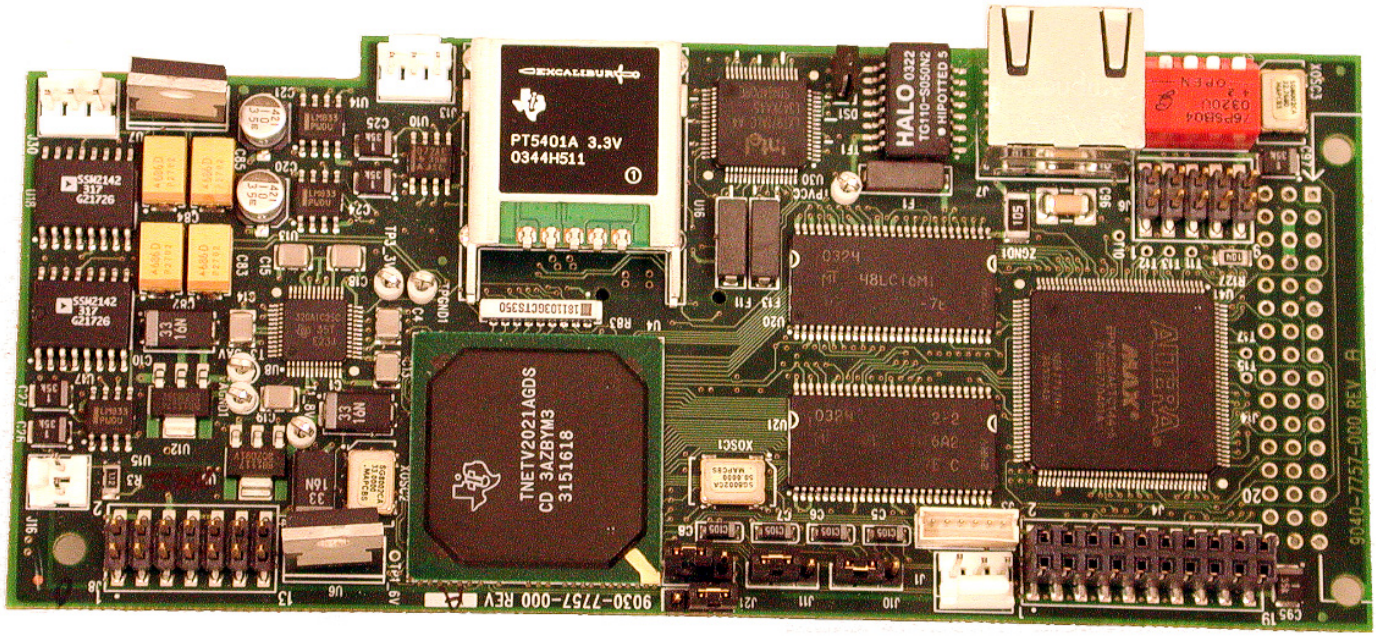
RTS® Digital Matrix Series
Intercom Systems

RVON-1

for the

KP-32 and KP-812 Family of Keypanels



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Customer Service Department
RTS/Telex Communications, Inc.
12000 Portland Avenue South
Burnsville, MN 55337 USA
Telephone: 800-392-3497
Fax: 800-323-0498
Factory Service: 800-553-5992

Return Shipping Instructions

Customer Service Department
Telex Communications, Inc. (Lincoln, NE)
Telephone: 402-467-5321
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Please include a note in the box which supplies the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

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All shipments of product should be made via UPS Ground, prepaid (you may request from Factory Service a different shipment method). Any shipment upgrades will be paid by the customer. The equipment should be shipped in the original packing carton. If the original carton is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four (4) inches of excelsior or similar shock-absorbing material. All shipments must be sent to the following address and must include the Proof of Purchase for warranty repair. Upon completion of any repair the equipment will be returned via United Parcel Service or specified shipper, collect.

