Description of document:	Three (3) Federal Emergency Management Agency (FEMA) National Radio System (FNARS) manuals: • FEMA National Radio System Concept of Operations, March 2017 • FEMA National Radio System Standard Operating Procedures, September 2016 • FEMA National Radio System Operators ' Quick Guide, August 2015
Requested date:	07-July-2017
Released date:	09-November-2017
Posted date:	26-February-2018
Source of document:	FEMA Information Management Division FOIA Request 500 C Street, S.W., Mailstop 3172 Washington, D.C. 20472 Email: fema-foia@dhs.gov Online FOIA Request Form

U.S. Department of Homeland Security
500 C Street, S.W. Mail Stop 3172
Washington, DC 20472-3172

FEMA

November 9, 2017

SENT VIA E-MAIL

Re: **FEMA FOIA Case Number 2017-FEFO-01989**

This is the final response to your Freedom of Information Act (FOIA) request to the Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), dated July 7, 2017 and received in this office on July 10, 2017. You are seeking:

1- A copy of the FNARS National Radio Network Station Handbook, and a copy of the table of contents of the FNARS National Radio Network Station Handbook, and

2- A copy of the FNARS Handbook or Manual.

A search of the National Continuity Program Directorate (NCP) for documents responsive to your request produced a total of 83 pages. We are granting your request under the FOIA, Title 5 U.S.C. § 552, as amended, and DHS' implementing regulations, 6 C.F.R. Chapter I and Part 5. After carefully reviewing the responsive documents, I determined that they are appropriate for public release. They are enclosed in their entirety; no deletions or exemptions have been claimed.

You have the right to appeal if you disagree with FEMA's response. The procedure for administrative appeals is outlined in the DHS regulations at 6 C.F.R. § 5.8. In the event you wish to submit an appeal, we encourage you to both state the reason(s) you believe FEMA's initial determination on your FOIA request was erroneous in your correspondence, and include a copy of this letter with your appeal. Should you wish to do so, you must send your appeal within 90 days from the date of this letter to fema-foia@fema.dhs.gov, or alternatively, via mail at the following address:

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Information Management Division (FOIA Appeals)
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Provisions of the FOIA allow us to recover part of the cost of complying with your request. In this instance, because the cost is below the $25 minimum, there is no charge.

If you have any questions or would like to discuss this matter, you may contact FEMA at (202) 646-3323, or you may contact FEMA's Public Liaison in the same manner. Please reference the subsequent case identifier: **FEMA 2017-FEFO-01989.**

Sincerely,

ERIC A NEUSCHAEFER

Digitally signed by ERIC A NEUSCHAEFER
DN: c=US, o=U.S. Government, ou=Department of Homeland Security, ou=FEMA, ou=People, cn=ERIC A NEUSCHAEFER, 0.9.2342.19200300.100.1.1=0647718256.FEMA
Date: 2017.11.08 11:43:18 -05'00'

Eric Neuschaefer
Chief, Disclosure Branch
Information Management Division
Mission Support

Enclosure(s): Responsive Documents (83 pages)

FEMA National Radio System Concept of Operations

March 2017

FEMA

~~For Official Use Only~~

VERSION HISTORY			
Date	**Version**	**Approver**	**Summary of Changes**
01/2015	1	TC	Official writing of document.
04/2015	2	TC	Rewording of body and formatting of entire document.
03/2016	3	TC	Edit to support Out-of-Band activation and supporting sections.
06/2016	4	TC	Edit and incorporation of review comments.
09/2016	5	TC	Revision based on FNARS changes.
11/2016	6	TC	Minor edits.
03/2017	7	TC	Updates to include security accreditation package information; minor edits

Executive Summary

The Federal Emergency Management Agency (FEMA) carries out its mission to support our citizens and first responders to ensure Americans work together to build, sustain, and improve our capabilities to *prepare for, protect against, respond to, recover from, and mitigate all hazards* that could potentially befall the Nation. To effectively collaborate and coordinate the management and implementation of federal, state, and territorial government resources and capabilities requires a resilient, survivable communications platform, independent from but interconnected with normal communications infrastructure.

FEMA's National Continuity Programs Directorate (NCP), in accordance with Presidential Policy Directive 40 (PPD 40), *National Continuity Policy*, maintains the FEMA High Frequency Continuity System (FHFCS), a suite of unclassified High Frequency (HF) radio communications systems designed to provide resilient capabilities across the full spectrum of potential hazards. The FEMA National Radio System (FNARS) is a key component of the FHFCS portfolio, and is supported with commercial-off-the-shelf (COTS) equipment installed at the Mount Weather Emergency Operations Center (MWEOC), Federal Regional Centers (FRCs), Regional Offices (ROs), the Mobile Emergency Response Support (MERS) detachments, as well as the emergency operations centers (EOCs) of the 50 states, the District of Columbia, and the U.S. Territories.

FNARS provides the FEMA Administrator and executive leadership with resilient voice and messaging capabilities for command, control, and communications (C3); continuity of operations (COOP) of FEMA assets and resources; and communication, coordination, and collaboration with Regional Administrators and state/territorial emergency management partners in response to all hazards.

This *Concept of Operations (CONOPS)* serves as the foundation for the development of FNARS operational plans and procedures, and will be reviewed and updated as necessary to ensure it is accurate, current, and provides appropriate guidance to ensure the program demonstrates maximum benefit to the Nation's continuity and security.

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1.0 Introduction

FNARS is a High Frequency (HF) radio system providing communications transport between nationally-distributed ground stations in times of degraded or destroyed telecommunications capabilities within the normal communications infrastructure. FNARS was developed to serve two purposes:

1. Enable command, control, and communications (C3) among the agency and its elements throughout continuity events; and
2. Communicate and coordinate with disaster response and recovery mission partners from FEMA Headquarters (HQ), FEMA Regions, states, and territories in support of the continual performance of the National Essential Functions (NEFs).

FNARS is a key component of the FEMA High Frequency Continuity System (FHFCS), a suite of HF communications systems managed and operated by the FEMA National Continuity Programs Directorate (NCP).

1.1 Background

National policy has long recognized the importance of emergency communications programs in protecting the continuity of the Nation. Government leaders developed robust legislation and executive policy aimed at protecting the ability of the Nation's leaders and emergency responders to access alternate communications systems in times of emergency through programs such as FNARS. See Appendix C on authorities and references that govern this document.

As a result, the Executive Office of the President, Office of Civil and Defense Mobilization, developed the predecessor to FNARS in 1958, with the initial procurement of a nationwide HF system called National Communications System 2 (NACOM2). Leadership over the system later transferred to the Office of Civil Defense - U.S. Army, and then to the Defense Civil Preparedness Agency (DCPA), and became known as the Civil Defense National Radio System (CDNARS) before becoming FNARS with the 1979 formation of FEMA. Today, FNARS is an HF radio system managed by NCP to enable the agency's mission of *supporting our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards."*[1]

HF radio functions independently of terrestrial and space-based (satellite) infrastructure, and offers a highly-resilient continuity communications capability in the event of compromise or degradation to normal communications platforms and infrastructure. Sources of potentially negative impacts may include hostile attack, natural disaster, or widespread commercial service outage. HF radio provides global coverage and requires minimal infrastructure to operate, while providing access to on-demand, point-to-point voice and messaging communications capabilities. All associated FNARS equipment (including hardware, such as HF radios, antennas, ancillary devices, and software) are government-owned and nationally distributed. FNARS radios are installed at the Mount Weather Emergency Operations Center (MWEOC); each Federal Regional Center (FRC) and Regional Office (RO); all

[1] Federal Emergency Management Agency, *Mission*. https://www.fema.gov/about-agency. Accessed 3/10/2017.

Mobile Emergency Response Support (MERS) detachments; and the Emergency Operations Centers (EOCs) of all 50 states, the District of Columbia, and U.S. Territories.

1.2 Mission

FNARS is engineered to meet FEMA's requirements for a resilient, survivable communications platform, independent from but interoperable with normative communications systems. The program is designed to meet core capabilities and needs identified within the FEMA *National Preparedness Goal* and *National Planning Framework*' (public information and warning, operational coordination, operational communications, and situational assessment). FNARS serves as a backup to commercial telecommunications and messaging capabilities and is accessible 24 hours a day, 7 days a week (24/7).

1.3 System Overview and Capability

FNARS is an unclassified communications system designed for utilization, either preemptively or reactively, to any event that compromises or potentially compromises the normal communications infrastructure. The FNARS system includes the following capabilities:

- HF Automatic Link Establishment (ALE), where the radio is utilized to establish a link to another FNARS radio on the system. The HF ALE capability meets MIL STD 188.141b.
- Voice capability, where voice messages are transmitted via the radio.
- Text messaging capability, where text messages can be sent to other FNARS stations through the FNARS radio via a standalone workstation.
- Ability to provide an interconnect to the PSTN through an electronic telephone patching network.

The events and hazards against which FNARS mitigates impacts on FEMA's continuity include:

- Natural disasters (e.g., hurricanes, earthquakes, tornados)
- Terrorist attacks
- Acts of war by foreign powers
- Large-scale communications infrastructure stress or failure (e.g., the 2003 Northeast blackout)
- Cyber-attack against communications systems or infrastructure
- National Special Security Events (NSSEs)
- National Weather Warnings

FNARS operates independently of terrestrial and space-based (satellite) infrastructure, and serves as a resilient backup continuity communications capability. Its meshed network of voice and data communications capabilities (e.g., HF data, phone patch) provides long-range coverage while requiring minimal infrastructure. Standard FNARS equipment includes HF radios, antennas, and other ancillary devices such as standalone workstations, power amplifiers, and backup power supply units.

2.0 FNARS Networks

FNARS comprises two networks ("nets"): the National Radio Network (NRN) and the compilation of Regional Radio Networks (RRNs), each with unique missions and user communities.

2.1 National Radio Network

The NRN is dedicated to FEMA C3 throughout the United States. FEMA elements, including agency leadership and regional leadership, utilize the NRN to maintain C3 in degraded or destroyed communications environments. The NRN encompasses 10 FEMA regions, with MWEOC serving as the primary Network Control Station (NCS), and five FRCs that can act as alternate NCSs in certain circumstances. At least once annually, a contingency test is performed (as part of the regular weekly NRN test) in which Net Control, usually at MWEOC, is assumed by one of these alternate locations and the test is conducted from that alternate location. The Denver MERS Operations Center (MOC) is also available 24/7 to activate FNARS in emergency and test/exercise events (See **Figure 1** for depiction of FNARS NRN map). The NRN involves the following group of participants, as shown in **Table 1**.

Region	MERS Detachment	MOC	Federal Regional Center	Regional Office
Region I	MERS Maynard	MERS Maynard MOC	FRC I	RO I
Region II				RO II
Region III	MERS Frederick			RO III
Region IV	MERS Thomasville		FRC IV	RO IV
Region V				RO V
Region VI	MERS Denton		FRC VI	
Region VII				RO VII
Region VIII	MERS Denver	MERS Denver MOC	FRC VIII	
Region IX				RO IX
Region X	MERS Bothell	MERS Bothell MOC	FRC X	

Table 1 – NRN Participants by Region

2.2 Regional Radio Networks (RRNs)

The RRNs are dedicated to facilitating communications between FEMA and state/territorial emergency management partners to coordinate disaster response and recovery activities in degraded or destroyed communications environments. Incidents that affect a limited area of the country may prompt FEMA leadership to activate an RRN. Five FRCs, located in Maynard, Massachusetts; Thomasville, Georgia; Denton, Texas; Denver, Colorado; and Bothell, Washington, host FNARS equipment, enabling them to function as Net Control (NC) for their respective RRNs (see **Figure 2**). The RRNs are organized into the following groups of participants, as shown in **Table 2**.

NC Site	Participating Locations			
Net Control - FRC Maynard (Region I)	• Connecticut • Delaware • Maine • Maryland • Massachusetts	• New Hampshire • New Jersey • New York • Pennsylvania	• Rhode Island • Vermont • Virginia • West Virginia	• Washington, DC • St. Croix (USVI) • St. John (USVI) • St. Thomas (USVI)
Net Control - FRC Thomasville (Region IV)	• Alabama • Florida	• Georgia • Kentucky	• Mississippi • North Carolina	• South Carolina • Tennessee
Net Control - FRC Denton (Region VI)	• Arkansas • Iowa • Kansas	• Louisiana • Missouri	• Nebraska • New Mexico	• Oklahoma • Texas
Net Control - FRC Denver (Region VIII)	• Colorado • Illinois • Indiana	• Michigan • Minnesota • Montana	• North Dakota • Ohio • South Dakota	• Utah • Wisconsin • Wyoming
Net Control - FRC Bothell (Region X)	• Alaska • Arizona • California	• Hawaii • Idaho • Nevada	• Oregon • Washington	• CNMI • Guam

Table 2 – FRC-Assigned RRN Stations

2.3 Activation Authorities

The following personnel serve as activation authorities, and any may independently direct activation of an FNARS network:

1. Administrator, FEMA
2. Deputy Administrator, FEMA
3. Deputy Administrator, Protection and National Preparedness, FEMA
4. Associate Administrator, Response and Recovery, FEMA
5. Deputy Associate Administrator, Response and Recovery, FEMA
6. Assistant Administrator, NCP, FEMA
7. Deputy Assistant Administrator, NCP, FEMA
8. Regional Administrator
9. Deputy Regional Administrator
10. Continuity Communications Division (CCD) Director, NCP, FEMA
11. CCD/Communications Architecture and Integration (CAI) Deputy Director, NCP, FEMA
12. CCD/CAI/Communications Management Branch (CMB) Chief, FEMA

2.4 Activation Roles and Responsibilities

This section outlines the roles and responsibilities of the stakeholders involved in the activation process.

