Allegan County 911
Policy & Procedure Board

Allegan County Central Dispatch
3271 – 122nd Avenue
Allegan, MI 49010
269-673- 0316 Main Office
269- 686-5211 Main Fax

Robert Sarro, Chairman
Henry Reinart, Vice Chairman

Undersheriff Michael Larsen
Co. Sheriff's Representative

Brad Lubbers
County Commissioner

Robert J. Sarro
County Administrator

Pam Crandle
Private Citizen At Large

Henry Reinart
Representative of Township Government
Monterey Township

F/LT Keith Disselkoen
MSP Representative
Wayland State Police Post

Brenda Mays
Allegan County
EMS Representative

Chris Mantels
Allegan County Medical Control Representative

Thomas Raymond
Public Safety Director
Gun Lake Tribe
Representative

Jay Gibson
City or Village Police Chief Representative
Allegan City Police

Chief David Haverdink
West Side Fire Officer Representative
Hamilton Fire Dept.

Chief Gary Fordham
East Side Fire Officer Representative
Dorr Fire Dept.

Aaron Mitchell
Representative of City or Village Government
City of Otsego

911 POLICY & PROCEDURE BOARD MEETING - Agenda

July 15, 2025 – 10AM
Human Services Building - Zimmerman Room
3255 - 122nd. Avenue, Allegan, MI

Please click this URL to join remotely:
https://us02web.zoom.us/j/82882186021?pwd=bGw5emF0bmoranpUb0pGU1MwVHBwUT09

Passcode: 926942

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Webinar ID: 828 8218 6021
Passcode: 926942

CALL TO ORDER:
ROLL CALL:
APPROVAL OF MINUTES:
ADDITIONAL AGENDA ITEMS:
APPROVAL OF AGENDA:
COMMUNICATIONS:
PRESENTATIONS:
DIRECTOR REPORT: Attached

ACTION ITEMS:
1. 2026 Budget Request
2. Radio Guide

DISCUSSION ITEMS:
1. Quarterly Report
2. Non-Preference Towing Update

PUBLIC PARTICIPATION:
FUTURE AGENDA ITEMS:
ROUND TABLE:
ADJOURNMENT:

Next Meeting - Oct 21, 2025 -10AM @
Human Services Building - Zimmerman Room
3255 - 122nd. Avenue, Allegan, MI

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911 POLICY & PROCEDURE BOARD MEETING - Minutes

April 15, 2025 – 10AM
Human Services Building, Zimmerman Room
3255 122nd Avenue

CALL TO ORDER: 10:03 am by H. Reinart.
PRESENT: Rob Sarro, Mike Larsen, Pam Crandle, Henry Reinart, Keith Disselkoen, Jay Gibson (arrived at 10:20), Dave Haverdink, Chris Mantels, Tom Raymond, Aaron Mitchell, Brad, Lubbers (arrived at 10:40), Gary Fordham, Jeremy Ludwig, Whitney Wisner, Shannen Chamberlain, Sarah Clark, Justin Johnson, and Billie Ketelaar.
APPROVAL OF MINUTES: Motion to approve the minutes made by D. Haverdink. Support by M. Larsen. All in favor, motion carried.
ADDITIONAL AGENDA ITEMS: N/A
APPROVAL OF THE AGENDA: Motion to approve the agenda made by C. Mantels. Support by M. Larsen. All in favor, motion carried.
COMMUNICATIONS:
PRESENTATIONS: Sarah Clark - Emergency Public Notification.
DIRECTOR REPORT: J. Ludwig shared with the board.

ACTION ITEMS:

1. 2110-01-19 Quality Assurance Policy:

-Motion to approve the updates to the Quality Assurance Policy with the addition of "N/A" to sections 6 & 7 made by H. Reinart. Support by P. Crandle. All in favor, motion carried.

DISCUSSION ITEMS:

1. Quarterly Report:
-Presented for questions by J. Ludwig.

2. Radio Workgroup Update:
-The Radio Workgroup met on February 20, 2025 to review feedback from Motorola and discuss the collection of information needed to produce a FAQ sheet for local units regarding the current radios in use including; serviceability and upgradability, encryption requirements, and other vendors that produce radios that have been authorized for use on the MPSCS.

-A smaller subgroup took the responsibility of reaching out to the different vendors to get more information on their radios using a standardized spreadsheet questionnaire for easier comparison between models and manufacturers.
-Completed surveys were not received from all vendors until April 8, 2025 therefore, the workgroup was unable to provide a FAQ sheet to the Policy Board in time for the April meeting.
-Workgroup will reconvene in the coming weeks and organize all of the data collected.

PUBLIC PARTICIPATION: N/A
FUTURE AGENDA ITEMS: ACCD Budget
ROUND TABLE: Sentiment shared by several board members concerning recent successful EOC incidents, all involved were commended. T. Raymond stated the Tribe's new hotel is now open. J. Ludwig thanked all the agencies that contributed to National Public Safety Telecommunicator Week.
ADJOURNMENT: Motion to adjourn made by C. Mantels. Supported by D. Haverdink. All in favor, motion carried. Adjourned at 10:53 am.

*Next meeting July 15, 2025. 10 am in the Zimmerman Room

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Director's Update
July 15, 2025

OPERATIONS:

- **Staffing:**
  - Danielle Tilley started on 6/3/2025
  - Brian Beute resigned on 6/8/2025

- **EMD Stats (Min Goal 85% High Compliant or Compliant)**

  - **Apr**: 83% High Compliant or Compliant
    11% Partial or Low Compliant
    6% Non-Compliant

  - **May**: 68% High Compliant or Compliant
    20% Partial or Low Compliant
    13% Non-Compliant

  - **Jun**: TBD

- **Fire – Call to Dispatch Stats (Goal is 90% and 95%)**
  - **Apr:**
    94% in 64 seconds or less
    100% in 106 seconds or less
  - **May.**:
    95% in 64 seconds or less
    100% in 106 seconds or less
  - **Jun**:
    98% in 64 seconds or less
    100% in 106 seconds or less

STATE 911 BOARDS:

- **SNC Certification Subcommittee:**
  - Director Ludwig continues to serve on the State 911 Board's Certification Subcommittee.

- **SNC Legislative Action Subcommittee (LAS):**
  - Director Ludwig continues to serve on the LAS. The LAS will soon be looking at the current 911 Act, which is set to sunset in 2026, and make recommendations for changes and updates to the state 911 office.

MCDA SUBCOMMITTEES:

- **MSP CJIS Board:**
  - Director Ludwig continues to serve on the MSP CJIS Board as an alternate for Midland 911 Director Lisa Hall and attends meetings quarterly as needed.

- **General Retention Schedule Review Committee:**
  - Director Ludwig served as a member of the General Retention Schedule Review Committee. A group of 911 Directors from across the state reviewed the State's current General Retention Schedule for 911 to provide recommended changes and updates to the State 911 Board. Those recommendations were submitted to the State for consideration at the beginning of Q2 of this year. The recommended changes are still under review, and we are awaiting approval.

PUBLIC RELATIONS:

- ACCD continues to use its Facebook page to communicate with the public.

PROJECTS:

- *Annual Reporting to the State*: This report was successfully submitted.
- *Fire Field Mobile:* Field testing is still ongoing with Saugatuck and Allegan Fire, but has been expanded to command staff.
- *RAVE Alert*: We continue to work with emergency management to implement RAVE Alert for Allegan County.
- *Virtual Academy*: Supervisory staff are now using Virtual Academy, and we plan to roll it out to the rest of the team as soon as we can schedule an orientation and training meeting. We are currently targeting sometime between now and the end of September.

RECOGNITION:

Sara Jenkins

Sara was recognized by Whitney Wisner:

We have different public safety partners who reach out from time to time with requests for their staff to sit in Dispatch for a short period. This connection between departments offers a more intimate look at the CD operations, networking opportunities, and allows for members from other agencies to bring back things learned to their own department. I have members of our team who are willing to accommodate folks coming in, but no one is ever as enthusiastic as Sara is when I ask. On top of being passionate about 9-1-1, I know that Sara will give whoever she's educating her full attention and represent the County with professionalism. I'm grateful we have Sara's bright personality in our corner to leave such a positive impression on those who come in for a better look at Dispatch.

Mallory Moyer

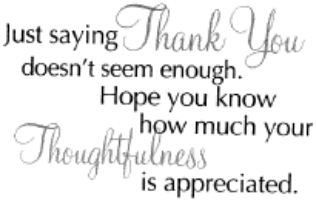
Mallory was recognized by Mary Brink:

During the evening of Saturday, May 31, 2025, a Sergeant with the Allegan County Sheriff's Office was traveling southbound on US-131 when he observed three suspicious

vehicles traveling northbound at a high rate of speed. You accurately documented all relevant information about the suspect vehicles and promptly relayed that information to the officers in the area in real time.
While fleeing from Law Enforcement, one of the suspect vehicles was disabled. All three occupants fled on foot, and K-9 units were deployed to locate them in the heavily wooded terrain. One of the K-9 units found, in that moment, that their tracking device was not operational. You were able to problem-solve on the fly by immediately requesting the K9 · The handler called 911 and placed the phone in their pocket so that we could utilize our resources to monitor the track. Less than two minutes after starting the track, the subject was located at gunpoint.
Your quick thinking and exceptional problem-solving skills contributed to the safe and efficient apprehension of the suspect. Your resourcefulness and professionalism under pressure are commendable and are very deserving of this recognition for your outstanding performance.

Kaleigh Tatrow, Kelsie Vogel, and Krysten Monsma

Kaleigh, Kelsi, and Krysten were recognized by a caller who lost a child:



S T A T E O F M I C H I G A N

ALLEGAN COUNTY 911 POLICY & PROCEDURE BOARD

CENTRAL DISPATCH – 2026 BUDGET RECOMMENDATION

WHEREAS, the Central Dispatch Policy and Procedure Board (Board) is authorized within its Operational Bylaws to review and recommend an annual Central Dispatch budget; and

WHEREAS, the Central Dispatch Director (Director) has presented the proposed 2026 – 2030 budget plan to the Board.

THEREFORE, BE IT RESOLVED, that the Board hereby recommends the budget plan presented by the Director on July 15, 2025, be submitted through the County's budget process for consideration.

2026 Capital Projects

New World Server Replacement - $35,000

AI Non-Emergency Call Taking - $80,000

Ceiling Fans in Dispatch - $8,500

Roof Replacement - $60,000

Radio Replacements and Encryption Upgrade - $200,000

496 (2118) - CENTRAL DISPATCH CIP	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Beginning Fund Balance - EDEN											
Beginning Fund Balance - Calculated	$ 1,842,836.56	$ 2,423,961.95	$ 3,234,788.32	$ 3,702,175.06	$ 4,225,823.14	$ 4,476,844.60	$ 5,271,347.12	$ 6,074,819.65	$ 6,621,728.53	$ 7,372,559.00	$ 8,226,718.93
Revenue											
P.A. 29 Funds	$ 788,937.00	$ 796,826.37	$ 804,794.63	$ 812,842.58	$ 820,971.01	$ 829,180.72	$ 837,472.52	$ 845,847.25	$ 854,305.72	$ 862,848.78	$ 871,477.27
Interest Earned	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00
Transfer In from 261 (Harris Savings)											
Transfer In - Other											
Contributions and Donations											
Grants											
Bond Proceeds											
Total Revenue	$ 804,937.00	$ 812,826.37	$ 820,794.63	$ 828,842.58	$ 836,971.01	$ 845,180.72	$ 853,472.52	$ 861,847.25	$ 870,305.72	$ 878,848.78	$ 887,477.27
Expenditures											
Capital	$ 223,811.61	$ 2,000.00	$ 353,407.90	$ 305,194.50	$ 585,949.55	$ 50,678.19	$ 50,000.00	$ 314,938.37	$ 119,475.25	$ 24,688.85	$ 389,522.68
Transfer Out to 2456 - Radio Project											
Transfer Out to 367 (3603) - Radio Project Debt											
Transfer Out to 4661 - Close out Building Auth Funds - Construction 911											
Indirect Expenditures	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Expenditures	$ 223,811.61	$ 2,000.00	$ 353,407.90	$ 305,194.50	$ 585,949.55	$ 50,678.19	$ 50,000.00	$ 314,938.37	$ 119,475.25	$ 24,688.85	$ 389,522.68
Ending Fund Balance - Calculated	$ 2,423,961.95	$ 3,234,788.32	$ 3,702,175.06	$ 4,225,823.14	$ 4,476,844.60	$ 5,271,347.12	$ 6,074,819.65	$ 6,621,728.53	$ 7,372,559.00	$ 8,226,718.93	$ 8,724,673.52
Ending Fund Balance - EDEN											
P.A. Increases from Previous Year	= average PA increase over past 5 years, Dispatch was using 2% increase for projections but dropped to 1% post COVID.										

496 (2118) - CENTRAL DISPATCH CIP	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Beginning Fund Balance - EDEN											
Beginning Fund Balance - Calculated	$ 1,842,836.56	$ 2,423,961.95	$ 2,833,199.95	$ 2,894,982.43	$ 3,008,970.22	$ 2,846,234.78	$ 3,222,842.84	$ 3,604,241.95	$ 3,724,856.68	$ 4,045,130.07	$ 4,464,427.34
Revenue											
P.A. 29 Funds	$ 788,937.00	$ 395,238.00	$ 399,190.38	$ 403,182.28	$ 407,214.11	$ 411,286.25	$ 415,399.11	$ 419,553.10	$ 423,748.63	$ 427,986.12	$ 432,265.98
Interest Earned	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00	$ 16,000.00
Transfer In from 261 (Harris Savings)											
Transfer In - Other											
Contributions and Donations											
Grants											
Bond Proceeds											
Total Revenue	**$ 804,937.00**	**$ 411,238.00**	**$ 415,190.38**	**$ 419,182.28**	**$ 423,214.11**	**$ 427,286.25**	**$ 431,399.11**	**$ 435,553.10**	**$ 439,748.63**	**$ 443,986.12**	**$ 448,265.98**
Expenditures											
Capital	$ 223,811.61	$ 2,000.00	$ 353,407.90	$ 305,194.50	$ 585,949.55	$ 50,678.19	$ 50,000.00	$ 314,938.37	$ 119,475.25	$ 24,688.85	$ 389,522.68
Transfer Out to 2456 - Radio Project											
Transfer Out to 367 (3603) - Radio Project Debt											
Transfer Out to 4661 - Close out Building Auth Funds - Construction 911											
Indirect Expenditures	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Expenditures	**$ 223,811.61**	**$ 2,000.00**	**$ 353,407.90**	**$ 305,194.50**	**$ 585,949.55**	**$ 50,678.19**	**$ 50,000.00**	**$ 314,938.37**	**$ 119,475.25**	**$ 24,688.85**	**$ 389,522.68**
Ending Fund Balance - Calculated	**$ 2,423,961.95**	**$ 2,833,199.95**	**$ 2,894,982.43**	**$ 3,008,970.22**	**$ 2,846,234.78**	**$ 3,222,842.84**	**$ 3,604,241.95**	**$ 3,724,856.68**	**$ 4,045,130.07**	**$ 4,464,427.34**	**$ 4,523,170.64**
Ending Fund Balance - EDEN											

P.A. Increases from Previous Year = average PA increase over past 5 years, Dispatch was using 2% increase for projections but dropped to 1% post COVID.

Account Number		2026 Department II	2027 Department I	2028 Department I	2029 Department I	2030 Department I
261	CENTRAL DISPATCH FUND					
261-325.000	CENTRAL DISPATCH					
261-325.000	CENTRAL DISPATCH					
261-325.000-727.000	OFFICE SUPPLIES	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
261-325.000-778.000	EQUIPMENT MAINTENANCE SUPPLIES	600.00	600.00	600.00	600.00	600.00
261-325.000-810.010	LEGAL -COURT APPT/OTHER LEGAL-	1,250.00	1,250.00	1,250.00	1,250.00	1,250.00
261-325.000-818.000	CONTRACTUAL SERVICES	610,000.00	610,000.00	610,000.00	610,000.00	610,000.00
261-325.000-851.000	TELEPHONE	7,350.00	7,350.00	7,350.00	7,350.00	7,350.00
261-325.000-861.000	TRAVEL EXPENSES	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
261-325.000-861.010	TRAVEL - ROOM/BOARD	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
261-325.000-861.020	TRAVEL - MILEAGE/FUEL	6,700.00	6,700.00	6,700.00	6,700.00	6,700.00
261-325.000-861.030	TRAVEL - CONF/REGISTRATION/TRAIN	13,200.00	13,200.00	13,200.00	13,200.00	13,200.00
261-325.000-900.000	PRINTING & BINDING	500.00	500.00	500.00	500.00	500.00
261-325.000-932.000	EQUIPMENT REP. & MAINTENANCE	145,000.00	155,000.00	165,000.00	175,000.00	175,000.00
261-325.000-934.000	OFFICE EQUIP. REPAIRS & MAINT.	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00
261-325.000-941.000	BUILDING/PROPERTY RENTAL	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00
261-325.000-955.000	LOW VALUE EQUIPMENT	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
261-325.000-956.000	MISCELLANEOUS	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
261-325.000-958.000	MEMBERSHIPS & SUBSCRIPTIONS	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00
261-325.000-960.000	INDIRECT EXP	350,000.00	350,000.00	350,000.00	350,000.00	350,000.00
261-325.000-961.000	LIABILITY INSURANCE	9,100.00	9,100.00	9,100.00	9,100.00	9,100.00
261-325.000-979.000	OFFICE EQUIPMENT & FURNITURE	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
261-325.000-979.010	OFFICE EQUIP&FURNITURE-COMPUT	3,200.00	3,200.00	3,200.00	3,200.00	3,200.00
261-325.000-986.000	COMPUTER SOFTWARE	26,000.00	26,000.00	26,000.00	26,000.00	26,000.00
Total	CENTRAL DISPATCH	1,234,600.00	1,244,600.00	1,254,600.00	1,264,600.00	1,264,600.00
261-326.000	911 PROJECT ACTIVITY					

Account Number		2026 Department II	2027 Department I	2028 Department I	2029 Department I	2030 Department I
261-326.000	911 PROJECT ACTIVITY					
Total	911 PROJECT ACTIVITY	0.00	0.00	0.00	0.00	0.00
Total	911 PROJECT ACTIVITY	0.00	0.00	0.00	0.00	0.00
Total	CENTRAL DISPATCH FUND	1,234,600.00	1,244,600.00	1,254,600.00	1,264,600.00	1,264,600.00
496	CENTRAL DISPATCH CIP					
496-325.000	CENTRAL DISPATCH					
496-325.000	CENTRAL DISPATCH					
496-325.000-955.000	LOW VALUE EQUIPMENT	32,000.00	32,000.00	32,000.00	32,000.00	32,000.00
496-325.000-960.000	INDIRECT EXP	786.00	847.00	912.00	979.00	979.00
496-325.000-967.000	SPECIAL PROJECT COSTS	319,603.00	586,985.00	524,798.00	903,552.00	903,552.00
496-325.000-974.000	LAND IMPROVEMENTS	2,000.00	2,000.00	100,000.00	2,000.00	2,000.00
496-325.000-976.000	BUILDING ADDITIONS AND IMPROV.	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
496-325.000-986.000	COMPUTER SOFTWARE	110,000.00	110,000.00	110,000.00	110,000.00	110,000.00
Total	CENTRAL DISPATCH	484,389.00	751,832.00	787,710.00	1,068,531.00	1,068,531.00
Total	CENTRAL DISPATCH	484,389.00	751,832.00	787,710.00	1,068,531.00	1,068,531.00
496-326.000	911 PROJECT ACTIVITY					
496-326.000	911 PROJECT ACTIVITY					
Total	911 PROJECT ACTIVITY	0.00	0.00	0.00	0.00	0.00
Total	911 PROJECT ACTIVITY	0.00	0.00	0.00	0.00	0.00
Total	CENTRAL DISPATCH CIP	484,389.00	751,832.00	787,710.00	1,068,531.00	1,068,531.00

Account Number	2026 Department II	2027 Department I	2028 Department I	2029 Department I	2030 Department I
Grand Total	1,718,989.00	1,996,432.00	2,042,310.00	2,333,131.00	2,333,131.00

Expenses 2026-2030

261 Central Dispatch

325.000 CENTRAL DISPATCH/E911	2021 Actuals	2022 Actuals	2023 Actuals	2024 Actuals	2025 Budget	2026 Change	2026 Projected	2027 Change	2027 Projected	2028 Change	2028 Projected	2029 Change	2029 Projected	2030 Change	2030 Projected
Total Compensation	1,616,388	1,632,884	1,660,848	1,831,746	2,182,639		2,576,912		2,605,258		2,633,916		2,662,889		2,692,181
325.000-727.000 OFFICE SUPPLIES	1,121	922	485	515	2,000		2,000		2,000		2,000		2,000		2,000
325.000-778.000 EQUIPMENT MAINTENANCE SUPPLIES	0	0	43	0	600		600		600		600		600		600
325.000-810.010 LEGAL -COURT APPT/OTHER LEGAL-	0	0	0	0	1,250		1,250		1,250		1,250		1,250		1,250
325.000-818.000 OTHER CONTRACTUAL SERVICES	**275,258**	**328,356**	**521,137**	**508,758**	**535,000**	**75,000**	**610,000**		**610,000**		**610,000**		**610,000**		**610,000**
325.000-851.000 TELEPHONE	5,878	4,762	5,429	6,593	7,350		7,350		7,350		7,350		7,350		7,350
325.000-861.000 TRAVEL EXPENSES	290	1,294	679	1,209	3,000		3,000		3,000		3,000		3,000		3,000
325.000-861.010 TRAINING - ROOM/BOARD	1,023	7,603	2,955	4,357	10,800		10,800		10,800		10,800		10,800		10,800
325.000-861.020 TRAVEL - MILEAGE/FUEL	98	1,513	745	934	6,700		6,700		6,700		6,700		6,700		6,700
325.000-861.030 TRAVEL - CONF-REGISTRATION/TRAINING	7,200	16,145	7,689	10,877	13,200		13,200		13,200		13,200		13,200		13,200
325.000-900.000 PRINTING & BINDING	0	42	134	895	500		500		500		500		500		500
325.000-932.000 EQUIPMENT REP. & MAINTENANCE	**107,219**	**112,334**	**115,788**	**125,215**	**135,000**	**10,000**	**145,000**	**10,000**	**155,000**	**10,000**	**165,000**	**10,000**	**175,000**		**175,000**
325.000-934.000 OFFICE EQUIP. REPAIRS & MAINT.	206	0	0	0	2,500		2,500		2,500		2,500		2,500		2,500
325.000-941.000 BUILDING/PROPERTY RENTAL	**23,859**	**31,230**	**0**	**0**	**34,000**	**2,000**	**36,000**		**36,000**		**36,000**		**36,000**		**36,000**
325.000-955.000 LOW VALUE EQUIPMENT	405	822	2,822	4,270	2,000		2,000		2,000		2,000		2,000		2,000
325.000-956.000 MISCELLANEOUS	759	0	910	113	1,000		1,000		1,000		1,000		1,000		1,000
325.000-958.000 MEMBERSHIPS & SUBSCRIPTIONS	1,432	1,864	2,324	2,102	2,400		2,400		2,400		2,400		2,400		2,400
325.000-960.000 INDIRECT EXP	308,747	293,621	293,621	332,581	350,000		350,000		350,000		350,000		350,000		350,000
325.000-961.000 LIABILITY INSURANCE	6,908	9,086	9,086	9,090	9,100		9,100		9,100		9,100		9,100		9,100
325.000-979.000 OFFICE EQUIPMENT & FURNITURE	269.95	1635	1635	0	2000		2,000		2,000		2,000		2,000		2,000
325.000-979.010 OFFICE EQUIPMENT & FURNITURE - COMPUTER HARDWARE	0	2,427	2,427	0	3,200		3,200		3,200		3,200		3,200		3,200
325.000-986.000 COMPUTER SOFTWARE	19,574	17,888	17,888	21,040	26,000		26,000		26,000		26,000		26,000		26,000
325.000-991.087 LEASE DEBT SRVC PRINCIPAL	0	0	0	19,435	0		0		0		0		0		
325.000-994.087 LEASE DEBT SRVC INTEREST				14,223	0		0		0		0		0		
325.000-995.496 Transfer Out 2118	271,463	271,463	271,563	0	0		0		0		0		0		0
	2,648,098	2,735,891	2,918,207	2,893,954	3,330,239	87,000	3,811,512	10,000	3,849,858	10,000	3,888,516	10,000	3,927,489	0	3,956,781
Line Item Explanation							1,234,600		1,244,600		1,254,600		1,264,600		1,264,600

Compensation

325.000-818.000 OTHER CONTRACTUAL SERVICES	2027-2030	Increased to accommodate escalators in existing contracts as well as new contract for AI assisted non-emergency call taking solution as part of a 2026 project
325.000-932.000 EQUIPMENT REP. & MAINTENANCE	2027	Increased based on new contract and escalators on existing contracts
325.000-941.000 BUILDING/PROPERTY RENTAL	2026-2030	Adjusted based on historical data

Revenue 2026-2030

261 Central Dispatch

325 CENTRAL DISPATCH/E911	2021 Actuals	2022 Actuals	2023 Actuals	2024 Actuals	2025 Budget	2026 Change	2026 Projected	2027 Change	2027 Projected	2028 Change	2028 Projected	2029 Change	2029 Projected	2030 Change	2030 Projected
261-325.000-406.010 P.A. 29 FUNDS	2,991,485	2,925,567	2,958,502	3,022,120	2,984,371	177,328	3,161,699	30,142	3,191,842	30,444	3,222,285	30,748	3,253,033		3,253,033
261-325.000-406.020 PA 32 FUNDS: Equal Pymt	115,709	290,988	290,760	281,014	290,988		290,988		290,988		290,988		290,988		290,988
261-325.000-406.022 PA 32 FUNDS: Training Funds	22,151	25,775	26,025	21,535	25,775		25,775		25,775		25,775		25,775		25,775
261-325.000-665.000 INTEREST EARNED - DEPOSITS	562	-562	63,826	85,927	0		0		0		0		0		0
261-325.000-667.000 RENTS	0	9,240	9,240	9,240	9,240	1,050	10,290		10,290		10,290		10,290		10,290
261-325.000-676.000 Reimbursements	0	471	3,134	0	0		0		0		0		0		0
261-325.000-682.000 OTHER REIMBURSEMENTS	712	84	812	174	0		0		0		0		0		0
261-325.000-699.213 Transfer In	0	0	0	0	0		0		0		0		0		0
Total Revenues	3,130,620	3,251,562	3,352,299	3,420,010	3,310,374	178,378	3,488,752	30,142	3,518,895	30,444	3,549,338	30,748	3,580,086	0	3,580,086
Total Expenditures	2,648,098	2,735,891	2,918,207	2,893,954	3,330,239		3,811,512		3,849,858		3,888,516		3,927,489		3,956,781
	482,522	515,671	434,092	526,056	-19,865		-322,760		-330,963		-339,178		-347,403		-376,695

Line Item Explanation	
261-325.000-406.010 P.A. 29 FUNDS	2026 - increased based on a review of actual revenue going back to 2021, and determining an underestimate in the 2025 revenue projections. Once corrected with the 2024 actuals available the project PA 29 funds was recalculated
261-325.000-406.010 P.A. 29 FUNDS	2027 - 2030 based on an expected 1% increase in surchage revenues based on a 5 year average reflected said growth
261-325.000-667.000 RENTS	2026 - increased to reflect contract with SEMCO for use of the Simulcase system for $1050 annually

Revenue 2026-2030

496 Central Dispatch - CIP						2026		2027		2028		2029		2030	
325 CENTRAL DISPATCH/E911	2021 Actuals	2022 Actuals	2023 Actuals	2024 Actuals	2025 Budget	Change	Projected	Change	Projected	Change	Projected	Change	Projected	Change	Projected
496-325.000-542.000 State Grant		0	0	0	0	0	0	0	0	0	0	0	0	0	0
496-325.000-406.010 P.A. 29 Funds	725,412	751,037	758,590	774,902	766,132	7,661	773,794	7,738	781,532	7,815	789,347	7,893	797,241		797,241
496-325.000-665.000 Interest Earned - Deposits	467	-467	30,592	0	0		0		0		0		0		0
496-325.000-674.000 Contributions & Donations	0	0	0	0	0		0		0		0		0		0
496-325.000-696.000 BOND/NOTE PROCEEDS	0	0	0	-1,200	0		0		0		0		0		0
496-325.000-699.261 Transfer In	271,463	271,463	271,463	0	0		0		0		0		0		0
496-325.000-699.403 Transfer In	0	10,576	0	0	0		0		0		0		0		0
Total Revenues	997,343	1,032,608	1,060,645	773,702	766,132	7,661	773,794	7,738	781,532	7,815	789,347	7,893	797,241	0	797,241
Total Expenditures	140,994	1,559,970	1,048,898	564,346	662,088		484,389		751,833		787,709		1,068,531		1,068,531
	856,349	-527,362	11,747	209,357	104,044		289,405		29,699		1,638		-271,291		-271,291

Line Item Explanation	
496-325.000-406.010 P.A. 29 Funds	2026-2030

Expenses 2026-2030

496 Central Dispatch - CIP

325 CENTRAL DISPATCH/E911	2021 Actuals	2022 Actuals	2023 Actuals	2024 Actuals	2025 Budget	2026 Change	2026 Projected	2027 Change	2027 Projected	2028 Change	2028 Projected	2029 Change	2029 Projected	2030 Change	2030 Projected
325.000-818.000 OTHER CONTRACTUAL SERVICES	3,264	0	0	0	0		0		0		0		0		0
325.000-955.000 EQUIPMENT	0	0	0	9,787	32,000		32,000		32,000		32,000		32,000		32,000
325.000-960.000 Indirect Exp	728	1,069	1,110	0	728	58	786	61	847	64	912	67	979		979
325.000-967.000 SPECIAL PROJECTS COSTS	0	0	0	20,120	457,360	-137,757	319,603	267,382	586,985	-62,188	524,798	378,755	903,552		903,552
325.000-974.000 LAND IMPROV.	1,999	435	0	365	2,000		2,000		2,000	98,000	100,000	-98,000	2,000		2,000
325.000-976.000 BUILDING ADDITIONS AND IMPROV.	0	0	0	179,194	60,000	-40,000	20,000		20,000		20,000		20,000		20,000
325.000-977.000 Machinery & Equipment	0	153,022	82,322	-150,368	0		0		0		0		0		0
325.000-979.000 Office Equipment & Furniture	0	0	46,357	1,577	0		0		0		0		0		0
325.000-983.000 AUDIO-VISULA EQUIPMENT	0	56,373	9,524		0		0		0		0		0		0
325.000-986.000 COMPUTER software	135,003	439,486	0	30,297	110,000		110,000		110,000		110,000		110,000		110,000
325.000-995.367 Transfer Out		909,585	909,585	473,374	0		0		0		0		0		0
325.000-995.403 Transfer Out	0	0	0	0	0		0		0		0		0		0
	0	0	0	0	0		0		0		0		0		0
	140,994	1,559,970	1,048,898	564,346	662,088	-177,699	484,389	267,443	751,833	35,877	787,709	280,822	1,068,531	0	1,068,531

Line Item Explanation

2026-2030 Revenue

Allegan County

Account Number		2026 Department II	2027 Department I	2028 Department I	2029 Department I	2030 Department I
261	CENTRAL DISPATCH FUND					
261-325.000	CENTRAL DISPATCH					
261-325.000	CENTRAL DISPATCH					
261-325.000-406.010	P.A. 29 FUNDS	3,161,699	3,191,842	3,222,285	3,253,033	3,253,033
261-325.000-406.020	PA 32 FUNDS: Equal Pymt	290,988	290,988	290,988	290,988	290,988
261-325.000-406.022	PA 32: PSAP Training Funds	25,775	25,775	25,775	25,775	25,775
261-325.000-667.000	RENTS	10,290	10,290	10,290	10,290	10,290
Total	CENTRAL DISPATCH	3,488,752	3,518,895	3,549,338	3,580,086	3,580,086
Total	CENTRAL DISPATCH	3,488,752	3,518,895	3,549,338	3,580,086	3,580,086
Total	CENTRAL DISPATCH FUND	3,488,752	3,518,895	3,549,338	3,580,086	3,580,086
496	CENTRAL DISPATCH CIP					
496-325.000	CENTRAL DISPATCH					
496-325.000	CENTRAL DISPATCH					
496-325.000-406.010	P.A. 29 Funds	773,794	781,532	789,347	797,241	797,241
Total	CENTRAL DISPATCH	773,794	781,532	789,347	797,241	797,241
Total	CENTRAL DISPATCH	773,794	781,532	789,347	797,241	797,241
Total	CENTRAL DISPATCH CIP	773,794	781,532	789,347	797,241	797,241
Grand Total		4,262,546	4,300,427	4,338,685	4,377,327	4,377,327

Format Name(s): S = Z_2026-30R O = anyyear.

A GUIDE TO PUBLIC SAFETY RADIOS IN ALLEGAN COUNTY

A Decision Maker's Guide to Public Safety Radio Upgrades or Replacement

Jeremy Ludwig
jludwig@allegancounty.org 2025

INTRODUCTION

In January of 2025, the Allegan County 911 Policy & Procedure Board recommended the creation of a workgroup to research and provide a Public Safety Radio facts sheet that could be distributed to all local units of government and public safety leaders. The workgroup was comprised of, Allegan County Central Dispatch Director, Jeremy Ludwig, Allegan County Central Dispatch Deputy Director, Whitney Wisner, Allegan County Medical Control Board Authority Member, Chris Mantels, Pamala Crandel, Allegan City Police Chief, Jay Gibson, City of Otsego City Manager, Aaron Mitchell, Allegan County Undersheriff, Mike Larsen, and Hamilton Township Fire Chief David Haverdink.

The workgroup created this manual to provide details related to all Allegan County Public Safety Departments' current radios as issued by the County in 2017, their current disposition, pending requirements for encryption of Criminal Justice Information on land mobile radios, and the impact that may have on departments. This manual also provides answers to commonly asked questions from public safety about the radios they received in 2017, as well as information related to discounts available exclusively to public safety agencies within Allegan County through Motorola, and models of radios and MSRP pricing of other vendor radios approved for use on the MPSCS radio system. This guide is intended to educate and aid public safety departments and local municipalities in decision-making as it relates to the maintenance, upgrade, or replacement of their current radios and is not an endorsement of any particular vendor or product.

While every effort has been taken to validate the information contained within this manual, we encourage public safety leaders and municipalities to use their due diligence in upgrading or replacing their radios. This includes completing your own review of vendors and their products, performing reference checks, and attending or scheduling product demonstrations if appropriate.

CONTENTS

Introduction 1
Current Motorola Radios Issued from 2017 3
Encryption Standards 3
Questions and Answers 4
Questions Fire Services' perspective 8
Appendix A: APX ENCRYPTION UNLOCKS AND "AN" MODEL RADIOS 9
Appendix B: Michigan State Police Land Mobile Radios and Encryption of Criminal Justice Information 11
Appendix C: Motorola Radio Survey 14
Appendix C: Allegan County Exclusive Motorola Pricing 15
Appendix C: APX N70 16
Appendix C: DMS User Guide 24
Appendix C: Lifecycle Support for APX6000 Models 39
Appendix C: Lifecycle Support Notices O5 AN Models 41
Appendix C: Radio Management System Planner 43
Appendix D: BK Technologies Survey 108
Appendix E: EF Johnson-JVC Kenwood Survey 109
Appendix E: NX-5200, 5300, & 5400 121
Appendix E: NX – 5700, 5800, & 5900 123
Appendix E: Viking VM8000 125
Appendix E: Vikining VM6000 127
Appendix E: Viking VM5000 129
Appendix E: Viking VP8000 131
Appendix E: Viking VP5000 133
Appendix F: L3Harris Survey 135

CURRENT MOTOROLA RADIOS ISSUED FROM 2017

- Portable Radios:
  - **APX6000**
    - ***"an" model***: Motorola issued notice as of December 31, 2023, that it would no longer support this model; however, extended support through December 31, 2024. With the end of support, Motorola has asserted that this model can no longer be flash upgraded, and Motorola no longer manufactures or sells parts for it. However, agencies both inside and outside of Allegan County have been able to flash upgrade "*an"* model radios even after the above-listed dates.

    - ***"bn" model***: This model is still fully supported by Motorola, but is represented by only a handful of radios from the 2017 distribution.

  Note: You can determine if your radio is an or bn by removing the battery and looking at the model number on the radio's label underneath.

  - **APX6000XE**
    - This model is the Fire Intrinsic version of the APX6000 and is still fully supported by Motorola.
- Mobile Radios:
  - **APX6500**
    - "an" model: Motorola released a statement that it is ending support for this model in September 2025.

  Note: End of service does not mean the radio ceases to function, only that there is no longer support available for the radio. The radio could still have years of life and use, but it may no longer be upgradable to new software versions or have additional function sets added, such as encryption, over-the-air programming, etc., and parts may be limited or unavailable.

ENCRYPTION STANDARDS

Currently, all Allegan County Public Safety Radios that were issued to departments in 2017 were equipped with an ADP encryption key. However, the only talkgroups that employed this encryption were 03LEIN, 03TAC, and 03SWAT. There are plans in place to also encrypt the prime law enforcement talkgroup 03LAW, which will initially be APD encryption.

Michigan State Police (MSP) issued a Land Mobile Radio and Criminal Justice Information (CJI) Encryption Guide on May 1, 2025. See the guide in the appendix for further information related to encryption requirements for CJI.

Based on the MSP guide, t*he Allegan County 911 Policy Board Radio Workgroup recommends that all Law Enforcement Agencies in Allegan County and Central Dispatch be prepared to have AES256 encryption in place no later than November 1, 2026, to avoid sanctions from the MSP CJIS Audit Team.*

QUESTIONS AND ANSWERS

1. **What is the best way to make the transition to AES encryption? Can each agency move to the AES at its own pace?**
   A. The MPSCS does not recommend we move to AES until all are ready to go. They recommend we create the new AES-capable talkgroups and let them reside on the system. Once all the subscribers are ready, set a date with all agencies and move everyone at once. If not, some will be able to hear traffic while other units with the non-compatible algorithms can't hear. Dispatch operators would have to monitor two talkgroups as well if we moved while only some were ready.

2. **What exactly and specifically can and cannot be updated with the APX6000an models now that they are no longer supported? OTAP? Multikey Encryption?**
   A. See Appendix C. Service on AN models has been discontinued.

   Aftermarket encryption is available as of today (2/18/25); however, if something breaks on the radio, we cannot repair it.

   Specifically, ADP Privacy, AES Encryption, DES-XL, DES-OFB, and ADP (not P25 CAP Compliant Configuration) are available in our system. However, this will be changing internally soon, where encryption will no longer be available altogether.

   Motorola will no longer support/repair this model

3. **Are the APX6500an models going to remain supported for the foreseeable future? If so, can they be upgraded with multi-key encryption and OTAP via Wi-Fi? Can agencies still buy post-warranty maintenance plans on the APX6500an models?**
   A. Please see Appendix C: Life Cycle Support document attached. It indicates an anticipated end of support date coming up in September 2025. It is highly likely that Motorola will provide a minimum of 5 years of service. Please note that support is subject to demand and related component availability.

   As of 2/18/25, AES, Multikey, Wi-Fi, and OTAP are available.
   OTAP usage is subject to MPSCS approval on a per-agency basis. Since OTAP requires programming over the radio network, further information is required in order to determine if this can be utilized for Allegan County.

   Post-warranty maintenance plans are not available due to the anticipated end of support date in September 2025.

4. **Can we add AES, Multikey, Wi-Fi, OTAP to the APX6000AN?**
   A. As of February 18th, this option was still available in the ordering system.

5. **Can we add AES, Multikey, Wi-Fi, OTAP to the APX6000BN?**
   A. Yes, as of 2/18/25.

6. **What is the availability of APX6000bn models? Are they eligible for seven years of service, as was offered on new purchases? If not, what is the longest Moto can offer service on them? What would they cost with multi-key encryption and OTAP capability via Wi-Fi? How long will the APX6000BN be supported?**
   A. APX6000BN portables are currently available for purchase
   A 7-Year Service Warranty is available

Cost is based on quantity and any applicable discounts. More information is requested in order to properly quote.

End of sale has not been announced. When the end of sale is announced, the products are typically supported for repair for a minimum of 5 years.

As of 2/18/25, AES, Multikey, Wi-Fi, and OTAP are still available

7. **Can we add AES, Multikey, Wi-Fi, OTAP to the APX6500AN?**
   A. As of February 18th, Yes

8. **Does the MPSCS system have enough control channels to take on OTAP in Allegan County?**
   A. OTAP or Over the Air Programming is not used on the MPSCS system; it is painstakingly slow due to the size of the current generation radio codeplugs. OTAR, or over-the-air Rekey, is a data function and rides secondary to voice traffic, so there are no capacity concerns with OTAR. OTAR is deployed in close collaboration with MPSCS, as the MPSCS must enroll all the radios in the KMF server once the OTAR functionality is added. OTAP, on the other hand, would probably require engineering to look at the grade of service and factor that in. The MPSCS does not have any real-world comparables since it is not used. (Chris Kuhl, MPSCS)

9. **How long will the MPSCS continue to support the APX6000AN, APX6000BN, and APX6500AN Motorola models?**
   A. The MPSCS has no plans to stop supporting any APX variety of radios, from a programming/functionality perspective, the AN vs BN doesn't make much difference to use. They are both fully capable radios and can support all encryption algorithms. (Chris Kuhl, MPSCS)

10. **What are the specifications of the APX Next (multi-band) and N70 (single-band) portable radios, and what would it cost with multikey and OTAP capability via Wi-Fi? Is it at all compatible with any of the accessories we currently use with the APX6000 models?**
    A. APX Next (Multi-band), N70 (Single-band). The model specifications are attached for easy reference. Price can be determined with more information with respect to quantity, and once the pre-approved discounts have been applied. APX Next MSRP is approx. $12K, which includes all smart features and applications. N70 MSRP is approx. $8.2K. Please note that this is only an estimation, not including any applicable discounts, and that prices are subject to change.

    Due to the size of the accessory catalogue, please specify the accessory, and we can confirm its compatibility with the APX Next.

11. **Do you offer a hi temp intrinsically safe radio in the Next or N70 series with a top display and/or Extreme version with larger knobs?**
    A. This version is due to ship later in 2025

12. **Have these new Next or N70 radios been approved by the MPSCS for use on the state system yet?**
    A. Yes.

13. **How many of our current accessories for the APX6000 will work on the Next and N70s?**
    A. None.

14. **Will we need new batteries, chargers, etc.?**
    A. Yes (APX6000AN Batteries will fit APX6000BN models)

15. **Will the 3% discount being offered exclusively to Allegan County agencies (see Appendix C) be applied to any of these models?**

A. Yes, as part of an exclusive agreement with Allegan County, but the purchase must go through Motorola directly and not a local vendor such as TeleRad, C-COMM, etc. Reach out to Rich Uslan or Andrea Bernard.

Rich Uslan, Area Sales Manager
616-438-1942
Rich.uslan@motorolasolutions.com

Andrea Bernard, Account Manager
616-889-0737
Andrea.bernard@motorolasolutions.com

16. **Does the 3% violate the MI deal since it's being offered above and beyond the MI deal pricing?**
    A. No, Motorola has often offered incentives above state contract discounts where customers have purchased utilizing the terms and conditions.

