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WZRDnet®

Handset Model WHD-310(V)2

USER MANUAL

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SECTION 1: GENERAL INFORMATION

1. Introduction

This document forms the user manual for the WZRDnet Handset Model WHD-310(V)2. As such it presents a detailed equipment description including the physical characteristics and operational instructions for the Handset.

2. Features

WZRDnet is a low-power wireless ad-hoc mesh network that provides secure voice and data communications without the need for infrastructure (i.e., no cell towers or satellites required). In WZRDnet each handset is a router, relaying calls from originator to destination. Unlike other mesh networks, this architecture does not employ central routing tables thus avoiding single points of failure. WZRDnet is a low-power network that allows its light-weight handsets to provide service for 38 hours between battery recharges. WZRDnet is a true end-to-end packet switched network which facilitates straight-forward interoperability with Wide Area Networks (WANs) supporting peer-to-peer communications and direct dialing. This is accomplished via the WZRDnet Gateway which provides connectivity with any available IP network (e.g., Wi-Fi, VOIP, etc.), or analog network (i.e., PSTN).

The WHD-310(V)2 Handset design was focused on SWAP (size, weight and power). It provides four times the battery life as compared to commercial two-way radios at one quarter of the weight. Handset operation is accomplished via a color LCD display and menu-driven control buttons. This reduces training time and facilitates simple inclusion of specific customer features at minimal cost. WZRDnet Handsets include embedded GPS receivers for friendly force tracking and situational awareness.

SECTION 2: EQUIPMENT DESCRIPTION

1. Handset Characteristics

Physical Characteristics

- Dimensions:
  - Handset: 1.3 x 2.8 x 5.4 inches
  - Antenna length: 2 inches
- Weight: 0.6 lbs including battery pack

Internal Components

- 1.5 inch Color LCD Screen
- 2.4 GHz Radio Transceiver
- GPS Receiver
- Real-Time Clock
- Integrated Speakerphone
- Microphone
- 5-Button Navigation Tool
- Illuminated Keypad
- Mini-USB Port
- 2.5mm Audio Output Jack

External Components

- Mini-USB to USB Cable
- Headset with Push-to-Talk button and microphone
- Shoulder Microphone with Push-to-Talk button and speaker
- Replaceable/ Rechargeable 3500mAhr Lithium Ion Battery Pack
- 110VAC Wall Adapter.

Additional Software

- USB to Serial Driver
- WZRDnet Command Center

Figure 2.1.1 WHD-310(V)2 Handset

SECTION 3: HANDSET POWER

1. Handset Power

Main power to the WHD-310(V)2 is provided by either a rechargeable 3500mAhr Lithium Ion battery pack or by an external power source connected to the Handset's USB port. The battery pack is constantly monitored and protected by an embedded battery gauge circuit. It is recharged whenever an external power source is connected to the USB port. An internal charger circuit determines whether the power is being supplied by battery pack or through an external power source.

The Handset's on-board voltage regulator provides three separate outputs of 3.3VDC each. One output powers the microcontroller, and the other two power the peripherals and the DC-DC converter for the Liquid Crystal Display (LCD) backlight.

1.1 Battery Charging

The battery pack is recharged via the USB port. This can be done by connecting to a PC via a mini-USB to USB cable or to a 5VDC 500mA to 1A wall charger. The Handset will automatically determine which charging method is being used and configure itself accordingly.

1.2 Battery Gauge

The current state of the Handset's battery pack is displayed with a battery icon on the LCD screen. The user can monitor the voltage and be alerted when the battery is low. When the battery voltage drops below a predetermined level, the handset will shut down automatically to save power.

Number of Bars	Minimum Voltage	Maximum Voltage
3	4v	4v and up
2	3.8v	4v
1	3.5v	3.8v
Flashing bars	3.3v	3.5v
Automatic shutdown	0	3.3v

SECTION 4: MODES OF OPERATION

1. Start-up Mode

The Handset enters Start-up Mode when the battery pack is charged and the center button of the keypad is pressed. It can also enter Start-up Mode automatically through a Real-Time Clock alarm. In the absence of a charged battery pack, the Handset enters Start-up Mode when an external power source, i.e., a PC or a wall charger is connected to the USB port.

When Start-up Mode is entered, the microcontroller checks the condition of the battery supply to determine if it should proceed to Power-on Mode.

2. Power-on Mode

The Handset is in Power-on Mode when the user is interacting with the Handset and it is running at maximum clock frequency with all the peripherals fully functional. Because this mode consumes the most power, the handset will enter Idle Mode or Power-off Mode as soon as conditions permit.

3. Idle Mode

The Handset enters Idle Mode when the user is inactive for a predetermined amount of time and the USB port is not connected to an external power source, i.e., a PC or a wall charger. In Idle Mode the LCD screen is disabled and the microprocessor runs at minimal clock frequency of 500Hz in order to preserve power.

The handset will not go into idle mode if the handset is in the following state of operation:

- Engaged in a PTT call segment
- Engaged in a Talk Group communication
- Engaged in an external call through the Gateway
- Performing a GPS function
- Performing a registration with the Gateway

In Idle Mode, the RF transceiver remains active as a repeater in order to interchange messages inside the mesh network. If the transceiver receives a message for the Handset, then the Handset transitions to Power-on Mode and the microprocessor resumes running at the higher clock frequency.

4. Power-off Mode

The Handset enters Power off Mode by a controlled power-off sequence or by an uncontrolled power off sequence. Both sequences will cause the main regulator to be disabled as the voltage supply disappears, thus the Handset will remain off.

4.1 Controlled Power off

The WHD-310(V)2 can be powered off by pressing the center button of the keypad for 1 second.

4.2 Uncontrolled Power-off

The Handset is powered off automatically if the battery voltage falls below a predetermined threshold or if the battery is removed from the Handset. The Handset is also powered off when the battery gauge disconnects the battery due to over temperature, over voltage, or under voltage.

Return to the Power-on Mode occurs when an external power source, i.e., a PC or a wall charger is connected to the USB port or a charged battery is inserted.

5. No Supply Mode

The Handset enters this mode if the battery pack is completely depleted and the voltage level falls below the undervoltage threshold.

Return to the Power-on Mode occurs when an external power source, i.e., a PC or a wall charger is connected to the USB port or a charged battery is inserted.

SECTION 5: NETWORK COMMUNICATIONS

1. Overview

The networking technology employed by WZRDnet is based on the IEEE 802.15.4 protocol. Each Wireless Mesh Network (WMN) is defined with a unique WMN Identifier (WMN ID).

2. Mesh Networking

WZRDnet supports mesh routing, allowing data packets to traverse multiple nodes in order to reach the destination node. This allows nodes to be spread out over a large region while still supporting communications among all nodes in the network.

3. Router

A Router must associate with a WMN before it can transmit, receive, or route data. In order to associate with a network the node must be provided the following network information:

- Operating channel
- WMN ID
- Network Key (for encryption only).

A Router assists in routing data and therefore its RF section must remain fully-powered when in idle. Handsets, Repeaters and Gateways are all considered Routers in the Mesh Network.

4. Ad-Hoc Network

WZRDnet is an ad-hoc network that is a comprised of self-configuring handsets. These handsets either form a new network or associate with the nearest available network. This encourages large-scale networks with minimal infrastructure support required.

4.1 Network Formation

A network is formed by selecting an operating channel and WMN ID. Encrypted networks require assigning a network key for nodes to decipher data.

