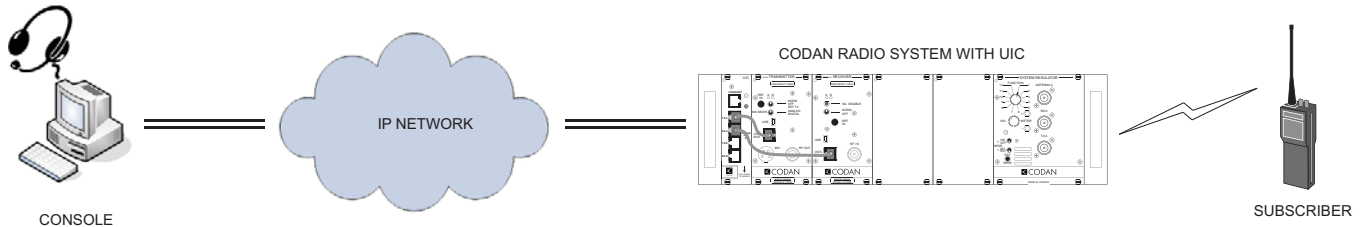**CODAN** COMMUNICATIONS

TN661 UIC-5 Universal Interface Card

The UIC-5-00 Universal Interface Card (UIC) is a plug-in module which provides an IP-based Ethernet network connection between MT-4 radio systems and other Land Mobile Radio (LMR) subsystems.

The UIC is programmable to support the TIA P25 Digital Fixed Station Interface (DFSI) standard via its network connection. The UIC can control and monitor radio modules installed in both the A-side (left) and B-side (right) of the subrack. An additional firmware purchase is required for B-side operation. The UIC-5-00 Card is a generational upgrade from the UIC-4-00, adding DFSI Packet Data as well as a number of significant performance improvements for running P25 over non-dedicated networks that may be shared with commercial or non-related users

TIA P25 DFSI Operation

The UIC supports the DFSI as published in the P25 standard document TIA-102.BAHA-A. The UIC provides a fully end-to-end digital link between consoles and subscriber units and supports analog-mode calls as well as P25 calls. The UIC transports digital P25 audio data packets (IMBE™or AMBE+2™) between the console and the transmitter and receiver radio modules without any conversion to or from baseband audio. The UIC uses Codan LVDS serial data to transport digital information between the UIC and the receiver and transmitter modules. This preserves a fully end-to-end digital link, including audio encryption. Analog voice is carried via the DFSI as digitized u-law pulse-code modulation (PCM) audio data.

The UIC-5 supports two different types of interfaces via its network connection:
• TIA Fixed Station Interface, Version 1 (Voice only)
• TIA Fixed Station Interface, Version 2 (Voice and/or Packet Data)

Console Controlled / Software Programmable Features

Some of the UIC functions (eg. call start/end, channel selection, etc.) are dynamically controlled by the console. The console that is used in a system with the UIC may not implement or provide access to all of the functions. See the console's documentation for more information on which UIC features are accessible from the console.

Other UIC functions (eg. IP address programming, interface mode selection, etc.) are controlled by static programmable configuration settings. These settings can be viewed and modified using a website GUI (Graphical User Interface) interface to the UIC.

TN661 UIC-5 Universal Interface Card

The UIC supports all of the following features:

• Channel and Bank control of receiver and transmitter modules (2 banks of 16 channels each).
• Detect the mode (analog or P25) of an inbound call on the receiver and report to the console.
• Receiver squelch selection (muted or unsquelched) controlled by the console.
• Clear the encryption keys from all encryption-equipped radio modules through the UIC's front panel Zeroize Key push button.
• Control and monitoring of 8 digital general purpose input and output (GPIO) signals from the console. The 4 inputs are 10 mA max., 0 to +1 Vdc low / +2 to +13.8 Vdc high. The 4 outputs are 20 mA max., 0 Vdc low / +5 Vdc high.
• Control and monitoring of 8 analog GPIOs for use with external equipment. The 4 inputs are 0 to +3.3 Vdc, 3 kΩ impedance. The 4 outputs are 20 mA max., 0 to +3.3 Vdc. Analog I/O resolution is10 bits (3.22 mv / bit = 1 LSB).
• Programmable simplex mode operation.
• Local repeating under the control of the console, or automatically when the UIC is not connected to a console.
• Current draw of 200 mA maximum.
• Audio Reception and Transmission using IMBE™ (P25) or u-law PCM (analog).
• Passes all received P25 LCW and ESW data to the console (NAC, TGID, MFID, ALGID, KID, etc.).
• Full end-to-end digital encryption if supported by the console and subscribers.
• Outbound audio buffering when transmitting P25 mode calls, with a programmable buffer length.
• supports DFSI v2 P25 Packet Data.