Factory Service Department
Telex Communications, Inc.
8601 East Cornhusker Hwy.
Lincoln, NE 68507 U.S.A.
Attn: Service

This package should include the following:

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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 hardwire 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.729 AB, 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

Installation	The RVON-1 provides a single RJ-45 Ethernet connection for use with a 10 BAS-T or 100 BASE-TX network.
1 Channel of AudioIN and OUT	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.
Ethernet Compatible	The RVON-1 card uses standard Ethernet protocols and is compatible with 10 BASE-T and 100 BASE-TX Ethernet compliant devices and networks.
AZedit Configurations	Users have the ability to adjust the audio parameters of the RVON-1 channel to optimize the available bandwidth.
Swappable Between Ethernet and AIO Connection	When connected ton 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.

Specifications

DIGITAL

Compression	Audio Bit Rate	Coding Delay	Playout Delay	IP Bandwidth
G.711	64k	125µs	20-60ms	160-224 kbps
G.729AB	8k	10ms	20-120ms	32-112kbps
G.723	5.3k/6.3k	30ms	60-120ms	29-45kbps

*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)

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

Description	Version
Master Controller	9.19.0 or later
Peripheral Controller	10.10.0 or later
DBX	1.10.1 or later
AZedit	2.06.06 or later
RVON-8	1.1.0 or later
KP-32	2.0.0 or later

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

Flash Chip Replacement

Keypanel	Flash Chip Replacement
KP-32 Standard	9015-7656-002 (U2)
	9015-7656-003 (U3)
KP-32 (Japan)	9015-7656-042 (U2)
	9015-7656-043 (U3)
KP-632	9015-7656-202 (U2)
	9015-7656-203 (U3)
KP-832	9015-7656-302 (U2)
	9015-7656-303 (U3)

TABLE 2. Flash Chip replacement part numbers.

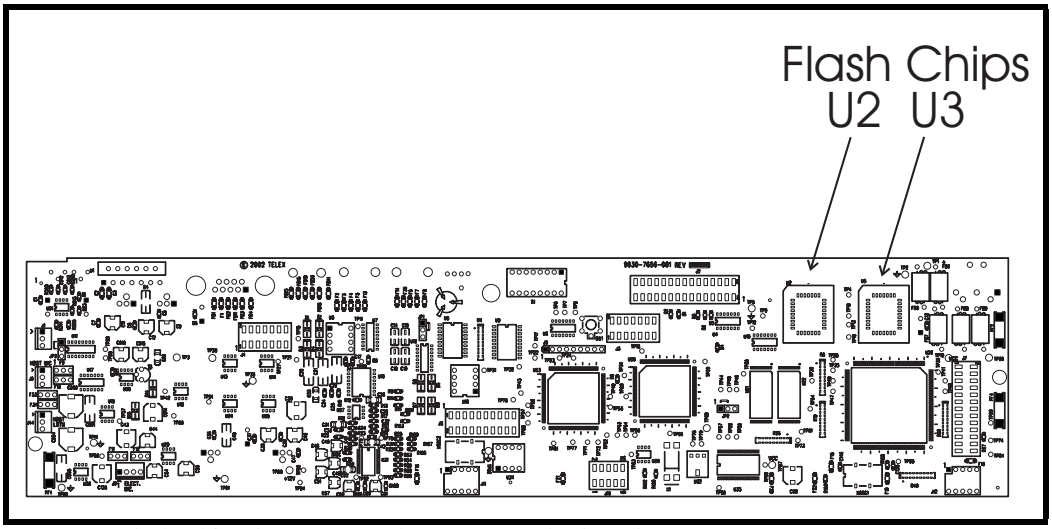

Figure 1. Flash Chip placement on the KP-32 motherboard

1.

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 you backpanel with the Ethernet RJ-45 connection (part number - 9080-7656-002) knockout present. Also, the KP-32 flash chips need to be replaced with larger flash chips (4MB) see Table 2, “Flash Chip replacement part numbers.,” on page 4.