- **Activation Authority:** May initiate activation as listed previously.

- **National Watch Center (NWC):** The NWC may facilitate the activation process. The individual who initiates activation of FNARS may use radio devices provided by the NWC to contact FNARS stakeholders. The NWC may contact the FEMA Operations Center (FOC) or the Denver MOC with instructions to activate FNARS.
- **FOC:** The FOC serves as a conduit to relay FNARS activation orders to the Denver MOC, and to recall NCP/CCD/CMB personnel to assume C3 of the system.
- **Denver MOC:** The MOC is responsible for responding to FNARS activation orders issued directly by senior leadership or via the NWC, the FOC, or other authorized entities. If activation orders did not previously pass through the FOC, the MOC will contact the FOC with instructions to recall NCP/CCD/CMB personnel.
- **NCP Continuity Readiness Cell (CRC):** While the CRC is not included in the primary notification path for FNARS activation, the FOC may enlist assistance from the CRC to recall NCP/CCD/CMB personnel during normal business hours (Monday–Friday, 8:00 AM – 4:30 PM ET).
- **NCP Joint Rendezvous Operations Control Center (JROCC):** While the JROCC is not included in the primary notification path for FNARS activation, the FOC may enlist assistance from the JROCC to recall NCP/CCD/CMB personnel during normal business hours (Monday–Friday, 8:00 AM – 4:30 PM ET).
- **NCP Continuity Communications Division (CCD):**
  - Assumes C3 of FNARS as soon as is practicable after the Denver MOC has activated the system.
  - Responds to FNARS activation requests in accordance with the FNARS CONOPs.
  - Provides training to NWC and FOC personnel on HF operations.
  - Maintains and updates appropriate HF radio operations documentation, to include the FNARS Standard Operating Procedure, operating information, call-sign listings, and a current list of Radio Room operators with their emergency contact information.

2.5 Conditions for Activation

The NRN and RRN are generally activated when communications between state/territories, MERS, ROs, FRCs, and/or FEMA leadership have been or are likely to become disrupted. An RRN may also be activated when, according to the *Robert T. Stafford Disaster and Emergency Assistance Act*, a major natural or manmade disaster occurs that results in degraded or destroyed communications. A state/territory EOC may make a request to the regional activation authority to activate the assigned RRN.

If the Continuity of Government Readiness Condition (COGCON) level changes, FNARS may be activated. Refer to the COGCON Matrix in Appendix E for activation timelines. **Figures 1** and **2** show the NRN and Regional Radio Networks (RRNs) respectively by region. **Figure 3** shows the FNARS activation workflow for both NRN and the RRNs. Details set forth in Section 3 provide additional information concerning roles and responsibilities of the groups and facilities involved in the activation/use of FNARS.

2.6 Activation/Deactivation Procedures

2.6.1 Activation

When a real-world event or exercise simulation occurs that requires senior leadership to reach officials on the national and state or regional levels:

1. The activation authority requests activation of FNARS by contacting the NWC, the FOC, the Denver MOC, or any other authorized entity (OAE) he/she deems appropriate.
2. The request is processed through commercial or out-of-band (OOB) methods. Capabilities listed (as applicable by location):

   If responding to an event that is pending (e.g., adverse weather event such as a hurricane):
   - FEMA Enterprise Network via email
   - FEMA Emergency Notification System (ENS)
   - Commercial lines (e.g., cell phones, land line telephone)

   If responding to an event that has occurred without warning (e.g., terrorist attack):
   - National Response Network UHF Line-Of-Sight (LOS) communications (NRN-U)
   - Strategic Network (STRATNET) Ultra High Frequency (UHF) Land Mobile Radio (LMR)
   - Broadband Global Area Network/Satellite Communications (BGAN/SATCOM)
   - NRN HF communications

   a. If notified via senior leadership, the NWC, or OAE, the FOC will contact the Denver MOC with instructions to activate FNARS and assume temporary C3 until NCP/CCD/CMB has been recalled.
   b. Once activated, the MOC will transmit the message traffic or send notification of the activation to affected FNARS stations and other relevant parties. The activation message will include the Activation Authority and the Date-Time group.
   c. The FOC will recall NCP/CCD/CMB via the ENS, CMB Conference Bridge, satellite phone, or land mobile radio/paging solution (future) to return to duty to assume C3 of FNARS.
   d. Denver MOC will assume temporary C3 and Net Control, activate FNARS, and contact appropriate regional assets.
3. If Denver MOC is notified to activate directly by senior leadership, it will:
   a. Assume temporary C3 and Net Control, activate FNARS, and contact appropriate regional assets.
   b. Notify the FOC to recall NCP/CCD/CMB via commercial lines, NRN-U/Public Switched Telephone Network (PSTN), or NRN-HF.
4. Once NCP/CCD/CMB has been recalled, it will assume C3, notify Denver MOC (via commercial lines, NRN-U/PSTN, or NRN-HF) it has activated National Net Control at MWEOC, and resume contact with appropriate regional assets.
5. If senior leadership contacts an OAE, it will contact the FOC or the MOC to initiate the procedures outlined.

6. Finally, the FNARS authentication tables may be utilized as appropriate to validate station identity for FNARS messages.

2.6.2 Deactivation

The deactivation process begins when the activation authority determines FNARS capabilities are no longer required to maintain effective C3 of FEMA's responsibilities in an emergency situation.

To deactivate FNARS, the Network Control Station (NCS) Operator will:

1. Utilize FNARS to contact stations via voice or chat to deliver the deactivation message.
2. Confirm all stations received the Network Deactivation Message.
3. Return radios to Automatic Link Establishment (ALE) Scan and initiate Radio Room shutdown procedures.
4. Compile all traffic logs and submit them to the FNARS Program Manager.

NCP/CCD/CMB will provide a standardized template for reporting results of FNARS communications.

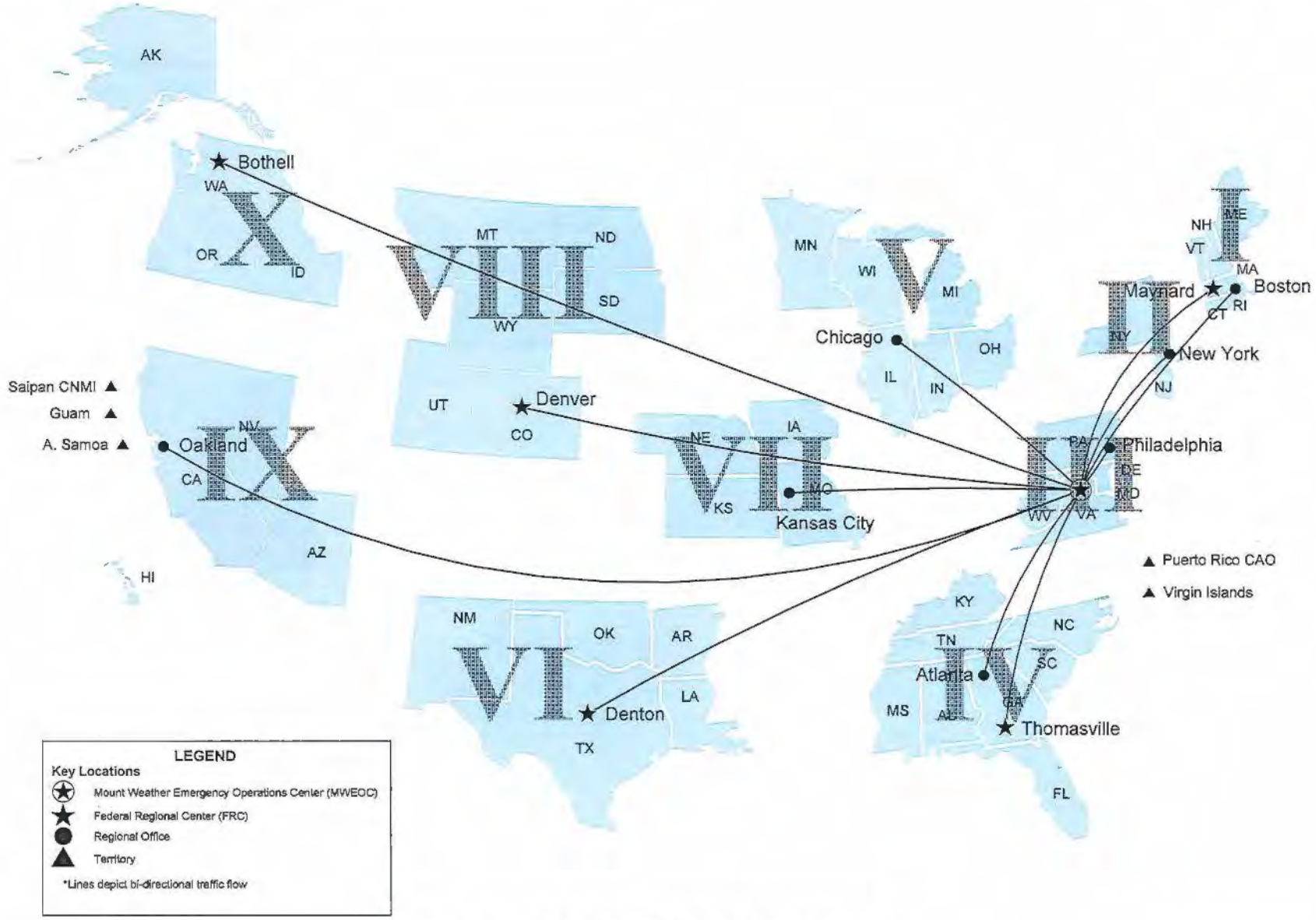


Figure 1 – FNARS National Radio Network (NRN)

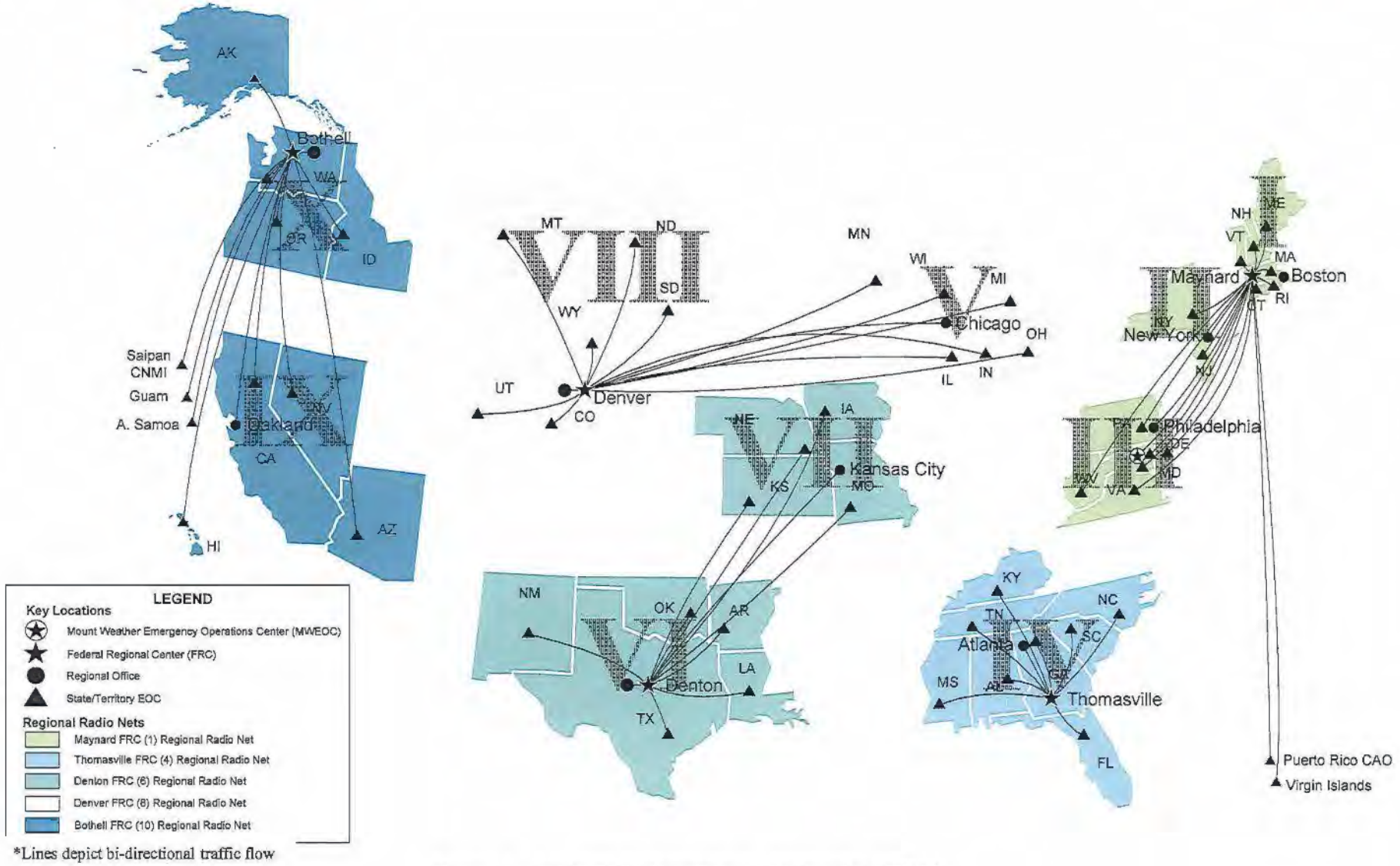


Figure 2 – FNARS Regional Radio Networks (RRNs)