4.1.1 Operating Channel

A WMN can operate on twelve channels from 1 to 12. The channel can be changed directly from the handset in cases of noise or excessive traffic.

4.1.2 WMN ID

The WMN ID is used to uniquely identify a WMN on a specific channel. Multiple WMNs can operate independently on the same channel as long as each is assigned a unique WMN ID.

4.1.3 Network Key

The network key is used to encrypt and decrypt packets on a secure network. The handset must have the correct key in order to decipher packets.

4.2 Associating with a WMN

WZRDnet Handsets include a factory preset WMN ID and operating channel. The operating channel can be changed from the handset and the WMN ID can be changed with the WZRDnet Command Center software. For instructions on changing the Node WMN ID see the WZRDnet Command Center User Manual.

5. Network Addressing

The 802.15.4 protocol specifies a 64-bit MAC address. A Node Identifier String can also be specified as a simple way to route packets to the underlying address.

5.1 64-bit MAC Address

Each node contains a unique IEEE defined 64-bit MAC address. The 64-bit address uniquely identifies a node and is static.

5.2 Node Identifier String (NI)

A node can be assigned a character based Node ID. The Node ID can be used to route messages to a specific node. The Node ID will then be linked to the underlying MAC address for packet transmission. For instructions on changing the NI String see the WZRDnet Command Center User Manual.

6. Broadcast Transmission

Broadcast transmissions are intended to be propagated throughout the entire network such that all nodes receive the transmission. This is useful for emergency alerts or network notifications. Each WHD-310(V)2 comes with the ability to broadcast voice and text messages as a standard feature. The WZRDnet Command Center application allows broadcast text messages.

7. Node Discovery

A node discovery mechanism can be used to discover all nodes that are associated with a network. A node discovery sends a broadcast discovery transmission throughout the network. All handsets that receive the

command will send a response that includes the handset's addressing information, Node Identifier String, and other relevant information.

8. Node Search

The WHD-310(V)2 provides the ability to search for a specific node based on the assigned Node Identifier String.

SECTION 6: WZRDnet COMMUNICATION UTILITIES

1. WZRDtalk™ Voice Communication

WZRDtalk is the voice communication utility of the WHD-310(V)2 which allows users to send and receive voice quickly and seamlessly. Voice messages are played over an integrated speaker or through a Push-To-Talk (PTT) headset for private conversations. Due to speaker volume the WHD-310(V)2 should never be held against a user's head.

1.1 Call Initiation

The call originator selects a destination and initiates a call to that destination by pressing and holding the PTT button. After a call is initiated, an invitation is sent to the destination.

1.2 Call Invitation

The call invitation determines the operating status of the destination. The system then automatically responds whether the user is ready to accept calls or is busy. The destination hears an audible alert when an invitation is received and the user is ready to accept calls.

1.3 Call Establishment

The call originator receives an audible alert if a response to the invitation was received and the destination is ready to accept the call. The response is received approximately 1-3 second after the call was initiated depending on the location of the destination and the status of the routing path. If the user is out of range and no response is received, a message will be displayed informing the user that the call has failed.

1.4 Call Communication

After a call is established the call originator will continue to hold the PTT button and begin talking.

1.5 Call Disconnect

A call disconnect is sent automatically when the user is finished speaking and the PTT button is released.

1.6 Call Reply

The call remains active for 15 seconds after each communication and displays the originator/ destination on the screen. After 15 seconds the call status will become inactive. To reconnect the originator and destination will have to go through the call initiation process. Alternatively it is possible to connect via the Speed Dial feature described below.

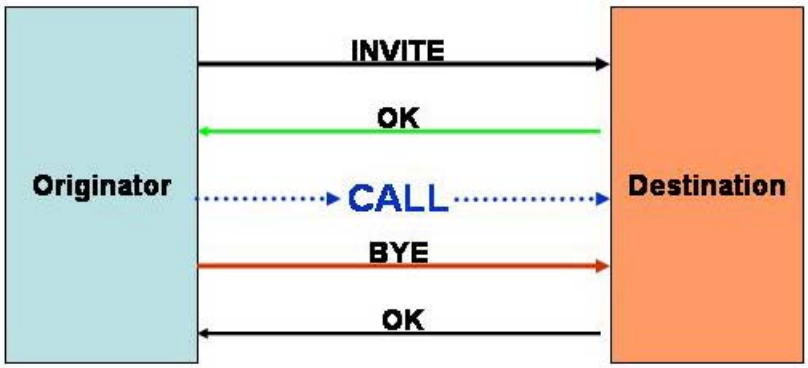

Figure 6.1.1 WZRDtalk Process

2. External Network Dialing

WZRDnet allows handsets to communicate with external Wide Area Networks (WANs) by providing a mechanism to transfer voice or data to the following external networks and utilities:

Public Switched Telephone Network (PSTN)

- Analog voice communication via landline or mobile telephones.

Session Initiation Protocol (SIP) Phone

- A signaling protocol to control voice communication over Internet Protocol (IP). A SIP phone is a hardware-based or software-based SIP user agent, that provides call functions such as dial, answer, reject, hold/ unhold, and call transfer.

Instant Messaging (IM) Client

- An IM client is a service that is based on either of the following real-time communication protocols developed by the Internet Engineering Task Force (IETF):
  - SIMPLE - Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions.
  - XMPP - Extensible Messaging and Presence Protocol (XMPP) which is an open source XML-based protocol.

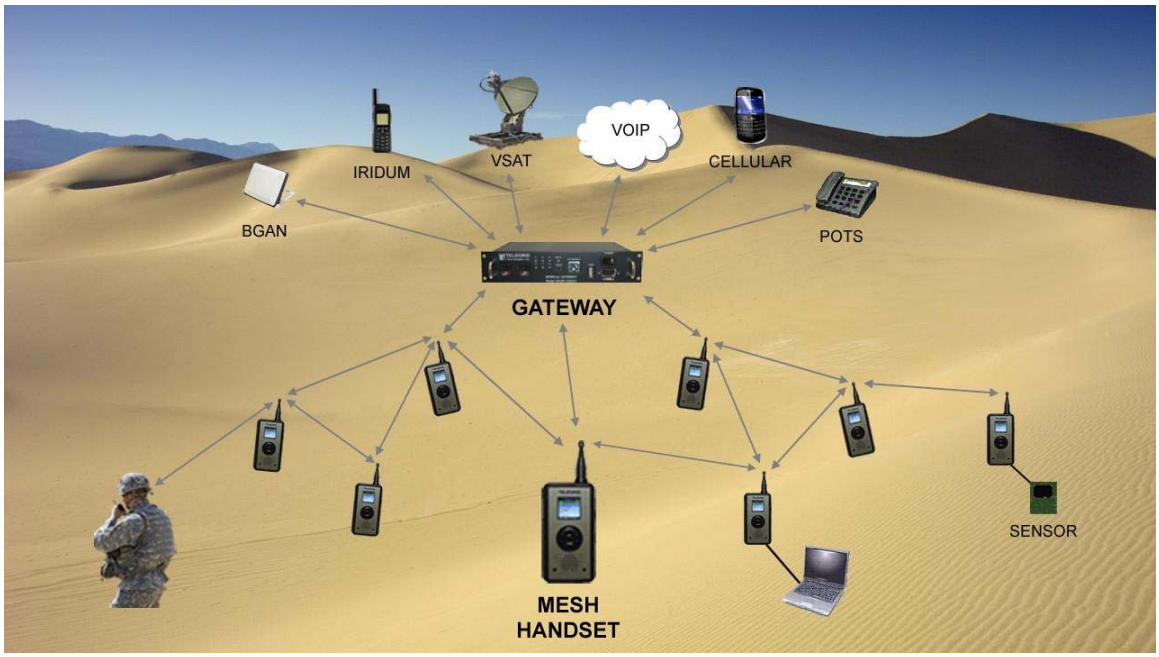

Figure 6.2.1 Sample External Dialing Network Design

2.1 External Dialing Elements

The key WZRDnet element which supports the external dialing feature is the WZRDnet Gateway which consists of a hardware unit and internal supporting software. The WHD-310(V)2 Handset register automatically with the Gateway. The Gateway maintains a constant list of all handsets in the network including their MAC addresses and other identifying information. The key components of the WZRDnet Gateway are described in the following:

2.1.1 WZRDnet Access Point

The WZRDnet Access Point (WAP) can be either embedded in the WZRDnet Gateway or be standalone equipment. It provides a link between the WZRDnet network and the WAN. The WAP is able to transfer packets between the WZRDnet and the WAN via Wi-Fi, Ethernet or Serial transmission. The WAP wraps the WZRDnet packet in the WAN format but does not do any conversion of the underlying packet.

A single WAP can process multiple calls simultaneously. In operation, a WHD-310(V)2 desiring to send a voice segment to a WAN destination will identify the WAP in closest proximity to it. The voice segment, defined as the time between pressing and releasing the PTT button, will be processed through the same WAP. The WAP can change over the course of a “call” but not within a single voice segment.

2.1.2 WZRDgate Software

The WZRDgate Software resides in the WZRDnet Gateway and completes conversion of WZRDnet packets and sends them to a SIP server for processing. The SIP Server can be hosted locally in the WZRDnet Gateway or remotely on a network.

The Gateway also converts inbound messages back into the WZRDnet packet format for transmission to a WHD-310(V)2 Handset. In order to locate a specific handset, each WHD-310(V)2 sends a registration message to the Gateway at a pre-determined interval. The Gateway uses this information to identify the nearest WAP to the WHD-310(V)2. This information is used to route inbound calls to a WHD-310(V)2 and provides the highest chance of a successful connection.

3. WZRDgroup™ Talk Group Communications

WZRDgroup provides communication with multiple users simultaneously. Users can establish “talk groups” without the need of a group administrator. A user can add or remove themselves from a talk group directly from the Handset. This approach allows the group to remain dynamic and eliminates the need for a group administrator to maintain the list of members. An alert will be forwarded to the existing members of the group declaring the arrival or removal of a new member. While this design allows large scale talk groups, call quality deteriorates when talk groups reach more than 5 users. A user can be a member of up to 10 different talk groups.

4. WZRDtext™ Text Messaging

The WZRDtext feature allows handsets to send and receive text messages. The user selects a destination based on the Node Identifier String. The messaging component includes utilities to bolster network communication.

4.1 Acknowledgments

Upon receipt of a new message, the Handset will automatically send an acknowledgement to the sender. The sender will then be able to determine if the message reached its destination.

4.2 Long-Term Message Storage

The Handset will store up to 30 sent messages and 30 received messages. A new message will automatically override the oldest message eliminating the need for message maintenance. The messages can be deleted or replied to at any time.

5. WZRDnet Command Center™ PC Instant Messaging

The WZRDnet Command Center feature employs a USB connection to provide a user-friendly PC interface for Handset configuration, text messaging and network monitoring. WZRDnet Command Center allows uploading of GPS coordinates and modification of node settings. The WZRDnet Command Center application serves as a gateway between WZRDnet Handsets, a local Personal Computer (PC) and the Internet where available.

6. WZRDalert™ Network-Wide Notification

The WZRDalert feature broadcasts a text message to all users on the network for emergency alerts or notifications.

SECTION 7: SECURE COMMUNICATIONS

1. Encryption

The WZRDnet system can be set for secure or non-secure communication. If security is enabled, the network employs 128-bit AES encryption with a Network Key. Only handsets that have the same security key can communicate on the WMN. Routers that associate with a secure WMN must obtain the correct security key.

1.1 Network Key

The Network Key is used to apply 128-bit AES encryption to all network level transmissions.

1.2 Key Update

The Network Key can be upgraded from WZRDnet Command Center software. For instructions on changing the Network Key see the WZRDnet Command Center User Manual.

SECTION 8: GLOBAL POSITIONING SYSTEM (GPS)

1. GPS Locator

The WHD-310(V)2 includes an embedded GPS locator which provides the local GPS latitude and longitude position.

2. GPS Direction

The WHD-310(V)2 calculates an initial bearing based on the GPS coordinates. The direction updates automatically as the user moves.

3. GPS Target

The WHD-310(V)2 calculates the direction and distance to a target based on the GPS coordinates. The direction and distance update automatically as the user moves. The target can be updated manually or received over the air.

4. GPS Clock Sync

The WHD-310(V)2 allows syncing of the time to the GPS clock. GPS time is reported in Greenwich Mean Time (GMT). The user has the ability to maintain a local time offset that will automatically recalculate the time to the local time before syncing.

5. GPS Tracking

The WHD-310(V)2 allows local storage of GPS coordinates along with a description. The coordinates, user description and timestamp can be uploaded to a PC via the WZRDnet Command Center software. These coordinates can then be displayed on a map.

6. GPS Mapping

A file of captured GPS coordinates can be uploaded to a PC for visual display on a map. The file of GPS coordinates will be stored in a comma delimited format (.csv) file for upload into any internet GPS mapping software.

SECTION 9: OPERATING INSTRUCTIONS

1. Network Association

1.1 Change Channel

If a channel becomes crowded it is possible for a handset to switch to a new channel. Perform the following steps:

Main Menu → Network → Change Channel

Select a new channel from the operating channel list. The operating channel list displays twelve channels. The channel options start at the current channel setting.

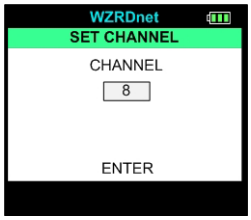

Figure 9.1.1 WHD-310(V)2 Change Channel Screen

1.2 Assigning Node Identifier Strings

Each WHD-310(V)2 Handset comes with a factory set Node Identifier String. The network administrator can change the Node Identifier String with the WZRDnet Command Center software. For instructions on changing the Node Identifier String see the WZRDnet Command Center User Manual.