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 4.
4. Using a hammer and screwdriver, remove the **specified knockout pieces**, see Figure 2..
5. Mount the **supplied spacer** on the RVON-1 card on the corner of the card near the DIP switch. See Figure 3 on page 6.
6. Securely connect the **RVON-1** card to the KP-32 motherboard , see page X for connector specifics.

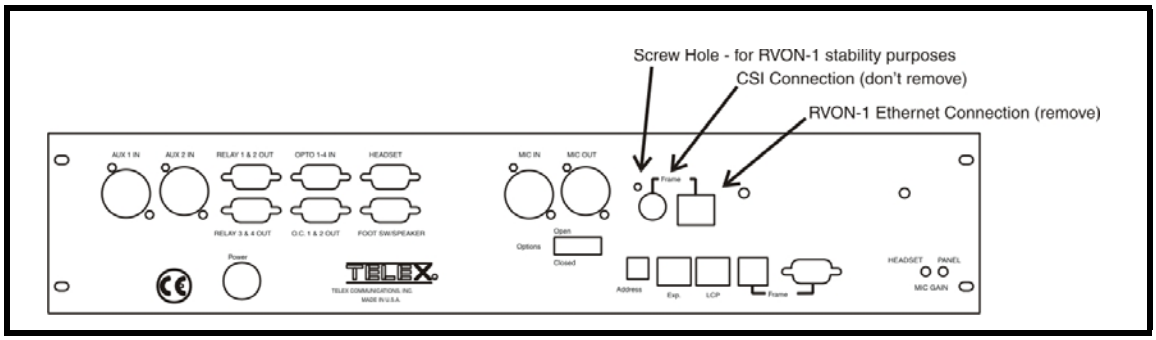

Figure 2. Knock out positions for the RVON-1 card on the KP-32

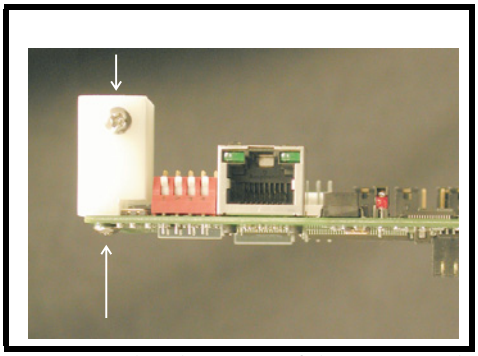

Figure 3. The placement of the spacer and screw position on the RVON-1 card.

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. See Figure 2 on page 5
9. Replace the **cover** on the KP-32 keypanel.

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 (see Figure 4.).

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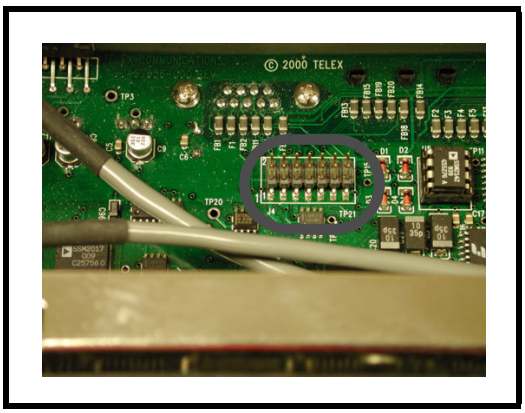


Figure 4. The J4 connector on the KP-32 board.

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

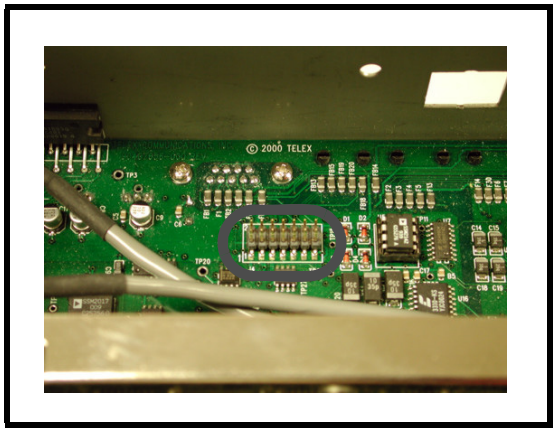


Figure 5. The J37 connector on the KP-812 board.

