CONSTANT ASSOCIATES

Multnomah County

MULTNOMAH COUNTY
COMMUNICATION GAP ANALYSIS
FINAL REPORT

Document Date: November 2022

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EXECUTIVE SUMMARY

Multnomah County Office of Emergency Management (MCEM) is responsible for building a more prepared and resilient community for any emergency event. Large and small-scale events may severely impact or overwhelm communication capabilities. Better understanding local radio communications capabilities and systems will assist local disaster response partners in providing accurate and timely information for decision-making and guiding response actions during an event. This project brought together communications professionals from throughout the County to collaborate on a county-wide communications gap analysis that addresses the current state of radio communication assets and capabilities for public, private, and non-profit emergency response partners.

Multnomah County engaged 21 organizations to help close the radio communication gap and increase the County's response capabilities. These organizations represent partners who may already have robust or no radio communication capabilities at all, but they all may be called upon to support disaster response. These organizations were not required to participate; but contributed to the analysis by completing an Assessment Tool, a survey, and/or participating in a small group interview.

The data collection revealed that there are noteworthy radio communication gaps in Multnomah County. These gaps center on planning and available radio equipment for non-public safety organizations. These organizations know that they would need to communicate with the County to maintain continuity communication for essential functions. The organizations that do have radio capabilities mainly use those systems for internal communication and do not have plans in place for external communication. Available information regarding support functions like planning, training, guides, personnel, and maintenance is wanting. This is even more evident when discussing secondary and Auxiliary Communication (AUXCOMM) capabilities.

The steps following the report are the most important. In the short-term, Multnomah County will use the report to establish a specific action plan that includes corrective actions with project leads and associated timeframes. They will also prioritize corrective actions for implementation. The County will also integrate the findings into the County Improvement Plan managed by MCEM and request quarterly updates. Long-term, these findings will influence the update of Tactical Communication Plan, spur more routine communications engagement (either county or regionally), and the potential for follow on Communication Assessments that measure collective growth and review priorities.

Summary of Gap Analysis and Key Findings

Key Findings:

- Many participants (71%) had radio capabilities; however, most of them use it for internal communication and a few organizations could communicate with law enforcement. Less than half of the participants had a secondary system and only a third had a form of AUXCOMM capability.
- Three-fourths of participants felt “strongly prepared” (8%) or “prepared” (69%) to communicate via radio in a disaster and the rest felt “not prepared” (15%) or “strongly not prepared” (8%).
- Nearly all organizations (94%) acknowledged in the supplementary survey that they would need to communicate with an external organization in a disaster to maintain continuity communications. More specifically, almost all said they would need to communicate with Multnomah County but less than half confirmed they could communicate with Multnomah County.
- Faith-based and social service organizations that completed the Assessment Tool and survey did not have primary radio systems. These organizations play a critical role in emergency response operations supporting vulnerable populations and operating shelters.
- Of the participants with primary radio systems (71%), three-fourths (47% overall) had access to repeaters or plan/process in place for accessing a repeater. Repeaters will be critical for communicating over distance and with external organizations during a disaster.
- On average, the 17 organizations were able to affirmatively respond to just over five out of the 12 of the capability questions in the Assessment Tool. County and local government agencies were able to say yes at a higher rate than the other organizations participating.
- Organizations provided limited information about planning, training, exercises, and events that utilized radios. There was even less information for those items with secondary radio systems and AUXCOMM.
- Just under half (47%) of the organizations have access to vendor information. However, five of the organizations indicated that the information was stored on internal databases/shared drives. No organization indicated they had physical copies of their vendor information. Physical copies of information will be critical when a disaster has impacted communication systems because they will likely be the same systems that support information technology.

Assessment Tool Data Summary:

Sector/Industry	# of Assessments	Completed Inventory	Primary Systems	Repeater Capabilities	Multiple Channels/Frequencie	Maintenance Personnel	Vendor Information	Will Not Dump Programming	Personnel Trained to Program	Backup Batteries	Secondary Systems	Maintenance Personnel	Vendor Information (Secondary)	AUXCOMM
City Government	1	1	1	0	0	0	0	0	0	0	1	0	0	1
College/Univ.	2	1	2	2	1	1	1	0	0	0	1	0	0	0
Faith-Based Organization	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Federal	5	2	2	1	1	2	2	2	1	2	1	1	1	1
Private Sector	1	0	1	0	0	1	1	1	1	1	0	0	0	1
Public Safety (Volunteer)	1	1	1	0	1	1	0	1	0	1	1	1	0	0
Regional Organization	1	0	1	1	1	1	1	1	0	1	0	0	0	0
School District	2	2	2	2	1	2	2	1	1	1	1	0	1	0
Social Services	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Special District	2	1	2	2	2	2	1	1	1	1	1	1	1	1
Total	**17**	**8**	**12**	**8**	**7**	**10**	**8**	**7**	**4**	**7**	**6**	**3**	**3**	**4**
Percentage	*100%*	*47%*	*71%*	*47%*	*41%*	*59%*	*47%*	*41%*	*24%*	*41%*	*35%*	*18%*	*18%*	*24%*

Thank You and Acknowledgments

Completion of this report would not have been possible without active participation from members of the workgroup and participating organizations. These individuals and organizations recognized the importance of improving primary radio communication systems and improving back up and auxiliary options. Thank you to all those that made this report possible. The methodology section identifies contributing organizations.

INTRODUCTION

Purpose

The purpose of the Communication Gap Analysis Report is to address the status of county-wide radio equipment, trained personnel, planning documentation, and implemented programs. Based on research and data collection, this report identifies recommendations for the County and participating organizations to strengthen their communications capabilities through enhanced planning, expanded capacity, systems improvements, equipment deployment, training, exercising, standards development, and other appropriate actions.

Process

The County completed this report in a phased process, incorporating communication assessments, inventories, and survey data collected from participating organizations. The Project Workgroup, consisting of ten technical specialists from Multnomah County, developed the Assessment Tool and inventory. Next, the Project Team identified organizations for participation through a list of licensed radio operators in the County and submissions from the Project Workgroup.

Of note, this report does not focus on radio communications capabilities and equipment from public safety partners/first responders. Instead, this data collection was focused on including a wide range of emergency response partners that may not receive consistent radio communication support; but radio communication is part of their routine operations and/or their emergency communication plan. Examples include Universities, Transportation Agencies, Healthcare Organizations, Municipal Emergency Management Offices, non-profit organizations, and private companies among others who may support emergency responses.

How to Use this Document

The information provided by organizations was compiled to provide an assessment of existing gaps county-wide and chart a path to close the gaps. The information in this report is not a critical analysis of the radio communication capabilities of participating organizations. The included recommendations are options identified for strengthening local government, and countywide response partners, disaster communications capabilities through enhanced planning, expanded capacity, systems improvements, equipment deployment, and other appropriate actions.

REPORT OVERVIEW

Organization

The Gap Analysis Report covers primary, secondary, and AUXCOMM systems, and is organized into Key Findings, Best Practices, and Lessons Learned, and Recommendations. Each Key Finding has referenced recommendations that are compiled in the Recommendations section.

Recommendations are sorted by Equipment, Planning, Training and Exercises, and Maintenance. These recommendations may apply to multiple systems and include associated outcomes, benefits, and costs. Multiple recommendations are provided for each key finding as the recommendations are not mutually independent from each other.

Methodology

Development of the Gap Analysis Report was divided into three phases:

- Phase 1: Refine Scope and Communications Assessment Development
- Phase 2: Assessment Completion and Draft Project Report Development
- Phase 3: Project Report Development

Phase 1

Phase 1 included the formation of a Project Workgroup consisting of technical specialists who refined the report's scope, determined participating organizations, and reviewed draft and final products. The workgroup also functioned as local points of contact for questions and clarification. Workgroup members included:

- Multnomah County Amateur Radio Emergency Service (ARES)
- Multnomah County Department of County Assets (DCA)
- Multnomah County Department of County Management (DCM)
- Multnomah County Office of Emergency Management (MCEM)
- Multnomah County Sheriff's Office (MCSO)
- Portland Bureau of Emergency Management (PBEM)
- Oregon Department of Administrative Services (DAS)
- Oregon Office of Emergency Management (OEM)

The County developed an Assessment Tool with input from the Project Workgroup for distribution to participating organizations. Participating organizations completed the Assessment Tool that included an inventory template and fillable Adobe Portable Document Format. The inventory included radio equipment for primary, secondary, and AUXCOMM communication systems and associated support equipment. The inventory also compiled information related to the associated radios, status, location, date of last use, and any additional information.

Phase 2

In Phase 2 of the project, the County conducted data collection to include the distribution and completion of the Assessment Tool and interviews with participating organizations. The Project Team invited organizations to attend two information sessions where they were provided an overview of the project and given the Assessment Tool and inventory. The Project Team compiled 17 completed organizational assessments into a database for analysis.

The Project Team also invited participating organizations to a small group interview session where they were able to receive assistance completing the assessment and answer questions related to interoperability, capabilities, and resources in the County. There were four sessions offered which built on the information session by quickly reviewing the project, troubleshooting issues completing the Assessment Tool, and then moving onto county-wide communication questions. Participants stated they had minimal issues completing the Assessment Tool. In addition, the participants indicated they did not have interoperability capabilities beyond law enforcement and noted it as a gap.

As the project progressed, the County identified a need for supplementary qualitative data to broaden the ability for partners to participate in the process. This was also similar feedback received from organizations completing the Assessment Tool. A total of 15 organizations completed the supplementary survey; overall 21 organizations participated in the data collection by completing the assessment and/or responding to the supplementary survey.

Participating organizations (Survey and Assessment Tool):

- City Governments (2)
  - City of Gresham
  - City of Troutdale
- College/Universities (4)
  - Lewis & Clark College
  - Portland Community College
  - Portland State University
  - University of Portland
- Faith-Based Organizations (1)
  - Ecumenical Ministries of Oregon
- Federal (5)
  - Federal Bureau of Investigation – Portland Division
  - Oregon Federal Executive Board
  - Transportation Security Agency Portland International Airport
  - U.S. Department of Agriculture-Food and Nutrition Service
  - U.S. Geological Survey - Northwest-Pacific Islands Region

- Private Sector (2)
  - Communications Northwest
  - PacifiCorp
- Public Safety Volunteer (1)
  - Sauvie Island Fire Department
- Regional Organization (1)
  - Northwest Oregon Health Preparedness Organization
- School Districts (2)
  - Portland Public Schools
  - Reynolds School District #7
- Special Districts (2)
  - Multnomah County Drainage District
  - Port of Portland
- Social Services (1)
  - Community for Positive Aging-Hollywood Senior Center

Phase 3

In Phase 3 of the project, the Project Team developed the report, presented the findings to the workgroup for input and edits, then presented the report to the participants. The team also updated equipment information in the U.S. Department of Homeland Security Communications Asset & Survey & Mapping Tool, where applicable.

