Exercise Evaluation Report

Radio Relay International – First Quarter, 2018 Exercise, 21 April 2018

RRI and REACT - Second Quarter Joint Exercise, 12 May 2018

Radio Relay International
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First Quarter Exercise Purpose:

The First Quarter, 2018 exercise was designed to test the ability of participating individuals and emergency communications organizations to establish communications using survivable, field expedient equipment. The exercise was of relatively short duration, running from 1600 to 1900 UTC; a total of three hours duration.

Emphasis was placed on use of the high frequency spectrum and several criteria were set in the exercise guidelines to ensure the purpose of the exercise was retained:

1. Participants could not use gasoline generators. All communications were conducted using battery power. Renewable sources of energy could be included in the form of solar panels or other renewable energy technologies if available, however; this was not mandatory.

2. Participants were required to originate a minimum of one radiogram message providing the following information:
    a. Geodetic coordinates in decimal degrees.
    b. Maximum RF power output used to establish communications
    c. Number of individuals assisting with deployment
    d. EMCOMM organization affiliation (if applicable).

This scenario was intended to simulate a situation in which gasoline to power generators was in short supply and furthermore, to create a simulation in which communications would have to be deployed to a location where needed.

Network Structure and Frequency Management:

The RRI cycle of quarterly exercises is designed to test specific assets and methods in a sequence leading to more complex scenarios. This first quarter exercise was designed to test radiotelegraph circuits, whereas the second quarter exercise, for example, was designed to test two digital networks.

In the case of the first quarter exercise, it should be noted that radiotelegraphy (“CW”) is an extremely effective mode for portable, forward-deployed high frequency communications. It offers minimal DC power consumption, elegant equipment simplicity, light weight, few failure points and a capacity to clear a higher volume of message traffic than voice methods, often at a ratio of three to one in a given time-period. With the emphasis on battery power and renewable energy schemes, the use of CW circuits was the logical mode selection for this exercise.

Three frequencies were assigned for use in this scenario:

7115-kHz
10115 kHz
14115 kHz

These are the default RRI watch frequencies (QSX) for the CW mode. In addition, they are specified priority circuits for use during a communications emergency.

Several IATN (Inter-Area Traffic Network) gateway stations were established on these watch frequencies. QNY procedures were used to manage traffic load. The gateway stations then relayed the traffic to the RRI National Emergency Communications Coordinator (NECC) in Southern Illinois, who acted as a SIMCELL representing a served agency emergency operations center.

Message Structure:

Each participating field expedient station was required to send a message indicating its location in geodetic coordinates as well as its maximum power output and the number of volunteers assigned to the task. A typical message might be formatted as follows (example):

3 TP K8QMN 9 LANSING MI 1343Z APR 21
RRI NECC
MARION IL 62959
<BT>
LOCATION 43<R>446N 83<R>982W MAXIMUM POWER
5 WATTS 3 PARTICIPANTS
<BT>
STEVE JOHANSON K8CBS
INGHAM COUNTY ARES

For more information on message formats, please refer to the Radio Relay International Training Manual (TR-001) available at: http://radio-relay.org/wp-content/uploads/2017/11/RRI-Training-Manual-TR-001-2017-Draft-for-Distribution.pdf

Radio Frequency Propagation Conditions:

The RF propagation conditions at the time of the exercise were poor. A solar storm was in progress. In addition, the time-period for the exercise was purposely selected to coincide with the time of day at which such problems are most evident. This was done to emphasize the fact that during a disaster situation, one must communicate with *specific locations* at *specific times, regardless of RF propagation conditions*.

