



Irish Radio Transmitters Society

Established in 1932

amateur radio in Ireland



AREN Network Protocol

Date : July 30, 2009
Version : 1.1
Status : Release

Synopsis : Guide to AREN Network protocol



Revision history:

| author | date | changes | version |
|------------------------------|--------------------|--------------------------------|----------------|
| John Ronan | July 30, 2009 | Added Radio Procedure Appendix | 1.1 |
| John Ronan & Tim McKnight | September 17, 2008 | Minor Edits | 1.0 |
| John Ronan | June 20, 2008 | Minor Edits | 0.7 |
| Conor O'Neill & Tim McKnight | June 19, 2008 | Review | 0.6 |
| John Ronan & Kristian Walsh | June 18, 2008 | Review | 0.5 |
| John Ketch | May 29, 2008 | Review | 0.4 |
| Tim McKnight | May 20, 2008 | Review | 0.3 |
| John Ronan | April 10, 2008 | Minor Reformat | 0.2 |
| Conor O'Neill | | First draft | |



Contents

| | | |
|----------|-----------------------------------|----------|
| 1 | Introduction | 4 |
| 1.1 | Responsible Persons | 4 |
| 1.2 | Testing | 4 |
| 1.3 | Definitions | 4 |
| 2 | Alerting Members | 5 |
| 2.1 | Goal | 5 |
| 2.2 | Responsibility | 5 |
| 2.3 | Resources | 6 |
| 2.4 | Used when | 6 |
| 2.5 | Approved Methods | 6 |
| 2.6 | Diction | 7 |
| 2.7 | Requirement | 7 |
| 3 | Setting up a net | 7 |
| 3.1 | Goal | 7 |
| 3.2 | Responsibility | 7 |
| 3.3 | Resources | 8 |
| 3.4 | Used when | 8 |
| 3.5 | Approved Method | 8 |
| 3.5.1 | Operations Co-ordinator | 8 |



| | | |
|----------|---|-----------|
| 3.5.2 | Net Controller and assistant Net Controller | 9 |
| 4 | Operating a Net | 9 |
| 4.1 | Goal | 9 |
| 4.2 | Responsibility | 10 |
| 4.3 | Resources | 10 |
| 4.4 | Used when | 10 |
| 4.5 | Approved Method | 10 |
| 4.5.1 | Net Controller and assistant Net Controller | 10 |
| 4.5.2 | Sub stations | 11 |
| 5 | Closing a Net | 11 |
| 5.1 | Goal | 11 |
| 5.2 | Responsibility | 11 |
| 5.3 | Resources | 11 |
| 5.4 | When to use | 11 |
| 5.5 | Approved Method | 12 |
| 6 | Acknowledgements | 12 |
| A | Radio Procedure in more detail | 13 |
| A.1 | Signal Report | 13 |
| A.1.1 | Example1 | 13 |



| | | |
|----------|--|-----------|
| A.1.2 | Example2 | 13 |
| A.1.3 | Example3 | 14 |
| A.1.4 | Example4 | 14 |
| A.2 | Normal Call | 15 |
| A.2.1 | Example1 | 15 |
| A.2.2 | Example2 | 15 |
| A.3 | All Stations Call | 15 |
| A.3.1 | Example1 | 15 |
| A.3.2 | Example2 | 15 |
| A.4 | Closing the NET | 16 |
| A.5 | Joining the NET | 16 |
| A.6 | Passing a formal message | 16 |
| B | Emergency Communications Frequencies | 17 |
| B.1 | HF Emergency Communications Frequencies | 17 |
| B.2 | VHF/UHF Emergency Communications Frequencies | 17 |
| B.2.1 | 4 meters | 17 |
| B.2.2 | 2 meters | 18 |
| B.2.3 | 70 centimeters | 18 |
| B.2.4 | 70 centimeter repeater | 18 |



1 Introduction

This document applies to:

- The Operations Co-ordinator
- All AREN Officers
- Net Controllers and assistants

1.1 Responsible Persons

1. This system is the responsibility of the Operations Co-ordinator.
2. It should be reviewed annually and updated as appropriate. Input should be sought from Net Controllers who were active during the year.
3. Revisions must be approved by the National Co-ordinator and the Training and Recruitment Co-ordinator.
4. Circulation of updates and maintenance of the list of recipients is the responsibility of the Training and Recruitment Co-ordinator.

1.2 Testing

1. This system must be tested at least once per annum.
2. It is the responsibility of the Operations Co-ordinator to schedule and ensure execution of same.
3. This should comprise Alerting members, Setting-up the Net, Operating the Net and Closing the Net as described herein.

