



# Tactical Node Radio Integration

Document Version 1.0

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## Table of Contents

|                         |    |
|-------------------------|----|
| Preface                 | 4  |
| Purpose                 | 4  |
| Intended Audience       | 4  |
| Requirements            | 4  |
| Your Comments           | 4  |
| Revision History        | 4  |
| Accessing Online        | 5  |
| Terminology             | 5  |
| Overview                | 6  |
| System Components       | 6  |
| Integration Components  | 6  |
| Integration Preparation | 6  |
| Setup                   | 6  |
| Configuration           | 7  |
| Operation and Test      | 12 |
| Troubleshooting         | 13 |



## Preface

As part of an effort to improve its product lines, Mutualink periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your Mutualink representative if a product does not function properly or does not function as described in this document.

This document was accurate at publication time. New versions of this document might be released on Mutualink, Inc. Check to ensure that you are using the latest version of this document.

## Purpose

The purpose of this procedure is to provide information and steps necessary to successfully integrate a radio/radio system to the Mutualink Tactical Node.

## Intended Audience

Anyone responsible for the integrating to the Mutualink Tactical Node.

## Requirements

This document assumes that readers are proficient in IP networking and Windows.

## Your Comments

Your suggestions are very important to us. They will help make our documentation more useful to you.

Please e-mail comments about this document to Mutualink, Inc at:

techpubs\_comments@mutualink.net

Please include the following information when commenting:

- Document title
- Document Version Number (on title page)
- Software Version Number (on title page)
- Page number (if appropriate)

## Revision History

The following table provides a description of document changes.

| Revision | Description and/or change |
|----------|---------------------------|
| 1.0      | First release             |



## Accessing Online

For information on EMS functions refer to the online help system. The help pages provide a description and explanation of the configuration settings on current EMS page selected.

To access:

1. In top right hand corner, click **Username**.
2. Click **Help**.

To navigate to help on a particular EMS configuration setting, click **Home** or **Endpoints**.

## Terminology

- **IWS (Interoperability Work Station)** – An IWS is a computer running Mutualink software that an operator uses to communicate with other organizations. The IWS allows the operator to perform two major functions. 1) Act as an individual communications device and 2) Direct the operation of any NICs that it is authorized to control.
- **Radio NIC (R-NIC)** – An R-NIC contains custom radio interface hardware to connect to various 2-way radio systems. The R-NIC may connect directly to portable, mobile, or fixed radios, or it may connect indirectly through radio equipment such as consoles or remote interfaces. The R-NIC is an audio-only device.
- **Tactical Node (TN)** – TN refers to the Mutualink communications kit that includes (2) Mutualink 4 x R-NICs, a Mutualink Edge 5, and associated networking components to provide flexible IP connectivity.
- **Element Management System (EMS)** – Is the primary administration/configuration interface for all Mutualink EPs. The EMS runs within a small web server on each of the EPs, and may be accessed using any modern web browser on any operating system.
- **Host/Donor Radio** – Is the radio device connected to the R-NIC via an integration cable that acts as a gateway to the radio system into the Mutualink system. This integration provides TX and RX audio along with control to and from the radio.
- **Field Radio** – Is the radio or radios on the same radio net as the Host/Donor radio integrated to Mutualink. This is a necessary tool for testing of the integration to Mutualink.
- **Push to Talk (PTT)** – This control initiates the transmit function of the radio. In the R-NIC integration, when the R-NIC is shared in an IWS incident and the TX button is pressed, an active PTT occurs from the R-NIC to the Host radio causing it to transmit.
- **Carrier Operated Relay (COR)** – The receive audio is controlled by the presence of an active COR signal from the host radio when receiving. When this signal is active, audio is assumed to be present; when it's inactive, audio is ignored.
- **Voice Operated Transmit (VOX)** – When there is no available control signal to indicate when audio is present, the VOX (Voice Operated Xmission) feature is used. This feature basically assumes that valid audio is present when the audio level rises above a specific threshold.