RADIO COMMUNICATIONS OVERVIEW FOR MULTNOMAH COUNTY

Overview of Communication in Multnomah County Emergency Operations Plan (EOP)

Updated in 2017, Multnomah County's EOP identifies the Department of County Assets (DCA) as the primary agency for Emergency Support Function (ESF) 2: Communications, with MCEM and the Multnomah County Sheriff's Office (MCSO) as supporting agencies. Multnomah County ARES and the Bureau of Emergency Communication (BOEC) as cooperating agencies. In the EOP, the ESF 2 "coordinates governmental and non-governmental organizations that provide the communications and information technology capabilities necessary to support response efforts, facilitate the delivery of information to emergency management decision makers, and that stabilize and re-establish systems and applications following natural, and human caused incidents.

ESF 2 Tasked Agencies	
Primary Agencies	Department of County Assets (DCA)
Supporting Agencies	Multnomah County Emergency Management (MCEM) Multnomah County Sheriff's Office (MCSO)
Cooperating Agencies and Organizations	Bureau of Emergency Communications (BOEC) Amateur Radio Emergency Service (ARES) General and special purpose call centers Private Sector Communications Service Providers

The Multnomah County Emergency Operations Center (EOC) can address interoperable communications between response organizations working through ESF 2. The EOC can also provide support for communication between the EOC and Cities. Both the City of Gresham and City of Portland each have an emergency operations/coordination center that provides overall support and coordination for incidents that occur within their jurisdictions. For incidents that occur within these cities, the jurisdictional EOC takes the lead in supporting incident commanders within the jurisdiction. In cases where the incident occurs within Troutdale, Wood Village, Fairview, or Maywood Park, the County EOC may provide direct support to Incident Commanders from the jurisdiction. The table below lists cited mutual aid agreements related to communications.

Table 1: Mutual aid agreements related to communication

Year	Name	Agreement
2012	Multnomah County Office of Emergency Management (MCEM) and Multnomah County Amateur Radio Emergency Service (ARES) Amateur Radio Memorandum of Understanding (MOU)	MCEM and Multnomah County ARES interagency agreement for amateur radio equipment and operators.
2009	State of Oregon Transfer of Amateur Radio Emergency Service (ARES) to Multnomah County Intergovernmental Agreement (IGA)	Agreement covers the transfer, installation, operations, and maintenance of amateur radio communications equipment from the Oregon Office of Emergency Management (OEM) to Multnomah County.
1995	Bureau of Emergency Communications (BOEC) IGA	Agreement for BOEC to serve as primary Public Safety Answering Point for all jurisdictions in Multnomah County.

Multnomah County Tactical Radio Plan (2013)

Multnomah County's Tactical Radio Plan establishes the concept of operations for how communications should be used in day-to-day activities, post disaster, or in any emergency when telephone, fax, computer networks and internet are unavailable or supplemental field communications are needed.

Scope:

- Supports Multnomah County's Emergency Operations Plan and can be used by county staff, departments, and elected officials as a guide to facilitate communications both internally and with external response partners
- Establishes common communications channels and procedures for use, as well as how communication channels could be prioritized in an emergency
- Is coordinated with and follows the Regional Tactical Interoperable Plan (TICP) and the Regional Field Operations Guide (RFOG)

The Tactical Radio Plan includes five operational phases to address situational needs. Escalating events may transition from one to the next. If supplemental communications are needed, responding agencies will notify MCEM to provide support, coordination, and monitoring as described in the EOP and ESF 2. For this report, radio communication systems are organized into primary, secondary, and AUXCOMM. This allows for alignment with the five operational phases of the Tactical Radio Plan.

Table 2: Table of Connectivity - Multnomah County Tactical Radio Plan

Table of Connectivity						
	Landlines	**Fax Lines**	**Cell Phones**	**Internet**	**800Mhz**	**VHF Systems**
Phase 1	Yes	Yes	Yes	Yes	Yes	Yes
Phase 2	No/Partial	No/Partial	Yes/Partial	Yes	Yes	Yes
Phase 3	No	No	No/Partial	No	Yes	Yes
Phase 4	No	No	No	No	No	Yes/Repeaters
Phase 5	No	No	No	No	No	Yes/Simplex

Phase One of the Multnomah County Tactical Radio Plan covers normal day-to-day activity. This assumes that all landlines, cell phones, fax lines, 800MHz radio systems, Very High Frequency (VHF) radio repeaters, networks, and internet connections are functional and in normal use.

Phase Two of this plan outlines a scenario that causes some portion, or all, of the landlines and fax lines to be unavailable. Given this scenario, radio could become a primary method of voice communication among County Departments, County Emergency Management, and emergency management offices in the surrounding community. If network and internet connections are still available, then the use of email for data communication should be considered. If the 800MHz system is available, normal dispatch and response conditions for that system should be used. If cell phones are still usable, be sure chargers are available.

Phase Three of this plan assumes that all landline phones, fax lines, networks, and internet connections have been lost. Cell phone voice connectivity may also be unavailable. During Phase Three it is assumed that radio is the primary method of voice communications and a secondary method of reduced data communication between County Departments, County Emergency Management, and emergency management offices in the surrounding community. If the 800MHz system is available, normal dispatch and response conditions for that system should be used.

Phase Four of this plan assumes that all landline phones, fax lines, cell phones, network and internet connections have been lost and the city-owned 800MHz system is either offline or overloaded. During Phase Four it is understood that VHF radio communications will be the primary method of voice communication among County Departments, County Emergency Management, and emergency management offices in the surrounding community.

Phase Five of this plan assumes that all landline phones, fax lines, cell phones, network and internet connections have been lost and all radio repeater functions, either county-owned or city-owned, including the 800MHz system, are either lost or overloaded. During Phase Five it is understood that VHF simplex radio communications will be the primary method of voice communication among County Departments, County Emergency Management, and emergency management offices in the surrounding community.

Primary Radio Communication

Radio equipment that corresponds to Phases One, Two, and Three of the Multnomah County Tactical Radio Plan.

Secondary Radio Communication

Radio equipment that corresponds to Phases Four and Five.

AUXCOMM

AUXCOMM is an all-inclusive term used to describe the many organizations and personnel that provide several types of communications support to emergency management, public safety, and other government agencies. This includes, but is not limited to amateur radio, military radio, citizen band (CB), etc.

Relevant Radio Communication Terms

Multnomah County partners use several types of radio frequencies and equipment. Below is a brief description of common terms to aid readers of the report in understanding the technology.

- **800 MHz** – refers to the radio frequency range of the radio network.[1] This frequency range is used by public safety organizations.[2]
- **Repeaters** – Repeaters receive transmissions from the field and retransmit (repeat) them with greater power and usually from a higher altitude, allowing communications over increased distances.[3]
- **Trunked/Trunking** – Communications system that draws from a pool of available frequencies and assigns them only when they are needed. For example, in the 800 MHz trunked network, when a radio user wishes to talk over the air, they push their transmit button and the system dedicates a frequency to broadcast that user's transmission. After the user releases the transmit button, the system can reassign that same frequency to a completely different radio.
- **Satellite Communication (SATCOM)** – refers to a radio system that utilizes satellites to communicate over long distances and without interruption from geography or the need for line of sight.
- **Simplex** – radios are off network and talk directly to each other. Also known as radio to radio.
- **Ultra High Frequency (UHF)** – Radio frequencies between 300 to 3,000 MHz spectrum.
- **Very High Frequency (VHF)** – Radio frequencies between 30 to 299 MHz spectrum.

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[1] City of Phoenix. *Glossary*. Phoenix Regional Radio Network. Accessed November 9, 2022 from https://www.phoenix.gov/fire/directory/fire-operations/phoenix-regional-radio-network/glossary#:~:text=Here's%20a%20glossary%20of%20terms,radio%20system%20a%20little%20better.&text=This%20refers%20to%20the%20range,frequencies%20between%20700%2F800%20MHz.
[2] Federal Communications Commission. *800 MHz Spectrum.* Accessed November 9, 2022, from https://www.fcc.gov/general/800-mhz-spectrum.
[3] Federal Emergency Management Agency. *Simplex vs Repeater.* Accessed November 9, 2022, from https://emilms.fema.gov/is_0951/groups/16.html.

GAP ANALYSIS FINDINGS

KEY FINDINGS: PRIMARY RADIO COMMUNICATIONS SYSTEMS

Summary of Findings

Organizations with primary radio systems identified having desktop radios paired with two-way radios (hand-held/Simplex) including VHF and some UHF systems. Faith-based and social service organizations that participated did not have primary radio systems. University/Colleges, Federal Law Enforcement, Special Districts, and Volunteer Public Safety organizations lean on City of Portland Public Safety radio systems for emergency operations outside of their day-to-day operations. Hospitals, that are members of a regional coordination organization, can communicate via UHF Simplex (hospital to hospital) during a disaster and have a primary radio network for a regional two-way radio system. School districts have multiple repeaters and primarily use two-way radios for day-to-day use. One district has UHF radio infrastructure with support from a private communication company.

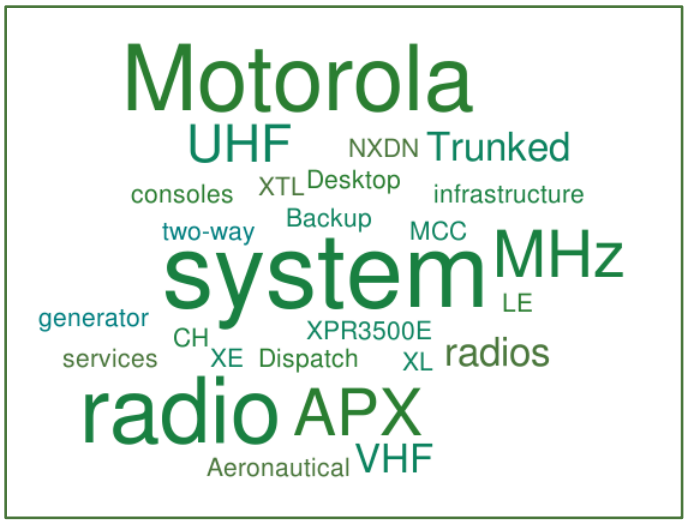

Image 1: Word cloud from primary radio descriptions.

Every organization that responded to the supplementary survey indicated that they would need to communicate with an external organization in a disaster to maintain continuity or essential functions. Of the total respondents, 94% indicated they would need to communicate with Multnomah County. Over 80% would need to communicate with Public Safety or City/County/State Agencies. Only 50% of respondents had the capability to communicate with external organizations with 44% saying they have the capability to communicate with Multnomah County in an emergency via radio. When asked about their level of readiness to communicate via radio in a disaster, 77% of supplementary survey respondents indicated they were strongly prepared or prepared, while 33% indicated they were not prepared or strongly not prepared.

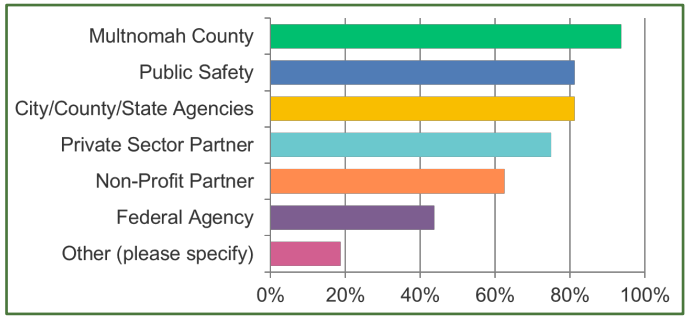

Chart 1: Survey Question: *In a disaster, our organization would need to communicate with the following organizations to maintain continuity or essential functions.*

Participating Faith-based and social service organizations did not have primary radio systems.