Power levels reported:

Exercise Guidelines required that each station report the maximum power level used to establish communications. As might be expected, most field expedient arrangements operated at power levels below 50 watts. Distribution based on power output levels reported were as follows:

5-9 watts	31 percent (mostly 5-watt stations)
10-25 watts	17 percent
26-50 watts	35 percent
51-100 watts	17 percent

Message Analysis:

For the purposes of this exercise, messages were analyzed from a qualitative standpoint. The following factors were of primary interest:

- Adherence to the standard format and sequence of data reported. This emphasis on standardized reporting was intended to serve as a prelude to the May 12 SITREP exercise.
- Message completeness. That is; the ability of stations to clear the entire message under less than optimum conditions.
- A general sampling of accuracy. In other words, did garbles appear due to poor circuit quality.

Summary:

Messages using correct precedence:	100%
Messages with correct data sequence:	100%
Messages with verified geodetic coordinates:	100%
Messages without fatal errors:	100%
Messages without non-fatal errors:	97%

It should be noted that, in the case of a radiotelegraph circuit, data containing numbers is easier to copy under poor radio conditions. Because the critical data conveyed was largely numerical in nature, accuracy tends to bias in a favorable direction, particularly when experienced operators are staffing the receive/relay side of the radio net. Future exercises will contain a more varied set of data under field expedient conditions, thereby providing a more challenging administrative and operating environment.

Based on exercise analysis to date; it does appear that RRI assets and participating EMCOMM groups, which adhere to standardized procedures, are quite capable of an extremely high level of accuracy and reliability under simulated conditions.

Communications Failures Reported:

Of the total participants, approximately 11-percent reported being unable to establish communications. This indicates the need to examine HF portable equipment for improved efficiency.

Radio amateurs often deploy low-power ("QRP") portable stations with the intention of establishing communications with any available station. Such random operating is not entirely analogous to the EMCOMM environment in which one may have to access a specific network or control station to clear message traffic. For example, a short, inductively loaded mobile or portable whip antenna deployed in the field may be insufficient to provide a traffic-quality signal, whereas a dipole or end-fed half wave antenna may provide the additional gain needed to assure connectivity.

Control stations should also be located at diverse points within the operational area to increase the odds of establishing connectivity under less than optimal conditions.

Some control stations reported high noise floors due to interference from unintentional radiators. In recent years, the RF noise floor at many Amateur Radio Stations has increased dramatically due to extremely lax F.C.C. enforcement of Part 15 and similar regulations. Numerous unintentional radiators are now deployed in large quantities throughout residential neighborhoods, thereby degrading the capacity of control stations to establish connectivity with relatively low-power field expedient stations operating under disaster conditions.

Local, state and Federal agencies should take immediate steps to encourage Congress and the F.C.C. to better regulate the manufacture and importation of small switching power supplies, televisions, lighting equipment and similar devices, to ensure these devices do not generate broadband noise throughout a community. It is becoming apparent that these devices are significantly degrading the High Frequency spectrum with potentially serious results. Simply put; a failure to correct the RF pollution problem is degrading the capacity of the Amateur Radio Service and critical agencies to aid emergency response forces in time of emergency.

Summary and Recommendations:

The First Quarter Exercise demonstrates the potential value of low-power, field expedient stations for EMCOMM response.

Recommendations include:

- Individual EMCOMM volunteers and organizations should examine deployable antenna systems to ensure a reasonable level of efficiency versus convenience. Periodic deployment of field stations with the intent of checking into scheduled traffic networks and originating routine messages will provide a reasonable indication of efficiency that is more analogous to an emergency deployment.

- Control stations should examine their environmental conditions to identify any unintentional radiators over which they have some control and take proactive measures to minimize the ambient RF noise floor. RF chokes, shielding devices and similar prophylactic measures can be applied.

- Emergency managers and public safety professionals may want to consider seeking legislative relief to prevent the manufacture and importation of lighting systems, power supplies, and similar devices, which can interfere with amateur, government, commercial or military high frequency radio communications in time of emergency.

- Standardized message format and a predictable data sequence makes it possible to format and populate a searchable spreadsheet for use by a network manager or emergency management officials. This exercise proved that a variety of radio amateurs with varying levels of experience were quite capable of adapting to the use of a standardized reporting method.