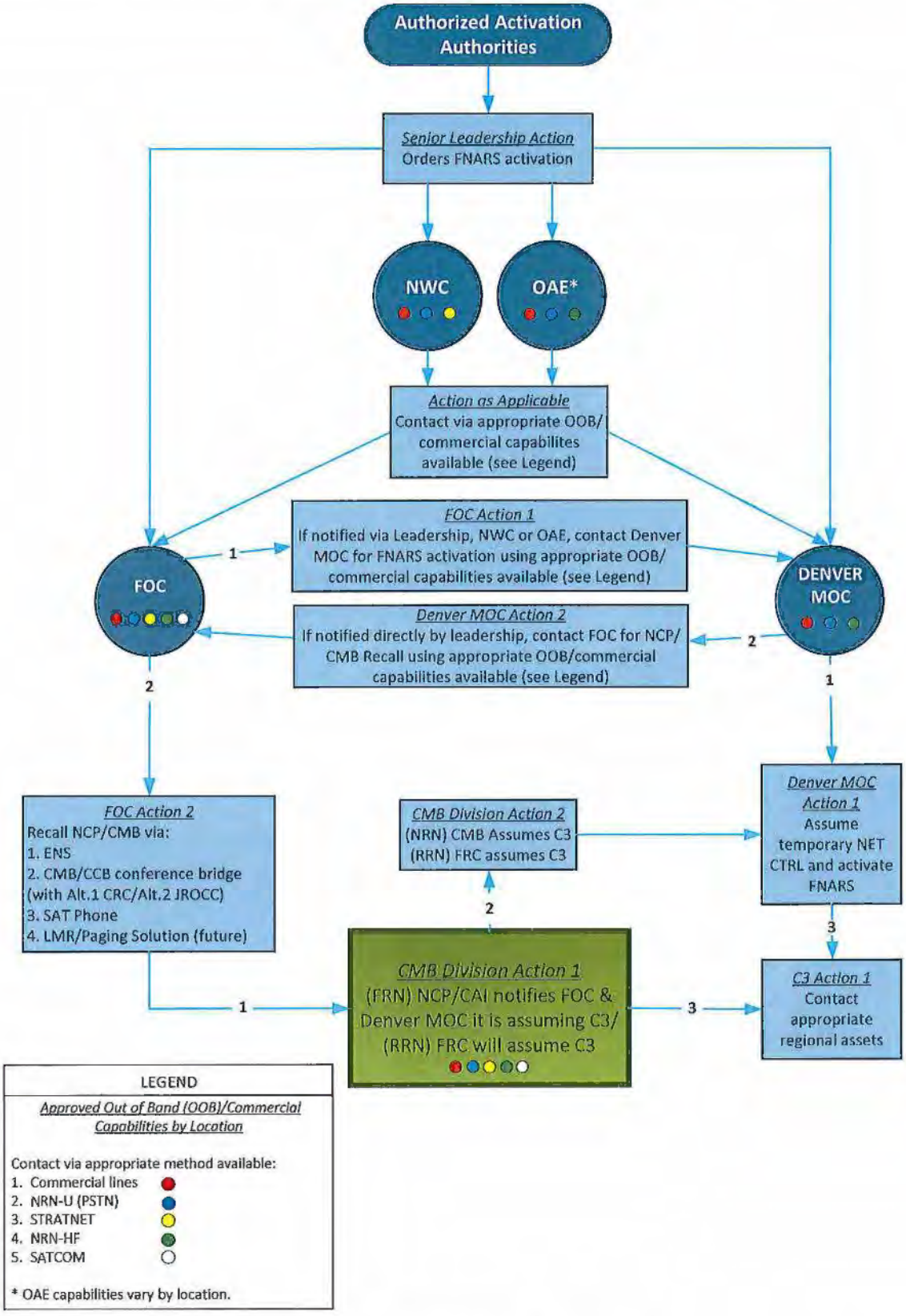


Figure 3 – FNARS Activation Workflow

2.7 Protective Measures

Many natural and manmade occurrences can disrupt HF communications, such as lightning strikes, solar flares, and power outages. FNARS uses various tools to mitigate the potential damaging effects on the system caused by these events. Antenna systems can feature lightning protection devices that diffuse the electrical charge of the strike, maintaining the integrity of the antenna system, as well as preventing power surges to the equipment. Solar activity can disrupt the earth's atmosphere, potentially resulting in degraded HF abilities. FNARS uses propagation methods to mitigate any effects caused by solar events. Each radio is installed with an uninterrupted power source (UPS) should a power outage occur in the building housing the radio. The UPS will automatically activate, allowing continued communications until emergency power generators are activated and commercial power is restored. The UPS also provides an added measure of protection against power surges and spikes on the commercial grid.

In addition to using its own set of tools to maintain operations during an event, FNARS also utilizes the services of the National Oceanic and Atmospheric Administration (NOAA)/National Weather Service (NWS) Space Weather Prediction Center, which provides alerts and warnings for future disturbances that could affect system operations. Once an alert/warning is received, FNARS Program Management Office (PMO) conducts an analysis to determine the impact on current and future system operations. See Appendix F for the NOAA Space Weather Scale. For up-to-date space weather information, go to the NOAA Space Weather Prediction Center website.

2.8 Outage Reporting

The PMO reports major system outages to the FEMA NOC at FEMA-NOC@fema.dhs.gov or (540) 542-4001.

3.0 Roles and Responsibilities

In order to ensure the successful operation of FNARS, coordination and oversight must occur among several stakeholder groups as well as geographically dispersed facilities. The following sections briefly describe each group or facility and their role(s) in supporting FNARS.

3.0.1 FEMA High Frequency Continuity System (FHFCS) PMO (System Owner)

FEMA NCP CCD is the high-level system owner of the FNARS program. Ultimately, the FHFCS PMO, a group within CCD, is directly responsible for FNARS program operation, providing oversight, management, and appropriate resources. The PMO assigns a Net Control (NC) contact who assumes responsibility for operational coordination, and directing and controlling all traffic on FNARS's nets. The PMO carries out the FNARS program management functions and is responsible for providing programmatic oversight, including policy-making decisions ranging from project engineering to property management functions for all national security and emergency preparedness (NS/EP)-related HF programs. The FHFCS PMO provides the following functions for FNARS:

1. **Program Administration:** Responsibilities include providing program management and oversight for the FNARS program; conducting risk management assessments; ensuring

adherence to program performance measures; performing regular status assessments of all FNARS HF assets deployed or in storage at the national, regional, and state/territory levels; and coordinating the logistics of installation or decommissioning activities for FNARS equipment with on-site facility managers and FEMA contacts at the national, regional, and state/territory levels.

2. **Technical Engineering:** Responsibilities include providing engineering support for all antennas, radios, and software for the FNARS program, including but not limited to providing technical expertise and coordinating configuration change management across all aspects of the system.

3. **Operations:** Responsibilities include ensuring the operational capability of the system at all times, as well as providing guidance on how the system functions and user training to all participants. As directed, the Operations team physically operates the system during hazard events and disasters, tests and exercises, and NSSE activities.

4. **Maintenance:** Responsibilities include providing maintenance support on all antennas, radios, and software for the FNARS program as well as ancillary devices.

5. **Security:** Responsibilities include providing policy guidance for FNARS, conducting system certification and accreditation (C&A), and in consultation with the FNARS Information Systems Security Officer (ISSO) ensuring all FNARS logical, physical, and communications security (COMSEC) equipment adheres to DHS and FEMA standards. In cooperation with the System Owner, the ISSO prepares and submits the system security package for approval to operate. The ISSO also advises the System Owner through all phases of the system engineering life cycle (SELC) regarding security.

3.0.2 National Watch Center

The National Watch Center (NWC) maintains 24/7 national situational awareness of potential, developing, or ongoing situations that may require a coordinated federal response. At the direction of any of the activation authorities listed previously, the NWC will notify the FOC of the activation of FNARS. The NWC also relays any message traffic related to the activation.

3.0.3 FEMA Operations Center

FEMA Operations Center (FOC) functions include maintaining 24/7 situational awareness, issuing notifications and warnings, and coordinating operational support. At the direction of any of the activation authorities listed previously, the FOC may initiate activation of FNARS by receipt of such notification and the communication of the intent to activate to the Denver MOC (24/7 operation).

3.0.4 MERS Operations Centers

FEMA maintains six MERS detachments, operating five MERS Operations Centers (MOCs) that provide mobile communications support during hazard events or disasters. The MOCs provide 24/7 FNARS monitoring. MERS Denver is the primary MOC location for FNARS (i.e., first communication requested by an activation authority will be directed to the Denver MOC), with two secondary MOCs located in Maynard, Massachusetts, and Bothell, Washington and two additional MOCs slated for future operational capability located in Thomasville, Georgia, and Denton, Texas. At the direction of any of the activation authorities listed previously, directly or via the FOC, the MOC may initiate activation of FNARS by receipt of such notification.

3.1 Operational Capabilities

3.1.1 Mount Weather Emergency Operations Center

FEMA's Mount Weather Emergency Operations Center (MWEOC) serves as the FNARS National NC station and is responsible for directing and controlling all communications on the FNARS NRN. As the National NC, MWEOC is responsible for the control and coordination of the NRN's telecommunications functions.

3.1.2 Federal Regional Centers

The Federal Regional Centers (FRCs) serve as the Regional NC station(s) for the RRNs and are therefore responsible for the coordination, execution, and providing documentation of weekly RRN tests to the PMO. Additionally, FRCs assist the PMO with coordination of technical support for FNARS assets within their designated regions and participate in weekly FNARS NRN tests. Within the RRN, the five FRCs are responsible for the state/territory EOCs within their respective nets. FRCs control message traffic within the nets and grant permission for their respective stations to contact one another.

FRCs relay all communications for their respective regions to National NC when operated within the NRN. FRCs may be tasked to serve as Alternate National NC centers in the event the Primary National NC is inoperable or unavailable. Due to this requirement, FRCs are equipped with robust and interoperable equipment to support a variety of scenarios, enabling them to seamlessly substitute for MWEOC should circumstances warrant. The FRCs offer the following capabilities in support of FNARS, above and beyond what can be provided by a regional office:

Reliability: Equipped with robust HF radio equipment comparable to the National NC to allow for optimal operational capabilities.

Availability: Integrated system redundancies ensuring continuous availability of the system; dispersed placement of facilities to sustain NC functions in the event of a significant geographical impact.

Maintainability: Sufficient and trained personnel to ensure any necessary operations and maintenance can be conducted onsite in an efficient manner.

Sustainability: Geographically dispersed locations with redundant capabilities means the loss of one or more location's capability does not impact the entire system's operation.

The National NC ensures the FNARS network operates efficiently. When an Alternate National NC assumes control, the Alternate becomes responsible for accomplishing all functions normally performed by the Primary National NC.

FRCs receive designation as Alternate NCs in the following sequence, as available:

1. FRC Denver
2. FRC Denton
3. FRC Maynard
4. FRC Thomasville
5. FRC Bothell

3.1.3 FEMA Regional Offices

The 10 FEMA Regional Offices (ROs) are located across the country, with three co-located at FRCs. FEMA ROs assist NCP with administering FNARS programmatic policies at the state and territory levels. ROs also participate in weekly FNARS tests for the national radio nets. The locations of FEMA's ROs are as follows, as shown in **Table 3**.

