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BCARES Packet Communications Network Description

I. The BCARES packet communications network architecture is shown in Figure 1 below. The number of packet radio stations is based upon a reasonable worse-case scenario for a Point-of-Distribution county-wide based incident. The VHF 145.01 MHz Packet Radio Network carries the digital record traffic messages. The packet station locations and other details can be found in Appendix A.

II. All BCARES packet communications are conducted as Winlink Packet Peer-to-Peer (P2P) message transactions. Every packet station is configured for P2P operation. Unless directed otherwise, all Winlink Packet P2P message transactions go through the Sandia Crest (SCREST), call sign W5SCA-11, digipeater node.

III. All packet communications are directed by a Network Control Station on the Orderwire Voice Network to minimize network interference, packet collisions and over all contention of the single, simplex, VHF frequency 145.01 MHz channel.

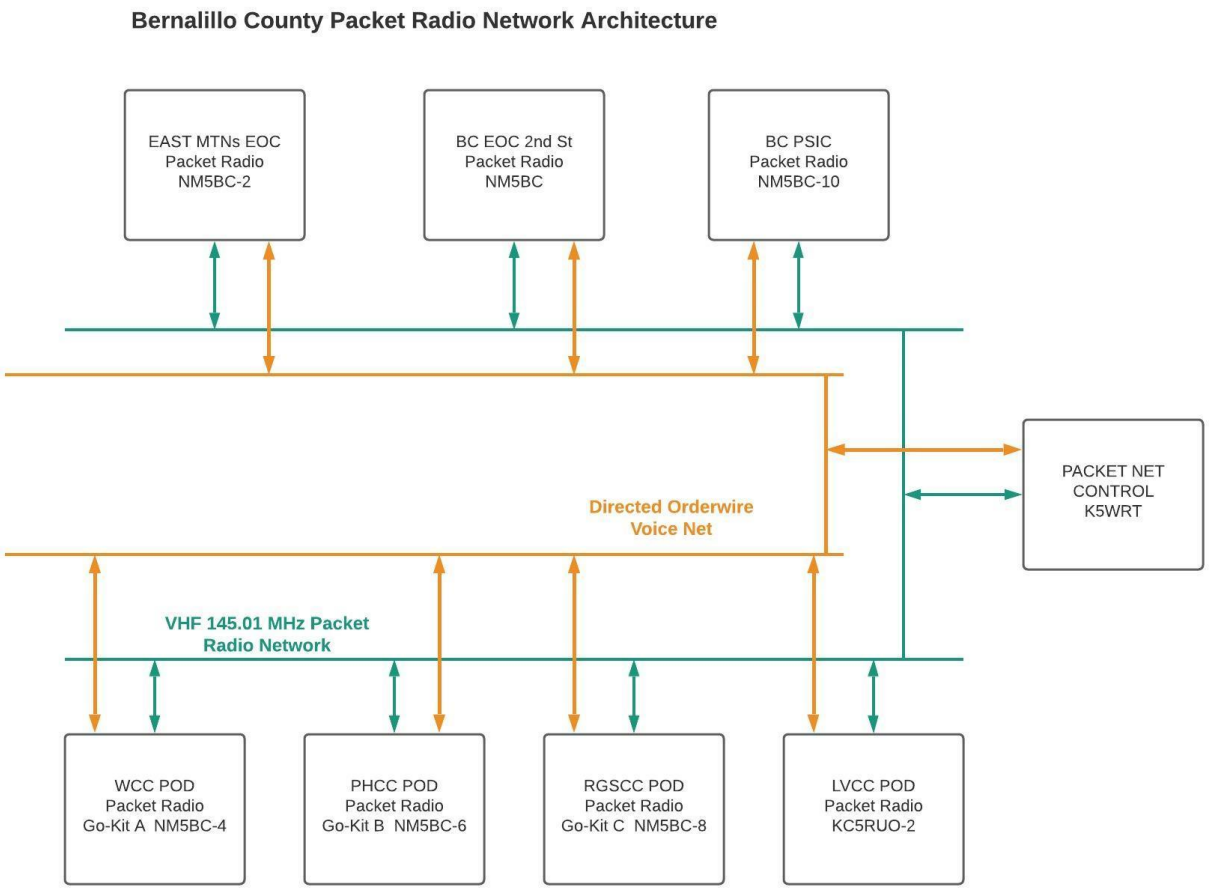

Figure 1. The BCARES Packet Communications Network

IV. Incident Radio Communications Plan (ICS-205) - The VHF 145.01 MHz Packet Radio Network and Directed Orderwire Voice Network function, channel, assignment, receive frequencies, and transmit frequencies will be listed on the ICS-205. Also included on the ICS-205 will be the Backup Packet Simplex Frequencies. The ICS-205(s) will be disseminated to each of the packet stations.

V. Packet Radio Station Configuration:

a. Each station is VHF capable.
b. Each station has a dedicated packet radio transceiver and uses the Kantronics KPC 3+ Terminal Node Controller (TNC).
c. With the exception of the 2nd Street EOC, the operator of each station must provide his/her own laptop PC with the Winlink Express software application and the USB interface cable.
d. All packet station TNCs will be configured as a digipeater to be used to relay packet messages in the event we lose the SCREST digipeater node.
e. There is just one packet radio station at each site.