1.3 Definitions

Alert Where Net Control has formed an opinion that the network may be required to be placed on standby or where it may be required to be activated. Operators will check all equipment, clothing and supplies and ensure that stations and vehicle are ready for deployment. Operators do not need to maintain constant contact with Net Control but must check into the Net at intervals to be assigned by net control and any operator must inform control immediately if (s)he becomes unavailable for elevation of readiness level to Standby or Activation.



Standby Where net control has been asked to prepare the network to serve during an impending or existing event. Operators are in attendance at their stations, en route to the Incident Command Post (ICP) or in attendance at the ICP, ready and equipped to operate. While on standby operators must be contactable by radio at all times and must check into the net at intervals to be assigned by net control.

Activation Where the network is required to actively participate in an event. Operators are now operating at an incident or event station.

Stand-down Where the network is no longer required to participate in an event. The definitions Alert, Standby or Activation no longer apply to the situation.

Net A Radio Net (Network) consists of two or more radio stations operating on the same frequency for the purpose of communicating with one another. It consists of a Control station and one or more Sub Stations.

Net Control Station also referred to as Control or NCS. The Control station is responsible for:

- Controlling Communications
- Radio Discipline
- The efficient clearance of traffic.

The Net Control Station can be located at a member's home station, at the Headquarters of a served agency or at a field location near the incident.

Sub Stations A Sub Station shall obey directions or instructions from Net Control. Sub Stations can be located at a member's home, at the regional office or station of a served agency or be mobile or portable as required.

2 Alerting Members

2.1 Goal

To notify all active AREN members of a change in operation status.

2.2 Responsibility

Operations Co-ordinator or persons appointed by him.



2.3 Resources

- AREN Handbook and this document.
- Membership database.
- Callout Log Sheet and Stationery.
- Landline telephone.
- Fixed repeaters.
- Phone numbers of members preferably stored on a mobile phone as a group.
- VHF and UHF FM voice radio transceiver.

2.4 Used when

1. Request from Served agency accepted by National Co-ordinator and one other officer.
2. A minimum of two officers recognise that due to extreme weather conditions, power-cuts or the occurrence of a major emergency of some kind that a change on operational status is appropriate.
3. Interim change in operational status.
4. End of operational activity to stand down.

2.5 Approved Methods

Listed in order of execution:

1. Electronically by group SMS text message
2. SERN and other repeater networks calling AREN members
3. Group email to members@aren.ie
4. Manual callout tree, landline or mobile phone
5. Through the communication channels open during the net (including APRS)



2.6 Diction

1. SMS text to read: AREN Activation Status is (Alert, Stand-by, Activate, Stand-down). Reply to this message is required with the following: "OK available" or "OK unavailable" or "Standing down". For example:
 - AREN activation status is Alert. **Reply:** OK Available
 - AREN activation status is Stand-Down. **Reply:** Standing down
2. Call on voice repeaters to read (for example): AREN members AREN members AREN Members this is EL... EL... EL.... AREN Members this is EL..., Activation Status is (Alert, Standby, Activate, Stand down) over.
3. APRS alert (Yet to be defined)
4. E-mail to members@aren.ie Subject: AREN Activation Status, Body text: Activation status is (Alert, Standby, Activate or Stand down). Reply to this message is required with the following: OK available or OK unavailable or Standing down.
5. Telephone members who have not responded to 1 to 4 above.

2.7 Requirement

1. If telephones are not answered, leave voice messages.

3 Setting up a net

3.1 Goal

To have a Net Control station and one or more Sub Stations operating on one or more frequencies and modes prepared for, or active in, passing Emergency and/or Public Welfare messages for third parties.

3.2 Responsibility

The Operations Co-ordinator, the Net Controller and assistant Net Controller as appointed by him.



3.3 Resources

- AREN Handbook and this document.
- Membership database.
- Landline telephone.
- Fixed repeaters and AREN portable repeater.
- Phone numbers of members preferably stored on a mobile phone as a group.
- Callout Log Sheet, Net Log sheets and stationery.
- Message transmittal forms.
- HF, VHF, and UHF radio stations equipped for voice and data modes with Personal Computer and printer
- APRS beacon capability.
- Broadcast radio receiver.
- Suitable power and back-up power for estimated Net duration.

3.4 Used when

Status is upgraded to Standby or Activation.

3.5 Approved Method

3.5.1 Operations Co-ordinator

On Standby the Operations Co-ordinator should

1. Alert members as per §2 above.
2. Appoint Net controller and assistant for 2m, 40m, and 80m watch periods.
3. Identify resources, manpower and equipment available.



On Activation the Operations Co-ordinator should

1. Meet with the served agency to define requirements
2. Allocate resources and call-signs
3. Brief all activated members (off-air) with available information and the plan.
4. Advise the served agency(s) when net is ready to pass messages.