Regional Office Locations	
Region I - Boston, MA	Region VI - Denton, TX
Region II - New York, NY	Region VII - Kansas City, MO
Region III - Philadelphia, PA	Region VIII - Denver, CO
Region IV - Atlanta, GA	Region IV - Oakland, CA
Region V - Chicago, IL	Region X - Bothell, WA

Table 3 – FEMA Regional Offices

3.1.4 Mobile Emergency Response Support Detachments

The primary function of Mobile Emergency Response Support' (MERS') in disaster response operations involves communications support. MERS can deliver voice, data, and video services in support of response officials. MERS detachments participate in the weekly FNARS tests for the NRN and relay any technical issues directly to the FNARS PMO. The locations of the six MERS detachments nationwide are as follows, as shown in **Table 4**.

MERS Detachment Locations	
Maynard, MA (Region I)	Denton, TX (Region VI)
Frederick, MD* (Region III)	Denver, CO (Region VIII)
Thomasville, GA (Region IV)	Bothell, WA (Region X)

Table 4 – MERS Locations

Each MERS detachment (*except the Frederick, Maryland, MERS) has a MOC that is available 24/7 to activate FNARS in emergency and test and exercise events.

3.1.5 State and Territory Emergency Operations Centers

State and territory Emergency Operations Centers (EOCs) participate in weekly tests and relay any technical issues to their designated FRC. Station status and point-of-contact information is regularly updated and relayed to the FHFCS PMO.

4.0 FNARS Test and Exercise Program

The FNARS Test and Exercise Program exists to support the following continuity objectives: (a) to maintain the highest level of network operator proficiency for the FNARS system, demonstrated through a regimen of periodic exercises; and (b) to ensure the continuity of FNARS operations in the event of primary NC failure through regular tests involving the transfer of NC responsibilities. The FNARS Test and Exercise Program encompasses both the NRN and RRNs.

4.1 Scope

The FNARS Test and Exercise Program discussed herein represent the minimum requirements to ensure a high level of operator proficiency given the strategic importance of FNARS as an essential backup communications method.

4.2 Test Procedures

The NRN and RRNs each have their own regularly scheduled tests and respective testing procedures. The NRN Test takes place weekly and is conducted by National Net Control or the Alternate Net Control. The NRN Test consists of an Automatic Link Establishment (ALE) connection followed by a second test exercising a specific FNARS capability, to include voice, message data, telephone interconnect, rotating weekly in accordance with the published test schedule. FNARS testing involves the following participants, as shown in **Table 5**.

		FNARS Participation Entities						
		MWEOC	FRCs	ROs	MERS Dets.	State EOCs	Territory EOCs	Scope of Engagement
Network	NRN	✓	✓	✓	✓			Incidents where communications are required across several regions and normal methods of are no longer available.
	RRN		✓			✓	✓	Local incidents that require communications within a relatively centralized location and normal methods of communication are no longer available.

Table 5 – FNARS Participation Entities

The RRN Test is an additional weekly test conducted by the FRC with the state/territory EOCs. The FRC acts as the Primary NC and is responsible for activating and conducting the test for the RRN.

The test consists of an ALE connection attempt followed by a voice test. Then a test is conducted for message data or telephone interconnect; these capability tests rotate weekly.

4.3 Preparation for and Conduct of the Tests

Advance notification of an FNARS test will be disseminated to participants. The notification will include scope of the test, participant responsibilities, Net Control authority, test participant windows, and point-of-contact information. Detailed test plans may be developed for specific activities as required. Participants are required to notify the FNARS PMO prior to the test if they are unable to participate or require modifications to the proposed timeframe (test participant window).

Unannounced testing may also be performed at the discretion of an activation authority to determine operational posture or verify functionality. **Table 6** shows the test schedule for NRN and RRN locations.

NC	Day*	Zulu Time *
I	Thursday	1300–1500
IV	Thursday	1400–1600
VI	Wednesday	1400–1600
VIII	Wednesday	1400–1600
X	Tuesday	1630–1900
MW	Tuesday	1400-1730

Table 6 – NRN and RRN Weekly Test Schedule

4.4 Test Reporting

The Continuity Communications Division produces monthly and annual FNARS reports detailing results obtained in the testing program(s). Test results are reported as follows, as shown in **Table 7**.

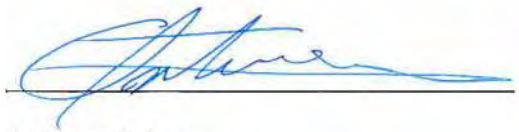
Test	Recipient
Monthly	Operators, Regional Continuity Managers/Federal Preparedness Coordinators, Regional Administrators
Annually	FEMA Administrator

Table 7 – Test Report Recipients

5.0 Conclusion

FNARS provides an essential emergency communications capability to federal, state, and territorial governments in times of national or regional emergency. The system's primary role is to provide communications capabilities to senior federal leadership enabling them to maintain C3 under all circumstances to ensure continual performance of the National Essential Functions (NEFs), Primary Mission Essential Functions (PMEFs), and Mission Essential Functions (MEFs).

6.0 Approval



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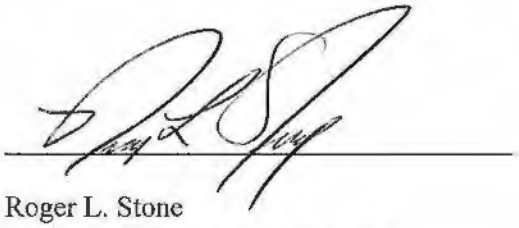

Roger L. Stone
Designated Authorizing Official
Assistant Administrator (A)
National Continuity Programs
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Appendix A – FHFCS Signed

U.S. Department of Homeland Security
500 C Street SW
Washington, D.C. 20472

FEMA

JAN 3 2011

MEMORANDUM FOR: W. Craig Fugate
Administrator

FROM: Damon C. Penn
Assistant Administrator
National Continuity Programs

SUBJECT: FEMA High Frequency Continuity System (FHFCS)

In support of FEMA's National Continuity Programs (NCP) mission to serve as the lead federal agent for continuity programs within the Federal Executive Branch, NCP requests formal executive level re-endorsement of NCP as the FEMA High Frequency Continuity Systems (FHFCS) Program Management Office (PMO). This PMO encompasses multiple High Frequency (HF) programs and systems that include the FEMA National Radio System (FNARS), the Department and Agency Continuity Network (DACN) and other continuity HF programs.

Backed by National Security Presidential Directive-51/Homeland Security Presidential Directive-20 (NSPD-51/HSPD-20), and NCS Directive 3-10, FEMA NCP assumed operational and programmatic oversight of all FEMA HF programs in a policy memorandum dated January 31, 2005, from then FEMA Chief Information Officer, Barry C. West, and entitled "FNARS Statement for the Record" (attached). Additionally, on February 22, 2008, then NCP Assistant Administrator Major General Martha T. Rainville issued a memorandum to FEMA HQ Senior Management and Regional Administrators outlining FEMA NCP efforts to modernize FNARS equipment and provide training to its stakeholders (also attached).

Your endorsement of NCP's PMO role will resolve confusion surrounding FEMA's HF programs, facilitate collaborative resolution of legacy FHFCS issues, and ensure the successful completion of current modernization efforts already in progress.

With the approval of this memorandum, NCP will publish guidance and documentation required to further solidify a survival communications capability as well as a robust operations and maintenance program. Should you have additional questions regarding this program, please contact me on (202) 646-4145.

Attachments as stated

Approve/date 2/2/2011 Disapprove/date _____

Modify/date _____ Needs discussion/date _____

Figure A-1 – Signed FHFCS Letter

Appendix B – FNARS Supporting Documentation

FNARS maintains the following suite of documentation articulating the program's business, security, and program management requirements, as shown in **Table B-1**.

Documentation	Date of Approval	Description
Capital Plan/Abbreviated Business Case	10/14/05	Justification for a proposed project or undertaking on the basis of its expected benefit
Configuration Management Plan	06/30/16	A systems engineering process for establishing and maintaining consistency of a product's performance, and functional and physical attributes with its requirements, design, and operational information throughout its life.
Computer System Life Cycle Upgrade Fielding Plan	02/16/15	Upgrade existing FNARS terminals to Windows 7 platform as part of lifecycle replacement and configuration management.
Contingency Plan	06/30/16	A process that prepares an organization to respond coherently to an unplanned event.
FNARS FRC Operator Guide (v3.0)	05/28/14	Technical communications documents providing assistance to FNARS operators and users.
FNARS Regional Office Operator Guide (v3.1)	06/28/14	Technical communications documents providing assistance to FNARS operators and users.
FNARS Standard Operating Procedures	09/07/16	Established or prescribed methods to be followed routinely for performance of designated operations or in designated situations.
Mitigation Plan	03/01/15	Provides an overview of the requirements for FNARS and describes the actions that are needed or planned for implementation to provide for the secure migration of the system to a policy-compliant state.
Operator Quick Guide (v2.0)	06/30/12	Technical communications documents providing assistance to FNARS operators and users.
Privacy Threshold Analysis	06/30/16	The Privacy Threshold Analysis (PTA) is a form used to determine whether a Privacy Impact Assessment is required.
Security Assessment Plan	06/30/16	A plan comprising various test and exercises to assess the security features and procedures of the FNARS system against all applicable security requirements of Department of Homeland Security (DHS) Management Directive (MD)-300B, *National Security Systems Handbook* and DHS *National Security Systems Policy Directive.*
Security Plan	06/30/16	A formal plan of action to secure a system, providing a systematic approach and techniques for protecting a system from unauthorized users, guarding against malware as well as any other incident, event, or process that can jeopardize the underlying system's security.

Documentation	Date of Approval	Description
Contingency Test Plan	06/30/16	A documented process describing how an organization tests its ability to respond coherently to an unplanned event.
Architecture Diagrams	06/30/16	A technical drawing representing the FNARS system, including equipment and connections.

Table B-1 – FNARS Documentation

Appendix C – Authorities and References

The FNARS CONOPS was developed based on the following Executive Orders, public laws, and national policy.

- Executive Order 12656, *Assignment of Emergency Preparedness Responsibilities*, dated November 18, 1988, as amended.
- Executive Order 13231, *Critical Infrastructure Protection in the Information Age*, dated October 16, 2001.
- Executive Order 13618, *Assignment of National Security and Emergency Preparedness Communications Functions*, dated July 6, 2012.
- Presidential Policy Directive 8, *National Preparedness*, dated March 30, 2011.
- Presidential Policy Directive 21, *Critical Infrastructure Security and Resilience*, dated February 12, 2013.
- Presidential Policy Directive 40, *National Continuity Policy*, dated July 15, 2016.
- Federal Continuity Directive 1, *Federal Executive Branch National Continuity Program and Requirements*, dated January 17, 2017.
- Federal Continuity Directive 2, *Federal Executive Branch Mission Essential Function and Primary Mission Essential Function Identification and Submission Process*, dated July 2013.
- Continuity Guidance Circular 1, *Continuity Guidance for Non-Federal Entities (States, Territories, Tribal, and Local Government Jurisdictions and Private Sector Organizations)*, dated July 2013.
- Continuity Guidance Circular 2, *Continuity Guidance for Non-Federal Entities: Mission Essential Functions Identification Process (States, Territories, Tribes, and Local Government Jurisdictions)*, dated October 2013.
- Department of Homeland Security National Security Systems Policy Directive 4300B.100, dated May 2016.
- Department of Homeland Security 4300B, *National Security Systems Handbook*, dated May 9, 2016.

Appendix D – COGCON Matrix

Figure D-1 shows the designated Continuity of Government Readiness Conditions (COGCON) levels.