May 12 Joint RRI – REACT International Second Quarter Exercise Simulated Hurricane Event

Purpose:

The purpose of the second quarter exercise was primarily that of a training event designed to familiarize EMCOMM organizations and individual volunteers with the structure of weather data and SITREP reports that might be transmitted during a hurricane event.

Each participating EMCOMM organization was asked to originate a minimum of one simulated weather data report and one SITREP describing an infrastructure failure, evacuation, or similar event, which might be of interest to local, state and Federal emergency management organizations.

Message Formats:

The message format utilized is defined in the Radio Relay International *Tropical Storm Net Standard Operating Guidelines*. Two example messages from these SOGs are provided below:

Weather Data Report Example:

22 P W4ABC 8 MYRTLE BEACH SC 1300Z OCT 5
NWS-LTX

HORRY COUNTY RAIN 6R50 WIND 47/65 PRESSURE 29R34

WILLIAMS
FIRE CHIEF

Explanation of above:

1. The message serial number is assigned by the originating station for administrative purposes.
2. Message precedence is "priority"
3. Station of origin is "W4ABC"
4. Group count (check) is "8"
5. The city (or township) in which the observation was made is "Myrtle Beach, SC"
6. The observation was made at 1300Z on October 5 (remember the new radio day starts at 0001Z)
7. The observation was made within the NWS-LTX County Warning Area (CWA) and is therefore addressed to that NWS office. However, such traffic may be routed via the National Hurricane Center (NHC) when appropriate.
8. Myrtle Beach is located in "Horry County."
9. Rainfall total is 6.50 inches, sustained winds are at 47 mph with gusts to 65 mph measured, and barometric pressure is 29.34 inches. The “R” is used to represent the decimal point.

10. The information was provided by the Fire Chief ("Williams"). It could have been provided directly by the radio amateur himself, a nearby weather observer, or another individual providing the weather data. Regardless of source, the last name (and title, if appropriate) of the actual observer should appear in the signature.

SITREP Example:

23 P W4ABC 31 MYRTLE BEACH SC 2130Z OCT 5
FEMA
NWS-LTX

SITREP HORRY COUNTY X STATE HIGHWAY 23 IMPASSIBLE BETWEEN ROUTE 10 AND US HIGHWAY 51 DUE TO WASHOUT X SAINT JAMES HOSPITAL EVACUATED DUE TO FLOODING X FIRE STATION THREE EVACUATED

WENDEL WILLKE
HORRY COUNTY EMERGENCY MANAGER

Explanation of Above:

1. Message serial number is 23
2. Message precedence is "priority"
3. Group count (check) is 31 groups/words
4. Message drafted and presented for transmission at 2130Z on October 5
5. Message addressed to **both** FEMA and NWS
6. Brief, concise summary of recent events beginning with the phrase "SITREP"
7. Official source identified and accountable for content
8. Note: “FEMA” may serve as a generic term for distribution to multiple emergency services organizations.

Networks / Methods Used to Convey Data:

Two automated digital networks were used to convey the weather data reports and SITREP data:

- Radio Relay International Digital Traffic Network (DTN)
- Winlink-2000

Exercise guidelines required that all traffic was to be originated using an RF-Only method. In other words, a message could NOT be injected into WL2K using a terrestrial data circuit.

States Participating:

The exercise was limited to States bordering the Gulf Coast and Atlantic Seaboard. Participating States included:

- Florida
- Maine
- North Carolina
- Pennsylvania
- Texas
- Virginia

Message Analysis:

Unlike previous exercises; only a brief qualitative review of message traffic was performed. Results may be summarized as follows:

- The correct message format and data sequence was used for all reports.
- Message content was realistic and useful in scope.