Console Systems
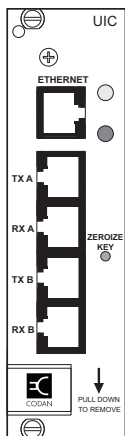
The UIC will interface with the following P25 DFSI consoles:

Avtec Scout
Catalyst IP FSI Gateway
InterTalk (Pantel)
Moducom UltraCom IP
Bosch / Telex C-Soft (P25 version)
Zetron Acom

Transmitter and Receiver Firmware Requirements

The UIC-5 requires that the MT-4E transmitter be firmware version 2.10.1 or later. The UIC-5 will work with any MT-4E receiver firmware.

# TN661 UIC-5 Universal Interface Card

Programming and Networking

Ethernet Port	10/100 Base-T, auto-sensing
Default IP Address	192.168.123.66
Rescue IP Address	172.23.123.2
Default Username and Password	p25admin (for both)

Maximum Network Bandwidth Requirement:

• Analog PCM Voice Call	100 Kbps
• Digital P25 Voice Call	70 Kbps

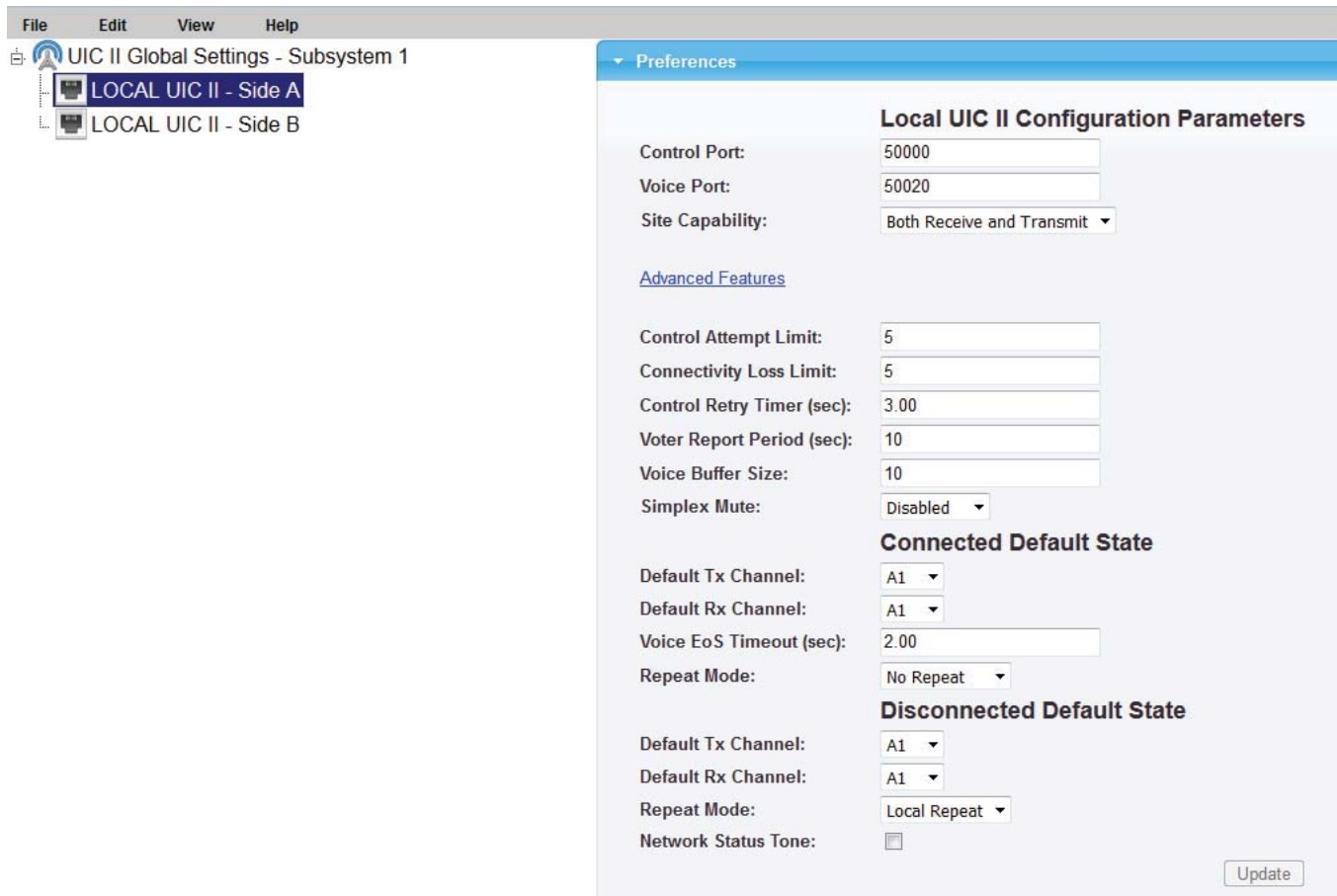|	
Default A-side UDP Port for Control Connection	50000
Default A-side RTP Port for Voice Conveyance Connection	50020
Default B-side UDP Port for Control Connection	50002
Default B-side RTP Port for Voice Conveyance Connection	50022
Default A-side Packet Data Port	50010
Default B-side Packet Data Port	50012