2. Getting Started

2.1 Buttons and Connectors

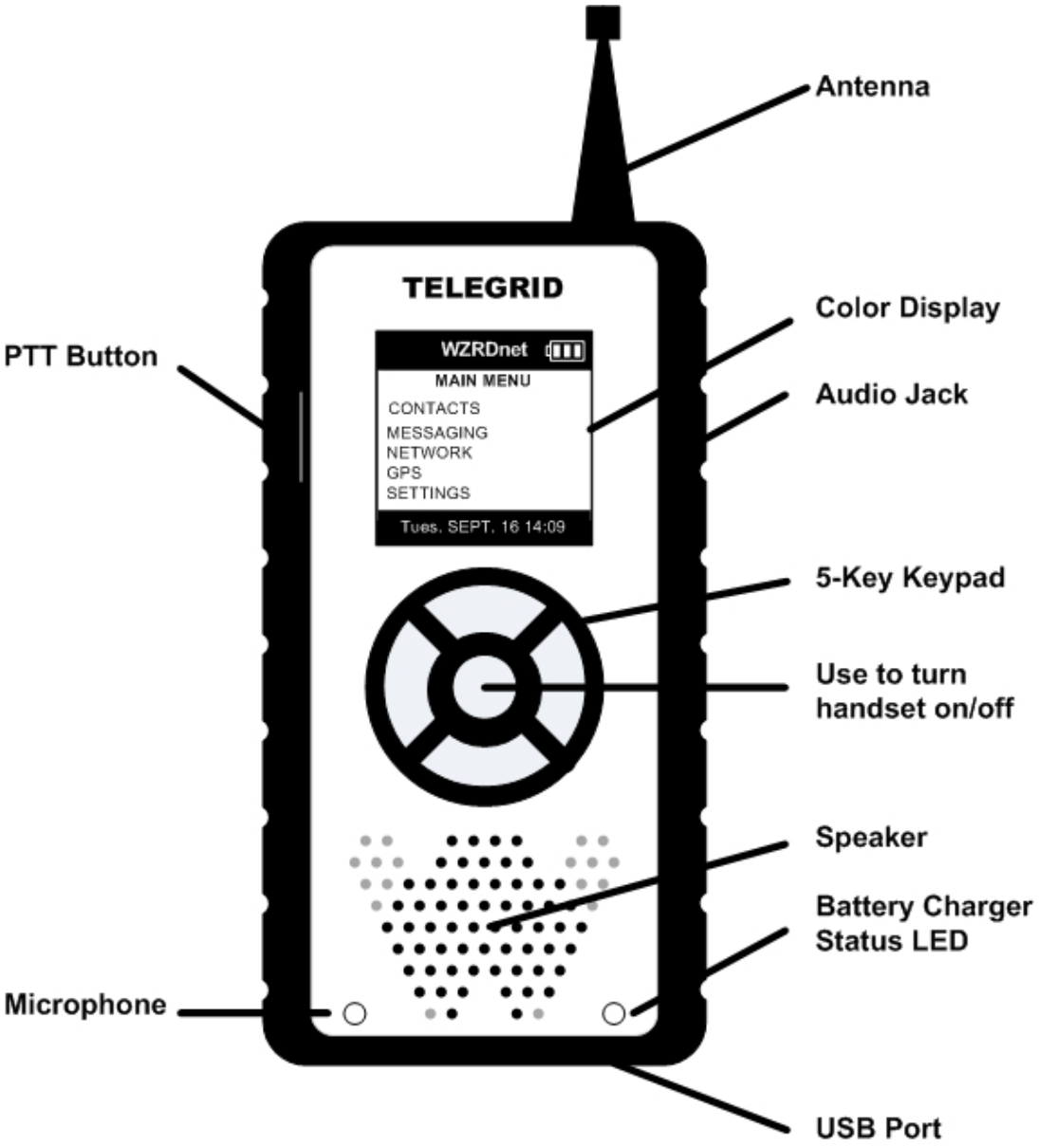

Figure 9.2.1

2.2 Battery Voltage Indicator

The battery voltage indicator is located in the upper right hand corner of the screen. The number of bars signifies the amount of voltage in the battery with three bars indicating full voltage. Low voltage will result in zero bars and the battery voltage indicator flashing. The handset will power off when the voltage drops below the minimum required threshold.

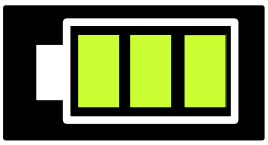

Figure 9.2.2

2.3 Charging the Battery

Charging the battery can be performed by PC or AC wall adapter. Handset operation is permitted while charging. The battery indicator will cycle through the bars to indicate charging is in progress. Use only approved chargers with the WHD-310(V)2.

2.3.1 USB Charging

1. Attach the mini-USB to USB cable to the mini-USB port on the bottom of the Handset.
2. Attach the USB cable to the USB port of a PC.

2.3.2 AC Wall Adapter Charging

1. Attach the AC wall adapter to the mini-USB port on the bottom of the Handset.
2. Attach the AC wall adapter to a wall outlet.

2.4 Turning ON/OFF

To turn the handset on and off simply press and hold the center button shown below.

2.5 Navigation Tool

The WHD-310(V)2 is a menu driven handset. A 5-button lighted navigation tool is used to maneuver through the provided menus. The navigation tool includes an up button, down button, left button, right button and center button as shown below:

Figure 9.2.3

In most instances the left button can be used to go back to the previous menu.

2.6 IDLE mode

To save power the Handset will automatically go into Idle Mode as described above. Press any button to deactivate Idle Mode and return to the last screen.

3. Using the Menu

The Handset features are grouped in a series of menus with each handset's Node Identifier String located at the top of the screen. The main menu is shown below:

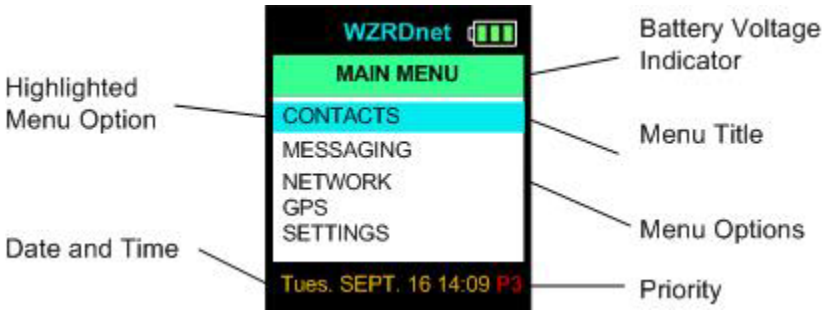

Figure 9.3.1

3.1 Scrolling

To access available menu items simply scroll using the up and down buttons. The left button will return to the previous menu.

3.2 List of Menu Functions

- **MAIN MENU**
  - Contacts
    - Contact List
    - Add Contact
    - Add Group
  - Messaging
    - New Message
    - Inbox (# in Inbox)
    - Outbox (# in Outbox)
  - Network
    - Network Info
    - Find Network
    - Node Search
    - Change Channel
  - GPS
    - Position

        - Direction
        - Target
            - View Target
            - Set Target
                - Manual
                - GPS
            - Send Target
                - Manual
                - GPS
            - Current Target
        - Save Position
        - Upload
    - Settings
        - Clock Settings
            - Set Date & Time
            - Sync to GPS
            - Local Offset
        - Sound Control
        - Brightness
        - Factory Reset
- **MESSAGE DETAILS**
    - Reply
    - Delete
    - Main Menu
- **TARGET MESSAGE DETAILS**
    - Accept
    - Decline
    - Main Menu
- **NODE LIST**
    - Send Txt Msg
    - Add Contact
    - Main Menu
- **CONTACT LIST**
    - Send Txt Msg
    - Remove Contact
    - Main Menu

4. Menu Functions

4.1 User Settings

User settings can be accessed by performing the following steps:

Main Menu → Settings

Figure 9.4.1

4.1.1 Clock Settings

4.1.1.1 Set Date & Time

The Handset contains a real-time clock to maintain the correct date and time even when the Handset is off or the battery is depleted. The real time clock uses a back-up battery in absence of the main battery supply. The date and time are displayed on the main menu screen. The user can set the clock manually by performing the following steps:

Main Menu → Settings → Clock Settings → Set Date and Time

Figure 9.4.2

Use the up button to move through the numbers. Use the right button to go to the next section. Press the center button to store the new date and time settings.