NOTE: 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 backplate that allows for the RJ-45 connection (Ethernet).
- Larger flash chips.

KP-812

- A backplate 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 See “Flash Chip replacement part numbers.” on page 4.).

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-32, press **Menu**.
   The top level menu appears.
2. Using the ⟩ ⟩, scroll to **Service**.
3. Press **PGM**.
   The Service menu appears.
4. Using the ⟩ ⟩, 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:

1. On the KP-32, press **Menu**.
   The top level menu appears in the CWW window.
2. Using the ⟩⟩, 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 ⟩⟩, scroll to the **connection offer** that you want to accept.
5. Press **PGM**.
   - *<connection offer> appears. 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 you 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 **13** and **14** 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:

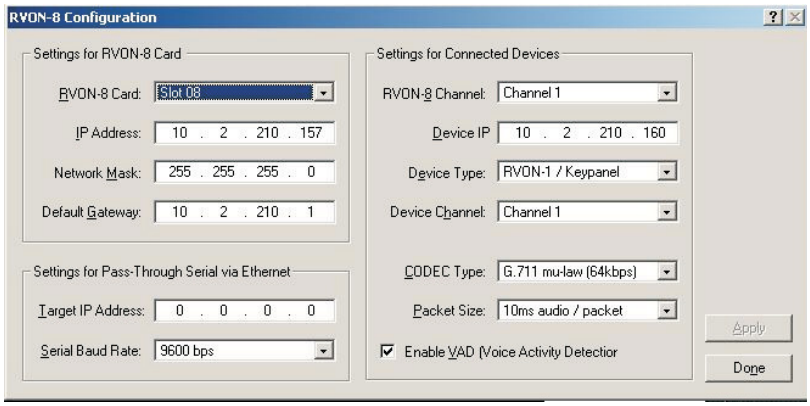
1. Using the encoder knob on the KP -812, scroll to **RVON Conn**.
2. Tap the encoder knob to select **RVON Conn**.
   The currently selected connection offer appears in the CWW window. If you have not previously selected the connection, you will see "none".
3. Turn the encoder knob to scroll to the 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.



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

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.

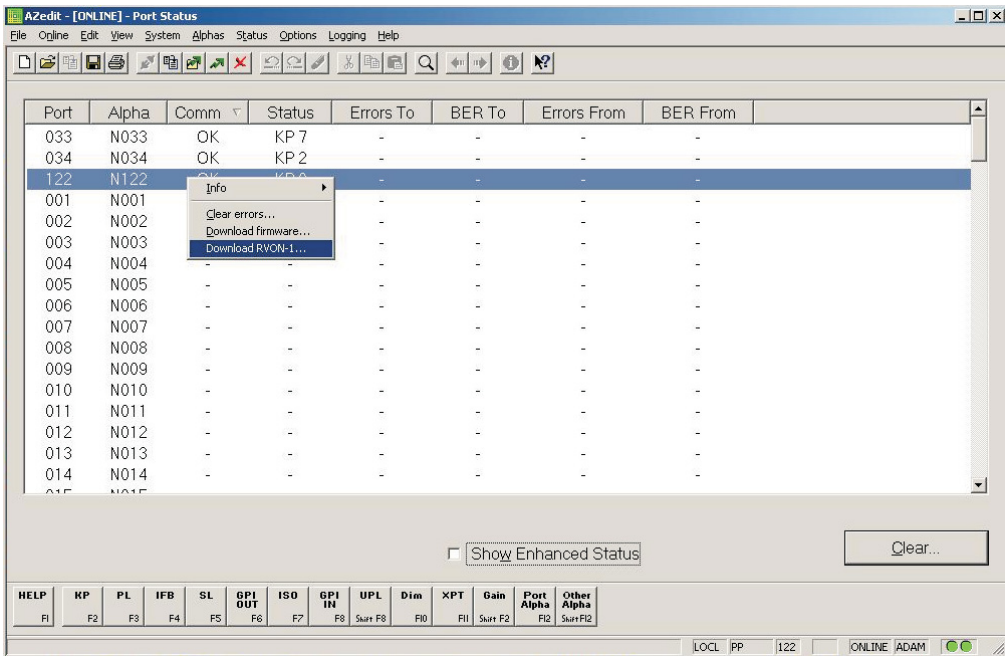
10. Once you are completely finished, click **Apply**.