17. **Above the 3%, how will Motorola assure the individual agencies a 10-year commitment and be financially responsible this time?**
    a. Each radio purchased will include 7 years of device support at no additional cost.

18. **What would I need to purchase to be able to do OTAP via Wi-Fi? Hardware? Software? Cost?**
    A. A computer. Please see the attached Radio Management System Planner document. Reference section 2.2.6 of the device planner in Appendix C, which outlines the requirements of the computer. (Different than OTAP)

    Approval from the MPSCS is also required. The MPSCS supports Motorola's Radio Manager, which deploys programming via WIFI connectivity. That product, however, requires a range-limited system key or ASK from MPSCS. Therefore, the MPSCS has some requirements since the county would be in possession of a system key.

    MPSCS requires a designated trained person(s) who would manage the programming, and the system key must remain in possession of the agency, not a vendor. The County would be responsible for the individual templates, and MPSCS would only provide master templates and would no longer return serialized programming. According to the MPSCS, there are some serious pitfalls and damage that can be done by using the ASK incorrectly, so they strongly encourage taking the CPS programming courses through Motorola, along with the Radio Manager training.

    Ingham, Oakland, and Livonia PD are all currently using Motorola Radio Manager.

    The system key expires every December, so each year the MPSCS will reach out and renew them for the agencies in possession of them.

19. **Will MPSCS provide any credits for the existing MIC fees towards the replacement, or will it still be $250?**
    A. No, the MPSCS will not provide any credits for devices being rolled off the system. Each new device would incur a one-time $250 per-device activation. (Chris Kuhl, MPSCS)

20. **If the agencies are responsible for this $250 MPSCS fee per radio, will Motorola cover that cost since we are having to do it 5 years earlier than we should have?**
    A. Motorola does not have approval to cover this cost.

21. **Do we even need AES / Multikey for fire, or can dispatch just patch talkgroups for the rare occurrences?**
    A. Encrypted talkgroups cannot be patched into unencrypted talkgroups. If Fire wanted to be able to talk with another agency on an encrypted talkgroup, they would need to have that agency's encryption.

However, this does not prohibit us from moving users to a UIC talkgroup, which is unencrypted for interoperability.

22. What other radios (Motorola and other vendors) are authorized for use on the MPSCS?

Portable Radios

Manufacturer	Model	Version	Minimum Firmware	Additional Information
Motorola Solutions	APX 900	2, 3	R35.00.00	DES encryption & OTAR not supported by this model ***NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO DES ENCRYPTION LIMITATIONS***
	APX 1000	1.5, 2, 3		DES/AES encryption & OTAR not supported on this model ***NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO DES/AES ENCRYPTION LIMITATIONS*** Discontinued by manufacturer
	APX 3000	1		
	APX 4000	2, 3		DES encryption & OTAR not supported on this model ***NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO DES ENCRYPTION LIMITATIONS***
	SRX 2200	1.5, 3.5		Model 1.5 requires QA01768 Enhanced Zone Bank Operation SRX 2200 (AN), APX 6000 (AN), and all APX 7000 models Discontinued by manufacturer
	APX 6000	1.5, 2.5, 3.5, XE, Li		
	APX 7000	1.5, 3.5, XE		
	APX 8000	2.5, 3.5, XE, H, HXE		
	APX N30	2, 3		DES encryption & OTAR not supported by this model ***NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO DES ENCRYPTION LIMITATIONS***
	APX N50	2, 3		
	APX N70	4.5	R05.00.00	Touchless Encryption Key Provisioning supported by MPSCS on N70/Next models *Radio Central programming not supported until further notice*
	APX Next	4.5, XE, XN	R08.00.00	APX Next XN NFPA 1802 Compliant

Portable Radios

Manufacturer	Model	Version	Minimum Firmware	Additional Information
JVCKenwood / EF Johnson Viking	VP5430	F2, F3	v8.42.30.83	Not approved for DE31 DES only hardware encryption option
	VP6430			
	VP8000		v8.42.30.123	
JVCKenwood	NX-5400	K2, K3	v5.22	Not approved for TDMA / OTAR / IV&D / DES 4 Keys ***NOT RECOMMENDED FOR WAYNE COUNTY / REGION 2 AREA DUE TO ARC4 ENCRYPTION LIMITATIONS***
	TK-5430			
L3Harris	XL-45P	Limited and Full Keypad *851-870MHz International version only*	R19C01.0312	XL-45P and XL-150P not approved for encryption use ***XL-45P AND XL-150P NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO SINGLE ENCRYPTION KEY LIMITATIONS*** Not approved for OTAR / IV&D Requires YRXL-PL9F P25 Conventional Fallback option XL-400P NFPA 1802 Compliant
	XL-95P			
	XL-150P			
	XL-185P			
	XL-200P			
	XL-400P			
Tait Communications	TP9400	9455, 9460	v3.04.08	Not approved for TPAS053 Single DES Encryption and TPAS109 Single Privacy Key options
	TP9600	9655, 9660		
	TP9800	9855, 9860 9865, 9870 9875, 9880		
BK Technologies	KNG2-P800	N/A	v5.7.10	KNG2 Not approved for TDMA / OTAR / IV&D KNG2 Discontinued by Manufacturer ***NOT RECOMMENDED FOR WAYNE COUNTY / REGION 2 AREA DUE TO ARC4 ENCRYPTION LIMITATIONS***
	BKR-9000	2.5, 3.5 only	v5.10.36f1	

Mobile Radios				
Manufacturer	Model	Version	Minimum Firmware	Additional Information
Motorola Solutions	APX 1500	O2	R33.52.00	DES encryption & OTAR not supported by this model ***NOT RECOMMENDED FOR PUBLIC SAFETY USE DUE TO DES ENCRYPTION LIMITATIONS***
	APX 4500	O2, O5, E5, Li		
	APX 6500	O2, O3, O5, O7, O9, E5, Li		
	APX 7500	O2, O3, O5, O7, O9, E5, Consolette		APX 7500 Discontinued by manufacturer
	APX 8500			
JVCKenwood / EF Johnson Viking	VM5930	KCH-19 KCH-20 KCH-21	v8.42.30.88	
	VM6930			
	VM7930			
JVCKenwood	NX-5900		v5.22	Not approved for TDMA / OTAR / IV&D / DES 4 Keys ***NOT RECOMMENDED FOR WAYNE COUNTY / REGION 2 AREA DUE TO ARC4 ENCRYPTION LIMITATIONS***
	TK-5930			
L3Harris	XL-185M	*851-870MHz International version only*	R19C01.0312	Not approved for OTAR / IV&D Requires YRXL-PL9F P25 Conventional Fallback option
	XL-200M			
Tait Communications	TM9400	9455, 9457	v3.04.08	Not approved for TPAS053 Single DES Encryption and TPAS109 Single Privacy Key options
BK Technologies	KNG-M800	SCH, HCH	v5.7.10	Not approved for TDMA / OTAR / IV&D ***NOT RECOMMENDED FOR WAYNE COUNTY / REGION 2 AREA DUE TO ARC4 ENCRYPTION LIMITATIONS***
Technisonic Communications	TDFM-9000 series	All versions	R33.52.00	Aircraft radio model based on Motorola APX 8000 hardware platform

*For quick reference, pricing estimates are in the appendix for quotes from the above Vendors. (Note: Tait did not respond to requests for information regarding their radios and is therefore not included in the appendix.)

QUESTIONS FIRE SERVICES' PERSPECTIVE

APX6500 AN MOBILE RADIO

1. What happens if I (fire dept) elect to do nothing and stay with the mobile radios I have?
A. This depends on which radio you have, but they will continue to function as they currently do. However, these are things to consider:

If you have the APX6500an model, then there are a few risks involved:

This radio will reach the end of support in September 2025. So, should it break or have other technical issues after that September, there may be no way to fix it.

If you want to move to multi-key encryption with AES to be able to interop with Law on their 03LAWe talkgroup, this radio may not be able to be upgraded to do this after September.

If you want wireless programming or over-the-air programming, the radio may not be able to be upgraded to do this after September.

2. What if I have an APX6000bn or APX6000XE portable radio?
A. Both of these radios are still supported by Motorola, and if you want multikey encryption with AES added to command staff radios of this model to be able to monitor 03LAWe you can do that. The estimated cost to upgrade those radios can be found in the appendix.

3. What is the justification statement for all new radios? (Plain English, no terms, no acronyms)
A. Justification for the replacement of the current radios should be determined by each local unit. Things to consider are the risk involved with operating radios for emergency response that are no longer supported by the

vendor, compliance with encryption standards for law enforcement radios, and interoperability with them on 03LAWe, as well as being able to add new or upgraded capabilities to the radios.

4. Can this radio be upgraded to the new encryption standards?
A. This is not supposed to be supported; however, due to what Motorola is calling a glitch with the Motorola website, vendors have been able to continue to submit for this upgrade. Motorola asserts this will soon be removed, so in short, yes, but not for much longer.

5. Is the need for new radios being driven by encryption?
A. In part, for law, yes. However, the other component is due to concerns over using radios that are no longer supported for emergency response use, access to replacements in a timely manner, and the ability to add OTAP or wireless programming.

6. Will the radio still continue to work on the current radio network?
A. Yes.

7. Will I still be able to talk to L.E. on UIC Channels?
A. Yes

8. Will I still be able to talk to L.E. on Special Event Channels?
A. Yes

9. Will I still be able to talk to the surrounding county Fire Departments that are also on the 800 Network?
A. At this time, yes. However, Allegan County has no control over what those other counties may choose to do. Should a surrounding County move to multi-key encryption, AES, or DES, you could lose your interoperability with them if you have “an” model radio.

10. Do I have to do any software upgrades to continue to use the current radios I have?
A. Not to our knowledge

11. Can I do software updates via a cable connection?
A. Yes, this is how all updates are currently applied to your radios.

APPENDIX A: APX ENCRYPTION UNLOCKS AND “AN” MODEL RADIOS

During the State Interoperability Conference (Interop) in early March of 2025, Mason-Oceana 911 Director Ray Hasil presented on radio encryption. One of the slides Ray presented spoke to the first-run “AN” model Motorola APX radios, which, per Motorola, were not upgradable beyond December 31, 2023. Before Interop, Ray was made aware of a vendor in Texas, Command Communications, that was selling used radios in Michigan with good results; Ray was told that Command Communications had been at Interop in the vendor area this year.

Post Interop, Ray also learned that Command Communications was able to do things that neither Motorola dealers nor Motorola themselves were able to do. Those services included updating XTS radios to the last firmware version for $100 (so the RPU would create updated templates) but most remarkably, unlock/install ADP/DES/AES and Multikey encryption in those APX AN models that Motorola says are no longer upgradeable, and for hundreds less than what Motorola charges for those upgrades.

Ray sent an e-mail to Command Communications where he explained that Oceana County had an agency that put cloned radios on the system in 2004, and some folks were charged with crimes, and that he didn't want to do anything illegal, and…how are they doing these unlocks?! The owner, Kevin, explained that when they are buying used radios in bulk from large agencies, they get upgrade CDs that were never used, and that's how they unlock them in used radios in Michigan.

Ray left his communications concerning this as such:
Command Communications claims that they have done a lot of business with Motorola for years. Command Communications purchases from Motorola, and vice versa. If this is true, then Motorola has been well aware of Command Communications and the services they provide. Of the agencies that have purchased used radios or encryption unlocks from Command Communications, Ray has not heard anything negative. On the contrary, Ray has heard lots of positives concerning cost, knowledge, customer service, and turnaround. Ray emailed Motorola on March 26, 2025. In that e-mail, Ray asked Motorola point-blank about whether or not the Command Communications unlocks are legal. As of April 28, 2025, Ray has had one phone call back from Motorola, but no answer to the legality of what Command Communications is doing.

At this time, based on what Ray has communicated, we cannot recommend for or against using Command Communications because we still don't understand how they're using CDs for encryption unlocks in AN model radios. It is very possible that these unlocks were done with CDs when APX radios were first produced, and somewhere down the line, Motorola changed its process to do the unlocks with USB sticks. For anyone who wants to know more about this, we encourage you to use caution and do your research before having upgrades like this done by a third-party vendor. Kevin Brost's, the President and CEO of Command Communications, contact information is listed below if you want to learn more.

Kevin Brost
President / CEO
Command Communications
416 Woodline Drive
Spring, TX 77386
281.363.3205-phone
281.363.3206-fax

Michigan State Police

Land Mobile Radios and Encryption of Criminal Justice Information

This correspondence is being distributed to all Michigan Criminal Justice Information Systems (CJIS) user agencies to provide guidance on the dissemination of criminal justice information (CJI) over land mobile radio (LMR). This guidance should be reviewed in conjunction with the Michigan CJIS Administrative Rules and the current version of the FBI Criminal Justice Information Services Security Policy (CJISSECPOL).

Issue:

Dissemination of CJI (obtained from both Michigan and the Federal Bureau of Investigation [FBI]) over LMR must comply with the same requirements for wired communications: CJI must only be disseminated to authorized agencies, entities, or persons; and CJI must be encrypted with in accordance with the CJISSECPOL standards.

Background:

Michigan's public safety community (i.e., law enforcement, fire, and dispatch centers) routinely communicates using radio systems, consisting of both fixed and mobile units, run by local municipalities and the state's Michigan Public Safety Communications System (MPSCS). These radio systems employ channels and talk groups to separate the various communications by agency type or level of confidentiality of the information being communicated (to include CJI). Depending on the municipality/radio system, agencies not approved/authorized for access to CJI may have access to channels/talk groups used to communicate CJI, resulting in unlawful dissemination of CJI.

Beginning with CJISSECPOL v.5.0 (September 30, 2010), CJI transmitted outside the boundaries of a physically secure location was required to be encrypted to the Federal Information Processing Standard (FIPS) 140-2 certified standard, with a minimum bit length of 128. The only exceptions to this requirement were when CJI was transmitted over facsimile or by voice using a cellular device. Though there were few references to LMR in the CJISSECPOL, LMR was not included in either exception. Additionally, with the progression of LMR systems from analog to digital, the FIPS 140-2 certified standard, typically considered for data encryption, is applicable. Unfortunately, the lack of discussion, training, and/or auditing on the application of the CJISSECPOL encryption standard to LMRs left radio system users and administrators unaware and/or unclear of the CJISSECPOL encryption requirement.

Encryption of LMR transmissions is important for several safety and privacy reasons, including but not limited to:

- Prevents unauthorized dissemination of CJI.
- Protects public safety personnel by securing voice communications related to operational procedures.
- Protects law enforcement tactics and response/scene information during rapidly evolving events.
- Prevents the public broadcast/compromise of an individual's personal/health-related information which could be used for nefarious purposes.

During Michigan's 2023 FBI Criminal Justice Information Services Information Technology Security Audit, FBI audit staff assessed LMR compliance with the CJISSECPOL encryption standard and cited agencies for non-compliance. These findings solidified the need for further education and action to bring Michigan criminal justice agencies into compliance. Since that time, the FBI Criminal Justice Information Services Information Security Officer Section has been clear in numerous presentations and discussions that the encryption requirement applies to the dissemination of CJI over LMR.

This issue was presented to the Michigan CJIS Board in January 2024 for the Board's education on the issue and to partner with Michigan's public safety stakeholders to resolve the compliance matter. Discussion with Michigan's public safety stakeholders revealed that to an extent, the stakeholders were already aware of the requirements and were working toward a solution. The solutions identified will take multiple years and a significant amount of money (potentially in the tens of millions of dollars).

As of October 1, 2024, the CJISSECPOL encryption requirement for CJI in-transit outside the boundaries of a physically secure location is to employ cryptographic modules that are FIPS 140-3 certified, or FIPS validated algorithm of symmetric key encryption and decryption (FIPS197[AES]). In either case, a symmetric cipher key of at least 128-bit strength is required.

The Michigan State Police (MSP) and the CJIS Board understand that the implementation of CJISSECPOL required encryption on LMR systems will take time and will be expensive. Since the CJISSECPOL requirement is in effect and sanctionable (by the FBI), the MSP's CJIS audit staff will audit to the requirement for educational purposes and require a written corrective action plan be submitted for findings of non-compliance. However, the lack of CJISSECPOL required encryption will not lead to sanctions imposed by the MSP until October 1, 2026.

After October 1, 2026, the MSP's CJIS audit staff will audit to the requirement and require a written corrective action plan be submitted for findings of non-compliance. Corrective action plans that do not achieve compliance within 30 days of the audit will initiate the MSP CJIS sanctions process, which is a cooperative and progressive process for agencies to report their progress towards compliance.

The following chart lists some of the cryptographic algorithms currently available for use on LMR systems:

Encryption	Description/Key Length	CJIS Compliant (Yes/No)
Advanced Digital Privacy (ADP)	40-bit encryption. Also referred to as ARC4.	No
Data Encryption Standard - Output Feedback (DES-OFB)	64-bit encryption.	No
Advanced Encryption Standard (AES)	128, 192, or 256-bit encryption.	Yes

Additional information on CJISSECPOL encryption standards can be found in controls SC-13, SC-28, and Appendix G. Additional information on FIPS 140-3 cryptographic module certification can be found at Approval and Issuance of FIPS 140-3 | CSRC. Information on FIPS validated cryptographic modules can be found using the Cryptographic Module Validation Program Search.

Compliance:

Michigan CJIS user agencies utilizing LMRs must take immediate action to comply with and adhere to the following:

- *Dissemination of CJI over LMR must be limited to channels and talk groups accessible only to agencies that have been approved/authorized to access Michigan CJIS and CJI in accordance with the Michigan CJIS Administrative Rules.*

  Rule 28.5201 of the Michigan CJIS Administrative Rules lists the agencies that may be approved for access to Michigan CJIS and CJI and the requirements for approval to access Michigan CJIS and CJI. Agencies approved by the MSP for access to CJIS and CJI are assigned an Originating Agency Identifier (ORI) specific to their level of authorized access. Since FBI CJI is generally obtained via Michigan CJIS, the Michigan CJIS Administrative Rules also apply to FBI CJI.

- *Dissemination of CJI over LMR must be encrypted in accordance with the CJISSECPOL (SC-13).*

Questions related to this guidance should be directed to the MSP CJIS Information Security Officer (ISO) at MSP-CJIS-ISO@michigan.gov.

Motorola

Radio Model	Radio Type	Current MSRP $	Discounts Offered	OTAP	$	WIFI Programm	$	GPS Capable	$	Bluetooth	$	Multikey Encrytpion	AES + $	ADP + $	DES +$
LL522	Portable	$5,999.00	20% at 500 or more	Yes	$350	No		No		No		Yes	$90	$90	N/A
APX 3000	Portable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SRX 2200	Portable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
APX600 Modeld 2.5 Bl	Portable	$5,884.00	See Below	Yes	$110	See Below	$330	Yes	$282	Yes		$363	$523.00	Included	$659 or $879.00 For all 3
APX 8000 Model 2.5	Portable	$8,635.00	See Below	Yes	$110	See Below	$330	Yes	$282	Yes		$363	$523.00	Included	$659 or $879.00 For all 3
APX N50	Portable	$5,200.00	See Below		$110	See Below	$330	Yes		Yes		$363	$523.00	Included	$659 or $879.00 For all 3
APX N70	Portable	$7,561	See Below		$110	See Below	Included	Yes		Yes		$363	$523.00	Included	$659 or $879.00 For all 3
APX Next (All Band)	Portable	$10,623	See Below		$110	See Below	$330	Yes		Yes		$363	$523.00	Included	$659 or $879.00 For all 3
APX 4500	Mobile	$5,644	See Below		$110	See Below	$330			No		$363	$523.00	Included	N/A
APX 8500	Mobile	$8,370	See Below		$110	See Below	See Below			Yes		$363	$523.00	Included	$659 or $879.00 For all 3

Radio Model	Top Screen	$	Dual or multiple band	$	ntrinsically Safe	$	Fire Rated Peripherals & current MSRP $	Accessories offered and current MSRP $	Accessories compatible with APX 6000 AN or APX 6500AN
LL522	Yes	included	No	N/A	No	N/A	None	Wired shoulder mic $95, holster $65, extra battery $125, single unit charger $95, multi-unti charger $250	Wired Mic modle 123456, holster 78910-2
APX 3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SRX 2200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
APX600 Modeld 2.5 Bl	Yes	Included	No	NA	Yes TIA Battery	$157	$880.00 XE Rugged Housing	Charger $186.50, Battery, $169.00, Speaker Mic $150	Most Chargers, speaker mics, antennas, and Batteries are compatible with the APX600 AN
APX 8000 Model 2.5	Yes	Included	Yes	$800	Yes TIA Battery	$157	$880.00 XE Rugged Housing	Charger $186.50, Battery, $169.00, Speaker Mic $151	Most Chargers, speaker mics, antennas, and Batteries are compatible with the APX600 AN
APX N50	No	N/A	No		Yes TIA Battery	$194	N/A	Battery $178.50, Charger $86.00, Speaker Mic $173	
APX N70	Yes	Included	No		Yes TIA Battery	$228	XE Rugged Housing ETA Q3 2025	Battery $178.50, Charger $207, Speaker Mic $173.00	
APX Next (All Band)	Yes	Included	Yes	ALL Bands Included			XE Rugged Housing Available	Battery $248.00, Charger, $207, Speaker Mic $486	
APX 4500	No (Mobile)	No (Mobile)	No				N/A		
APX 8500	No (Mobile)	No (Mobile)	Yes	$800	N/A	N/A	N/A	control Heads	

The MSPR pricing is going to vary for each Mobile and Portable. We have multiple options such as no keypad, limited and full keypad. For the sake of this exercise I'll quote The Model 2.5 on the APX 6000 and APX8000.

Since there are a plethora of options I'll add a couple in each column.

https://www.motorolasolutions.com/content/dam/msi/docs/products/apx/apx-accessories/apx_accessories_catalog.pdf

State Contract 25% off all Accessoires
Allegan County Agrred Pricing Available Until June 30th 2026
State Contract 33% off with a radio that includes MultiKey and Encryption (1-49 Radios)
State Contract 38% off with a radio that includes MultiKey and Encryption (50-99 Radios)
State Contract 43% off with a radio that includes MultiKey and Encryption (100+ Radios)
*Each Radio will also include 7 Years Device Management Support at no cost

WiFi Programming - MPSCS Approval Needed
$330 Per Radio
RADIO MANAGEMENT ESTIMATED COST $30k for the installation and configuration
$100 per license x's quantity of radios. This is for Perpetual Licenses which are not specific to a serial#. The server is expandable so a customer can start with 100 licenses and buy in increments.
Customer's only task is to provide a CPU.
OTAP - Engineering resource needed to design and work with MPSCS on if this option can be approved before providing a price
OTAP - Cost for the Feature needs to be added for each radio

Motorola Solutions, Inc.
500 W Monroe St
Chicago, IL 60661

June 13, 2024

Jeremy Ludwig, 911 Director
Allegan County
3271 122nd Ave
Allegan, MI 49010

Subject: Allegan County Voice Radio Project: Change Order #05

Director Ludwig:

To finalize the Allegan County Voice Radio Project, Motorola has presented change order #5 which will release Allegan County from the 10% retainer in the amount of $240,459.29 thereby reducing the final payment due to $0.00 and recognize final acceptance and closure of MI-161103A Allegan County Voice Radio Project.

With this fully executed change order Motorola will provide Allegan County agencies the following discounts on Motorola P25 Mobiles and Portable radios with a trade in of existing APX6000 and AP6500 radios.

- Quantity 1: 33% off List Price and 7-year Device Management Support (DMS) when minimally configured with AES/DES Encryption and Multikey.
- Quantity 50-99: 38% off List Price and 7-year Device Management Support (DMS) when minimally configured with AES/DES Encryption and Multikey.
- Quantity 100+: 43% off List Price and 7-year Device Management Support (DMS) when minimally configured with AES/DES Encryption and Multikey.

Motorola's proposal is subject to the terms and condition in the MiDEAL contract #190000001544. This proposal shall remain valid until June 30, 2026. Proposal requests, Purchase Orders (PO) and Notice to Proceed (NTP) will be directed to Bill Irwin, Account Manager at Bill.Irwin@motorolasolutions.com.

We are proud of the successful deployment of the communications system in Allegan County and the positive impact it has had on the community. This project is a testament to the strong partnership between Motorola and Allegan County, and we are grateful for the trust and support we have received.

Sincerely,

Rich Uslan
Area Sales Manager

Brochure

APX N70 XE

single -band P25 smart radio

Keeping firefighters safe,
focused and always in touch

MOTOROLA SOLUTIONS

Equipping fire crews with smart, rugged, reliable communications, streamlined management and simplified ownership

When lives are threatened, your radio can be the lifeline that keeps teams safe, focused and in touch during critical moments. The APX N70 XE radio helps your personnel be ready for any challenge — even in extreme environments.

Made for firefighters and EMS personnel on the front line, the APX N70 XE combines high tier adaptive audio with sure, intuitive operation, advanced connectivity and streamlined device management.

Every element of the radio's tough, ergonomic design is focused on maximizing task performance. Large control knobs and buttons can be operated while wearing thick gloves. The 3" touch screen lets firefighters view critical information and interact with smart apps, via a clear user interface.

Adaptive audio monitors the surrounding environment and adjusts the radio's sound settings for maximum clarity. High Dynamic Range mics handle extremes in speech volume – from a whisper to an urgent scream for assistance – without distortion.

Advanced processing filters out noise and suppresses feedback, so firefighters can always hear and be heard loud and clear.

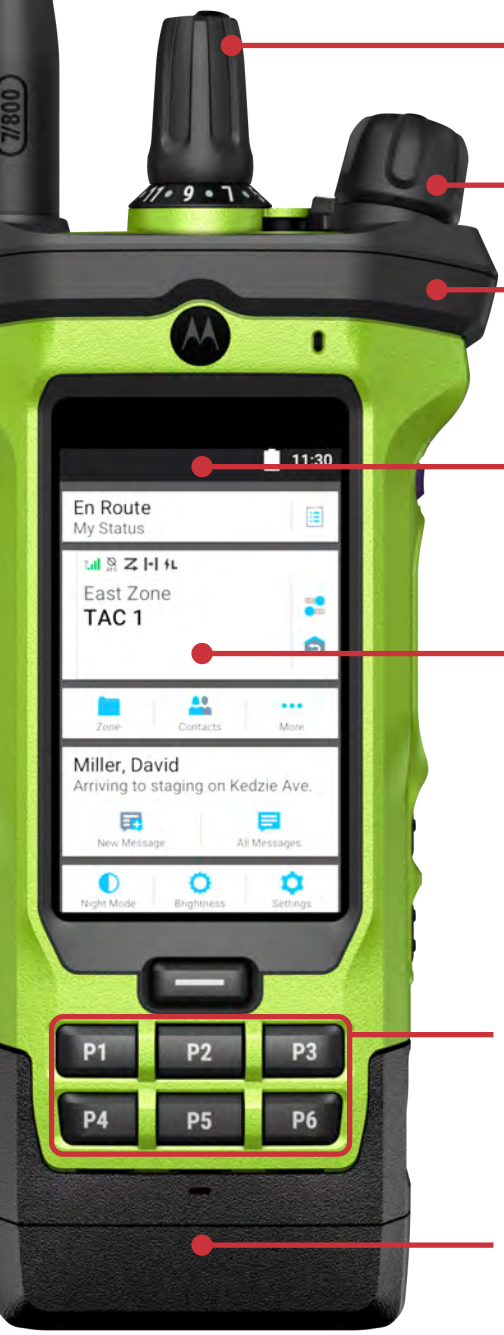
The APX N70 XE goes beyond boundaries with Wi-Fi and optional LTE connectivity, keeping crew members in touch even when they are outside regular radio coverage. Optional smart apps and services further enhance performance, heightening situational awareness and enabling more effective collaboration.

A superior ownership experience helps amplify the return on investment, while reducing the burden on time-stretched radio managers. An entire fleet of radios can be provisioned and updated over the air – ensuring secure, reliable operation and giving access to new apps and functions, without needing to take radios out of service for manual maintenance.

Rugged performer

Tough, familiar, and ready to handle any challenge, even in harsh conditions.

Refined through Motorola Solutions' decades of experience in the public safety space, the APX N70 XE maintains an unwavering focus on reliable operations, even when wearing heavy gloves.



Large channel knob

Easy to access and operate, feels different from volume knob

Angled power/volume knob

Stands out from other controls, for optimal access

Ergonomic T-grip design

Helps ensure the radio stays in the hand

3-inch Corning® Gorilla® Glass screen

See and interact with critical information at a glance

SmartTouch interface

- Focused on essential needs
- Large, intuitive icons
- Easy to use wearing gloves
- Quick switching between tasks

Programmable buttons

Nine programmable buttons for one-touch quick access

HAZLOC-rated Div I battery

Safe to use where flammable or explosive gases may be present

Maximum clarity

Adaptive audio that's responsive to your environment

Firefighters and EMS personnel are dependent on being able to hear and be heard clearly.

The APX N70 XE smart radio delivers the loudest and most intelligible audio possible, so crucial messages always get through without seconds wasted re-adjusting the radio's audio settings.

The advanced **Adaptive audio engine** manages gain, equalization, noise suppression and other sound parameters. The result: optimal speech quality, either in whisper-quiet conditions or challenging environments where loud extraneous noise can make it hard to hear or be heard.

Dual High Dynamic Range (HDR) microphones on the radio's front and rear ensure that the firefighter's voice is always picked up clearly from either direction. Advanced beam-forming technology can even "steer" mic sensitivity to track the user's voice. Higher saturation level handles extremely loud voices, minimizing distortion even when the incident commanders' shouting or screaming in stressful situations.

Automatic acoustic feedback suppression enables team members to work closely together without needing to manually lower their radio's audio volume or distancing themselves from each other to avoid the audio feedback howl.

Receive volume leveling ensures that both loud and soft talkers can be heard clearly at one consistent volume, cutting the need to constantly adjust the radio volume to accommodate different voices.

The **Noise sensing volume control** 'listens' to noise levels in the user's surrounding environment, automatically adjusting the radio's receive volume for comfortable listening in varying background conditions.

3W

The powerful **3W speaker** delivers a maximum loudness of 102 phons on the base model, while the optional enhanced audio bundle boosts this to 105 phons– a perceived increase in loudness of 25% that ensures greater intelligibility without distortion to combat high background noise levels. The speaker also doubles as a Speaker As Mic (SAM), filtering wind and background noise without impairing speech quality.

Essential accessories

Audio

The XVE500m Remote Speaker Microphone is the next generation mission-critical RSM, designed specifically for extreme and challenging environments. This RSM is ideal for Firefighters, Emergency Response Personnel, and other public safety personnel. *This Remote Speaker Microphone utilizes the GCAI-Mini.

Energy

Work with confidence knowing your radios will be ready. Our IMPRES 2 batteries and charging solutions let you be flexible while also ensuring your safety with HAZLOC rated, UL Div 1 certified equipment.

Carry

Keep your device safe from the elements. Choose from a wide variety of carry options including belt clips, holsters, and leather cases.

Antennas

The latest antennas from Motorola Solutions are crafted for comfort while still delivering high performance. Their compact and adaptable design suits the needs of mission-critical environments.

For a complete list of compatible accessories, please visit:
motorolasolutions.com/apxaccessories

Intelligence beyond P25

Smart apps and services to enhance firefighters' task performance

The role of the firefighter's radio is evolving.The APX N70 XE radio provides firefighters with reliable voice and data connectivity, and access to a powerful ecosystem of feature-rich applications that increase situational awareness and collaboration. It also supports broadband LTE networks for high-speed data transfers, device updates, and remote radio provisioning.

SmartConnect automatically switches connectivity between regular radio coverage and LTE/Wi-Fi networks, maintaining dependable voice communications beyond short-range P25 coverage. The speed and wide-area network coverage of LTE also connects firefighters with a rich ecosystem of apps by Motorola Solutions, boosting situational awareness and streamlining workflow for frontline personnel.

SmartLocate leverages LTE high-speed broadband for more frequent first responder position updates over GPS. Giving crew members and controllers an even quicker fix on colleagues' physical locations, it can mean seconds saved – and the difference between positive knowledge and uncertainty about a firefighter's situation during life-threatening incidents.

SmartIncident keeps firefighters informed and on top of the situation, enhancing their situational awareness with key information including assignment notifications, incident updates, CAD comments, map views of deployed units and hazards in the vicinity.

SmartMessaging complements a first responder's voice communications with instant text, photo and video clips, giving a more complete view of an unfolding incident.

ViQi Virtual Partner saves valuable time and effort for busy dispatch teams, letting firefighters run database queries using hands-free voice commands for fast, secure, eyes-up access to information. ViQi Voice Control helps firefighters stay focused, performing functions like changing radio channels or check battery status with voice commands.

SmartProgramming allows super-speed over-the-air device updates wherever LTE cellular network coverage is available – so radios can stay out in the field where they're needed as a lifeline for firefighters, rather than being recalled to base.

SmartMapping keeps everyone in the picture, displaying the location of personnel in the vicinity to keep incident commanders appraised of the situation and allowing firefighters to summon support quickly. SmartIncident keeps firefighters informed and on top of the situation, enhancing their situational awareness with key information including assignment notifications, incident updates, CAD comments, map views of deployed units and hazards in the vicinity.

Streamlined ownership

Superior connectivity and management with lowered ownership costs

Managing a fleet of radios can be a significant cost and time burden for fire services and public safety agencies.

The APX N70 XE saves valuable time and effort for busy radio managers, simplifying fleet set-up and day-to-day management – reducing IT hassles and delivering a welcome reduction in lifetime ownership costs.

Radio updates can be pushed out over the air to all devices in the field, over Wi-Fi or LTE. Everything is accomplished in minutes via an efficient web-based user interface, delivering big time savings for radio managers and eliminating the need to recall radios from the field for one-by-one manual device updates.

Touchless Key Provisioning is a quick one-time process that securely delivers initial encryption keys plus subsequent key updates over the air to each radio, ensuring that critical voice and data communications are never at risk of interception.

To learn more, visit:
motorolasolutions.com/APXN70XE

MOTOROLA SOLUTIONS

Motorola Solutions, Inc. 500 West Monroe Street, Chicago, IL 60661 U.S.A.

This device is only available in North America.

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DMS Client User Guide

Document History

Version	Description	Date
1.0	Original release of the DMS User Guide. Combined prior DMS Setup, DMS Update and DMS Internet Guides.	October 24, 2018
1.1	Minor updates, new screenshot of DP settings page	September 4, 2019

Table of Contents

Document History 2

Table of Contents 3

Introduction 4

Service Overview 4

Before You Begin 4

RM Installation 7

Client connectivity requirements **Error! Bookmark not defined.**

Domain Name Resolution 6

Coordinated Time **Error! Bookmark not defined.**

RM Client Users and DP Hostnames 6

RM Licenses and Radio Features 7

Firewall and RM Ports 6

Power Settings **Error! Bookmark not defined.**

DMS Client connectivity **Error! Bookmark not defined.**

DP Configuration and Validation 9

RMC Validation 10

Updating DMS Clients 11

Introduction 11

Device Programmer AutoUpdate Procedure 11

RM Client AutoUpdate Procedure 12

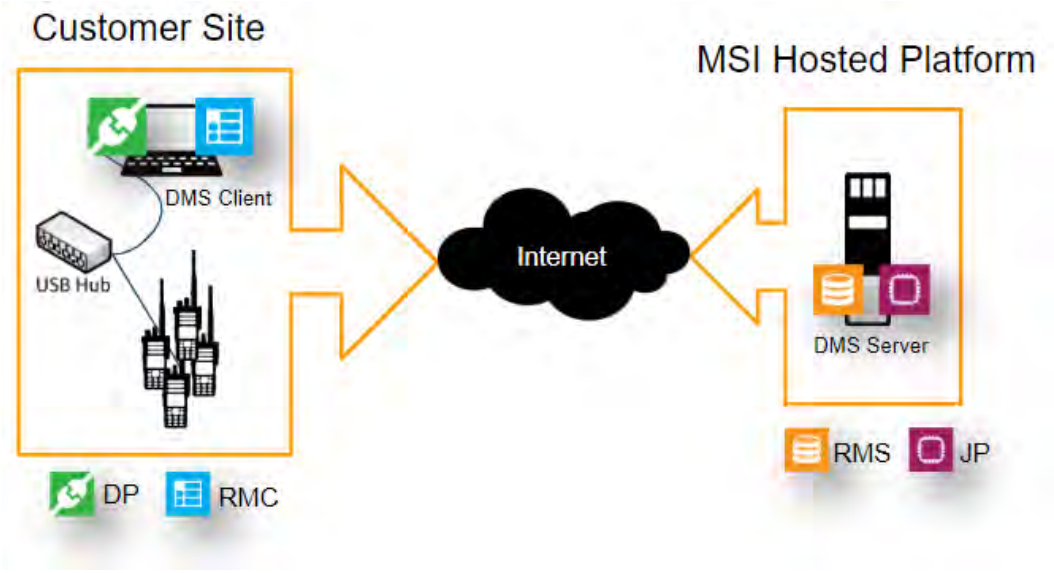
DMS Client Manual Update Procedure 14

Troubleshooting 15

1. Introduction

1.1. Overview

The Device Management Services (**DMS**) Client Setup Guide is as a companion guide for existing Radio Management documentation to provide information and basic steps needed to install and maintain a Radio Management (**RM**) Device Programmer (**DP**) and RM Configuration Client (**RMC**) to utilize the DMS service. DMS provides a hosted Radio Management Server (**RMS**) and Job Processor (**JP**) within MSI's monitored and secure hosting platform. Client machines may be configured specifically as a Device Programmer or include the RM Configuration Client software to allow programming and management functions. The standard DMS configuration for Device Programmers is to configure radio connectivity and programming via a **USB hub**. For more advanced installations, additional DMS clients may be added as well as alternate programming of devices like wif-fi and OTAP.



1.2. Before You Begin

This document is meant to be a complementary guide specific for the needs of connecting a DMS client to the hosted DMS Server within MSI's datacenter. Please reference RM documentation for more specific configurations, use and troubleshooting. The following list identifies the general prerequisites for successfully completely the setup:

- Server matching (typically latest) version of APX or MOTOTRBO RM Software:
  - Note: APX RM and MOTOTRBO RM software installed on the same machine is not supported.
- RM Documentation
  - RM System Planner - MN004686A01
  - APX RM User Guide - MN003621A01
  - MOTOTRBO User Guide - MN003733A01
- Hosted server connectivity information received from MSI
  - DMS Server hostname:_____
  - DMS Server IP address: _____
  - DMS DP OTP: _____
- Provide the following to MSI (see Section 2.3)
  - The hostname of each client machine acting as a Device Programmer
  - RM Client User Info - Full Name, Username(optional), email address
- An understanding of Windows OS administration, networking, and security concepts.
- Physical hardware meeting the RM hardware specifications for the Client / DP. Refer to the RM System Planner for more information.

Component	**Hardware Specifications** (minimum / **recommended**)
OS	Windows 8.1 (64-bit) / **10 Pro (64-bit)** (Windows 7 and 32-bit not supported)
Processor	1GHz dual core / **2GHz dual core**
RAM	4GB / **6GB**
Graphics	Aero capable 128 MB / DirectX-9 class
Drives	Hard drive - 10GB / **40 GB** (* excludes OS requirements) DVD-ROM
Ports	2 USB 3.0, 1 Ethernet (Optional Wi-Fi)

- Internet Connectivity
- Necessary RM application and radio feature licenses

2. Client Connectivity Requirements

2.1. Domain Name Resolution

When properly configured, the DNS on the network generally handles hostname resolution without any issue. With DMS however, clients will be in a non-domain deployment scenario where the RM Server hostname is not directly resolvable by the computer running the RM client component. Update the /etc/hosts file locally on the client machine, one method is:

1. From the client computer running the RM client components, open Notepad via Run As Administrator.
2. File->Open, navigate to C:\Windows\System32\drivers\etc\.
3. Select the 'hosts' file. If not shown in list, select All files (*.*) from file name dropdown.
4. Add an entry to the end of the file using the following syntax:
   <IPAddress> <hostname> (e.g. 111.222.333.444 DMSServerHostname)
   where, <IPAddress> is the DMS Server IP Address and <hostname> is the hostname of the DMS Server provided by MSI.

4. Save the hosts file.
5. From a cmd prompt, type:
   ping <hostname>
   Verify the ip address entered in 3 above is being returned.

2.2. Firewall and RM Ports

A firewall like Windows Firewall should be enabled on the client machine. With the DMS Hosted service, for client (DP or RMC) to communicate with the cloud server, the client will typically only need to support TLS1.2 and use port 443. An unsupported/older client OS or some radio programming configurations may require additional needs. In the event of connectivity issues, please refer to RM documentation for a complete list of potential ports required.

2.3. RM Users and DP Hostnames

As DMS is a non-domain deployment, users wishing to utilize the RM Configuration Client component (RMC) must have their usernames added to the RM server. Each user will be provided with a default password that will require to be changed on first login. If a user forgets their password, a request for support will be required to reset the credentials.

For client machines performing as a Device Programmer, the hostname of client must be added to the RM Server. This can be obtained by typing the command **hostname** at a cmd prompt. This hostname must be provided to MSI in order to securely authenticate that machine with the hosted RM Server. A One Time Password (OTP) will be provided but communication will not succeed until the server has been updated with this information. In the event the OTP is ever changed on the server, the settings for the client DP will need to be updated.

2.4. RM Licenses and Radio Features

Depending on the quantity of radios and features required, additional entitlements may be purchased. Any DMS client that will be used to access and download additional licenses or features must be able to access https://licensing.motorolasolutions.com. Please reference relevant RM system documentation for more information on how to add application licenses and radio features.

2.5. Coordinated Time

Normally, client computers are configured to automatically set their time but in the event time is being set manually, DMS clients running any Radio Management component (RMC, DP) must have its time set to within five minutes of the time on the hosted DMS server.

- This synchronization of time ensures that the Radio Management components connected to the RM Server.
- Computers may exist in different time zones; however, their time must be set to within 5 minutes of the DMS server's time, accounting for the difference in time zones. For example, a DMS server in Chicago is set to 1:15 p.m. (CST). Ensure that the computers running the RMC and DP in California are set to 11:15 a.m. (PST).

2.6. Power Settings

For DMS DP's to be readily available when radio's are connected, power settings should be adjusted where necessary especially if they are laptop computers. As an example:

1. Settings -> Network and Internet -> Ethernet, Select Change Adapter Options.
    a. Find active network adapter being used ('Ethernet') and right click and select Properties.
    b. Click "Configure" button. On the Power Management tab Uncheck/Deselect 'Allow computer to turn off this device to save power'
2. Settings -> System -> Power & Sleep, Select Additional Power Settings.
    a. Click the Create a Power Plan link and select High Performance - name the plan DMS Plan.
    b. Select Next, set 'put computer to sleep' to Never, set turn off display to 30 minutes and click Create.
    c. With the newly created plan selected, Click the 'Choose what Power buttons do' link
    d. For power button and sleep button, set these to Turn Off Display for both Battery or Plugged In.
    e. For close the lid, ensure both are Do Nothing.

3. RM Installation

The following steps below provide an overview of the installation process. For additional detailed information, please refer to RM User Guides.