4.1.1.2 Sync to GPS Clock

Sync the time to the GPS clock by performing the following steps:

Main Menu → Settings → Clock Settings →Sync to GPS

4.1.1.3 Local Offset

GPS time is transmitted in Greenwich Mean Time (GMT). The user can create a local time offset by performing the following steps:

Main Menu → Settings → Clock Settings →Local Offset

4.1.2 Sound Control

The Handset contains a volume control feature that the user can set from the interface by performing the following steps:

Main Menu → Settings → Sound Control

Figure 9.4.3

The current volume is displayed on the bottom of the screen. Use the up and down button to adjust the volume. Press the center button to save the volume setting.

4.1.3 Brightness

Adjusts the brightness of the screen.

4.1.4 Factory Reset

A factory reset option is available from the menu screen. It can be accessed by performing the following steps:

Main Menu → Settings →Factory Reset

By selecting Factory Reset the following will occur:

- Erase Contacts
- Erase Inbox
- Erase Outbox
- Reset Volume Setting
- Erase saved GPS Coordinates
- Reset Local Time Offset

4.2 Network Management

The network management tools can be accessed by performing the following steps:

Main Menu → Network

Figure 9.4.4

4.2.1 Network Info

The Network Info screen displays the handsets network information including the following:

- Node Identifier String
- 64 bit IEEE MAC Address
- Channel
- 16 bit WMN ID

4.2.2 Find Network

The WHD-310(V)2 is capable of sending out a node discovery request to update the list of available nodes. The number of node responding will be displayed in real time. Upon completion of the node search the screen will display a list of nodes found.

When all available nodes have been found the node list will be displayed. To add a node to the contact list scroll through the list and highlight the desired node. Press the center button and select Add Contact from the pop-up menu. The pop-up menu features the following options:

- Send a text message
- Add to contacts
- Return to Main menu.

After adding a contact, press the left button to return to the node list. To begin a call with a node in the node list, highlight the

desired node using the up and down buttons and press the PTT button.

4.2.3 Node Search

The Node Search function allows the user to search for a specific node based on the Node Identifier String. The system will display a virtual keyboard to enter the ID. The system will check locally for the node using a node discovery request. If the node is not found, the Handset will then query the network externally via the Gateway. The system will then display if the node was found. If the node was found the system will provide the following pop-up menu featuring the following options:

- Send a text message
- Add to contacts
- Return to Main menu.

To begin a call with the node, press the PTT button.

4.2.4 Change Channel

If a channel becomes crowded it is possible for a handset to switch to a new channel. Perform the following steps:

Main Menu → Network → Change Channel

Select a new channel from the operating channel list. The operating channel list displays twelve channels.

4.3 Contacts

The user can maintain a list of personal contacts in the Handset. The contacts are a subset of the network node list. The contacts can be accessed by performing the following steps:

Main Menu → Contacts

Figure 9.4.5

4.3.1 Contact List

An alphabetical list of contacts can be accessed by performing the following steps:

Main Menu → Contacts → Contact List

4.3.2 Adding Contacts

Nodes can be added to the contact list directly from the node list by performing either of the following steps:

Main Menu → Contacts → Add Contact
Main Menu → Network → Find Network

A node discovery will be performed and the user can add a contact per the instructions above. Pressing the left button will return the user to the node list.

4.3.3 Navigation

The user can scroll through the list using the up and down buttons. Pressing the center button will allow the user to create a text message. Pressing the PTT button will send a call invitation.

4.3.4 Removing Contacts

Contacts can be removed from the list by performing the following steps:

Main Menu → Contacts → Contact List

Highlight the contact the desired contact and press the center button. Select Remove Contact from the pop-up menu and press the center button.

5. WZRDtalk

5.1 Call Initiation

5.1.1 WHD-310(V)2 to WHD-310(V)2

A call begins by selecting a node from the contact list or the node list by performing the following steps:

Main Menu → Contacts
or
Main Menu → Network → Find Network.

Highlight the desired recipient and simply **press and hold** the PTT button on the side of the Handset. The selected recipient's Node Identifier String will appear on the screen in **RED**.

5.1.2 External Network Calling

5.1.2.1 Dial-Pad

The Handset includes an external call feature for Wide Area Network access. The user can access the numeric keypad by performing the following steps:

Main Menu → Contacts → External Dial

Figure 9.5.1

Upon selecting the external call option a numeric dial pad will appear on the LCD screen. Enter a phone number manually using the 5-button navigation tool. After the number has been entered simply press and hold the PTT button on the side of the handset. The entered phone number will appear in **RED** on the screen.

The number should be entered area code first without a "1". The "1" will be inserted by the Gateway.

5.1.2.2 Contact List

External phone numbers can be stored in the contact list for later use. To add an External Network contact, enter the number and select SAVE from the dial pad. An alphanumeric keypad will appear to enter a contact description. The name will appear in **BLACK** in the contact list in order to distinguish it from WZRDnet contacts.

5.2 Call Invitation

After a call is initiated an invitation is sent to the recipient to check their status and alert them to the inbound call. If available the recipient will see the following:

- The caller's ID will appear in **RED** and then **BLUE** on the LCD
- A single audible beep will be sounded.

5.3 Call Establishment

The Handset will make two attempts to connect to the recipient within the local network. If the Handset is unavailable locally it will try to contact to a remote WZRDnet network through the WZRDnet Gateway. If the recipient is available the following will occur:

- The recipient's ID will turn to **BLUE** on the LCD
- A double audible beep will be sounded.

The caller can then begin speaking.

5.4 Call Termination

A call is terminated by releasing the PTT button. Upon termination the caller's LCD will display the recipient's IDs in **BLACK** and the recipient's LCD will display the caller's IDs in **BLACK.**

If no call activity occurs within 15 seconds the system will return to the main menu.

5.5 Speed Dial

WZRDtalk provides a quick mechanism to redial the last caller. The system retains the address information of the most recent caller/ recipient.

This address can be called by simply pressing and holding the PTT button. The most recent caller/ recipient is also retained through a power cycle.

5.6 Preemption

The WZRDnet network allows pre-emption of ongoing calls based on handset priority. The system supports the following 5 levels of priority:

1. Flash Override
2. Flash
3. Immediate
4. Priority
5. No Priority

Broadcast calls pre-empt all ongoing peer-to-peer or group calls. If a broadcast call is in progress and another user initiates a broadcast call then the handset priority will be used to determine who will pre-empt the call.

6. Broadcast

The user can establish a broadcast call to all nodes on the network by selecting the **BROADCAST** contact from the contact list. The **BROADCAST** contact will always appear below the external dial contact.

7. WZRDgroup

7.1 Group Establishment

Talk Groups are defined and established by individual users in the network. Users will define a name for the new group and add it to their Handsets. Users can be added or removed as often as necessary. An alert will be forwarded to the existing members of the group declaring the arrival of a new member or the removal of a member.

7.2 Group Maintenance

Talk groups are maintained in the Handset and do not require a third party group administrator. The user is allowed to add, remove and view talk groups from the Handset.

7.2.1 Group List Display

Talk Groups are displayed in red and uppercase in the Contact List.

7.2.2 Add Group

To add a group perform the following steps:

Main Menu → Contacts → Add Group

A virtual keyboard will be displayed to enter the new talk group name. When the new name is entered press the save button. A message indicating that the new group was added will be displayed. A message will then be forwarded to the existing members of the group declaring the new member.