Many volunteer organizations and government agencies, beyond public safety responders, support disaster response operations in Multnomah County. The County counts on these organizations to assist in functions like sheltering and family reunification. The ability to communicate with these organizations will be essential when disasters impact normal communications. The two organizations that completed the assessment did not have radio communication systems and would need to be supported by Multnomah County or AUXCOMM. Neither organization had plans in place to support this process.

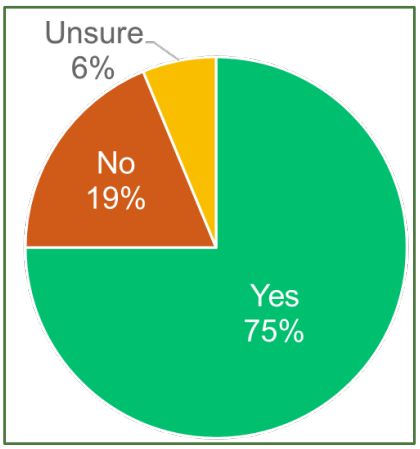

Chart 2: Survey Question: *Our organization can communicate via radio in a disaster that has impacted our normal communication methods.*

Relevant Recommendations:

- Equipment Recommendations: 2, 3, 4, and 5
- Planning Recommendations: 2, 4, 5, 6, 8a, and 10
- Training and Exercises Recommendations: 1, 2, 3, and 4
- Maintenance Recommendations: 1, 2, and 3

Approximately half (47%) of the organizations had the capability to communicate with external organizations or over extended distances.

Organizations with primary radio systems mostly used those systems to communicate internally and often consisted of desktop radios paired with two-way radios (hand-held/Simplex). These radios operated on VHF and some UHF systems. Of the organizations that had external communication capabilities, they lean on County and City Public Safety radio systems for emergency operations or public safety entities can communicate on the organization's designated frequencies in certain events.

School districts and organizations that communicate regularly with public safety/law enforcement commonly have or have access to repeaters. Organizations with a large geographic footprint use repeaters for internal communication. That said, the supplementary survey indicated that of the respondents 50% had the capability to communicate with external organizations. 44% of the respondents stated they had the capability to communicate with Multnomah County in an emergency.

Relevant Recommendations:

- Equipment Recommendations: 2, 3, 4, and 5
- Planning Recommendations: 1, 2, 4, 5, 6, 11, and 12
- Training and Exercise Recommendations: 2, 3, and 4
- Maintenance Recommendations: 1 and 3

Four organizations (24%) provided information about internal radio communication plans.

Most of these plans focused on radio equipment use not disaster communication. One organization provided information about an emergency action plan and emergency radio protocols. Organizations should have radio communication plans that cover both their day-to-day radio communications and communication during a disaster. These plans should align with the County's communication plans. The organizations that provided information about their plans shared internal operating procedures, net control procedures, and equipment training videos. Incident Command System (ICS) Form 205 provides a template for an incident response communication plan. ICS 205 is prepared by the Logistics Section-Communications Unit (COMU) Leader and given to the Planning Section Chief for inclusion in the Incident Action Plan.

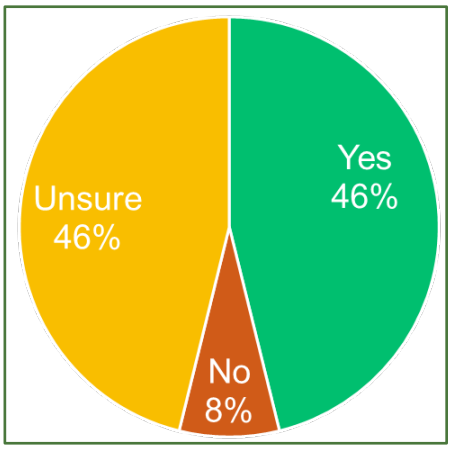

Chart 3: Survey Question*: Our organization has plans in place to support the use of radio (internally or externally) communications in a disaster.*

Relevant Recommendations:

- Planning Recommendations: 1, 3, 5, 6, 8, 8a, 11, and 12
- Maintenance Recommendations: 2 and 3

Three organizations (18%) provided information regarding radio communication training.

Two of the organizations provide individual training to their staff and/or receive manufacturer-specific training. One organization conducts organizational-level training on radio communication. The Assessment Tool asked organizations to provide information about training activities their personnel have completed within the last five years. This could include training from the manufacturer, private organizations, local partner, Oregon, federal agencies, or internal training.

As discussed in the *Lessons Learned* section, the more people that are trained on radio communications, the better prepared an organization will be to use radios in a disaster. In many situations, if a single individual is responsible, they may not be present when the organization needs that information or radio equipment. Organizations who participated provided limited information regarding training available for their staff. Of the organizations that did list training it included manufacturer provided trainings, internally facilitated training, and organizational level training.

Relevant Recommendations:

- Planning Recommendations: 1, 4, 6, 9, 10, and 11
- Training and Exercises Recommendations: 1, 2, 3, and 4
- Maintenance Recommendations: 2 and 3

Five organizations (29%) provided information about their exercises and real-world use of radios.

A volunteer public safety organization used their radios in several real-world events and exercises. Four additional organizations identified exercises and radio equipment tests within the last five years. Organizations with internal hand-held radios frequently use them in drills but the radios were not the subject of the drill. Two organizations used radios in functional exercises, one of which federal regulation mandates. The Assessment Tool asked organizations to provide recent radio communication-related exercises (scenario-driven events to test capabilities), events, or real-world uses within the last 5 years (survey asked about 3 years). This could have included exercises where radio communications were activated or used, exercises focused on radio communications, communication drills, or equipment tests. Of the 12 organizations who had primary radio systems identified with the Assessment Tool, five provided information about their exercises and real-world use of radios.

Examples of real-world use included medical, fire, and rescue incidents. Exercises and drills occurred frequently for three of the organizations and consisted of monthly radio checks and using the radios in drills/exercises where the radios were not the subject. The federal regulations required exercises every three years that focused on radio systems.

Relevant Recommendations:

- Equipment Recommendation: 4
- Planning Recommendations: 2, 3, 4, 5, 8a, and 9
- Training and Exercises Recommendations: 1, 2, 3, and 4
- Maintenance Recommendations: 2 and 3

Five organizations (29%) indicated they have internal personnel to support radio maintenance ranging from a technician to a radio shop of multiple personnel.

Seven organizations (41%) have a contractor or external support for their radio maintenance. Two of the groups have internal and external support for radio maintenance. Identifying personnel and alternatives to support radio maintenance will be critical during a disaster or when the primary method of maintenance is unavailable. The Assessment Tool asked organizations to provide information on internal or external support to their systems and to list maintenance steps. Internal capacity would be a best practice, but organizations should have plans or processes in place for external support if they lack personnel capacity or as an alternative if internal personnel are unavailable.

Of the 12 organizations who had primary radio systems identified with the Assessment Tool, 10 provided information about the maintenance capabilities with three organizations that have internal and external support. Seven of the 10 organizations had external support in place or contracts ready for external support if needed. The types of maintenance conducted included radio audits, replacing batteries in portable radios, and radio and repeater inspections. In some cases, the contractor/manufacturer conducts the maintenance as required by their contract. Of note, two organizations indicated they were unsure or did not provide information if they had maintenance personnel to support their radio systems.

Relevant Recommendations:

- Equipment Recommendations: 1 and 2
- Planning Recommendations: 3, 5, 9, and 11
- Training and Exercises Recommendation: 1
- Maintenance Recommendations: 1, 2, and 3

Four organizations (24%) have staff trained to program radios and those organizations limit the training to select personnel.

Another three organizations (21%) rely on their vendors for programming their radios. While programming or reprogramming radios should be the primary responsibility of radio technicians and contractors, training staff to program/reprogram in an emergency will increase capacity. This can be accomplished through training and/or providing a guide if needed.

Six of the 12 organizations with primary radio systems do not have personnel trained to program or reprogram radios. Three of those six rely on their vendors to program or reprogram and the other did not provide information on radio programming. Of note, contracts with vendors may require that the vendor conducts radio programming.

Relevant Recommendations:

- Equipment Recommendations: 3 and 4
- Planning Recommendations: 1, 3, 4, 6, 9, and 11
- Training and Exercises Recommendations: 1, 2, 3, and 4
- Maintenance Recommendations: 1, 2, and 3

Under half of the organizations (47%) have access to vendor information.

Five (29%) of the organizations indicated that they stored information on internal databases/shared drives. No organization indicated they had physical copies of their vendor information. The Assessment Tool asked organizations if they file vendor or manufacture information for the various equipment in their primary radio communication system. Vendor information is valuable for troubleshooting any issues beyond the internal capabilities of an organization. The types of information could be a regional or sales representative or any direct contacts with a manufacturer.

Under half of the organizations noted that they had access to the vendor information for their radio systems. No organization provided information about physical storage of vendor information. If a disaster impacts day-to-day communication systems, it may be difficult to access digitally located files and information.

Relevant Recommendations:

- Equipment Recommendations: 1, 2, and 3
- Planning Recommendations: 4, 5, 6, 9, and 11
- Training and Exercises Recommendations: 1
- Maintenance Recommendations: 2 and 3

Other notable information:

- One organization purchased supplementary radios for employees after a severe weather event impacted their ability to communicate via cellphone.
- One organization is in the process of receiving new radios.

KEY FINDINGS: SECONDARY RADIO COMMUNICATIONS SYSTEMS

Summary of Findings

Six of the 17 organizations (35%) to complete the Assessment Tool had a secondary radio communication system. Of the six, two organizations have a secondary radio system specifically for communicating with law enforcement. Another two organizations have access to secondary systems, but they have not been used for a lengthy period or they have little information on how to use the system. The remaining two organizations have secondary radio capabilities, but the system is primarily for backup internal communication.

For the supplementary survey, 31% said they had a backup radio communication system if their primary was unavailable, and the same percentage was unsure; 38% did have a backup system in place.

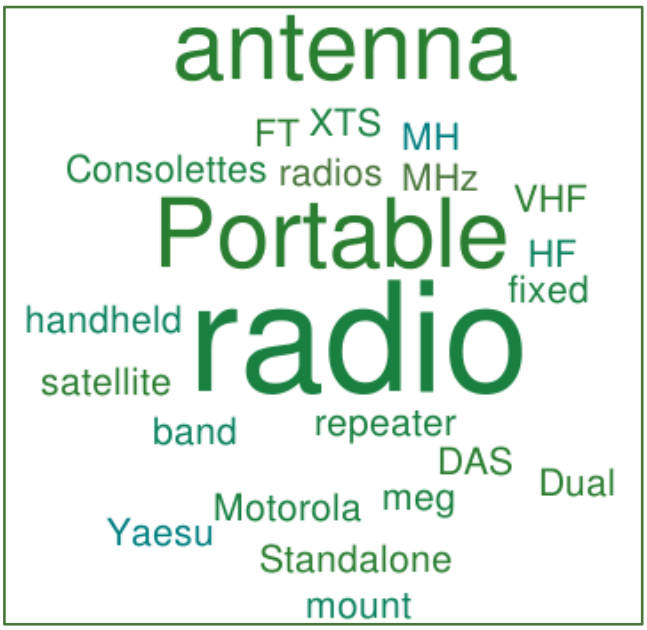

Image 2: Word cloud from secondary radio descriptions.