1. Download/obtain the zip file corresponding to the RM version installed on the server (typically latest version).
   1.1. Visit and login to MyView at MyView.motorolasolutions.com.
   1.2. Navigate to Entitlements -> Software and then look for “Radio Management”, select the latest version, e.g. “APX CPS R30.00.00 2023.1 Baseline Release with Radio Management”.
2. From the DMS client machine, navigate to the location where the RM software zip file has been downloaded/copied, extract the contents to a temporary location.
3. From the temporary location navigate into the extracted files to find the root folder containing the setup.exe installer file. Right-click and Run As Administrator.
4. Select Appropriate Language (typically English) from the menu and Click Next
5. Select Next > from the Welcome Screen.
6. Select the Features to Install. Note: it is only necessary to select the features that were unable to be auto updated and was updated in the new RM release. Primary components for client machines will be:

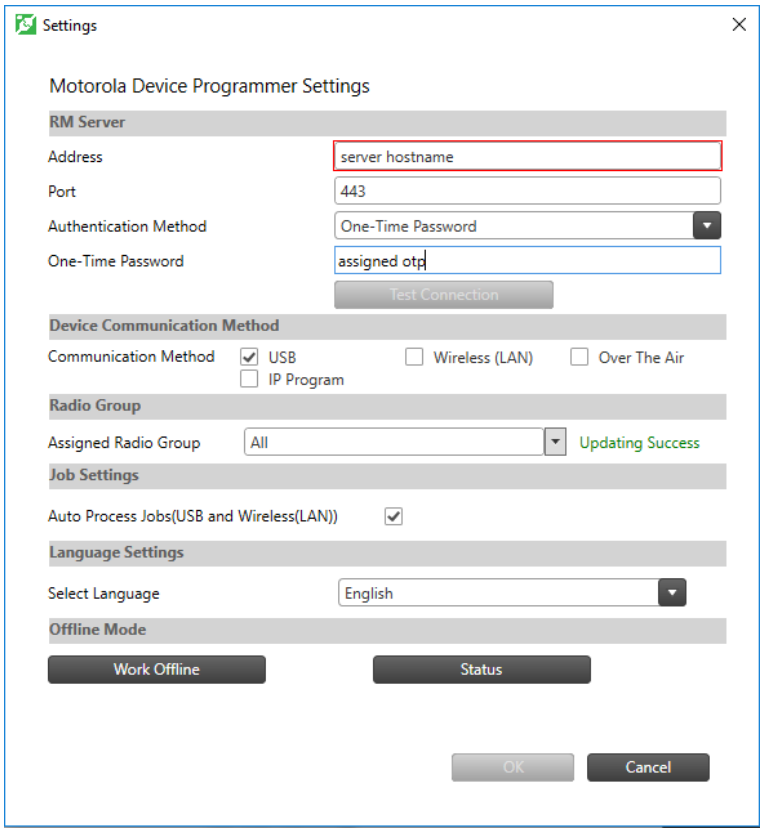
   - APX CPS (which includes RM Client)
   - Radio Management Device Programmer
   - ARS Data Administrator (OTAP only)

7. Follow screen prompts to Accept License Agreements and continue past any Read Me and Installation screens.
8. Select Install to begin the installation. This may take a few minutes. Dependent software will be installed during this process and Reboots may be necessary.
9. Select Finish once the installer has completed. Reboot the machine if necessary.

4. DMS Server Connectivity

4.1. DP Configuration and Validation

1. Login to Windows
2. Verify network is available and internet is reachable
3. Launch the RM Device Monitor.. (Start Button -> Motorola folder -> APX RM Device Monitor)
4. Click “Settings” button from RM Device Monitor Application Window.
5. Enter MSI provided information for the hosted RM Server:
    a. Address: provided hostname
    b. Port: 443
    c. Authentication Method: select One Time Password
    d. One Time Password - provided OTP. Upon success, the One-Time Password field will display REGISTERED. Note: The Authentication Method drop-down will default back to displaying Certificate.
6. To verify connectivity Click “Test Connection” button.



7. RM will now return a server connection status message.
8. Click OK to exit. A pop-up message may appear noting that services are being restarted.

4.2. RMC Validation

There is no additional configuration required for the RM Client component. To verify connectivity with the server, simply access Radio Management and login.

1. Login to Windows
2. Verify network is available and internet is reachable
3. Launch CPS or RM Configuration Client
4. Click Radio Management if accessing via CPS
5. Enter MSI provided information for the hosted RM Server:
    a. Address: provided hostname
    b. Port: 443
6. Enter RM username and password.

As the server is on a different domain than the client, a non-domain user account must be set up on the DMS Server for users needing to use the RM Client. See the Section RM Users and DP Hostnames.

5. Updating DMS Clients

5.1. Introduction

By default, DMS servers and clients utilize the AutoUpdate feature in Radio Management (RM) to help ensure that all RM components connected to the RM Server are running compatible software versions. The AutoUpdate feature compares the software version installed on the RM component to the software version installed on the RM Server, when the RM component connects to the RM Server. If an incompatible software version is detected, the latest version is downloaded from the RM Server to the RM client component. The RM component receives the updated version and initiates the installation.

The RM components installed on the DMS client must be running a software version that is compatible with the RM version running on the DMS Server. DO NOT attempt to upgrade clients pre-maturely or install prior versions of the RM software as the clients will no longer be able to communicate with the server.

5.2. Device Programmer AutoUpdate Procedure

The AutoUpdate process automatically starts when the RM Device Programmer attempts to connect to the RM Server with an incompatible version. The RM Device Programmer downloads the update file from the RM Server and runs the file. The installation runs in the background with no user interaction or notification.

The user can use the RM Device Monitor to check the version compatibility for the RM Device Programmer.

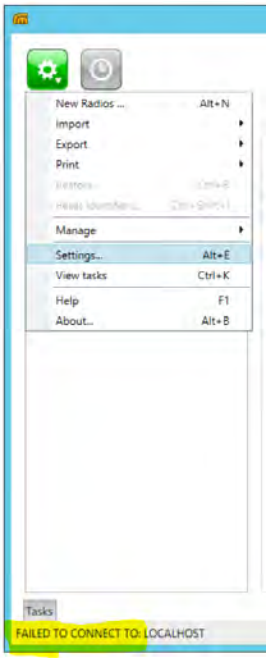
1. Stop / Exit any currently running RM Device Monitor program.
2. Start the RM Device Monitor
3. To confirm the Device Programming client connects to the server, it should in normal cases do this automatically (as displayed in bottom status bar), if it does not (see diagram below) or to manually verify (local admin rights required), Click “Settings” button from RM Device Monitor Application window.
4. The Device Monitor settings will have remained unchanged from the prior installation. To verify connectivity Click “Test Connection” button. RM will now return a server connection status message.

There is no need to make any changes! If changes are made, however, a pop-up message may appear noting that services will be restarted and is normal operation.

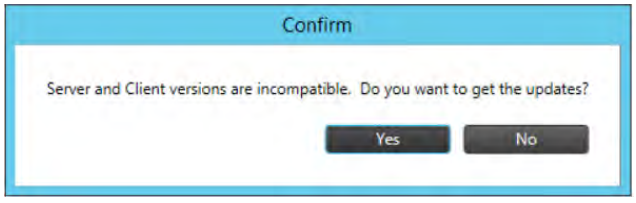
5.3. RM Client AutoUpdate Procedure

The AutoUpdate feature requires user interaction in the RM Client. When the RMC attempts to connect to the RM Server with an incompatible version, and the preconditions are met, the user is notified and presented with the option to update. If the user acknowledges the update, a file is downloaded from the RM Server to the client and
installed. The RMC client application shuts down and a progress bar displays the installation progress. Once the RMC client is updated to the current version, the user must re-launch the RMC client to connect to the RM Server.

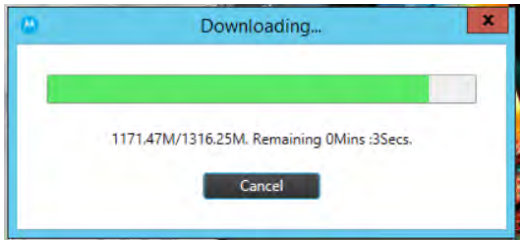
1. If the Radio Management Client is currently running at the time a server upgrade takes place, the client will lose connection which will be indicated within the bottom status bar. Bringing the Settings window up will allow you to re-test the connection.



2. Either by testing the connection or by restarting/running the client again after an upgrade, a message window will appear stating the server and client versions are not compatible.



3. Choose Yes and the latest update files will begin downloading. This may take a long time! In the event of failure/timeout, see DMS Client Manual Update Procedure section. **Tip:** If you see the update will take more than 60 minutes to download, cancel the process and proceed with a manual update.



4. Then, you will be prompted to acknowledge the update, once done the update will proceed. You must be present when the download completes in order to acknowledge UAC requests. If you are not present, the update will not continue. If you are unable to be present or miss the prompts, you will find successful downloads within the C:\ProgramData\Motorola\CommonCPS\AutoUpdate directory.

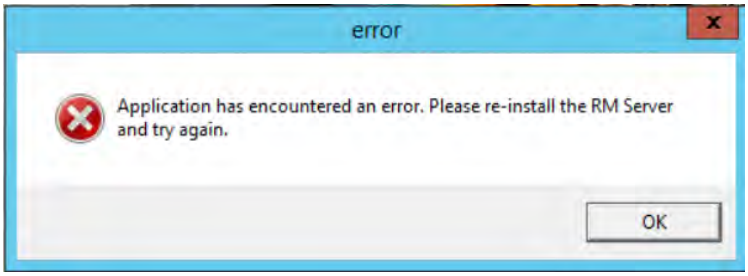
   IMPORTANT: The update may seemingly just stop. Wait at least 5 minutes for the installation to continue. If it does not, then re-run the update procedure as it has been reported at times to be required to run this twice.

5. Once downloaded, follow the screens to run the installer for the latest release.

   NOTE The Auto Update process does not take into account any non-default installation folders. New software will be installed in C:\Program Files directory regardless of prior installations.

6. When Complete, run the newly installed RM Client and login as before. The Version number should be updated.

   NOTE At times an ERROR box will appear stating to re-install the RM Server, please ignore this error and re-run Radio Mgmt. There are times where it may be necessary to re-run Radio Management a few times once a new RM Server is installed or updated to a new version.



7. In the event of a major release, the old version of CPS will not be removed. Though it is safe to uninstall the older version, we recommend leaving the version installed in the event a server rollback may be required. You may however, delete the shortcut from the desktop - attempting to use this older version in the future will again prompt to perform the update process.

5.4. DMS Client Manual Update Procedure

In the event the AutoUpdate is unable to complete due to connectivity issues or has been disabled, the newly released RM version will need to be downloaded from the Motorola Solutions Online (MOL) website. DMS Premier or other customers who do not have MOL access will require Motorola Field Support assistance to obtain the latest copy of RM.

A manual update is essentially a re-install of the client software using the latest release of the software. It is not necessary to uninstall the current software. Please follow the steps provided in RM Installation section of this document.

6. Troubleshooting

There are some basic troubleshooting tips to follow prior to engage MSI for support. Please refer to RM User Guides and online Help documentation for more assistance.

Note: At any time during the DMS Client install process if any questions or issues arise that cannot be easily corrected using these troubleshooting tips, please engage your Customer Support Manager (CSM) to coordinate support.

1. Connectivity to RM Server
    a. Verify Ethernet cable is connected appropriately between DMS RM Client and network or client is connected to Wi-Fi network allowing internet connectivity.
    b. Ping 8.8.8.8 - validate internet
    c. Verify etc/hosts configured properly. Ping the server hostname to ensure the proper ip address is resolved. NOTE: use hostname (not ip address) when entering the server address in both RMC login and DP settings.
    d. Verify Date/Time is accurate (do not adjust clock time manually if possible as a time drift can cause clients to not connect or lose connection to the server).
    e. RM Users have been added to the server
    f. Ports in firewall are open
2. USB HUB - not detected by the DP Station
    a. Power off, disconnect and reconnect hub to the client. Then power back on to ensure the power LED is lit on top of the unit.
3. Device Programmer - not detecting
    a. See 1 above to validate rm server access
    b. Has client hostname been provided to MSI and added to the RM Server
    c. RM Server hostname, port and OTP correctly added
    d. If you receive a message related to being unable to connect the Device Programmer, please ensure the Motorola RM Device Programmer service has started.

LIFECYCLE SUPPORT NOTICE

"AN MODEL" APX™ 6000, APX 6000Li, APX 6000XE, AND SRX2200

OVERVIEW

The above-named model subscriber radios have been canceled as of December 31, 2016.

Motorola Solutions will extend support for the legacy radio models through December 31, 2023. All products will be supported on a commercially reasonable effort after the end of the support period solely at Motorola's discretion.

Enhanced models with similar features, functionalities and options but with additional new hardware and software features are available and listed below.

APX 6000 MODELS

LEGACY RADIO MODEL	DESCRIPTION	ENHANCED RADIO MODEL
H98UCD9PW5AN, H98UCD9PW5_N	APX 6000 7/800 MHZ MODEL 1.5 PORTABLE	H98UCD9PW5BN
H98UCF9PW6AN, H98UCF9PW6_N	APX 6000 7/800 MHZ MODEL 2.5 PORTABLE	H98UCF9PW6BN
H98UCH9PW7AN, H98UCH9PW7_N	APX 6000 7/800 MHZ MODEL 3.5 PORTABLE	H98UCH9PW7BN
H98KGD9PW5AN, H98KGD9PW5_N	APX 6000 VHF MHZ MODEL 1.5 PORTABLE	H98KGD9PW5BN
H98KGF9PW6AN, H98KGF9PW6_N	APX 6000 VHF MHZ MODEL 2.5 PORTABLE	H98KGF9PW6BN
H98KGH9PW7AN, H98KGH9PW7_N	APX 6000 VHF MHZ MODEL 3.5 PORTABLE	H98KGH9PW7BN
H98QDD9PW5AN, H98QDD9PW5_N	APX 6000 UHF R1 MODEL 1.5 PORTABLE	H98QDD9PW5BN
H98QDF9PW6AN, H98QDF9PW6_N	APX 6000 UHF R1 MODEL 2.5 PORTABLE	H98QDF9PW6BN
H98QDH9PW7AN, H98QDH9PW7_N	APX 6000 UHF R1 MODEL 3.5 PORTABLE	H98QDH9PW7BN
H98SDD9PW5AN, H98SDD9PW5_N	APX 6000 UHF R2 MODEL 1.5 PORTABLE	H98SDD9PW5BN
H98SDF9PW6AN, H98SDF9PW6_N	APX 6000 UHF R2 MODEL 2.5 PORTABLE	H98SDF9PW6BN
H98SDH9PW7AN, H98SDH9PW7_N	APX 6000 UHF R2 MODEL 3.5 PORTABLE	H98SDH9PW7BN

OPTION	DESCRIPTION
QA02006	ENH: APX 6000XE RUGGED RADIO
Q811	ENH: LI DIGITAL CONVENTIONAL
QA02829	ENH: LI ANALOG CONVENTIONAL
Q443	ENH: LI ANALOG 3600 TRUNKING
QA02756	ENH: LI 9600 OR 3600 SINGLE SYSTEM DIGITAL TRUNKING
QA02812	ENH: LI P25 9600 BAUD TRUNKING W/ INTEROPERABILITY

MOTOROLA SOLUTIONS

SRX2200 MODELS

LEGACY RADIO MODEL	DESCRIPTION	ENHANCED RADIO MODEL
H99UCD9PW5AN, H99UCD9PW5_N	SRX2200 7/800 MHZ MODEL 1.5 PORTABLE	H99UCD9PW5BN
H99UCH9PW7AN, H99UCH9PW7_N	SRX2200 7/800 MHZ MODEL 3.5 PORTABLE	H99UCH9PW7BN
H99KGD9PW5AN, H99KGD9PW5_N	SRX2200 VHF MHZ MODEL 1.5 PORTABLE	H99KGD9PW5BN
H99KGH9PW7AN, H99KGH9PW7_N	SRX2200 VHF MHZ MODEL 3.5 PORTABLE	H99KGH9PW7BN
H99QDD9PW5AN, H99QDD9PW5_N	SRX2200 UHF R1 MODEL 1.5 PORTABLE	H99QDD9PW5BN
H99QDH9PW7AN, H99QDH9PW7_N	SRX2200 UHF R1 MODEL 3.5 PORTABLE	H99QDH9PW7BN

OPTION	DESCRIPTION
H553	ADD: ULTRA LOW POWER RADIO TRIGGER

CONTACT INFORMATION

If you have specific questions regarding this notification,
please contact your Motorola Solutions Account Representative.

MOTOROLA SOLUTIONS

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LIFECYCLE SUPPORT NOTICE

APX™ O5 Control Head & “AN Model” APX™ Single Band Mobile: UHF R1 (380-470MHz), 700/800 MHz, VHF (136-174MHz)

OVERVIEW

Due to end of life parts, a business decision has been made to cancel the below APX™ subscriber mobile radio and control head effectively on May-2020.

- G442 - APX™ O5 Control Head
- H1904 - APX™ O5 Control Head Retrofit Kit
- M36QSS9PW1AN - APX™ 1500 UHF R1 (380-470MHz)
- M24QSS9PW1AN - APX™ 2500 UHF R1 (380-470MHz)
- M22QSS9PW1AN - APX™ 4500 UHF R1 (380-470MHz)
- M25QSS9PW1AN - APX™ 6500 UHF R1 (380-470MHz)
- M25QSS9PW1AN - APX™ 6500Li UHF R1 (380-470MHz)
- M36KSS9PW1AN - APX™ 1500 VHF (136-174MHz)
- M24KSS9PW1AN - APX™ 2500 VHF (136-174MHz)
- M22KSS9PW1AN - APX™ 4500 VHF (136-174MHz)
- M25KSS9PW1AN - APX™ 6500 VHF (136-174MHz)
- M25KSS9PW1AN - APX™ 6500Li VHF (136-174MHz)
- M36URS9PW1AN - APX™ 1500 700/800 MHz
- M24URS9PW1AN - APX™ 2500 700/800 MHz
- M22URS9PW1AN - APX™ 4500 700/800 MHz
- M25URS9PW1AN - APX™ 6500 700/800 MHz
- M25URS9PW1AN - APX™ 6500Li 700/800 MHz

APX™ E5 Control Head will be made available in June 2020 and is the replacement of APX™ O5 Control Head. Retrofit kits for the E5 Control Head will be available in Q3 2020.

Enhanced Mobile radio 7/800 and UHF R1 “BN” models with similar features, functionalities and options but with new hardware and additional software features are available and listed below.

Enhanced Mobile VHF “BN” models will be available in June 2020.

Cancelled Product	Product Description	Suggested Replacement Product	Replacement Product Description	Last Order Date	Last Ship Date	Aftermarket Support Last Date
G442	O5 CONTROL HEAD	GA01670	E5 CONTROL HEAD	07/31/2020	09/30/2020	09/30/2025
H1904	O5 CH	H1930	E5 CH	07/31/2020	09/30/2020	09/30/2025
M36QSS9PW1AN	APX™ 1500 UHF R1 MOBILE	M36QSS9PW1BN	APX™ 1500 UHF R1 ENHANCED	07/31/2020	09/30/2020	09/30/2025
M24QSS9PW1AN	APX™ 2500 UHF R1 MOBILE	M24QSS9PW1BN	APX™ 2500 UHF R1 ENHANCED	07/31/2020	09/30/2020	09/30/2025

M22QSS9PW1AN	APX™ 4500 UHF R1 MOBILE	M22QSS9PW1BN	APX™ 4500 UHF R1 ENHANCED	07/31/2020	09/30/2020	09/30/2025
M25QSS9PW1AN	APX™ 6500 UHF R1 MOBILE	M25QSS9PW1BN	APX™ 6500 UHF R1 ENHANCED	07/31/2020	09/30/2020	09/30/2025
M25QSS9PW1AN	APX™ 6500Li UHF R1 MOBILE	M25QSS9PW1BN	APX™ 6500Li UHF R1 ENHANCED	07/31/2020	09/30/2020	09/30/2025
M36KSS9PW1AN	APX™ 1500 VHF MOBILE	M36KSS9PW1BN	APX™ 1500 VHF ENHANCED	07/31/2020	09/30/2020	09/30/2025
M24KSS9PW1AN	APX™ 2500 VHF MOBILE	M24KSS9PW1BN	APX™ 2500 VHF ENHANCED	07/31/2020	09/30/2020	09/30/2025
M22KSS9PW1AN	APX™ 4500 VHF MOBILE	M22KSS9PW1BN	APX™ 4500 VHF ENHANCED	07/31/2020	09/30/2020	09/30/2025
M25KSS9PW1AN	APX™ 6500 VHF MOBILE	M25KSS9PW1BN	APX™ 6500 VHF ENHANCED	07/31/2020	09/30/2020	09/30/2025
M25KSS9PW1AN	APX™ 6500Li VHF MOBILE	M25KSS9PW1BN	APX™ 6500Li VHF ENHANCED	07/31/2020	09/30/2020	09/30/2025
M36URS9PW1AN	APX™ 1500 700/800 MHz MOBILE	M36URS9PW1BN	APX™ 1500 700/800 MHz ENHANCED	07/31/2020	09/30/2020	09/30/2025
M24URS9PW1AN	APX™ 2500 700/800 MHz MOBILE	M24URS9PW1BN	APX™ 2500 700/800 MHz ENHANCED	07/31/2020	09/30/2020	09/30/2025
M22URS9PW1AN	APX™ 4500 700/800 MHz MOBILE	M22URS9PW1BN	APX™ 4500 700/800 MHz MOBILE	07/31/2020	09/30/2020	09/30/2025
M25URS9PW1AN	APX™ 6500 700/800 MHz MOBILE	M25URS9PW1BN	APX™ 6500 700/800 MHz ENHANCED	07/31/2020	09/30/2020	09/30/2025
M25URS9PW1AN	APX™ 6500Li 700/800 MHz MOBILE	M25URS9PW1BN	APX™ 6500Li 700/800 MHz ENHANCED	07/31/2020	09/30/2020	09/30/2025

All above aftermarket support dates are subject to demand and related component availability. All products will be supported on a commercially reasonable effort after the end of the support period solely at Motorola's discretion.

Retrofit kits and FLASHport for the "BN" Models will be available in Q3 2020.

Please note the UHF R2 (450-512MHz) and 900 MHz are not part of this cancellation notice and will continue to be available.

If you have specific questions regarding this notification, please contact your Motorola Solutions Account Representative.

System Release M2023.01

Radio Management System Planner

JUNE 2023

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- The page number or title of the section with the error
- A description of the error

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Document History

Version	Description	Date
MN004686A01-AA	Original release of the *Radio Management System Planner* manual.	March 2018
MN004686A01-AB	The following sections were added: • Radio Management Errors After Installation on page 39 • Radio Management Fails to Upgrade from RM 1.x to RM 2.x on page 38 • SHA256 Certificates Update on page 49 • Setting Up the NAT RM System Support Between the RM Components on page 42 • Configuring ARS when Using Windows Firewall on page 47 • Unable to Connect to GDG When Configuring FDL on page 46 • EID System in RM Instead of FLASHkey Dongles for Flashcode Upgrades on page 49 • RMC/Device Programmer/Job Processor Failure to Connect to RM Server on page 51 • Troubleshooting RMC/Device Programmer/Job Processor Failure to Connect to RM Server on page 51 • Device Programmer Installation Selection on page 19	July 2019
MN004686A01-AC	Added "Windows Server 2019" to Operating System Requirements for CPS and RM on page 27.	July 2021
MN004686A01-AD	Added Radio Management Virtual Machine Installation on page 21	September 2021
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Version	Description	Date
	• RM Server Hardware Recommendation on page 20 • Hardware Specifications for Radio Management on page 25 • Operating System Requirements for CPS and RM on page 27 • Disabling FIPS set by WHK on page 40 • Setting Up the NAT RM System Support Between the RM Components on page 42 • Enabling the Windows Identity Foundation Installation on page 64 The following section was added: • After Unsuccessful IP Change from RM, the Rollback Mechanism Does Not Undo All Changes on page 41 The following section was removed: • Enabling the Microsoft .NET 3.5 Framework Installation	

Contents

Intellectual Property and Regulatory Notices..... 2
Contact Us..... 3
Document History..... 4
List of Figures..... 9
List of Tables..... 10
List of Procedures..... 11
About the Radio Management System Planner..... 12
Helpful Background Information..... 12
What is Covered in this Manual..... 12
Chapter 1: Introduction to the Radio Management System..... 13
1.1 Radio Management Functions..... 13
1.2 Radio Management System Components..... 13
Chapter 2: Deployment of RM System Components..... 16
2.1 Radio Management System Deployment..... 16
2.1.1 All-In-One RM Deployment..... 16
2.1.2 Distributed RM Deployment..... 17
2.1.3 Factors Affecting Deployment Choice..... 18
2.1.4 Device Programmer Installation Selection..... 19
2.2 Radio Management Hardware Recommendations..... 20
2.2.1 RM Server Hardware Recommendation..... 20
2.2.1.1 Radio Management Virtual Machine Installation..... 21
2.2.2 RM Job Processors Hardware Considerations..... 22
2.2.3 RM Device Programmer Hardware Recommendations..... 22
2.2.4 Windows Ports Used by Radio Management..... 22
2.2.5 HTTPS Protocol Support..... 24
2.2.5.1 Configuring the HTTPS Protocol..... 24
2.2.6 Hardware Specifications for Radio Management..... 25
2.2.7 Radio Fleet Topology Recommendations..... 25
Chapter 3: Radio Management Suite Installation..... 27
3.1 Operating System Requirements for CPS and RM..... 27
3.2 USB Programming Cables for MOTOTRBO..... 28
3.3 Radio Management Suite of Applications..... 28
3.4 Installing the ASTRO APX RM Suite..... 29
3.5 Updates to MOTOTRBO Radio Management..... 31
3.5.1 Installing the MOTOTRBO CPS RM Suite..... 32

3.6 Migrating the RM Server Database..... 33
3.7 Installing the Android RM Suite..... 35
3.8 Networking Considerations for Installed RM System Components..... 36
3.9 Supplemental RM Suite Applications.....37
Chapter 4: Troubleshooting in Radio Management.....38
4.1 Radio Management Installation and Upgrade Problems..... 38
4.1.1 Radio Management Fails to Upgrade from RM 1.x to RM 2.x..... 38
4.1.2 Radio Management Database Is Lost After an Upgrade..... 38
4.1.3 Antivirus Software Blocks CPS/RM Installation..... 39
4.1.4 Radio Management Errors After Installation..... 39
4.1.5 Hash File Not Found..... 40
4.1.5.1 Disabling FIPS Mode..... 40
4.1.5.2 Disabling FIPS set by WHK..... 40
4.1.6 After Unsuccessful IP Change from RM, the Rollback Mechanism Does Not Undo All Changes..... 41
4.2 Radio Management Server Utility Features Grayed Out..... 41
4.3 Radio Management Connection Problems..... 41
4.3.1 Setting Up the NAT RM System Support Between the RM Components.....42
4.3.2 RM Client Component and RM Server Computers in Different Domains..... 45
4.3.2.1 Obtaining the IP Address and Hostname for the RM Server..... 45
4.3.2.2 Resolving DNS Names for RM Server..... 46
4.3.3 Network Connectivity Problem.....46
4.3.3.1 Unable to Connect to GDG When Configuring FDL.....46
4.3.4 Windows Firewall and RM Ports..... 47
4.3.4.1 Configuring ARS when Using Windows Firewall.....47
4.3.5 Port Conflict by Multiple Applications.....47
4.3.6 Unable to Validate Server SSL Certificate..... 47
4.3.7 Coordinated Time for Distributed Radio Management Deployment..... 48
4.3.8 Radio Management Windows Services..... 48
4.3.9 Certificates and License Server..... 49
4.3.9.1 EID System in RM Instead of FLASHkey Dongles for Flashcode Upgrades 49
4.3.9.2 SHA256 Certificates Update..... 49
4.3.10 LEX L10 Device Fails to Connect to Radio Management.....50
4.3.11 RMC/Device Programmer/Job Processor Failure to Connect to RM Server..... 51
4.3.11.1 Troubleshooting RMC/Device Programmer/Job Processor Failure to Connect to RM Server 51
4.4 Delete Button is Grayed Out.....54
4.5 Read and Write Jobs..... 55
4.5.1 Write Failure due to Write Protect Password Mismatch.....55

4.6 Prevent USB LAN as the Default LAN for USB Connection....56
4.6.1 Changing the Operating System Network Priority Table....56
4.6.2 Checking the Metrics of Network Connections....56
4.7 Resolving Port Binding Issues with Unicast WiFi....57
Appendix A: Radio Management Upgrade Processes....60
A.1 Radio Management Upgrades....60
A.1.1 ASTRO APX Software Installation Upgrades....60
A.1.1.1 Backing Up the RM Server Database....61
A.1.1.2 Manually Restoring the RM Server Database....61
A.1.1.3 RM Server Database Downgrade....62
A.1.2 Radio Management 1.x Data Upgrade Process....62
A.1.3 Radio Management 2 Data Upgrade Process....64
A.2 Additional Installations for Radio Management....64
A.2.1 Enabling the Windows Identity Foundation Installation....64
A.2.2 Assigning User Permissions on Hardened Operating Systems....65

List of Figures

Figure 1: All-In-One Deployment..... 17
Figure 2: Distributed Deployment..... 18
Figure 3: Write Job Process..... 19
Figure 4: Minimum Server Specifications..... 21
Figure 5: NAT Distributed Connection..... 42
Figure 6: Location of Hostfile..... 43
Figure 7: Hostfile Entry Example..... 43
Figure 8: Example of the Hostname use..... 44
Figure 9: Location of RMDiscoveryServiceHost.exe.config file..... 44
Figure 10: Example of RMDiscoveryServiceHost.exe.config file..... 45
Figure 11: Values of Certificate Hash and Application ID..... 52
Figure 12: Change of HTTPS Ports in RM Server..... 54
Figure 13: Change of SHA certificates..... 54
Figure 14: New WiFi Programming Option..... 57
Figure 15: PID for UDP port 5353..... 58

List of Tables

Table 1: Radio Management Mode Support by Technology..... 14
Table 2: Fleet Size Categories..... 18
Table 3: TCP and UDP Windows Ports for Radio Management..... 23
Table 4: Recommended Hardware Specifications for Radio Management.....25
Table 5: Recommended Topology, Hardware, and Software for the Radio Management System..... 25
Table 6: Cables for Radio Programming, Data Applications, Testing, or Alignment..... 28
Table 7: Radio Management Suite Applications.....28
Table 8: Supplemental Applications..... 37
Table 9: CPS Versions using RM 1 or RM 2..... 62

List of Procedures

Configuring the HTTPS Protocol 24
Installing the ASTRO APX RM Suite 29
Installing the MOTOTRBO CPS RM Suite 32
Migrating the RM Server Database 33
Installing the Android RM Suite 35
Disabling FIPS Mode 40
Disabling FIPS set by WHK 40
Setting Up the NAT RM System Support Between the RM Components 42
Obtaining the IP Address and Hostname for the RM Server 45
Resolving DNS Names for RM Server 46
Configuring ARS when Using Windows Firewall 47
Auto-Upgrading Older Versions of RM with SHA1 Setting 49
Troubleshooting RMC/Device Programmer/Job Processor Failure to Connect to RM Server 51
Changing the Operating System Network Priority Table 56
Checking the Metrics of Network Connections 56
Resolving Port Binding Issues with Unicast WiFi 57
Backing Up the RM Server Database 61
Manually Restoring the RM Server Database 61
Enabling the Windows Identity Foundation Installation 64
Assigning User Permissions on Hardened Operating Systems 65

About the Radio Management System Planner

The purpose of this document is to provide field service technicians, field service engineers, customers, and end users with the necessary information for planning and deploying a Radio Management system.

This document can be used as a planning tool for presales and pre-installations. Customer services teams can also use the document to help troubleshoot common issues experienced during installations and configurations.

The idea is to define all the components and system settings required to successfully install and deploy a Radio Management system within a customer network. The objective is to help guide the users and prevent many of the common errors that are experienced when a new system is deployed.

This document supports all technologies (ASTRO APX, MOTORTRBO, and Android) and the content shall be differentiated by technology when applicable. The focus is primarily on Radio Management.

Helpful Background Information

Motorola Solutions offers various courses designed to assist in learning about the system. For information, go to https://learning.motorolasolutions.com to view the current course offerings and technology paths.

What is Covered in this Manual

This guide contains the following chapters:

- Introduction to the Radio Management System on page 13
- Deployment of RM System Components on page 16
- Radio Management Suite Installation on page 27
- Troubleshooting in Radio Management on page 38
- Radio Management Upgrade Processes on page 60

Chapter 1

Introduction to the Radio Management System

Radio Management (RM) is a distributed suite of software applications that allows customers to program and manage their fleet of radios in an ASTRO APX, MOTOTRBO, or Android system.

1.1 Radio Management Functions

Radio Management provides functions for managing and programming an entire fleet of radios.

An example of Radio Management functions, include but do not limit to the following:

- Add, maintain, and access radio data remotely in a centralized database server
- Manage multiple radios simultaneously
- View and edit radio data in a simple table
- Assign shared data to multiple radios
- Search, sort, and group radios
- Manage features such as Templates, Configurations, Firmware, Voice Announcements, Language Packs and so on
- Program radios through a wired USB, Over The Air, or Wi-Fi connection methods
- Setup remote programming stations with a variety of connection methods

These RM functions are supported by the various RM system components.

1.2 Radio Management System Components

The components of the Radio Management system provide a complete solution for the programming and managing of an entire fleet of radios.

NOTE: The information in this document provides a high-level description of the RM system components. A more detailed explanation is available in the RM online help.

Radio Management (RM) Server

The RM Server is the central database that stores and manages all radio data, templates, and configurations. Only one RM Server is supported in an RM system. All clients in an RM system interface with the RM Server to manage the entire fleet of radios.

The management of server settings and database operations are performed with an integrated application called the RM Server Utility. The RM Server Utility supports the following operations:

- Status of all RM services
- Database settings for backup and restore
- User and Machine Authorization

- Network settings

NOTE: The RM server also supports an upgrade feature for older RM systems. See Radio Management 1.x Data Upgrade Process on page 62.

RM Client

The RM Client application is the primary user interface in an RM system. It allows the user to view and manage all the radios in the fleet. Multiple RM Clients are supported in an RM System. The RM Client supports the following two modes of operation:

Template Mode
In Template Mode, the RM Client is integrated into the Customer Programming Software (CPS) application and used only to manage and distribute templates. The programming of templates is performed using CPS.

Configuration Mode
In Configuration Mode, the RM Client is used to program, edit, and distribute configurations. There is no CPS application.

NOTE:
In a single RM system, customers can install both CPS with RM and RM Configuration Client. Installing both applications allows the customer to convert templates to configurations. However, the same radio cannot be managed in both modes.

Table 1: Radio Management Mode Support by Technology

Technology	Template Mode	Configuration Mode
ASTRO APX	Yes	No
MOTOTRBO	No*	Yes*
Android	No	Yes

* The MOTOTRBO Capacity Max feature and devices such as MNIS, controllers, and repeaters are only supported in Configuration Mode. See Updates to MOTOTRBO Radio Management on page 31.

RM Device Programmer

The RM Device Programmer (DP) is a Windows-based service that performs scheduled programming jobs stored in the RM Server.

The RM Device Programmer is configured to process either **USB** and/or **Wireless (LAN)** or **Over The Air** jobs using the RM Device Monitor. Wired jobs require an RM Device Programmer configured for USB and OTA jobs require an RM Device Programmers configured for **Over The Air**. The RM Device Monitor provides the user-interface to configure the RM Device Programmer and continuously monitors for the presence of radios that have scheduled jobs stored in the RM Server. The RM Device Monitor does not need to be open to process available jobs.

NOTE:
Each RM Device Programmer in the RM system can program up to 16 radios simultaneously. If using a USB hub, ensure that it is a powered USB hub.

For 40 W MOTOTRBO repeaters and MTR radios, jobs are performed in sequential order if multiple devices are present.

RM Device Programmers can also be configured to program radios using Wi-Fi.

RM Job Processor

The RM Job Processor (JP) is a Windows-based service that validates the data in the RM Server and transforms the radio data into a format that can be written to a radio.

IMPORTANT: Motorola Solutions recommends deploying the RM Job Processor on the same computer as the RM Server. When using multiple RM Job Processors, it is recommended to colocate the JPs with the RM Server and connect them to the same physical subnet on the network.
Deploying too many RM Job Processors is not recommended because it may impact the performance of the system.

Deploying multiple RM Job Processors across a Wide Area Network (WAN) is not recommended due to the potential for network errors when transferring large amounts of data between the RM Job Processor and the RM Server.

Chapter 2

Deployment of RM System Components

The deployment of a Radio Management system depends mostly on the number of radios within the fleet and the physical location of RM components to minimize the processing time for programming radios.

The following factors influence the choice of a deployment method:

- Number of radios in the fleet to be programmed
- How often the radio fleet requires programming
- The ease of getting the physical radios to a programming station
- The maximum time allowed to program the fleet of radios
- The cost for extra hardware, software, and network capabilities

2.1 Radio Management System Deployment

Radio Management is deployed in a wide range of scenarios depending on customer requirements.

The deployment scenarios depend on customer requirements and size of radio fleet. The following deployments are the more common methods:

- All-In-One Deployment
- Distribute Deployment

NOTE: Deployment of Radio Management on Cloud/VM environments is currently not supported.

2.1.1 All-In-One RM Deployment

In an all-in-one deployment, all the RM components are installed on a single computer.

This deployment method automatically configures the communication between the RM components and is an idea solution for a small fleet of radios.

The following are some requirements and considerations:

- All radio programming is perform on a single computer
- All radios are physically accessible to the single computer
- Fleet size is small or requires minimal programming time
- Does not require network connectivity

Figure 1: All-In-One Deployment

As the number of radios increase and the fleet topology becomes geographically more scattered, the benefits of a more advanced deployment option become evident.

2.1.2
Distributed RM Deployment

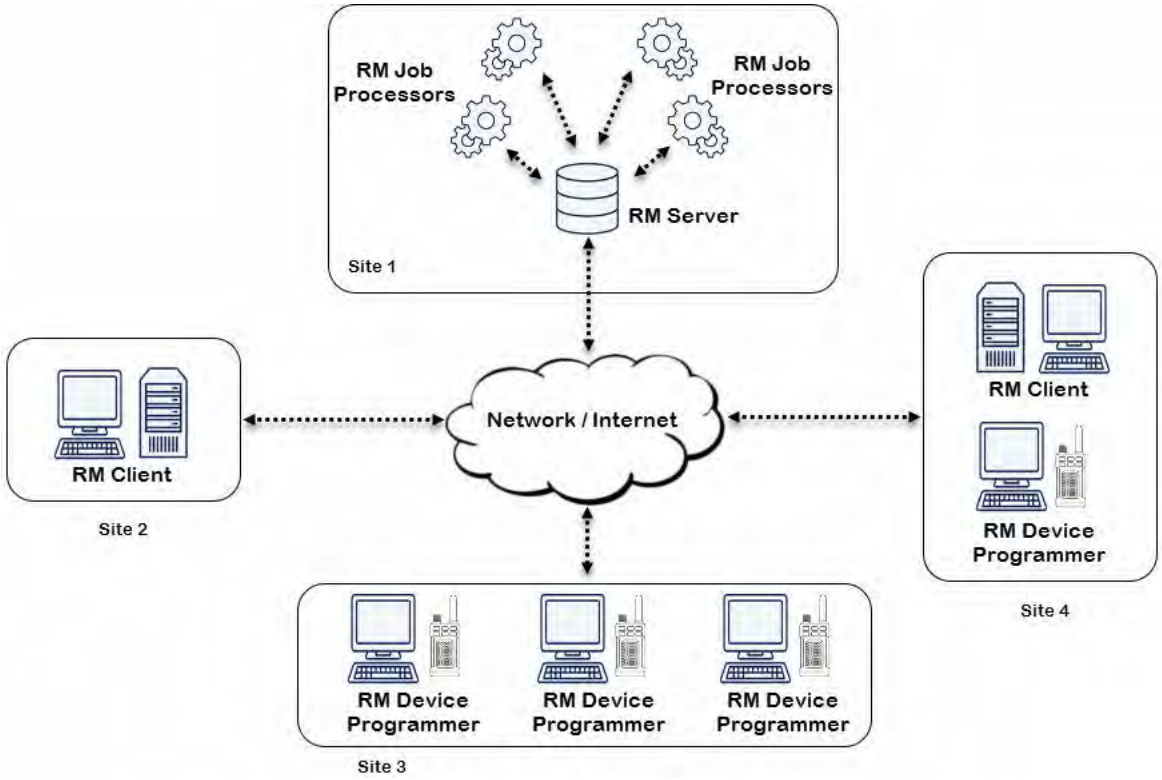
In a distributed deployment, the RM components are installed on multiple computers across a network.

This deployment method allows the customer to deploy an RM system across a large geographical area to support a large fleet of radios. The following rules and recommendations should be observed when deploying an RM system using distributed deployment:

- Only one RM server is supported in an RM system.
- Additional RM Job Processors enable more computing resources for processing jobs. It is recommended to install the RM Job Processors on the same computer as the RM Server.
- Colocating additional RM Job Processor with the RM Server machine is recommended to improve performance and reduce traffic across the whole LAN.
- Multiple RM Clients (CPS with RM and RM Configuration Client) enable radio configuration editing and job scheduling by multiple people in remote locations.
- RM Device Programmers can be deployed remotely to enable programming of radios from different locations convenient to the location of the radios.
- For distributed deployments, it is recommended to enable the AutoUpdate feature, either from the install program or from within the RM Server utility. AutoUpdate upgrades remote RM client components (RMC, RM Device Programmer, or RM Job Processor) to the latest version automatically over the network.

Figure 2: Distributed Deployment

In the following distributed deployment, the RM Server is co-located with multiple RM Job Processors in site 1. Site 2 only contains the RM Client. Site 3 only contains RM Device Programmers, while Site 4 contains an RM Client and RM Device Programmer. These are the more common examples of distributed deployment.



NOTE: In a distributed deployment, all installed RM components must have a network connection to the RM Server. This may require network configuration changes to allow network connectivity through routers and firewalls.

2.1.3

Factors Affecting Deployment Choice

The most important aspect of a Radio Management (RM) system deployment is deciding on the number of RM Job Processors and RM Device Programmers required.

Since an RM system only supports one RM Server and the number of RM Clients depends on your editing and programming needs, knowing the overall size of your radio fleet, where the radios are located, and the desired processing time to program your radios is essential.

Fleet Size

The increase of radios in a system requires more processing power from the RM Server. This increase also defines the number of RM Job Processors (JPs) required. For simplicity, four categories of sizes are used.

Table 2: Fleet Size Categories

Category	Fleet Size
Small	Under 1,000 radios

Category	Fleet Size
Medium	1,000 to 5,000 radios
Large	5,000 to 20,000 radios
Extra Large	Greater than 20,000 radios

See the Radio Fleet Topology Recommendations on page 25 for determining the number of RM Job Processor required for your RM system.

