RVON-1
for the
KP-32 and KP-812 Family of Keypanels
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www.telex.com

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Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
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CHAPTER 1

Introduction

General Description of the RVON-1 Voice Over Network Card

Installed directly into KP-32 or KP-812 keypanels, the RVON-1 provides voice over IP (Internet Protocol) communications, for the RTS ADAM Intercom family. In general, voice over IP means sending voice information in digital form using discrete packets rather than the traditional hard-wire connection. The RVON-1 delivers an integrated solution for connecting keypanels to the Intercom matrix over standard IP networks.

The RVON-1 is compatible with any RTS Matrix Intercom System equipped with a suitable RVON interface. In conjunction with any new or existing KP-32 or KP-812 keypanel, the RVON-1 brings a new level of enterprise-wide and remote access functionality to your RTS Matrix Intercom.

The RVON-1 card is configurable through the keypanel service menu and Telex’s AZedit configuration software. It is also fully compatible with internationally recognized standards and supports the following protocols: G.711, G.729A, and G.723 (2 bit rates).

The RVON-1 reaffirms RTS’ history of providing support for the latest technology in a fully supported backward compatible manner to all its RTS products.

Features

<table>
<thead>
<tr>
<th>Installation</th>
<th>The RVON-1 provides a single RJ-45 Ethernet connection for use with a 10 BAS-T or 100 BASE-TX network.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Channel of Audio IN and OUT</td>
<td>The RVON-1 card supports one channel IN and OUT and has configurable network and bandwidth parameters that can be tailored to individual network functions.</td>
</tr>
<tr>
<td>Ethernet Compatible</td>
<td>The RVON-1 card uses standard Ethernet protocols and is compatible with 10 BASE-T and 100 BASE-TX Ethernet compliant devices and networks.</td>
</tr>
<tr>
<td>AZedit Configurations</td>
<td>Users have the ability to adjust the audio parameters of the RVON-1 channel to optimize the available bandwidth.</td>
</tr>
<tr>
<td>Swappable Between Ethernet and AIO Connection</td>
<td>When connected to an Ethernet LAN, audio comes from the RVON-1 card; and, when an Ethernet link is not present, the audio comes from the AIO connection. Note, the user does not need to remove the RVON-1 card to switch to AIO mode.</td>
</tr>
</tbody>
</table>
**Specifications**

**DIGITAL**

<table>
<thead>
<tr>
<th>Compression</th>
<th>Audio Bit Rate</th>
<th>Coding Delay</th>
<th>Playout Delay</th>
<th>IP Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.711</td>
<td>64k</td>
<td>125μs</td>
<td>20-60ms</td>
<td>160-224 kbps</td>
</tr>
<tr>
<td>G.729A</td>
<td>8k</td>
<td>10ms</td>
<td>20-120ms</td>
<td>32-112kbps</td>
</tr>
<tr>
<td>G.723</td>
<td>5.3k/6.3k</td>
<td>30ms</td>
<td>60-120ms</td>
<td>29-45kbps</td>
</tr>
</tbody>
</table>

*Data depends on CODEC selection.*

**NOTE:** The Playout Delay and Bandwidth depend on the configured amount of audio per packet.

**CONNECTIONS**

RJ-45 Ethernet via backcard

14-pin KP Compatible Expansion Connector

- Pin 1: ............................................................. 5 Volt Analog
- Pin 2: ............................................................. -12 Volt
- Pin 3: ............................................................. +12 Volt
- Pin 4: ............................................................. 5 Volt Digital
- Pin 5: ............................................................. Analog GND
- Pin 6: ............................................................. Digital GND
- Pin 7: ............................................................. To Matrix Audio L
- Pin 8: ............................................................. NC
- Pin 9: ............................................................. From Matrix Audio L
- Pin 10: ............................................................. RS485L
- Pin 11: ............................................................. From Matrix Audio H
- Pin 12: ............................................................. NC
- Pin 13: ............................................................. To Matrix Audio H
- Pin 14: ............................................................. RS485H

Power.......................................................................................................................... Powered internally from keypanel motherboard

Physical .......................................................................................................................... 2.5”W x 5.75”L (63.5mmW X 146.05mmL)
Default Ethernet IP Addresses

**TABLE 1.** Default Address for the RVON Product Line

<table>
<thead>
<tr>
<th>Product</th>
<th>Default IP Address</th>
<th>Default Subnet Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVON-I/O</td>
<td>192.168.0.1</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>RVON-8</td>
<td>192.168.0.2</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>RVON-1</td>
<td>192.168.0.3</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>RVON-C</td>
<td>192.168.0.4</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>RVON-16</td>
<td>192.168.0.5</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>GPIO-16</td>
<td>192.168.0.6</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>MCII-e</td>
<td>192.168.0.7</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>Cronus</td>
<td>192.168.0.8</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>Zeus</td>
<td>192.168.0.9</td>
<td>255.255.0.0</td>
</tr>
</tbody>
</table>

Dip Switches

**Switch 1**  Reserved

**Switch 2**  Disable Telnet Shell

Default Setting: Off (Telnet Enabled)

Description: The Telnet shell allows you to access configuration options through the use of Telnet. When Dip switch 2 is off, you can use Telnet to access configuration options on the RVON-1 card. Turn Dip switch 2 on to disable the Telnet shell.