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.

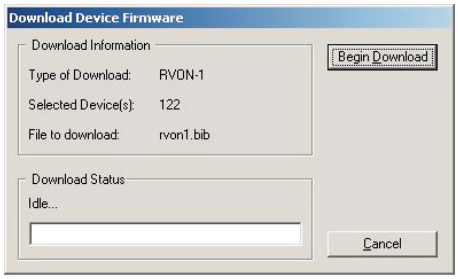
To download the RVON-1 Firmware, do the following:

1. Open **AZedit**.
2. From the Status menu, select **Software Versions** and then **Keypanels**.
   The Keypanel Version screen appears.

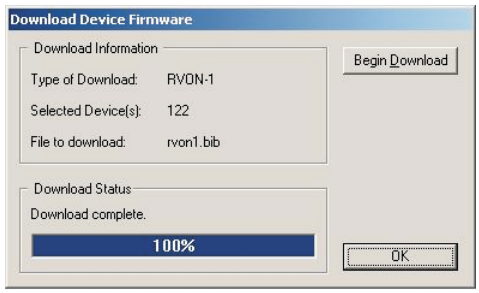


3. On the Keypanel Version screen, select the **Show RVON-1 Versions** check box.
4. Select and right click the **keypanel** which has the RVON-1 installed, and then select **Download RVON-1**.
   The Download Device Firmware screen appears.

5. Using the Browse feature, browse to the **file to be downloaded**.
6. Click **Open**.
   The Download Device Firmware screen appears.



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



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

Basic Network Configuration

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 you 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 you local network administrator.

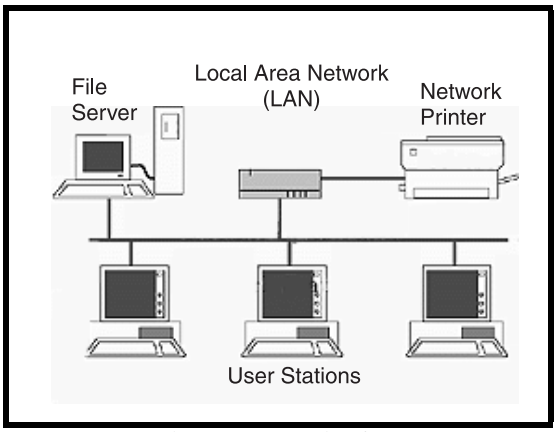


Figure 6. Local Area Network Diagram

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.

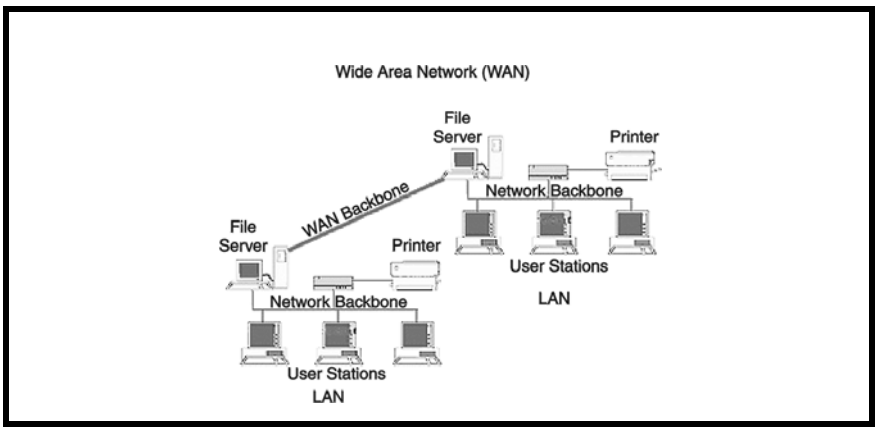


Figure 7. Wide Area Network Diagram

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.