7.2.3 Remove Group

A member can remove themselves from the group by selecting the Talk Group from the contact list. A sub-menu will pop-up and the user will select remove. A message indicating the group was removed will be displayed. A message will then be forwarded to the existing members of the group declaring the member has been removed.

7.3 Call Establishment

Talk group calls are initiated in an identical fashion to unicast calls. The group is highlighted in the Contact List and the PTT button is pressed.

The speed dial feature will maintain a talk group if it was the most recent caller/ recipient.

7.4 Call Display

Talk Group calls alert the user in the same mechanism as unicast calls. The user will see the name of the node who is speaking as well as the name of the Talk Group. The name of the Talk Group will appear in red above the name of the node who is speaking. Pressing the PTT button will call back the entire group not the last node speaking.

8. WZRDtext

8.1 Message Creation

A new text message can be created by performing the following steps:

Main Menu → Contacts.
Main Menu → Find Network
Main Menu → Messaging → New Message.

Highlight the desired node and press the center button. Select **NEW TXT MSG** from the pop-up menu and a virtual keyboard will be displayed.

8.1.1 Virtual Keyboard

WZRDtext contains an on-screen QWERTY keyboard. The keys can be maneuvered using the up, down, left and right button buttons. When the desired key is highlighted, press the center button and it will be added to the message.

Figure 9.7.1

8.2 Message Received Status

The destination will send an ACK to confirm the message has been received. The Outbox will display messages in **RED** that were not received while messages displayed in **GREEN** were received. Talk Group messages will always display in **GREEN** due to the amount of network traffic caused by the large number of acknowledgements.

8.3 Incoming Message Alert

Upon receipt of the message the following will occur:

- A new message pop-up will appear on the display
- A single audible beep will be sounded.

8.4 Reading a Message

When a message is received, the full message details will be displayed by pressing the center button. Press the left button to remove the pop-up and return to the prior screen.

8.4.1 Message Details

The message contains the following details:

- Senders Node ID – Talk Group ID (if applicable)
- Full Message Text
- Local Received Timestamp

8.4.2 Message Options

Press the center button to display the following options:

- Main Menu
- Reply
- Delete

8.5 Replying to a Message

By selecting reply the virtual keyboard will be displayed with the recipient's Node Identifier String displayed at the top.

8.6 Deleting a Message

By selecting delete the message is removed from the system.

8.7 Message Archive

The Handset will maintain the 30 most recently received messages and 30 most recently sent messages. All messages will be automatically saved until they are deleted by the user or replaced by newer messages.

To view received messages perform the following steps:

Main Menu → Messaging → Inbox (# of messages)

To view sent messages perform the following steps:

Main Menu → Messaging → Outbox (# of messages)

Figure 9.7.2

Scroll through the list of messages using the up and down buttons. To see the full message screen highlight a message and press the center button.

9. GPS

The Handset contains a GPS receiver to allow viewing and saving coordinates. The GPS menu can be accessed by performing the following steps:

Main Menu → GPS

Figure 9.10.1

9.1 Position

The user can track their GPS location by performing the following steps:

Main Menu → GPS → Position

The screen will display **Searching for Signal** followed by the Handset's latitude and longitude in decimal degrees as shown below. The GPS may take several minutes to obtain a signal if started in a cold state. Once the GPS coordinates are established the location will continue to update until the users hits the keypad's left arrow to return to the GPS menu.

If the mini-USB to USB cable is attached to a PC, the full GPS NMEA data sentences will be sent to the PC. This allows mapping of GPS coordinates on the PC to support situational awareness.

9.2 Direction

The user can view their initial bearing by performing the following steps:

Main Menu → GPS → Direction

The screen displays a virtual compass with the current direction in degrees at the top of the screen. The bearing is calculated from real-time GPS coordinates and updated automatically with any change in position. A sample of the direction screen is below:

Figure 9.10.3

9.3 Target

The handset supports situational awareness by allowing the user to find a specific target or destination using a compass-like image. The target's GPS coordinates can be stored in the handset by the user or sent as a message from other users. The user can access the target functions by performing the following steps:

Main Menu → GPS → Target

9.3.1 View Target

The user can view the current saved target by performing the following steps:

Main Menu → GPS → Target → View Target

A virtual compass will be displayed showing the current bearing. A red dot will appear on the compass to indicate the location of the target in regards to the user's current heading. The distance to the target will appear in the lower right hand corner of the screen. The screen will continue to update as the user's position changes.

Figure 9.10.4

9.3.2 Set Target

The user can set the target manually or use current GPS coordinates. The user can set the target by performing the following steps:

Main Menu → GPS → Target → Set Target

9.3.2.1 Manual

The user can manually set the target by performing the following steps:

Main Menu → GPS → Target → Set Target → Manual

A virtual keyboard will be displayed to enter the latitude.

Latitude must be entered in decimal degrees with the cardinal point (N or S) at the end. Hit **SAVE** to save the latitude.

After entering the latitude another keyboard will be displayed to enter the longitude.

Longitude must be entered in decimal degrees with the cardinal point (E or W) at the end. Hit **SAVE** to save the longitude and complete entering the target.

9.3.2.2 GPS

The user can set the target to the current position by performing the following steps:

Main Menu → GPS → Target → Set Target → GPS

The GPS coordinates will be saved locally and a screen will be displayed indicating the target has been saved.

9.3.3 Send Target

The user can send the target by performing the following steps:

Main Menu → GPS → Target → Send Target

The user can set the target manually or use the current GPS coordinates and broadcast it to all members of the network

automatically. The recipients will receive a new message indication with the name of the sender and the coordinates that have been sent. The recipient can choose to accept or decline the new target coordinates. The target message will be stored in the recipient's inbox.

9.3.3.1 Manual

The user can manually set the target by performing the following steps:
Main Menu → GPS → Target → Send Target → Manual

A virtual keyboard will be displayed to enter the latitude.

Latitude must be entered in decimal degrees with the cardinal point (N or S) at the end. Hit **SAVE** to save the latitude.

After entering the latitude another keyboard will be displayed to enter the longitude.

Longitude must be entered in decimal degrees with the cardinal point (E or W) at the end. Hit **SEND** to save the longitude and broadcast it to all users on the network.

9.3.3.2 GPS

The GPS coordinates will be saved locally and automatically broadcast to all users on the network. A screen will be

displayed indicating the target has been saved and sent to all users.

9.3.4 Current Target

To view the current target coordinates perform the following steps:

Main Menu → GPS →Target →Current Target

The screen displays the latitude and longitude coordinates of the currently saved target in decimal degrees. Target coordinates are saved through power cycles.

9.4 Save Position

To save a location with a description perform the following steps:

Main Menu → GPS →Save Position

Enter a description using the keypad and the location will then be saved in the system for future upload.

9.5 Upload GPS Coordinates

In order to upload saved GPS coordinates perform the following steps:

1) Connect the Handset to a PC via mini-USB to USB cable.
2) Open WZRDnet Command Center application
3) On the Handset go to **Main Menu → GPS →Upload**
4) GPS data will be stored in the user specified directory for all GPS uploads. To specify the directory see the WZRDnet Command Center User Manual.
5) The display will notify the user when the upload is complete.