**Switch 3**  Enable Boot Downloader

Default Setting: Off (Boot Downloader Disabled)

Description: The purpose of the boot downloader is to allow you to recover from having your main application image corrupted (either by bad flash programming or by downloading an invalid image). Turn Dip switch 3 on to enable the boot downloader.

**Switch 4**  Debug Only!

Default Setting: Off

Description: Dip switch 4 should always be left in the off position. It is reserved for debugging and can have unintended consequences.
Firmware Compatibility Requirements for the RVON-1 Card

TABLE 2. Compatibility Requirements for the RVON-1 card.

<table>
<thead>
<tr>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Controller</td>
<td>9.19.0 or later</td>
</tr>
<tr>
<td>Peripheral Controller</td>
<td>10.10.0 or later</td>
</tr>
<tr>
<td>DBX</td>
<td>1.10.1 or later</td>
</tr>
<tr>
<td>AZedit</td>
<td>2.06.06 or later</td>
</tr>
<tr>
<td>RVON-8</td>
<td>1.1.0 or later</td>
</tr>
<tr>
<td>KP-32</td>
<td>2.0.0 or later</td>
</tr>
</tbody>
</table>

Flash Chip Replacement

TABLE 3. Flash Chip replacement part numbers.

<table>
<thead>
<tr>
<th>Keypanel</th>
<th>Flash Chip Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP-32 Standard</td>
<td>9015-7656-002 (U2)</td>
</tr>
<tr>
<td></td>
<td>9015-7656-003 (U3)</td>
</tr>
<tr>
<td>KP-32 (Japan)</td>
<td>9015-7656-042 (U2)</td>
</tr>
<tr>
<td></td>
<td>9015-7656-043 (U3)</td>
</tr>
<tr>
<td>KP-632</td>
<td>9015-7656-202 (U2)</td>
</tr>
<tr>
<td></td>
<td>9015-7656-203 (U3)</td>
</tr>
<tr>
<td>KP-832</td>
<td>9015-7656-302 (U2)</td>
</tr>
<tr>
<td></td>
<td>9015-7656-303 (U3)</td>
</tr>
</tbody>
</table>

Figure 1. Flash Chip placement on the KP-32 motherboard
CHAPTER 2

Installation

Installation of the RVON-1 Card

Before using the RVON-1 card with the KP-32, a few modifications need to be made to the keypanel. If the serial number on your KP-32 keypanel is 61170, you will need to update your backpanel with the Ethernet RJ-45 connection knockout present. Also, the KP-32 flash chips need to be replaced with larger flash chips (4MB) see Table 3, “Flash Chip replacement part numbers.,” on page 10.

To install the RVON-1 card, do the following:

1. Remove the cover from the KP-32 keypanel.
2. If present, remove the GPI/O board.
   The GPI/O board contains the general purpose input and output connections located on the back cover.
3. Using a chip extractor, carefully remove and replace the flash chips located at U2 and U3 on the KP-32 Motherboard, see “Flash Chip Replacement” on page 10.
4. Using a hammer and screwdriver, remove the specified knockout pieces.

5. Mount the supplied spacer on the RVON-1 card on the corner of the card near the DIP switch.
6. Securely connect the **RVON-1** card to the KP-32 motherboard, see page X for connector specifics.

7. Replace the **GPI/O board**.
8. Re-attach the **backplate** to the KP-32 keypanel. Be sure to secure the spacer with a screw in the back plate.
9. Replace the **cover** on the KP-32 keypanel.

**KP-32**

In the KP-32 keypanel, the RVON-1 card connects to the KP-32 by way of the J2 connector on the RVON-1, attached to J4 on the KP-32 header.

10. Gently secure the board in place.

**KP-812**

In the KP-812, the RVON-1 card connects to the KP-812 by way of the J2 connector on the RVON, attached to J37 on the KP-812 header.

11. Gently secure the board in place

**IMPORTANT:** Be sure the orientation of the board is correct, otherwise undesirable effects may occur. Make sure the RJ-45 connection is positioned so it will fit through the specified knockout on the back cover. When installing the RVON-1 card in an existing KP-32 or KP-812, each keypanel needs to be upgraded to include the following:
KP-32

- A back plate that allows for the RJ-45 connection (Ethernet).
- Larger flash chips.

KP-812

- A back plate that allows for the RJ-45 connection (Ethernet)
- Extension for the RJ-45 connector.

RVON-1 Relay

When connected to an Ethernet LAN, audio comes from the RVON-1 card; and, when Ethernet is not plugged in, the audio comes from the AIO connection. Note, the user does not need to remove the RVON-1 to switch to AIO mode.

**WARNING:** You cannot have both an Ethernet connection and an AIO connection simultaneously. If the Ethernet and AIO are connected simultaneously, no audio communication will occur.

Addresses and the RVON-1

Because the RVON-1 has an Ethernet interface, it is required to have a MAC (Media Access Control) Address. This is a low level address that contains 48 bits. Do NOT confuse this address with an IP (Internet Protocol) Address. In order to be IP compliant, all cards must have a unique MAC ID when shipped from the manufacturer. Typically, the MAC ID of a piece of hardware, such as the RVON-1 card, has a fixed or static address. Where as the RVON-1 card’s IP Address can change over time.

The MAC Address uniquely identifies each node of a network and interfaces directly with the network media. The RVON-1 card has a small 8-pin serial device on the board that the processor can read the unique MAC Address from. For more information on MAC IDs, contact technical support.