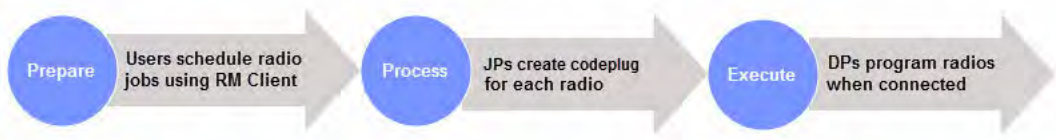
Factors Affecting Processing Time

Programming time is a complex combination of factors, as follows:

- Number of programming jobs and radios scheduled at the same time
- Number and capabilities of the RM Job Processors
- The complexity of the code plug data
- Type of programming (for example, Firmware, Language Packs...)
- Number of RM Device Programmers and their location
- Overall system topology and network capabilities

The following figure illustrates the actions the RM system performs to program each radio.

Figure 3: Write Job Process



More RM Job Processors allow the system to perform these actions in parallel, which reduces the total time for programming all radios. Adding more computing power and network capabilities allow for an individual radio to be programmed faster, which results in a reduction of time to program all radios.

Fleet Topology

Deploying RM Device Programmers at locations that are more frequently visited by radio users improves the overall job execution and reduces potential disruption to user activities. The RM system administrator must define the number of RM Device Programmers and their placement to meet system and network requirements.

See Radio Fleet Topology Recommendations on page 25 for determining the number of RM Device Programmers required for your RM system.

2.1.4 Device Programmer Installation Selection

The Radio Management Suite Installation allows to select one of two versions of the Device Programmer (DP) to install on the Radio Management (RM) system: Radio Management Device Programmer or ASTRO POP25 Radio Management Device Programmer.

Only one Device Programmer must be configured for POP25 on the entire RM System. Depending on the configuration of the system, select to install either the **Radio Management Device Programmer** configured for POP25 or the **ASTRO POP25 Device Programmer**.

The Radio Management Device Programmer supports the Presence Notifier service for versions of IMW prior to 5.2. This Device Programmer is compatible with IMW 5.2 or later versions, but cannot utilize POP25 performance improvements.

The ASTRO POP25 Radio Management Device Programmer requires version 5.2 or later versions of IMW. Install this DP to leverage POP25 performance enhancements introduced with version R19.00.01 of Customer Programming Software (CPS) or version 2.16.5 of RM.

NOTE: The performance enhancements include quicker response to the changing presence of radios, and providing the ability to program more than one radio at a time.

This version of the DP is only supported on Windows 10 through RM, and not through the standalone CPS.

NOTE: This scenario has additional licensing and deployment considerations. For pricing information and deployment or configuration assistance, contact your Motorola Solutions Representative.

2.2 Radio Management Hardware Recommendations

The effectiveness of a Radio Management deployment depends on the hardware selection.

Once a Radio Management System Deployment on page 16 is selected and the Factors Affecting Deployment Choice on page 18 are considered, the next step is selecting the hardware for effectively running the Radio Management System Components on page 13.

2.2.1 RM Server Hardware Recommendation

The RM Server is the primary component of the RM system and its hardware selection is primarily driven by the size of the radio fleet.

Many hardware servers are available with various specifications and networking capabilities.

IMPORTANT: It is recommended that the customer adhere to the hardware and networking requirements from their local Information Technology (IT) department when selecting a server.

Figure 4: Minimum Server Specifications

The actual brand images and models are for illustration only and can be replaced with those with comparable specifications. Windows 10 is required to host the RM server.

SAS interfaces to SSD provide better performance compared to SATA and are recommended.

NOTE:
New hardware is introduced into the market frequently. As newer processor families are introduced by Intel and AMD, the reader is encouraged to refer to major server manufacturers' (Dell, HP, etc.) web sites for current server hardware.

Extra-large fleets may require more considerations. Contact Motorola Solutions for recommendations.

2.2.1.1
Radio Management Virtual Machine Installation

The installation of Radio Management is not fully supported in the virtual machine environment. This is largely in part because there are many available hardware and virtual machine environment combinations in the market. For questions regarding the current supported hardware and software program, contact the DMS-RM Security Update Service. For other questions regarding Motorola Solutions Security Update Service, contact sus001@motorolasolutions.com.

2.2.2
RM Job Processors Hardware Considerations

Since the primary function of the RM Job Processor is to validate radio data and generate codeplugs for distribution to the radios, as the number of radios in a fleet increase, more job processors must be added to maintain performance.

See the Hardware Specifications for Radio Management on page 25 for RM Job Processor (JP) hardware recommendations.

IMPORTANT: Motorola Solutions recommends deploying the RM Job Processor on the same computer as the RM Server. When using multiple RM Job Processors, it is recommended to colocate the JPs with the RM Server and connect them to the same physical subnet on the network.
Deploying too many RM Job Processors is not recommended because it may impact the performance of the system.

Deploying multiple RM Job Processors across a Wide Area Network (WAN) is not recommended due to the potential for network errors when transferring large amounts of data between the RM Job Processor and the RM Server.

2.2.3
RM Device Programmer Hardware Recommendations

The RM Device Programmers (DP) does not require high performance hardware and can be deployed on hardware with minimum specifications.

An x64 PC with 4 GB RAM running Windows 10 is recommended. The number of RM Device Programmers is driven primarily by fleet size and topology. Even in small fleet sizes, multiple DPs may be used to provide convenient access.

See the Hardware Specifications for Radio Management on page 25 for RM Device Programmer (DP) hardware recommendations.

NOTE:
Each RM Device Programmer in the RM system can program up to 16 radios simultaneously. If using a USB hub, ensure that it is a powered USB hub.

For 40 W MOTOTRBO repeaters and MTR radios, jobs are performed in sequential order if multiple devices are present.

RM Device Programmers can also be configured to program radios using Wi-Fi.

There can only be one DP configured for **Over The Air** per system. The RM Device Programmer, configured for Over The Air, must have connectivity to the radio network and if presence-driven programming is required, then connectivity to the Intelligent Middleware (IMW) / Unified Network Services (UNS) is required.

2.2.4
Windows Ports Used by Radio Management

Radio Management uses various TCP and UDP ports to communicate between components and sometimes to configure devices.

The following table describes the ports that Radio Management uses and the conditions under which the ports must be opened in the corporate or computer firewall.

NOTE: As port 443 is now the default port setting, port conflicts can occur when RM system components are deployed on a computer running other services concurrently. See Port Conflict by Multiple Applications on page 47.

Table 3: TCP and UDP Windows Ports for Radio Management

RM Component	Protocol and Ports	Firewall Settings	Comments
RM Server	TCP: 8675, 3416, 443	Open in the corporate firewall and the RM Server.	Required for Radio Management to work in a distributed environment. If only HTTPS is used, then the only open port required is 443.
	TCP: 49202, 49205-49210, 50003, 51020 – 51030, 65534	Open in the corporate firewall and the RM Server.	RM uses port selection to communicate through any of these TCP ports. Can be changed in the Settings of the RM Server Utility.
Presence Notifier (PN)	TCP: 3000 for clear, 50000 for secure	Open in the corporate firewall and computer in which a DP configured for OTAP is installed.	Can be changed in the Settings of the RM Device Monitor Utility.
DP DNS-SD Device Detection	UDP: 5353	Open in the corporate firewall and computers in which a DP configured for the DNS-SD device detection is installed. The DNS-SD device detection is used for Wi-Fi programming and USB programming (for the Ion family).	Can be changed in the Settings of the RM Device Monitor Utility. Multicast must be enabled on the network for the DNS-SD device detection.
DP IP Programming	TCP: 50000 – 50100	Open in the corporate firewall and computers in which a DP configured for IP Programming is installed.	Can be changed in the Settings of the RM Device Monitor Utility.
RM Client	TCP: 80, 443	Open in the corporate firewall and RM Client computer.	Cannot be changed. Only needed when licensing features in the RM Client.

2.2.5
HTTPS Protocol Support

In addition to the TCP protocol, Radio Management supports the HTTPS protocol to allow RM clients (RM Configuration Client, RM Device Programmer and RM Job Processor) to communicate with the RM Windows services (RM Server and Job Server).

IMPORTANT: The HTTPS protocol is only supported when the Windows services of the RM Server and the RM clients are running on computers using Windows Server 2012 and above.

When the HTTPS protocol is enabled (default setting), the Windows service listens for requests on the HTTPS and TCP channels. When the HTTPS protocol is disabled, the Windows service listens for requests only on the TCP channel. The HTTPS protocol is set in the **Network Settings** window of the RM Server Utility.

See Configuring the HTTPS Protocol on page 24.

The RM client request is transparently routed to the appropriate channel based on the capabilities of the Windows service and the operating system running on the RM client computer. If the Windows service is listening on the HTTPS and TCP channels and the RM client is running on Windows Server 2012 and above, the RM client request is routed to the HTTPS channel. Otherwise, the RM client request is routed to the TCP channel.

NOTE:
RM clients are now required to connect to the RM Server on port **443** instead of port **8675**.

The following troubleshooting topics are related to the HTTPS protocol feature:

- Port Conflict by Multiple Applications on page 47
- Unable to Validate Server SSL Certificate on page 47

2.2.5.1
Configuring the HTTPS Protocol

The HTTPS protocol for RM Windows services (RM Server and Job Server) can be enabled or disabled for individual services using the RM Server Utility application deployed with the RM Server.

When and where to use: This procedure configures the HTTPS Protocol to allow RM clients to communicate with the RM Server over the Internet. See HTTPS Protocol Support on page 24.

Procedure:

1. Launch the RM Server Utility by selecting the Windows icon and searching for **RM Server Utility**.
2. Select **Network Settings** from the left column.
3. From the RM Server and/or Job Server sections, **check** or **uncheck** the **HTTPS (Port 443)** check box to enable or disable the HTTPS protocol.
4. Click **Apply**.

   A warning message appears stating that changes will not take effect until the service is restarted.

5. Press **OK**.
6. Restart the RM services. Perform the following actions:
   a. Select **Status** from the left column.
   b. From the Server Status section, click **Stop All**.
   c. Once the **Service Status** reads `Stopped`, click **Start All**.

2.2.6

Hardware Specifications for Radio Management

Motorola Solutions provides recommended hardware for deploying Radio Management systems.

The following general hardware requirements are recommended for computers used in the deployment of the Radio Management system:

Table 4: Recommended Hardware Specifications for Radio Management

Motorola Solutions provides recommended hardware for deploying Radio Management systems.

RM Comp.	PC Type	MSI Part Number	No. of Cores	RAM Memory	HD Size	HD Type	SQL Support
DP/RM Client	Laptop	DSSU-BLAP-TOP	4	4 GB	250 GB	N/A	N/A
DP / RM Client / All-in-one	Desktop	DSSUB-DESK-TOP	4	8 GB	1 TB	6Gbps SATA	N/A
JP	Tower or Rack	DSSUB-SERV-ER1	8	16 GB	N/A	N/A	N/A
JP	Tower or Rack	DSSUB-SERV-ER2	16	32 GB	N/A	N/A	N/A
RM Server	Tower or Rack	DSSUB-SERV-ER3	4	16 GB	2 TB	SAS HD *	Standard
RM Server	Tower or Rack	DSSUB-SERV-ER4	4	16 GB	4 TB	SAS HD **	Enter-prise

* SAS HD with 2 TB usable space for Data, QUAD NIC, Supports RAID 5

** SAS HD with 4 TB usable space for Data, Solid State System Drive, QUAD NIC, Supports RAID 6

2.2.7

Radio Fleet Topology Recommendations

The recommended topology, hardware, and software for the Radio Management system depends on the number of radios in the fleet.

Table 5: Recommended Topology, Hardware, and Software for the Radio Management System

Fleet Size	RM Server Cores / RAM	HD Size	JP Cores / RAM	No. of DPs	RM Client
1,000	4 Cores / 8 GB	500 GB	All in One	1	1
5,000	4 Cores / 16 GB	1 TB	12 Cores / 6 GB	4	4

Fleet Size	RM Server Cores / RAM	HD Size	JP Cores / RAM	No. of DPs	RM Client
10,000	4 Cores / 16 GB	1 TB	16 Cores / 8 GB	6	6
20,000	4 Cores / 16 GB	2 TB	24 Cores / 12 GB	10	8

- If > 2,000 configurations or > 20,000 radios, using SQL Server Standard Edition is recommended.
- 1 GB Ethernet for all configurations is required.
- Recommendations are for codeplug programming only, firmware upgrades increase the time significantly.
- Time to program radios vary depending on when radios are connected to the system.
- Assumes medium size codeplug, 500 Contacts, 100 Channels.

Chapter 3

Radio Management Suite Installation

The components that are supported as part of the Radio Management (RM) Suite installation can vary based on the technology (ASTRO APX, MOTOTRBO, or Android). During the installation process, you will be asked to select the RM system components that best meet your deployment needs. See Radio Management System Deployment on page 16.

If an All-In-One RM Deployment on page 16 is the requirement, then all the RM system components are installed on the same computer.

If a Distributed RM Deployment on page 17 is the requirement, then you repeat the RM Suite installation on multiple computers, possibly at different sites, and based on the specific RM system component. For example, if you are installing an RM Server and RM Job Processors at a site, then you select only the RM Server and RM Job Processor as part of the installation for that site.

WARNING: For existing RM systems, before installing a newer version of RM, it is highly recommended to perform a backup of the current RM Server database before upgrading to a newer version. See Backing Up the RM Server Database on page 61.

NOTE:
It is recommended that the installation be performed by an administrator that understands the system and how the RM system components are deployed.

Allow for all Windows upgrades to complete before installation.

After the installation process is complete, customers upgrading from RM versions prior to 2.0 are given the option to migrate the existing data to the current RM Server SQL database structure the first time RM is launched. See Radio Management 1.x Data Upgrade Process on page 62 for details.

In rare instances during the installation of Radio Management components, the Windows PowerShell blue screen opens for about 10 minutes with no progress status and the installation ends displaying `install interrupted`. For this instance, re-start the installation.

For existing RM systems deployed in a distributed configuration, it is recommended to enable the AutoUpdate feature before upgrading to a newer version of RM.

The Auto-Update feature provides the ability to upgrade remote RM client components (RMC, RM Device Programmer, or RM Job Processor) to the latest version automatically over the network. This eliminates the need to update each client manually at the local PC, allowing for decreased RM system upgrade times.

The AutoUpdate feature can be enabled by selecting the AutoUpdate checkbox from the install program. Once installed, AutoUpdate can be enabled or disabled from the RM Serve utility.

AutoUpdate will only update a CPS client that has been installed from the suite installation.

3.1 Operating System Requirements for CPS and RM

The installation of the Customer Programming Software (CPS) and the Radio Management (RM) components require supported operating systems as well as recommended hardware specifications.

Windows 10, 64-bit is recommended for all applications except for the RM Server.

IMPORTANT: Windows 10 version 1511 and Windows 10 version 1507 are not supported. For all Windows OS versions, enable the installation of the Windows Identity Foundation. See Enabling the Windows Identity Foundation Installation on page 64.

The following operating system requirements are recommended for the RM Server:

- Windows Server 2016 (Essential and Standard)
- Windows Server 2019
- Windows 11

NOTE: These requirements are recommended for the RM system components for both template mode and configuration mode.

3.2 USB Programming Cables for MOTOTRBO

Motorola Solutions can provide programming cables used for connecting a MOTOTRBO radio to a USB port.

Table 6: Cables for Radio Programming, Data Applications, Testing, or Alignment

Motorola Solutions Part Number	Cable Name	Description
PMKN4012_	Portable Programming Cable	This cable connects the radio to a USB port for radio programming and data applications.
PMKN4013_	Portable Programming, Testing and Alignment Cable	This cable connects the radio to a USB port for radio programming, data applications, testing and alignment.
HKN6184_	Mobile Front Programming Cable	This cable connects the radio front connector to a USB port for radio programming and data applications.
PMKN4010_	Mobile and Repeater Rear Programming Cable	This cable connects the radio rear connector to a USB port for radio programming and data applications.
PMKN4016_	Mobile and Repeater Rear Programming, Testing and Alignment Cable	This cable connects the radio rear connector to a USB port for radio programming, data applications, testing and alignment.

3.3 Radio Management Suite of Applications

The applications that are available for installation as part of the Radio Management suite vary depending on the technology.

Table 7: Radio Management Suite Applications

Technology	Application
ASTRO APX	• APX CPS with RM (Template Mode)

Technology	Application
	• Radio Management Server with AutoUpdate Enable • Radio Management Device Programmer • Radio Management Job Processor • APX Family Tuner ** • Advanced Keys Administrator ** • ARS Data Administrator ** • APX Migration Assistant **
MOTOTRBO	• Radio Management Client (Configuration Mode) * • Radio Management Server with AutoUpdate Enable • Radio Management Device Programmer • Radio Management Job Processor • MOTOTRBO AirTracer ** • MOTOTRBO RDAC (Repeater Diagnostics and Control) ** • MOTOTRBO Tuner **
Android	• Radio Management Client (Configuration Mode) • Radio Management Server with AutoUpdate Enable • Radio Management Device Programmer • Radio Management Job Processor

* RM Configuration Client is required for Capacity Max systems. MOTOTRBO CPS does not support Capacity Max. See Updates to MOTOTRBO Radio Management on page 31

** ASTRO APX and MOTOTRBO provide supplemental applications. See Supplemental RM Suite Applications on page 37.

3.4 Installing the ASTRO APX RM Suite

Prerequisites:

WARNING: For existing RM systems, before installing a newer version of RM, it is highly recommended to perform a backup of the current RM Server database before upgrading to a newer version. See Backing Up the RM Server Database on page 61.

- Disconnect all Motorola Solutions devices connected the computer.
- Exit all programs running on the computer.
- Do not stop the RM Windows services.
- If upgrading an existing RM installation version R14 or older, ensure that no jobs are pending in Radio Management.
- If you are using a hardened operating system and have not set the required user privileges, see Assigning User Permissions on Hardened Operating Systems on page 65.

- For distributed deployments, enable the AutoUpdate feature either from the install program or from within the RM Server utility.

  NOTE: AutoUpdate upgrades remote RM client components (RMC, RM Device Programmer, or RM Job Processor) to the latest version automatically over the network.

Procedure:

1. Log on to the computer as an administrator.
2. Insert the ASTRO APX CPS DVD media into the optical drive.
3. Wait for the auto-install program to start and follow the on-screen instructions.

   NOTE:
   If the auto-install program fails to launch, navigate the root folder and double-click **Setup.exe**.

   If the **User Account Control** window opens asking you to allow the changes to your device, click **Yes**.

   Antivirus software may block the Setup.exe file from running. See Antivirus Software Blocks CPS/RM Installation on page 39.
4. If the Microsoft® .NET 4.8 Framework or other pre-requisites are not found on the computer, a prompt to install opens. Click **Yes** or **Install** to install the .NET Framework and other prerequisites.

   IMPORTANT: If prompted to restart the computer during the installation process, perform the restart before proceeding with the install.
5. From the **Choose Setup Language** window, select the language to be used during the installation process.
6. Press **Next**.
7. From the **Welcome** window, select **Next**.
8. Select all the RM Suite applications to be installed on the computer.

   NOTE:
   For an All-In-One RM Deployment on page 16, select the **APX CPS**, **RM Server with AutoUpdate Enable**, **RM Device Programmer**, and **RM Job Processor**.

   For a Distributed RM Deployment on page 17, select only the RM system components for the current computer. You have to redo the installation for other RM system components on each distributed computer. See Networking Considerations for Installed RM System Components on page 36.

   Do not connect a radio to the computer before installing the APX CPS, Device Programmer, or APX Tuner application. Failure to do so can prevent required files from being updated, which in turn can cause communication problems between the radio and the computer.
9. When installing the RM Server, the **Auto Add Radio feature setting** window open and allows you to select whether to initially enable this feature.

   NOTE:
   Enabling this feature as part of the installation increases the efficiency of adding new radios to the RM Server when detected by the RM Device programmer. The Auto Add feature can be disabled later from the RM Server Utility.
10. From the **License Agreement** window, accept the terms of the license agreements and click **Next**.
11. Click **Next** on any **Read Me** and **Installation Guide** windows.

12 From the **Change Current Destination Folder** window, if necessary, click **Change** to browse for a new folder for **Program Files** and **Data Files**.

Program Files
Folder location where application executable files and dynamic linked libraries are installed.

Data Files
RM Server database folder location where user created templates/configurations and xPBA files generated during read operations and write operations are stored. Network locations are not supported.

13 Click **Install**.

14 Follow the on-screen instructions to complete the installation.

NOTE:
If any Windows 10 security-related messages come up during the install, click **OK** to proceed.

If installing the APX CPS and/or Tuner on Windows 10 computers, do not install any other applications that communicate with the APX radio, such as the Data Terminal Application.

If prompted to restart, restart the computer for the installation process to complete successfully.

15 When complete, click **Finish** and restart the computer.

NOTE: If the computer has never had a 1-Wire USB device connected to it before, such as the USB dongle used for FLASHkeys or Advanced keys, plug in a 1-Wire USB device immediately after the installation finishes to ensure that the 1-Wire USB drivers are properly installed.
If the device is not recognized or if auto-detect cannot locate the USB device driver, direct the New Hardware Wizard driver installer to the 1-Wire driver at one of the following folder locations:

- C:\WINDOWS\system32\drivers for 32-bit operating systems
- C:\WINDOWS\sysWOW64\drivers for 64-bit operating systems

3.5 Updates to MOTOTRBO Radio Management

MOTOTRBO Radio Management introduced the Configuration Mode with the launch of R02.06.00 CapMax support. The Configuration Mode has improved users capabilities to manage a large fleet of Radios and Infrastructure component (Repeaters and Controller) level configuration.

Since the Configuration Mode inception, the software suite has been supporting both the legacy Template Mode and Configuration Mode. To continue improving the overall user experience, future Radio Management releases will be focusing on exclusive support of Configuration Mode.

Effective with the launch of MOTOTRBO Radio Management software suite R02.10.00, the following Radio Management change will be made:

- Radio Management Template Mode will no longer be available.
- Radio Management Template Mode training module will no longer be available from Learning Management System (PCT1026 - Radio Management 2.0 Template Mode).

RM Migration Analysis Tool is available via MOL to help determine User actions needed to prepare their database for Configuration Mode. This tool will identify Radios that cannot be converted to Configuration Mode with the recommended corrective actions.

Key Tips for RM Users:

- When installing the server on an existing RM installation, the installer will run the RM Migration Analysis Tool program (RmConfigModeReadinessHelper.exe) in silent mode. If the program finds radios that can not be converted to config mode it will block the installation.
- User should run RMMigrationAnalysisTool.exe program separately. The program will tell you which devices can not be converted and why.
- User will need to take the recommended corrective actions. (for example, upgrading the device, discarding pending changes, canceling running jobs, or deleting the device)
- The RM R2.10 Suite installer will not uninstall the previous version of CPS. It is recommended to keep CPS R2.9 installed since it is required for converting template mode radios, and importing .CTP files into RM.

3.5.1
Installing the MOTOTRBO CPS RM Suite

Prerequisites:

WARNING: For existing RM systems, before installing a newer version of RM, it is highly recommended to perform a backup of the current RM Server database before upgrading to a newer version. See Backing Up the RM Server Database on page 61.

- Disconnect all Motorola Solutions devices connected the computer.
- Exit all programs running on the computer.
- Do not stop the RM background services.
- If upgrading an existing RM installation version V12.1 (Build 645) RM 1.5.0 or older, ensure that no jobs are pending in Radio Management.
- If you are using a hardened operating system and have not set the required user privileges, see Assigning User Permissions on Hardened Operating Systems on page 65.
- For distributed deployments, enable the AutoUpdate feature either from the install program or from within the RM Server utility.

  NOTE: AutoUpdate upgrades remote RM client components (RMC, RM Device Programmer, or RM Job Processor) to the latest version automatically over the network.

Procedure:

1. Log on to the computer as an administrator.
2. Insert the MOTOTRBO CPS DVD media into the optical drive.
3. Wait for the auto-install program to start and follow the on-screen instructions.

   NOTE:
   If the auto-install program fails to launch, navigate the root folder and double-click **Setup.exe**.

   If the **User Account Control** window opens asking you to allow the changes to your device, click **Yes**.

   Antivirus software may block the Setup.exe file from running. See Antivirus Software Blocks CPS/RM Installation on page 39.
4. If the Microsoft® .NET 4.8 Framework or other pre-requisites are not found on the computer, a prompt to install opens. Click **Yes** or **Install** to install the .NET Framework and other prerequisites.

   IMPORTANT: If prompted to restart the computer during the installation process, perform the restart before proceeding with the install.

5 Optional: From the **Choose Setup Language** window, select the language to be used during the installation process.

NOTE: The **Choose Setup Language** window is displayed for region installations that support multiple languages.

6 Press **Next**.

7 Select all the RM Suite applications to be installed on the computer.

NOTE:
For an All-In-One RM Deployment on page 16, select the **MOTOTRBO CPS**, **RM Client**, **RM Server with AutoUpdate Enable**, **RM Device Programmer**, and **RM Job Processor**.

For a Distributed RM Deployment on page 17, select only the RM system components for the current computer. You have to redo the installation for other RM system components on different computer. See Networking Considerations for Installed RM System Components on page 36.

If the CPS and Tuner applications are installed on the same computer, install them on different directories.

8 When installing the RM Server, the **Auto Add Radio feature setting** window open and allows you to, select whether to initially enable this feature.

NOTE:
Enabling this feature as part of the installation increases the efficiency of adding new radios to the RM Server when detected by the RM Device programmer, eliminating the need to manually enter radio serial numbers and scheduling jobs.

9 From the **License Agreement** window, accept the terms of the license agreements and click **Next**.

10 From the **Change Current Destination Folder** window, if necessary, click **Change** to browse for a new folder for **Program Files** and **Data Files**.

Program Files
Folder location where application executable files and dynamic linked libraries are installed.

Data Files
RM Server database folder location where user created templates/configurations and xPBA files generated during read operations and write operations are stored. Network locations are not supported.

11 Click **Install**.

12 Follow the on-screen instructions to complete the installation.

NOTE:
If any Windows 10 security-related messages come up during the install, click **OK** to proceed.

If prompted to restart, restart the computer for the installation process to complete successfully.

13 When complete, click **Finish** and restart the computer.

3.6 Migrating the RM Server Database

The migration of the RM Server database is required when upgrading RM systems from Radio Management 1.x to Radio Management 2.x for ASTRO APX and MOTOTRBO.

When and where to use:

When migrating from RM 1.x to RM 2.x, leave the RM Windows services running (the Motorola RM Server service, and SQL Server). If these Windows services are not running during the installation, the data from the previous version is not processed for migration to the new version. See Radio Management 1.x Data Upgrade Process on page 62.

The migration process occurs automatically once the Radio Management client is launched for the first time after an installation.

Procedure:

1 Launch the CPS application and click the **RM** (Radio Management) button.

NOTE: If the RM system detects an older versions of the database, a **Data Upgrade** window opens and provides options for migrating the RM database.

2 From the **Data Upgrade** window, select how to migrate the radio data in the RM database.

IMPORTANT: The estimated time to complete the migration process depends on the migration selection and the amount of radio data in the database. During the data migration process, the data upgrade program schedules a one-time upgrade read job. This read job does not require any radios to be connected. It is completed by reading the data from the old database and restructuring it into the new format used by the RM 2.x platform. Do not interrupt this process.

If…	Then…
If upgrading the RM data without radio history,	perform the following actions: **a** Select **Upgrade RM data excluding each radio's individual job history**. **b** Click **OK**.
If upgrading the RM data and radio history,	perform the following actions: **a** Select **Upgrade RM data including each radio's individual job history**. **b** Click **OK**.
If not upgrading RM data,	click **Never**.

3 At the end of the data migration process, decide whether to delete the old data.

NOTE: This option is provided for situations where disk space is limited. For such situations, it is highly recommended to preserve this data.

Once the migration process is complete, the Radio Management Client opens in **Radio View**. The upgrade read job may take a significant amount of time depending on the size of the database. As these jobs are completed, the Job Status is updated to `Completed`. Radios can be modified once they are in the completed state.

3.7
Installing the Android RM Suite

Prerequisites:

WARNING: For existing RM systems, before installing a newer version of RM, it is highly recommended to perform a backup of the current RM Server database before upgrading to a newer version. See Backing Up the RM Server Database on page 61.

IMPORTANT:
The RM system components for Android cannot be installed on the same computer with ASTRO APX or MOTOTRBO RM system components. Also, the RM Server database cannot be migrated to an ASTRO APX or MOTOTRBO RM Server database.

Ensure that the firewall is turned off for computers running the RM Device Programmer. Otherwise, the computer cannot program devices using the USB port.

- Disconnect all Motorola Solutions devices connected the computer.
- Exit all programs running on the computer.
- Do not stop the RM background services.
- If upgrading an existing RM installation, ensure that no jobs are pending in Radio Management.
- If you are using a hardened operating system and have not set the required user privileges, see Assigning User Permissions on Hardened Operating Systems on page 65.

Procedure:

1. Log on to the computer as an administrator.
2. Insert the Radio Management Android™ Edition DVD media into the optical drive.
3. Wait for the auto-install program to start and follow the on-screen instructions.

   NOTE:
   If the auto-install program fails to launch, navigate the root folder and double-click **Setup.exe**.

   If the **User Account Control** window opens asking you to allow the changes to your device, click **Yes**.

   Antivirus software may block the Setup.exe file from running. See Antivirus Software Blocks CPS/RM Installation on page 39.
4. If the Microsoft® .NET 4.8 Framework or other pre-requisites are not found on the computer, a prompt to install opens. Click **Yes** or **Install** to install the .NET Framework and other prerequisites.

   IMPORTANT: If prompted to restart the computer during the installation process, perform the restart before proceeding with the install.
5. From the **License Agreement** window, accept the terms of the license agreements and click **Next**.
6. From the **Setup Type** window, select one of the following installation methods:
   - For an All-In-One RM Deployment on page 16, select **Typical** to install the **RM Client**, **RM Server with AutoUpdate Enable**, **RM Device Programmer**, and **RM Job Processor** on the same computer.
   - For a Distributed RM Deployment on page 17, select **Custom** and select only the RM system components for the current computer. You have to redo the installation for other RM system components on different computer. See Networking Considerations for Installed RM System Components on page 36.

7 When installing the RM Server, the **Auto Add Radio feature setting** window open and allows you to, select whether to initially enable this feature.

NOTE:
Enabling this feature as part of the installation increases the efficiency of adding new radios to the RM Server when detected by the RM Device programmer, eliminating the need to manually enter radio serial numbers and scheduling jobs.

8 From the **Change Current Destination Folder** window, if necessary, click **Change** to browse for a new folder for **Program Files** and **Data Files**.

Program Files
Folder location where application executable files and dynamic linked libraries are installed.

Data Files
RM Server database folder location where user created templates/configurations and xPBA files generated during read operations and write operations are stored. Network locations are not supported.

9 Click **Next**.

10 Select the creation of **Desktop Shortcut** icons and **Start Menu Shortcut** icons.

11 Click **Install**.

12 Follow the on-screen instructions to complete the installation.

NOTE:
If any Windows 10 security-related messages come up during the install, click **OK** to proceed.

If prompted to restart, restart the computer for the installation process to complete successfully.

13 When complete, click **Finish** and restart the computer.

3.8 Networking Considerations for Installed RM System Components

The system administrator is responsible for ensuring that all the computers used in a distributed deployment have an open IP connection between all the RM system components.

In addition, observe the following:

- System firewall and routers are configured to allow IP address connectivity.
- All ports used by the RM system are open.
- In Distributed RM Deployment on page 17, for all RM system components installed on a different computer than the RM Server, ensure that the RM Server address for each RM system component matches either the IP address or the DNS host name of the RM Server computer.
- In All-In-One RM Deployment on page 16, the RM Server address for all system components, installed on a single computer, is set automatically to **localhost**.
- When adding remote CPS applications, RM Configuration Clients, and RM Device Programmers to an all-in-one deployment, ensure that the RM Server address matches either the IP address or the DNS host name of the RM Server computer.
- RM system defaults to port 443 for all deployment types.
- Radio Management Server installation installs Microsoft SQL Server 2017 (RTM-CU25) (KB5003830) – 14.0.3401.7.

- If using Network Address Translation (NAT), see Setting Up the NAT RM System Support Between the RM Components on page 42.
- It is not recommended to deploy a Radio Management system (Distributed or All-In-One) that is open to the Internet. Enable the appropriate PC and network security controls (password protection, firewalls, and others) to ensure the RM system is secure and protected from unauthorized network users and/or traffic.

NOTE: New versions of the CPS application and RM Configuration Client are not compatible with older versions of the RM Server. Before installing a new version of the CPS application or RM Configuration Client, ensure that the RM Server is of the same new version and that the AutoUpdate Enable feature is enabled for the RM system.

3.9 Supplemental RM Suite Applications

In addition to the CPS and RM system component applications, there are additional supplemental applications that can be installed.

The following supplemental applications are available from the DVD media for each relevant technology.

Table 8: Supplemental Applications

Technology	Application
ASTRO APX	• APX Family Tuner • Advanced Keys Administrator • ARS Data Administrator • APX Migration Assistant
MOTOTRBO *	• MOTOTRBO AirTracer • MOTOTRBO RDAC (Repeater Diagnostics and Control) • MOTOTRBO Tuner
* For MOTOTRBO, the installation instructions vary by region. Refer to the *MOTOTRBO CPS, Tuner, AirTracer, and RDAC Applications Installation Guide*, part number 6880309T92, for details.	

Chapter 4

Troubleshooting in Radio Management

This section covers various troubleshooting related topics in Radio Management that are intended to provide information and resolution.

WARNING: Only a user with a good understanding of the system should perform these troubleshooting activities.

The following sections contain helpful troubleshooting information:

4.1 Radio Management Installation and Upgrade Problems

Radio Management installations and upgrade issues can be a result of unsupported computer hardware or system settings.

The issues and resolutions described in this section are from actual errors encountered in older releases or current releases when attempting to install or upgrade the Radio Management suite of applications.

4.1.1 Radio Management Fails to Upgrade from RM 1.x to RM 2.x

Problem

RM does not open after attempted upgrade from RM 1.x (R14.01.00/RM 1.6.1 or earlier) to RM 2.x (any version later than R15.00.02/RM 2.2.14).

Resolution

Follow the specified upgrade path when upgrading from RM 1.x to any version of RM 2.x:

1 Upgrade RM 1.x to RM 2.x version R15.00.02/RM 2.2.14

2 Upgrade RM 2.x version R15.00.02/RM 2.2.14 to the later version of RM 2.x

To upgrade from RM 1.x to the latest version of RM 2.x, follow the sequence:

Example: Upgrade RM 1.x to RM 2.x (R15.00.02/RM 2.2.14) and then to RM 2.x (all later versions)

4.1.2 Radio Management Database Is Lost After an Upgrade

During an upgrade, the root directory for the RM Server database was changed from the previous installation and the database now appears empty.

Problem

The data in the RM Server database appears to be lost or missing after upgrading to R16.00.00.

During the installation process, the user can use the default folder location for storing **Data Files** or change the destination folder. When installing a newer version, if the destination folder for the **Data**

Files is changed from the previous installation, a new database is created and the data that existed in the previous installation is lost.

WARNING:
Do not change the root directory of the RM Server database when performing an upgrade. This results in the creation of a new database and any exiting data is lost.

It is highly recommended to perform a backup of the RM Server database before upgrading to a newer version. Failure to perform a backup of the database can result in lost data. See Backing Up the RM Server Database on page 61.

Resolution

If a backup of the RM Server database is available, the newly install version must be removed from the computer. Reinstall the previous RM Server version and restore the backup using the RM Server Utility. Once the database is restored, install the new RM Server and do not modify the **Data Files** folder location.

NOTE: Starting with CPS/RM release R16.01.02, the install has been enhanced to better assist the user during the upgrade process.

4.1.3
Antivirus Software Blocks CPS/RM Installation

Antivirus software can block the installation of the CPS/RM application.

If detected, many antivirus programs prevent application/executable files from running a malicious application. The antivirus program can be configured to allow the application/executable to run on the computer. The steps required to exclude a specific application from being blocked varies on the antivirus program.

Problem

When trying to unzip the CPS/RM software, and/or run the **setup.exe** to install CPS/RM, the antivirus software blocks the installation program and prevents the software from installing or running on the computer. An example message would be, `Antivirus software is blocking an 'unknown' program from running since it believes it to be a malicious actor.`

Resolution

Add the **setup.exe** file to the exclusion/exception list of the antivirus program running on the computer.

NOTE: Consult the documentation for the antivirus software installed on the computer on how to add an application/executable to the exceptions/exclusions list.

4.1.4
Radio Management Errors After Installation

The Radio Management (RM) server or RM Server Utility can encounter unexpected errors. The error messages show that files or assemblies are not updated or are missing. Parts of the RM system may appear to be working while other parts may not.

Problem

Windows updates that are started or in progress when the RM suite installation is started can interfere with the installation of RM components.

Resolution

Motorola Solutions recommends checking Windows Update to ensure that no installations are pending or in progress before installing the RM suite.

4.1.5
Hash File Not Found

The Radio Management installation fails on a secured computer with a `hash file not found` error.

The CPS/RM installation does not support Federal Information Processing Standards (FIPS) enabled on the target computer.

Problem

The `hash file not found` error occurs on computers with FIPS enabled, or on computers that were hardened using the Motorola Solutions Windows Hardening Kit (WHK), which enables FIPS by default.

The hardening kit sets an internal bit in the operating system (OS) registry that enables FIPS. The setting of FIPS by the Motorola Solutions Windows Hardening Kit overrides any settings made by the user in the main FIPS setting.

Resolution

Disable FIPS on the target computer and then reinstall the Radio Management Suite. See Disabling FIPS Mode on page 40.

If WHK was used to secure the target computer, additionally disable FIPS from the registry. See Disabling FIPS set by WHK on page 40.

4.1.5.1
Disabling FIPS Mode

Some software installations require the user to manually disable the Federal Information Processing Standards (FIPS) mode on the target computer.

Procedure:

1. From Control Panel, click **Administrative Tools**.
2. Double-click **Local Security Policy**.
3. From the left pane, expand the **Local Policies** node.
4. Click **Security Options**.
5. From the right pane, scroll down to **System cryptography: Use FIPS compliant algorithms for encryption, hashing, and signing**.
6. Double-click **System cryptography: Use...** and select **Disabled**.
7. Click **OK** and close the **Local Security Policy** window.

4.1.5.2
Disabling FIPS set by WHK

The Federal Information Processing Standards (FIPS) mode set by the Motorola Solutions Windows Hardening Kit (WHK) must be manually disabled by the user.

Procedure:

1. In Windows, open a **Command Prompt** window.

2 Enter `regedit`.

3 From the left pane, expand **HKEY_LOCAL_MACHINE**.

4 Continue expanding to **SYSTEM→CurrentControlSet→Control→Lsa→FipsAlgorithmPolicy**.

5 Double-click **Enabled**.

6 Set **Value data** to **0**.

7 Click **OK** and close all windows.

4.1.6
After Unsuccessful IP Change from RM, the Rollback Mechanism Does Not Undo All Changes

The background of supporting snapshot rollback is to ensure that the communication between each Virtual Machine (VM)/KVM via the internal IP is always valid. In case some of the VMs are changed to the new internal IP but some of the VMs failed to do that, CSACS reverts the VMs to the state before the IP change happens but it does not revert all RM configurations changes that have already been written prior to posting the IP configurations to the server.

If the IP change fails, RM informs the user about the following error `IP change failed`, the user could either retry the write of the new IP configuration or revert the IP parameters and write the original configuration back. If during the retry, the write of a new IP configuration problem occurs, contact Motorola Support.

NOTE: The issue may be related to a network connection problem. In this case, the operator can restart CMSS VMs or the whole CMSS server, and retry the write operation.

4.2
Radio Management Server Utility Features Grayed Out

The System Key Administration, User Authorization, and Machine Authorization features of the RM Server Utility are only accessible by local administrators of the computer running the RM Server.

Problem

When the RM Server Utility is launched, the System Key Administration, User Authorization, and Machine Authorization features are grayed out and not accessible by the current user. This issue can also occur if the current user is a local administrator but was added to the local machine after the RM Server Utility was launched for the first time.

Resolution

Assign the local administrator the role of the RM Administrator in the RM Server Utility.

NOTE: The user must be an administrator of the computer running the RM Server and be assigned the role of RM Administrator.

4.3
Radio Management Connection Problems

The Radio Management Configuration Client and the RM Device Programmer may experience issues connecting to the RM Server in a distributed environment.

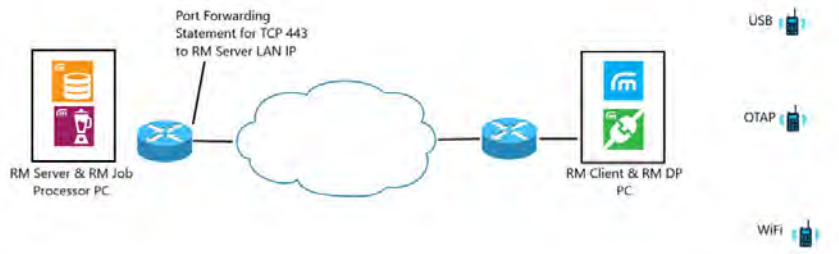
These issues may be caused by a number of factors and the error messages that are displayed do not always provide the necessary information to resolve the issue.

The following sections provide the user with helpful information to resolve common problems.

4.3.1
Setting Up the NAT RM System Support Between the RM Components

This procedure describes how to configure Radio Management (RM) to work when the RM Server is inside a private network behind a Network Address Translation (NAT) router that provides a public address (different from the server's private address) so that RM Clients and RM Device Programmers on the public side of the NAT can properly authenticate with the server. The procedure also describes how to edit a configuration file used by RM services that creates a trusted list of relying parties for authentication messages between RM components.

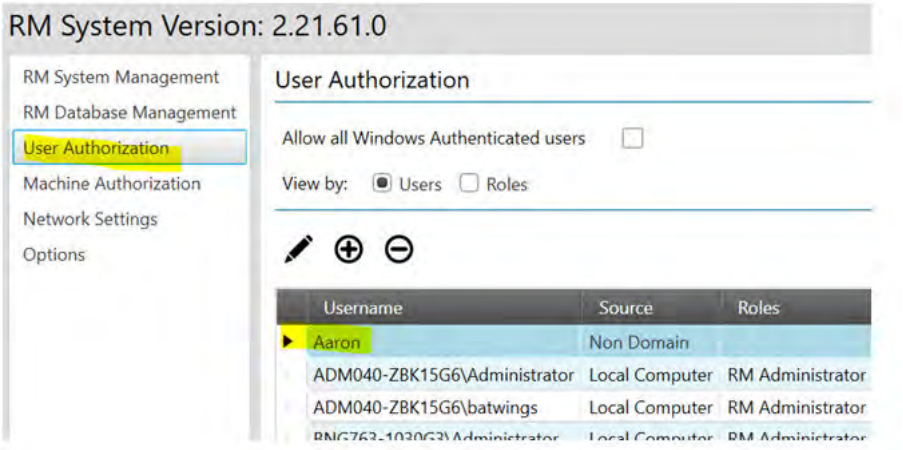
Figure 5: NAT Distributed Connection



Prerequisites: Ensure that the RM Server side router has a port forwarding statement for TCP 443 pointing towards the LAN IP for the RM Server.