SECTION 10: TROUBLESHOOTING

1. Factory Reset

If you begin to experience any odd behavior a factory reset option is available from the menu screen. It can be accessed by performing the following steps:

Main Menu → Settings →Factory Reset

By selecting Factory Reset the following will occur:

- Erase Contacts
- Erase Inbox
- Erase Outbox
- Reset Volume Setting
- Erase saved GPS Coordinates
- Reset Local Time Offset

SECTION 11: PRODUCT AND SAFETY INFORMATION

1. WHD-310(V)2 Safety Instructions

Do not disassemble, crush, open, bend, deform, microwave or puncture Handset.
Avoid dropping Handset.
Avoid excessive pressure on Handset.
Do not expose to extreme temperatures, liquid, moisture, or high humidity.
Handset contains small parts which may present a choking hazard.
Keep metal objects away from connectors and battery terminals.
Do not expose to open flames.
Do not dispose of Handset in fire or water.
Recycle or dispose of Handset according to local regulations.
Do not use harsh chemicals, aerosol cleaners or solvents to clean the Handset
Avoid dramatic shifts in temp as will cause moisture. Allow sufficient time for moisture to evaporate before using the Handset.
Avoid pushing objects into the Handset as this action might cause a short circuit, a fire, or electric shock. Never force a connector into a port.
Do not disassemble Handset or accessories.
Do not repair or service the Handset yourself.
Turn your Handset OFF where posted notices so require.
Failure to observe all safety instructions will void Warranty.

1.1 Battery Information

The WHD-310(V)2 contains rechargeable Lithium Ion batteries. Lithium Ion batteries pose a risk of fire, explosion, leakage, or other hazard. Replace only with approved batteries. Recycle or dispose of used batteries according to local regulations.

Use only approved batteries and chargers. Use of an unapproved battery or charger may present a risk of fire, explosion, leakage, or other hazard.
Do not disassemble, crush, open, bend, deform, microwave or puncture battery.
Avoid dropping battery.

Keep metal objects away from battery terminals.
Do not expose battery to extreme temperatures, fire, direct sunlight, liquid, moisture, or high humidity.
Do not use batteries that appear damaged, deformed, discolored, rust or emits foul odor.
In the event the battery leaks and the fluid gets into one's eye, do not rub the eye. Rinse well with water and immediately seek medical care. If left untreated, the battery fluid could cause damage to the eye.
Do not use charger if the power cord or plug has become frayed or damaged; The charger is exposed to rain, liquid, or excessive moisture; The charger has become damaged.

1.2 Antenna

Use only approved replacement antennas. Unauthorized antennas or modifications could damage your Handset or result in a violation of FCC regulations.
Do not use any Handset that has a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

1.3 Health and General Use

Loud speaker can cause hearing loss. Keep Handset away from head and set volume to a safe level. When using the earpiece set volume to a safe level. Use of earpiece at high volume can lead to hearing loss.

Avoid repetitive motion and take frequent breaks when using the Handset.

Avoid use on Aircraft. RF Interference might disrupt instrumentation, communication and performance; Might disrupt the network; Might be illegal. Turn your Handset OFF before boarding an aircraft. Always request and obtain prior consent and approval of an authorized airline representative before using your Handset aboard an aircraft. Always follow the instructions of the airline representative whenever using your Handset aboard an aircraft, to prevent any possible interference with airborne electronic equipment

Do not place the Handset in the area over an air bag or in the air bag deployment area. Air bags inflate with great force. If a Handset is placed in the air bag deployment area and the air bag inflates, the Handset may be propelled with great force and cause serious injury to occupants of the vehicle.

Do not use in explosive atmosphere in presence of explosive fumes, explosive dust, or other explosive chemicals. Sparks could cause fire or explosion resulting in serious injury or death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fueling areas such as gasoline or petrol stations; below deck on boats; fuel or chemical transfer or storage facilities; vehicles using liquefied petroleum gas (such as propane or butane); areas where the air contains chemicals or particles, such as grain, dust, or metal powders; and any other area where you would normally be advised to turn off your vehicle engine.

Blasting areas: To avoid interfering with blasting operations, turn off all wireless connections on the Handset when in a “blasting area” or in areas posted: “Turn off two-way radio”. Obey all signs and instructions.

Use of Handset when driving, riding or walking is not recommended and is illegal in some areas. Comply with local laws and regulations regarding use of wireless Handsets when driving, riding or walking.

Pacemakers: The Advanced Medical Technology Association (AdvaMed) recommends that a minimum separation of 6 inches (15 centimeters) be maintained between a handheld wireless Handset and a pacemaker.
These recommendations are consistent with those of the U.S. Food and Drug Administration.
Persons with pacemakers should:

- ALWAYS keep the Handset more than 6 inches (15 centimeters) from their pacemaker when the Handset is turned ON.
- Not carry the Handset in the breast pocket.
- Use the ear opposite the pacemaker to minimize the potential for interference.
- Turn the Handset OFF immediately if you have any reason to suspect that interference is taking place.

Hearing Aids: Some digital wireless radios may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

This Handset may cause RF Interference with other personal medical equipment. Consult manufacturer of medical Handset to determine if it is adequately shielded

Do not rely on this phone during emergencies. All wireless Handsets operate using radio signals which cannot guarantee a connection at all times due to network availability or environmental interference.

SECTION 12: CERTIFICATIONS

1. Certifications

FCC ID: XAYWHD310V2
IC ID: 9251A-WHD310V2

1.1 FCC Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications not expressly approved by TELEGRID Technologies, Inc. could void the user's authority to operate the equipment.

1.2 Industry Canada (IC)

This device complies with the Class B limits for radio noise emissions as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICE-003 of Industry Canada. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada. This Category II radiocommunication device complies with Industry Canada Standard RSS-310. Ce dispositif de radiocommunication de catégorie II respecte la norme CNR-310 d'Industrie Canada. This device complies with RSS 210 of Industry Canada under certification number 9251A-WHD310V2.

SECTION 13: LEGAL NOTICES

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUTARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

1. Copyright

2. Software Licensing Agreement

By clicking on the “Accept” button, opening the package, downloading the product, or using the equipment that contains this product, you are consenting to be bound by this Agreement.

TELEGRID shall grant Customer a limited, non-exclusive subscription to use the TELEGRID software (“Software”), per the terms set forth below.

The Agreement shall entitle Customer to use the Software with the hardware communication devices purchased from TELEGRID (“Hardware”) to facilitate communications between the Hardware. The Customer is also entitled to use the Software with other equipment to provide a communication interface between the Hardware and other equipment, provided however, that Customer may not modify the Software in any manner. Customer may not re-sell, lease, license or distribute the Software by themselves or as part of any collection, product or service. Customer may not copy, in whole or in part, Software or documentation; modify the Software; reverse compile, reverse engineer or reverse assemble all or any portion of the Software.

Software maintenance includes the publishing of bug/defect fixes via patches and updates/upgrades in function and technology to maintain the operability and usability of the Software. It may also include other support such as user blogs, discussion forums, on-line help libraries and FAQs (Frequently Asked Questions), hosted chat rooms, and limited telephone, email and/or web-based general technical support for user’s self

diagnostics. This software maintenance is not included with the Software and is available for an extra fee.

Software integration includes the creation, design, implementation, etc. of the Software. This software integration is not included with the Software and is available for an extra fee.

This Agreement will continue in perpetuity until terminated by either Party upon 90 days prior written notice, unless otherwise stated. If the Customer does not meet its obligations as set forth in this Agreement then TELEGRID shall have the immediate right to terminate this Agreement. In addition, this Agreement may be terminated by TELEGRID without notice based on any breach of the provisions of the hardware agreements for the equipment supplied by TELEGRID. Customer's obligation to pay all charges that have accrued will survive any termination of this Agreement.