**NOTE:** Each RVON-1 card needs to be programmed with its own IP Address.
Configure the RVON-1 from the KP-32

To use the RVON-1 with the KP-32, the KP-32 firmware must be at version 2.0.0 or higher. In turn, the firmware requires that larger flash chips be used as well (See “Flash Chip replacement part numbers.” on page 10.).

Top Level Menu, Service, Rvon Setup

Set the IP Address from the Service Level Menu

The RVON-1 card, when shipped has a default IP Address already configured. This must be changed in order for the RVON-1 card to function properly because the pre-configured IP Address may not work with your network.

To set the IP Address, do the following:

   The top level menu appears.
2. Using the arrow keys, scroll to Service.
3. Press PGM.
   The Service menu appears.
4. Using the arrow keys, scroll to RVON Setup.
5. Press PGM.
   The IP Address menu item appears.
6. Press PGM.
   The actual IP Address appears.
7. Enter the first number in the IP Address.
   This activates the first octet of the IP Address and clears the rest of the IP Address.
8. Press PGM.
   This confirms the first octet in the IP Address and moves you to the second octet.

   NOTE: Press PGM to skip over any octet that does not need modifications.
9. Repeat steps 7 and 8 until the entire IP Address is entered.
10. Press PGM.
    The Netmask menu item appears.

    NOTE: Once you have entered the IP Address, you will then enter the Netmask. The Netmask is a string of numbers similar to an IP Address, except that it masks or screens out the network part of an IP Address so that only the host computer part of the address remains (for example, 255.255.255.0).

11. Press PGM.
    The actual Netmask appears.
12. Enter the first number in the Netmask.
    This activates the first octet of the Netmask and clears the rest of the Netmask.
13. Press PGM.
    This confirms the first octet in the Netmask and moves you to the second octet.

    NOTE: Press PGM to skip over any octet that does not need modifications.
14. Repeat steps 13 and 14 until the entire Netmask is entered.
15. Press PGM.
    The Gateway IP Address menu item appears.

    NOTE: Once you have entered the Netmask, you may need to enter the Gateway IP Address. A Gateway is a note (for example, a computer) on a network that serves as an entrance to another network.
16. Press PGM.
   The actual Gateway IP Address appears.

17. Enter the first number in the Gateway IP Address.
   This activates the first octet of the Gateway IP Address and clears the rest of the address.

18. Press PGM.
   This confirms the first octet in the Gateway IP Address and moves you to the second octet.

   NOTE: Press PGM to skip over any octet that does not need modifications.

19. Repeat steps 19 and 20 until the entire Gateway is entered.

20. Press PGM.

21. Press CLR to exit the menu.
   The changes are now enabled.

   NOTE: You can still set the IP Address without being connected to an Ethernet LAN. Once you have entered the IP information you will be prompted to perform a Save Cfg. The address is saved in the keypanel until the RVON-1 is connected to an Ethernet LAN.

**Top Level Menu, Rvon Conn.**

*Select an RVON Connection from the Top Level Menu*

The RVON Conn menu contains a list of connection offers from intercoms. This menu allows the keypanel to dynamically select an intercom and port to which it will connect.

To select a connection offer, do the following:

   The top level menu appears in the CWW window.

2. Using the arrow keys, scroll to RVON Conn.

3. Press PGM.
   The currently selected intercom port appears in the CWW window. If you have not previously selected a connection, you will see “none”.

4. Using the arrow keys, scroll to the connection offer that you want to accept.

5. Press PGM.
   The arrow to the left of the offer designates which connection offer was chosen.

6. Press CLR to exit.
   The keypanel will now connect to the selected intercom port.
Configure the RVON-1 from the KP-812

Top Level Menu, Service, Rvon Setup

Set the IP Address from the Service Level Menu

The RVON-1 card, when shipped has a default IP Address already configured. This must be changed in order for the RVON-1 card to function properly because the pre-configured IP Address may not work with your network.

To set the IP Address, do the following:

1. On the KP-812, scroll to Menu.
   The top level menu appears.
2. Turning the encoder knob, scroll to Service.
3. Tap the encoder knob to select Service.
   The Service menu appears.
4. Turning the encoder knob, scroll to RVON Setup.
5. Tap the encoder knob to select RVON Setup.
   The IP Address menu item appears.
6. Tap the encoder knob to select IP Address.
   The actual IP Address appears.
7. Enter the first number in the IP Address.
   This activates the first octet of the IP Address and clears the rest of the IP Address.
8. Tap the encoder knob.
   This confirms the first octet in the IP Address and moves you to the second octet.
   NOTE: Tap the encoder knob to skip over any octet that does not need modifications.
9. Repeat steps 7 and 8 until the entire IP Address is entered.
10. Tap the encoder knob.
    The Netmask menu item appears.
    NOTE: Once you have enter the IP Address, you will then enter the Netmask. The Netmask is a string of number similar to an IP Address, except that it masks or screens out the network part of an IP Address so that only the host computer part of the address remains (for example, 255.255.255.0).
11. Tap the encoder knob to select Netmask.
    The actual Netmask appears.
12. Enter the first number in the Netmask.
    This activates the first octet of the Netmask and clears the rest of the Netmask.
13. Tap the encoder knob.
    This confirms the first octet in the Netmask and moves you to the second octet.
    NOTE: Tap the encoder knob to skip over any octet that does not need modification.
14. Repeat steps 12 and 13 until the entire Netmask is entered.
15. Tap the encoder knob.
    The Gateway IP Address menu item appears.
    NOTE: Once you have entered the Netmask, you may need to enter the Gateway IP Address. A Gateway is a node (for example, a computer) on a network that serves as an entrance to another network.
16. Tap the encoder knob to select Gateway.
    The actual Gateway IP Address appears.
17. Enter the **first number** in the Gateway IP Address.
   *This activates the first octet of the Gateway IP Address and clears the rest of the address.*