VI. The BCARES packet network is used to send record traffic messages as defined in the BCARES Packet Utilization Guidelines in Appendix B. The message transaction rates are expected to be fairly low for incidents confined to Bernalillo County. During the Cities Readiness Initiative (CRI) exercise in February 2019, only two messages qualified as packet messages per the BCARES Packet Utilization Guidelines over the two-hour exercise period. However, this network under directed control of the Voice Orderwire NCS should be able to accommodate higher rate message transactions. A detailed description and operation of the Directed Orderwire Voice Network can be found in Appendix C.

VII. The BCARES packet station operator only needs to know how to do 6 things when deployed to a Bernalillo County packet station:

f. Compose and send a P2P “casual” email
g. Retrieve a “casual” email from their In Box
h. Compose and send a P2P ICS-213 General Message
i. Retrieve an ICS-213 General Message from their In Box
j. Compose and send a P2P ICS-213 General Message reply

k. Recognize and fix the most common Winlink Packet P2P connection problems. The most common problems are identified in the QUICK LOOK-UP P2P TROUBLESHOOTING GUIDE, in Appendix D. A more detailed P2P connection establishment and troubleshooting procedure is found in Appendix E.

VIII. There are training opportunities and practice packet networks that allow BCARES members to become Winlink Packet P2P operators and maintain proficiency. These are listed in Appendix F.

a. Note: Proficiency with other ICS form transmissions and use is desireable.

Appendix A – The Packet Radio Station Particulars

I. Figure 1 above shows the BCARES Packet Communications Network.

a. East Mountains EOC, located in the village of Tijeras. Known as the Bernalillo County James McGrane Public Safety Facility or BC Sheriff's Office. Packet SSID: NM5BC-2. As of the publication of this document, there isn't a packet station installed in the BCARES radio room. The SSID is reserved for the packet station that eventually will be installed at that facility.

b. BC EOC 2nd Street, 6840 2nd Street NW ABQ. Packet radio station is in the radio room. SSID: NM5BC.

c. Bernalillo County Public Safety Interoperability Communications van. To be deployed in BC where needed. SSID: NM5BC-10. A packet station has not yet been installed in the PSIC.

d. Packet Net Control Station. This could be anywhere but for the purpose of this architecture, it is placed at the home of Bill Tucker, K5WRT. SSID: K5WRT.