Readiness Level	Department & Agency (D/A) Continuity Capability			
	Operations	Staffing Level	Time to Transition to Successive Stages	Communications
	• Continue to perform NOC business functions at normal location(s) • Maintain alternate operating facility(ies) to ensure readiness for activation at all times • Conduct training and exercise activities to ensure personnel readiness	• Normal staffing • Maintain normal delegations and devolution of authority to ensure performance of essential functions to respond to a no-notice event	• Continuity plan is fully operational within 12 hours	• Test all internal agency communications capabilities between normal operating locations (HQ and other) and alternate operating facility(ies) no less than weekly
COGCON 3	• Continue to perform NOC business functions at normal location(s) • Maintain alternate operating facility(ies) to ensure readiness for activation at all times	• Sufficient staffing required to meet 8-hour operational requirement	• Continuity plan is fully operational within 8 hours	• Conduct at least one additional internal agency communications test between normal operating locations (HQ and others) and alternate operating facility(ies) within 24 hours
COGCON 2	• Continue to perform NOC business functions at normal location(s) • Monitor/ track major NOC activities • Maintain alternate operating facility(ies) to ensure readiness for activation at all times • Take appropriate steps to ensure alternate operating facility(ies) can be activated with 4 hours' notice	• Deploy sufficient staff to NOC to allow activation with 4 hours' notice	• Continuity plan is fully operational within 4 hours	• Conduct internal agency communications test between normal operating locations (HQ and others) and alternate operating facility(ies) within 24 hours
COGCON 1	• Monitor/ track major NOC activities • Take appropriate steps to ensure alternate operating facility(ies) can be activated with a two hour notice	• Deploy sufficient staffing to NOC to perform essential functions with a two hour notice	• Agency headquarters continuity plan activated immediately and report operational status within two hours	• Test internal agency communications between normal operating locations (HQ and other) and alternate operating facility(ies) daily

Figure D-1 – COGCON Matrix

Appendix E – NOAA Space Weather Scales

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Geomagnetic Storms			Kp values* determined every 3 hours	Number of storm events when Kp level was met; (number of storm days)
G 5	Extreme	Power systems: widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. Other systems: pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).**	Kp=9	4 per cycle (4 days per cycle)
G 4	Severe	Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: may experience surface charging and tracking problems, corrections may be needed for orientation problems. Other systems: induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).**	Kp=8	100 per cycle (60 days per cycle)
G 3	Strong	Power systems: voltage corrections may be required, false alarms triggered on some protection devices. Spacecraft operations: surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).**	Kp=7	200 per cycle (130 days per cycle)
G 2	Moderate	Power systems: high-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. Spacecraft operations: corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).**	Kp=6	600 per cycle (360 days per cycle)
G 1	Minor	Power systems: weak power grid fluctuations can occur. Spacecraft operations: minor impact on satellite operations possible. Other systems: migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).**	Kp=5	1700 per cycle (900 days per cycle)

* Based on this measure, but other physical measures are also considered.
** For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see www.swpc.noaa.gov/Aurora)

Solar Radiation Storms			Flux level of ≥ 10 MeV particles (ions)*	Number of events when flux level was met**
S 5	Extreme	Biological: unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity), passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. *** Satellite operations: satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. Other systems: complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	Biological: unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	Biological: radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. Other systems: degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	Biological: passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.*** Satellite operations: infrequent single-event upsets possible. Other systems: effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S1	Minor	Biological: none. Satellite operations: none. Other systems: minor impacts on HF radio in the polar regions.	10	50 per cycle

* Flux levels are 5 minute averages. Flux in particles s^{-1} ster^{-1} cm^{-2} Based on this measure, but other physical measures are also considered.
** These events can last more than one day.
*** High energy particle (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.

Radio Blackouts			GOES X-ray peak brightness by class and by flux*	Number of events when flux level was met; (number of storm days)
R 5	Extreme	HF Radio: Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 ($2x10^{-3}$)	Fewer than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side of the Earth, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 ($5x10^{-5}$)	350 per cycle (300 days per cycle)
R 1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side of the Earth, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

* Flux, measured in the 0.1-0.8 nm range, in W m^{-2}. Based on this measure, but other physical measures are also considered.
** Other frequencies may also be affected by these conditions.
URL: www.swpc.noaa.gov/NOAAscales

April 7, 2011

Figure E-1 – NOAA Space Weather Scales

Appendix F – Acronyms

24/7—24 Hours a Day, 7 Days a Week

ALE—Automatic Link Establishment

BGAN—Broadband Global Area Network

C3—Command, Control and Communications

C&A—Certification & Accreditation

CAI—Communications Architecture and Integration

CCB—Conference Call Bridge

CCD—Continuity Communications Division

CDNARS—Civil Defense National Radio System

CMB— Communications Management Branch

COGCON—Continuity of Government Readiness Conditions

COMSEC—Communications Security

CONOPS—Concept of Operations

COOP—Continuity of Operations

COTS—Commercial-off-the-Shelf

D/A—Department and Agency

DCPA—Defense Civil Preparedness Agency

DHS—U.S. Department of Homeland Security

ENS—Emergency Notification System

EOC—Emergency Operations Center

FEMA—Federal Emergency Management Agency

FHFCS—FEMA High Frequency Continuity System

FNARS—FEMA National Radio System

FOC—FEMA Operations Center

FRC—Federal Regional Center

HF—High Frequency

HQ—Headquarters

ISSO—Information System Security Officer

JROCC— Joint Rendezvous Operations Control Center

LMR—Land Mobile Radio

LOS—Line-of-Sight

MEF—Mission Essential Function

MERS—Mobile Emergency Response Support

MOC—MERS Operations Center

MWEOC—Mount Weather Emergency Operations Center

NACOM2—National Communications

NC—Net Control

NCP—National Continuity Programs

NCS—Network Control Station

NOAA—National Oceanic and Atmospheric Administration

NOC—Network Operations Center

NRN—National Radio Network-High Frequency (FNARS)

NRN-U—National Response Network-Ultra High Frequency

NS/EP—National Security/Emergency Preparedness

NSSE—National Special Security Event

NWC—National Watch Center

NWS—National Weather Service

OAE—Other Authorized Entity

OCD—Office of Civil Defense

OOB—Out-of-Band

PMO—Program Management Office

PSTN—Public Switched Telephone Network

RO—FEMA Regional Office

RRN—Regional Radio Network

SATCOM—Satellite Communications

STRATNET—Strategic Network

UHF—Ultra High Frequency

UPS—Uninterrupted Power Source

Appendix G – Point of Contact

For questions regarding the FNARS system and its associated documentation, contact the FEMA National Continuity Programs' Continuity Communications Division at 202-212-2142 or FEMA-NCP-COMMS@fema.dhs.gov.

FEMA National Radio System Standard Operating Procedures

September 2016

FEMA

For Official Use Only

EXECUTIVE SUMMARY

The Federal Emergency Management Agency's (FEMA) mission is to support our citizens and first responders to ensure that, as a nation, we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. To effectively collaborate and coordinate the management and implementation of federal and state/territorial government resources and capabilities in accordance with the FEMA mission requires a resilient, survivable communications platform independent from, but interconnected with the normative communications infrastructure.

FEMA's National Continuity Programs Directorate, in accordance with Presidential Policy Directive (PPD) 40, *National Continuity Policy*, maintains the FEMA High Frequency Continuity System (FHFCS), a suite of classified and unclassified High Frequency radio communications systems designed to provide resilient communications capabilities across the full spectrum of hazards. The FEMA National Radio System (FNARS) is one element of the FHFCS portfolio, and is supported with commercial-off-the-shelf equipment installed at the Mount Weather Emergency Operations Center (MWEOC), Federal Regional Centers (FRCs), Regional Offices (ROs), the Mobile Emergency Response Support (MERS) detachments, and the Emergency Operations Centers (EOCs) of the 50 states, the District of Columbia, and the U.S. Territories. FNARS provides the FEMA Administrator and Executive Leadership with resilient voice and messaging capabilities for command, control, and communications and Continuity of Operations of FEMA assets and resources, and to communicate, coordinate, and collaborate with Regional Administrators and state/territorial emergency management partners in response to all hazard events.

This Standard Operating Procedures (SOP) document complements the FNARS Concept of Operations document with operational-level information.

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this Standard Operating Procedures (SOP) document is to set forth policy and practices for the operation and use of the Federal Emergency Management Agency (FEMA) National Radio System (FNARS).

1.2 Scope

The procedures delineated in this document apply to the FNARS notification process, activation, and operations, at both the national and regional levels.

1.3 Objective(s)

The overarching objective of this SOP is to provide guidance and assistance to all FNARS stakeholders for continuity planning and implementation.

2.0 PROGRAM SUMMARY

2.1 Mission

FEMA requires a resilient, survivable communications platform, independent from, but interconnected with, normal communications for the dual purpose of meeting requirements within FEMA *National Planning Frameworks* core capabilities (public information and warning and operational coordination) and the *National Response Framework* (operational communications and situational assessment).

2.2 System Overview

The FNARS is a nationally-distributed system of high frequency (HF) equipment and capabilities, which serves as a continuity communications channel for FEMA's internal command, control, and communications (C3) traffic, and for external communications and coordination with state and territorial emergency management partners.

FNARS ensures FEMA senior leadership will have external communications in environments of degraded communications infrastructure. FNARS is designed for utilization, either preemptively or reactively, to any event that compromises, or potentially compromises, normal communications infrastructure and operation. The hazards against which FNARS mitigates include the full spectrum of threats to FEMA's continuity, such as:

- Natural disasters (e.g., hurricanes, earthquakes, tornados)
- Terrorist attacks
- Acts of war or civil disorder
- Large-scale communications infrastructure stress or failure (e.g., the 2003 Northeast blackout)
- National Special Security Events

2.3 Operations

2.3.1 Organization

FNARS comprises two network systems ("nets"): the National Radio Network (NRN) and the Regional Radio Networks (RRN).

The NRN is dedicated to maintaining FEMA C3 throughout the United States. FEMA elements, including agency leadership, regional leadership, and Continuity of Operations (COOP) locations, utilize the NRN to maintain positive C3 in degraded communications environments.

The RRNs are dedicated to facilitating communications between FEMA Regional Offices and state/territorial emergency management partners to communicate and coordinate during an all-hazards communications environment. Incidents affecting a limited area of the country may prompt FEMA leadership to activate an RRN. Five Federal Regional Centers (FRCs) (located in Maynard, Massachusetts; Thomasville, Georgia; Denton, Texas; Denver, Colorado; and Bothell, Washington) host FNARS equipment, enabling them to function as Network Control (NC) for their respective RRNs.

2.3.2 System Capabilities

FNARS operates independently of terrestrial and space-based (satellite) infrastructure, and serves as a resilient backup continuity communications capability. Its meshed network of voice and data communications capabilities (including HF data and phone patch) provides long-range coverage while requiring minimal infrastructure. Standard FNARS equipment includes HF radios, antennas, and other ancillary devices.

2.4 Stakeholders

FNARS provides continuity communications support to the following stakeholders:

- FEMA Internal Stakeholders
  - Executive leadership
  - Regional leadership
  - Mobile Emergency Response Support (MERS) detachments
- External Stakeholders
  - State and territorial emergency management leadership
  - Authorized non-governmental organizations

2.5 Mission Support

The National Continuity Programs (NCP) FEMA High Frequency Continuity System (FHFCS) Program Management Office (PMO) supports the FNARS Program Management functions and is responsible for providing programmatic oversight, including policy-making decisions, ranging from project engineering to property management functions for all national security and emergency preparedness-related HF programs. The FHFCS PMO provides support for the following critical functions for FNARS.

2.5.1 Program Administration

Responsibilities include program management and oversight for the FNARS program, conducting risk management assessments and ensuring adherence to program performance measures through regular assessment of the status of all FNARS HF assets deployed or in storage at the national, regional, and

state/territory levels. Program responsibilities also include coordination of installation or decommissioning activities for FNARS equipment with on-site facilities managers and FEMA contacts at the national, regional, and state/territory levels.

2.5.2 Technical Engineering

Responsibilities include providing engineering support for all antennas, radios, and software for the FNARS program, to include, but not limited to, technical expertise and coordination of configuration change management across all aspects of the entire system.

2.5.3 Operations

Responsibilities include ensuring the operational capability of the system at all times, as well as providing guidance on how the system functions and training to all participants.

2.5.4 Security

Responsibilities include providing policy guidance for FNARS, conducting system certification and accreditation as required, and ensuring all FNARS physical and communications security adheres to FEMA standards.

2.6 Roles and Responsibilities

2.6.1 Network Control Operator

FNARS NC is a qualified station operator that:

- Directs and manages other stations on the net
- Clears and processes traffic listed
- Maintains a written record of all stations and radio traffic on the net
- Relays traffic to points outside the net as required
- Primary and alternate NC locations are:
  - Mount Weather Emergency Operations Center (MWEOC) serves as primary NC for NRN
  - FRCs serve as alternate NCs for the NRN
  - FRCs serve as primary NC for the RRN in their respective and adjacent regions
  - Mobile Operations Centers (MOCs) serve as alternate NC in their respective and adjacent regions

2.6.2 Station Operator

The FNARS Station Operator is a qualified and trained radio operator who can perform the following key tasks:

- Review FNARS Concept of Operations (CONOPS)
- Maintain familiarity with and perform FNARS SOPs
- Activation and deactivation of the networks
- Perform HF radio operations
- Perform all tasks as outlined in the FNARS Quick Guide
- Perform basic HF system troubleshooting
- Maintain a written record of all stations and radio traffic on the net

2.7 NCS Documentation and Record-Keeping Procedures

NCS is required to maintain and generate a Master Station Log, manage NC transfers to alternate stations, and document decision making and execution of NC functions, including positive acknowledgement of stations. NCP RE will provide a standardized template for reporting results of FNARS communications.

3.0 NETWORK ACTIVATION PROCEDURES

In severe emergencies requiring federal coordination with regional and state authorities, a strong likelihood exists that the commercial communications (such as cellular, landline, and Internet capabilities) upon which normal governmental processes rely may be compromised or unavailable. To mitigate for such a challenge, FEMA NCP offers communications methods that do not depend on the availability of commercial communications, known as out-of-band (OOB) capabilities. OOB capabilities are activated by establishing radio contact with the intended recipient via the FNARS system.

FNARS network activation procedures, roles, and responsibilities are specified in detail to ensure that, in a real-world emergency, senior leadership may rely on the system to expedite C3 in coordinating response efforts with their counterparts at the state and regional levels. Normal day-to-day functions remain the responsibility of regional personnel to include the NRN and RRN. The NRN and RRNs are activated OOB when commercial communications between Regional Offices, MERS detachments, FRCs, state/territorial Emergency Operations Centers (EOCs) and/or FEMA Leadership have been or are likely to be disrupted. The Activation Authority who initiates the request will determine the scope of the activation.