## Overview

The Mutualink Tactical Node has the capability of integrating up to 8 host radios which provide access to the those radio nets or systems. Through the Mutualink Tactical Node solution, these radio resources and the associated radio system traffic can be bridged locally and/or shared with other agencies across NJ Net and Mutualink IRAPP.

### System Components

- Mutualink Tactical Node IWS
- Mutualink Tactical Node 4 x RNIC

### Integration Components

- Mutualink Radio Interface Cable
- Host/Donor Radio (Programmed Properly)
- Field Radio for Testing (Programmed Properly)

### Integration Preparation

The following are required for preparing for integration:

- Identify the make/model of the host radio to be integrated
- Confirm proper Mutualink Radio Integration cable for make/model of host radio to be integrated.
- Confirm good communication between host and field radio prior to physical connection to radio and Tactical Node.
- If integrating to a portable radio, make sure volume control is set to mid range.
- Confirm access to the 4 x RNIC web based EMS (Element Management System) from the IWS (Interoperability Workstation) web browser.

### Setup

The following steps are required for setup:

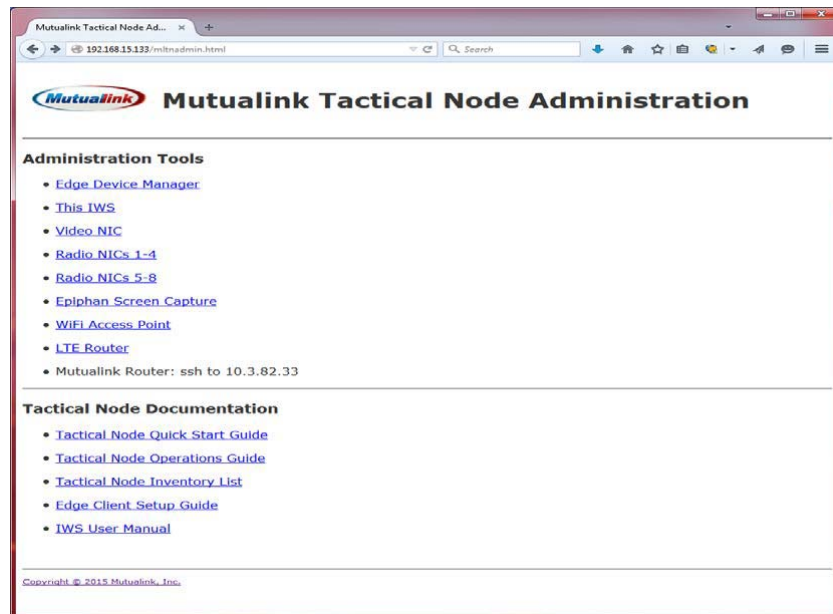
1. Test Host/Donor and Field Radio Operation.
2. Physically Connect Host/Donor Radio to TN via Radio Integration Cable to Radio 1-8 connector on Tactical Node.
3. Access RNIC EMS via IWS.
4. Configure RNIC EMS.
5. Test Radio Integration and Operation.



## Configuration

To configure:

1. Access the IWS Browser homepage.



2. Select the link for RNIC to configure Radio NICs 1-4 or Radio NICs 5-8.

**NOTE:** Radio NIC 1-4 connects to Radio 1-4 TN Connectors Radio NIC 5-8 connects to Radio 5-8 TN Connectors

3. Enter **Username** and **Password** provided to access Element Management System (EMS).
4. Click **Sign In**.
5. Confirm the correct RNIC Endpoint resource is selected.

If the current RNIC Endpoint is not the one to configure, click **Show All Instances** in the top right area.



**EMS**

[Manage Host](#) [Show All Instances](#) [customer](#)

**R-NIC**

**ZZ.MLINK-TacNode : Radio1**

10.2.84.181

Interop Integration Preferences Management

## Home

Software Version: 3.3.6\_Build\_116

Process ID: 2532

Up Time: 6 days, 8 hours, 8 mins, 37 secs

Configuration Modified On: Thu, Jul 09 2015 15:33:40 UTC

The **Enabled Endpoints on this Host** window displays.