UIC Web GUI Global Settings
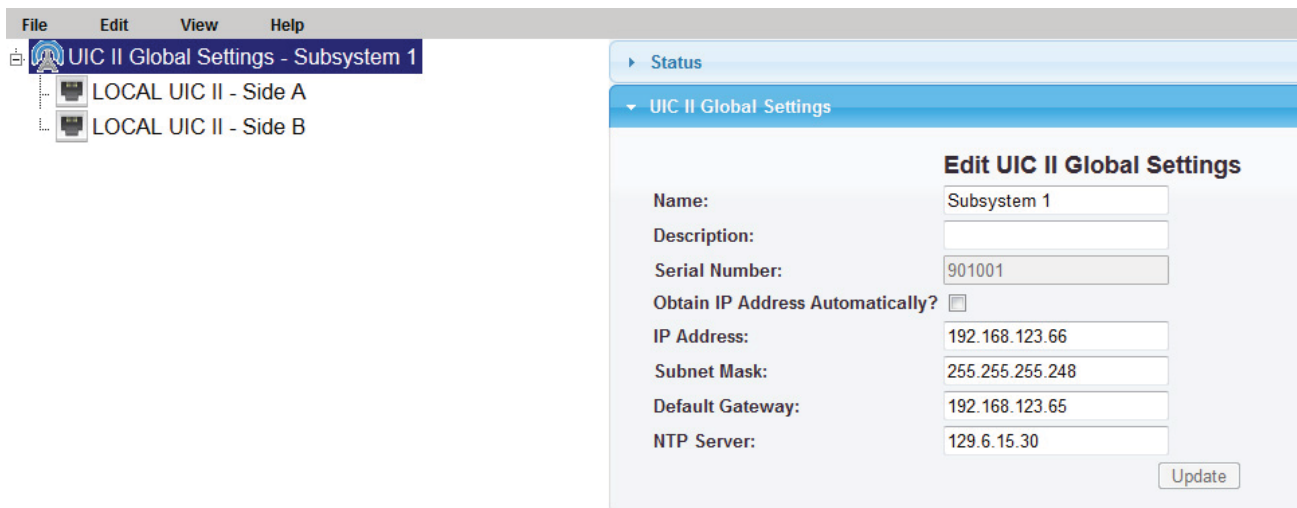
The UIC Web GUI is used to read and to modify various static configuration settings in the UIC. The Web GUI can be used to configure the UIC Global Settings such as the IP address.

UIC MAC Address

The UIC has a factory-assigned unique Ethernet MAC address that cannot be modified. This unique address is stored in non-volatile memory and is not affected by changes to any of the UIC's configuration settings.

TN661 UIC-5 Universal Interface Card

UIC Web GUI Configuration Parameters

The UIC Web GUI can also be used to set the indivicual configuration parameters for each of the radio pairs connected to the UIC (Side 'A' and Side 'B').

TN661 UIC-5 Universal Interface Card

Recommended Network Requirements for P25 DFSI with Codan UIC

Following is a list of recommended network requirements for both the Codan UIC-4 and UIC-5 cards for P25 Digital Fixed Station Interface connection (in both P25 and analog mode).

These recommended values are for the Codan equipment. Other P25 DFSI equipment (consoles / base stations) may have different network requirements.

Specification	Fixed Network	3G / LTE Network	Notes
Latency	< 20 ms	< 250 ms	Based on end user acceptable audio delay
Jitter (UIC-5)	< 8 ms	< 100 ms	*See Note below
Jitter (UIC-4)	< 4 ms	< 15 ms	
Packet Loss (UIC-5)	< 3%	< 6%	Better than DAQ 3.4 voice reproduction
Packet Loss (UIC-4)	< 0.5%	< 1%	
Bandwidth	250 kbps or better (full duplex)		Minimum 70kbps for P25 voice and/or 100kbps for Analog

Note: For jitter conditions beyond the stated values (eg. satellite communications), increasing the audio buffer will account for these situations at the cost of additional voice latency.

The UIC configuration settings for the buffer are as follows:

UIC Configuration Setting	Default Value	Range
Audio Buffer Length (UIC-4)	200 ms	40 - 500 ms
Audio Buffer Length (UIC-5)	200 ms	20 - 10000 ms

The UIC-4 is more sensitive to jitter and packet loss, the maximum specifications shown for a 3G / LTE network may result in less than ideal performance.

IMBE™ is a trademark of Digital Voice Systems, Inc.

This Page Intentionally Left Blank