18. Tap the **encoder knob**.
   *This confirms the first octet in the Gateway IP Address and moves you to the second octet.*

   **NOTE:** Press PGM to skip over any octet that does not need modifications.

19. Repeat steps 19 and 20 until the entire Gateway is entered.

20. Tap the **encoder knob**.

21. Press and hold the encoder knob to **exit** the menu.
   *The changes are now enabled.*

   **NOTE:** You can still set the IP Address without being connected to an Ethernet LAN. Once you have entered the IP information, you will be prompted to perform a **Save Cfg**. The address is saved in the keypanel until the RVON-1 is connected to an Ethernet LAN.

---

**Top Level Menu, Rvon Conn.**

**Select an RVON Connection from the Top Level Menu**

The RVON Conn. menu is a list of connection offers from other intercoms. This menu allows the keypanel to dynamically select an intercom and port to which it will connect.

To **select the connection offer**, do the following:

1. Using the encoder knob on the KP -812, scroll to **RVON Conn**.
2. Tap the encoder knob to select **RVON Conn**.
   *The currently selected connection offer appears in the CWW window. If you have not previously selected the connection, you will see “none”.*
3. Turn the encoder knob to scroll to the connection offer to which you want to connect.
4. Tap the encoder knob to select the **connection**.
   *The connection offer begins to flash indicating that it has been selected.*
5. Press and hold the **encoder knob** to exit the menu.
   *The keypanel will now connect to the select port.*
Configure the RVON-8 using AZedit to contact the RVON-1

To configure the RVON-1 card, do the following in AZedit:

1. From the Status menu, select I/O Cards.
   The I/O Card Status screen appears showing the types of installed.
2. Right click on an RVON-8 card and select RVON-8 Configuration
   The RVON-8 Configuration screen appears.

![RVON-8 Configuration Screen](image)

NOTE: The RVON-8 you use should be already configured. If it is not configured, refer to your RVON-8 Card User Manual.

NOTE: Remember, the RVON-1 has only one channel that can be configured.

3. In the RVON-8 Channel drop down list, select the channel that will be used to communicate to the RVON-1 card across network.
4. In the Device IP field, enter the IP Address for the RVON-1 card.
5. From the Device Type drop down list, select RVON-1/Keypanel.
6. From the Device Channel drop down list, select Channel 1.
   *There may be two channels listed, but the connection can only be made through channel 1.*
7. From the CODEC Type drop down list, select the CODEC type.
8. From the Packet Sized drop down list, select the size of each audio packet.

NOTE: A CODEC is an algorithm used to compress audio. Codecs dictate the quality of audio you hear and the network bandwidth used. The packet size determines how much audio data is carried across the network in each transmitted packet. The CODEC type and packet size chosen require different amounts of bandwidth from the network. As with the CODEC type, the packet size you choose for the audio transfer will affect the audio you hear and the bandwidth you use over the network. The larger the audio packet you choose to use, the lower the bandwidth used. However, the larger packet size can result in a higher delay and longer gaps if the packet is lost. On the other hand, smaller packet sizes result in larger bandwidth use, but lower delays and smaller gaps if the packet is lost. The Intercom System Engineer and the Network Designer may want to work together in choosing the CODEC type and packet size suitable for the size of the network, so degradation of network resources does not occur.

9. Select Enable VAD (Voice Activation Detection), if you want to conserve bandwidth when the audio level is below a given threshold.

NOTE: VAD saves network bandwidth by stopping the flow of audio packets when silence is detected. VAD is similar to VOX.

10. Once you are completely finished, click Apply.
Download RVON-1 Firmware Through AZedit

NOTE: AZedit sends firmware directly to the RVON-1 card over Ethernet. This is different from other I/O cards (except the RVON-8) that receive the firmware from the Master Controller. For this reason, verify the PC running AZedit is able to contact the RVON-1 card via the network, or is configured with a Gateway IP Address that can contact the RVON card. If it is not, AZedit will not be able to find the RVON-8 card. To test the connection, pin the RVON card from a command line. For more information on how to test for a connection, see Appendix A.

To download the RVON-1 Firmware, do the following:

1. Open AZedit.
2. From the Status menu, select Software Versions and then Keypanels. The Keypanel Version screen appears.
3. On the Keypanel Version screen, select the Show RVON-1 Versions check box.
4. Select and right click the keypanel which has the RVON-1 installed, and then select Download RVON-1. The Download Device Firmware screen appears.
5. Using the Browse feature, browse to the file to be downloaded.
6. Click **Open**.
   The **Download Device Firmware** screen appears.

![Image of Download Device Firmware screen](image)

7. Click **Begin Download**.
   The download begins.

![Image of download progress](image)

8. Click **OK**.
   The RVON-1 firmware download is complete. This takes a minute or two to occur.

**WARNING:** Do **NOT** power down the keypanel until you have verified the new version information from AZedit. If the card loses power while reprogramming the onboard flash memory, the card may become unbootable and may need to have its flash chips reprogrammed at the factory.