One organization (6%) indicated that they had operational procedures or plans available for their secondary system.

Organization plans should include secondary radio systems if the primary system has been impacted. Maintaining internal secondary radio systems may be cost prohibitive for most organizations; however, organizations can plan for impacted communication systems. This could include accessing AUXCOMM, accessing partner organization's systems, engaging the County to request assistance, or modifying the primary radio communication system to operate on a simplex channel.

The organization that provided plan information indicated they had standard operating procedures available for radio operations if needed for interoperability or failure of wide-area trunking.

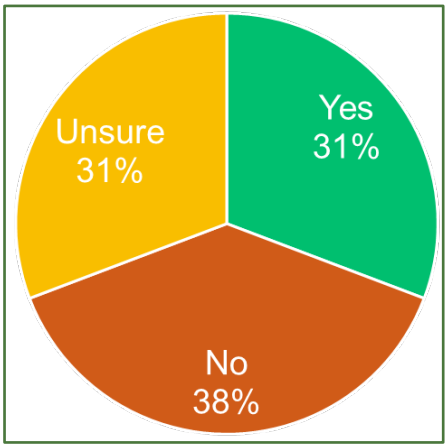

Chart 4: Survey Question: *We have a backup radio communication system in case our primary radio system is unavailable.*

Relevant Recommendations:

- Equipment Recommendations: 1, 3, 4, 5, 6, 8, 8a, and 11
- Training and Exercises Recommendations: 1, 2, 3, and 4

Participating organizations did not provide information related to exercises or event use of their secondary systems.

If available, exercising and training with secondary systems will provide increased capabilities when disasters have impacted primary systems.

Relevant Recommendations:

- Planning Recommendations: 1, 4, 6, 9, 10, and 11
- Training and Exercises Recommendations: 1, 2, 3, and 4
- Maintenance Recommendations: 2 and 3

Three organizations (18%) maintain their secondary systems with internal technicians, but the other organizations did not provide maintenance information about their secondary system.

While not necessarily different than the primary radio system's maintenance, organizations should be able to identify associated personnel and steps to maintaining their secondary systems. The organizations that provided information about their maintenance capabilities relied on the same internal staff to maintain the secondary system. No organization provided information about a vendor or contractor maintaining their secondary system.

Relevant Recommendations:

- Equipment Recommendations: 1 and 2
- Planning Recommendations: 3, 5, 9, and 11
- Training and Exercises Recommendation: 1
- Maintenance Recommendations: 1, 2, and 3

KEY FINDINGS: AUXCOMM

Summary of Findings

Most organizations (76%) that participated do not have AUXCOMM capabilities to include established relationships, planning, training, exercises, or drills. Organizations that did have AUXCOMM capabilities indicated that they had VHF Go-Kits, Amateur Radios, and SATCOM for emergency communications. In addition, no organization provided information about planning, training, or exercises related to the use of these systems.

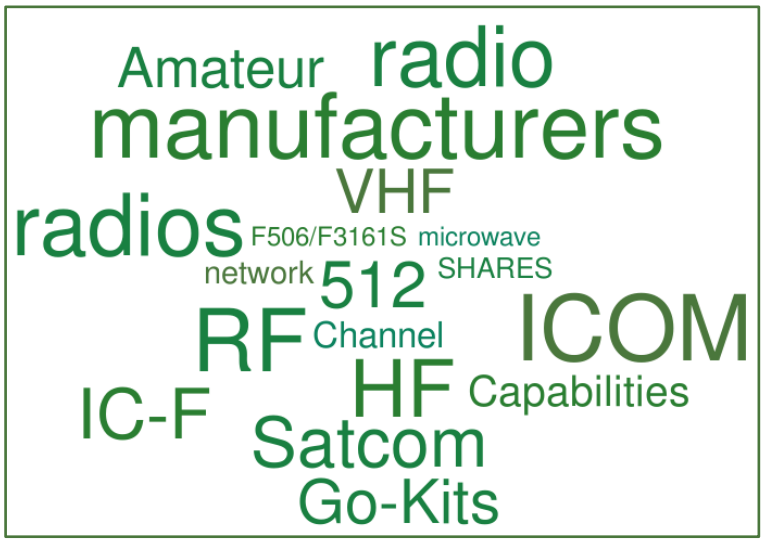

Image 3: Word cloud from AUXCOMM descriptions.

13 of the 17 organizations (76%) do not have AUXCOMM capabilities or partnerships.

During a disaster, activating these partners and capabilities is a crucial response function and knowing which organizations have pre-existing relationships and plans allows for streamlining deployment of AUXCOMM assets. The Assessment Tool asked participants if their organization has identified or established relationships with AUXCOMM organizations.

Three organizations provided information regarding AUXCOMM capabilities. The capabilities included accessing a federal network for long range radio support, VHF Go-Kits, and amateur radios on-site.

Relevant Recommendations:

- Equipment Recommendations: 3, 4, and 5
- Planning Recommendations: 1, 2, 3, 4, 5, 6, 8, 8a, 10, and 11
- Training and Exercises Recommendations: 1, 3, and 4
- Maintenance Recommendation: 2

One organization has VHF Go-Kits assigned to Emergency Management Personnel.

Another organization had amateur radios and SATCOM capabilities, but no internal staff trained to utilize them. Of note, one organization indicated that they assumed help would come from Multnomah County if needed. To aid in disaster operations, one organization has VHF Go-Kits assigned to Emergency Management personnel this allows for just-in-time radio communication capabilities for impacted organizations or for emergency personnel deployed in areas with impacted communications. Training on AUXCOMM assets or with organizations is a critical step in adding AUCOMM as a communication capability.

Relevant Recommendations:

- Equipment Recommendations: 1, 2, 4, and 5
- Planning Recommendations: 1, 2, 3, 4, 5, and 6
- Training and Exercises Recommendations: 2, 3, and 4

BEST PRACTICES AND LESSONS LEARNED

Best practices are considerations for Multnomah County and their local partners to integrate into future planning and actions. These are efforts that other organizations undertook to successfully improve radio communications.

The Assessment Tool allowed agencies to share their best practices or lessons learned with Multnomah County and include them in the report. Along with the information provided by participants, the Project Team conducted research on other lessons learned or best practices that could be useful and relevant to the key findings. Of note, some of the best practices and lessons learned may originate from public safety agencies but were still included because the best practice and/or lesson learned is applicable to all users of radio communication.

Best Practice: Radio communications equipment maintenance should be a priority and conducted regularly.

A participating organization shared a best practice for prioritizing maintenance on systems and subscriber field units. Proper maintenance is important to ensure the radio is ready for use during an emergency. Common maintenance steps include ensuring the radio is properly programmed, the radio is checked regularly to ensure it is in good working condition, the radio is charged properly and has a full battery before use.

Best Practice: There should be diversity in Radio Frequency (RF) technology deployed.

A participating organization identified that having RF technology diversity would optimize connectivity and interoperability during events. An example would be having UHF and SATCOM available during an event when VHF is the primary means of communication. There are other methods of increasing RF technology diversity including frequency and spatial diversity.

Lesson Learned: Consider implementing a mentor and/or shadowing program for key system support personnel so that the system is not reliant on informal institutional knowledge of a limited number of personnel.

During the 2022 Oregon Cybersecurity Tabletop Exercise (TTX), participants noted that a dedicated group of knowledgeable individuals support the regional radio system that user agencies can turn to when problems arise. This group can be narrowed down to one or two individuals that everyone turns to. Continuity plans need to be in place for when/if that person is absent such as vacation, family emergency, or illness. These plans can include implementing a

mentoring program or shadow program that allows information to be passed from system support personnel to other key personnel.[4]

Lesson Learned: Formalize vendor relationships to set clear processes and expectations as well as develop a vendor contact list to ensure rapid communication in case of an outage.

Participants in the 2022 Cybersecurity TTX felt uncomfortable with their vendor relationships. For any radio communication plan, it is important to have clear lines of communication and set specific expectations. It may be necessary to have alternative means to contact the vendor when a disaster has impacted communication.

Lesson Learned: Provide a minimal operationally sufficient number of 7/800 MHz subscriber radios on any Oregon Public Safety Mobile Communication Vehicle (MCV).

During a radio communications exercise involving Multnomah County, Oregon, and Cybersecurity and Infrastructure Security Agency (CISA); participants were required to communicate with the local dispatch center using the Non-Federal 800 MHz National Mutual Aid Channel. The 800 MHz subscriber assets were not readily available in any of the MCVs. As an outcome of the exercise, CISA recommended that any 7/800 MHz subscriber radios on any Oregon MCV have the Non-Federal 800 MHz national Mutual Aid Channels (in both direct and repeated).[5]

Of note the report said: “The suggested actions in this report should be viewed as recommendations only. In some cases, agencies may determine that the benefits of implementation are insufficient to outweigh the costs. In other cases, agencies may identify alternative solutions that are more effective or efficient.”

Lesson Learned: Encourage organizations that utilize radio communication systems to incorporate radio training into annual training requirements.

During the 2022 radio communication exercise, participants identified that multiple first responder agencies did not require or incorporate annual training for their personnel beyond the initial training academy. This same approach should be applied to individuals conducting radio communications at non-public safety organizations.

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[4] Gremlins in the Gears Cybersecurity Tabletop Exercise and Functional Exercise After Action Report and Improvement Plan. (2022, March). Cybersecurity and Infrastructure Security Agency. https://www.oregon.gov/siec/SiteAssets/Pages/Lessons-Learned/Oregon%20Cybersecurity%20TTX%20FE%20AAR_Final.pdf.

[5] Oregon Interoperable Communications Functional Exercise After Action Report and Improvement Plan. (2021, July). Cybersecurity and Infrastructure Security Agency. https://www.oregon.gov/siec/Documents/2021%20Oregon%20FE%20AAR-IP_Final.pdf.

Lesson Learned: Access to redundant and/or backup systems and frequencies will be critical during wildfires and other severe weather events.

During the 2020 Oregon Wildland Fires, several key components of communications infrastructure were destroyed including: two critical high elevation radio sites, several cellular sites, and a considerable amount of aerial fiber optic lines. There were several wildfires in the State of Oregon including counties surrounding Multnomah County. The CISA Communication After Incident Report discussed that with two critical radio sites destroyed, there was a lack of mutual aid frequencies that compounded radio communication issues. The wildfires did not destroy many of the other radio sites but forced them into site-trunking mode due to several critical single points of failure in the backhaul connections. Due to this, radio communication coverage did not cover several populated areas for extended periods of time.[6]

Image 4: Summary Impacts from CISA After Incident Report

Best Practice: New York City provided radios to healthcare partners and facilities allowing them to communicate with their EOC.

New York City Emergency Management provided 320 radios to hospitals, nursing homes, adult care facilities, and the New York Blood Center to provide an additional means for critical care facilities to communicate with Emergency Management and for Emergency Management to provide participants situational awareness during emergencies. The city also gave training on proper radio operations and etiquette. The program is part of the NYC Department of Information and Technology Telecommunications (DoITT) City Wide Radio Network. There is no cost to participate in the program for the facilities but there are a set of standards and responsibilities outlined in an MOU that all participants must adhere to.[7] Multnomah County should consider creating a cache of radio equipment to distribute to the appropriate partners in an emergency or issue radio equipment to partners who are commonly communicated with during a disaster.

