speaker
  - 2-mic noise canceling technology
- Utilizes Windows 7 Customer Programming Software (CPS)
  - Supports USB communications
  - Built in FLASHport™ support
- Full portfolio of accessories including IMPRES batteries, chargers and audio devices[2]

OPTIONAL FEATURES

- ASTRO 25 Integrated Voice & Data
- Programming Over Project 25
- P25 Link Layer Authentication

TRANSMITTER - TYPICAL PERFORMANCE SPECIFICATIONS

		VHF	UHF Range 1	UHF Range 2	700/800 MHz	900 MHz
Frequency Range/Bandsplits		136-174 MHz	380-470 MHz	450-520 MHz	764-776 MHz 794-806 MHz 806-824 MHz 851-870 MHz	896-901 MHz 935-940 MHz
Channel Spacing		25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj[3]		1-5 Watts Max	1-5 Watts	1-5 Watts Max	1-2.5 Watts 1-3 Watts	1-2.5 Watts
Frequency Stability[3] (-30°C to +60°C; +25°C Ref.)		±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %
Modulation Limiting[3]		±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±2.5 kHz
Emissions (Conducted and Radiated)[3]		–75 dB	–75 dB	–75 dB	–75 dB	–75 dB
Audio Response[3]		+1, –3 dB	+1, –3 dB	+1, –3 dB	+1, –3 dB	+1, –3 dB
FM Hum and Noise	25 kHz 12.5 kHz	–47 dB –45 dB	–47 dB –45 dB	–47 dB –45 dB	–47 dB –45 dB	 -45dB
Audio Distortion[3]		1.00%	1.00%	1.00%	1.00%	1.00%

BATTERIES FOR APX 1000

BATTERY CAPACITY / TYPE	DIMENSIONS (H X W X D)	WEIGHT	BATTERY PART NUMBER	BATTERY CAPACITY
Li-Ion IMPRES 1900 mAh IP54	114.5 x 55.04 x 17.85	150 grams	NNTN8128B	1900 mAh
Li-Ion IMPRES 2300 mAh IP54	114.5 x 55.04 x 23.15	160 grams	PMNN4424AR	2300 mAh
Li-Ion IMPRES 2700 mAh IP54	114.5 x 55.04 x 23.15	160 grams	PMNN4448AR	2700 mAh

[1] Per the FCC Narrowbanding rules, new products (APX 1000 UHFR1) submitted for FCC certification after January 1, 2011 are restricted from being granted certification at 25 KHz for United States - State and Local Markets only.
[2] Chargers and batteries for the APX 1000 radios will interoperate with APX 4000 radios.
[3] Measured in the analog mode per TIA / EIA 603 under nominal conditions.

PRODUCT SPEC SHEET
APX™ 1000 PROJECT 25 PORTABLE RADIO

RADIO MODEL

	MODEL 1.5	MODEL 2	MODEL 3
Display	Full bitmap color LCD display, 3 lines of text x 14 characters, 1 line of icons, 1 menu line x 3 menus, White backlight		
Keypad	Backlight keypad 3 soft keys	Backlight keypad, 3 soft keys, 4 direction navigation key, Home and Data buttons	Backlight keypad, 3 soft keys, 4 direction navigation key, 4x3 keypad, Home and Data buttons
Channel Capacity	512		
FLASHport Memory	64 MB		
VHF (136-174 MHz)	H84KDD9PW5AN	H84KDF9PW6AN	H84KDH9PW7AN
UHF Range 1 (380-470 MHz)	H84QDD9PW5AN	H84QDF9PW6AN	H84QDH9PW7AN
UHF Range 2 (450-520 MHz)	H84SDD9PW5AN	H84SDF9PW6AN	H84SDH9PW7AN
700/800 MHz (763-870 MHz)	H84UCD9PW5AN	H84UCF9PW6AN	H84UCH9PW7AN
900 MHz (896-940 MHz)		H84WCF9PW6AN	
Buttons and Switches	Large PTT button • Multi-function knob • Orange emergency button • 3 programmable side buttons		

TRANSMITTER CERTIFICATION

VHF (136-174 MHz)	AZ489FT3834
UHF Range 1 (380-470 MHz)	AZ489FT4917
UHF Range 2 (450-520 MHz)	AZ489FT4920
700/800 MHz (764-869 MHz)	AZ489FT7057
900 MHz (896- 901, 935-940 MHz)	AZ489FT5861

FCC EMISSION DESIGNATORS

FCC Emissions Designators	11K0F3E, 16K0F3E, 8K10F1D, 8K10F1E, 8K10F1W

POWER SUPPLY

Power Supply	One rechargeable Li-Ion 1900 mAh battery standard, or 2300 and 2700 mAh high cap Li-Ion.