4.0 TESTING, TRAINING, AND EXERCISES

FNARS HF testing of both the NRN and the RRNs will take place once each week. This weekly test is used to exercise equipment, and to train and maintain operator proficiency. Schedules for the NRN will be provided by the PMO and the RRN schedule will be provided by each Region's FRC. These tests will be conducted to improve the efficiency and operation of net procedures and message handling.

Upon testing session activation, the NCS of any FNARS NRN or RRN will provide a weekly report of net activities to the FNARS Program Manager.

To support the FNARS CONOPS, test results are generated on a weekly basis for both the FNARS NRN and RRN. Each NCS of the NRN and RRN will submit test results to the NCP Help Desk at FEMA-NCP-COMMS@fema.dhs.gov. The weekly test results are aggregated into a monthly report, which flows into an annual report.

5.0 MAINTENANCE

Any maintenance support required for the FNARS systems will be coordinated with and requested through the NCP Help Desk. The PMO will coordinate, assign, and allocate any logistics support or advanced troubleshooting with a senior FNARS operator or technician, or facilitate repairs as needed through the NCP Help Desk's request system. All property movement within the FNARS System must be coordinated through the Property Custodial Officer and recorded in the Sunflower Asset Management System. Every item in the property inventory that is transferred must be transferred on a Property Transaction Record.

6.0 POINT OF CONTACT

NCP Help Desk
(202) 212-2142
FAX: (202) 646-4691
FEMA-NCP-COMMS@fema.dhs.gov

APPENDIX A – PHONETIC ALPHABET AND PROWORDS

Table A-1 shows the standard phonetic alphabet used for radio messages. Table A-2 lists standard prowords used for radio messages.

Table A-1. Phonetic Alphabet

Letter	Phonetic
A	Alpha
B	Bravo
C	Charlie
D	Delta
E	Echo
F	Foxtrot
G	Golf
H	Hotel
I	India
J	Juliet
K	Kilo
L	Lima
M	Mike
N	November
O	Oscar
P	Papa
Q	Quebec
R	Romeo
S	Sierra
T	Tango
U	Uniform
V	Victor
W	Whiskey
X	X-Ray
Y	Yankee
Z	Zulu

Table A-2. Standard Prowords

Proword	Explanation
Affirmative	Permitted, granted, yes
All After	Say again all which is part of your transmission after
All Before	Say again all which is part of your transmission before
ARL	ARL numbered radiogram message follows
Break	I hereby indicate the separation of the text from other portions of the message. Also used to communicate I desire you to stop your transmission
By Authority Of	Name of official who is authorizing the transmission
Correct	You are correct, or what you have transmitted is correct
Correction	An error has been made in this transmission. Transmission will continue with the last word correctly transmitted. The correct version is _____.
Disregard This Transmission	This transmission is in error. Disregard it. This Proword shall not be used to cancel any message completely transmitted and for which receipt or acknowledgement has been received.
Drill	The Proword Drill will be the first word given in the body of all drill messages. This Proword will be included in the word count.
Figures	Numerals or numbers follow.
From	The originator of this message is indicated by the address designator immediately following.
Groups	This message contains the number of groups indicated by the numeral following.
Incorrect	You are incorrect. The correct version is _____.
Initial	A single letter or initial follows
I Read Back	The following is my response to your instructions to read back. I read back everything exactly as transmitted.
I Say Again	I am repeating transmission or portion indicated.
I Spell	I shall spell the next word phonetically
I Verify	That which follows has been verified at your request and is repeated. To be used only as a reply to VERIFY.
Message Follows	A message which requires recording is about to follow (transmitted immediately after the call).
More to Follow	I have more messages, traffic, or information for you.
Negative	Not received
Out	This is the end of my transmission to you and no answer is required or expected. After the Proword "Out", all stations will pause for a five-second interval to listen for stations desiring to break-in.
Over	This is the end of my transmission to you and a response is necessary. Go ahead, transmit.
Read Back	Repeat this entire transmission exactly as received.
Relay (To)	Transmit this message to all addressees (or addressees immediately following this Proword). The address component is mandatory when this Proword is used.
Roger	I have received your last transmission satisfactorily. The Proword "Roger" is also used by stations confirming receipt of a message and by NET CONTROL when checking stations into a net.
Say Again	Repeat all of your last transmission. Followed by identification data means "Repeat_____ (portion indicated)".
Speak Faster	Your transmission is too slow. Increase speed of transmission
Speak Slower	Your transmission is too fast. Decrease speed of transmission.
Time	That which immediately follows is the time or date-time group of the message.
To	The addressees, whose designations immediately follow, are to act on this message.
Unknown Station	The identity of the station with whom I am attempting to establish communications is unknown.
Verify	Verify entire message (or portion indicted) with the originator and send the correct version. To be used only at the discretion of or by the addresses to which the questioned message was directed.
Wait	I must pause for a few seconds.
Wait—Out	I must pause for [X] minutes (expressed in numerals)
Word After	Repeat the word after.
Word Before	Repeat the word before.
Words Twice	Communication is difficult. Transmit (transmitting) each phrase (or each code group) twice. This Proword may be used an order, request, or as information.

APPENDIX B – SAMPLE SCRIPT FORMAT FOR FNARS VOICE RADIOTELEPHONE

Standard FNARS voice radiotelephone script is detailed as follows in Table B-1. This script is intended as an example and guide.

Table B-1. Example Message Script

Establish:
This is [WGYXXX], on the [National or Regional] Radio Net. This is a directed net. All stations standby for roll call ... Out.
Priority Traffic:
Any stations with traffic call now ...Over.
Check-in:
This is [WGYXXX], Net Control. Requesting all stations check in by call sign...Over *[WGYXXX] this is [Station call sign] ...Over* *Net Control replies "Roger, [Station call sign] ...over" and repeats process for other stations checking in.* NET CONTROL will record all stations checking in.
Closing:
This is [WGYXXX], this concludes the session of the [NRN or RRN] ... Out.
Message:
All stations, prepare to copy message ... Out. Message is now given. All message lines will begin with the word "line" followed by a number. (Call sign of alternate NET CONTROL or any other station in the net) Read back the message *... Over. Are there any stations requiring fills? ... Over.* Do necessary fills for message. *All stations beginning with (call sign) in Region (first region in net) verify receipt of the message ... Over.* After stations have verified the receipt of the message *This is [WGYXXX], Net Control for the FNARS net. Are there any other stations wishing to check into this net? If so, call now ... Over.*
Transfer Net Control:
This is [WGYXXX], Net Control for the FNARS net. Net Control authority at this time will transfer to [New NET CONTROL call sign]. ...Out
All stations on this net [WGYXXX] is now Net Control for the [National or Regional] Radio Net ...Out
Message Handling:
Sender: [Dest. Station Call sign] this is [Orig. Station Call sign] with message for copy...acknowledge when ready...Over *Receiver: [Dest. Station Call sign] is ready for message...Over* *Sender: [Dest. Station Call sign] message follows...* *Sender: Line 1...[Line One]....Line 2...[Line Two]...* *Sender:* Continue till message complete *Sender: Message complete...How copy?...Over* *Receiver: [Orig. Station Call sign] good copy...Over* *Sender: [Dest. Station Call sign] this is [Orig. Station Call sign] verify last message...Over* *Receiver: [Orig. Station Call sign] message follows...* *Receiver: Line 1...[Line One]....Line 2...[Line Two]...* *Receiver:* Continue till message complete *Receiver: Message complete...How copy?...Over* *Sender: [Dest. Station Call sign] good copy...Out*

APPENDIX C – FNARS STANDARD MESSAGE FORMAT

The Standard FNARS Message Form uses the following standard instructions, defined in Table C-1.

Table C-1. FNARS Standard Message Format and Instructions

Line	Instruction	Explanation
1	Message Number:	Local number of messages received or originated per day
2	Priority:	Priority of the message: Emergency, Priority, or Routine
3	Originator/FROM:	Person who created message
4	Orig. STN:	Call Sign of Station
5	Orig. NET:	FNARS Radio Network: NRN or RRN
6	Orig. DATE/TIME:	Date and time in standard format: DDMMMYYHHMMZ
7	Destination/TO:	Person Message is intended for
8	Destination STN:	Call Sign of Station
9	Destination NET:	FNARS Radio Network: NRN or RRN
10	Rcvd DATE/TIME:	Date and time in standard format: DDMMMYYHHMMZ
11	Rcvd from STN:	Call Sign of Station
12	Rcvd NET:	FNARS Radio Network: NRN or RRN
13	Sent/Relayed DATE/TIME:	Date and time in standard format: DDMMMYYHHMMZ
14	Sent/Relayed to STN	Call Sign of Station
15	Sent/Relayed NET:	FNARS Radio Network: NRN or RRN
16	Delivered TO:	Person who received the message
17	Delivered DATE/TIME:	Date and time in standard format: DDMMMYYHHMMZ
18	Message Size	Number of words in message
19	Message	The message to be delivered

The message format is as follows, illustrated in Figure C-1.

1. Message #	2. Priority	3. FROM:	4. Station Originate:	5. Originate Network:
	Emergency Priority Routine			RRN or NRN
6. Originate Date/Time:	7. TO:	8. Station Destination:	9. Destination Network:	
			RRN or NRN	
10. Received Date/Time:	11. Received from Station:	12. Received Network	16. Delivered To:	17. Delivered Date/Time:
		RRN or NRN		
13. Sent/Relayed Date/Time:	14. Sent/Relayed to Station:	15. Sent/Relayed Network		
		RRN or NRN		
18. Message Size				
19. Message				

Figure C-1. Sample FNARS Message Form

APPENDIX D – TIME CONVERSION

Table D-1 shows the time conversion chart used for scheduling tests.

Table D-1. Time Conversion Chart

UTC/ZULU	PST/ALDT	PDT/MST	MDT/CST	CDT/EST	EDT/AST	ALST	HST
2400/0000	1600	1700	1800	1900	2000	1500	1400
0100	1700	1800	1900	2000	2100	1600	1500
0200	1800	1900	2000	2100	2200	1700	1600
0300	1900	2000	2100	2200	2300	1800	1700
0400	2000	2100	2200	2300	2400/0000	1900	1800
0500	2100	2200	2300	2400/0000	0100	2000	1900
0600	2200	2300	2400/0000	0100	0200	2100	2000
0700	2300	2400/0000	0100	0200	0300	2200	2100
0800	2400/0000	0100	0200	0300	0400	2300	2200
0900	0100	0200	0300	0400	0500	2400/0000	2300
1000	0200	0300	0400	0500	0600	0100	2400/0000
1100	0300	0400	0500	0600	0700	0200	0100
1200	0400	0500	0600	0700	0800	0300	0200
1300	0500	0600	0700	0800	0900	0400	0300
1400	0600	0700	0800	0900	1000	0500	0400
1500	0700	0800	0900	1000	1100	0600	0500
1600	0800	0900	1000	1100	1200	0700	0600
1700	0900	1000	1100	1200	1300	0800	0700
1800	1000	1100	1200	1300	1400	0900	0800
1900	1100	1200	1300	1400	1500	1000	0900
2000	1200	1300	1400	1500	1600	1100	1000
2100	1300	1400	1500	1600	1700	1200	1100
2200	1400	1500	1600	1700	1800	1300	1200
2300	1500	1600	1700	1800	1900	1400	1300

LEGEND			
PST=Pacific Standard Time	MDT=Mountain Daylight Time	EST=Eastern Standard Time	ALDT=Alaskan Daylight Time
PDT=Pacific Daylight Time	CST=Central Standard Time	EDT=Eastern Daylight Time	AST=Atlantic Standard Time
MST=Mountain Standard Time	CDT=Central Daylight Time	ALST=Alaskan Standard Time	HST=Hawaiian Standard Time

APPENDIX E – AUTHORITIES

The NCP FNARS SOP was developed based on the following Executive Orders (EOs), public laws, and national policy:

- Presidential Policy Directive (PPD) 40, National Continuity Policy, July 15, 2016
- Office of Science and Technology Policy (OSTP)/ Office of Management and Budget (OMB) Directive D-16-1, Minimum Requirements for Continuity Communications Capabilities
- EO 13618, Assignment of National Security and Emergency Preparedness Communications Functions, September 6, 2012
- EO 12656, Assignment of Emergency Preparedness Responsibilities, November 18, 1988, as amended
- EO 13407, Public Alert and Warning System, September 26, 2006
- HSPD 7, Critical Infrastructure Identification, Prioritization, and Protection, December 17, 2003

APPENDIX F – SAMPLE STATION LOG

HF LOG SHEET

STATION CALLSIGN _____ **PAGE** _____ **OF** _____

DATE	UTC		FREQ	MODE	CALLSIGN	COMMENTS
	ON	OFF				

Figure F-1 shows a sample station log.