3.5.2 Net Controller and assistant Net Controller

On Standby the Net controller and assistant should

1. Satisfy themselves that they can maintain watch on 2m, 40m, and 80m and have the resources listed in §3.3 above available to them.
2. Revert to using fixed voice repeaters in the event that a watch on 2m cannot be maintained.

On Activation the Net controller and assistant should

1. Co-ordinate the deployment of members to activate as Sub Stations.
2. Set up APRS beacon for the location of the assembly point or Net Control Station as appropriate. APRS Status message to read Alert, Standby, Activate, or Stand Down
3. Notify operators to use AREN repeater if applicable.

4 Operating a Net

4.1 Goal

The Net Control Station will monitor this watch period and will use the opportunity to brief stations on the developing situation or to gather information from participating stations. These on-air briefings or information gathering opportunities will be held at the end of the watch period and will be carried out on a frequency other than the watch frequency.

It is the sole responsibility of the net control station to maintain a clear frequency during the watch period.



4.2 Responsibility

The Net Controller and assistant.

4.3 Resources

As per §3.3.

4.4 Used when

Status remains Standby or Activation.

4.5 Approved Method

4.5.1 Net Controller and assistant Net Controller

1. To facilitate members activating, on the hour, every hour, maintain a listening watch on **40m**, and locally on **2m** for 5 minutes. This watch shall be immediately followed by a period of listening on **80m** and locally on **2m** that shall continue until ten minutes past each hour (see §B for frequency list). For example:
 - 09:00 Listen on 40m and 2m.
 - 09:05 Listen on 80m and 2m.
 - 09:10 return to normal activities.
2. Maintain appropriate operating frequencies and modes for the net and switch to alternate frequencies as conditions dictate.
3. Communicate current operating frequencies and modes to Sub Stations.
4. Ensure all Sub Stations are updated on the status of the incident in particular, aspects of a health and safety nature.
5. Facilitate the served agency and Sub Stations in the passing of messages in an orderly manner.
6. All spoken messages to be recorded at source Sub Station, at Net control and at the destination Sub Station on the message transmittal form.
7. Save all data messages at net control, and at destination Sub Stations on removable media.



8. Mark or stamp all recorded messages with date, time, and the name of originator and that of recipient clearly recorded.
9. Confirm that each message has been received and been recorded.
10. Co-ordinate the deployment of members to relieve operators coming off duty.

4.5.2 Sub stations

1. Sub Stations shall inform the Net Controller if they need to leave the net while it is in operation and await a confirmatory reply. There may still be traffic for the assigned area and in a busy situation alternative arrangements will need to be made to cover this area before the operator is given permission to leave.

5 Closing a Net

5.1 Goal

Notify all Sub stations that the net has closed. Refer to §2 if there is a change in operation status eg. Stand-down.

5.2 Responsibility

The Operations Co-ordinator, the Net Controller and assistant Net Controller as appointed by him.

5.3 Resources

As per §3.3.

5.4 When to use

1. Under direction of the Operations Co-ordinator and
2. Operational status Alert, Stand-by or Activation no longer applies. "All stop" required from served agency or



3. Acknowledgment from served agency that AREN cannot continue to support the incident.

5.5 Approved Method

1. No station shall cease to operate without receiving permission from the Net Controller.
2. Controller to stand down Sub Stations one by one and thank them for participation.
3. Maintain log regarding members standing down.
4. Keep all logs, message transmittal forms, and all records for subsequent debriefing session and archiving. These documents may be requisitioned for legal purposes.
5. When all sub stations have signed off maintain listening watch for 5 minutes and then shut down the Net Control Station.
6. Alert members re Stand-down as per §2.

6 Acknowledgements

The authors would like to thank those whose contributions and reviews were invaluable in the creation of this document. We would also like to thank the clubs and individuals who have permitted the use of their equipment for public service.



A Radio Procedure in more detail

A.1 Signal Report

Once all equipment is set-up and it is time to commence the NET, Control needs to ascertain whether his/her transmission are being received by all substations, and that he can receive each substation in turn. This is done by means of a Radio Check. Control uses the Pro-words "Radio Check" to request readability report from all substations.

The message transmitted by Control is:

"All stations, This is AREN Control, Radio Check Over".

All substations should answer in turn giving a readability report using the following pro-words:

- **O.K.** - Communications satisfactory for working
- **DIFFICULT** - Communication is workable only with difficulty. Care and extra measures are needed.
- **UNWORKABLE** - meaning impossible for communications. I am unable to receive message traffic from you until communications between us has improved.

A.1.1 Example1

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "All stations, This is EI2GN, AREN Control, Radio Check, Over".

Response: "This is EI1AA, O.K. Over".

"This is EI2AA, O.K., Over".

"This is EI3AA, O.K., Over".

"This is EI4AA, O.K., Over".

Control: "This is AREN Control, ".