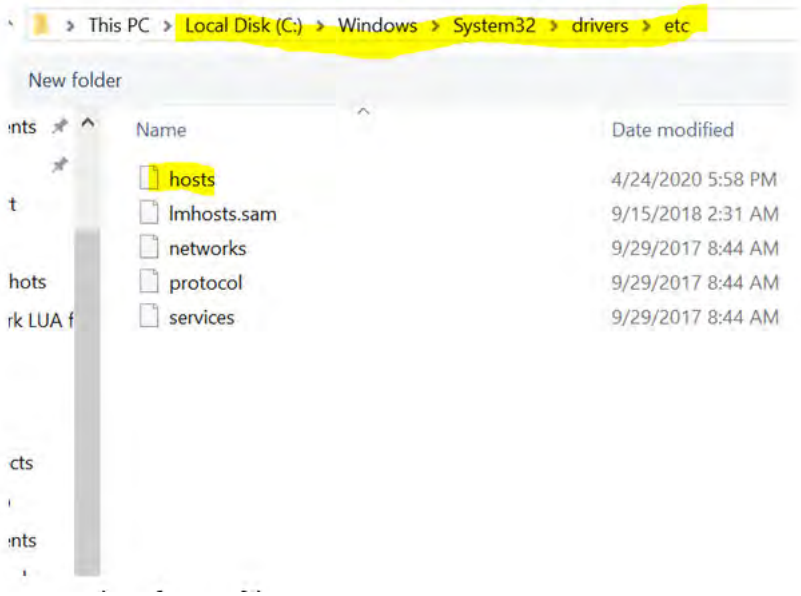
Procedure:

1. In the RM Server, add a user for the remote RM DP and RM Client PC by adding a Non Domain.
   a. Disable Machine Authorization to limit troubleshooting on setup.
   b. In the User Account check the RM Client box.



2. Record the remote RM Server Hostname and Public IP.
   a. Verify the RM Server Hostname by using `hostname` command in the CMD of the RM Server.
   b. Verify the Public IP of the RM Server by using https://whatismyipaddress.com/.
3. Connect remotely in the RM DP and RM Client PCs.
4. If there is no mechanism to resolve the RM server Hostname on the RM DP or RM JP PCs, add an entry to the local Hostfile on the RM DP or RM JP PCs.
   a. To save changes, open the Hostfile as **Admin**.

Figure 6: Location of Hostfile



Step example:

Figure 7: Hostfile Entry Example

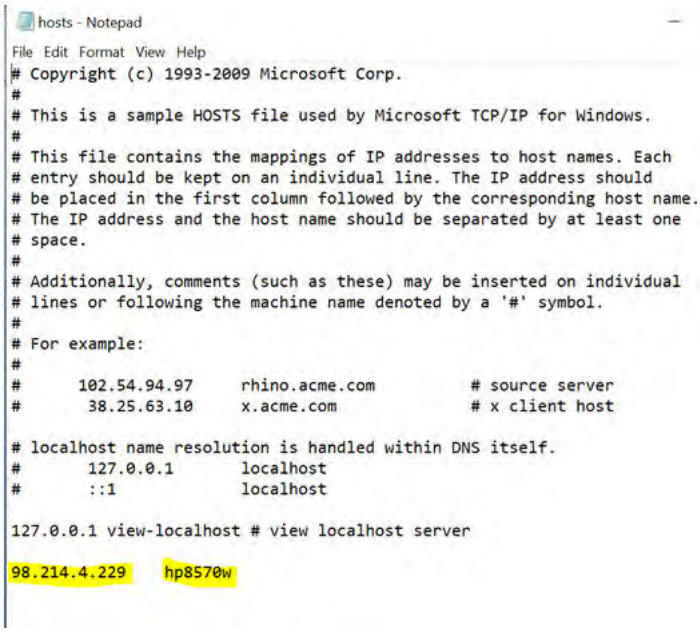
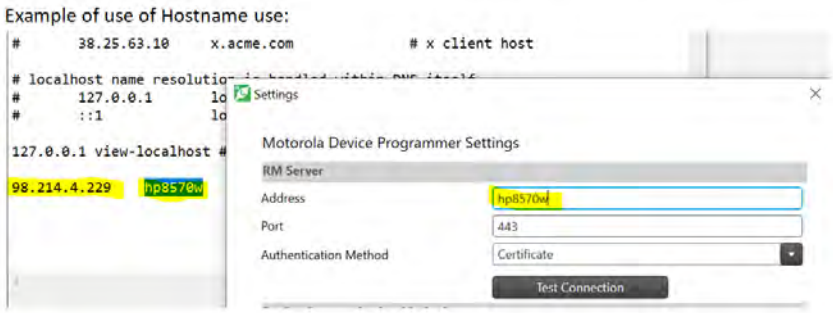


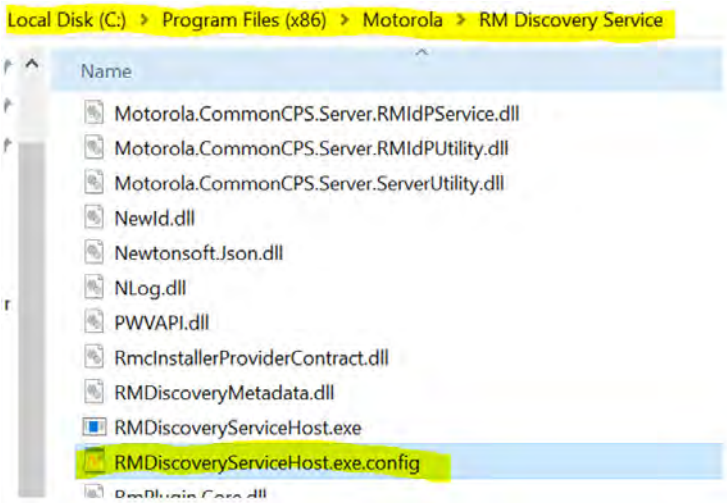
Figure 8: Example of the Hostname use



b On the RM Server PC, open the `RMDiscoveryServiceHost.exe.config` file as **Admin**.

c Edit the `RMDiscoveryServiceHost.exe.config` file.

Figure 9: Location of RMDiscoveryServiceHost.exe.config file



d Create duplicate entries for the **relyingParty** elements for the MotorolaRMServer, MotorolaRMJobServer, and MotorolaRMDiscoveryServer.

e To make each entry distinct from the original, edit the **Name** attribute of each duplicate by appending `1`

f Edit the **Hostname** attribute of each duplicate from **localhost** to the public IP address that the NAT router presents for the RM Server. In this example, `98.214.4.229`.

Step example:

Figure 10: Example of RMDiscoveryServiceHost.exe.config file

g Save the file and to ensure that the changes take effect, restart the RM Server.

Postrequisites: If you have any issues after implementing the procedure, perform some of the following steps:

- Verify if both PCs have the same RM versions.
- Ensure that the **Date** and **Time** match on both PCs.
- Turn off the Firewall on both PCs. If this resolves the issue, the Firewall can then be turned back on with proper security statements.

4.3.2
RM Client Component and RM Server Computers in Different Domains

Problem:

The RM client component (RMC, RM Device Programmer, or RM Job Processor) cannot connect to the RM Server. This can occur even if the RM client component is using the correct RM Server hostname or IP address within its connection settings.

When properly configured, the DNS on the network generally handles hostname resolution without any issue. However, there are cases (especially in non-domain deployment scenarios), where the RM Server hostname is not resolved by the computer running the RM client component.

Resolution:

Perform the following procedures to connect the RM client component to the RM Server:

1 Obtain and record the **IPv4 Address** and **hostname** of the computer running the RM Server. See Obtaining the IP Address and Hostname for the RM Server on page 45.

2 Modify the Windows hosts file `C:\Windows\System32\drivers\etc\hosts` on the RM client to resolve the DNS name of the computer running the RM server. See Resolving DNS Names for RM Server on page 46.

4.3.2.1
Obtaining the IP Address and Hostname for the RM Server

Procedure:

1 From the RM Server computer, run **Command Prompt** as an administrator.

2 Enter the command, `ipconfig`.

3 Record the **IPv4 Address** for the RM Server computer.

4 At the command prompt, enter the command, `hostname`.

5 Record the **hostname** for the RM Server computer.

4.3.2.2
Resolving DNS Names for RM Server

An RM client computer residing in a different domain then the RM Server requires that the DNS name for the server be resolved on the client computer.

Procedure:

1 From the client computer running the RM client component, navigate to `C:\Windows\System32\drivers\etc\`.

2 Open the **hosts** file, as an administrator, using a text editor (Notepad).

3 Add an entry to the end of the file using the following syntax:

<IPAddress> <hostname>
where, ***<IPAddress>*** is the RM Server IPv4 Address and ***<hostname>*** is the hostname of the RM Server record in Obtaining the IP Address and Hostname for the RM Server on page 45.

Step example: `111.222.333.444 MyRMServerName`

4 Save the **hosts** file.

5 Start the RM client component (RMC, Device Programmer, or Job Processor) and verify the connection to the RM Server.

NOTE:
If the server is on a different domain than the client, a non-domain user account must be set up in the RM Server Utility for each user running the RM Configuration Client.

4.3.3
Network Connectivity Problem

Intranet or Internet

An internal company intranet connection to the RM Server is required.

The RM Configuration Client requires an internet connection for the licensing feature.

4.3.3.1
Unable to Connect to GDG When Configuring FDL

When configuring Radio Management (RM) to use the FWDL over Land Mobile Radio (LMR), a connection to the GDG must be established.

Problem

Unable to connect to the Group Data Gateway (GDG) when configuring Firmware Download (FWDL).

Resolution

To allow communications with GDG, you must enable TLS 1.1 and TLS 1.2 on each computer running an RM client and RM Server.

NOTE: Consult the appropriate documentation corresponding to your server operating system and/or web browsers to enable these TLS versions.

4.3.4
Windows Firewall and RM Ports

Problem:

Communication between the Radio Management (RM) Clients and the RM Server requires open HTTPS and TCP ports. The RM Client cannot connect with the RM Server due to a Windows firewall error. The current firewall settings are blocking required RM Server ports.

Resolution:

Configure the valid range of RM Server ports as inbound rules in the firewall application. A valid range of RM Server ports can be found in the RM Server Utility.

4.3.4.1
Configuring ARS when Using Windows Firewall

You must add ARS Administrator Application connections to the list of allowed applications in the firewall settings for the ARS connection to work.

Procedure:

In the Device Programmer, add the following applications to the exceptions list:

- `ExecutorConfigUI.DP.exe`
- `ExecutorService.exe`

One application is for the device monitor and the other for the executable. Both applications must be added to the firewall exceptions list to connect to ARS and submit jobs successfully.

4.3.5
Port Conflict by Multiple Applications

Port conflicts can occur when the RM Server is deployed on a computer running other services concurrently.

Problem:

The RM Windows services do not start. An error is logged in the service log file indicating that the service port is in use by another application.

Resolution:

Review the service log, identify the application using the port and stop the application. Launch the RM Server Utility and **Start All** the services.

4.3.6
Unable to Validate Server SSL Certificate

The RM Client (RM Configuration Client, RM Device Programmer and RM Job Processor) must establish a trust relationship for the SSL Certificate used by the RM Windows services.

NOTE: This error can occur when using the HTTPS Protocol feature that uses port 443 to connect to the RM Server.

Problem:

The RM client is unable to start and an error is reported in the client log file. The error indicating that a trust relationship could not be established for the SSL/TLS secure channel. This error can occur when the default port 443 has been registered with another application on the client machine.

Resolution:

Install the Trusted Root Certification Authority of the SSL certificate on the client machine. Contact Motorola Solutions Service Center for assistance.

4.3.7
Coordinated Time for Distributed Radio Management Deployment

Any computer running Radio Management components (RM Client, RM Device Programmer, or RM Job Processor) must have its time set to within five minutes of the time on the computer running the RM Server.

- This synchronization of time ensures that the Radio Management components connect to the RM Server.
- Computers may exist in different time zones; however, their time must be set to within 5 minutes of the RM Server's time, accounting for the difference in time zones. For example, an RM Server in Chicago is set to 1:15 p.m. (CST). Ensure that the computers running the DP and JP in California are set to 11:15 a.m. (PST).
- Ensure that the daylight saving time setting is set the same for all RM computers.

4.3.8
Radio Management Windows Services

Problem:

Communication with any of the RM components has failed. One or more of the Motorola RM services may have stopped running.

Resolution:

Verify that the following Motorola RM Windows services are running on the server.

- Motorola RM Discovery Service
- Motorola RM Server
- Motorola RM Job Server
- Motorola RM Job Processor
- Motorola RM Device Programmer

If any of the above mention services is not running, open Windows services on the server, stop all the Motorola RM services, and restart them in the order listed above.

NOTE: If the Motorola RM services do not start, there is a problem with the installation and no further action can be performed. Contact Motorola Solutions Service Center for assistance.

4.3.9
Certificates and License Server

Digital Certificates

Radio Management uses digital certificates to authenticate the RM Device Programmer. Occasionally, the certificates can become corrupted, or they can expire.

Contact customer support to have the digital certificates manually reinstalled.

Connection Problems with the License Server

If the server is in a separate network than the client, it may be necessary to create a route to the server in the client's Windows Route Table. Refer to Windows documentation to perform this task.

The URL to the license server is https://licensing.motorolasolutions.com

4.3.9.1
EID System in RM Instead of FLASHkey Dongles for Flashcode Upgrades

When ordering flashcode upgrades for RM, it is recommended to use the RM EID system instead of FLASHkey dongles. The RM EID system allows for an easier full recovery of the current flashcode and reactivation of licenses if the radio has to be deleted, re-added, or re-read into RM.

4.3.9.2
SHA256 Certificates Update

The following information explains certificate selection in the Radio Management (RM) Server Utility:

The RM server utility application has a new **Certificate** option in the **Option** tab. It sets the certificate type used by the server, to authenticate remote Radio Management Clients (RMC), Device Programmers (DP) and Job Processors (JP). By default, it is set to the newer and more secure SHA256 setting. Changing this setting is not recommended unless upgrading an older version of RM.

The SHA1 setting should only be used by customers upgrading versions older than the following or equal to them:

- APX 7.17 - RM 2.2.x
- PCR 2.7.5 - RM 2.6.x
- PBB Fusion 1.1 - RM 2.3.x

4.3.9.2.1
Auto-Upgrading Older Versions of RM with SHA1 Setting

Prerequisites: Ensure that upgrade from versions older or equal to these versions:

- APX 7.17 - RM 2.2.x
- PCR 2.7.5 - RM 2.6.x
- PBB Fusion 1.1 - RM 2.3.x

If you have remote Radio Management Client (RMC), Device Programmers (DP) or Job Processors (JP), follow the procedure below:

Procedure:

1. Install the newest version of RM Server.
2. Run the RM server utility.
   a. Go to the **Options** tab.

b Select the **SHA256** setting.

c Click **Apply**.

All the RMC, JP and DP are auto-updated.

NOTE: Verify if the auto-update of RMCs, JPs and DPs is complete. After RMC, JP or DP are updated, you are no longer able connect to the server because the certificate setting is set to the newer and more secure SHA256 certificate.

3 Run the RM server utility after update of the remote RMC, JP and DP is complete.

a Go to the **Options** tab.

b Select the **SHA1** setting.

c Click **Apply**.

All updated RMC, JP and DP will connect.

NOTE: If the server is not configured to use the auto-update feature or if you missed any of the remote RMC, JP or DP, then you need make a manual update using the DVD. The certificate option should be left at SHA256.

When all remote RMC, DP and JP are updated, the administrator must remove the SHA1 certificate from the RM server certificate store by using the **Remove SHA1** button in RM Server Utility.

4.3.10

LEX L10 Device Fails to Connect to Radio Management

The following LEX L10 devices are supported:

- LEX L10
- LEX L10g
- LEX L10i
- LEX L10ig

Problem:

Connection failure may be caused by Windows update KB3161608. This update is a roll-up which includes several different fixes and the most likely cause of the problem is KB3161639 which modifies the TLS cipher suite on windows. The TLS cipher suite determines the modes of secure communications between devices. The windows update added two new cipher suites and modified the priority list.

Resolution:

1 The user must delete **"TLS_DHE_RSA_WITH_AES_128_CBC_SHA"** from value data of `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Cryptography\Configuration\Local\SSL\00010002\Functions`

2 Restart the machine in order for the changes to take effect.

4.3.11

RMC/Device Programmer/Job Processor Failure to Connect to RM Server

By default, Windows Server 2008 R2/2012/2016 Essentials Edition creates a server certificate and binds it to port 443. Radio Management (RM) Server requires to bind its own certificate to the same port.

Problem:

After you install RM Server on Windows Server 2008 R2/2012/2016 Essentials Edition, the client RMC /Device Programmer/Job Processor, which is running on a remote computer, fails to connect to the RM Server.

The following error message occurs in the client's log:

```
ErrorID: DISCOVERY_LOGIN_FAILED
Message: Could not establish trust relationship for the SSL/TLS secure
channel with authority 'xxxxx'
Message: The underlying connection was closed: Could not establish trust
relationship for the SSL/TLS secure channel.
Message: The remote certificate is invalid according to the validation
procedure
```

Resolution

To resolve the problem, you must change the HTTPS port or assign certificates to port 443. See Troubleshooting RMC/Device Programmer/Job Processor Failure to Connect to RM Server on page 51

4.3.11.1

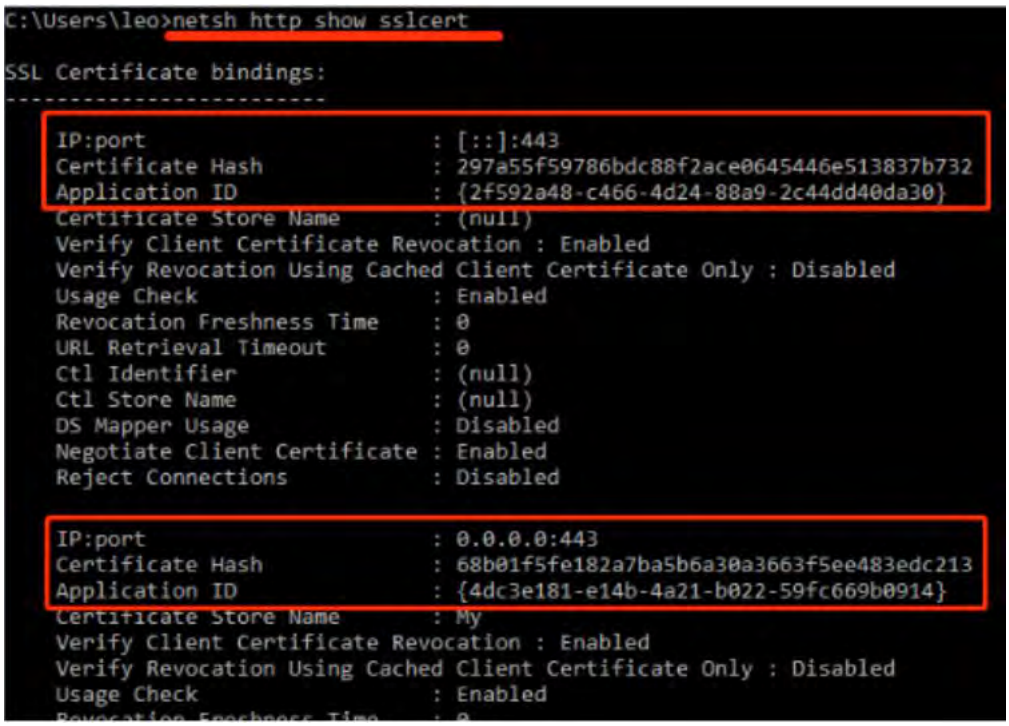
Troubleshooting RMC/Device Programmer/Job Processor Failure to Connect to RM Server

Only one certificate can be bound to a given port, and the Radio Management (RM) Server installation fails to override the existing certificate on port 443. This is why the RM client and other RM components cannot connect to the RM Server which has the default Windows server certificate bound to the same port.

Procedure:

1. To confirm the root cause of the issue, run `netsh http show sslcert` on the Radio Management (RM) Server computer.
2. Compare the values of `Certificate Hash` and `Application ID` for IP Ports `[::]:443` and `0.0.0.0:443`.

Figure 11: Values of Certificate Hash and Application ID



3 If the specified values are different, perform one of the following actions:

If…	Then…
If you are using default Windows server certificate,	change the HTTPS port to a new port number in RM Server Utility to avoid conflict by performing the following actions: **a** Run Notepad or another text editor as an Administrator. **b** Open `C:\Program Files (x86)\Motorola\RM Job Server\MotorolaJobServer.exe.config` **c** On `<add key="SSLPort" value="443" />` line replace `443` with the new port number. **d** Click **Save** **e** In RM Server Utility, stop and restart all RM Services. For more details, see Figure 12: Change of HTTPS Ports in RM Server on page 54.
If you are not using the default Windows certificate and you want RM Server running on port 443,	perform the following actions: **a** Run RM Server Utility. **b** Select **Options**→ **Certificate Options**.

If…	Then…
	c Switch to **SHA1 certificates** or **SHA256 certificates** depending on what is currently selected. **d** Click **Apply**. **e** Switch back to the previously selected certificate. **f** Click **Apply**. For more details, see Figure 13: Change of SHA certificates on page 54. **NOTE:** When the change is applied, the RM Server Utility forces the selected RM certificate to the current HTTPS port. If you cannot find **Certificate Options** in the **Options** menu, then your RM has an earlier version.

If you are not using the default Windows certificate and you want RM Server running on port 443, and you do not have Certificate Options in the Options menu,	run the following commands on the server computer in the **Command Prompt** window as an Administrator:
	`netsh http delete sslcert ipport=0.0.0.0:443`
	`netsh http add sslcert ipport=0.0.0.0:443 certhash=297a55f59786bdc88f2ace0645446e513837b732`
	The commands bind RM certificate to port 443.

Figure 12: Change of HTTPS Ports in RM Server

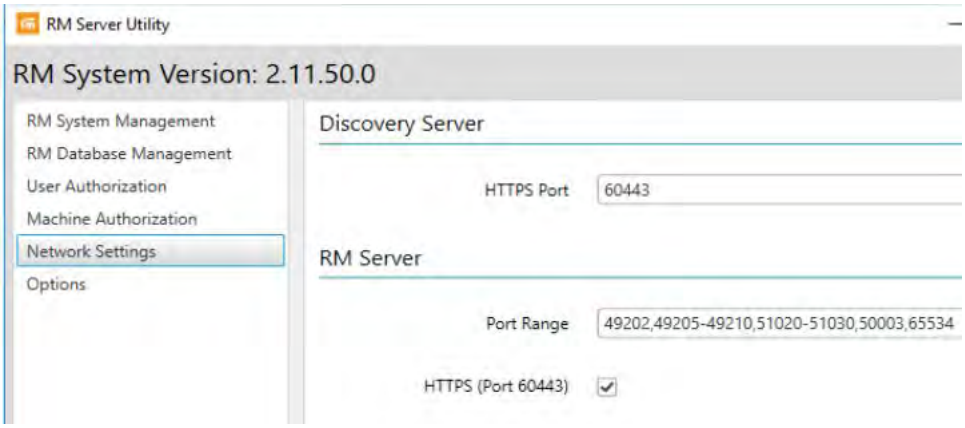
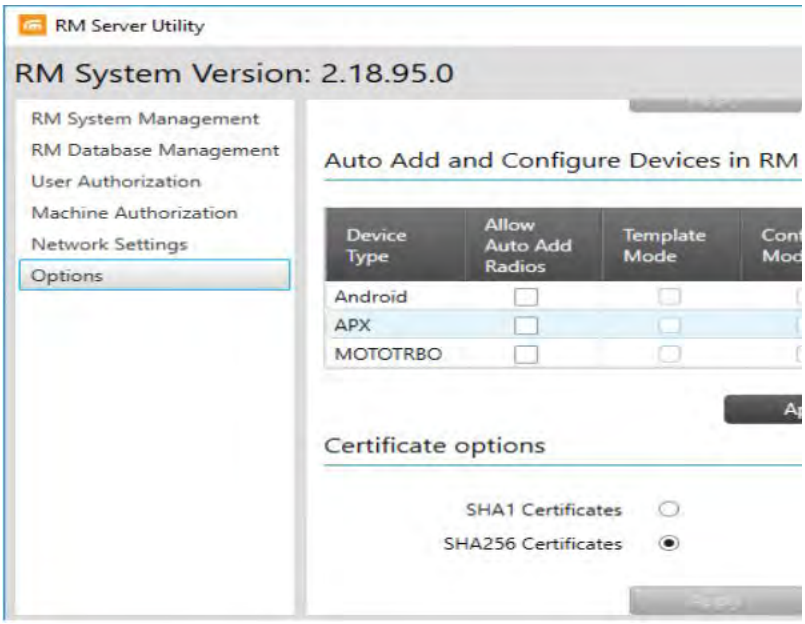


Figure 13: Change of SHA certificates



4.4 Delete Button is Grayed Out

There are many reasons why a delete button is grayed out. The following sections describe some of the more common reasons.

Views Displaying Grayed Out Delete Button

In **Radio View**, the delete button can be grayed out when the selected radio has a scheduled job that is waiting to be completed.

In **Configuration View**, the delete button can be grayed out when the selected Configuration is assigned (referenced) to a radio.

NOTE: Configuration View is displayed when a radio is selected from **Radio View** and the user clicks **Edit Configuration**.

In **Set View**, the delete button can be grayed out when a selected Set is referenced in a Configuration.

NOTE: The **Set View** is displayed when the user selects **Actions→Manage→Sets** and selects a Set within the programming pane.

Showing Referenced Elements

The user can identify the referenced relationship between Sets and Configuration by performing one of the following actions:

1. When editing a Configuration in **Configuration View**, select a Set within the Configuration, right-click, and select either **Show Related Sets** or **Show Related Configurations**.
2. When editing a Set in **Set View**, select a Set within the programming pane, right-click, and select either **Show Related Sets** or **Show Related Configurations**.

To remove the reference, edit the Configuration and delete the Set from the Configuration.

4.5 Read and Write Jobs

The Radio Management Client and the RM Job Processor may experience issues when performing read and write jobs.

These issues may be caused by a number of factors and the error messages that are displayed do not always provide the necessary information to resolve the issue.

The following sections provide the user with helpful information to resolve common problems.

4.5.1 Write Failure due to Write Protect Password Mismatch

A mismatch in the write protect password causes the RM Job Processor to fail a write job.

Problem:

A scheduled write job fails with an error informing the user that the password is invalid.

This issue can occur when users import radios from a CSV file with no associated template. This import results in RM not having system information for the radio, including the write protect password.

Resolution:

Reset the identifier for each impacted radio.

In CPS, select the relevant radio and click **Settings→Reset Identifiers**.

4.6 Prevent USB LAN as the Default LAN for USB Connection

If the user selects direct cable (USB) instead of wireless (Wi-Fi) connection as the interface between the RM tool and the device, the device will work as a modem (USB tethering).

Problem:

USB tethering prevents the PC from connecting to the internet because Windows uses the USB LAN as a default LAN. When there are no valid internet connection, it may cause errors during license registration or license recovery.

NOTE: This issue may also occur if the wireless driver utility is configured to disable Wi-Fi until all wired network connections are disconnected. Ensure that all wired network connections are disabled, so that the wireless connection stays active even when a wired link is present.

Resolution:

Motorola Solutions recommends setting an interface metric value greater than any network connections to the main network. See Changing the Operating System Network Priority Table on page 56.

4.6.1 Changing the Operating System Network Priority Table

To ensure that the main network receives a higher priority than the connected radio, modify the network priority table on the OS.

Prerequisites: Locate and record the largest interface metric value for the PC. See Checking the Metrics of Network Connections on page 56.

Procedure:

1. From **Control Panel**, select **Network and Sharing Center**.
2. Click **Change adapter settings** on the left side.
3. Right-click the **Local Area Connection** associated with the Motorola Series Radio device.
4. Click **Properties**.
5. From the **Ethernet Properties** window, select **Internet Protocol Version 4 (TCP/IPv4)**.
6. Click the **Properties** button.
7. From the **Internet Protocol Version 4 Properties** window, click the **Advanced** button.
8. From the **Advanced TCP/IP Settings** window, remove the check from **Automatic metric** and set the **Interface metric** to a value greater than any other network connection.

   NOTE: The actual metric setting used for the Radio is relative to the metric set for other networks/connections.
9. Acknowledge and close all windows.

4.6.2 Checking the Metrics of Network Connections

Procedure:

1. From Windows, search for **Command Prompt**.
2. Right-click **Command Prompt** and select **Run as administrator**.

3 From the **Administrator Command Prompt** window, enter `route print`.

4 Scroll down to the **IPv4 Route Table** and view the current **Metric** values of all network connections.

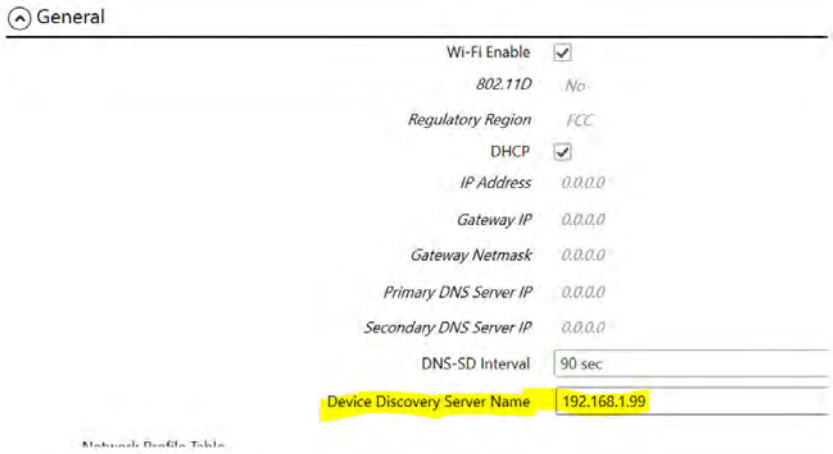
4.7 Resolving Port Binding Issues with Unicast WiFi

This procedure fixes the inability to program over WiFi when using the new WiFI programming option. The new WiFi programming options allow the Radio send the WiFi Beacon to a specific IP while the prior version could only be sent to a predetermined Multicast IP.

The conflict is caused by other programs/services using the same UDP 5353 port. Stopping these programs can resolve the issue.

Prerequisites: Verify the **Device Discovery Server Name** in the **General** tab. If the highlighted field is blank, the new WiFi Programming option is not used and the procedure is not applicable.

Figure 14: New WiFi Programming Option



Procedure:

1 Check the Process ID (PID) that binds the UDP port 5353.

a Run `netstat -ano >C:\temp.txt` at cmd window.

b Open `temp.txt` with a notepad or any other text editor.

c In the opened file search for `5353`

d Record the PID for every item with UDP 5353. In the below example, the PID is 14552.

Step example:

Figure 15: PID for UDP port 5353

UDP	0.0.0.0:3000	*:*	4828
UDP	0.0.0.0:3702	*:*	18204
UDP	0.0.0.0:3702	*:*	18204
UDP	0.0.0.0:3702	*:*	18204
UDP	0.0.0.0:3702	*:*	18204
UDP	0.0.0.0:4005	*:*	4828
UDP	0.0.0.0:4500	*:*	3296
UDP	0.0.0.0:5050	*:*	10384
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	14784
UDP	0.0.0.0:5353	*:*	14784
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	1888
UDP	0.0.0.0:5353	*:*	14784
UDP	0.0.0.0:5353	*:*	23020
UDP	0.0.0.0:5353	*:*	14552
UDP	0.0.0.0:5353	*:*	14784
UDP	0.0.0.0:5355	*:*	1888
UDP	0.0.0.0:18500	*:*	18204
UDP	0.0.0.0:49218	*:*	14552
UDP	0.0.0.0:50000	*:*	18204
UDP	0.0.0.0:51890	*:*	4984
UDP	0.0.0.0:51895	*:*	4828
UDP	0.0.0.0:51896	*:*	5048
UDP	0.0.0.0:52311	*:*	4896
UDP	0.0.0.0:54266	*:*	3716
UDP	0.0.0.0:54267	*:*	3716

e If there only one item for UDP 5353, open **Details** tab of the **Task Manager** to verify if it is a `ExecutorService.exe` or RM Device Programmer file.

Step example:

Task Manager

File Options View

Processes Performance App history Startup Users Details Services

Name	PID	Description	Status
CDPSvc	11772	Connected Devices Platform Service	Running
RMServerService	12032	Motorola RM Server	Running
WarpJITSvc	12980	WarpJITSvc	Running
Netman	13044	Network Connections	Running
RmSvc	13080	Radio Management Service	Running
WSearch	14096	Windows Search	Running
MotorolaRMDeviceProgram...	14296	Motorola RM Device Programmer	Running
MSSQL$MOTORMSVR2	15144	SQL Server (MOTORMSVR2)	Running
SmartPTT Radio Service	15436	SmartPTT Radio Service	Running
SgrmBroker	15452	System Guard Runtime Monitor Broker	Running
PcaSvc	15716	Program Compatibility Assistant Servi...	Running
PrintWorkflowUserSvc_3d11...	16012	PrintWorkflow_3d1180	Running
RMServicesMonitor	16268	Motorola RM Services Monitor	Running
QWAVE	17960	Quality Windows Audio Video Experi...	Running
lmhosts	18044	TCP/IP NetBIOS Helper	Running
BthAvctpSvc	18084	AVCTP service	Running
UsoSvc	18148	Update Orchestrator Service	Running
UserDataSvc_3d1180	18860	User Data Access_3d1180	Running

f If there are multiple items in step 1d, confirm what the tasks are.

g Right-click the task found in step 1f and verify the services.

h Stop the service in **services.msc** window.

There are other services that use the same UDP 5353 and the port-binding issues are caused by TeamViewer, Bonjour, Google, DNS Cache and other such services.

NOTE: `MotorolaRMDeviceProgrammer` is an example and it is an expected service. Do not stop it.

i Optional: Ensure that the DNS Client Service is not binding UDP port 5353. If yes, proceed to step 1j.

DNS Client Service cannot be stopped from **services.msc**. This service may be listed as `svchost.exe`. Use the Open Services function to see it.

j Optional: Stop the DNS Client Services by modifying the registry by performing the following actions:

- Run `regedit`
- Go to `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Dnscache`
- Change `Start` from **2** to **4**.
- Reset the PC.

k If the task found in step 1d is a normal application, close it at the Task Manager, or by any regular method.

NOTE: Chrome is an example. Do not open Chrome during RM operation.

Appendix A

Radio Management Upgrade Processes

The information in this appendix covers topics for upgrading Radio Management database structures as well as upgrade compatibility among RM system components.

A.1 Radio Management Upgrades

When installing RM system components over an existing installation, you may be asked to migrate the RM Server database to a newer version.

This section provides various RM version scenarios with important information regarding the migration process.

A.1.1 ASTRO APX Software Installation Upgrades

The installation of ASTRO APX software depends on the version changes.

During a software upgrade of the CPS application and Radio Management components, the components that are upgraded depend on whether a minor version upgrade is being performed or a major system release is being performed.

Minor version upgrades contain modifications to existing features within the same system release. Major system release upgrades introduce modifications to existing features while introducing new system-level features.

APX CPS Application

When performing a minor version upgrade, the current Customer Programming Software (CPS) installation is overwritten with the newer version. For example, if R10.**00**.00 is installed, a minor version upgrade of R10.**01**.00 overwrites the existing installation. However, a system release upgrade from **R10**.00.00 to **R11**.00.00 contains new features and is installed in addition to the existing R10.00.00 system release.

Radio Management Server

The Radio Management Server must be upgraded for minor version upgrades or major system release upgrades.

IMPORTANT: When upgrading from Radio Management version 1.1.3 or earlier, uninstall the Radio Management Server component before upgrading to a new version. The RM Server database will be upgraded to the new version with no user interaction required. If any failures occur, manually restore the RM Server database back to its original state. See Manually Restoring the RM Server Database on page 61.

Radio Management Device Programmer

The Radio Management Device Programmer must be upgraded for minor version upgrades or major system release upgrades.

Radio Management Job Processor

The Radio Management Job Processor must be upgraded for minor version upgrades or major system release upgrades.

Advanced Keys Administrator (AKA)

AKA does not support any upgrades. Multiple versions of the AKA application can be installed on the same computer without having to uninstall the older version.

ARS Administrator Application (ARS)

The ARS application must be upgraded for minor version upgrades or major system release upgrades.

Tuner Application

The upgrade behavior of the of Tuner Application is the same as the CPS.

Migration Assistant Application

The upgrade behavior of the of Migration Assistant Application is the same as the CPS.

A.1.1.1

Backing Up the RM Server Database

The RM Server database should be backed up when new radios and data are added to the RM system.

This operation ensures that the RM system can be restored to its operation state in the event of a database error, when the RM system is updated to a newer version.

Procedure:

1. From the **RM Server Utility**, select **RM Database Management→Database Backup→Browse**.

   The **Browse For Folder** window opens, where you can select an existing folder location or create a new folder to store the backup.

2. Optional: Select the **Enable Password** check box and enter a **Password** to password protect the backup folder.
3. To initiate the backup operation, click **Backup**.

   A confirmation Warning message appears and warns against performing any operations when using the RMC Client while the backup operation is in progress.

4. To confirm the backup operation, click **Yes**.

   A folder is created and named with the current date and time in the **Destination** folder.

A.1.1.2

Manually Restoring the RM Server Database

Use this procedure when upgrading from Radio Management 1.1.3 or earlier on computers running Windows 10.

Procedure:

1. Navigate to `C:\ProgramData\Motorola\CommonCPS\AutoBackup`.

   NOTE: The AutoBackup folder contains timestamp sub-folders (for example, `2013-11-05_11.20`)

2 Navigate to `C:\ProgramData\Application Data\Motorola\CommonCPS\RMServer\Repository`.

3 3. Copy the **Repository** folder (including sub-folders) from RM Server data folder, into the relevant timestamped folder in the **AutoBackup** folder.

For example, copy the **Repository** folder into the `2003-11-05_11.20` **AutoBackup** folder.

4 Launch the RM Server Utility and select **Database Settings**.

5 From the **Database Restore** section, select **Browse** and navigate to the relevant timestamped folder (for example, `2003-11-05_11.20`) under the **AutoBackup** folder.

NOTE: Only backups of the same database version as the current RM Server database can be restored.

6 Click **Restore**.

A.1.1.3
RM Server Database Downgrade

In order to downgrade to a previous version of RM, it may be necessary to uninstall the current version of RM data from the Microsoft® SQL Server.

Removing the Microsoft® SQL Server database can be performed using one of the following three methods:

1 Completely uninstall Microsoft® SQL Server from the computer using Programs and Features in Control Panel.

2 Re-run the install for Microsoft® SQL Server, select modify, and delete/uninstall only the RM database.

3 Launch the SQL Management Studio and delete the RM database from the list of databases.

Once the database is removed, install the desired RM Server. A new empty database is created. Restore a compatible version of an RM Server backup to the new database using the RM Server Utility.

A.1.2
Radio Management 1.x Data Upgrade Process

Any RM 1.x installation should be upgraded to RM 2 version R15.00.02/RM 2.2.14 first PRIOR to upgrading to later version of RM 2.x. Once on version R2.2.14, Radio Management can be upgraded to any later RM 2.x version.

Earlier releases of the Customer Programming Software (CPS) used the Radio Management (RM) 1 database platform. Current releases of CPS use a new database structure for its Radio Management (RM) 2 platform.

NOTE: The Radio Management Configuration Client was developed using the RM 2 platform.

Any RM system upgrading to the Radio Management 2 platform selects whether to migrate the data after the installation of a new RM 2 release. See Migrating the RM Server Database on page 33.

The following are the last Customer Programming Software (CPS) releases using the RM 1 database platform:

Table 9: CPS Versions using RM 1 or RM 2

Technology	Last RM 1 Release	First RM 2 Release
ASTRO APX	R14.01.00 RM 1.6.1	R15.00.02 RM 2.2.14

Technology	Last RM 1 Release	First RM 2 Release
	March 2016	October 2016
MOTOTRBO	V12.1 (Build 645) RM 1.5.0 November 2015	V13.1 (Build 666) RM 2.0.43 May 2016

IMPORTANT: During the upgrade process, Radio Management is not available for configuring radios. Depending on the number of radios and templates in the RM Server, RM may be unavailable for a significant amount of time.
Before upgrading to the RM 2 platform, it is recommended to backup the older RM database using the RM Server Utility.

Ensure that the computer has the same amount of available disk space currently used by the Radio Management system.

Prerequisites for Installing RM 2

- **Available Disk Space**
  RM checks the disk space requirements before installation and does not allow the installation of the RM Server unless enough disk space is detected.
- **Time Required for Upgrade**
  The time required to upgrade all the RM data depends on the number of radios and the size of the RM Server.

  IMPORTANT: Although the time to upgrade all the radios may vary, a good rule of thumb is to plan an hour to upgrade 500 radios. For a fleet of 2000 radios, the entire upgrade process could take more than 4 hours to complete.

Radio Management 2 Installation and Data Upgrade

For RM 1 deployments where all RM components are installed on the same computer, run the RM 2 installation on the same computer hosting all the RM 1 components.

Once Radio Management is launched from the CPS, and a newer version of the RM Server is detected, the user is prompted to begin the upgrade process. The options available are as follows:

- Perform the upgrade later
- Perform the upgrade now
- Do not upgrade any data

If you choose to upgrade now, you are given an option to upgrade data that is used for radio recovery. This option upgrades data that was created from previous radio read and write jobs and allows you to recover those past read/write points in RM. If the option to recover radios from past points is not required, it is recommended that you leave this option unselected. The radio recovery point option adds significant time to the upgrade process.

Once the upgrade process begins, a progress screen opens and describes which RM components are being upgraded. RM schedules virtual read jobs for each radio in the RM Server. The virtual read jobs migrate the data for each radio from the RM 1 database structure to RM 2 database structure. Virtual read jobs do not require radios to be connected. The radios and radio data migrated to the new RM Server database is not accessible until all virtual read jobs are complete.

NOTE: As the virtual read jobs are processed by RM Job Processors (JP) in the RM system, the more JP instances are utilized the faster the jobs are processed. It is recommended to upgrade the RM Server and all JPs. First, configure the JP with an appropriate **concurrent job number** and then launch Radio Management from CPS to migrate the data.

Machine Authentication is not Migrated

Machine authentication configurations set up in earlier versions of Radio Management are not migrated to RM 2. The restriction in migration is done for security purposes and requires the user to reenter the machine authentication values again in the RM 2 Server Utility. Before migrating, record all the relevant machine authentication values.

A.1.3

Radio Management 2 Data Upgrade Process

The database structure and data within a configuration can change between releases of Radio Management (RM) 2 Configuration Mode.

After installing a newer RM 2 version of the RM Server, RM analyzes and upgrades all configurations stored in the RM Server. While RM is upgrading the database and configurations, RM is not available to program radios.

Prerequisites for Upgrading the RM Server

Before upgrading, it is recommended to backup the existing RM database using the RM Server Utility.

Allow all jobs to complete or cancel them before upgrading the RM Server. Pending jobs in the RM Server can, in rare cases, cause undesirable behaviors.