Figure F-1. Sample HF Log Sheet

APPENDIX G – SPACE WEATHER PROTECTIVE GUIDANCE

HF systems are susceptible to interference from space based events that affect the electromagnetic spectrum including radios. National Oceanic and Atmospheric Administration (NOAA) has identified three scales to identify threats, which is similar to the Hurricane Category scale. The three space weather scales are geomagnetic storms (G scale), Solar Radiation (S scale), Radio Blackouts (R scale). Table G-1 lists each rating and instructions to respond to each; Figure G-1 shows a more detailed description of each type of weather discutrbance and descriptions of each rating level. For more information, see the NOAA website for Space Weather Prediction Center at www.swpc.noaa.gov.

Table G-1. NOAA G/R/S Rating Scale

Rating	Description	Action
G/R/S1-3	Minor-Strong	Monitor equipment; anticipate degradation of RF signal and interference with increased noise on radio receiver.
G/R/S4	Severe	FEMA Management Authority will decide to take appropriate action based on situation, most common action is to power down radio systems and disconnect antenna from radios.
G/R/S5	Extreme	FEMA Management Authority will decide to take appropriate action based on situation, most common action is to power down radio systems and disconnect antenna and power from radios.

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Geomagnetic Storms			Kp values* determined every 3 hours	Number of storm events when Kp level was met; (number of storm days)
G 5	Extreme	Power systems: widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. Other systems: pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.)**	Kp=9	4 per cycle (4 days per cycle)
G 4	Severe	Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: may experience surface charging and tracking problems, corrections may be needed for orientation problems. Other systems: induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.)**	Kp=8	100 per cycle (60 days per cycle)
G 3	Strong	Power systems: voltage corrections may be required, false alarms triggered on some protection devices. Spacecraft operations: surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.)**	Kp=7	200 per cycle (130 days per cycle)
G 2	Moderate	Power systems: high-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. Spacecraft operations: corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.)**	Kp=6	600 per cycle (360 days per cycle)
G 1	Minor	Power systems: weak power grid fluctuations can occur. Spacecraft operations: minor impact on satellite operations possible. Other systems: migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine)**	Kp=5	1700 per cycle (900 days per cycle)

* Based on this measure, but other physical measures are also considered.
** For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see www.swpc.noaa.gov/Aurora)

Solar Radiation Storms			Flux level of ≥ 10 MeV particles (ions)*	Number of events when flux level was met**
S 5	Extreme	Biological: unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. Other systems: complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	Biological: unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	Biological: radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. Other systems: degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	Biological: passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.*** Satellite operations: infrequent single-event upsets possible. Other systems: effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S1	Minor	Biological: none. Satellite operations: none. Other systems: minor impacts on HF radio in the polar regions.	10	50 per cycle

* Flux levels are 5 minute averages. Flux in particles·s^{-1}·sr^{-1}·cm^{-2} Based on this measure, but other physical measures are also considered.
** These events can last more than one day.
*** High energy particles (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.

Radio Blackouts			GOES X-ray peak brightness by class and by flux*	Number of events when flux level was met; (number of storm days)
R 5	Extreme	HF Radio: Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 ($2x10^{-3}$)	Fewer than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side of the Earth, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 ($5x10^{-5}$)	350 per cycle (300 days per cycle)
R 1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side of the Earth, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

* Flux, measured in the 0.1-0.8 nm range, in W·m^{-2}. Based on this measure, but other physical measures are also considered.
** Other frequencies may also be affected by these conditions.
URL: *www.swpc.noaa.gov/NOAAscales* April 7, 2011

Figure G-1. NOAA Space Weather Scales

FEMA National Radio System Operators' Quick Guide

August 2015

FEMA

Date	Version	Approvers	Description
6/30/2011	1.0	Tom Cross	First version of the *Quick Guide*
5/18/2012	2.0	Neil Diaz	Inclusion of phone patching
6/8/2012	2.1	Neil Diaz	Updates to the instructions
3/26/2013	2.2	Neil Diaz	General updates
3/18/2015	2.3	Mike Bellamy	General updates
8/12/15	2.4	Richard Pimentel/Mary Daughtrey	Formatting and updates to instructions

Preface

This *Quick Guide* provides abridged instructions, distilled from the detailed *Federal Emergency Management Agency (FEMA) National Radio System (FNARS) Operator Guide*. The instructions herein are designed to provide concise directions to prepare for and establish high frequency (HF) communications over automatic link establishment (ALE) and manual links. This quick reference guide is specifically designed to support standard FNARS configuration settings and equipment. For additional information, please contact the FEMA National Continuity Programs (NCP) Helpdesk at FEMA-NCP-COMMS@fema.dhs.gov.

This document is *FOR OFFICIAL USE ONLY* and not to be distributed beyond FEMA Regional Centers (FRCs), FEMA Regional Offices (RO), and state and territory emergency operations centers (EOC).

Table of Contents

Using This Guide

While knowledge of technical specifications and settings is not required, the instructions found in this guide assume high-level familiarity with the following three key FNARS components:

1. JPS Communications RTU-292 Radio/Telephone Interface Unit (RTU)

Connects FNARS with the Public Switched Telephone Network (PSTN)

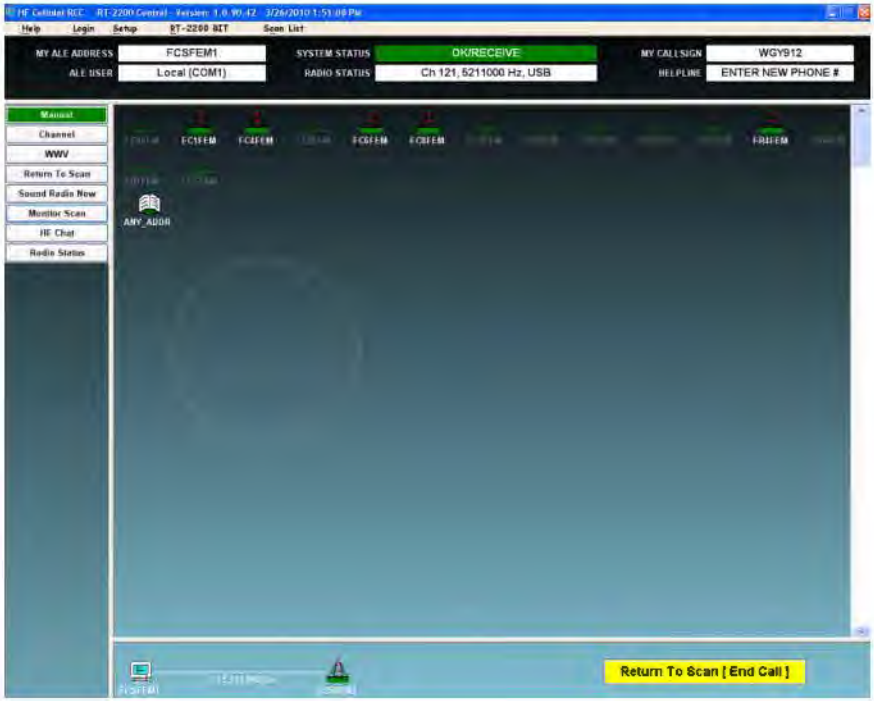
2. Larry McGee 17-95148 Audio Panel

Enables operators to transmit/listen to radio via microphone and speaker

3. Remote Control Console Graphical User Interface

Allows users to interface with electronic devices with images rather than text commands or physical actions. Most of the instructions found in this guide will deal with the remote control console (RCC) graphical user interface (GUI). Note that the instructions in this guide reflect the options and figures available in **USER** mode, which does not require a login. If the **Login** option in the menu bar is replaced with **Logout**, the GUI is in **ADMINISTRATOR** mode.

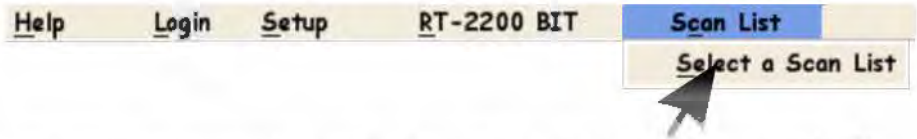
- To proceed, log out and switch to **USER** mode.



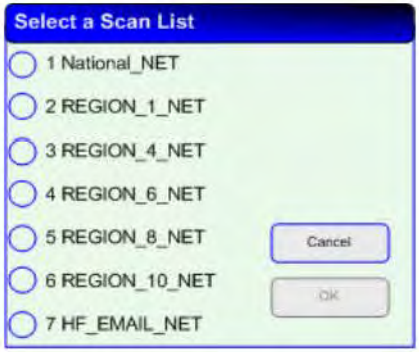
Scanning

Unless sounding or participating in a radio call, all FNARS stations should be in the scanning or listening mode, continuously monitoring for incoming calls. The operator should be familiar with the appropriate scan list for each test or exercise, along with participating stations. If unknown, contact the local FNARS administrator.

- Click on **Scan List**
- Click **Select a Scan List**.



- Select the appropriate scan list from the available options and click **OK**.



- Click **Return to Scan**.

The station will begin to monitor every channel programmed in the selected scan list for incoming calls.

By default, the HF noise is automatically muted until an attempted link is detected.

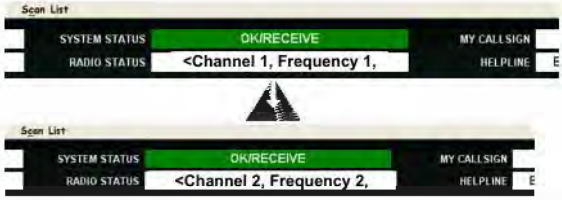
- If you wish to hear the HF noise, click **Monitor Scan**.

Sounding

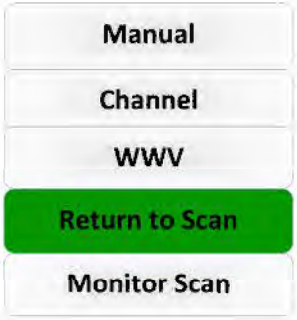
Radios will automatically sound upon power up and then every 60 to 90 minutes thereafter, on the National Radio Network (NRN). This is to broadcast its presence, to assist other stations in measuring channel quality via link quality analysis (LQA) and determine what frequency(s) to best reach the station. On the Regional Radio Networks (RRN's), state emergency operations centers (EOC's) will not automatically sound and may manually sound if they need to contact Net Control Station (NCS). Stations on either network should manually sound 30 minutes prior to scheduled tests for reasons above. Sounding should be used sparingly as it may disrupt HF calls in progress. To manually sound, perform the following.

- Click **Sound Radio Now** to begin sounding.

The radio will transmit on all channels programmed on the selected Scan List in consecutive order. Transmission activity will appear in **System Status** and **Radio Status.**



At any point, you may abort sounding and resume scanning by clicking **Return to Scan**.



Establishing ALE Links

Unless directed otherwise by the local FNARS contact or Net Control, all FNARS calls should be established using ALE.

- Double-click left on the desired **ALE icon.**

- Monitor the **Call Status Area**:

Initially, the Status will read **CA** (Calling). Once the link has been established, Status will read **L1** (Linked). An alert will sound signifying a successful link is currently active.

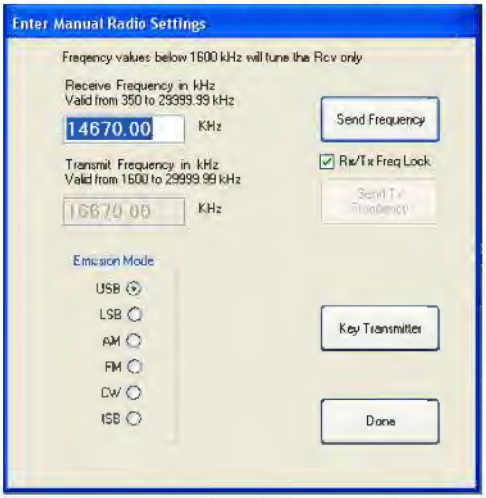
- Begin conducting your call via the established HF ALE link. Refer to the CONDUCTING CALLS section of this manual for more information.

Establishing Manual Links

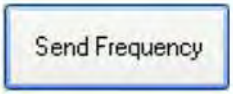
If ALE is unavailable, FNARS calls may be established by manually selecting a mutual frequency between participating stations.

- Pre-select a set of frequencies and a preferred emission mode, typically Upper Sideband (USB).
- Click **Manual** to establish an HF link.

- Enter frequency in the **KHz** box, and select the appropriate **Emission Mode**.
- Check the **Rx/Tx Freq Lock** box for Normal Operation



- Click **Send Frequency.** If the selected frequency is below the acceptable volume level, repeat steps 2 and 3 with a different frequency.



- Begin your call. Refer to the CONDUCTING CALLS section of this manual for further information.

Conducting Calls

Once a link has been established, operators have various end-user transmit/receive options. This section covers those options, as well as how to adjust volume and toggle between handset and speaker.