**EMS**

[Show All Instances](#) [customer](#)

**Multiple Endpoints**

**Serial Number : 00:30:18:C1:DF:C2**

10.2.84.181

Status Network Management

## Endpoints Enabled on this Host

|   |                                              |                                                      |
|---|----------------------------------------------|------------------------------------------------------|
| 1 | <a href="#">CHAN/ZZ.MLINK-TacNode/Radio4</a> | <a href="#">210-000-2137d10c9c-2c0d-003018c1dfc2</a> |
| 2 | <a href="#">CHAN/ZZ.MLINK-TacNode/Radio2</a> | <a href="#">210-002-2137d130ab-68aa-003018c1dfc2</a> |
| 3 | <a href="#">CHAN/ZZ.MLINK-TacNode/Radio1</a> | <a href="#">210-003-2137d1320a-a14f-003018c1dfc2</a> |
| 4 | <a href="#">CHAN/ZZ.MLINK-TacNode/Radio3</a> | <a href="#">210-004-2137d1335d-de09-003018c1dfc2</a> |

6. Select the link for the RNIC Endpoint to configure.



Mutualink™ EMS

Manage Host Show All Instances customer

R-NIC

ZZ.MLINK-TacNode : Radio1

10.2.84.181

Home

Interop Integration Preferences Management

Device Interface

External Channels

Rx Interface

DigiRIB Settings

DigiRIB Profiles

PTT Device

Relay RTP

Software Version: 1.6

Pro

Up Time: 6 days, 8 hours, 8 mins, 37 secs

Configuration Modified On: Thu, Jul 09 2015 15:33:40 UTC

7. Once the correct RNIC Endpoint is selected, click **Integration**.
8. Select **DigiRIB Profiles**.
9. Click **Apply** next to the profile name to select the corresponding Make/Model of host radio.

Mutualink™ EMS

Manage Host Show All Instances admin

R-NIC

US.MLINK-DemoRH : ValRadio1

10.2.11.90

Interop Integration Preferences Status Logs Management

Digital RIB Profiles

Upload Profile

Factory Profiles

User Profiles

| Name                | Date Created             |       |
|---------------------|--------------------------|-------|
| ANPRC-117F          | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-117G          | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-119F/RT-1523C | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-119F/RT-1523C | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-138(V2)       | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-140(V2)       | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-140(V3)       | Nov 18 2014 03:59:58 UTC | Apply |
| ANPRC-140(V1)       | Nov 18 2014 03:59:58 UTC | Apply |



10. Test radio integration/operation. Refer to [“Operation and Test” on page 12](#).
11. If changes or adjustments to configuration are required, click **Edit**.

The screenshot shows the Mutualink EMS web interface. At the top, there is a navigation bar with links for Home, Integration, Preferences, Status, Logs, and Management. Below the navigation bar, a green banner displays the text "Digital RIB set with user profile 'test'". The main content area is titled "Digital RIB" and includes a "Download" button and a "Save" button. Below these buttons, a text field shows "Applied user profile: test". The "General" section contains a "Control Signal Voltage Source" dropdown menu set to "Internal +5v". The "Control Inputs" section contains a table with columns for Pin Number, Active Level, and Debounce Time. The table has two rows: "PTT In:" and "Tx Grant:", both with "None" for Pin Number, "Low" for Active Level, and "0 ms" for Debounce Time. The "Control Outputs" section contains a table with columns for Pin Number and Active Level.

|           | Pin Number | Active Level | Debounce Time |
|-----------|------------|--------------|---------------|
| PTT In:   | None       | Low          | 0 ms          |
| Tx Grant: | None       | Low          | 0 ms          |

|  | Pin Number | Active Level |
|--|------------|--------------|
|--|------------|--------------|

12. From the **Edit Digital RIB** window, make the necessary configuration changes.
13. When complete, click **Save**.
14. Retest radio integration/operation. Refer to [“Operation and Test” on page 12](#).
15. Once radio integration has tested successful with edited changes, the configuration may be saved to a new profile.
16. Click **Save**.