Postrequisites after Upgrading the RM Server

After upgrading the RM Server, if any configurations are stored in the RM Server, the RM Server only allows for one RM Client (configuration mode or template mode) to connect to the RM Server. Launching the RM Configuration Client opens a dialog stating that an upgrade must be performed. After confirming the upgrade, RM upgrades all the configurations in the RM Server. After the upgrade is complete, the RM Server allows for more than one RM Client to connect to the RM Server.

A.2

Additional Installations for Radio Management

The installation of an RM system requires that the computers have certain services installed and active to compliment the RM system components and supplemental RM suite applications.

This section contains procedures for the following services:

- Windows Identity Foundation
- Permissions on Hardened Operating Systems

A.2.1

Enabling the Windows Identity Foundation Installation

Procedure:

1. Ensure that the Windows Update Service is not disabled on the computer.

   NOTE: Refer to the relevant operating system documentation for instructions on how to enable the Windows Update Service.

2. To fully enable the Windows Update Service, go to Microsoft® page at http://support.microsoft.com/kb/958043 and follow the steps for the relevant operating system.
3. Run the CPS and Radio Management suite installation again.

A.2.2

Assigning User Permissions on Hardened Operating Systems

The installation of Radio Management requires certain permissions on hardened computers.

When and where to use:
Use this procedure the assign permissions to a user that is not an administrator of the computer. Local administrator have these permissions set by default.

Procedure:

1. Perform a Windows search for **Local Security Policy** and open the application.

   The **Local Security Policy** window opens.

2. Navigate the console tree to **Local Policies→User Rights Assignments**.
3. Add the user to the following policies:
   - Backup files and directories
   - Debug programs
   - Manage auditing and security log
4. Disable the FIPS (Federal Information Processing Standards) setting. Perform the following actions:
   a. Navigate the console tree to **Local Policies→Security Options**.
   b. In the Policy pane, scroll down and double-click **System cryptography: Use FIPS compliant algorithms for encryption, hashing, and signing**.
   c. Ensure that this option is **Disabled**.
5. Verify that FIPS is disabled in the registry. Perform the following actions:
   a. Perform a Windows search for **regedit** and open the application.
   b. Navigate the console tree to **HKEY_LOCAL_MACHINE→System→CurrentControlSet→Control→Lsa→FipsAlgorithmPolicy**.
   c. Double-click **Enabled** and ensure that the value is **0**.
   d. Click **OK**.
6. Install Radio Management following the directions in Installing the ASTRO APX RM Suite on page 29.
7. Revert to the initial permissions assigned to the non-administrator user.

BK Tech

Radio				Add On / Capabilities											
Radio Model	Radio Type	Current MSRP $	Discounts Offered	OTAP	$	WIFI Programming	$	GPS Capable	$	Bluetooth	$	Multikey Encrytpion	AES + $	ADP + $	DES +$
BKR-9000	Portable	3,623.00	20% at 20 units 30% at 80 units	yes	161	Future Feature		Yes	Included	Yes	Included	Yes	373.1	included	included
KNG-M800	Mobile	$3,768.09	20% at 20 units 30% at 80 units	yes	161	Future Feature		yes	Included	no		yes	231	included	included

Example

Radio Model	Top Screen	$	Dual or multiple band	$	Intrinsically Safe	$	Fire Services Rated Peripherals Offered and current MSRP $
BKR-9000	Yes	Included	Yes	600	no	N/A	Connection to MSA SCBA Included. High Temp Fire Microphone $222.00
KNG-M800	no		no		no		

EF Johnson -JVC Kenwood

Radio				Add On / Capabilities										
Radio Model	Radio Type	Current MSRP $	Discounts Offered	OTAP	$	WIFI Programming	$	GPS Capable	$	Bluetooth	$	Multikey Encryption	AES + $	ADP + $	DES +$
VP5430F2 Black Standard Keypad	Portable	$1,850.00 7/800MHz Radio Only	20% off radios and accessories	Yes	$235.00	No		Yes	$120.00	Bluetooth	$120.00	Yes KWD-AE30K AES FIPS 140-2 Encryption Module Required $330.00**	$560.00	$0.00	Included
VP5430F3 Black Full Keypad	Portable	$1,910.00 7/800MHz Radio Only	20% off radios and accessories	Yes	$235.00	No		Yes	$120.00	Bluetooth	$120.00	Yes KWD-AE30K AES FIPS 140-2 Encryption Module Required $330.00**	$560.00	$0.00	Included
VP8000BKF2 Black Standard Keypad	Portable	$2,455.00 Radio Only. No Bands Enabled. $715.00 per Band	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes	$120.00	Bluetooth and Bluetooth Low Energy	Included	Yes	$560.00	$0.00	Included
VP8000BKF3 Black Full Keypad	Portable	$2,770.00 Radio Only. No Bands Enabled. $715.00 per	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes	$120.00	Bluetooth and Bluetooth Low Energy	Included	Yes	$560.00	$0.00	Included
VP8000GRF2 Hi-Viz Green Standard Keypad	Portable	$2,710.00 Radio Only. No Bands Enabled. $715.00 per Band	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes	$120.00	Bluetooth and Bluetooth Low Energy	Included	Yes	$560.00	$0.00	Included
VP8000GRF3 Hi-Viz Green Full Keypad	Portable	$3,020.00 Radio Only. No Bands Enabled. $715.00 per Band	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes	$120.00	Bluetooth and Bluetooth Low Energy	Included	Yes	$560.00	$0.00	Included
VM5930BF	Mobile	$2,550.00 7/800MHz Deck Only No Control Head - See accessories for	20% off radios and accessories	Yes	$235.00	No		Yes - Requires KRA-40GM Module ($50.80)	$120.00	Bluetooth	$120.00	Yes	$560.00	$0.00	Included

VM6930BF	Mobile	$2,690.00 7/800MHz Deck Only No Control Head - See accessories for options	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes - Requires KRA-40GM Module ($50.80)	$120.00	Bluetooth	$120.00	Yes	$560.00	$0.00	Included
VM7930BF-P	Mobile	$3,005.00 7/800MHz Deck Only No Control Head - See accessories for options	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes - Requires KRA-40GM Module ($50.80)	$120.00	Bluetooth	$120.00	Yes	$560.00	$0.00	Included
VM8000BF	Mobile	$2,990.00 Deck Only No Bands Enabled No Control Head - See accessories for options	20% off radios and accessories	Yes	$235.00	Yes - OTIP	$235.00	Yes - Requires External Antenna	$120.00	Bluetooth and Bluetooth Low Energy Requires External Antenna	Included	Yes	$560.00	$0.00	Included

Radio Model	Top Screen	$	Dual or multiple band	$	Intrinsically Safe	$	Fire Services Rated Peripherals Offered and current MSRP $	Accessories offered and current MSRP $
VP5430F2 Black Standard Keypad	No		No		Yes - Requires IS Battery KNB-LS5 or KNB-LS7	$108.00		See List Below
VP5430F3 Black Full Keypad	No		No		Yes - Requires IS Battery LS5 or LS7	$108.00		See List Below
VP8000BKF2 Black Standard Keypad	Yes	Included	Yes	$715.00 VHF $715.00 UHF $715.00 7/800	Yes - Requires IS Battery LS5 or LS7	$108.00		See List Below

VP8000BKF3 Black Full Keypad	Yes	Included	Yes	$715.00 VHF $715.00 UHF $715.00 7/800	Yes - Requires IS Battery LS5 or LS7	$108.00		See List Below
VP8000GRF2 Hi-Viz Green Standard Keypad	Yes	Included	Yes	$715.00 VHF $715.00 UHF $715.00 7/800	Yes - Requires IS Battery LS5 or LS7	$108.00		See List Below
VP8000GRF3 Hi-Viz Green Full Keypad	Yes	Included	Yes	$715.00 VHF $715.00 UHF $715.00 7/800	Yes - Requires IS Battery LS5 or LS7	$108.00		See List Below
VM5930BF	N/A		No		Not Applicable			See List Below
VM6930BF	N/A		No		Not Applicable			See List Below
VM7930BF-P	N/A		Yes	See VM7930 Accessories for Options	Not Applicable			See List Below
VM8000BF	N/A		Yes	$715.00 VHF $715.00 UHF $715.00 7/800	Not Applicable			See List Below

* prices shown are when configured with radio. The list price may be higher when purchased separately. See the Viking Accessory Catalog for list price when purchased separately.

VP5430 & VP8000 PORTABLE ACCESSORIES

Antennas VP5430 & VP8000

KRA-32K 700/800 MHz Whip Antenna $ 42.50
KRA-36 700/800 MHz Stubby Antenna $ 30.50
KRA-47MB Multi-Band Whip Antenna, 136-870 MHz $ 105.00

Batteries and Chargers VP5430 & VP8000

KNB-L2M Li-ion 2600mAh (Standard) $ 169.00
KNB-L3M Li-ion 3400mAh (High Capacity) $ 218.70
KNB-LS5CU Li-ion Intrinsically Safe 2000 mAh $ 254.50
KNB-LS7-IS Li-ion Intrinsically Safe 3800mAh (High Capacity) $ 366.00
KNB-L11M Li-ion 3900 mAh (High Capacity) Note: Requires the KSC-52AK single bay charger or KSC526K charger equipped with KSC-52PAW A-Pocket charger insert. $ 219.25
KNB-L11X Li-ion 3900 mAh (High Capacity). KNB-L11M Equivalent Note: Requires the KSC-52AK single bay charger or KSC526K charger equipped with KSC-52PAW A-Pocket charger insert. $219.25
KSC-52AK Rapid rate single unit charger with A-Pocket charger insert. Compatible with KNB-L11M/X $ 97.30
KSC-52BK Rapid rate single unit charger with B-Pocket charger insert. Compatible with KNB-L2/L3/LS5/LS7 batteries. $ 97.30

KSC-526K Rapid rate 6-unit charger. Note: Requires insertion of 6 charger pockets of styles KSC52PAK, KSC-52PBK or KSC-52CK $823.80
KSC-52PAW Charger Pocket type A for KSC-526K 6-bay or as replacement pocket for KSC-52AK charger. Compatible with KNB-L11M battery. $10.80
KSC-52PBW Charger Pocket type B for KSC-526K 6-bay or as replacement pocket for KSC-52BK charger. Compatible with KNB-L2/L3/LS5/LS7 batteries. $10.80
KMB-526K Wall Mount Bracket for KSC-526K 6-Bay Charger $ 83.20
KVC-23A Vehicular Charger. Supports KNB-L2/L3/LS7/L11 batteries. Replaces KVC-23V. $ 366.00

Carry Options - VP5430

KBH-11 Spring action belt clip (2.5") $ 17.80
KBH-8DS Leather Belt Loop with D-swivel $ 32.00
KLH-6SW Leather swivel belt loop / detachable swivel D-Ring back for KLH-200K3 $ 26.80
KLH-137ST Firemen's Heavy-Duty Leather Shoulder Strap for a HeavyDuty Leather Case $ 44.80
KLH-200K3 Heavy duty leather carrying case for VP5000 series with KNB-L2/L3/LS5CU batteries (for both keypad models) $ 53.80
KLH-201K3 Nylon carrying case for VP5000 series with KNBL2/L3/LS5CU battery (for both keypad models) $ 32.00

Carry Options - VP8000

KBH-11 Spring action belt clip (2.5") $ 17.80
KW9130-LF Leather Case, Fire service shoulder strap D-rings. Compatible with larger batteries: KNB-L3, KNB-LS7 and KNB-L11 $80.00
KW9140-LF Leather Case, Fire service shoulder strap D-rings. Compatible with smaller batteries: KNB-L2 and KNB-LS5. $80.00
KW9130-LP Leather Case, Police style D-Swivel. Compatible with larger batteries: KNB-L3, KNB-LS7 and KNB-L11 $80.00
KW9140-LP Leather Case, Police style D-Swivel. Compatible with smaller batteries: KNB-L2 and KNB-LS5. $80.00
KW9130-NP Nylon Case, Police style D-Swivel. Compatible with larger batteries: KNB-L3, KNB-LS7 and KNB-L11. $80.00
KW9140-NP Nylon Case, Police style D-Swivel. Compatible with smaller batteries: KNB-L2 and KNB-LS5. $80.00

Microphones and Audio Options VP5430 & VP8000

KMC-49 MIL-SPEC, Speaker Mic. with Antenna Connector Note: 5/16" Coax cable hex wrench included (antenna is not included.) $ 450.00
KMC-70M MIL-SPEC, IP67 (Immersion) Speaker Mic. 3 Programmable Buttons $ 158.30
KEP-1 3.5mm earphone kit for KMC-41/42W/54W/70M Speaker Mics $ 67.70
KEP-2 2.5mm earphone kit for KMC-49 Speaker Mic $ 67.70
KHS-11BL 2-wire palm mic w/earphone, universal connector (Black) $ 202.80
KHS-12BL 3-wire mini lapel mic w/earphone, universal connector (Black) $ 257.80
KHS-14C Light Weight Single muff headset w/boom mic & In-line PTT $ 177.70

Protocol VP5430 & VP8000

8321050001 Analog FM (standard) $0
8321000002 P25 CAI AMBE+2 (standard) $0

System Options - VP5430

8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 0
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 0
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00

System Options - VP8000

8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 415.00
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 145.00
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00
8322000009 DMR Tier II Conventional, Vx8000 $475.00
8322000010 DMR Tier III Trunking, Vx8000 $475.00

Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2) VP5430 & VP8000

8323000003 DES-OFB (multi-key) NOTE: Requires addition of KWD-DE31F or KWD-AE30K module to VP5000 if the radio was initially purchased without any DES, AES, or P25 Authentication encryption options. $ 0
8323000002 AES FIPS140-2 (single key) (DES-OFB single key included) NOTE: Requires addition of KWD-AE30K module to VP5000 if the radio was initially purchased without any AES or P25 Authentication encryption option. $180.00
8323000004 AES FIPS140-2 (multi key) (DES-OFB multi-key included) NOTE: Requires addition of KWD-AE30K module to VP5000 if the radio was initially purchased without any AES, or P25 Authentication encryption option. $560.00
8323000005 ARC4 (ADP compatible) $ 0

Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2) VP5430 ONLY

KWD-DE31F Encryption Module required for-DES OFB (multi-key). Does not support AES. $236.70
KWD-AE30K ** Encryption Module required for AES FIPS 140-2 or P25 Authentication. Also supports DES-OFB. List price shown if the module and the encryption option is purchased together with Radio at initial order. * $330.00
KWD-AE30K Encryption Module required for AES FIPS 140-2 or P25 Authentication. Also supports DES-OFB. List price shown is if the module and encryption option is purchased separately from radio. $1,034.00

Programming and Data - VP8000

8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS $ 120.00
8326000025 Bluetooth *(no charge in initial offering of VP8000) $0
8326000033 Bluetooth Low Energy *(no charge in initial offering of VP8000) $0
8326000039 WiFi * (no charge in initial offering of VP8000) $0
8324000004 OTIP (Programming over WiFi). (Requires 8326000039) $ 235.00

Programming and Data - VP5430

8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS $ 120.00
8326000025 Bluetooth $ 120.00
8326000033 Bluetooth Low Energy $120.00

VM5930 MOBILE ACCESSORIES

Mounting Accessories

KMB-33M Mounting Bracket $17.20
KMB-34 Mounting Case for Control Station with KPS-15 $65.70
KPS-15 DC Switching Power Supply (117/230 VAC; 23A max. continuous, 25A peak) $210.80
KCT-46 Ignition Sense Cable $16.70

Control Head

KCH-19VM Dash - KCH-19 $ 218.70
KCT-23M DC Cable-Dash 10' $ 47.70
KCT-23M3 DC Cable-Remote, 23' $ 65.70
KRK-17BF Remote Kit for KCH Control Head $ 170.00
KCT-71M2 17 Ft remote cable, KCH-19 $ 85.50
KCT-71M3 25 Ft remote cable, KCH-19 $ 97.30
KCT-71A50 Remote Cable up to 50 Ft, KCH-19 $ 226.80
KCT-71A100 Remote Cable up to 100 Ft, KCH-19 $ 292.30
KMC-65M Standard Mobile Mic for KCH Control Head $ 63.50
KMC-66M 12 Button Keypad Mic for KCH Control Head $ 115.20
KMC-9C Control Station Desktop Microphone (8-pin mod. plug) $ 104.80
KMC-59C Control Station Desktop Microphone (8-pin mod. plug) Improved noise response for Phase 2 TDMA systems $232.30

Speaker

KAP-2 Horn Alert / PA Relay Option Kit $ 76.70
KES-5A 40W External Speaker. Requires KAP-2 kit to connect to radio. $73.00
KES-8K 10W External Speaker, 3.5 mm audio plug $ 59.30

Protocol

8321050001 Analog FM (standard) $0
8321000002 P25 CAI AMBE+2 (standard) $0

System Options

8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 0
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 0
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00

Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2)

8323000003 DES-OFB (multi-key) NOTE: Requires addition of KWD-DE31F or KWD-AE30K module to VP5000 if the radio was initially purchased without any DES, AES, or P25 Authentication encryption options. $ 0
8323000002 AES FIPS140-2 (single key) (DES-OFB single key included) NOTE: Requires addition of KWD-AE30K module to VP5000 if the radio was initially purchased without any AES or P25 Authentication encryption option. $180.00
8323000004 AES FIPS140-2 (multi key) (DES-OFB multi-key included) NOTE: Requires addition of KWD-AE30K module to VP5000 if the radio was initially purchased without any AES, or P25 Authentication encryption option. $560.00
8323000005 ARC4 (ADP compatible) $ 0
Programming and Data - VM5930
8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS $ 120.00
KRA-40GM GPS Antenna. Required for GPS option 8325000003. Automatically selected when GPS option is selected in CEvo Radio Configurator $ 50.80

VM6930 MOBILE ACCESSORIES
Mounting Accessories
KMB-33M Mounting Bracket $17.20
KMB-34 Mounting Case for Control Station with KPS-15 $65.70
KPS-15 DC Switching Power Supply (117/230 VAC; 23A max. continuous, 25A peak) $210.80
KCT-46 Ignition Sense Cable $16.70
KCT-23M3 DC Cable-Remote, 23' $ 65.70
Control Head
KCH-20RV KCH-20 Enhanced control head $ 729.70
KCH-21RVM KCH-21 Hand Held control head $ 1 ,211.00
KRK-17BF Remote Kit for KCH Control Head $ 170.00
KCT-71M2 17 Ft remote cable, KCH-19 $ 85.50
KCT-71M3 25 Ft remote cable, KCH-19 $ 97.30
KCT-71A50 Remote Cable up to 50 Ft, KCH-19 $ 226.80
KCT-71A100 Remote Cable up to 100 Ft, KCH-19 $ 292.30
KCT-71M4 1.6 Ft Remote Cable, KCH-20 (Control Station) $ 54.70
KCT-77M2 Hand Held Control Head remote cable $ 222.80
KMC-65M Standard Mobile Mic for KCH Control Head $ 63.50
KMC-66M 12 Button Keypad Mic for KCH Control Head $ 115.20
KMC-9C Control Station Desktop Microphone (8-pin mod. plug) $ 104.80
KMC-59C Control Station Desktop Microphone (8-pin mod. plug) Improved noise response for Phase 2 TDMA systems $232.30
Speaker
KCT-72M External Accessory Connection Cable for KCH-20RV remote control heads $44.70
KAP-2 Horn Alert / PA Relay Option Kit $ 76.70
KES-5A 40W External Speaker. Requires KAP-2 kit to connect to radio. $73.00
KES-8K 10W External Speaker, 3.5 mm audio plug $ 59.30
Protocol
8321050001 Analog FM (standard) $0
8321000002 P25 CAI AMBE+2 (standard) $0
System Options
8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 415.00
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 145.00
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00
Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2)
8323000003 DES-OFB (multi-key) $0
8323000002 AES FIPS 140-3 (single-key) $ 180.00
8323000004 AES FIPS 140-3 (multi-key) $ 560.00
8323000005 ARC4 (ADP compatible) $ 0
Programming and Data - VM6930

8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS $ 120.00
KRA-40GM GPS Antenna. Required for GPS option 8325000003. Automatically selected when GPS option is selected in CEvo Radio Configurator $ 50.80

VM7930 MOBILE ACCESSORIES
Secondary Radio - (2nd-4th Deck, Choose up to 3)
VM7630HBF-S VM7000 39-50 MHZ Hi Power Low Band Secondary $ 2 ,255.00
VM7730HBF-S VM7000 136-174 MHZ Hi Power Secondary $ 2 ,255.00
VM7730BF-S VM7000 136-174 MHZ Secondary $ 1 ,380.00
VM7830BF-S VM7000 450-520 MHZ Secondary $ 1 ,380.00
VM7830HBF-S VM7000 450-520 MHZ High Power Secondary $ 2 ,255.00
VM7830BF2-S VM7000 380-470 MHZ Secondary $ 1 ,380.00
VM7930BF-S VM7000 700/800 MHZ Secondary $ 1 ,380.00
Mounting Accessories
KMB-33M Mounting Bracket $17.20
KMB-36 Hi Power Deck Mounting Bracket $ 91.70
836VMB10 Mounting Bracket, Dual Deck, VM7000 $ 180.00
KCT-46 Ignition Sense Cable $16.70
KCT-18 Hi Power Ignition Sense Cable $ 24.00
KCT-23M3 DC Cable-Remote, 23' $ 65.70
KCT-23M4 Hi Power Deck DC Cable $ 65.70
Control Head
KCH-20RV KCH-20 Enhanced control head $ 729.70
KCH-21RVM KCH-21 Hand Held control head $ 1 ,211.00
KRK-17BF Remote Kit for KCH Control Head $ 170.00
KCT-77M2 Hand Held Control Head remote cable $ 222.80
KCT-71M2 17 Ft remote cable, KCH-19 $ 85.50
KCT-71M3 25 Ft remote cable, KCH-19 $ 97.30
KCT-71A50 Remote Cable up to 50 Ft, KCH-19 $ 226.80
KCT-71A100 Remote Cable up to 100 Ft, KCH-19 $ 292.30
KCT-71M4 1.6 Ft Remote Cable, KCH-20 (Control Station) $ 54.70
KMC-65M Standard Mobile Mic for KCH Control Head $ 63.50
KMC-66M 12 Button Keypad Mic for KCH Control Head $ 115.20
Speaker
KCT-72M External Accessory Connection Cable for KCH-20RV remote control heads $44.70
KAP-2 Horn Alert / PA Relay Option Kit $ 76.70
KES-5A 40W External Speaker. Requires KAP-2 kit to connect to radio. $73.00
KES-8K 10W External Speaker, 3.5 mm audio plug $ 59.30
Protocol
8321050001 Analog FM (standard) $0
8321000002 P25 CAI AMBE+2 (standard) $0
System Options
8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 415.00
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 145.00
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00
Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2)
8323000003 DES-OFB (multi-key) $0
8323000002 AES FIPS 140-3 (single-key) $ 180.00

8323000004 AES FIPS 140-3 (multi-key) $ 560.00
8323000005 ARC4 (ADP compatible) $ 0
Programming and Data - VM7930
8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS $ 120.00
KRA-40GM GPS Antenna. Required for GPS option 8325000003. Automatically selected when GPS option is selected in CEvo Radio Configurator $ 50.80

VM8000 MOBILE ACCESSORIES
Frequency Bands
VHF - $715.00
UHF (380-520MHz) - $715.00
7/800MHz - $715.00
Mounting and Power Accessories
KMB-33M Mounting Bracket $17.20
KCT-46 Ignition Sense Cable $ 16.70
KCT-23M DC Cable-Dash, 10' $ 47.70
KCT-23M3 DC Cable-Remote, 23' $ 65.70
KCT-18 Hi Power Ignition Sense Cable $ 24.00
KLF-2 Line filter for DC voltage supply. Filters noise induced from vehicular alternator $ 51.20
835VM8000CTS Desktop Control Station Mounting Kit for KPS-15 $ 635.00
KPS-15 DC Switching Power Supply for Control Station (117/230 VAC; 23A max. continuous, 25A peak) $ 210.80
Antennas and Mounts
836VRA12 Mobile Antenna, Multiband, WPD136M6C 136-174/380-520/760-870 MHz $ 305.00
5010012060 Mobile Antenna, Multiband, 136-960 MHz $ 205.20
836VRA10 Mobile Antenna, VHF, 136-174 MHz, Unity Gain $ 109.00
KRA-40GM GPS antenna, Mag mount $ 50.80
5018800104 GPS Antenna, Vehicular Through-hole mount $ 125.00
5018800102 GPS/Wifi/Bluetooth Antenna, Vehicular Through-hole mount $ 200.00
5018800103 Wifi/Bluetooth Antenna $ 115.00
Control Heads and Accessories
KCH-19VM KCH-19 Control Head $ 218.70
KRK-14HV KCH-19 Rear Panel for Remote Mount $ 193.00
KCH-21 Hand Held Controller Single (requires KCT-77M2 and KRK-15BM) $1,211.00
KCH-20RV KCH-20 Enhanced control head, remote Mount $ 729.70
KCH-21RVM KCH-21 Hand Held control head $ 1,211.00
KRK-15BM Remote Kit for KCH Control Heads, VM8000 $60.80
KCT-71M4 1.6 Ft Remote Cable, KCH-20 (Control Station) $ 54.70
KCT-71M2 17 Ft remote cable, KCH-19 $ 85.50
KCT-71M3 25 Ft remote cable, KCH-19 $ 97.30
KCT-71A50 Remote Cable up to 50 Ft, KCH-19 $ 226.80
KCT-71A100 Remote Cable up to 100 Ft, KCH-19 $ 292.30
KCT-77M2 Hand Held Control Head remote cable $ 222.80
Microphones and Speakers
KMC-65M Standard Mobile Mic for KCH Control Head $ 63.50
KMC-66M 12 Button Keypad Mic for KCH Control Head $ 115.20
KMC-9C Control Station Desktop Microphone (8-pin mod. plug) $ 104.80
KMC-59C Control Station Desktop Microphone (8-pin mod. plug) Improved noise response for Phase 2 TDMA systems $232.30
KES-8K 10W External Speaker, 3.5 mm audio plug $ 59.30
KES-5A 40W External Speaker. Requires KAP-2 kit to connect to radio. $73.00
KCT-72M External Accessory Connection Cable for KCH-20RV remote control heads $44.70

Protocol
8321050001 Analog FM (standard) $0
8321000002 P25 CAI AMBE+2 (standard) $0
System Options
8322000001 Analog Conventional $0
8322000002 P25 Conventional $ 415.00
8322000005 P25 Phase 1 Trunking (Requires option 8322000002) $ 145.00
8322000006 P25 Phase 2 TDMA (Requires option 8322000005) $ 475.00
8322000104 Viking16 $ 100.00
8322000009 DMR Tier II Conventional, Vx8000 $475.00
8322000010 DMR Tier III Trunking, Vx8000 $475.00
Encryption (requires Protocol Option 8322000002 - Digital/Project 25 CAI AMBE+2)
8323000003 DES-OFB (multi-key) $0
8323000002 AES FIPS 140-3 (single-key) $ 180.00
8323000004 AES FIPS 140-3 (multi-key) $ 560.00
8323000005 ARC4 (ADP compatible) $ 0
Other Accessories
5975390200 USB-C Programming Cable $30.00
Programming and Data - VM8000
8324000002 OTAR (Over-The-Air-Rekeying) $ 890.00
8324000003 OTAP (Over-the-Air Programming) $ 235.00
8325000003 GPS (Antenna required) $ 120.00
8326000025 Bluetooth *(no charge in initial offering of VM8000) (Antenna required)' $0
8326000033 Bluetooth Low Energy *(no charge in initial offering of VM8000) (Antenna required) $0
8326000039 WiFi *(no charge in initial offering of VM8000) (Antenna required) $0
8324000004 OTIP (Programming over WiFi). (Requires 8326000039) $ 235.00

Radio				Add On / Capabilities											
Radio Model	**Radio Type**	**Current MSRP $**	**Discounts Offered**	**OTAP**	**$**	**WIFI Programming**	**$**	**GPS Capable**	**$**	**Bluetooth**	**$**	**Multikey Encryption**	**AES + $**	**ADP + $**	**DES +$**
NX-5400K2 Standard Keypad	Portable	$1,004.20 7/800MHz radio only	20% off radios and accessories, plus free shipping	No		No		Yes	Included	Bluetooth 4.0	Included	Yes Module KWD-AE30K Needs Labor Code L-5003 $81.00	$1,034.00	Software License No Cost	Included
NX-5400K3 Full Keypad	Portable	$1,066.00 7/800MHz radio only	20% off radios and accessories, plus free shipping	No		No		Yes	Included	Bluetooth 4.0	Included	Yes Module KWD-AE30K Needs Labor Code L-5003 $81.00	$1,034.00	Software License No Cost	Included
NX-5900BK	Mobile	$1,205.20 7/800MHz Deck Only No Control Head - See accessories for options	20% off radios and accessories, plus free shipping	No		No		Yes - Requires KRA-40GM Module ($50.80)	$50.80	Bluetooth 4.0	Included	Yes Module KWD-AE30K Needs Labor Code L-5003 $81.00	$1,034.00	Software License No Cost	Included
NX-5900K	Mobile	$1,521.20 7/800MHz Dash Mount Radio / Control Station	20% off radios and accessories, plus free shipping	No		No		Yes - Requires KRA-40GM Module ($50.80)	$50.80	Bluetooth 4.0	Included	Yes Module KWD-AE30K Needs Labor Code L-5003 $81.00	$1,034.00	Software License No Cost	Included

Radio Model	**Top Screen**	**$**	**Dual or multiple band**	**$**	**Intrinsically Safe**	**$**	**Fire Services Rated Peripherals Offered and current MSRP $**	**Accessories offered and current MSRP $**
NX-5400K2 Standard Keypad	No		No		Yes - Requires IS Battery KNB-LS5 or KNB-LS7	$108.00		See List Below
NX-5400K3 Full Keypad	No		No		Yes - Requires IS Battery KNB-LS5 or KNB-LS7	$108.00		See List Below
NX-5900BK	N/A		Yes	See List Below	Not Applicable			See List Below
NX-5900K	N/A		Yes	See List Below	Not Applicable			See List Below

NX-5400 PORTABLE ACCESSORIES

General Radio Features

KWD-5000CH License Key for 4000 Channel Expansion $453.70
KWD-5001FP License Key for Front Panel Programming $324.00
KWD-5002SD License Key for microSD Memory Card Slot Activation $113.30
KWD-5003BT License Key for Bluetooth Data (Required for Data Communication)Note: Voice Communication for Bluetooth Head Set does NOT require KWD-5003BT.You can pair with any Bluetooth audio device without this option. $37.80
KWD-5007RC License Key for Remote Control by Subscriber Units Note: - P25 Mode is NOT available.- This license may be used by Administrator due to Stun/Revive/Kill.- The license is required for only Transmitting of Remote Control.- PC command for Remote Control NOT require the license. $43.20

P25 Radio Features

KWD-5100CV License Key for P25 Conventional $621.00
KWD-5101TR License Key for P25 Phase 1 Trunking (requires KWD-5100CV) $561.70
KWD-5102TR License Key for P25 Phase 2 Trunking (requires KWD-5100CV & KWD-5101TR) $432.00
KWD-5103RK License Key for P25 OTAR (requires KWD-5106DT for a Trunking Operation) $756.00
KWD-5105VT License Key for P25 Conventional Voting Scan $129.70
KWD-5106DT License Key for P25 Trunking OTAR / GPS Note: Conventional (OTAR/GPS) does NOT require KWD-5106DT. $194.30
KWD-5107EE License Key for P25 ARC4 Enhanced Encryption - No Charge

Antennas
KRA-32K 700/800 MHz Whip Antenna $42.50
KRA-36 700/800 MHz Stubby Antenna $30.50
Batteries
KNB-L1M Li-ion 2000mAh (Compact Slim) $144.00
KNB-L2M Li-ion 2600mAh (Standard) $169.00
KNB-L11M Li-ion 3900mAh (High Capacity)Note: The KNB-L11 battery requires NX-5x00 firmware 5.12 or newer $218.70
KNB-LS5CU CSA US Intrinsically Safe Battery Li-ion 2000mAhNote:Due to the I.S. circuitry on the KNB-LS5CU, the cells may lose charge during storage. To prevent loss of capacity during storage, charge the battery for 10 minutes at least every 4 months with the KSC-32
KSC-Y32K, KSC-52BK, KSC-326K, KSC-326AK or KSC-526K. [Intrinsically Safe Option] $254.50
KNB-LS7M CSA US Intrinsically Safe Battery Li-ion 3800mAhNote:Due to the I.S. circuitry on the KNB-LS7M, the cells may lose charge during storage. To prevent loss of capacity during storage, charge the battery for 10 minutes at least every 4 months with the KSC-32,
KSC-Y32K, KSC-52BK, KSC-326K, KSC-326AK or KSC-526K. [Intrinsically Safe Option] $366.00
KBP-8M2 AA Alkaline Refillable Battery Pack (12 AA: 9V). Cells not included. Note: The color of the case is International Orange. $143.20
Chargers
KSC-Y32K Rapid rate single unit charger (Long-Life Charge Mode capable with KAS-12 Software)Note: NOT compatible with the KNB-L11 battery $155.20
KSC-52BK Rapid rate single unit charger for KNB-L1/KNB-L2/KNB-L3/KNB-LS5/KNB-LS7/KNB-33L/PB-45L/KNB-47L/KNB-48L/KNB-72LC/KNB-70LEX/KNB-41NC/KNB-50NC/KNB-54N $97.30
KSC-52AK Rapid rate single unit charger for the new KNB-L11 high capacity battery $97.30
KSC-526K Rapid rate 6-unit charger CEC Compliant Note: Requires charging pocket KSC-52PBW and/or KSC-52PCW, and/or KSC-52PAW $823.80
KSC-52PBW Charging pocket for KSC-526K and/or to convert the pocket style of a KSC-52 Single unit charger compatible with the KNB-L1, L2, L3, LS5 and LS7 batteries, and NX-205/305 and NX-210 series $10.80
KSC-52PAW Charging pocket for KSC-526K and/or to convert the pocket style of a KSC-52 Single unit charger compatible with the KNB-L11 battery $10.80
KMB-526K Wall Mount Bracket for KSC-526K $83.20
KVC-15 Rapid rate DC vehicular charger adapter for the KSC-32 (chargers not included; includes KSC-mobile bracket & cigarette lighter cable DC adapter) Note: NOT compatible with KSC-52BK or KSC-52AK $193.00
KVC-23A Rapid rate DC vehicular charger for TK-5x10/5x20, NX-5x00/x00/x10/x20, TK-x180, TK-x170, & TK-x360 portables with Lithium Ion /Lithium Polymer/NiMH packs only. Note: Compatible with KNB-L11 battery $366.00
Carrying Accessories
KBH-11 Spring action belt clip (2.5") $ 17.80
KBH-8DS Leather Belt Loop with D-swivel $ 32.00
KLH-6SW Leather swivel belt loop / detachable swivel D-Ring back for KLH-200K3 $ 26.80
KLH-137ST Firemen's Heavy-Duty Leather Shoulder Strap for a HeavyDuty Leather Case $ 44.80
KLH-200K3 Heavy duty leather carrying case for VP5000 series with KNB-L2/L3/LS5CU batteries (for both keypad models) $ 53.80
KLH-201K3 Nylon carrying case for VP5000 series with KNBL2/L3/LS5CU battery (for both keypad models) $ 32.00
Microphones and Audio Options
KMC-70M MIL-SPEC, IP54/55/67/68* Speaker Mic with Active Noise Reduction Note: IP68 is available only when used with NX-5000 series portable[Intrinsically Safe Option] $ 158.30
KMC-72W MIL-SPEC, IP54/55/67 Noise-cancelling Speaker Mic[Intrinsically Safe Option] $121.70
KMC-49 MIL-SPEC, Speaker Mic. with Antenna Connector Note: 5/16" Coax cable hex wrench included (antenna is not included).[Intrinsically Safe Option] $450.00
KEP-1 3.5mm earphone kit for KMC-41/42W/54W/70M Speaker Mics $ 67.70
KEP-2 2.5mm earphone kit for KMC-49 Speaker Mic $ 67.70
KCT-51 Hirose 6-pin Adapter (adapts KVL/aftermarket audio acc. to portable connector)[Intrinsically Safe Option] $278.80
KHS-11BL 2-wire palm mic w/earphone, universal connector (Black) $ 202.80
KHS-12BL 3-wire mini lapel mic w/earphone, universal connector (Black) $ 257.80
KHS-14C Light Weight Single muff headset w/boom mic & In-line PTT $ 177.70
KHS-15D-BH Hvy-duty noise reduction behind-the-headset w/noise cancelling boom mic & PTT[Intrinsically Safe Option] $542.80
KHS-15D-OH Hvy-duty noise reduction over-the-headset w/noise cancelling boom mic & PTT[Intrinsically Safe Option $475.30

NX-5900 MOBILE ACCESSORIES
RF Deck Only
NX-5700BK NX-5700K (50W, 136-174 MHz) RF Deck Only $877.00
NX-5800BK NX-5800K (45W, 450-520 MHz) RF Deck Only $877.00
NX-5800BK2 NX-5800K2 (45W, 380-470 MHz) RF Deck Only $877.00
General Radio Features
KWD-5000CH License Key for 4000 Channel Expansion $453.70
KWD-5001FP License Key for Front Panel Programming $324.00
KWD-5002SD License Key for microSD Memory Card Slot Activation $113.30
KWD-5003BT License Key for Bluetooth Data (Required for Data Communication)Note: Voice Communication for Bluetooth Head Set does NOT require KWD-5003BT.You can pair with any Bluetooth audio device without this option. $37.80
KWD-5007RC License Key for Remote Control by Subscriber Units Note: - P25 Mode is NOT available.- This license may be used by Administrator due to Stun/Revive/Kill.- The license is required for only Transmitting of Remote Control.- PC command for Remote Control does NOT require the license. $43.20
P25 Radio Features
KWD-5100CV License Key for P25 Conventional $621.00
KWD-5101TR License Key for P25 Phase 1 Trunking (requires KWD-5100CV) $561.70
KWD-5102TR License Key for P25 Phase 2 Trunking (requires KWD-5100CV & KWD-5101TR) $432.00
KWD-5103RK License Key for P25 OTAR (requires KWD-5106DT for a Trunking Operation) $756.00
KWD-5105VT License Key for P25 Conventional Voting Scan $129.70
KWD-5106DT License Key for P25 Trunking OTAR / GPS Note: Conventional (OTAR/GPS) does NOT require KWD-5106DT. $194.30
KWD-5107EE License Key for P25 ARC4 Enhanced Encryption - No Charge
Microphones and Speakers
KMC-65M MIL-SPEC Standard electret mobile microphone (8-pin mod. plug) $ 63.50
KMC-66M MIL-SPEC Standard electret mobile microphone with 12 keypad (8-pin mod. plug) $ 115.20
KES-8K External speaker, 10W, 4-Ohm, 3.5mm phone plug $59.30
KES-5A External speaker, 40W max input Note: Requires KCT-72M to connect to Remote Control Head $73.00
KCT-72M External Accessory Connection Cable for KCH-19M / KCH-20RM $44.70
KMC-9C Control Station Desktop Microphone (8-pin mod. plug)Note: NOT compatible with TDMA operations $104.80
KMC-59C Control Station Desktop Microphone (8-pin mod. plug) $232.30
DC Power Cables

KCT-23M DC Cable, 35-50W, 10 feet Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $47.70
KCT-23M3 DC Cable, 35-50W, 23 feet Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $65.70
KCT-23M2 DC Cable, 75-110W, 10 feet Note: For high power mobiles (NX-5600HB/5700HB) only. $47.70
KCT-23M4 DC Cable, 75/110W, 23 feet Note: For high power mobiles (NX-5600HB/5700HB) only. $65.70

Mounting Bracket

KMB-33M Mounting Bracket Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $17.20
KMB-36 Mounting Bracket Note: For high power mobiles (NX-5600HB/5700HB) only. $91.70

Control Heads

KCH-19M Basic Control Panel $218.70
KRK-14HM Control Head Interface Kit for KCH-19M $193.00
KCH-20RM Full Featured Remote Control Panel Note: - Remote configuration only. No Internal Speaker included. KES-5A is required.- microSD License (KWD-5002SD) and Bluetooth SPP License (KWD-5003BT) are NOT required for both KCH-20RM and connected RF Decks.KCH-20RM and connected RF Decks can be used of microSD and Bluetooth SPP with NO License Activation. $729.70
KCH-21RM Hand Held Control Head for Long Cable *Requires KCT-77M2 (17 ft.)Note:- Bluetooth SPP License (KWD-5003BT) is NOT required for both KCH-21RM and connected RF Decks.KCH-21RM has built-in Bluetooth SPP license that will also activate the connecte Decks. $1,211.00
KCH-21RM-S Hand Held Control Head with Short Cable (4 ft.)Note:- Bluetooth SPP License (KWD-5003BT) is NOT required for both KCH-21RM and connected RF Decks.KCH-21RM has built-in Bluetooth SPP license that will also activate the connected RF Decks. $1,21

Control Head Remote Kit for Mid Power Mobiles

KRK-15BM Control Head Remote Kit Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $60.80

Remote and Multi Deck Cables

KCT-71M2 Remote Control Cable (17 feet) $85.50
KCT-71M3 Remote Control Cable (25 feet) $97.30
KCT-71M4 Remote Control Cable (1.6 feet) $54.70
KCT-71A50 KCT-71A Extended Control Head Cable (up to 50 ft. max.)Note: Please specify exact length at 1ft. increments when ordering. Caution: Extended control head cables exhibit a loss in speaker audio power to the control heads. $226.80
KCT-71A100 KCT-71A Extended Control Head Cable (up to 100 ft. max.)Note: Please specify exact length at 1ft. increments when ordering. Caution: Extended control head cables exhibit a loss in speaker audio power to the control heads. $292.30
KCT-77M2 Remote Control Cable for KCH-21RM (17 feet) $222.80

Other Accessories

KCT-46 Ignition sense cable Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $16.70
KCT-18 Ignition sense cable Note: For high power mobiles (NX-5600HB/5700HB) only. $24.00
KAP-2 Horn Alert/P.A. Relay Option Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $76.70
KCT-72M External Accessory Connection Cable for KCH-19M / KCH-20RM $44.70
KLF-2 Line Filter (suppresses alternator whine, 25dB, 25A max). $51.20
KMB-10 Key lock adapter Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $32.00
KRA-40GM GPS Antenna $50.80
KCT-90USB USB Mobile Cable for SD Card Direct Access Support Note: microSD function requires KWD-5002SD license. $113.30
KCT-91MRS DB25 Cable for Mobile Relay Station (Conventional Only)Note: - Mobile Relay Station requires Multi RF Deck Configuration.- Built-in GPS and Bluetooth are not available with Mobile Relay Station.- DMR mode is not available $41.80
KPS-15 DC Switching Power Supply (117/230 VAC; 23A max. continuous, 25A peak) $210.80
KMB-34 Control Station Mounting Case for KPS-15 Power Supply with mobile Note: For mid power mobiles (NX-5700/5700B/5800/5800B/5900/5900B) only. $65.70

Remote and Multi-RF Deck Accessory Kits

MID POWER / Remote Kit - Single Head / Single RF Deck
5ABM - KMC-65M, KCH-19M, KRK-14HM, KRK-15BM, KCT-71M2, KCT-23M3, KMB-33M $704.30
5AFM - KMC-65M, KCH-20RM, KRK-15BM, KCT-71M2, KCT-23M3, KMB-33M, KES-5A, KCT-72M $1,140.20
5AHM - KCH-21RM, KRK-15BM, KCT-77M2, KCT-23M3, KMB-33M $1,577.50
MID POWER / Remote Kit - Dual Head / Single RF Deck
5ABBM - KMC-65M(x2), KCH-19M(x2), KRK-14HM(x2), KRK-15BM, KCT-71M2(x2), KCT-23M3, KMB-33M $1,265.00
5AFFM - KMC-65M(x2), KCH-20RM(x2), KRK-15BM, KCT-71M2(x2), KCT-23M3, KMB-33M, KES-5A(x2), KCT-72M(x2) $2,136.70
MID POWER / Remote Kit - Single Head / Dual RF Deck
5ABMM - KMC-65M, KCH-19M, KRK-14HM, KRK-15BM(x2), KCT-71M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2) $902.70
5AFMM - KMC-65M, KCH-20RM, KRK-15BM(x2), KCT-71M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A, KCT-72M $1,338.50
5AHMM - KCH-21RM, KRK-15BM(x2), KCT-77M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2) $1,775.80
MID POWER / Remote Kit - Single Head / Dual RF Deck, External Speakers per deck
5ABMM-MR - KMC-65M, KCH-19M, KRK-14HM, KRK-15BM(x2), KCT-71M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KAP-2(x2) $1,202.20
5AFMM-MR - KMC-65M, KCH-20RM, KRK-15BM(x2), KCT-71M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KAP-2(x2) $1,520.30
5AHMM-MR - KCH-21RM, KRK-15BM(x2), KCT-77M2, KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KAP-2(x2) $2,075.30
MID POWER / Remote Kit - Dual Head / Dual RF Deck
5ABBMM - KMC-65M(x2), KCH-19M(x2), KRK-14HM(x2), KRK-15BM(x2), KCT-71M2(x2), KCT-71M4, KCT-23M3(x2), KMB-33M(x2) $1,463.30
5AFFMM - KMC-65M(x2), KCH-20RM(x2), KRK-15BM(x2), KCT-71M2(x2), KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KCT-72M(x2) $2,335.00
MID POWER / Remote Kit - Dual Head / Dual RF Deck, External Speakers per deck
5ABBMM-MR - KMC-65M(x2), KCH-19M(x2), KRK-14HM(x2), KRK-15BM(x2), KCT-71M2(x2), KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KAP-2(x2) $1,763.00
5AFFMM-MR - KMC-65M(x2), KCH-20RM(x2), KRK-15BM(x2), KCT-71M2(x2), KCT-71M4, KCT-23M3(x2), KMB-33M(x2), KES-5A(x2), KAP-2(x2) $2,399.00
HIGH POWER / Single Head Remote Mount Kit
6ABMIG - KMC-65M, KCH-19M, KRK-14HM, KCT-71M2, KCT-23M4, KCT-18, KMB-36 $742.00
6AFMIG - KMC-65M, KCH-20RM, KCT-71M2, KCT-23M4, KCT-72M, KES-5A, KCT-18, KMB-36 $1,177.70
6AHMIG - KCH-21RM, KCT-77M2, KCT-23M4, KCT-18, KMB-36 $1,615.20
HIGH POWER / Single Remote Mount / Dual High Power RF Deck
6AFMMIG - KMC-65M, KCH-20RM, KCT-71M2, KCT-23M4(x2), KCT-72M, KES-5A, KCT-18(x2), KMB-36 (x2), KCT-71M4 $1,413.70
HIGH POWER / Single Deck Dual Head Remote Mount
6ABBMIG - KMC-65M(x2), KCH-19M(x2), KRK-14HM(x2), KCT-71M2(x2), KCT-23M4, KCT-18, KMB-36 $1,302.70
6AFFMIG - KMC-65M(x2), KCH-20RM(x2), KCT-71M2(x2), KCT-23M4, KCT-72M(x2), KES-5A(x2), KCT-18, KMB-36 $2,174.20

KENWOOD

NEXEDGE®

One Radio with Multi-Protocol Support

NX-5200/5300/5400

VHF/UHF/700-800MHz MULTI-PROTOCOL DIGITAL & ANALOG PORTABLE RADIOS

NXDN™ P25 DMR Gen2 Bluetooth FleetSync microSD HC GPS

The NX-5000 Series offers unsurpassed interoperability for a wide variety of users as it supports three digital CAIs — NXDN™, DMR (Tier 2 & 3) and P25 (Phase 1 & 2) — plus FM analog in a single radio. Best of all, a desired CAI can be selected at will, giving you the freedom to migrate at your own pace — whether you are intent on going fully digital, undecided about which digital system to pick, or just wanting to maintain both digital and analog for a while. A NX-5000 radio can simultaneously support two digital protocols plus analog, offering the following combinations: FM/DMR/NXDN, FM/NXDN/P25, and FM/DMR/P25.