e. LVCC POD. Los Vecinos Community Center 478 1/2 Old Hwy. 66, Tijeras, NM 87059. This facility does not have a packet radio station. It would have to be provided by a BCARES member. For the purpose of this network description KC5RUO's go-kit packet radio station is used, SSID: KC5RUO-2.

f. RGSCC POD. Raymond G. Sanchez Community Center, 9800 4th St. NW, Albuquerque, NM 87114. In this network description it has the BCARES Go-Kit C packet radio station, SSID: NM5BC-8.

g. PHCC POD. Paradise Hills Community Center, 5901 Paradise Blvd. NW, Albuquerque, NM 87114. In this network description it has the BCARES Go-Kit B packet radio station, SSID: NM5BC-6.

h. WCC POD. Westside Community Center (WCC), 1250 Isleta Blvd. SW, Albuquerque, NM 87105. In this network description it has the BCARES Go-Kit A packet radio station, SSID: NM5BC-4.

Appendix B - BCARES Packet Utilization Guidelines

I. Digital messaging using packet radio is exercised under the following conditions:
   a. When the internet, cell phone email or text messaging, FAX machine, or other more expedient commercial data communication means are not available.
   b. To transmit High Precision Messages
      i. Typically, a long message that **does** require forward-error correction, i.e. cannot tolerate transmission errors – requires perfect message reception
      ii. Is a complex message (complex drug names, instructions, directions, or detailed descriptions, etc)
   c. **NOT** Time-Critical Messages
      i. NOT Urgent Messages (Routine messages, information, health and welfare, resources, logistical list of supplies etc.)
      ii. Messages that can tolerate some transmission delays
   d. Formal Messages – written messages to be sent using a standardized format
      i. ICS Forms (General Message ICS 213, Resource Request ICS213RR). Damage Assessment, weather forecast, record copy traffic, etc.
   e. Point - to - Point Messages. Single-Point Destinations, where distant-end single addressees are specified.
   f. Packet radio can be used to send names of individuals that are **NOT** considered SENSITIVE INFORMATION
      i. Example of non-sensitive information: forwarding amateur radio operator names and callsigns manning a Bernalillo County shelter
      ii. **Example of SENSITIVE INFORMATION:** Casualty list of victims names.

II. **Winlink Packet Peer-to-Peer (P2P) Email Mode.** This mode is radio-to-radio email transfer using the Winlink Express software application. This mode is used to transmit the Incident Command System (ICS) General Message Form 213 and other ICS forms. This mode accommodates the transmission of long, complex

messages consisting of names of medications, extensive list of items or names, detailed descriptions, and instructions that would be too cumbersome copying/pasting line-by-line into a Simple Terminal mailbox message.

Appendix C – Directed Orderwire Voice Network

I. All packet communications are directed by a Network Control Station on the Orderwire Voice Network to minimize network interference, packet collisions and over all contention of the single, simplex, VHF frequency 145.01 MHz channel.

II. The Net Controller is assigned by the Auxiliary Communications Manager, usually the BCARES District Emergency Coordinator.

III. During a Bernalillo County exercise or actual incident the Directed Orderwire Voice Network would most likely consist of a subset of the Upper Rio FM Society repeaters that can provide both East Mountains and West Mountains coverage. BCARES has an MOU with URFMSI. Repeaters will be linked together by an URFMS member.

IV. This network can be expanded and contracted as needed to accommodate the Winlink Packet P2P message transaction rates and network maintenance actions. For example, it can start off as an Open Net with informal control via voice coordination communications between the originating and destination packet station operators. However, in the event of network degradation, such as the loss of the SCREST digipeater node, or significantly increased frequency of message transactions, the NCS operator will take over and declare it a Directed Net.

V. In the event of a SCREST digipeater node failure the NCS will direct P2P connections between the originating and destination station by assigning simplex frequencies and packet station digipeater relays.