9. Verify the **correct version** is shown on the Keypanel Version screen.

   **NOTE:** You can also download the RVON-1 firmware through **Status > Ports**. You will not be able to check the version once the download is completed from the Port Status screen.
CHAPTER 4

Telnet & Serial Port Programming of the RVON-1 Card

RVON Serial and Telnet Commands

RVON card programming can be done via direct serial or telnet connection. There are several physical connections to an RVON board:

- Direct serial through custom debug cable (J20 6-pin bottom front)
  The customer debug cable always functions as the general-purpose debug tool.
- Backcard RJ-45 J1 (Telnet Only)

Setup

<table>
<thead>
<tr>
<th>Serial Port</th>
<th>38,400 baud, No-flow control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telnet</td>
<td>IP Address, port 23</td>
</tr>
</tbody>
</table>

How to Configure the RVON-1 using Telnet

IMPORTANT: Because the RVON-1 card is shipped with a default IP Address, it may not be accessible on the network. The IP Address should already be configured before attempting to try to connect through Telnet.

Without access to the physical KP-32 or KP-812 where the RVON-1 is installed, you can still configure the card through the use of Telnet. The following instructions show you how to access the telnet screens and the information you can display or edit.

NOTE: These instructions are intended to help you get to the telnet screens and give you an overview of what can be done.
To display the settings for the RVON-1 Card, do the following:

1. Open a command prompt.
2. At the prompt, type `Telnet <IP ADDRESS>` (The IP Address is the IP Address assigned to the RVON-1 card).

3. Press Enter.
   *The RVON logon screen appears.*

4. In the logon field, type the **RVON logon** (default = telex).
5. Press Enter.
6. In the password field, type the **RVON password** (default = password).
7. Press Enter.
   *A prompt appears.*
8. Type `dbgcmd` to access the debug command screens.

   An MXP prompt appears.
10. At the prompt, type `Show`.
11. Press Enter.
    The show commands screen and MXP prompt appears.

12. At the MXP prompt, type the `show` command you want to see (for example, “show rvon”).
13. Press Enter.
    The values for the RVON-1 card appear.

To edit the RVON-1 configuration, do the following:

1. Repeat steps 1 through 9 from above.
2. At the MXP prompt, type either `set RVON` or `set EMAC` (see screen descriptions below).
3. Press Enter.
set rvon ip_addr Allows you to edit the IP Address

set rvon netmask Allows you to edit the netmask

set rvon gateway Allows you to edit the gateway

set rvon serial_ip Allows you to edit the serial IP Address

set rvon serial_baud Allows you to set the baud rate (50-38400)

set rvon user Allows you to set the username for the RVON-1 card. By default the user name is “telex”

set rvon password Allows you to set the password for the RVON-1 card. By default, the password is “password”

set rvon vad_threshold Lets you set the vad threshold.

NOTE: In AZedit, you can enable and disable VAD, however, through Telnet you able to set the amount. You will able to set the VAD threshold in later versions of AZedit.

NOTE: This Telnet screen is almost duplicate to the right side of the Configuration screen for the RVON in AZedit.

set channel dest_ip Allows you edit the destination IP Address the RVON-1 card will communicate with

set channel dest_type Allows you to edit the destination type for the device the RVON-1 card will talk with

set channel dest_channel Allows you to edit the destination channel of the device the RVON-1 will talk with

set channel channel_codec Allows you to edit the CODEC to be used for transferring the data between the two devices

set channel input_gain Allows you to edit the input gain for the RVON-1 card

set channel output_gain Allows you to edit the output gain for the RVON-1 card.
set the channel
onhook

onhook = hang up
If the channel was already connected, going offhook will have no effect (it is already offhook if connected). Going onhook will hang up the call, and it should then try to reconnect.
If the channel was not already connected, going offhook will cause it to try and establish a connection. Going onhook in this state will have no effect (it is already onhook if idle.

offhook = connected
If the channel was already connected, going offhook will have no effect (it is already offhook if connected). Going onhook will hang up the call, and it should then try to reconnect.
If the channel was not already connected, going offhook will cause it to try and establish a connection. Going onhook in this state will have no effect (it is already onhook).
Jumpers and Connections

A selectable RS232/485 serial port is at connector J1. Jumper connections on J10, J11, and J12 select the signal mode on J1.

- When J10, J11, and J12 are jumped from pins 1 to 2, J1 is configured for RS485.
- When J10, J11, and J12 are jumped from pins 2 to 3, J1 is configured for RS232.

J21 must be jumped from pins 1 to 2 to select UART B for RS485 RVON-1 keypanel operation.

J2 Connector

The RVON-1 card is designed to be used with either a keypanel or an RVON-I/O card. The J2 connector mounts the RVON-1 card onto a keypanel.
RS232 debug serial port via connector J3

J3 is a 6-pin header that connects to RS232 compatible serial ports of the TNETV2020.
Basic Network Configuration

This section covers basic network configuration set-up and testing. Also covered are basic concepts and operations, including the difference between LAN and WAN networks and how IP Addressing is used.

In a networked environment, such as a company, typically there are many computers connected together using a router or a switch. In larger companies, there may be several different routers distributed in buildings and plant locations. A router allows any LAN-side computer to communicate with other computers and devices outside the LAN (local area network). Routers send data packets from one place to another place on a network. Routers use network addresses to route packets to the correct destination. For example, in a TCP/IP network, the IP (internet protocol) address of the network interface is used to direct router destinations.