A small sample of exercise message traffic originated during the joint exercise is provided below:

0501 TP WD9GET 10 ALVIN TX 1338Z MAY 12
JAMES WADES WB8SIW
MARION IL 62959
BT
EXERCISE X BRAZORIA COUNTY RAIN
10R85 WIND 27/55 PRESSURE 29R29
BT
KEITH WD9GET

0502 TP WD9GET 17 ALVIN TX 1345Z MAY 12
JAMES WADES WB8SIW
MARION IL 62959
BT
EXERCISE X SITREP BRAZORIA COUNTY
X WIDESPREAD FLOODING COASTAL AREAS
X HIGHWAY 288 IMPASSABLE SOUTH
OF ANGLETON
BT
KEITH WD9GET

376 TP KB1TCE 25 OWLS HEAD ME 2015Z MAY 12
FEMA
RRI NECC
JAMES WADES WB8SIW
MARION IL 62959
BT
EXERCISE X SITREP OWLS HEAD
HARBOR X 1 F/V BROKEN
UP AGAINST PILINGS X 1
F/V ON ROCKS SOUTH SIDE
X NO POB EITHER BOAT
BT
STEVE KB1TCE

NR 130 TP K3TX 16 YARDLEY PA MAY 12
RRI NECC
JIM WADES WB8SIW
MARION IL 62959
BT
LOWER MAKEFIELD TOWNSHIP EPA LIGHT
RAIN TEMP 52 XRAY 11
PARTICIPANTS 5 WATTS SOLAR CHARGING
73
BT
TOM AF4NC
BT
K3TX

375 TP KB1TCE 10 OWLS HEAD ME 2010Z MAY 12
NWS GYX
RRI NECC
JAMES WADES WB8SIW
MARION IL 62959
BY
EXERCISE X OWLS HEAD RAIN
8R20 WIND 43/57 PRESSURE 28R97
BT
STEVE KB1TCE

Summary:

This exercise was primarily a training activity the goal of which was to familiarize radio operators and EMCOMM specialists with the process of submitting data in a repeatable and predictable sequence. The radiogram format facilitates much of this. For example:

- The place of origin is the location of the observed event or weather conditions.
- The date-time-group represents when the event was observed.
- The text provides a brief, concise summary of the situation.

By submitting each report in the same sequence, a radio operator and/or message clerk can quickly transfer SITREP data to a searchable spreadsheet for use in an EOC. For example:

1. Weather data may be entered in alphabetical order based on NWS CWA, County and City/Township.
2. SITREP data can likewise be entered in alphabetical order by State, County and City/Township.

A simple team consisting of a radio operator processing incoming data and one or two administrative staff members populating the necessary databases can generate bulletins for distribution to various emergency management agencies, relief agencies and other organizations. These spreadsheets can be updated as additional reports arrive or even posted on-line for access.

The use of a standard radiogram format and a predictable data sequence ensures that the data can be quickly transferred with less error. Furthermore, an initial quality control check can be performed easily to ensure relevancy and accuracy before posting.

In future exercises, we may establish a SIMCELL operation at a served agency EOC or similar facility and perform this latter administrative function in real time as weather and SITREP data arrives.

Conclusion and Recommendations:

By relying on time-proven principles and procedures, it was possible to quickly and easily implement a sound SITREP transmission and routing methodology. Some recommendations:

- Participation should be expanded. Additional exercises should encourage a greater diversity of individual participants. Outreach to additional EMCOMM groups is also recommended. Endorsement of the activity by emergency management officials would likely prove beneficial in that it would encourage greater participation.

- Data sharing and distribution should be incorporated as a function in a future exercise. For example, a future exercise could be conducted in real-time. Incoming SITREPs should be received, processed and a database created/updated and distributed in real-time via WebEOC or an on-line tool.

- The Tropical Storm Net procedures are also adaptable for major winter weather events along the East Coast. It is recommended that a fourth quarter exercise utilize the same reporting procedures for a simulated significant winter weather event, such as an exercise based on the 1993 super storm.

Point of Contact:

Questions regarding this document may be directed to:

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