[6] 2020 Oregon Wildland Fires Communications After Incident Report. (2021). Cybersecurity and Infrastructure Security Agency. https://www.oregon.gov/siec/Documents/WO21-010%20OR%20Wildland%20Fires%20AAR%20-%20FINAL.pdf.
[7] International Media Representatives Inc. (IMR Group Inc.). (2022, April 27). Best Practice: Auxiliary Radios for Healthcare Facilities. Domestic Preparedness. Retrieved October 21, 2022, from https://domesticpreparedness.com/healthcare/best-practice-auxiliary-radios-for-healthcare-facilities/.

Best Practice: Ensure change management practices and policies are in place when there are any changes to operational policies, system modifications, additions, or deletions of radio system infrastructure are communicated to all affected agencies (both internal and external).

The National Public Safety Telecommunications Council (NPSTC) report of Best Practices for Public Safety Interoperable Communications identified various best practices to achieve the highest level of interoperability. The Best Practices Working Group recognized that change management processes are not frequently developed. When a radio system or system use changes, there should be an establish organizational change management process to be successful when implemented.[8] Multnomah County and partners can use change management practices to ensure that changes to plans, procedures, frequencies, equipment, training, and maintenance are properly implemented.

Best Practice: Radio equipment and systems should be used and managed only by personnel who have been properly trained and who have demonstrated proficiency with the appropriate technical, operational, and procedural aspects.

The NPSTC report of Best Practices for Public Safety Interoperable Communications states this best practice applies to technicians, responders, telecommunicators, and managers, and includes operational issues. The exact language has been modified to apply to this Radio Communications Gap Analysis.

Lesson Learned: When frequency channels are not encrypted, there is a higher chance for those frequencies to be hacked and disrupt radio communications during an emergency.

According to CISA, there have been multiple instances where radio communication channels were hacked and distracted public safety officers while they were attempting to communicate with other agencies during an emergency response. In some states, police departments have encrypted their radio communications to protect officers and block criminals from listening in on widely available phone apps that broadcast police radio channels.[9]

[8] Radio Interoperability Best Practices. (2017, January). National Public Safety Telecommunications Council. https://www.npstc.org/radioInteropBP.jsp.
[9] Considerations for Encryption in Public Safety Radio Systems. (2016, September). Cybersecurity and Infrastructure Security Agency. https://www.cisa.gov/.

RECOMMENDATIONS

Recommendations are organized by equipment, plans, training and exercises, and maintenance. The recommendations include an expected outcome, associated benefits, cost, and an identified responsible party. Within each of the four categories, the recommendations are ordered from low to high cost. There are a total of 24 recommendations with most recommendations falling into the planning category. Not every recommendation corresponds to a key finding; instead, the recommendation may be based on discussions and assessment of provided documentation and best practices.

Recommendations where County-wide partners are listed as the responsible parties, recognizes that partners have varying levels of radio communications capabilities and therefore not every recommendation will apply to every organization.

EQUIPMENT

Summary of Equipment Recommendations

Equipment recommendations range from conducting regular inventories to assessing available radio equipment to supplementing radio equipment during disasters to maintain emergency communications. Because organizations have varying levels of radio equipment, not every recommendation applies to every organization that completed an assessment.

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

Equipment Recommendation 1: Organizations should review and inventory internal radio equipment available for use during a disaster when communication has been impacted. Equipment inventories should be minimally conducted on an annual basis.

- Outcome – Organizations will conduct an internal inventory and review of their internal radio equipment for disasters.
- Benefits – Once organizations have identified what equipment is available for them to use, they can assess whether purchasing equipment or partnering with other organizations is necessary for them to communicate during a disaster.
- Cost – Low, staff time will be required to complete the inventory.
- Responsible Party: County-wide partners

Equipment Recommendation 2: Multnomah County should develop a recommended radio equipment list and maintenance plan for non-public safety partners to support interoperability during emergencies.

- Outcome – Multnomah County DCA develops and shares a recommended radio equipment list for non-public safety partners. In addition, DCA will provide a guide to non-public safety organizations for maintaining their radio equipment. This would include battery charging and radio cache storage.
- Benefits – Radio equipment list will inform non-public safety partners the type of equipment they should have in inventory to be able to better communicate during emergencies. Note: Operators may need a Federal Communications Commission (FCC) license to use certain radio equipment. Organizations would be able to provide basic levels of maintenance to their radio communication equipment without the need for a technician or vendor. This would be vital during a disaster.
- Cost – Low, Multnomah County technicians can provide their expertise to generate a list.
- Responsible Party: DCA

Equipment Recommendation 3: Multnomah County should ensure information related to radio frequencies, which can be used during an emergency by non-public safety partners, is available on their website.

- Outcome – A complete list of radio frequencies available for use will be compiled and distributed to all non-public safety partners.
- Benefits – Multiple organizations do not have the ability to communicate with Multnomah County despite expressing the need. Having shared information related to radio frequencies will better inform non-public safety partners and encourage their organizations to explore external radio communication options.
- Cost – Low, staff time to compile the information and infrastructure needed to host the information on the County website.
- Responsible Party: DCA/MCEM

Equipment Recommendation 4: Organizations should ensure they can use Multnomah County EOC frequencies during an emergency.

- Outcome – Organizations will program or provide a guide for programming Multnomah County EOC frequencies to their radios.
- Benefits – Organizations will be able to communicate with the Multnomah County EOC during an emergency.
- Cost – Medium, staff time to compile the information and/or program radios for the correct frequencies. If equipment is unable to be reprogrammed or communicate over the necessary distance, additional equipment will need to be purchased.
- Responsible Party: County-wide partners

Equipment Recommendation 5: Multnomah County should create and distribute go-kits for non-public safety partners during emergencies to organizations essential to response.

- Outcome – Multnomah County DCA/MCEM create radio equipment go-kits and distribute them during emergencies to impacted organizations that are essential during response.
- Benefits – Go-kits will allow for just-in-time radio communication capabilities for impacted organizations. Note: Operators may need an FCC license to use certain radio equipment.
- Cost – Medium to high depending on the radios that are comprised of the go-kit and the amount of kits needed.
- Responsible Party: DCA/MCEM

PLANNING

Summary of Planning Recommendations

Planning remains the largest gap between Multnomah County and organizations that participated in the data collection. This section consists of 12 recommendations ranging from updating plans, creating a Radio Communications Workgroup, to sponsoring personnel training to enhance planning efforts.

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

Planning Recommendation 1: Multnomah County should establish a Radio Communications Workgroup to meet quarterly to guide improvement and development of radio communication capabilities. The Workgroup should include a subcommittee focused on AUXCOMM capabilities.

- Outcome – Multnomah County will use the established workgroup to guide and oversee efforts improving and developing radio communications.
- Benefits – A dedicated workgroup for county level radio communications planning and advisement ensures proper coordination and continued improvement to radio communication.
- Cost – Low, cost will be comprised of staff time needed to facilitate and attend the workgroup meetings and incorporation of the workgroup's recommendations into radio communication efforts.
- Responsible Party: DCA/MCEM

Planning Recommendation 2: Multnomah County ARES should develop a strategy document for AUXCOMM capabilities for organizations to partner with AUXCOMM organizations during a disaster to establish communications in an emergency.

- Outcome – Multnomah County ARES will create an AUXCOMM strategy document for organizations to develop AUXCOMM partnerships.
- Benefits – Organizations will be able to establish AUXCOMM communications for emergency radio communications. Organizations with only primary or no radio communication capabilities will be able to establish radio communications during a disaster that impacts communications. Note: Operators may need an FCC license to use certain radio equipment.
- Cost – Low, Multnomah County ARES would need to use volunteer time to develop and distribute the strategy document.
- Responsible Party: Multnomah County ARES

Planning Recommendation 3: Organizations should assess their capabilities to communicate via radio to external partners during an emergency. This may include identifying available radio repeaters and/or assessing their capability to communicate on a partner's channel.

- Outcome – Organizations will identify whether they can communicate with external partners and identify the means of communicating either via repeaters or changing channels.
- Benefits – Internal assessments of an organization's ability to communicate with external partners is the first step in bridging the gap of interoperability. Once completed, organizations will be able to identify whether they have repeaters or interoperable channels available to access or if they need to identify alternative means.
- Cost – Low, staff time to review and compile the information.
- Responsible Party: County-wide partners

Planning Recommendation 4: Multnomah County should sponsor a staff member(s)'s participation in relevant State Interoperability Executive Council (SIEC)/Statewide Interoperability Coordinator (SWIC) committees and workgroups.

- Outcome – Multnomah County staff member(s) will participate in statewide communication planning and information sharing.
- Benefits – Staff members will be able provide Multnomah County's perspective on statewide communication planning efforts and share relevant information from the SIEC/SWIC to county stakeholders.
- Cost – Low to medium depending on meeting location, length, and travel cost.
- Responsible Party: DCA/MCEM

Planning Recommendation 5: Multnomah County should host a workshop to review or develop Radio Communication Plans for Partners.

- Outcome – Multnomah County DCA and MCEM will host a planning workshop for organizations developing or updating radio communication plans. This should also include lessons learned, best practices, and future planning.
- Benefits – Partners will have aligned and updated radio communication plans.
- Cost – Low to medium, cost would come from staff time to develop and conduct the workshop. In addition, there may be costs associated if the County does not have a space available to use and will need to rent a location. Conducting a virtual workshop can mitigate costs required for in person activities.
- Responsible Party: DCA/MCEM

Planning Recommendation 6: Organizations should collect and store relevant communication publications, resources, cheat sheets, ICS Forms, job sheets, FAQs, templates, and vendor information. When possible, physical copies be printed and stored in an appropriate location.

- Outcome – Organizations will compile and store radio communication documentation in a known digital and physical location. This should also include vendor information for radio equipment.
- Benefits – Staff will be able to access a specific location for internal radio communication documentation. In the event of a disaster that impacts connectivity, physical copies will provide redundancy.
- Cost – Low to medium, the digital location will require infrastructure and physical copies will require printing and storage. If existing infrastructure is usable, then the cost would be lower. Access control may be necessary.
- Responsible Party: County-wide partners

Planning Recommendation 7: MCEM and DCA should identify additional staff to provide staffing depth to the COMU.

- Outcome – MCEM and/or DCA will have staff members trained and dedicated to the COMU. These staff members may serve as the County point of contact for Radio Communications for partners and other agencies. It may also be necessary for other agencies to staff or designate similar radio communication positions or roles.
- Benefits – These staff members will be able to serve as depth for the COMU and provide just-in-time training to other staff on radio equipment and maintain all radio equipment.
- Cost – Medium depending on budgetary restrictions for hiring new positions or compensating employee for extra duties.
- Responsible Party: DCA/MCEM

Planning Recommendation 8: Multnomah County should update their Tactical Radio Communications Plan and ESF-2 and then distribute to partners.