17. Type a new name in the **Profile Name** window.

**Digital RIB** Save

Profile Name:

Save Cancel

Applied user profile: test

**General**

Control Signal Voltage Source: Internal +5v

**Control Inputs**

|           | Pin Number | Active Level | Debounce Time |
|-----------|------------|--------------|---------------|
| PTT In:   | None       | Low          | 0 ms          |
| Tx Grant: | None       | Low          | 0 ms          |

**Control Outputs**

|          | Pin Number | Active Level |
|----------|------------|--------------|
| PTT Out: | Pin 5      | Low          |

18. Click **Save**.

19. To select the **User Profile**, click **Integration**.

20. Click **DigiRIB Profiles**.

21. Click **User Profiles**.

The saved User Profile will be selectable by clicking **Apply**.



## Operation and Test

To test the radio integration:

1. Create an Incident in the IWS.
2. Drag the associated R-NIC/radio resource into the Incident.
3. Test the Host Radio integration Receive (RX) function by transmitting on the Field Radio. This presents traffic into the Host Radio through the R-NIC into the IWS and heard through speaker on IWS.

The Incident left Volume bar should be solid **Green** when receiving.

If level is low or high in the IWS speaker, adjust IWS speaker volume or RX level in the R-NIC EMS ("Integration", "DigiRib Settings" section).

4. Test the Host Radio integration Transmit (TX) function by pressing the Incident TX button and speaking into the IWS microphone. This presents traffic from IWS through R-NIC into the Host Radio causing to PTT and presented out to Field Radio.

The Incident left Volume bar should be solid **Red** when transmitting.

If level is low or high on the Field Radio, adjust Field Radio speaker volume or TX level in the R-NIC EMS ("Integration", "DigiRib Settings" section).



## Troubleshooting

- **No Receive or Transmit:** Disconnect integration cable from Host radio and verify good communication between Host and Field radios.
- **No Receive from Field Radio:** Check setting in R-NIC EMS "Integration", "RX Interface", and set "Interface Mode" to "VOX Half Duplex". Also enter a value of 10,000 in "VOX Level". Make sure Host radio volume is set for mid-range. Retest the Receive function. This will always be setting for Host radios are portables/hand-helds.
- **Receive Audio from Field Radio Low/High:** Adjust/Edit RX level in the R-NIC EMS under "Integration", "DigiRib Settings", "Audio", "Receive", "Max. Voltage". Also check IWS speaker level.
- **No Transmit from Host Radio:** Verify when IWS TX pressed and traffic presented, there is a PTT indication observed on R-NIC and Host radio. If positive on R-NIC and not on Host radio, then check integration cable or programming of Host radio to support external PTT. If not on R-NIC or Host radio, check IWS microphone.
- **Transmit Audio to Field Radio Low/High:** Adjust/Edit TX level in the R-NIC EMS under "Integration", "DigiRib Settings", "Audio", "Transmit", "Max. Voltage". Also check Field radio speaker level.
- **Hot Key:** If The Incident left Volume bar is constant solid **Green** when not receiving traffic, check setting in R-NIC EMS "Integration", "RX Interface", "VOX Level" and increase level until condition eliminated.
- **Ping-Pong:** Occurs when the Host radio switches to receive mode immediately after release of PTT and receives a remnant of its own transmission or an over the air signal for a short period. Indication would be when IWS TX button released, a solid **Green** RX indication immediately observed in left Incident Volume bar for a short period. To eliminate, adjust setting in R-NIC EMS "Integration", "RX Interface", "Hang Time" to eliminate condition. Increase this time (milliseconds) in small steps until condition no longer observed. Note: If time is set too long, could interfere with valid traffic received after Host radio stops transmitting.