Full-Keypad & Standard Models

Features

Multi-Digital operation in NXDN, DMR (Tier 2 & 3), and P25 (Phase 1 & 2)
Any combination of two digital protocols may be selected from NXDN, DMR, and P25
Mixed Digital & FM Analog Operation allows intelligent migration in mixed sites and easy migration with digital radios in other sites
Large, Color 1.74" (240 x 180 pixels) Transflective TFT Display for better interface even in direct sunlight and with use of polarized sunglasses
Easy to follow GUI for at-a-glance operational status and Multi-line Text to convey information
4-way Directional-pad (D-pad) and 2-Position Lever Switch for intuitive control
Built-In GPS Receiver/Antenna for effective fleet and incident management
Bluetooth® Module Built-in for hands-free and IoT applications operation
Renowned KENWOOD Audio Quality achieved with Active Noise Reduction (ANR) that utilizes built-in DSP with two microphones for suppression of ambient noise
Built-in 56-bit DES Encryption
Optional 256-bit AES Encryption
Built-in Motion Sensor for man down detection
microSD/microSDHC Up to 2GB/32GB Memory Card Slot for increased memory capacity for "Voice & Data"
IP67/68 and MIL-STD-810 C/D/E/F/G
6 W (136-174 MHz) Models
5 W (380-470, 450-520 MHz) Models
3 W (700/800 MHz) Models
Full Key Models (w/numeric keypad) and Standard Key Models (w/o numeric keypad)
Maximum of 1024 CH, 128 Zones (4000 Ch. Opt)
1 W Speaker Audio

Digital – NXDN™ Mode

- NXDN Conventional
- NXDN Type-C & Gen2 Trunking
- 6.25 & 12.5 kHz Channels
- Paging Call
- Emergency Call
- All Group Call
- Status Messaging
- Remote Stun/Kill
- Remote Check
- Over-the-Air Alias (OAA)
- Over-the-Air Programming (OTAP)
- Short & Long Data Messages
- NXDN Digital Scrambler
- 2-Tone (Digital)

Digital – DMR Mode

- Two-slot TDMA in 12.5 kHz channels
- DMR Tier 2 Conventional
- DMR Tier 3 Trunking
- DMR Over-the-Air Programming
- Call Interruption
- Dual-slot Direct Mode
- Energy Efficient
- Optional ARC4 encryption

Digital – P25 Mode

- P25 Phase 1 Conventional/Trunked Operation
- P25 Phase 2 Trunked Operation
- Talk Group ID Lists
- Individual ID Lists
- Caller ID Display
- 2-Tone (Digital)
- Remote Monitor / Check / Inhibit
- Encryption Key Zeroize & Retention
- P25 Over-the-Air Re-keying
- P25 Over-the-Air Programming
- Optional ARC4 encryption

FM Modes – General

- Conventional & LTR Zones
- NPSPAC (USA only) Channels (±4.0 Modulation)
- FleetSync®/II: PTT ID ANI / Caller ID Display, Selective Group Call, Emergency Status / Text Messages
- MDC-1200: PTT ID ANI / Caller ID Display, Emergency, Radio Check / Inhibit
- QT / DQT & Two-Tone
- Built-in Voice Inversion Scrambler

Intelligent Battery System (option)

System consists of the Rapid Charger (KSC-Y32), and Battery Reader (KAS-12 software Up to 60 Rapid Chargers can be chain-connected to a PC installed with the KAS-12.

KAS-12 Battery Reader software can display and manage information including battery type, model name, voltage, temperature, discharge cycle, expected life, and remaining capacity Up to 5,000 batteries can be managed at a time.
(Requires an additional option)

Accessories

All accessories may not be available in all markets.
Contact an authorized KENWOOD dealer for details and complete list of all accessories.

KNB-L1/L2/L3
Li-ion Battery Pack
(IP67/68 Immersion)

KSC-Y32
Rapid Charger

KRA-22
VHF Helical Antenna
(Low Profile)

KRA-32
700/800MHz
Whip Antenna

KMC-70M
Speaker Microphone
(with dual-sided
2-mic for superior
ANR, IP67)

KNB-N4
Ni-MH Battery Pack
(IP67/68 Immersion)

KSC-32
Rapid Charger

KRA-23
UHF Helical Antenna
(Low Profile)

KRA-41
UHF Stubby
Antenna

KBH-11
Belt Clip (2.5")

KNB-LS5CU
Li-ion Battery (2,000mAh)

KNB-LS7M
Li-ion Battery (3,800mAh)
CSA US Intrinsically Safe

KSC-326AK
Rapid Charger
(6-unit Rapid Rate)

KRA-26
VHF Helical Antenna
(Standard Length)

KRA-42
UHF Stubby
Antenna

KWD-AE30/AE31
Secure Cryptographic Module

KBP-8
Alkaline Battery Case

KAS-12/PRO
Battery Reader
(PC Software)

KRA-27
UHF Whip Antenna
(Standard Length)

KMC-72W
Speaker Microphone
(IP67)

KPG-180AP
OTAP Manager

Specifications

General	NX-5200	NX-5300	NX-5400
Frequency Range	136-174 MHz	Type 1: 450-520 MHz Type 2: 380-470 MHz	RX: 763-776, 851-870 MHz TX: 763-776, 793-806, 806-825, 851-870 MHz
Max. Channels Per Radio	1024 (Up to 4000 CH with option)		
Number of Zones	128		
Max. Channels per Zone	512		
Channel Spacing			
Analog	12.5/15/20/25*/30* kHz	12.5/25* kHz	12.5/25 kHz
Digital	6.25 kHz/12.5 kHz	6.25 kHz/12.5 kHz	12.5 kHz (6.25 kHz)
Power Supply	7.5V DC ± 20%		
Battery Life	(5-5-90/10-10-80 duty cycle)		
KNB-L1 (2,000 mAh)	10 hours / 6.5 hours		
KNB-L2 (2,600 mAh)	12.5 hours / 8.5 hours		
KNB-L3 (3,400 mAh)	17 hours / 11 hours		
KNB-N4 (2,500 mAh)	12 hours / 8.5 hours		
KBP-8 (w/AA x12)	High Power 11 hours / 8 hours / Low Power 26 hours / 18.5 hours		
Operating Temperature	-22ºF to +140ºF (-30ºC to +60ºC)		
Frequency Stability	± 0.5 ppm		
Dimensions/Weight Radio w/battery	(W x H x D) Projections Not Included		
KNB-L1 (2,000 mAh)	2.28 x 5.47 x 1.44 in. (58.0 x 138.9 x 36.5 mm)		13.5 oz (382 g)
KNB-L2 (2,600 mAh)	2.28 x 5.47 x 1.56 in. (58.0 x 138.9 x 39.5 mm)		14.3 oz (406 g)
KNB-L3 (3,400 mAh)	2.28 x 5.47 x 1.77 in. (58.0 x 138.9 x 44.9 mm)		15.8 oz (449 g)
KNB-N4 (2,500 mAh)	2.28 x 6.55 x 1.78 in. (58.0 x 166.4 x 45.2 mm)		20.4 oz (579 g)
KBP-8	2.64 x 8.59 x 2.12 in. (67.0 x 218.3 x 53.9 mm)		5.1 oz (712 g)
FCC ID			
Type 1	K44431400	K44431500	ALH442000
Type 2		K44431501	
IC Certification			
Type 1	282F-431400		282D-442000
Type 2		282F-431501	

*25/30 kHz in VHF/UHF Bands (except T-Band) are not included in the models sold in the USA or US territories.
Analog measurements made per TIA603. Specifications are measured according to applicable standards.
P25 Digital measurements made per TIA 102CAAA and specifications shown are typical.
Specifications are subject to change without notice, due to advancements in technology.

Receiver	NX-5200	NX5300	NX-5400
Sensitivity			
NXDN 6.25 kHz Digital (3% BER)		0.20 µV	
NXDN 12.5 kHz Digital (3% BER)		0.25 µV	
DMR Digital (5% BER)		0.25 µV	
DMR Digital (1% BER)		0.40 µV	
P25 Digital (5% BER)		0.25 µV	
P25 Digital (1% BER)		0.40 µV	
Analog (12dB SINAD)		0.25 µV	
Selectivity			
Analog @ 12.5kHz	67 dB		64 dB
Analog @ 25kHz		73 dB	
Intermodulation		73 dB	75 dB
Spurious Rejection	80 dB		75 dB
Audio Distortion		3%	
Audio Output Power	500 mW/8Ω (3% Distortion) / 1,000 mW/8Ω (5% Distortion)		

Transmitter	NX-5200	NX-5300	NX-5400
RF Power Output	6 W to 1 W	5 W to 1 W	3 W to 1 W
Spurious Emission	-70 dB		
FM Hum & Noise			
Analog @ 12.5kHz		40 dB	
Analog @ 25kHz		45 dB	
Audio Distortion	Less than 2%		
Emission Designator	16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 8K30F1E, 8K30F1D, 8K30F7W, 7K60FXE, 7K60FXD, 4K00F1E, 4K00F1D, 4K00F7W, 4K00F2D		16K0F3E, 14K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 8K30F1E, 8K30F1D, 8K30F7W, 7K60FXE, 7K60FXD,4K00F1E, 4K00F1D, 4K00F7W, 4K00F2D

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Windows® is a registered trademark of Microsoft Corporation.
NXDN™ is a registered trademark of JVCKENWOOD Corporation and Icom Inc.
NEXEDGE® & FleetSync® are a registered trademarks of JVCKENWOOD Corporation.
All other trademarks are the property of their respective holders.

MIL-STD & IP

MIL Standard	MIL 810C Methods/Procedures	MIL 810D Methods/Procedures	MIL 810E Methods/Procedures	MIL 810F Methods/Procedures	MIL 810G Methods/Procedures
Low Pressure	500.1/Procedure I	500.2/Procedure I, II	500.3/Procedure I, II	500.4/Procedure I, II	500.5/Procedure I, II
High Temperature	501.1/Procedure I, II	501.2/Procedure I, II	501.3/Procedure I, II	501.4/Procedure I, II	501.5/Procedure I, II
Low Temperature	502.1/Procedure I	502.2/Procedure I, II	502.3/Procedure I, II	502.4/Procedure I, II	502.5/Procedure I, II
Temperature Shock	503.1/Procedure I	503.2/Procedure I	503.3/Procedure I	503.4/Procedure I, II	503.5/Procedure I
Solar Radiation	505.1/Procedure I	505.2/Procedure I	505.3/Procedure I	505.4/Procedure I	505.5/Procedure I
Rain	506.1/Procedure I, II	506.2/Procedure I, II	506.3/Procedure I, II	506.4/Procedure I, III	506.5/Procedure I, III
Humidity	507.1/Procedure I, II	507.2/Procedure II, III	507.3/Procedure II, III	507.4	507.5/Procedure II
Salt Fog	509.1/Procedure I	509.2/Procedure I	509.3/Procedure I	509.4	509.5
Dust	510.1/Procedure I	510.2/Procedure I	510.3/Procedure I	510.4/Procedure I, III	510.5/Procedure I
Vibration	514.2/Procedure VIII, X	514.3/Procedure I	514.4/Procedure I	514.5/Procedure I	514.6/Procedure I
Shock	516.2/Procedure I, II, V	516.3/Procedure I, IV	516.4/Procedure I, IV	516.5/Procedure I, IV	516.6/Procedure I, IV
Immersion				512.4/Procedure I	512.5/Procedure I
International Protection Standard					
Dust & Water Protection	IP54/55				
Immersion	IP67/68*				

*Conditions: Portable radio immersed for 2 hours at a depth of 1 meter (IP68=1m/2H)

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www.kenwood.com/usa

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www.kenwood.com/ca

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ISO9001 Registered
Communications Systems Business Unit
JVCKENWOOD Corporation

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KENWOOD

NEXEDGE®

One Radio with Multi-Protocol Support

NX-5700/5800/5900

VHF/UHF/700-800MHz MULTI-PROTOCOL DIGITAL & ANALOG MOBILE RADIOS

The NX-5000 Series offers unsurpassed interoperability for a wide variety of users as it supports three digital CAIs — NXDN™, DMR (Tiier 2 & 3) and P25 (Phase 1 & 2) — plus FM analog in a single radio. Best of all, a desired CAI can be selected at will, giving you the freedom to migrate at your own pace — whether you are intent on going fully digital, undecided about which digital system to pick, or just wanting to maintain both digital and analog for a while. A NX-5000 radio can simultaneously support two digital protocols plus analog, offering the following combinations: FM/DMR/NXDN, FM/NXDN/P25, and FM/DMR/P25.

Features

Multi-Digital operation in NXDN, DMR (Tier 2 & 3), and P25 (Phase 1 & 2) protocols
Any combination of two digital protocols may be selected from NXDN, DMR, and P25
Mixed Digital & FM Analog Operation allows intelligent migration in mixed sites and easy migration with digital radios in other sites
Large, Color 2.55" (154 x 422 pixels) TFT Display for at-a-glance operational status
Easy to follow GUI and Multi-line Text to convey information
Dual Remote Control Head and Multi-Band (Multi RF Deck) Control Option providing scalable configurations for various operations and applications
Built-In GPS Receiver for effective fleet and incident management
Bluetooth® Module Built-in for hands-free and IoT applications operation
Renowned KENWOOD Audio Quality achieved with Active Noise Reduction (ANR) that utilizes built-in DSP with two microphones for suppression of ambient noise
Built-in 56-bit DES Encryption
Optional 256-bit AES Encryption
microSD/microSDHC Up to 2GB/32GB Memory Card Slot for increased memory capacity for "Voice & Data"
50 W to 5 W (136-174 MHz) Models
45 W to 5 W (380-470, 450-520 MHz) Models
30 W to 2 W (700 MHz) Model 35 W to 2 W (800 MHz) Model
Maximum of 1024 CH/Zone, 128 Zones (4000 CH. Opt)
DB-25 Accessory Connector
AMBE+2™ Enhanced Vocoder
4 W Speaker Audio

Digital – DMR Mode

Two-slot TDMA in 12.5 kHz channels
DMR Tier 2 Conventional
DMR Tier 3 Trunking
DMR Over-the-Air Programming
Call Interruption
Dual-slot Direct Mode
Spectrum Efficient
Optional ARC4 encryption

Digital – P25 Mode

P25 Phase 1 Conventional/Trunked Operation
P25 Phase 2 Trunked Operation
Talk Group ID Lists
Individual ID Lists
Caller ID Display
2-Tone (Digital)
Remote Monitor / Check / Inhibit
Encryption Key Zeroize & Retention
P25 Over-the-Air Re-keying
P25 Over-the-Air Programming
Optional ARC4 encryption

FM Modes – General

Conventional & LTR Zones
FleetSync®/II: PTT ID ANI / Caller ID Display, Selective Group Call, Emergency Status / Text Messages
MDC-1200: PTT ID ANI / Caller ID Display, Emergency, Radio Check / Inhibit
QT / DQT & Two-Tone
Built-in Voice Inversion Scrambler

Digital – NXDN™ Mode

NXDN Conventional
NXDN Type-C & Gen2 Trunking
6.25 & 12.5 kHz Channels
Paging Call
Emergency Call
All Group Call
Status Messaging
Remote Stun/Kill
Remote Check
Over-the-Air Alias (OAA)
Over-the-Air Programming (OTAP)
Short & Long Data Messages
NXDN Digital Scrambler
2-Tone (Digital)

Multiple Configurations (Option)

The NX-5000 mobile series allows users to create a variety of configurations to suit different requirements by combining different options. Some of the standard configurations are:

Single Remote Control Head x Single RF Deck
Dual Remote Control Head x Single RF Deck
Dual Remote Control Head x Multi RF Decks

Other combinations are available. Consult your local KENWOOD dealer for more.

Accessories

All accessories may not be available in all markets.
Contact an authorized KENWOOD dealer for details and complete list of all accessories.

NX-5700B/5800B/5900B
RF Deck

KCH-19
Basic Control Head Kit

KCH-20R
Featured Control Head

KCH-21RM
Handheld Control Head

KRK-14H
Control Head Interface Kit (Adapter for the Head)

KRK-15B
Control Head Remote Kit (Adapter for the RF Deck)

KCT-71
Remote Control Cable (available in 3 lengths of 17ft (5.2m), 25ft (7.6m), 1.6ft (0.5m)

KCT-72
External Accessory ConnectionCable for the KCH-19/20R

KMC-65M
Microphone

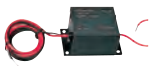
KMC-66M
Keypad Microphone

KES-5A
External Speaker (40 W max input, requires KAP-2)

KCT-23
DC Power Cable (for High Power)
M2: [10 ft/3 m] /
M4: [23 ft/7 m]

KCT-46
Ignition Sense Cable

KLF-2
Line Filter



KMB-10
Key Lock Adapter

KAP-2
Horn Alert/P.A. Relay Unit

KRA-40G
GPS Active Antenna

KMB-34
Mounting Case for KPS-15

KPS-15
DC Power Supply (23A max)

KWD-AE30/AE31
Secure Cryptographic Module

KPG-180AP
OTAP Manager

Specifications

General	NX-5700	NX-5800	NX-5900
Frequency Range	136-174 MHz	Type 1 450-520 MHz Type 2 400-470 MHz	RX: 763-776, 851-870 MHz TX: 763-776, 793-806 806-825, 851-870 MHz
Max. Channels Per Radio	1,024 (Up to 4,000 CH with option)		
Max. # of P25 Trunked Group ID's	512		
Number of Zones	128		
Channel Spacing			
Analog	12.5/15/25*/30* kHz	12.5/25* kHz	12.5/25 kHz
Digital	6.25/12.5 kHz	6.25/12.5 kHz	6.25/12.5 kHz
Power Supply	13.6 V DC ±15%		
Current Drain			
Standby	0.45 A		
RX	2.3 A		
TX	13 A		
Operating Temperature	-22ºF to +140ºF (-30ºC to +60ºC)		
Frequency Stability	± 0.5 ppm		
Dimensions	(W x H x D) Projections Not Included		
Radio with Control Head	6.69 x 1.89 x 6.93 in. (170 x 48.0 x 176 mm.)		6.73 x 1.89 x 7.72 in. (171 x 48 x 196 mm.)
Weight Radio	3.53 lbs (1.6 kg)		3.53 lbs (1.6 kg)
Radio with Control Head			
FCC ID			
Type 1	K44471100	K44471200	K44478500
Type 2		K44471201	
IC Certification			
Type 1	282F-471100		282F-478500
Type 2		282F-471201	

Receiver	NX-5700	NX-5800	NX-5900
Sensitivity			
NXDN 6.25 kHz Digital (3% BER)		0.20 µV	
NXDN 12.5 kHz Digital (3% BER)		0.25 µV	
DMR Digital (5% BER)		0.25 µV	
DMR Digital (1% BER)		0.40 µV	
P25 Digital (5% BER)		0.25 µV	
P25 Digital (1% BER)		0.40 µV	
Analog (12dB SINAD)		0.25 µV	
Selectivity			
Analog @ 12.5kHz	71 dB		70 dB
Analog @ 25kHz	81 dB		78 dB
Intermodulation	80 dB		
Spurious Rejection	85 dB		
Audio Distortion	2%		
Audio Output Power	4 W/4 Ω (Remote Control Head: 3 W/4 Ω)		

Transmitter	NX-5700	NX-5800	NX-5900
RF Power Output	50 W to 5 W	45 W to 5 W	30 W to 2 W (700 MHz) 35 W to 2 W (800 MHz)
Spurious Emission	-73 dB	-75 dB	-80 dB
FM Hum & Noise			
Analog @ 12.5kHz	45 dB		40 dB
Analog @ 25kHz	50 dB		45 dB
Audio Distortion	2%		
Emission Designator	16K0F3E, 14K0F3E** 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 8K30F1E, 8K30F1D, 8K30F7W, 7K60FXE, 7K60FXD 4K00F1E, 4K00F1D, 4K00F7W, 4K00F2D		

*25/30 kHz in VHF/UHF Bands (except T-Band) are not included in the models sold in the USA or US territories.
**NX-5900 model only.
Analog measurements made per TIA603. Specifications are measured according to applicable standards.
P25 Digital measurements made per TIA 102CAAA and specifications shown are typical.
Specifications shown are typical and subject to change without notice, due to advancements in technology.

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NXDN™ is a registered trademark of JVCKENWOOD Corporation and Icom Inc.
NEXEDGE® & FleetSync® are a registered trademarks of JVCKENWOOD Corporation.
All other trademarks are the property of their respective holders.

MIL-STD & IP

MIL Standard	MIL 810C Methods/Procedures	MIL 810D Methods/Procedures	MIL 810E Methods/Procedures	MIL 810F Methods/Procedures	MIL 810G Methods/Procedures
Low Pressure	500.1/Procedure I	500.2/Procedure I, II	500.3/Procedure I, II	500.4/Procedure I, II	500.5/Procedure I, II
High Temperature	501.1/Procedure I, II	501.2/Procedure I, II	501.3/Procedure I, II	501.4/Procedure I, II	501.5/Procedure I, II
Low Temperature	502.1/Procedure I	502.2/Procedure I, II	502.3/Procedure I, II	502.4/Procedure I, II	502.5/Procedure I, II
Temperature Shock	503.1/Procedure I	503.2/Procedure I	503.3/Procedure I	503.4/Procedure I, II	503.5/Procedure I
Solar Radiation	505.1/Procedure I	505.2/Procedure I	505.3/Procedure I	505.4/Procedure I	505.5/Procedure I
Rain	506.1/Procedure I, II	506.2/Procedure I, II	506.3/Procedure I, II	506.4/Procedure I, III	506.5/Procedure I, III
Humidity	507.1/Procedure I, II	507.2/Procedure II, III	507.3/Procedure II, III	507.4	507.5/Procedure II
Salt Fog	509.1/Procedure I	509.2/Procedure I	509.3/Procedure I	509.4	509.5
Dust	510.1/Procedure I	510.2/Procedure I	510.3/Procedure I	510.4/Procedure I, III	510.5/Procedure I
Vibration	514.2/Procedure VIII, X	514.3/Procedure I	514.4/Procedure I	514.5/Procedure I	514.6/Procedure I
Shock	516.2/Procedure I, II, V	516.3/Procedure I, IV, V	516.4/Procedure I, IV, V	516.5/Procedure I, IV, V	516.6/Procedure I, IV, V
International Protection Standard					
Dust & Water Protection*1	IP54, IP55*2				

*1 Applicable microphone must be connected to the radio, and all accessory connectors must be covered. *2 IP54: RF Deck; IP55: Remote Control Head.

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Communications Systems Business Unit
JVCKENWOOD Corporation

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KENWOOD

VIKING®

P25 Mission Critical

VM8000

Multi-Band ▪ Multi-Protocol ▪ Mission Critical Mobile Radio

The KENWOOD Viking 8000 series Multi-Band, Multi-Protocol mobile is specifically designed for today's public safety agencies with advanced features to meet the first responder's mission critical operational needs.

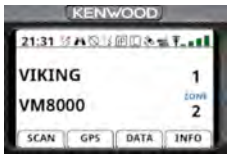
Features

- Multi-Band operation (VHF, UHF, 700/800 MHz)
- Multi-Protocol:
  - P25 Phase 1 & 2 Trunking
  - P25 Conventional
  - DMR Tier II & Tier III
  - Viking16 (SmartNet/SmartZone™ Compatible)
  - FM Analog Conventional
- Mixed protocol zones (each channel in a zone can be from a different system)
- 1024 channels (2048 & 4096 options)
- P25 Authentication (Link Layer Authentication)
- P25 GPS data (built-in GPS)*
- MDC-1200 & GE-Star signaling
- Analog & P25 Conventional vote scan
- Mixed System Conventional Priority Scan (Analog, P25 Conventional, and DMR Tier II)
- Single or Dual Remote-Mount control heads (KCH-19VM, KCH-20RV, and KCH-21RVM) or Single Dash-Mount control head (KCH-19VM)
- Single-Deck Multi-Band operation or optional Multi-Deck operation (up to 4 RF Decks)
- Instant Recording Replay (IRR) and Voice Recording
- TrueVoice™ Noise Cancellation technology
- Wi-Fi® 2.4 & 5 GHz (802.11a/b/g/n/ac)
- Bluetooth® 5.0 & Bluetooth Low Energy
- 15-Watt audio output via external speaker
- High-speed programming using rear USB Type-C™ connector
- Encryption
  - ARC4™ (Motorola ADP™ compatible)
  - DES-OFB
  - AES-256 (FIPS 140-3) Single and Multi-Key
  - Over-the-Air-Rekeying (OTAR)
  - VK5000 or Motorola KVL4000/KVL5000 Keyloaders
  - Optional FIPS 140-3 Level 3 Encryption Module (KWD-AE40K) in compliance with federal and military requirements

**Refer to the Viking VM8000 operating manual for detailed requirements & conditions for proper GPS operation.*

Enhanced Control Head

- Large display - 2.75" (36 x 60 mm)
- Resolution of 400 x 240 pixels
- Viewing angle of 140°
- Multi-color LCD + TX/RX (green/red/orange) LEDs
- D-Pad & more PF keys, dedicated emergency key and channel/volume control knobs
- Replaceable A/B/C button labels
- User selectable themes (8 themes available)
- Day & night display options
- Optionally, the KCH-21RVM Handheld Control Head (HHCH) or the KCH-19VM Control Head can be used with the VM8000.



Day - High Contrast

Night - High Contrast

KCH-19VM Control Head

Compatible With P25 Systems

- ATLAS® P25 Phase 1 and Phase 2 System
- Motorola Astro® 25 - P25 Phase 1 & Phase 2
- L3Harris VIDA® - P25 Phase 1 & Phase 2
- Airbus (formerly Cassidian) VESTA™ Radio - P25 Phase 1 & Phase 2
- All P25-standard systems

Accessories

Complete line of accessories including microphones, speakers & antennas. Download the accessory catalog at

https://info.efjohnson.com/viking-accessory-catalog/

We combine P25 design expertise with recognized quality & reliability along with advanced technology to make KENWOOD Viking radios simple to use & maintain.

Perpetual Software Licensing

Adds greater value to your radios by extending the life of the software into your next hardware platform — you own the software option forever, and your licenses are simple to manage with our cloud-based tool — Vault™.

Armada® Fleet Management

Update your radios in a group rather than one at a time. One template programs both portables & mobiles. Supports direct computer connection, Over-the-Air Programming (OTAP), or Over-the-Internet Programming (OTIP).

TrueVoice™ Noise Cancellation

Software-based noise cancellation automatically filters out noise source frequencies and eliminates the need for extra configuration. Works in analog or digital mode and with any accessory.

VM8000 Mobile Specifications

General		VHF	UHF	700/800 MHz
Frequency Ranges (FCC ID: K44520000)		136-174 MHz	380-520 MHz	RX: 763-776, 851-870 MHz TX: 763-776, 793-806, 806-825, 851-870 MHz
Max. Channels Per Radio		1024 (2048 and 4096 options)		
Number of Zones		255		
Max. Channels Per Zone		255		
Channel Spacing	Analog	12.5/15/20/25[1]/30[1] kHz	12.5/25[1] kHz	12.5/25 kHz
	Digital	12.5 kHz		
Power Supply		13.6 V DC ±15 %		
Current Drain @ 13.6 V	Standby	0.45 A		
	RX @ rated audio power	3.2 A		
	TX @ rated TX power	13 A		
Operating Temperature		-22 °F to +140 °F (-30 °C to +60 °C)		
Storage Temperature		-40 °F to +185 °F (-40 °C to +85 °C)		
Frequency Stability		±1.0 ppm [-22 °F to +140 °F (-30 °C to +60 °C); +77 °F Ref. (+25 °C)]		
Electrostatic Discharge		IEC 61000-4-2 Level 4		
Dimensions[2] (W x H x D): (RF Deck + KCH-19VM Control Head)		6.69 x 1.89 x 10.81 in. (170 x 48 x 274.7 mm)		
Weight: (RF Deck + KCH-19VM Control Head)		7.5 lbs (3.4 kg)		

Receiver		VHF	UHF	700/800 MHz
Sensitivity	P25 Digital (5% BER)	-121.5 dBm (0.188 µV)	-120.5 dBm (0.211 µV)	-121.5 dBm (0.188 µV)
	Analog (12 dB SINAD) @ 12.5 kHz	-121.5 dBm (0.188 µV)	-120.5 dBm (0.211 µV)	-121.5 dBm (0.188 µV)
	Analog (12 dB SINAD) @ 25 kHz	-121.5 dBm (0.188 µV)	-120.5 dBm (0.211 µV)	-121.5 dBm (0.188 µV)
Selectivity	P25 Digital	60 dB		
	Analog @ 12.5 kHz[3]	76 dB	71 dB	70 dB
	Analog @ 25 kHz[3]	84 dB	81 dB	78 dB
Intermodulation		83 dB	82 dB	83 dB
Spurious Rejection		85 dB	90 dB	87 dB
Audio Distortion[4]		1.25% @ rated audio power (4W/15W)		
Audio Output Power[4]		4W (4Ω) / 15W (4Ω) @ 1.25% Distortion		
Modulation		FM, C4FM, H-DQPSK		

Transmitter		VHF	UHF	700/800 MHz
RF Output Power		5W/50W	5W/45W	2W/30W (700 MHz), 2W/35W (800 MHz)
Spurious Emission		80 dB	75 dB	
FM Hum & Noise	Analog @ 12.5 kHz	45 dB		40 dB
	Analog @ 25 kHz	50 dB		45 dB
Audio Distortion		1.5%		
Emission Designator		16K0F3E, 14K0F3E[5], 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 7K60FXE, 7K60FXD, 7K60F1E, 7K60F1D, 7K60F1W, 7K60FXW		
Modulation		FM, C4FM, H-CPM		

MIL-STD	810C	810D	810E	810F	810G	810H
Low Pressure	500.1/ I	500.2/ I, II	500.3/ I, II	500.4/ I, II	500.5/ I, II	500.6/ I, II
High Temperature	501.1/ I, II	501.2/ I, II	501.3/ I, II	501.4/ I, II	501.5/ I, II	501.7/ I, II
Low Temperature	502.1/ I	502.2/ I, II	502.3/ I, II	502.4/ I, II	502.5/ I, II	502.7/ I, II
Temperature Shock	503.1/ I	503.2/ I	503.3/ I	503.4/ I, II	503.5/ I	503.7/ I
Solar Radiation	505.1/ I	505.2/ I	505.3/ I	505.4/ I	505.5/ I	505.7/ I

MIL-STD	810C	810D	810E	810F	810G	810H
Rain*	506.1/ I, II	506.2/ I, II	506.3/ I, II	506.4/ I, III	506.5/ I, III	506.6/ I, III
Humidity	507.1/ I, II	507.2/ II, III	507.3/ II, III	507.4	507.5/ II	507.6/ II
Salt Fog	509.1/ I	509.2/ I	509.3/ I	509.4	509.5	509.7
Dust	510.1/ I	510.2/ I	510.3/ I	510.4/ I, III	510.5/ I	510.7/ I
Vibration	514.2/ VIII, X	514.3/ I	514.4/ I	514.5/ I	514.6/ I	514.8/ I
Shock	516.2/ I, II, III, V	516.3/ I, IV, V	516.4/ I, IV, V	516.5/ I, IV, V	516.6/ I, IV, V	516.8/ I, IV, V, VI

*Blowing rain applicable conditions: RF Deck with attached remote control head kit adapter and remote control head with attached interface kit adapter, or RF Deck with attached dash-mount control head. All interfaces must be fully sealed with appropriate covers, unless they are connected to a genuine accessory.

International Protection Standard	
Dust & Water	IP54**, IP55** (IEC 60529)

**IP54: RF Deck with attached remote control head kit adapter or RF Deck with attached dash-mount control head; IP55: Remote-mount control head with attached interface kit adapter only. All interfaces must be fully sealed with appropriate covers, unless they are connected to a genuine accessory.

Encryption Options	
Supported Encryption	AES, DES-OFB, ARC4 (ADP compatible)
Encryption Keys per Radio	Capable of storing 1024 keys. Programmable for 252 Common Key Reference (CKR). Compatible w/ Motorola Key Variable Loader.
Encryption Frame Re-sync Interval	P25 CAI 360 MSEC
Encryption Keying	External Key Loader, OTAR
Mode	OFB-Output Feedback
Encryption Type	Digital
Key Erasure	Keyboard Command, OTAR Zeroize, Tamper Detection
Standards	FIPS 140-3 Level 1 & Level 3, FIPS 197
Encryption Module	Optional FIPS 140-3 Level 3 Encryption Module (KWD-AE40K)

FIPS 140-3 Inside #4699

[1] 25/30 kHz in VHF/UHF Bands are not included in the models sold in the USA or US territories.
[2] Dash mount configuration. Projections are not included.
[3] Measured using the TIA-603 single-tone method.
[4] External audio output.
[5] 700/800 MHz Band operation only.

Analog measurements made per TIA 603E and specifications shown are typical. P25 Digital measurements made per TIA 102CAAA and specifications shown are typical. This document contains preliminary information which may include features still under development. There may be changes to the specifications and features prior to the release. The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. All other trademarks are the property of their respective owners.

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KENWOOD

VIKING®

P25 Mission Critical

VM6000

VHF · UHF (High & Low) · 700/800 MHz

P25 Phase 1 & 2 · Viking16

Uncompromised quality and performance with public safety ergonomics, the KENWOOD Viking® is the industry's only mobile platform providing TrueVoice™ noise cancellation.

Features

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, Viking16, FM Analog)
- 1024 channels (2048 and 4096 options)
- Mixed protocol zones
- P25 Authentication (Link Layer Authentication)
- P25 IP packet data
- P25 GPS data (built in GPS)[1]
- MDC-1200 & GE-Star signaling
- Analog & P25 Conventional vote scan
- Remote mount only (KCH-20RV Control Head)
- Dual Control Heads (option)
- External speaker
- Fixed control station
- WiFi
- Bluetooth
- Instant Recording Replay (IRR)
- Voice Recording
- Text Messaging
- Bluetooth Low Energy
- Custom Transmit Power Levels
- Encryption
  - · ARC4™ software encryption; compatible with Motorola ADP™
  - · DES-OFB
  - · AES-256 (FIPS 140-2) Single and Multi-Key
  - · Over-the-Air-Rekeying (OTAR)
  - · VK5000 or Motorola KVL3000/KVL4000 Keyloaders

[1]Refer to the Viking VM6000 operating manual for detailed requirements & conditions for proper GPS operation.

Accessories

Complete line of accessories including microphones, speakers & antennas.
Download the accessory catalog at
https://info.efjohnson.com/viking-accessory-catalog/

Enhanced Control Head

- Large display - 2.75" (36 x 60 mm)
- Resolution of 400 x 240 pixels
- Viewing angle of 140°
- Multi-color LCD + TX/RX (green/red/orange) LEDs
- D-Pad & more PF keys, dedicated emergency key and channel/volume control knobs
- Replaceable A/B/C button labels
- User selectable themes (8 themes available)
- Day & night display options
- An optional KCH-21RV Handheld Control Head (HHCH) can be used with the VM6000 radio

Day - High Contrast

Night - High Contrast

Compatible With P25 Systems

- ATLAS® P25 Phase 1 and Phase 2 System
- Motorola Astro® 25 - P25 Phase 1 & Phase 2
- L3Harris VIDA® - P25 Phase 1 & Phase 2
- Airbus (formerly Cassidian) VESTA™ Radio - P25 Phase 1 & Phase 2
- All P25-standard systems

We combine P25 design expertise with recognized quality & reliability along with advanced technology to make KENWOOD Viking radios simple to use & maintain.

Perpetual Software Licensing

Adds greater value to your radios by extending the life of the software into your next hardware platform — you own the software option forever, and your licenses are simple to manage with our cloud-based tool — Vault™.

Armada® Fleet Management

Update your radios in a group rather than one at a time. One template programs both portables & mobiles. Supports direct computer connection, Over-the-Air Programming (OTAP), or Over-the-Internet Programming (OTIP).

TrueVoice™ Noise Cancellation

Software-based noise cancellation automatically filters out noise source frequencies and eliminates the need for extra configuration. Works in analog or digital mode and with any accessory.

VM6730/6830/6930 Mobile Specifications

General		VM6730	VM6830	VM6930
Frequency Range		136-174 MHz	Type 1: 450-520 MHz Type 2: 380-470 MHz	RX: 762-776, 851-870 MHz TX: 762-776, 792-806, 806-825, 851-870 MHz
Max. Channels Per Radio		1024 (2048 and 4096 options)		
Number of Zones		255		
Max. Channels Per Zone		255		
Channel Spacing	Analog	12.5/15/20/25*/30* kHz	12.5/25* kHz	12.5/25 kHz
	Digital	12.5 kHz	12.5 kHz	12.5 kHz
Power Supply		13.6 V DC ±15 %		
Current Drain	Standby	1.2 A		
	RX	3.0 A		
	TX	14 A		
Operating Temperature		-22 °F to +140 °F (-30 °C to +60 °C)		
Frequency Stability [-22 °F to +140 °F (-30 °C to +60 °C), +77 °F Ref. (+25 °C)]		±1.0 ppm		
Dimensions (W x H x D): RF Deck + KRK-17BF (not including KCH-20RV)		6.73 x 1.89 x 7.24 in. (171 x 48 x 184 mm)		6.73 x 1.89 x 8.03 in. (171 x 48 x 204 mm)
Weight: RF Deck + KRK-17BF (not including KCH-20RV)		3.44 lbs (1.56 kg)		3.88 lbs (1.76 kg)

Receiver		VM6730	VM6830	VM6930
Sensitivity	P25 Digital (5% BER)	-119 dBm (0.25 µV)		
	Analog (12 dB SINAD)	-119 dBm (0.25 µV)		
Selectivity	P25 Digital	60 dB		
	Analog @ 12.5 kHz	60 dB		
	Analog @ 25 kHz	75 dB		75 dB
Intermodulation		80 dB		
Spurious Rejection		85 dB		87 dB
Audio Distortion		2%		
Audio Output Power		RF Deck: 4 W/4 Ω		
Modulation		FM, C4FM, H-DQPSK		

Transmitter		VM6730	VM6830	VM6930
RF Output Power		5W/50W	5W/45W – (Type 1: 450-485 MHz) 5W/40W – (Type 1: 485-520 MHz) 5W/40W – (Type 2: 380-470 MHz)	2W/30W (700 MHz) 2W/35W (800 MHz)
Spurious Emission		-73 dB	-75 dB	-80 dB
FM Hum & Noise	Analog @ 12.5 kHz	45 dB		40 dB
	Analog @ 25 kHz	50 dB		45 dB
Audio Distortion		2%		
Emission Designator		VM6730/6830: 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W VM6930: 16K0F3E, 14K0F3E,11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W		
Modulation		FM, C4FM, H-CPM		

Mil Standard	810C	810D	810E	810F	810G
Low Pressure	500.1/ I	500.2/ I, II	500.3/ I, II	500.4/ I, II	500.5/ I, II
High Temperature	501.1/ I, II	501.2/ I, II	501.3/ I, II	501.4/ I, II	501.5/ I, II
Low Temperature	502.1/ I	502.2/ I, II	502.3/ I, II	502.4/ I, II	502.5/ I, II
Temp. Shock	503.1/ I	503.2/ I	503.3/ I	503.4/ I, II	503.5/ I
Solar Radiation	505.1/ I	505.2/ I	505.3/ I	505.4/ I	505.5/ I
Rain	506.1/ I, II	506.2/ I, II	506.3/ I, II	506.4/ I, III	506.5/ I, III

Mil Standard	810C	810D	810E	810F	810G
Humidity	507.1/ I, II	507.2/ II, III	507.3/ II, III	507.4	507.5/ II
Salt Fog	509.1/ I	509.2/ I	509.3/ I	509.4	509.5
Dust	510.1/ I	510.2/ I	510.3/ I	510.4/ I, III	510.5/ I
Vibration	514.2/ VIII, X	514.3/ I	514.4/ I	514.5/ I	514.6/ I
Shock	516.2/ I, V	516.3/ I, V	516.4/ I, V	516.5/ I, V	516.6/ I, V

International Protection Standard	
Dust & Water	IP54, IP55[1]

[1]IP54: RF Deck of the mobile radio; IP55: Remote Control Head for the mobile radio.