- Outcome – Multnomah County DCA/Emergency Management update the Tactical Radio Communications plan which was last updated in 2013 and ESF-2 which was updated in 2017. Once updates are complete, Multnomah County will hold an information session and/or an exercise with partner organizations.
- Benefits – Multnomah County and partners will have an updated communications infrastructure and concept of operations for responding during an emergency. Partners will be familiarized with Multnomah County radio communication plans and be able to ask questions about their roles and responsibilities during a disaster. Organizations with existing plans will be able to better align their plans with the County plans.
- Cost – Medium to high, staff time and/or contracting with a consultant to update the plan and conduct an information session/exercise. In addition, there may be costs associated if the County does not have a space available to use and will need to rent a location. Conducting a virtual information session or exercise can mitigate costs required for in person activities.
- Responsible Party: DCA/MCEM

Planning Recommendation 8a: Expand emergency planning related to radio communications to include first receivers at hospitals, triage centers, mass care shelters, special needs shelters, educational facilities, and the specialized operations centers that coordinate operations centers for various state, county, and municipal agencies.[10]

- Outcome – Multnomah County Radio Communication Plans will be updated to include non-public safety entities and their associated radio communication capabilities.
- Benefits – Expanded interoperability capabilities and improved communication during disasters impacting communication systems.
- Cost – Low to medium, staff time to update plans and collect radio communication data.
- Responsible Party: DCA/MCEM

Planning Recommendation 9: Multnomah County should develop a COMU staffing and training strategy. Trainings may include Incident Communications Center Manager (INCM), Communications Leader (COML), and/or Communications Technician (COMT) training.

- Outcome – Multnomah County will designate a COMU staffing and training strategy for associated personnel.
- Benefits – The COMU will have the appropriately designated and trained staff for emergency radio communications. The strategy should include a clear framework for how the staff will be deployed.
- Cost –Medium to high, depending on budgetary restrictions for hiring new positions or compensating employee for extra duties.
- Responsible Party: DCA/MCEM

Planning Recommendation 10: Multnomah County should establish radio communication partner credentialling aligned with COMU Qualification Program credentialling requirements or encourage partners to seek the COMU credential.

- Outcome – Partners conducting radio communications will be credential when working with Multnomah County.
- Benefits – Partners will have a base level of training and understanding of Multnomah County radio communications. In addition, the partners will have the appropriate credentials required for emergency response to include licensing.
- Cost – Low to Medium, if a credentialing system already exists it can be expanded to include radio qualifications. If non-existent, then the credentialing process will need to be created. Encouraging partners to seek the COMU credential is low cost.
- Responsible Party: DCA/MCEM

[10] Reference (Page 27): A more pressing concern is integrating expanded emergency operations to include agencies that respond alongside first responders. These include first receivers at hospitals, triage centers, mass care shelters, special needs shelters, educational facilities, and the specialized operations centers that coordinate operations centers for various state, county, and municipal agencies. Among these agencies are traffic control centers, public health operations centers, transportation dispatchers, transit agency operations centers, fusion centers, JICs and so on. https://www.fema.gov/sites/default/files/documents/fema_eoc-quick-reference_guide.pdf.

Planning Recommendation 11: Create a webpage under the Multnomah County Emergency Management/DCA Website hosting relevant communication publications, resources, cheat sheets, ICS Forms, job sheets, FAQs, and templates.

- Outcome – Multnomah County will create a centralized hub for radio communication partners to access relevant communication publications, resources, cheat sheets, ICS Forms, job sheets, FAQs, and templates. If the workgroup deems it more appropriate, then organizations should be directed to a regional communication group's resources.
- Benefits – The website will provide an easily accessible location for partner organizations and enable standardization as these documents would be reviewed and approved for sharing by Multnomah County.
- Cost – Low to medium, Multnomah County would need to host the website. If existing infrastructure is usable, then the cost would be lower. Access control may be necessary.
- Responsible Party: DCA/MCEM or Regional Communications Workgroup

Planning Recommendation 12: Organizations and Multnomah County radio communications staff should attend the SWIC RADIO conference.

- Outcome – Staff attend the yearly RADIO Conference, if recommended by the County Communications workgroup.
- Benefits – Multnomah County and organizations who use radio communications will be familiarized with state-level capabilities. The conference also provides information related to interoperability communications. In addition, the event should be attended by several communication vendors. Registration opens in January 2023.[11]
- Cost – Medium, costs are associated with staff time and travel costs.
- Responsible Party: County-wide partners and DCA/MCEM

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

[11] Registration will be located on this webpage: https://www.oregon.gov/siec/Pages/RADIOConf.aspx.

TRAINING AND EXERCISES

Summary of Training and Exercises Recommendations

Many of the training and exercise recommendations overlap with the planning recommendations and were covered under that heading. This section identifies four recommendations focused on training individual staff and expanding exercises to include non-public safety partners and exercising AUXCOMM capabilities.

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

Training and Exercises Recommendation 1: Multnomah County should establish a recommended training plan for staff members at organizations using radio communication during a disaster.

- Outcome – Multnomah County will publish a recommended training plan for radio communication staff. Example training includes ICS, COMU, COMT, ARES, Radio Operator (RADO), COML, and INCM.
- Benefits – Partner organizations will be able to align staff training with County recommendations. The training should also align with the Oregon COMU Qualification Program.
- Cost – Low to medium, Multnomah County would need to develop the training plan and host the plan on a webpage. If existing infrastructure is usable, then the cost would be lower.
- Responsible Party: DCA/MCEM

Training and Exercises Recommendation 2: Multnomah County should revise the current Quarterly Communication Drill with EOC to include partner organizations with external radio communication capabilities.

- Outcome – Non-public safety partners will participate in MCEM quarterly radio communication drills.
- Benefits – The drills will test the ability of non-public safety organizations to establish radio communications with the EOC. If unable to establish communication, DCA/MCEM will troubleshoot with the organization.
- Cost – Low, there is already staff time used to conduct the drill. Staff time would be required to communicate the drill and invites to partner organizations.
- Responsible Party: DCA/MCEM and County-wide partners

Training and Exercises Recommendation 3: Organizations and Multnomah County radio communications staff should participate in AUXCOMM Annual/Bi-Annual Activation Exercises[12]

- Outcome – Non-public safety organizations and Multnomah County staff will participate in AUXCOMM activation exercises.
- Benefits – Radio communications staff will be familiarized with AUXCOMM operations and capabilities, familiarized with simplex coverage, and practice establishing emergency radio communications. This is a longer-term goal after organizations have begun to engage AUXCOMM partners.
- Cost – Low to medium, staff participation will require time to participate in the exercise plus time to coordinate participation.
- Responsible Party: County-wide partners and DCA/MCEM

Training and Exercises Recommendation 4: County-wide partners and Multnomah County radio communications staff should attend Oregon SWIC's All-Hazard Training[13] for AUXCOMM, COML, and COMT.

- Outcome – Non-public safety organizations and Multnomah County staff will receive the appropriate training to conduct radio operations in alignment with the state's all-hazard training and COMU Qualification Program. The AUXCOMM training registration will open in January 2023 and is expected to be delivered in April 2023.
- Benefits – Radio communications staff will be trained to conduct ICS/National Incident Management System compliant and best practice radio operations.
- Cost – Medium, costs are associated with staff time and travel costs.
- Responsible Party: County-wide partners and DCA/MCEM

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

[12] Example: https://www.scc-ares-races.org/activities/files/SCCo_Quarterly_Drill_Plan_2010-04-17_rev_1.3.pdf.
[13] SWIC All Hazard Trainings can be found here: https://www.oregon.gov/siec/Pages/Interoperability-Trainings.aspx

MAINTENANCE

Summary of Maintenance Recommendations

Noted as a best practice, equipment maintenance should be a priority for organizations especially if an organization does not incorporate radios into their day-to-day operations. Maintenance recommendations include ensuring programing radios for interoperability, trained to conduct maintenance, and receiving technical assistance from the County.

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

Maintenance Recommendation 1: Multnomah County should offer interoperability frequencies/channels when practical to partner organization. Organizations should program radios for interoperability when feasible and allowable or provide the necessary documentation to reprogram radios during an emergency.

- Outcome – Non-public safety organizations will program certain radios to store interoperable channels/frequencies and/or create documentation that allows staff to reprogram radios in an emergency.
- Benefits – Organizations will be able to communicate externally during emergencies on identified channels/frequencies.
- Cost – Low, cost will be associated with staff time to program and maintain radios. Organizations may need assistance from vendors or technicians to program radios.
- Responsible Party: County-wide partners

Maintenance Recommendation 2: Organizations should provide regular training on the organization's communication plan, procedures, and maintenance to staff members designated to use radios.

- Outcome – Non-public safety organizations will provide internal training to staff members on radio plans, procedures, and maintenance.
- Benefits – Staff members will be able to conduct radio operations and basic without the need for a technician or vendor. This would be vital during a disaster. Examples include battery diagnostics, checking channel and frequency programming, and identifying equipment issues (antenna, buttons, screens, etc.).
- Cost – Low, cost will be associated with staff time to train members on maintenance plan.
- Responsible Party: County-wide partners

Maintenance Recommendation 3: Multnomah County should facilitate DCA Technical Assistance to non-public safety partners to establish and maintain radio communication capabilities during disasters.

- Outcome – DCA technical staff will be available to help non-public safety organizations with radio communication maintenance.
- Benefits – Organizations would be less reliant on vendors and internal capabilities to maintain radio communication equipment.
- Cost – Medium, cost will be associated with staff time to provide technical assistance.
- Responsible Party: DCA/MCEM

Return to Primary Radio Section | Return to Secondary Radio Section | Return to AUXCOMM Section

APPENDIX A: ASSESSMENT TOOL DATA SUMMARY

Key Findings

- 71% of participants had primary radio capabilities but of that 71%, 50% had secondary radio systems and 33% had Auxiliary Communication (AUXCOMM). Most use their primary system to communicate internally and a few can communicate with law enforcement on their primary system.
- Faith-based and social service organizations that participated did not have primary radio systems.
- Of the 12 that had primary radio systems, seven had access to repeaters or plan/process in place for accessing a repeater.
- On average, the 17 organizations were able to affirmatively respond to just over five out of the 12 of the capability questions. County and local government agencies were able to say yes at a higher rate than the other organizations participating with Faith-based Organizations (FBO) and Social Service organizations unable to communicate with radios in an emergency.
- Organizations provided limited information about plans, training, exercises, and events that utilized radios. There was even less information for those items with secondary radio systems and AUXCOMM.
- Just under half (47%) of the organizations have access to vendor information. However, five of the organizations indicated that the information was stored on internal databases/shared drives. No organization indicated they had physical copies of their vendor information.

Methodology

With input from the project workgroup a communication assessment tool was developed for distribution to participating organizations. The communication assessment tool consisted of an inventory template and fillable Adobe Portable Document Format (PDF) completed by a participating organization. The inventory included radio equipment for primary, secondary, and AUXCOMM communication systems and associated support equipment. The inventory compiled information related to the associated radios, status, location, date of last use, and any additional information.

The Project Team invited organizations to an information session where the Project Team provided an overview of the project and given the assessment tool and inventory. Participating organizations were also invited to an interview meeting where they were able to receive assistance completing the assessment and answer questions related to interoperability and radio communication capabilities and resources in the County. Once an organization completed

the Assessment Tool and inventory, they provided the result to the Project Team who compiled them into a database for analysis.