"All O.K., Out".

A.1.2 Example2

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.



Control: "All stations, This is EI2GN, AREN Control, Radio Check, Over".
Response: "This is EI1AA, O.K. Over".
"This is EI2AA, O.K., Over".
"This is EI3AA, Difficult, Over".
"This is EI4AA, O.K., Over".
Control: "This is AREN Control, ".
"EI1AA, EI2AA, EI4AA O.K. ".
"EI3AA Difficult, Out".

A.1.3 Example3

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "All stations, This is EI2GN, AREN Control, Radio Check, Over".
Response: "This is EI1AA, O.K. Over".
EI2AA, No reply (Five second pause)
"This is EI3AA, Difficult, Over".
"This is EI4AA, O.K., Over".
Control: "This is AREN Control, ".
"EI1AA, EI3AA, EI4AA O.K. ".
"EI2AA, Nothing Heard, Out".

The substations experiencing problems should take whatever action necessary to improve their signal strength and then conduct further Radio Checks with Control

A.1.4 Example4

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control. EI2AA has moved his location and wishes to to perform a radio check with Control.

EI2AA: "AREN Control, This is EI2AA, Radio Check, Over".
Control: "This is AREN Control, O.K. Over".
EI2AA: "Roger, Out".



A.2 Normal Call

A.2.1 Example1

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "EI2AA, This is AREN Control, how many cyclists have passed your location?, Over".

EI2AA: "This is EI2AA, 15 cyclists have passed my location, Over".

Control: "Roger, Out".

A.2.2 Example2

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "EI1AA, This is AREN Control, have all the walkers passed you, Over".

EI1AA: "This is EI1AA, Negative, Over".

Control: "Could you call me with the time the last walker passes your position, ".

EI1AA: "Wilco, Out".

A.3 All Stations Call

A.3.1 Example1

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "All stations, This is AREN Control, return to base, Over".

Response: "This is EI1AA, Wilco, Out".

"This is EI2AA, Wilco, Out".

"This is EI3AA, Wilco, Out".

"This is EI4AA, Wilco, Out".

A.3.2 Example2

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.



Control: "All stations, This is AREN Control, Race begins in five minutes, Over".

Response: "This is EI1AA, Roger, Out".

"This is EI2AA, Roger, Out".

"This is EI3AA, Roger, Out".

"This is EI4AA, Roger, Out".

A.4 Closing the NET

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.

Control: "All stations, This is EI2GN, AREN Control, Closing NET, Over".

Response: "This is EI1AA, Closing NET, Over".

"This is EI2AA, Closing NET, Over".

"This is EI3AA, Closing NET, Over".

"This is EI4AA, Closing NET, Over".

Control: "This is AREN Control, ".

"Closing Now, Out".

Note, until everyone acknowledges the instruction from Control, the net cannot be closed.

A.5 Joining the NET

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control. EI5AA wishes to join the net.

EI5AA: "AREN Control, This is EI5AA, Permission to join the NET, Over".

Control: "This is Control, Permission Granted, Answer after EI4AA, Over".

EI5AA: "Wilco, Out".

A.6 Passing a formal message

EI1AA, EI2AA, EI3AA, EI4AA are all sub stations, EI2GN is at AREN Control.



- EI1AA:** "AREN Control, This is EI1AA, Message, Over".
Control: "This is AREN Control, Send, Over".
EI1AA: "Message begins."
 (short Pause)
 "Radio Discipline" (short pause) "is a fundamental ingredient" (short pause)
 "of voice procedure, Over".
Control: "Continue, Over".
EI1AA: "without which" (short pause) "a radio net" (short pause)
 "cannot function efficiently, end of message, Over".
 (there will be a short delay as control finishes writing the message)
Control: "Roger, Out".

B Emergency Communications Frequencies

B.1 HF Emergency Communications Frequencies

| Band (Meters) | IARU Region 1 CoA Frequency (MHz) | AREN (MHz) |
|---------------|-----------------------------------|------------|
| 160 | - | - |
| 80 | 3.760 | 3.660 |
| 40 | 7.110 | 7115 |
| 20 | 14.300 | |
| 17 | 18.160 | |
| 15 | 21.360 | |

B.2 VHF/UHF Emergency Communications Frequencies

B.2.1 4 meters

| Frequency (MHz) | Mode |
|-----------------|------------------|
| 70.325 | Packet & Winlink |



B.2.2 2 meters

| Frequency (MHz) | Mode |
|-----------------|--------------------------|
| 144.525 | FM Voice communication |
| 144.800 | AX.25 APRS communication |

B.2.3 70 centimeters

B.2.4 70 centimeter repeater

| Frequency (MHz) | Mode |
|-----------------|-------------|
| 438.450 | Mobile TX |
| 430.850 | Repeater TX |