The operator has two equipment options when transmitting voice to the distant station: the Larry McGee Audio Panel or the Rockwell Collins RTU-292 Radio/Telephone Interface Unit. The Audio Panel is the quickest method to transmit radio messages. When available, the Radio/Telephone Interface Unit may be used to patch radio transmissions with telephone recipients.

- Set the Larry McGee Audio Panel to **LOCAL**. The LED light on the bottom right will turn **RED**.
- If the red light does not illuminate, press the **red button** to the left of the LED light to use the attached microphone and foot pedal to transmit voice.

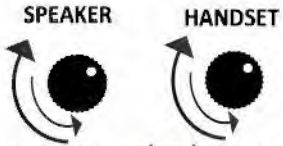
- If the audio panel is unavailable, use the RTU. If the interface unit is connected to an audio panel, set the audio panel to **REMOTE**. The LED light will light **GREEN**.

- Press **RADIO** in the Handset box on the RTU to speak via the attached handset.
- Press **RADIO** in the Speaker box to hear incoming transmissions from the built-in speaker.

Once the call connects, a tone sounds and receive audio is heard, communications may begin.

- If using the handset attached to the interface unit, press the button on the interior of the handset to begin transmitting.
- If using the foot pedal connected to the audio panel, step on the pedal to transmit.

Sample transmission scripts may be found on the last page of this guide.



- Adjust the *SPEAKER* and *HANDSET* volume using the dials on the interface as necessary.

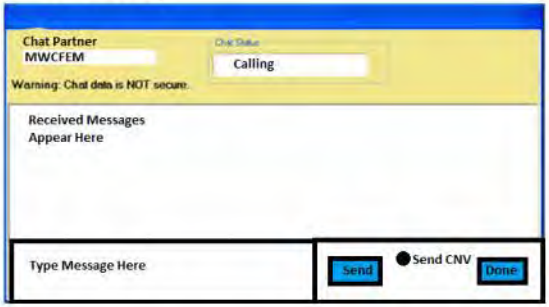
- When communications are complete, click **Return to Scan** to close the HF link.

HF Chat

When a radio call between participating stations provides inaudible voice, HF chat provides an alternative means to communicate.

- Before initiating an HF Chat communication, have the ALE address of the intended recipient available.
- Select **HF Chat.**

- Type message in the bottom left Chat Screen and click **Send**. Received messages will appear in the upper left portion of the screen. Repeat as necessary.



- Click **Done** when finished communicating.

Phone patch

A Phone Patch allows the operator to connect a PSTN line to a radio connection.

- Before initiating a phone patch, have the recipient's telephone number available.
- Establish an active HF radio call before attempting to perform a phone patch.
- Using the RTU-292 radio interface unit, press **PHONE** in the Tel Line box and **PHONE** in the Handset box. If the **RADIO** button in the Handset box is already pressed, press again to turn off.

- When you hear a dial tone, enter the phone number of the phone patch recipient on the keypad.

- Adjust the HANDSET volume as necessary using the dials on the interface.

- If an audio panel is located next to the RTU-292, verify the **LOCAL/REMOTE** button is set to **GREEN**. If the light is **RED**, press the **LOCAL/REMOTE** button on the audio panel to switch it to **GREEN**.

- Press **RADIO** in the Handset box to allow operator voice transmissions to be heard over the Handset.

- Press and hold the button located on the interior of the handset to begin transmitting. Notify both the phone user and the distant-end radio operator to *"Standby for phone patch."*

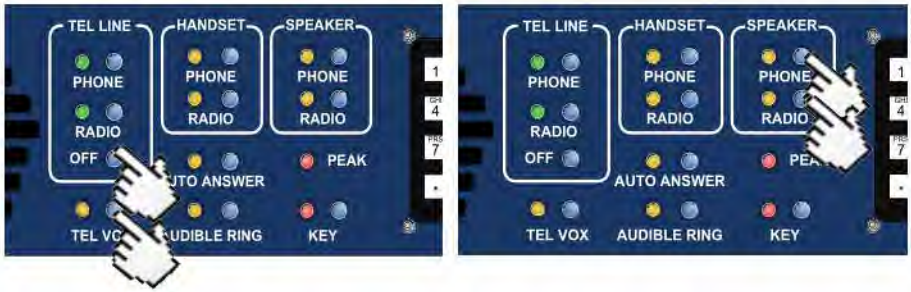
- Press **RADIO** in the Tel Line box. Wait for the flashing light to turn solid and an audible beep to sound. Press **TEL VOX** below the Tel Line box.

While the RTU-292 processes the connection between phone and radio, the **RADIO** light in the Tel Line box will blink. Once a beep sounds and the light becomes steady, the connection is complete.

- Once the patch is established, notify all parties they may begin voice transmissions.

When communications are complete:

- Press **TEL VOX** in the bottom left corner
- Press **OFF** in the Tel Line box to disconnect and hang up the phone.
- Press **PHONE** and **RADIO** in the Handset box to disengage the handset.



- If an audio panel is available, press the **LOCAL/REMOTE** button to return radio input/output to the audio panel.
- The **LOCAL/REMOTE** light next to the button will change from **GREEN** to **RED**.

- Click **Return to Scan** to terminate the HF link.

Link Quality Analysis

LQA is a measure of the signal quality between two stations. The LQA measurement is collected over time via sounding or when links are established. When initiating ALE calls, the initiating station automatically scans the collected LQA measurements to select the best channel to reach its distant end station.

- Right-click on the desired **ALE Icon**.
- Select **List LQA**

ALE systems use recently-measured radio channel characteristics, or LQA data, stored in a memory matrix. To extract the respective channel, add the corresponding channel numbers, in blue, from the LQA value's row and column. For example, the second column of the fifth row indicates the LQA value of 38 for Channel 42 between the source station and a distant end station, FC1FEM.

CHAN	1	2	3	4	5	6	7	8	9	10
00+	0	0	0	0	0	0	0	0	0	0
10+	0	0	0	0	0	0	0	0	0	0
20+	0	0	0	0	15	0	13	0	0	0
30+	0	0	0	28	0	27	0	0	0	0
40+	0	38	0	0	0	0	0	0	0	0
50+	0	0	0	0	0	0	0	0	0	0
60+	0	0	0	0	0	0	0	0	0	0
70+	0	0	0	0	0	0	0	0	0	0
80+	0	0	0	0	0	0	0	0	0	0
90+	0	0	0	0	0	0	0	0	0	0

The LQA value is an estimated quality of the radio frequency (RF) link between the base station and the distant station for a particular channel. Using these values, ALE stations can select the channel providing the highest LQA value to reach a particular station. LQA values range from 0 to 50, lowest to highest quality: An LQA value of 30 or higher is recommended for optimal quality.

- Click **OK** when complete.

Time Check

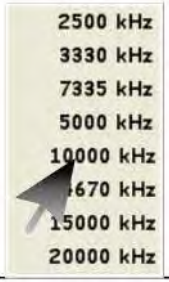
Time check allows operators to quickly assess radio frequency (RF) receiving capability without specialized test equipment. Continuous beacon messages recite the time of day and emit synchronous beeps (or ticks) to verify the time in Coordinated Universal Time (UTC).

- Click on **WWV**.

WWV transmits audio beeps once per second to facilitate accurate manual clock synchronization. A recorded voice announcement occurs at the end of every minute in the following format:

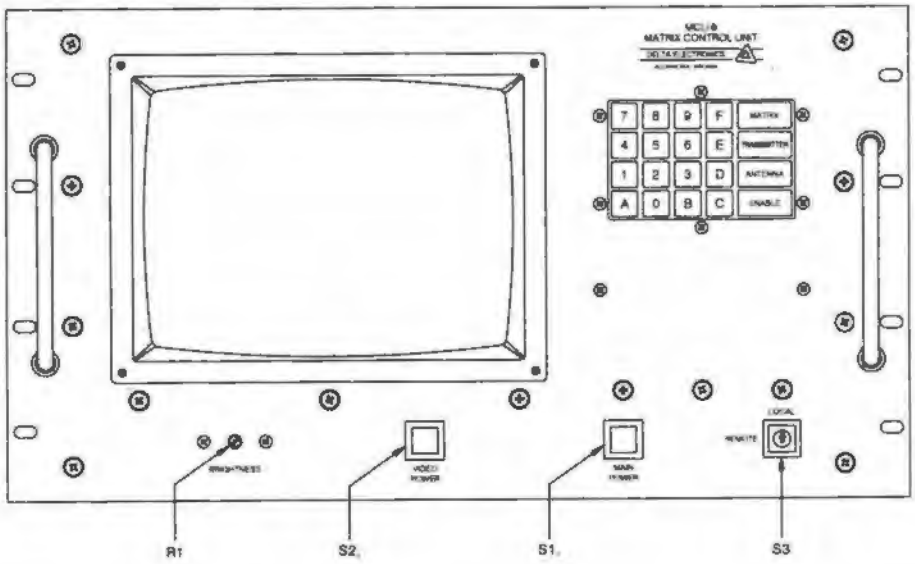
At the tone, X hours, Y minute(s), Coordinated Universal Time.

- Select a frequency from the list that appears. Due to varying propagation correlated with time of day, a wide range of frequencies is provided for validation to ensure a good link.



- Wait to listen to the audio beeps and voice announcements.
- Click **Return to Scan** when complete.

Antenna Matrix



- To change the antenna that the radio (transmitter) connects too, follow this button pattern on the Antenna Matrix:

  Transmitter ## Antenna ## Enable

  For example to change transmitter 01 to antenna 01 press the following key sequence:

  Transmitter 01 Antenna 01 Enable

- To disconnect the radio (transmitter)from any antenna, follow this button pattern on the Antenna Matrix: (this will send the radio to ground (G))

  Transmitter ## Antenna 00 Enable

  For example, to ground transmitter 01 to antenna 00 press the following key sequence:

  Transmitter 01 Antenna 00 Enable

Rotatable Log Periodic (RLP) Antenna Rotation

Manual Tab

Preset Tab

- Using the Antenna Rotation Control Laptop, select or change the direction the antenna is pointing towards by one of two methods:
  - Select a preset, or
  - Change the heading degrees.
- Press the **Turn** button.
- The pointing direction and degrees necessary will depend on your location and the location of the intended receiving system.

References

Operating Rules

The following radio script is intended to serve as an example. It may be modified as needed. However, HF transmissions should be as clear and concise as practicable. A few key operating rules include:

- To avoid interfering with other traffic, **listen** to make certain that a net/frequency is clear before making any transmission;
- **Write** down the text of all messages prior to transmission;
- Always **use** call signs;
- **Begin** each radio transmission by identifying distant end call-sign and your local call sign;
- When necessary, **use** the phonetic alphabet;
- **Ensure** transmissions over radiotelephone are clear and emphasize each word;
- When testing, **begin** and **end** each test session with "This is a test, this is a test";
- **End** each transmission with "over," except at the end of the HF link, which should end with "out"; and
- **Check** signal strength and readability prior to exchanging key messages. See "Strength and Readability" section below.

Strength and Readability

- Check signal strength and readability prior to transmitting any message. Both characteristics may be measured using five standardized descriptive metrics as follows:

Signal		Readability	
Descriptive	Definition	Descriptive	Definition
Loud	Very Strong	Perfectly Readable	Excellent
Good	Strong	Readable	Satisfactory/Good
Weak	Weak	Readable but with difficulty	Marginally good/OK
Very Weak	Very Weak	Readable now and then	Transmission is too weak/ unsatisfactory and the message is intermittent
Fading	Fading signal strength to an extent that continuous reception cannot be relied upon	Unreadable	Scarcely perceptible

Sample Script

Role	Script
Remote Station (Call Sign *WGY903*)	*WGY901, WGY901, this is WGY903. How do you copy? Over.*
Local Station (Call Sign *WGY901*)	*WGY903, this is WGY901. I copy you. How do you read me? Over.*
Remote Station	WGY901, this is WGY903. I copy you. [Message] Over.
Local Station	*WGY901, this is WGY903. Message received. Over.*
Remote Station	*WGY901, this is WGY903. That concludes the message. Out.*

Acronyms/ Meaning

ALE—Automatic Link Establishment

CA—Calling

EOC—Emergency Operations Center

FEMA—Federal Emergency Management Agency

FNARS—FEMA National Radio System

FRC—Federal Regional Center

GUI—Graphical User Interface

HF—High Frequency

L1—Linked/ connected between two stations

LQA—Link Quality Analysis

MWEOC—Mount Weather Emergency Operations Center

NCP—National Continuity Programs

NCS—Network Control Station

NRN—National Radio Network

PSTN—Public Switched Telephone Network

RCC—Rockwell Collins Console

RF—Radio Frequency

RLP—Rotatable Log Periodic

RO—FEMA Regional Office

RRN—Regional Radio Network

RTU—Radio/Telephone interface Unit

TEL—Telephone

USB—Upper Side Band

VOX—Voice Operated Exchange

WWV— Call-Sign for the National Institute of Standards and Technology radio station