Initial Findings and Data

Summary Data:

- 17 organizations completed assessments ranging from the private sector, higher education, school districts, hospital systems, and government agencies.
- Eight organizations completed an inventory to go with their assessments.
- 12 of the 17 organizations had a primary radio communication system, six had a secondary radio communication system, and four had AUXCOMM capabilities through a partnership.
    - Of the 12 that had primary radio, eight had access to repeaters or plan/process in place for accessing a repeater. Seven had the capability to switch frequencies and channels.
    - Ten of 12 had identified maintenance staff or vendor support with eight of those organizations retaining vendor information. On the other side, four trained or provided resources to personnel to reprogram radios.
    - Seven of the 12 organizations indicated that their radios would not dump programming if they removed the battery but the other five were unsure what would happen if they removed the battery. Seven of the organizations did have back up batteries and two were unsure whether they did.
- On average, the 17 organizations were able to affirmatively respond to just over five out of the 12 of the capability questions. County and local government agencies were able to say yes at a higher rate than the other organizations participating with FBOs and Social Service organizations unable to communicate with radios in an emergency.

Primary Radio Systems:

Notable findings

- Primary Radio Descriptions:
    - Some organizations have desktop radios paired with two-way radios (hand-held). Frequently Very High Frequency (VHF) and some Ultra High Frequency (UHF) systems. Other organizations primarily rely on two-way radios for internal communications.
    - Faith-based and social service organizations that participated did not have primary radio systems.
    - University/Colleges, Federal Law Enforcement, and Volunteer Public Safety organizations lean on County Public Safety radio systems for emergency operations.
    - Hospitals can communicate via UHF during a disaster and have a primary radio network for a regional two-way radio system.

    - School districts have multiple repeaters and primarily use two-way radios for day to day use. One district has UHF radio infrastructure and is supported by a private communication company.
- Who do they communicate with?
    - Primarily internal communication.
    - A few organizations have the capability to communicate with public safety/law enforcement.
- Repeater capabilities
    - School districts and organizations that communicate regularly with public safety/law enforcement commonly have or have access to repeaters.
    - Organizations with a large geographic footprint use repeaters for internal communication.
- Frequencies/Channels
    - Some organizations have programmed radios with specific channels to use in a disaster.
    - Organizations that have external channels programmed primarily used them for monitoring.
    - One organization indicated that their radios were Project 25 (P25) compliant.[14]
- Planning
    - Four organizations provided information about internal radio communication plans. Most of these plans focused on radio equipment use not disaster communication. One organization provided information about their emergency action plan and emergency radio protocols.
- Training
    - Two organizations provide individual training to their staff and/or receive manufacturer specific training.
    - One organization conducts organizational level training on communication.
- Exercises and events
    - One organization indicated several real-world events that required radio communication. Another indicated a required exercise every 3 years with the last one being conducted in 2022.
    - Five organizations identified exercises and radio equipment tests within the last 5 years.
    - Organizations primarily run internal drills with radio equipment, but the radio equipment is not the primary subject of the drill. For example, fire drills and evacuations.
- Personnel
    - Five organizations indicated they have internal personnel to support radio maintenance ranging from a technician to a radio shop of multiple personnel. Seven organizations have a contractor or external support for their radio maintenance. Two of the groups have internal and external support for radio maintenance.

[14] CISA – Project 25 Resources. https://www.cisa.gov/safecom/p25.

    - No organization provided details on their maintenance programs.
- Vendor information
    - Under half of the organizations have access to vendor information. However, five of the organizations indicated that the information was stored on internal databases/shared drives. No organization indicated they had physical copies of their vendor information.
- Programing
    - Four organizations have staff trained to program radios and those organizations limit the training to select personnel.
    - Two organizations rely on their vendors for programming their radios.
- Additional information
    - One organization purchased supplementary radios for employees after a severe weather event impacted their ability to communicate via cellphone.
    - One organization is in the process of receiving new radios.

Secondary Radio Systems:

Notable findings

- Secondary Radio Descriptions
    - Two organizations have a secondary radio system specifically for communicating with law enforcement.
    - Two organizations have access to secondary systems, but they have not been used for a lengthy period or they have little information on how to use the system.
    - The remaining two organizations have secondary radio capabilities, but the system is primarily for internal communication.
- Planning, Training, Exercises and Events
    - One organization indicated that they had operational procedures available for their secondary system.
    - Organizations did not provide information related to exercises or event use of their secondary systems.
- Maintenance
    - Three organizations with internal technicians had the capability of maintaining the secondary systems.
    - Other organizations did not provide information related to maintaining their secondary systems.

AUXCOMM:

Notable findings

- AUXCOMM Descriptions:
    - Most organizations do not have AUXCOMM capabilities.
    - One organization has VHF Go-Kits assigned to Emergency Management Personnel.

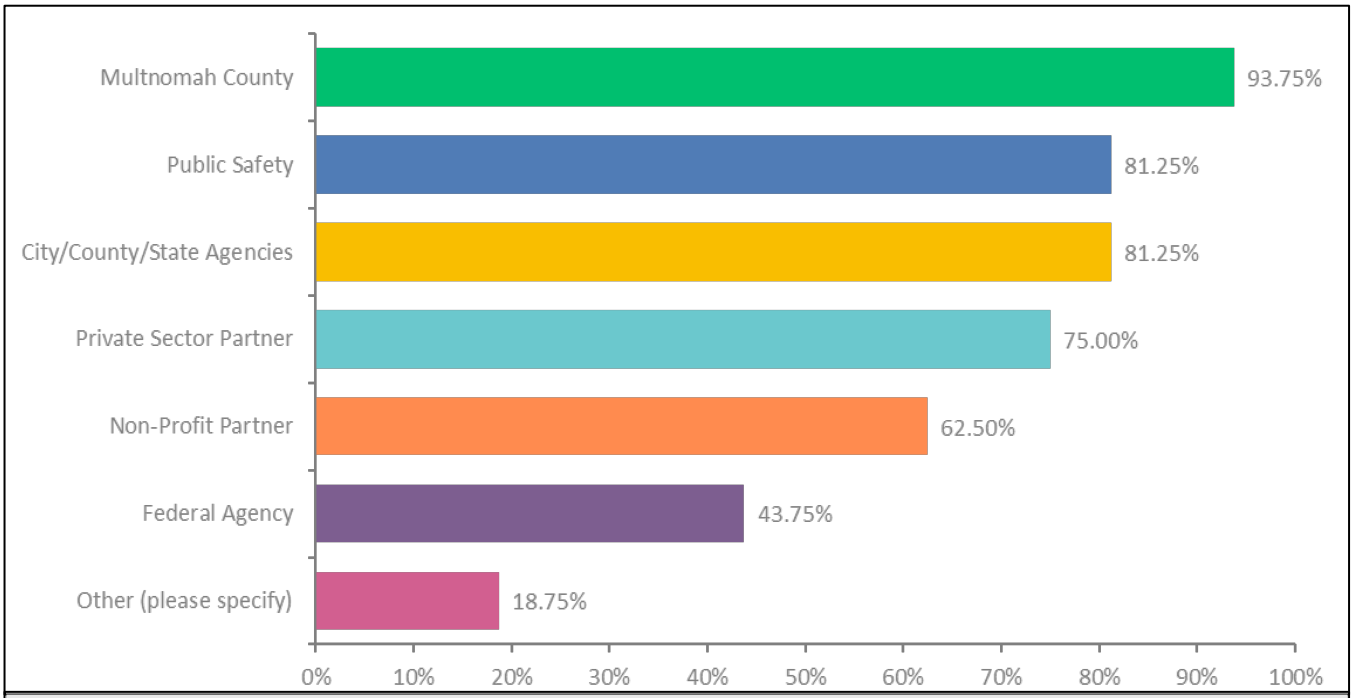
    - One organization had amateur radios and Satellite Communication (SATCOM) capabilities, but no internal staff trained to utilize them.
    - One organization indicated that help would come from Multnomah County if needed.
- Planning, Training, Exercises, and Drills
    - No organization provided information related to AUXCOMM plans, training, exercises, and/or drills.

Best Practices and Lessons Learned (Provided via Assessment)

- The more people who are trained to operate radio equipment, the better.
    - Many situations have occurred where a single trained individual is not present when information or operation is needed.
    - Keep information and cheat sheets available and easily accessible.
- Maintenance is paramount on systems and field units, yet not always top priority.
- The diversity in radio frequency technology deployed impacts entities and their abilities in connectivity and inter-operability during events.

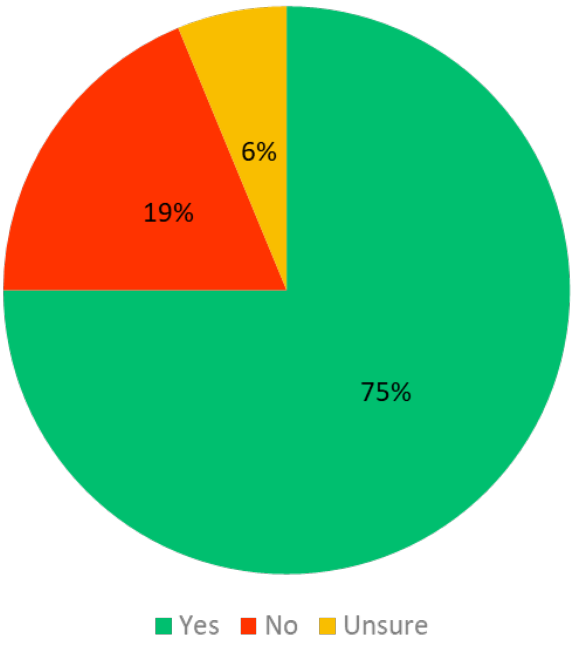
APPENDIX B: SUPPLEMENTARY SURVEY DATA

Q4: In a disaster, our organization would need to communicate with the following organizations to maintain continuity or essential functions. (Check all that apply)



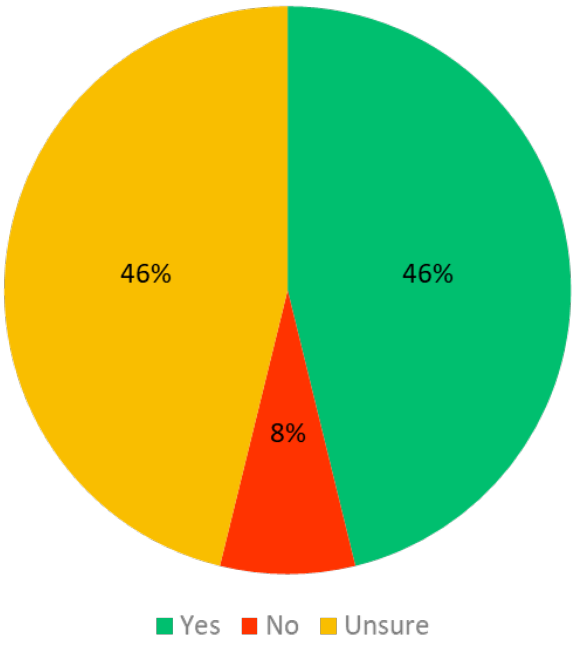
ANSWER CHOICES	RESPONSES	
Multnomah County	93.75%	15
Public Safety	81.25%	13
City/County/State Agencies	81.25%	13
Private Sector Partner	75.00%	12
Non-Profit Partner	62.50%	10
Federal Agency	43.75%	7
Other (please specify)	18.75%	3
TOTAL		73