Because routers help computers inside the LAN “talk” with computers outside of the LAN, the security of a company’s LAN may be compromised by gaps of open ports in the router. Security measures may have been instituted to compensate for these vulnerabilities. Consult your network administrator to learn about the security measures taken to protect your network. VPN, or virtual private network, is one such security measure to protect the intelligence of the LAN. A computer outside the LAN must have an address or key known by the VPN to allow access to the LAN. Many companies use a VPN to connect two different LANs, thus allowing the transfer of data between two networks.

LAN (local area network) vs. WAN (wide area network)

LOCAL AREA NETWORK

Simply put, a LAN is a computer network that connects a relatively small area (a single building or group of buildings). Most LANs connect workstations and computers to each other. Each computer (also known as a “node”), has its own processing unit and executes its own programs; however, it can also access data and devices anywhere on the LAN. This means many users can access and share the same information and devices. A good example of a LAN device is a network printer. Most companies cannot afford the budgetary or hardware expense of providing printers for each of its users; therefore, one printer (or device) is placed on the LAN where every user can access the same printer.

The LAN uses IP Addresses to route data to different destinations on the network. An IP Address is a 32-bit numeric address consisting of four numbers separated by periods (for example, 1.160.10.240).

NOTE: For more information on IP Addresses, see your local network administrator.
WIDE AREA NETWORK

A wide area network (WAN) connects two or more LANs and can span a relatively large geographical area. For example, Telex Headquarters in Burnsville, MN is connected to several branch offices in Nebraska and Arkansas over a WAN. The largest WAN in existence is the Internet.

ACCESSING THE WIDE AREA NETWORK (WAN)
Figure 3 shows LAN IP Addresses using a common IP Address, 10.2.100.X (192.168.X.X is another common address). Most devices are shipped with these addresses as its default. It is recommended to use these addresses for LANs.

![Network Interface Device Diagram](image)

Figure 4. Network Address Translation

**NETWORK ADDRESS TRANSLATION (NAT)**

Using the initial IP Address, then converting it to a valid WAN IP Address is how the network address translation works, in theory. Once the IP address is changed, it is up to the network interface device (such as a router, gateway, switch, etc.) to keep track of which computers are talking on which ports. For example, if two local devices (PC1 and PC2 in Figure 3) both wanted to talk via port 1031, then the network interface device would have to change one of the port requests to the next available port, 1032.

**PORTS**

In general, a network port is an endpoint to a logical connection. The port number identifies what type of port it is. For example, port 80 is used for HTTP traffic. When you type an address into the address bar of a web browser, your computer goes to find an IP Address for the url you are requesting (http://www.telex.com). To obtain this address, the computer contacts a DNS server (Domain Name Server). Once the IP Address is found, it tries to connect to the http port of the network device (port 80). See Table 1 for a list of the more well-known port numbers.

Each network device can be set-up to respond or not respond to the various ports. The function of responding or “hosting a service” is called “serving”.

**TABLE 1. Packet Translation**

<table>
<thead>
<tr>
<th>Packet before Translation</th>
<th>Packet after Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Source</td>
</tr>
<tr>
<td>IP Address</td>
<td>10.2.100.2</td>
</tr>
<tr>
<td>To Internet</td>
<td>192.156.136.22</td>
</tr>
</tbody>
</table>

If a second workstation on the LAN wants to communicate to the same server, and happens to use the same source port number, then the LAN Modem will translate the source port number as well as the source IP address. In Table 2, a second LAN computer wants to access a web page. The NAT device now uses port 1032 for this connection where it used port 1031 in Table 1.
TABLE 2. Packet Translation

<table>
<thead>
<tr>
<th>Source IP Address</th>
<th>Source Port</th>
<th>Destination IP Address</th>
<th>Destination Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.2.100.1</td>
<td>1031</td>
<td>192.156.136.22</td>
<td>80</td>
</tr>
<tr>
<td>192.156.136.22</td>
<td>80</td>
<td>99.5.1.30</td>
<td>1032</td>
</tr>
</tbody>
</table>

Amazingly, all the address translation that occurs takes place automatically in order to make web browsing and other functions easier. This is also a way for large web hosting services to speed up the network by having different devices perform different functions.