Appendix D - QUICK LOOK-UP P2P TROUBLESHOOTING GUIDE

- Your PC fails to connect to your Terminal Node Controller – your ***Packet Peer-to-Peer Session*** window annunciates *"Initialization failed"*
  - Select ***Settings*** in the ***Packet Peer-to-Peer Session*** window - In the ***Packet Winlink/P2P window*** go to ***Serial Port:*** box and click on the drop-down arrow to determine if there is a second COM Port listed. If so, select that COM Port, then select ***Update*** at the bottom.
  - If changing the COM Port does not work, power down the TNC, and then power it back on
- **Originating Station -** Your ***Packet Peer-to-Peer Session*** window annunciates, ***Ready,*** but you cannot Connect with the distant end receiving packet station, or you are connected but cannot pass the Winlink Packet P2P message to the recipient
  - **Originating Station** does not have the correct receiving station ***CALLSIGN*** in the ***Packet Peer-to-Peer Session*** Window
  - **Originating Station** selected a ***Connection Type:*** = ***Direct*** in the ***Packet Peer-to-Peer Session*** Window but the receiving station is not within Line-of-Sight. Change ***Connection Type:*** to ***Digipeater*** and use via **SCREST** digipeater node or assigned digipeater node.
  - **Originating Station** addressed the message to the wrong ***To:*** addressee in the Winlink message
  - **Originating Station** fell prey to the Booby Trap **–** the Winlink message ***Sent as:*** was not ***Posted to Outbox*** as ***Peer-to-Peer Message***
- **Receiving Station -** Your ***Packet Peer-to-Peer Session*** window annunciates, ***Ready,*** but you cannot Connect with the originating packet station, or you are connected but cannot receive the Winlink Packet P2P message
  - **Receiving Station** has the wrong ***CALLSIGN*** in the ***Winlink Express Setup*** Window for that station
  - **Receiving Station** TNC is configured with the wrong **MYCALL**

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Appendix E - Winlink Peer-to-Peer (P2P) Packet Radio 1-on-1 Over-the-Air Training

Instructor and student training takes place using cell-phones or over the BCARES Voice Net

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Verify Winlink Settings: settings → Winlink Express Setup → My Callsign → My Password → Password recovery email → My Grid Square → Contact Information → Update

KC2LM composes the ICS-213 message or casual email for transmission

a. From the Winlink Express window select NEW MESSAGE
b. Verify in the "From" box has the message originator's CALLSIGN, in this case it is KC2LM
c. Send as: drop-down box, select Peer-to-Peer Message
    i. WARNING: For whatever reason Winlink has a mind of its own and routinely changes the Send as: back to Winlink Message or Radio-only Message
d. Compose your ICS-213 message, verify the Send as: still annunciates " Peer-to-Peer Message", and then Post to Outbox.

<u>KC5RUO – Message Recipient P2P Connection Procedure</u>

1. **KC5RUO, message recipient,** opens Winlink Express and configures his station for Winlink P2P packet communications
    a. *Note: If the Packet Winlink Session window opens KC5RUO will have to close that window to be able to configure Winlink Express for* ***Packet P2P***
    b. From the Winlink Express window title bar go to ***Open Session:*** and from the drop-down list selects ***Packet P2P***.
    c. KC5RUO then selects the ***OPEN SESSION BOX*** that looks like an ***AMTRAC sign***
    d. The Packet Peer-to-Peer Session window opens and the software connects the PC to the TNC.
    e. If the connection to the TNC was successful it will appear as below:
    ****** Starting peer-to-peer packet session...***
    ****** Initializing Kantronics; port COM10; 9600 baud***
    ****** Initialization complete***
    ****** Opening serial port COM10; 9600 baud; Kantronics***
    ****** Ready***

If the connection failed KC5RUO packet operator may have to do one or more of the following:

1. First, power down the TNC and then power it back up. Then, repeat the steps c and d above to open the Packet Peer-to-Peer Session window
2. If the TNC still fails to connect to the PC the KC5RUO operator will do the following:

   Select ***Settings*** in the Packet Peer-to-Peer Session window

   In the ***Packet Winlink/P2P window*** go to ***Serial Port:*** box and click on the drop-down arrow to determine if there is a second COM Port listed. If so, select that COM Port, then select ***Update*** at the bottom.