RECEIVER - TYPICAL PERFORMANCE SPECIFICATIONS

		VHF	UHF Range 1	UHF Range 2	700/800 MHz	900 MHz
Frequency Range/Bandsplits		136-174 MHz	380-470 MHz	450-520 MHz	763-776 MHz 851-870 MHz	935-940 MHz
Channel Spacing		25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	25/12.5 kHz	12.5 kHz
Maximum Frequency Separation		Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated[3]		500mW	500mW	500mW	500mW	500mW
Frequency Stability[3] (–30°C to +60°C; +25°C Ref.)		±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %	±0.00010 %
Analog Sensitivity[4] Digital Sensitivity[5]	12 dB SINAD 1% BER (800 MHz) 5% BER	0.216µV 0.277µV 0.188µV	0.234µV 0.307µV 0.207µV	0.234µV 0.307µV 0.207µV	0.250µV 0.400µV 0.250µV	0.236µV 0.33µV 0.222µV
Selectivity[3]	25 kHz channel 12.5 kHz channel	-76 dB -70 dB	-76 dB -67 dB	-76 dB -67 dB	-76 dB -67 dB	-67 dB
Intermodulation		-79.5 dB	-77 dB	-77 dB	-75 dB	-75 dB
Spurious Rejection		-79.3 dB	-80.3 dB	-80.3 dB	-76.6 dB	-80 dB
FM Hum and Noise	25 kHz 12.5 kHz	-51 dB -45 dB	-50 dB -45 dB	-50 dB -45 dB	-53 dB -47 dB	-47 dB
Audio Distortion[3]		1.00%	1.00%	1.00%	1.00%	1.00%

[4] Measured conductively in analog mode per TIA / EIA 603 under nominal conditions.
[5] Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions.

PORTABLE MILITARY STANDARDS 810 C, D, E, F AND G

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F		MIL-STD 810G	
	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat	Method	Proc./Cat
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/ Basic Hot	501.5	I/A1, II/A2
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II/C1
Temperature Shock	503.1	I	503.2	I/A1C3	503.3	I/A1C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	1 Proc	507.5	II/Aggravated
Salt Fog	509.1	I	509.2	I	509.3	I	509.4	1 Proc	509.5	1 Proc
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Blowing Sand	1 Proc	1 Proc	510.2	II	510.3	II	510.4	II	510.5	II
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, III	516.3	I, VI	516.4	I, VI	516.5	I, VI	516.6	I, VI
Shock (Drop)	516.2	II	516.2	IV	516.4	IV	516.5	IV	516.6	IV

DIMENSIONS OF THE RADIOS WITHOUT BATTERY

	INCHES	MILLIMETERS
Length	5.26	133
Width Push-To-Talk button	2.37	60.2
Depth Push-To-Talk button	1.72	43.6
Width Top	2.56	65
Depth Top	2.13	43
Weight of the Radios Without Battery	8.47 oz	240 g

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature[6]	-30°C / +60°C
Storage Temperature[6]	-40°C / +85°C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water and Dust Intrusion	IP54
Housing Availability	Black only

ENCRYPTION

Supported Encryption Algorithms	ADP SW
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command

[5] Accuracy specs are for long-term tracking (95th percentile values >5 satellites visible at a nominal –130 dBm signal strength)
[6] Temperatures listed are for radio specifications. Battery storage is recommended at 25°C, ±5°C to ensure best performance.
Specifications subject to change without notice. All specifications shown are typical.
Radio meets applicable regulatory requirements.

To learn more about the APX 1000 P25 portable radio contact your Motorola representative or visit **motorolasolutions.com/apx1000**.

Motorola Solutions, Inc. 1301 E. Algonquin Road, Schaumburg, Illinois 60196 U.S.A. **motorolasolutions.com**

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