Q5: Our organization is capable of communicating via radio in a disaster that has impacted our normal communication methods (telephone, email, internet, etc.). (Select One)



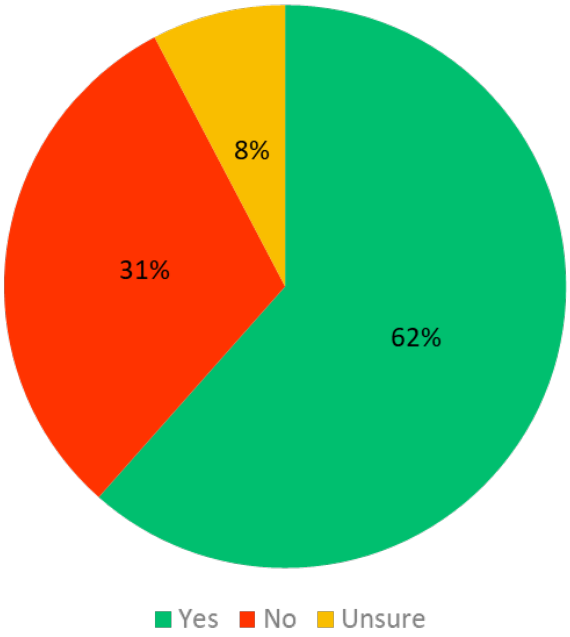
ANSWER CHOICES	RESPONSES	
Yes	75.00%	12
No	18.75%	3
Unsure	6.25%	1
TOTAL		16

Q6: Our organization has plans in place to support the use of radio (internally or externally) communications in a disaster. (Examples: Communication Plan, Radio Use Guide, etc.)



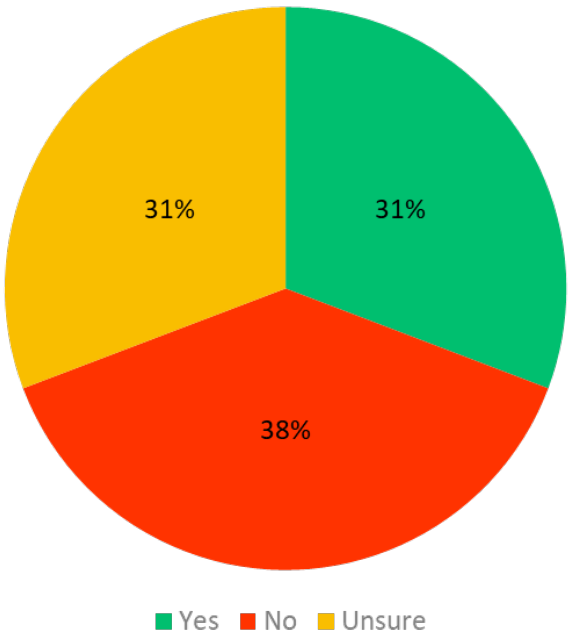
ANSWER CHOICES	RESPONSES	
Yes	46.15%	6
No	7.69%	1
Unsure	46.15%	6
TOTAL		13

Q7: In the last 3 years, our organization has participated in an exercise, training event, or real-world event that required us to use our radio communication equipment.



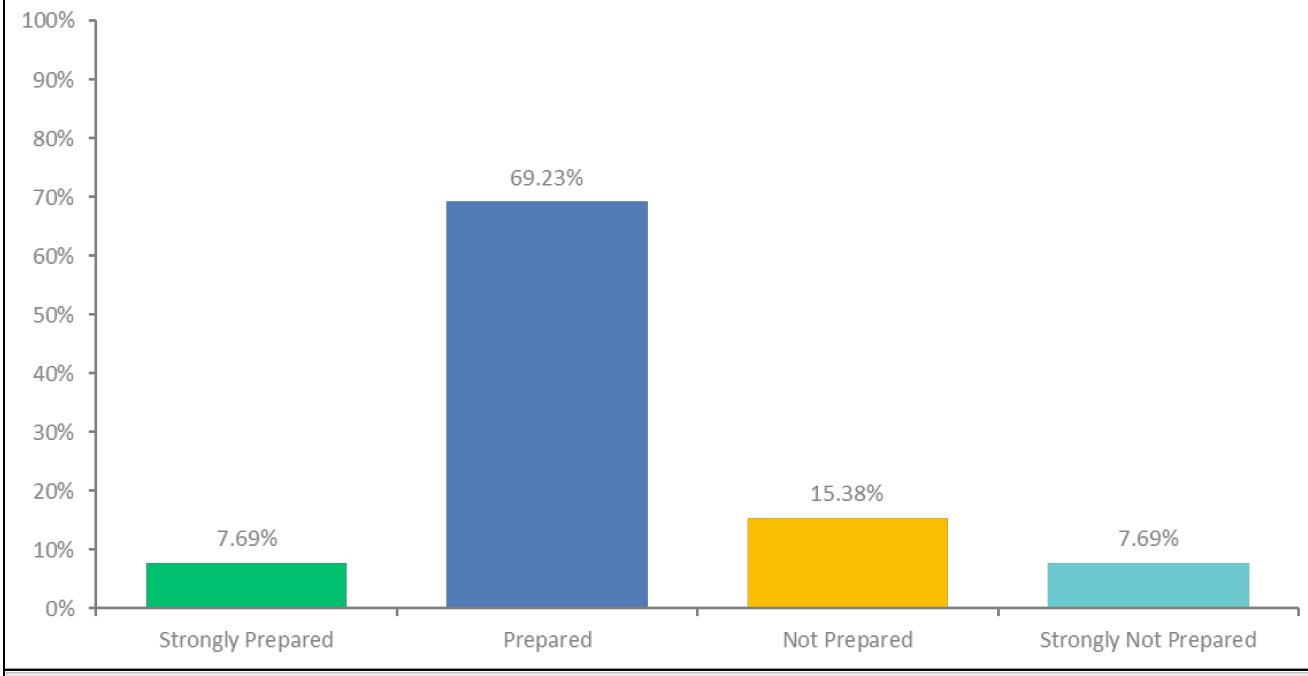
ANSWER CHOICES	RESPONSES	
Yes	61.54%	8
No	30.77%	4
Unsure	7.69%	1
TOTAL		13

Q8: We have a backup radio communication system in case our primary radio system is unavailable.



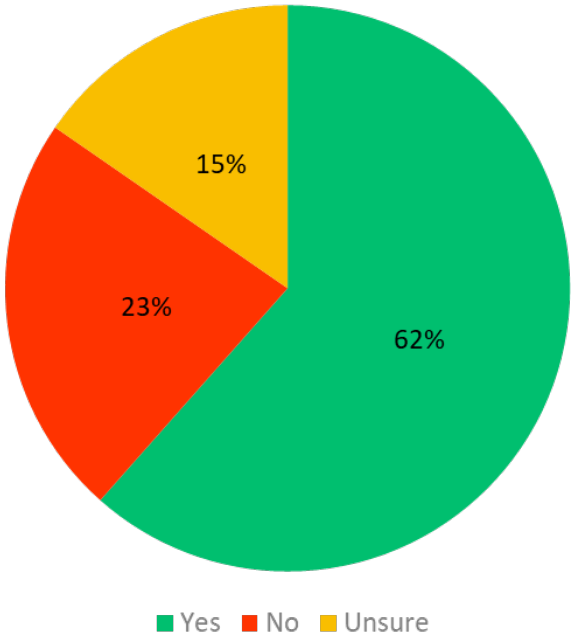
ANSWER CHOICES	RESPONSES	
Yes	30.77%	4
No	38.46%	5
Unsure	30.77%	4
TOTAL		13

Q9: Rate your organization's preparedness to communicate via radio in a disaster on the following Likert scale:



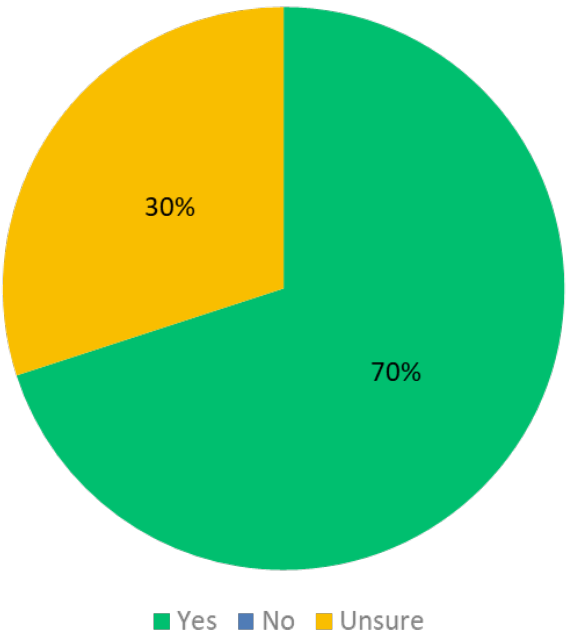
ANSWER CHOICES	RESPONSES	
Strongly Prepared	7.69%	1
Prepared	69.23%	9
Not Prepared	15.38%	2
Strongly Not Prepared	7.69%	1
TOTAL		13

Q10: We have the capability to communicate with external organizations via radio communication.



ANSWER CHOICES	RESPONSES	
Yes	61.54%	8
No	23.08%	3
Unsure	15.38%	2
TOTAL		13

Q11: Our organization has the capability to communicate with Multnomah County in an emergency via radio.



ANSWER CHOICES	RESPONSES	
Yes	70.0%	7
No	0%	0
Unsure	30.0%	3
TOTAL		10

APPENDIX C: ACRONYMS

ARES	Amateur Radio Emergency Service
AUXCOMM	Auxiliary Communication
BOES	Bureau of Emergency Communication
CB	Citizen Band
CISA	Cybersecurity and Infrastructure Security Agency
COML	Communications Leader
COMT	Communications Technician
COMU	Communications Unit
DAS	Department of Administrative Services
DCA	Department of County Assets
DCM	Department of County Management
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
ESF	Emergency Support Function
FBO	Faith-Based Organizations
FCC	Federal Communications Commission
ICS	Incident Command System
IGA	Intergovernmental Agreement
INCM	Incident Communications Center Manager
MCEM	Multnomah County Office of Emergency Management
MCSO	Multnomah County Sheriff's Office
MCV	Mobile Communication Vehicle
MOU	Memorandum of Understanding
NPSTC	National Public Safety Telecommunications Council

OEM	Office of Emergency Management
PBEM	Portland Bureau of Emergency Management
RADO	Radio Operator
RF	Radio Frequency
RFOG	Regional Field Operations Guide
SATCOM	Satellite Communication
SIEC	Statewide Interoperability Executive Council
SWIC	Statewide Interoperability Coordinator
TICP	Regional Tactical Interoperable Plan
TTX	Tabletop Exercise
UHF	Ultra High Frequency
VHF	Very High Frequency

ATTACHMENTS:

ATTACHMENT 1: ASSESSMENT TOOL

ATTACHMENT 2: ASSESSMENT TOOL GUIDE

ATTACHMENT 3: RADIO EQUIPMENT INVENTORY SHEET

ATTACHMENT 4: SUPPLEMENTARY SURVEY