   Repeat steps c and d above

3. If the TNC still fails, close Winlink Express application, check all cables, and re-start Winlink Express

f. From the Packet Peer-to-Peer Session window go to the ***Connection Type:*** entry and select either ***Direct or Digipeater***.
g. In the next box ***CALLSIGN*** can be populated with any CALLSIGN. When you are the recipient the Originator will be able to connect to your packet station in Winlink Packet Peer-to-Peer mode regardless of the CALLSIGN designator
h. If DIGIPEATER was selected, in the box to the right of "Via" enter ***SCREST or assigned.***

KC2LM – Message Originator P2P Connection and Message Transmission Procedure

2. **KC2LM, message originator,** opens Winlink Express and configures his station for Winlink P2P packet communications
   a. *Note: If the Packet Winlink Session window opens KC5RUO will have to close that window to be able to configure Winlink Express for* ***Packet P2P***
   b. From the Winlink Express window title bar go to ***Open Session:*** and from the drop-down list selects ***Packet P2P***.
   c. KC2LM then selects the ***OPEN SESSION BOX*** that looks like an ***AMTRAC sign***
   d. The Packet Peer-to-Peer Session window opens and the software connects the PC to the TNC.
   e. If the connection to the TNC was successful it will appear as below:
   ****** Starting peer-to-peer packet session...***
   ****** Initializing Kantronics; port COM10; 9600 baud***
   ****** Initialization complete***
   ****** Opening serial port COM10; 9600 baud; Kantronics***
   ****** Ready***

If the connection failed KC5RUO packet operator may have to do one or more of the following:

3. First, power down the TNC and then power it back up. Then, repeat the steps c and d above to open the Packet Peer-to-Peer Session window
4. If the TNC still fails to connect to the PC the KC5RUO operator will do the following:

   Select ***Settings*** in the Packet Peer-to-Peer Session window

   In the ***Packet Winlink/P2P window*** go to ***Serial Port:*** box and click on the drop-down arrow to determine if there is a second COM Port listed. If so, select that COM Port, then select ***Update*** at the bottom.

   Repeat steps c and d above

5. If the TNC still fails, close Winlink Express application, check all cables, and re-start Winlink Express

a. From the Packet Peer-to-Peer Session window go to the ***Connection Type:*** entry and select either ***Direct or Digipeater***.
   i. Note: if uncertain on whether or not your packet connection with KC5RUO can be accomplished DIRECTLY, select DIGIPEATER
b. In the next box enter the ***CALLSIGN*** of the distant-end packet station you are going to establish a P2P connection with. In this case the recipient CALLSIGN is KC5RUO
c. If DIGIPEATER was selected, in the box to the right of “Via” enter ***SCREST or assigned.***
d. Then ***select Start*** to make your connection with KC5RUO.

Follow the progress of the message transmission as annunciated on the Packet Peer-to-Peer window.

At the completion of the transmission, the Packet Peer-to-Peer Session window will annunciate Message Sent: 1 at the bottom of the page and the system will automatically disconnect the P2P connection between KC2LM and KC5RUO.

Appendix F – BCARES Packet Radio Training Opportunities

BCARES packet operators must be skilled in conducting Winlink Packet Peer-to-Peer message transactions to participate in the BCARES Packet Communications Net. There are opportunities to achieve these skills and maintain proficiency:

a. Periodic one-on-one, hands-on, classroom sessions and over-the-air training sessions.
b. An individually scheduled personal one-on-one, hands-on training session with a BCARES packet operator.
c. Participation in the third Tuesday of the month BCARES Packet Net to maintain proficiency.