TABLE 3. Well-Known TCP Port Numbers

<table>
<thead>
<tr>
<th>Port Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TCP Port Service Multiplexer (TCPMUX)</td>
</tr>
<tr>
<td>5</td>
<td>Remote Job Entry (RJE)</td>
</tr>
<tr>
<td>7</td>
<td>ECHO</td>
</tr>
<tr>
<td>18</td>
<td>Message Send Protocol (MSP)</td>
</tr>
<tr>
<td>20</td>
<td>FTP-Data</td>
</tr>
<tr>
<td>21</td>
<td>FTP-Control</td>
</tr>
<tr>
<td>23</td>
<td>Telnet</td>
</tr>
<tr>
<td>25</td>
<td>Simple Mail Transfer Protocol (SMTP)</td>
</tr>
<tr>
<td>29</td>
<td>MSG ICP</td>
</tr>
<tr>
<td>37</td>
<td>Time</td>
</tr>
<tr>
<td>42</td>
<td>Host Name Server (Nameserv)</td>
</tr>
<tr>
<td>43</td>
<td>Whols</td>
</tr>
<tr>
<td>49</td>
<td>Login Host Protocol (Login)</td>
</tr>
<tr>
<td>53</td>
<td>Domain Name Server (DNS)</td>
</tr>
<tr>
<td>69</td>
<td>Trivial File Transfer Protocol (TFTP)</td>
</tr>
<tr>
<td>70</td>
<td>Gopher Service</td>
</tr>
<tr>
<td>79</td>
<td>Finger</td>
</tr>
<tr>
<td>80</td>
<td>HTTP</td>
</tr>
<tr>
<td>103</td>
<td>X.400 Standard</td>
</tr>
<tr>
<td>108</td>
<td>SNA Gateway Access Server</td>
</tr>
<tr>
<td>109</td>
<td>POP2</td>
</tr>
<tr>
<td>110</td>
<td>POP3</td>
</tr>
<tr>
<td>115</td>
<td>Simple File Transfer Protocol</td>
</tr>
<tr>
<td>118</td>
<td>SQL Services</td>
</tr>
<tr>
<td>119</td>
<td>Newsgroup (NNTP)</td>
</tr>
<tr>
<td>137</td>
<td>NetBIOS Name Service</td>
</tr>
<tr>
<td>139</td>
<td>NetBIOS Datagram Service</td>
</tr>
<tr>
<td>143</td>
<td>Interim Mail Access Protocol (IMAP)</td>
</tr>
<tr>
<td>150</td>
<td>NetBIOS Session Service</td>
</tr>
<tr>
<td>156</td>
<td>SQL Server</td>
</tr>
<tr>
<td>161</td>
<td>SNMP</td>
</tr>
<tr>
<td>179</td>
<td>Border Gateway Protocol (BGP)</td>
</tr>
<tr>
<td>190</td>
<td>Gateway Access Control Protocol (GACP)</td>
</tr>
<tr>
<td>194</td>
<td>Internet Relay Chat (IRC)</td>
</tr>
<tr>
<td>197</td>
<td>Directory Location Services (DLS)</td>
</tr>
<tr>
<td>389</td>
<td>Lightweight Directory Access Protocol (LDAP)</td>
</tr>
<tr>
<td>396</td>
<td>Novell Netware over IP</td>
</tr>
<tr>
<td>443</td>
<td>HTTPS</td>
</tr>
<tr>
<td>444</td>
<td>Simple Network Paging Protocol (SNPP)</td>
</tr>
<tr>
<td>445</td>
<td>Microsoft-DS</td>
</tr>
<tr>
<td>458</td>
<td>Apple Quick Time</td>
</tr>
<tr>
<td>546</td>
<td>DHCP Client</td>
</tr>
<tr>
<td>547</td>
<td>DHCP Server</td>
</tr>
<tr>
<td>563</td>
<td>SNEWS</td>
</tr>
<tr>
<td>669</td>
<td>MSN</td>
</tr>
</tbody>
</table>

IP ADDRESSES

If you do not know your IP Address, you can open a DOS screen in a Windows®-based environment and bring up the ipconfig screen.
To find your IP Address using ipconfig, do the following:

1. From the Start Menu, open a **Command Prompt** screen.

2. At the prompt, type `ipconfig`, then press **Enter**.
   
   *The IP configurations appear for your machine, such as the DNS suffix, IP Address, Subnet Mask, and Default Gateway.*

3. At the prompt, type **Exit** to close the screen.

**NOTE**: If you want more detailed parameters for your machine, type `ipconfig/All`. This screen shows the computers network configuration settings.

**Ping a Computer**

Pinging a computer on the network makes sure it is able to be “seen” and receive messages on the network.

**NOTE**: You can also ping your RVON-8 card to verify that it is responding over the network by putting the cards IP Address in place of the computer IP Address.

To Ping a computer on the network, do the following:

1. From the Start menu, select **Run...**.
2. At the Run command, type CMD to open a Command Prompt screen.

![Command Prompt](image1)

3. At the prompt, type the **IP Address** of the computer you wish to ping (for example, 10.2.100.130).

4. Press **Enter**.

![Command Prompt](image2)

**NOTE**: If the computer you are pinging is not responding to the ping, you will receive a time-out message in the command prompt screen.

**POSSIBLE PITFALL WITH ROUTERS, GATEWAYS, AND SWITCHES**

Anytime computers communicate through routers, gateways, and switches, they may be allowed or denied the connection. Network interface devices can be configured to block specific outgoing requests, as well as incoming requests, based on the IP Address and/or port. This is one of the security mechanisms of a router. This also happens when broadcast messages are sent and received.

To view the path an IP Address takes to retrieve information, you can execute a tracert from the Command Prompt Screen.

1. From the Start Menu, open a **Command Prompt** screen.
2. At the prompt, type `tracert` and type the url or IP Address you want to trace.

![Command Prompt](image1)

3. Press Enter.
   The details of the tracer route are displayed.

![Command Prompt](image2)

**NOTE**: You will receive the message “request timed out” if the IP Address/ port IN or OUT is denied to the incoming or outgoing message.

4. When you are finished, type `exit` to close the Command Prompt screen.

### RVON Configuration

RVON cards use ports for communication of audio and control packets. Because routers can be configured to block certain incoming and outgoing requests, you will need to open the following ports in your network to allow WAN connections to and from a Network Interface Device. See Table X for the ports that need to be opened for the RVON cards to operate properly.