All materials whether provided physically, electronically (on-line or on a tangible media), including, but not limited to set-up guides, operating manuals, and help manuals furnished by TELEGRID to the Customer ("Materials") are licensed (not sold). Customer is granted a personal, non-transferable, and nonexclusive subscription to use Materials solely for Customer's own internal business use. Customer does not have the right to copy, distribute, reproduce, alter, display, or use these Materials or any TELEGRID trademarks for any other purpose except as it relates to internal communication. Customer agrees that (a) it will keep Materials confidential and will use commercially reasonable efforts to prevent and protect the content of Materials from unauthorized use and (b) its subscription to use Materials ends on the termination date of this Agreement. Upon termination, Customer agrees to destroy materials and provide documentation certifying destruction of said materials.

Customer agrees that aspects of the licensed materials, including the specific design and structure of individual programs, constitute trade secrets and/or copyrighted material of TELEGRID. Customer agrees not to disclose, provide, or otherwise make available such trade secrets or copyrighted material in any form to any third party without the prior written consent of TELEGRID. Customer agrees to implement reasonable security measures to protect such trade secrets and copyrighted material. Title to Software and documentation shall remain solely with TELEGRID.

Software, including technical data, is subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Customer agrees to comply strictly with all such regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import Software.

TELEGRID's Software is provided to the Government with RESTRICTED RIGHTS and its supporting documentation is provided with LIMITED RIGHTS. Use, duplication, or disclosure by the Government is subject to the restrictions set forth in the FAR 52.227-19. The Software and its supporting documentation were developed at private expense and its use, duplication, or disclosure by the United States Government is subject to restrictions as set forth in DFARS 252.227-7013, DFARS 252.227-7014, or DFARS 252.227-7015.

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, THE MAXIMUM TOTAL LIABILITY OF TELEGRID TO CUSTOMER SHALL NOT EXCEED THE TOTAL AMOUNT PAID BY CUSTOMER FOR THE DEFECTIVE SOFTWARE CAUSING THE DAMAGE DURING THE 12 MONTHS IMMEDIATELY PRECEDING THE LOSS. THIS REMEDY IS CUSTOMER'S SOLE AND EXCLUSIVE REMEDY. TELEGRID SHALL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES EVEN IF TELEGRID HAS KNOWLEDGE OF THE POSSIBILITY OF SUCH POTENTIAL LOSS OR DAMAGE.

This Agreement and the Parties rights and obligations shall be governed and construed pursuant to the laws of the State of New Jersey; (b) Any lawsuit concerning this contract shall be brought in a court of competent jurisdiction in Essex County, New Jersey; (c) Customer consents to be subject to the jurisdiction of the state or federal courts located in Essex County, New Jersey; (d) Customer may not assign this Agreement except with TELEGRID's prior written approval; (e) No action under this Agreement may be brought by either party more than one year after the cause of action has occurred.

If any provision of this Agreement or any construction or application of any provision of this Agreement is held to be unenforceable or invalid for any reason, then the validity of all the remaining provisions shall not be affected and the validity of any remaining construction or application of the provision shall not be affected, and the rights or obligations of each of the parties hereto shall be construed and enforced as if the Agreement did not contain such invalid provision or, as the case may be, invalid construction or application of such provision; provided, however, that such resulting construction and enforcement shall be generally consistent with the basic purpose of this Agreement. For this purpose, "provision" refers to any word, phrase, dollar amount, part, term or other portion of this Agreement.

THE EXPRESS WARRANTIES SPECIFIED IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF

MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TELEGRID DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES.

EXCEPT AS PROVIDED OTHERWISE IN THIS AGREEMENT, TELEGRID PROVIDES THIS SOFTWARE ON AN "AS IS" BASIS WITHOUT FURTHER WARRANTIES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF TITLE OR IMPLIED WARRANTIES OF MERCHANTABILITY, OTHER THAN THOSE WARRANTIES WHICH ARE IMPLIED BY AND INCAPABLE OF EXCLUSION, RESTRICTION OR MODIFICATION UNDER THE LAWS APPLICABLE TO THIS AGREEMENT.

Third Party Software: TELEGRID Technologies, Inc. products may include copyrighted third-party software stored in semiconductor memories or other media. Laws in the United States and other countries preserve for third-party software providers certain exclusive rights for copyrighted software, such as the exclusive rights to distribute or reproduce the copyrighted software. Accordingly, any copyrighted third-party software contained in TELEGRID Technologies, Inc. products may not be modified, reverse-engineered, distributed, or reproduced in any manner to the extent allowed by law. Furthermore, the purchase of TELEGRID Technologies, Inc. products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents, or patent applications of any third-party software provider, except for the normal, non-exclusive license to use that arises by operation of law in the sale of a product. The software included in this product may contain copyrighted software that is licensed under the GPL. For more information and to obtain possible Corresponding Source code from us for a period of three years after our last delivery of this product email GPL@telegrid.com.

3. Limited Warranty

TELEGRID TECHNOLOGIES, INC. (“TELEGRID”) warrants to the Customer that the equipment to be delivered hereunder will be free from defects in material and in workmanship for a period of one year (“Warranty Period”) from the date of delivery by TELEGRID unless extended at the time of purchase as evidenced by adequate documentation.

The Customer must notify TELEGRID within 30 days of any claimed defect. Any equipment which becomes defective due to material or workmanship during the Warranty Period will be promptly repaired or replaced by TELEGRID at its option using either new or like new equipment.

TELEGRID warrants the items repaired or replaced under this clause will be free from defects in material and workmanship for ninety (90) days from date of delivery by TELEGRID, or the balance of the Warranty Period for the equipment, whichever is longer. Equipment found not to be defective will be

returned to the Customer, freight charges collect, and charges will be forwarded to the Customer for inspection and test time. Transportation charges for equipment found to be defective within the Warranty Period will be paid by TELEGRID to and from the original point of acceptance. TELEGRID's liability to the Customer shall not in any case exceed the cost of correcting defects in the equipment as provided herein or the price paid to TELEGRID by the Customer, whichever is less.

TELEGRID will not warrant any equipment if, during the Warranty Period the Customer: (a) fails to follow applicable operation, maintenance, or environmental requirements described in any of the manuals and other materials provided to the Customer, including without limitation product bulletins; (b) makes additions to, alters, modifies, enhances, repairs or disassembles the equipment (itself or using a third party) without TELEGRID's written consent; (c) mishandles, abuses, misuses or damages the equipment (either itself or by others doing so).

TELEGRID will not warrant any equipment damaged due to fire, explosion, power irregularities, power surges, Acts of God (including, without limitation, earthquakes, rains, floods or lightning), or any other cause not attributable to TELEGRID.

Upon expiration of the Warranty Period, all warranty liability shall terminate. The foregoing shall constitute the sole remedy of the Customer and the sole liability of TELEGRID and shall be in lieu of any other Warranty, implied, statutory, or otherwise, including the Warranty of Merchantability. TELEGRID SHALL NOT BE LIABLE FOR INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.

4. Jurisdiction

This Customer's rights and obligations shall be governed and construed pursuant to the laws of the State of New Jersey; (b) Any lawsuit concerning this product shall be brought in a court of competent jurisdiction in Essex County, New Jersey; (c) Customer consents to be subject to the jurisdiction of the state or federal courts located in Essex County, New Jersey; (d) Customer may not assign this Agreement except with TELEGRID's prior written approval; (e) No action may be brought by the Customer more than one year after the cause of action has occurred.