Encryption Options	
Supported Encryption	AES, DES-OFB, ARC4
Encryption Key/ Radio	126 Common Key Reference (CKR), 126 Physical Identifier, (PID), Compatible w/ Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 MSEC
Encryption Keying	External Key Loader, OTAR
Mode	OFB-Output Feedback
Encryption Type	Digital
Key Erasure	Keyboard Command
Standards	FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197

*25/30 kHz in VHF/UHF Bands are not included in the models sold in the USA or US territories. Analog measurements made per TIA 603 and specifications shown are typical. Digital measurements made per TIA 102CAAA and specifications shown are typical. VM6730/6830/6930 Mobile SPECIFICATIONS All specifications are subject to change without notice. Please check the website for the latest version. V.12.18.23

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a JVCKENWOOD Company
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Phone: 800.328.3911 · efjohnson.com

KENWOOD

VIKING®

P25 Mission Critical

VM5000

VHF · UHF (High & Low) · 700/800 MHz
P25 Phase 1 & 2 · Viking16

With uncompromised quality and performance, the VM5000 has built-in speakers to take the complexities out of mission-critical communications.

Features

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, Viking16, FM Analog)
- 1024 channels
- Mixed protocol zones
- P25 Authentication (Link Layer Authentication)
- P25 IP packet data
- GPS AVL data (built in GPS)[1]
- MDC-1200 & GE-Star signaling
- Analog & P25 Conventional vote scan
- Dash mount (KCH-19 control head only)
- Remote mount
- Dual control heads
- Internal or external speaker
- Fixed control station
- WiFi (remote mount configuration only)
- Bluetooth (Future)
- Instant Recording Replay (IRR)
- Voice Recording
- Text Messaging
- Bluetooth Low Energy
- Custom Transmit Power Levels
- Encryption
  - · ARC4™ software encryption; compatible w/Motorola ADP™
  - · DES-OFB
  - · AES-256 (FIPS 140-2) Single and Multi-Key
  - · Over-the-Air-Rekeying (OTAR)

[1]Refer to the Viking VM5000 operating manual for detailed requirements & conditions for proper GPS operation.

Basic Control Head

- Resolution of 422 x 154 pixel
- Viewing angle of 140°
- User selectable themes (8 themes available)
- Day & night display options

Day - High Contrast

Night - High Contrast

Compatible With P25 Systems

- ATLAS® P25 Phase 1 and Phase 2 System
- Motorola Astro® 25 - P25 Phase 1 & Phase 2
- Harris VIDA® - P25 Phase 1 & Phase 2
- Airbus (formerly Cassidian) VESTA™ Radio - P25 Phase 1 & Phase 2

Accessories

Complete line of accessories including microphones, speakers & antennas.
Download the accessory catalog at
https://info.efjohnson.com/viking-accessory-catalog/

We combine P25 design expertise with recognized quality & reliability along with advanced technology to make KENWOOD Viking radios simple to use & maintain.

Perpetual Software Licensing

Adds greater value to your radios by extending the life of the software into your next hardware platform — you own the software option forever, and your licenses are simple to manage with our cloud-based tool — Vault™.

Armada® Fleet Management

Update your radios in a group rather than one at a time. One template programs both portables & mobiles. Supports direct computer connection, Over-the-Air Programming (OTAP), or Over-the-Internet Programming (OTIP).

TrueVoice™ Noise Cancellation

Software-based noise cancellation automatically filters out noise source frequencies and eliminates the need for extra configuration. Works in analog or digital mode and with any accessory.

VM5730/5830/5930 Mobile Specifications

General		VM5730	VM5830	VM5930
Frequency Range		136-174 MHz	Type 1: 450-520 MHz Type 2: 380-470 MHz	RX: 762-776, 851-870 MHz TX: 762-776, 792-806, 806-825, 851-870 MHz
Max. Channels Per Radio		1024		
Number of Zones		255		
Max. Channels Per Zone		255		
Channel Spacing	Analog	12.5/15/20/25*/30* kHz	12.5/25* kHz	12.5/25 kHz
	Digital	12.5 kHz	12.5 kHz	12.5 kHz
Power Supply		13.6 V DC ±15 %		
Current Drain	Standby	0.45 A		
	RX	2.3 A		
	TX	13 A		
Operating Temperature		-22 °F to +140 °F (-30 °C to +60 °C)		
Frequency Stability [-22 °F to +140 °F (-30 °C to +60 °C), +77 °F Ref. (+25 °C)]		±1.0 ppm		
Dimensions (W x H x D) Radio w/Control Head, Projections not Included		6.73 x 1.89 x 6.93 in. (171 x 48 x 176 mm)		6.73x1.89x7.72 in. (171.0 x 48.0 x 196 mm)

Receiver		VM5730	VM5830	VM5930
Sensitivity	P25 Digital (5% BER)	-119 dBm (0.25 µV)		
	Analog (12 dB SINAD)	-119 dBm (0.25 µV)		
Selectivity	P25 Digital	60 dB		
	Analog @ 12.5 kHz	60 dB		
	Analog @ 25 kHz	75 dB		75 dB
Intermodulation		80 dB		
Spurious Rejection		85 dB		87 dB
Audio Distortion		2%		
Audio Output Power		4 W/4 Ω (Remote Control Head: 3 W/4 Ω)		
Modulation		FM, C4FM, H-DQPSK		

Transmitter		VM5730	VM5830	VM5930
RF Output Power		5W/50W	5W/45W – (Type 1: 450-485 MHz) 5W/40W – (Type 1: 485-520 MHz) 5W/40W – (Type 2: 380-470 MHz)	2W/30W (700 MHz) 2W/35W (800 MHz)
Spurious Emission		-73 dB	-75 dB	-80 dB
FM Hum & Noise	Analog @ 12.5 kHz	45 dB		40 dB
	Analog @ 25 kHz	50 dB		45 dB
Audio Distortion		2%		
Emission Designator		VM5730/5830: 16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W VM5930: 16K0F3E, 14K0F3E,11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W		
Modulation		FM, C4FM, H-CPM		

Mil Standard	810C	810D	810E	810F	810G
Low Pressure	500.1/ I	500.2/ I, II	500.3/ I, II	500.4/ I, II	500.5/ I, II
High Temperature	501.1/ I, II	501.2/ I, II	501.3/ I, II	501.4/ I, II	501.5/ I, II
Low Temperature	502.1/ I	502.2/ I, II	502.3/ I, II	502.4/ I, II	502.5/ I, II
Temp. Shock	503.1/ I	503.2/ I	503.3/ I	503.4/ I, II	503.5/ I
Solar Radiation	505.1/ I	505.2/ I	505.3/ I	505.4/ I	505.5/ I
Rain	506.1/ I, II	506.2/ I, II	506.3/ I, II	506.4/ I, III	506.5/ I, III

Mil Standard	810C	810D	810E	810F	810G
Humidity	507.1/ I, II	507.2/ II, III	507.3/ II, III	507.4	507.5/ II
Salt Fog	509.1/ I	509.2/ I	509.3/ I	509.4	509.5
Dust	510.1/ I	510.2/ I	510.3/ I	510.4/ I, III	510.5/ I
Vibration	514.2/ VIII, X	514.3/ I	514.4/ I	514.5/ I	514.6/ I
Shock	516.2/ I, V	516.3/ I, V	516.4/ I, V	516.5/ I, V	516.6/ I, V

INTERNATIONAL PROTECTION STANDARD	
Dust & Water	IP54, IP55[1]

[1]IP54: RF Deck of the mobile radio; IP55: Remote Control Head for the mobile radio.

Encryption Options	
Supported Encryption	AES, DES-OFB, ARC4
Encryption Key/ Radio	126 Common Key Reference (CKR), 126 Physical Identifier, (PID), Compatible w/ Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 MSEC
Encryption Keying	External Key Loader, OTAR
Mode	OFB-Output Feedback
Encryption Type	Digital
Key Erasure	Keyboard Command
Standards	FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197

*25/30 kHz in VHF/UHF Bands are not included in the models sold in the USA or US territories.
Analog measurements made per TIA 603 and specifications shown are typical. Digital measurements made per TIA 102CAAA and specifications shown are typical. All specifications are subject to change without notice. Please check the website for the latest version.
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KENWOOD

VIKING®
P25 Mission Critical

VP8000

Multi-Band · Multi-Protocol
Mission Critical Portable Radio

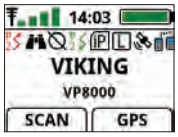
The KENWOOD Viking 8000 series Multi-Band, Multi-Protocol portable is specifically designed for today's public safety agencies with advanced features and ergonomics to meet the first responder's mission critical operational needs.

Features

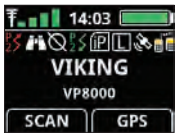
- Multi-Band operation (VHF, UHF, 700/800 MHz)
- Multi-Protocol
  - P25 Phase 1 & 2 Trunking
  - P25 Conventional
  - DMR Tier II & Tier III[1]
  - Viking16 (SmartNet/SmartZone™ Compatible)
  - FM Analog
- Mixed protocol zones (each channel in a zone can be from a different system)
- 1024 channels (2048 & 4096 options)
- Public safety ergonomics: flare grip for control, large glove friendly knobs, large emergency button
- 3-Watt audio maximum output for high noise environments
- Voice annunciation & custom announcement creation
- Fully ruggedized - IP67/68 & MIL-STD-810 C/D/E/F/G/H
- Full key models (with numeric keypad)
- Built-in GPS receiver/antenna for enhanced awareness
- MDC-1200 & GE-Star signaling
- P25 Authentication
- Bluetooth® / Bluetooth Low Energy
- Wi-Fi® 2.4 & 5 GHz (802.11a/b/g/n/ac)
- Man Down
- Instant Recording Replay (IRR) and Voice Recording
- Text Messaging
- Radio Cloning
- FIRESafe® Fire Ground Commander and First Responder
- Encryption
  - ARC4™ software encryption; compatible with Motorola ADP™
  - P25/TIA defined: AES-256
  - DES-OFB
  - Over-the-Air-Rekeying (OTAR)

User Selectable Color Themes

- Large full-color top LCD
- Multi-line text on both front and top displays
- Top flip display changes text orientation for viewing while in holster
- Multiple visual indicators including battery health & signal strength
- Day & night user selectable display options (8 themes available)



Day - High Contrast



Night - High Contrast

Accessories

Complete line of accessories including microphones, speakers & antennas.
Download the accessory catalog here:
https://info.efjohnson.com/viking-accessory-catalog/

We combine P25 design expertise with recognized quality & reliability along with advanced technology to make KENWOOD Viking radios simple to use & maintain.

Perpetual Software Licensing

Adds greater value to your radios by extending the life of the software into your next hardware platform — you own the software option forever, and your licenses are simple to manage with our cloud-based tool — Vault™.

Armada® Fleet Management

Update radios in a group rather than one at a time. One template programs both portables & mobiles. Supports either direct computer connection or Over-the-Air Programming (OTAP). Elite battery management enables wireless tracking of battery fleet.

TrueVoice™ Noise Cancellation

Software-based noise cancellation automatically filters out noise source frequencies and eliminates the need for extra configuration. Works in analog or digital mode and with any accessory.

VP8000 Portable Specifications

General		VHF	UHF	700/800 MHz
Frequency Ranges (FCC ID K44515000)		136-174 MHz	380-520 MHz	RX: 763-776, 851-870 MHz TX: 763-776, 793-806, 806-825, 851-870 MHz
Channel Spacing	Analog	12.5/15/20/25[2]/30[2] kHz	12.5/25[2] kHz	12.5/25 kHz
	Digital	12.5 kHz	12.5 kHz	12.5 kHz
Frequency Stability		±1.0 ppm -22 °F to +140 °F (-30 °C to +60 °C) [+77 °F Reference (+25 °C)]		
Maximum Channels or Talkgroups		1024 (2048 and 4096 options)		
Number of Zones		255		
Maximum Channels Per Zone		255		
Power Supply		7.5 V DC ±20%		
Operating Temperature		-22 °F to +140 °F (-30 °C to +60 °C)		
Case		Reinforced polycarbonate plastic - black or high visibility (additional fee)		
Dimensions (radio with battery)	KNB-L2 (2600 mAh)	3.04/2.28 x 5.91 x 1.73 in. (77.3/58.0 x 150.0 x 44.0 mm) [W(Top/Bottom) x H x D, projections not included]		
	KNB-L3 (3400 mAh)	3.04/2.28 x 5.91 x 1.94 in. (77.3/58.0 x 150.0 x 49.4 mm) [W(Top/Bottom) x H x D, projections not included]		
	KNB-L11 (3900 mAh)	3.04/2.28 x 5.91 x 2.02 in. (77.3/58.0 x 150.0 x 51.4 mm) [W(Top/Bottom) x H x D, projections not included]		
Weight (radio with battery)	KNB-L2 (2600 mAh)	18.7 oz (530.0 g)		
	KNB-L3 (3400 mAh)	20.2 oz (574.0 g)		
	KNB-L11 (3900 mAh)	20.7 oz (586.0 g)		

Receiver		VHF	UHF	700/800 MHz
Sensitivity	P25 Digital (5% BER)	-122 dBm (0.178 µV)	-121 dBm (0.199 µV)	-120 dBm (0.224 µV)
	Analog (12 dB SINAD) @ 12.5 kHz	-122 dBm (0.178 µV)	-121 dBm (0.199 µV)	-120 dBm (0.224 µV)
Selectivity	P25 Digital	62 dB		
	Analog @ 12.5 kHz	75 dB	71 dB	65 dB
	Analog @ 25 kHz	78 dB	75 dB	70 dB
Intermodulation		77 dB		75 dB
Spurious Rejection		85 dB		83 dB
Audio Distortion		1.25% (Analog)		
Audio Output Power		Nominal 1.5 W (P25 Digital < 1% Distortion), Maximum 3 W		

Transmitter		VHF	UHF	700/800 MHz
RF Output Power		1W/6W	1W/5W	1W/3W
Spurious Emission		77 dB	76 dB	75 dB
FM Hum & Noise	Analog @ 12.5 kHz	51 dB	47 dB	43 dB
	Analog @ 25 kHz	57 dB	53 dB	49 dB
Audio Distortion		1%		
Emission Designator		11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 7K60FXD, 7K60FXE, 7K60F1E, 7K60F1D, 7K60F1W, 7K60FXW		16K0F3E, 14K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W, 7K60FXD, 7K60FXE, 7K60F1E, 7K60F1D, 7K60F1W, 7K60FXW

MIL Standard	810H
Low Pressure	500.6/ I, II
High Temperature	501.7/ I, II
Low Temperature	502.7/ I, II
Temp. Shock	503.7/ I
Solar Radiation	505.7/ I
Rain	506.6/ I, III
Humidity	507.6/ II
Salt Fog	509.7
Dust	510.7/ I
Vibration	514.8/ I
Immersion	512.6/I
Shock	516.8/ I, IV, VI

Encryption Options	
Supported Encryption	AES, DES-OFB, ARC4 (ADP compatible)
Encryption Keys per Radio	Capable of storing 1024 keys. Programmable for 252. Common Key Reference (CKR), 252 Physical Identifier, (PID), Compatible w/ Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 MSEC
Encryption Keying	External Key Loader, OTAR
Mode	OFB-Output Feedback
Encryption Type	Digital
Key Erasure	Keyboard Command, OTAR Zeroize, Tamper Detection
Standards	FIPS 140-3 Level 1, FIPS 140-3 Level 3, FIPS 197 (Pending)

Hazardous Location Standard	
Certification Lab	CSA Group
Standard Applied	ANSI/TIA 4950-A-2014, UL913 5th Edition & ANSI/ISA-12.12.01-2011
Classification Rating	Intrinsically Safe: Classes I[3] II, III, Division 1, Groups C, D, E, F, G Non-incendive: Class I, Division 2, Groups A, B
Approved Battery	KNB-LS7
Approved Speaker Microphones	KMC-70M, KMC-70GR, KMC-72W

International Protection Standard	
Dust & Water	IP54, IP55
Immersion	IP67, IP68[4]

[1] DMR Tier III- future release

[2] 25 and 30 kHz are not included in the models sold in the USA or US territories.

[3] Division I US Group C is applicable for radio with approved battery only, or radio with approved battery and KMC-70-type speaker microphone only. If radio is in combination with any other approved accessories, Group D is applicable.

[4] IP68 = 2 m/2 hours

Specifications shown are typical and subject to change without notice. Please check the website for the latest version. V.11.16.23

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KENWOOD

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P25 Mission Critical

VP5000

VHF · UHF (High & Low) · 700/800 MHz

P25 Phase 1 & 2 · Viking16

At just under 5.5 inches tall (140 mm), these small KENWOOD Viking portable radios are packed with advanced features for today's public safety agencies.

Features

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, Viking16, FM Analog)
- Mixed protocol zones (each channel in a zone can be from a different system)
- 1024 channels
- 1 Watt audio output for high noise environments
- Voice annunciation & custom announcement creation
- Fully ruggedized - IP67/IP68 & MIL-STD-810 C/D/E/F/G
- Full key models (w/numeric keypad) & standard key models (w/o numeric keypad)
- Built-In GPS receiver/antenna for enhanced awareness[1]
- MDC-1200 & GE-Star signaling
- P25 Authentication
- Bluetooth®
- Man Down
- Instant Recording Replay (IRR)
- Voice Recording
- Text Messaging
- Radio Cloning
- Bluetooth Low Energy
- Encryption
  - · ARC4™ software encryption; compatible w/Motorola ADP™
  - · DES-OFB
  - · AES-256 (FIPS 140-2) Single and Multi-Key
  - · Over-the-Air-Rekeying (OTAR)
  - · VK5000 or Motorola KVL3000/KVL4000 Keyloader

User Selectable Color Themes

- Multi-line text
- Multiple visual indicators including battery health & signal strength
- Day & night user selectable display options (8 themes available)

Day - High Contrast

Night - High Contrast

Compatible With P25 Systems

- ATLAS® P25 Phase 1 and Phase 2 System
- Motorola Astro® 25 - P25 Phase 1 & Phase 2
- Harris VIDA® - P25 Phase 1 & Phase 2
- Airbus (formerly Cassidian) VESTA™ Radio - P25 Phase 1 & Phase 2

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Update radios in a group rather than one at a time. One template programs both portables & mobiles. Supports either direct computer connection or Over-the-Air Programming (OTAP). Elite battery management enables wireless tracking of battery fleet.

TrueVoice™ Noise Cancellation

Software-based noise cancellation automatically filters out noise source frequencies and eliminates the need for extra configuration. Works in analog or digital mode and with any accessory.

VP5230/5330/5430 Portable Specifications

General		VP5230	VP5330	VP5430
Frequency Range		136-174 MHz (FCC ID K44431400)	Type 1: 450-520 MHz (FCC ID K44431500) Type 2: 380-470 MHz (FCC ID K44431501)	RX: 763-776, 851-870 MHz TX: 763-776, 793-806, 806-825, 851-870 MHz (FCC ID ALH442000)
Max. Channels Per Radio		1024		
Number of Zones		255		
Max. Channels Per Zone		255		
Channel Spacing	Analog	12.5/15/20/25*/30* kHz	12.5/25* kHz	12.5/25 kHz
	Digital	12.5 kHz	12.5 kHz	12.5 kHz
Power Supply		7.5 V DC ±20%		
Operating Temperature		-22 °F to +140 °F (-30 °C to +60 °C)		
Frequency Stability [-22 °F to +140 °F (-30 °C to +60 °C), +77 °F Ref. (+25 °C)]		±1.0 ppm		
Dimensions (W x H x D) Projections Not Included	KNB-L2 (2,600 mAh)	2.28 x 5.47 x 1.56 in. (58.0 x 138.9 x 39.5 mm)		
	KNB-L3 (3,400 mAh)	2.28 x 5.47 x 1.77 in. (58.0 x 138.9 x 44.9 mm)		
Weight with Battery	KNB-L2 (2,600 mAh)	14.3 oz (406 g)		
	KNB-L3 (3,400 mAh)	15.8 oz (449 g)		

Receiver		VP5230	VP5330	VP5430
Sensitivity	P25 Digital (5% BER)	-119 dBm (0.025 µV)		
	Analog (12 dB SINAD)	-119 dBm (0.025 µV)		
Selectivity	P25 Digital	60 dB		
	Analog @ 12.5 kHz	65 dB		
	Analog @ 25 kHz	73 dB		
Intermodulation		73 dB		75 dB
Spurious Rejection		80 dB	75 dB	
Audio Distortion		3%		
Audio Output Power		500 mW/8 Ω (3% Distortion)/1,000 mW/8 Ω (5% Distortion)		
Modulation		FM, C4FM, H-DQPSK		

Transmitter		VP5230	VP5330	VP5430
RF Output Power		1W/6W	1W/5W	1W/3W
Spurious Emission		-70 dB		
FM Hum & Noise	Analog @ 12.5 kHz	40 dB		
	Analog @ 25 kHz	45 dB		
Audio Distortion		2%		
Emission Designator		16K0F3E, 11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W		16K0F3E, 14K0F3E,11K0F3E, 8K10F1E, 8K10F1D, 8K10F1W
Modulation		FM, C4FM, H-CPM		

Mil Standard	810G
Low Pressure	500.5/ I, II
High Temperature	501.5/ I, II
Low Temperature	502.5/ I, II
Temp. Shock	503.5/ I
Solar Radiation	505.5/ I
Rain	506.5/ I, III
Humidity	507.5/ II
Salt Fog	509.5
Dust	510.5/ I
Vibration	514.6/ I
Immersion	512.5/I
Shock	516.6/I, IV

Encryption Options	
Supported Encryption	AES, DES-OFB, ARC4
Encryption Key/ Radio	126 Common Key Reference (CKR), 126 Physical Identifier, (PID), Compatible w/ Motorola Key Variable Loader
Encryption Frame Re-sync Interval	P25 CAI 360 MSEC
Encryption Keying	External Key Loader, OTAR
Mode	OFB-Output Feedback
Encryption Type	Digital
Key Erasure	Keyboard Command
Standards	FIPS 46-3, FIPS 81, FIPS 140-2, FIPS 197

Hazardous Location Certification	
Certification Lab	CSA Group
Standard Applied	ANSI/TIA 4950-A-2014, UL913 5th Edition & ANSI/ ISA-12.12.01-2011
Classification Rating	Intrinsically Safe: Classes I, II, III, Division 1, Groups D, E, F, G Non-incendive: Class I, Division 2, Groups A, B, C, D
Approved Battery	KNB-LS7
Approved Speaker Micro-phones	KMC-54WDM, KMC-70M

International Protection Standard	
Dust & Water	IP54, IP55
Immersion	IP67**/68***

[1]Refer to the Viking VP5000 operating manual for detailed requirements & conditions for proper GPS operation.
* 25/30 kHz in VHF/UHF Bands (except T-Band) are not included in the models sold in the USA or US territories.
** IP67/68 - Must have the Speaker Mic Universal Connector or Universal Connector Protector connected.
***IP68=1m/2H
Specifications shown are typical and subject to change without notice Please check the website for the latest version. V.09.25.21
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L3 Harris

Radio				Add On / Capabilities											
Radio Model	Radio Type	Current MSRP $	Discounts Offered	OTAP	$	WIFI Programming	$	GPS Capable	$	Bluetooth	$	Multikey Encrytpion	AES + $	ADP + $	DES +$
XL-95P	Portable	4400.02	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-185P	Portable	5385.03	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-200P	Portable	6660.02	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-400P	Portable	12820.02	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-185M	Mobile	8330.02	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-200M	Mobile	9565.01	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Yes	Incl	Yes	Incl	Option	785	Incl	Incl w AES
XL-85M	Mobile	4865.02	26%; Qty 10-49 35%, Qty 50-99 40%, Qty 100+ 45%	Option	395	Yes	Incl	Option	755	Yes	Incl	Option	785	Incl	Incl w AES
XL-85M: Pending certification with MPSCS															
Base radio includes: Transceiver; P25 Phase 1 Trunking/Conv, Analog Conv; Phase 2/TDMA; P25C Fallback/MS Failsoft; 700/800 MHz incl Guard Band; MDC-1200; Status Message; Tier 2 GPS; Standard Warranty															
Mobiles: CH2 Control Head, Palm Mic, Speaker, Universal Mount Kit, Antenna Base; Portables: Battery, Belt Clip; Antenna; 2-Year															
Discounts Offered per MiDEAL/DTMB Contract 210000000897; prices furnished at MSRP															
Regarding OTAP: Please consult with MPSCS whether they support the use of L3Harris OTAP via P25 data conveyance; requires L3Harris OTAP PC application															

Radio Model	Top Screen	$	Dual or multiple band	$	Intrinsically Safe	$	Fire Services Rated Peripherals Offered and current MSRP $	Accessories offered and current MSRP $
XL-95P	No	N/A	No	N/A	C1D2 Option	90	500F Speaker Mic $399, Leather Case w/ Shoulder Strap $100	Speaker Mic $210, Leather Case/D-Post $70, Extra Battery $155, Extra C1D2 Battery $245, Single Charger $170, 6-Bay Charger $945, Add'l 3-Year Warranty $200
XL-185P	Yes	included	No	N/A	C1D2 Option	75	500F Speaker Mic $425, Extreme Speaker Mic $825, Leather Case w Shoulder Strap $120, Advanced Safety Feature $200	Speaker Mic $255, Leather Case/D-Swivel $65, Extra Std Cap Battery $175, High Cap Battery $215, Extra C1D2 Std Battery $250, High Cap C1D2 Battery $275, Single+ Charger $250, 6-Bay Charger $945, Add'l 3-Year Warranty $220
XL-200P	Yes	included	Optional	Dual $125(	C1D2 Option	75	500F Speaker Mic $425, Extreme Speaker Mic $825, Leather Case w Shoulder Strap $120, Advanced Safety Feature $200	Speaker Mic $255, Leather Case/D-Swivel $65, Extra Std Cap Battery $175, High Cap Battery $215, Extra C1D2 Std Battery $250, High Cap C1D2 Battery $275, Single+ Charger $250, 6-Bay Charger $945, Add'l 3-Year Warranty $220

XL-400P	Yes	included	Optional	Dual $125(	C1D2	Incl	NFPA 1802 radio; see accessories	Homeland-Six Case/Shoulder-Strap/Anti-Sway Included w/ Radio, Extreme Speaker Mic $825, Extra C1D2 Battery $275, Single+ Charger $250, 6-Bay Charger $945, Add'l 3-Year Warranty $250
XL-185M	N/A	N/A	No	N/A	N/A	N/A	N/A	Add'l CH2 Control Head w/ Speaker & Palm Mic $1159, Add'l 3-Year Warranty $275
XL-200M	N/A	N/A	Optional	Dual $600;	N/A	N/A	N/A	Add'l CH2 Control Head w/ Speaker & Palm Mic $1159, Add'l 3-Year Warranty $275
XL-85M	N/A	N/A	No	N/A	N/A	N/A	N/A	Remote Mt Kit $837, Dual CH2 Control Head Remote Mount Kit with Speaker and Palm Mic $1989, Add'l 3-Year Warranty $275

S T A T E O F M I C H I G A N

ALLEGAN COUNTY 911 POLICY & PROCEDURE BOARD

CENTRAL DISPATCH – Radio Guide

WHEREAS, the 911 Policy and Procedure Board (Board) authorized the formation of the Central Radio Project Fact Finding Workgroup (Workgroup) at its January 2025 meeting; and

WHEREAS, the Workgroup was tasked with gathering and compiling facts related to the current radios issued to Public Safety within Allegan County through the 2016 Central Dispatch Radio Project; and

WHEREAS, the Workgroup was further tasked with creating a document for the use of local units to guide them in the upgrade or replacement of the aforementioned radios; and

WHEREAS, the Workgroup has compiled and submitted a Radio Guide to the Board.

THEREFORE, BE IT RESOLVED that the Board hereby accepts the submission of the Radio Guide; and

BE IT FURTHER RESOLVED that the Board supports the distribution of the Radio Guide to all Allegan County Public Safety Agencies and local units of government; and

BE IT FINALLY RESOLVED that the workgroup is thanked for its efforts and is considered dissolved.

Allegan County

Quarterly Report

SERVICE AREA: Central Disaptch

SUBMITTED BY: Jeremy Ludwig

PERIOD OF REPORTING: Quarter 2

1/1/25 thru 3/31/25	- Statistics provided in April
4/1/25 thru 6/30/25	- Statistics provided in July
7/1/25 thru 9/30/25	- Statistics provided in October
10/1/25 thru 12/31/25	- Statistics provided in January

TABLE OF CONTENTS:

1.0 Projects…… pg 2
2.0 Employee Engagement….. pg 5
3.0 Operations…….. pg 6
4.0 Customer Services…….. pg 8
5.0 Financial…….. pg 13

1.0 LIST OF ACTIVE PROJECTS (by service area):

STAGE	DESCRIPTION
Not Started	Project has been approved but is not scheduled to begin until the specified start date based on resource availability, project priority and window of opportunity for contracting and execution.
Development	Detailed scope of work for the project is being developed or refined and documented in preparation for purchasing or contracting.
Cancelled	The project was cancelled for a reason and will not be considered as presented. Will need to go through development stage again for reconsideration, prioritization and acceptance.
Contracting	Purchasing policy is being applied to requisition goods or services based on the developed scope of work. Stage concludes with necessary purchasing approvals and contract negotiation.
Execution	In the execution stage, work is being done to achieve the desired outcomes. This stage may be short in the case of a vehicle purchase or lengthy if implementing a major software solution.
On Hold	Prior to or during the execution stage, elements of the project were not following the desire activity schedule. Despite mitigation strategies to bring back on track, the project team determined to put on hold for a period of time.
Monitoring	In monitoring, the project is reviewed and debriefed to evaluate the degree to which the scope of work has been completed and desired outcomes successfully realized.
Completed	Project is fully completed.

1.1 PROJECTS

STAGE	PROJECT NAME & DESCRIPTION (include 1-2 sentence description)	PLANNED START	ACTUAL START	PLANNED END	ACTUAL END	APPROVED BUDGET	ACTUAL EXPENSES	PROGRESS - last action and next action (2-4 sentences per action description, any changes from original scope)
Execution	Mass Notification System	1/26/2024	1/26/2024	3/30/2025	3/30//2025	$ 100,000.00	$28,568.40 - pending invoicing	Contract with RAVE was finalized in February; however, orientation and training for administrators were conducted in January for Dispatch and Emergency Management. A soft go-live of RAVE Alert was implemented and used on March 30, 2025, to issue a warning concerning severe weather in Allegan County.
Execution	Virtual Academy	12/1/2024	12/1/2024	6/30/2025	3/30/2025	$ 4,290.00	$ 4,290.00	Dispatch has contracted with Virtual Academy for a cloud-based solution that will organize, store, and retain policies and procedures as well as digitize training documents and processes. Virtual Academy also comes with over 70 hours of SNC-approved training modules to support continuing education requirements set by the State for Telecommunicators. We have already begun to use the training modules and have added all of our Policies and Procedures as well as training documents into the platform. Training for staff is scheduled to occur by the end of September for full use of the solution.
Execution	Emergency Fire Dispatch (EFD)	2/1/2025	2/1/2025	10/31/2025	3/21/2025	$ 110,000.00	$ 99,263.00	A contract has been executed with Priority Dispatch to add EFD to our current EMD module. ACCD will be working with Priority Dispatch to determine a schedule for implementation and go-live, to include training and working with the Allegan County Fire Chiefs' Association to review and approve protocols that will be used by ACCD as part of EFD. Due to training requirements and constraints with current staffing levels, this will likely be a multi-year project with go-live potentially in 2026.
Development	Radios and Encryption	Scoping started 1/21/2025	1/21/2025	6/30/2026	TBD	TBD	TBD	Due to requirements under the FBI's CJIS Policy, encryption standards will need to be updated on all Allegan County Law Enforcement Radios and related Dispatch equipment. The current ADP encryption we use was deemed non-compliant. The current radios deployed may not be able to upgrade to the new standard, and a workgroup through the 911 Policy Board was formed to investigate and provide an FAQ sheet for both the County and Local units on the issue. The FAQ is completed and will be presented to the 911 Policy Board on July 15, 2025.

2.0 KEY PERFORMANCE INDICATORS (KPI) – ENGAGEMENT:

ORGANIZATIONAL	Q1	Q2	Q3	Q4
Turn over rate *(# of separated divided by total employees)*				
# of days to hire (average)				
% complete toward identified staff professional development	57%	139%		

SERVICE AREA	Q1	Q2	Q3	Q4
Employee Engagement				
Employee Engagement (bi-annual)	due by Q4			
Staffing				
Full time employees (FTE) (28)	22	22		
# of IRPT Dispatchers	1	1		
# of Dispatchers (20)	11	12		
# of Supervisors (4)	4	3		
# of Administrative Assistants (1)	1	1		
# of Training Coordinators (1)	1	1		
# of Directors (1)	1	1		
# of Deputy Directors (1)	1	1		
# of Employees in Introductory Training	3	3		
# of Employees who separated from Dispatch	0	0		
# of Vacant Positions	6	6		
Professional Development (Target: 8 hrs of training per FTE, quarterly. Annual cumulative team target of 640+)				
Total cumulative team hours of professional development	342.5	485.9		
Average hours of professional development per FTE	57	81		
Overtime				
Total Hours of Overtime	313	120		
Total Hours of Mandated Overtime	12.5	0		
Percentage of Mandated OT	4%	0.0%		

Safety				
# of work place injuries incidents	0	0		
Lost time due to injury (days)	0	0		

3.0 KEY PERFORMANCE INDICATORS (KPI) - OPERATIONS (by service area):

ORGANIZATIONAL	Q1	Q2	Q3	Q4
# of Standards of Work (SOW) Total	142	155		
# of Standards of Work (SOW) Completed Total	142	155		
# of Standards of Work (SOW) planned to review this year	155			
# of Standards of Work (SOW) reviewed this quarter	45	30		

SERVICE AREA	Q1	Q2	Q3	Q4
Radios (Harris System Only)				
800 Mhz mobiles	0	0		
800 Mhz portables	0	0		
VHF radios	1	1		
VHF pagers	0	0		
Radios (Motorola System Only)				
800 Mhz mobiles	2	2		
800 Mhz portables	10	10		
VHF radios	2	2		
VHF pagers	3	3		
Towers				
Owned	5	5		
Leased	3	3		
800 Mhz only	8	8		
VHF only	4	4		
Dispatch				
Dispatcher stations	6	6		
Law enforcement agencies served	9	9		
Fire departments served	21	21		
EMS agencies served	5	5		

4.0 KEY PERFORMANCE INDICATORS (KPI) - CUSTOMER SERVICE (by area):

ORGANIZATIONAL	Q1	Q2	Q3	Q4
Customer Service Satisfaction - internal customers	0	0		
Customer Service Satisfaction - external customers	1	0		

SERVICE AREA	Q1	Q2	Q3	Q4
911	Calls for Service (CFS) Dispatched by Agency			

Law Enforcement	Q1	Q2	Q3	Q4
Allegan City Police Department	967	995		
Allegan County Central Dispatch	45	50		
Allegan County Emergency Management	8	8		
Allegan County Medical Examiner	52	39		
Allegan County Sheriff's Office	6229	6937		
DNR-PLAINWELL	14	31		
Douglas Police Department	603	701		
Fennville Police Department	4	2		
Gun Lake Tribal Public Safety Department	225	276		
Hopkins Police Department	0	0		
Michigan State Police Wayland	1792	1674		
Otsego Police Department	533	673		
Plainwell Department of Public Safety	705	756		
Wayland Police Department	639	807		
Total	**11,816**	**12,949**	**0**	**0**

Fire Services	Q1	Q2	Q3	Q4
Allegan County Dive Team	0	4		
Alamo Twp Fire Department	0	1		
Allegan Fire District	112	136		
Byron Township Fire Department	0	0		
Bloomingdale Fire Department	14	13		
Caledonia Fire Department	1	1		
Clyde Fire Department	38	39		
Columbia Twp Fire Department - Van Buren County	4	6		
DNR FIRE	12	30		
Dorr Fire Department	141	143		
Dutton Fire Department	1	1		
Fennville Fire Department	134	126		
Ganges Fire Department	82	93		
Graafschap Fire Department	204	244		
Gun Plain Fire Department	67	84		
Hamilton Fire Department	128	161		
Holland City Fire Department	12	8		
Hopkins Fire Department	149	141		
Lee Fire Department	154	169		
Leighton Fire Department	149	165		
Martin Fire Department	106	124		

MDOT	107	59		
Orangeville Fire Department	1	1		
Otsego Fire Department	374	318		
Overisel Fire Department	45	89		
Park Township Fire Department	0	2		
Pinegrove Fire Department	36	48		
Plainwell Fire Department	40	32		
Salem Fire Department	132	110		
Saugatuck Fire Department	247	325		
South Haven Fire Department	38	53		
Wayland Fire Department	285	288		
Zeeland Fire Department	0	4		
Total	**2,813**	**3,018**	**0**	**0**

EMS	**Q1**	**Q2**	**Q3**	**Q4**
Aero Med	0	4		
Grand Rapids AMR	2	2		
Holland AMR	250	282		
Life EMS Ambulance	1172	1222		
Plainwell Emergency Medical Service	926	826		
South Haven Ambulance	75	81		
Thornapple Ambulance	10	8		
Wayland Ambulance Company	1067	944		
West Michigan Air Care	0	0		
Total	**3,502**	**3,365**	**0**	**0**

Call Totals by Type	**Q1**	**Q2**	**Q3**	**Q4**
911 - Landline	333	393		
911 - Wireless	7,044	8,198		
911 - VOIP	663	562		
911 - Abandoned	539	718		
Non-Emergency - Inbound	14,068	15,770		
Non Emergency - Abandoned	307	397		
Administrative - Outbound	6,137	6,755		
Text - Inbound	129	168		
Text - Outbound	113	208		
Total	**29,333**	**33,169**	**0**	**0**

FOIA	**Requests Received and Hours Utilized**			
FOIA Requests	**Q1**	**Q2**	**Q3**	**Q4**
# opened	77	77		
Total # hours spent to complete	10.92	12.38		
Average hours per request	0.14	0.16	#DIV/0!	#DIV/0!

Technical Support Services	**Requests Received and Hours Utilized**			
Support Requests	**Q1**	**Q2**	**Q3**	**Q4**
Support requests received	202	312	0	0

Priority 1 support (emergency requests for service or unscheduled walk in)				
# opened	0	0		
# completed	0	0		
# hours	0	0		

Average open time before completion	0.00	0.00	#DIV/0!	#DIV/0!

Priority 2 support (general requests for service)				
# opened	155	173		
# completed	155	173		
# hours	41	45		
Average hours open time before completion	0.26	0.26	#DIV/0!	#DIV/0!

Priority 3 support (project requests or require advanced scheduling)				
# opened	1	0		
# completed	1	0		
# hours	0	0		
Average open time before completion	0.00	0.00	#DIV/0!	#DIV/0!

MSAG support (modification, verification, adding of MSAG data)				
# opened	46	139		
# completed	46	139		
# hours	37.25	26.5		
Average open time before completion	0.81	0.19	#DIV/0!	#DIV/0!

5.0 KEY PERFORMANCE INDICATORS (KPI) - FINANCIAL (by activity):

Fund #: 261- Central Dispatch/E911 Fund			**Activity #: 325**		
	AMOUNT	**%**		**AMOUNT**	**%**
2024 Revenue Budget	$ 3,310,374.00		2024 Expense Budget	$ 3,330,239.00	
Q1 Revenue	$ 16,331	0.49%	Q1 Expenditures	$ 835,897	25.10%
Q2 Revenue	$ 837,213	25.29%	Q2 Expenditures	$ 744,890	22.37%
Q3 Revenue		0.00%	Q3 Expenditures		0.00%
Q4 Revenue		0.00%	Q4 Expenditures		0.00%
YTD	**$853,544**	**25.78%**		**$1,580,787**	**47.47%**

ADDITIONAL INFORMATION: Per EDEN 7/3/20205

Fund #: 496 - Central Dispatch CIP			**Activity #: 325 -Central Dispatch/911**		
	AMOUNT	**%**		**AMOUNT**	**%**
2024 Revenue Budget	$ 766,132		2024 Expense Budget	$ 662,088	
Q1 Revenue	$ 4,170	0.54%	Q1 Expenditures	$ 106,247	16.05%
Q2 Revenue	$ 273,405	35.69%	Q2 Expenditures	$ 13,746	2.08%
Q3 Revenue		0.00%	Q3 Expenditures		0.00%
Q4 Revenue		0.00%	Q4 Expenditures		0.00%
YTD	**$ 277,575**	**36.23%**		**$ 119,993**	**18.12%**

ADDITIONAL INFORMATION: Per EDEN 7/3/20205

Non-Preference Towing Summary

Complaints received regarding six different wrecker companies Jan - June 2025

Date	Issue Reported	Results
1/4/2025	Adding unauthorized fees to invoices	Warning
2/22/2025	Wrecker Operator Impaired	Warning
2/26/2025	Unauthorized storage at home of wrecker operator	Warning
3/13/2025	Adding unauthorized fees to invoices	Warning
4/28/2025	Wreckless Driving, failure to properly secure vehicle	Warning
5/29/2025	Exceeding time limit to arrive on scene	Warning
5/31/2025	Unauthorized subcontracting	Warning
5/31/2025	Attempted to charge owner to collect personal items	Suspended
6/14/2025	Wreckless Driving, failure to properly secure vehicle	Suspended
6/24/2025	Adding unauthorized fees to invoices	Suspended
6/24/2025	Adding unauthorized fees to invoices	Warning