**TABLE 4.** Ports necessary for RVON card functionality.

<table>
<thead>
<tr>
<th>Port</th>
<th>Port Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2076</td>
<td>UDP Call Control Signalling</td>
</tr>
<tr>
<td>2077</td>
<td>UDP Audio Packets</td>
</tr>
<tr>
<td>2079</td>
<td>UDP Telex Proprietary Signalling</td>
</tr>
<tr>
<td>2080</td>
<td>TCP Telex Keypanel Protocol</td>
</tr>
<tr>
<td>2081</td>
<td>UDP Pass Through Serial</td>
</tr>
<tr>
<td>2082</td>
<td>TCP Firmware Download</td>
</tr>
</tbody>
</table>
Below, is an example of a router configuration screen. Not all routers are configured the same way and may not look exactly like this screen.

<table>
<thead>
<tr>
<th>Port</th>
<th>Port Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2100</td>
<td>Remote Administration</td>
</tr>
<tr>
<td>2102</td>
<td>Authentication Server</td>
</tr>
</tbody>
</table>

NOTE: Linksys™ supports up to 253 nodes on a router. This is why it is called a Router/Switch because there are WAN functions like a router as well as having a 4-port LAN switch. It also does not support simultaneous forward and DHCP.

**Network Terminology**

**Bridges**

A bridge is a device that connects two LANs, or two segments of the same LAN that use the same protocol. Sometimes called “transparent bridges, they work at the OSI model Layer 2. Simply put, they are not concerned with protocols. Their main job is to pass data to a destination address that is predetermined in the data packet.

With a bridge, all of your computers are on the same network subnet (see Subnet). This means your computers can communicate with each other and have their own Internet connection. If you assign your own IP Addresses be sure to use the same first 3 “octets” of the IP Address (for example, 192.168.0.X).

**Domain Name Server (DNS)**
A **DNS Server** is an Internet service that translates domain names (for example, in the URL http://www.telex.com, the domain name is the telex.com) into IP Addresses. The Internet is based on IP Addresses which are numeric and since domain names are alphabetic, they are easier to remember. Every time a domain name is used it must go through the DNS server to be translated into an IP Address.

**Gateway**

A **gateway** is a node on a network that serves as an entrance to another network. The gateway routes traffic from a computer to an outside network that is serving the web pages. For example, the gateway for a home computer is the ISP provider that connects the user to the Internet.

In a corporate environment, the gateway often acts as a proxy server and a firewall. Gateways are similar to routers and switches in that they forward data to the destination and provide the path for which the data will travel to the destination.

**Hub**

A hub is a common connection point for devices in a network. A hub has multiple ports. When a data packet arrives at a hub, it is copied and distributed to all of its ports so that all nodes on the LAN can see the packets.

There are three types of hubs:

- **passive hub** - this hub serves as a conduit for the data, enabling it to go from one device to another.
- **intelligent hub (also known as manageable hubs)** - this hub includes addition features that enable administrators to monitor traffic through the hub.
- **switching hub** - this hub reads the destination address of each packet and then forwards the data pack to the appropriate port.

**IP Address (Internet Protocol Address)**

An **IP Address** is an identifier or numerical name for a computer or device on a network. Data between computers are routed over the network using these addresses to identify the computer the message is being sent to and the computer the message is being sent from.

The format of an IP Address is a 32-bit numeric address written as four numbers separated by periods. For example, an IP Address looks like 10.100.1.1.

**IMPORTANT**: When working within an isolated network (meaning there is no Internet access), IP Addresses can be assigned at random just as long as they are unique to each computer and device. When the isolated network is connected to the Internet, registered Internet Addresses must be obtained. This is to prevent duplication of addresses.

The four numbers in and IP Address are used in different was to identify a particular network and host on that network. There are three classes of Internet Addresses.

- **CLASS A** - supports 16 million hosts on each of 127 networks.
- **CLASS B** - supports 65,000 hosts on each of 16,000 networks.
- **CLASS C** - supports 254 hosts on each of 2 million networks.

**LAN**

A **LAN** is a computer network that connects a relatively small area (a single building or group of buildings). Most LANs connect work stations and computers to each other. Each computer (also known as a “node”), has its own processing unit and executes its own processing unit and executes its own programs; however it can also access data and devices anywhere on the LAN. This means that many users can access and share the same information and devices. A good example of a LAN device is a network printer. Most companies
cannot afford the budgetary or hardware expense of providing printers for each of its users; therefore, one printer (i.e., device) is placed on the LAN where every user can access the same printer.

The LAN uses IP Addresses to route data to different destinations on the network. An IP Address is a 32-bit numeric address written as four numbers separated by periods (for example 1.160.10.240).

Port

A port, when referring to TCP and UDP networks, is an endpoint in a logical connection. The port number identifies the type of port it is. For example, port 80 is used for HTTP traffic.

Routers

A router is a device that forwards data packets over networks. Most commonly, a router is connected to at least two networks (normally LANs or WANs). Routers are located at gateways, the place where two networks are connected. Routers do little data filtering, they mainly deliver the data.

Subnet

A subnet is a portion of a network that shares a common address component. On a TCP/IP network, a subnet is described as all computers or devices whose IP Address have the same prefix.

Subnetting a network is useful because it provides security for the network as well as increases performance of the network. IP networks are divided using subnet masks.

Switches

A switch is a device that filters and forwards data packets between networks. Switches operate at the data layer, and sometimes at the network layer.

WAN

A wide area network connects two or more LANs and can span a relatively large geographical area. For example, Telex Headquarters in Burnsville, MN is connected to several of its branch offices in Nebraska and Arkansas over the wide area network. The largest WAN is the Internet.