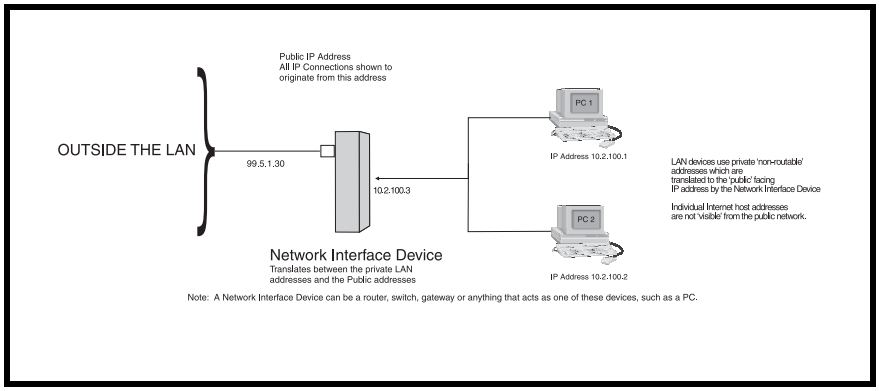


Figure 8. Network Address Translation

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

	Packet before Translation				**Packet after Translation**			
	Source		Destination		Source		Destination	
	IP Address	Port Number	IP Address	Port Number	IP Address	Port Number	IP Address	Port Number
To Internet	10.2.100.2	1031	192.156.136.22	80	99.5.1.30	1031	192.156.136.22	80
From Internet	192.156.136.22	80	99.5.1.30	1031	192.156.136.22	80	10.2.100.2	1031

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

	Packet before Translation				Packet After Translation			
	Source		Destination		Source		Destination	
	IP Address	Port Number	IP Address	Port Number	IP Address	Port Number	IP Address	Port Number
To Internet	10.2.100.1	1031	192.156.136.22	80	99.5.1.30	1032	192.156.136.22	80
From Internet	192.156.136.22	80	99.5.1.30	1032	192.156.136.22	80	10.2.100.1	1031

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

Port Number	Description
1	TCP Port Service Multiplexer (TCPMUX)
5	Remote Job Entry (RJE)
7	ECHO
18	Message Send Protocol (MSP)
20	FTP-Data
21	FTP- Control
23	Telnet
25	Simple Mail Transfer Protocol (SMTP)
29	MSG ICP
37	Time
42	Host Name Server (Nameserv)
43	Whols
49	Login Host Protocol (Login)
53	Domain Name Server (DNS)
69	Trivial File Transfer Protocol (TFTP)
70	Gopher Service
79	Finger
80	HTTP
103	X.400 Standard
108	SNA Gateway Access Server
109	POP2
110	POP3

TABLE 3. Well-Known TCP Port Numbers

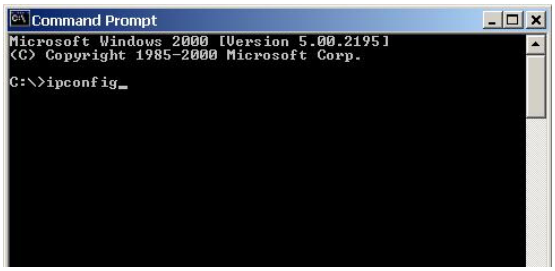
Port Number	Description
115	Simple File Transfer Protocol
118	SQL Services
119	Newsgroup (NNTP)
137	NetBIOS Name Service
139	NetBIOS Datagram Service
143	Interim Mail Access Protocol (IMAP)
150	NetBIOS Session Service
156	SQL Server
161	SNMP
179	Border Gateway Protocol (BGP)
190	Gateway Access Control Protocol (GACP)
194	Internet Relay Chat (IRC)
197	Directory Location Services (DLS)
389	Lightweight Directory Access Protocol (LDAP)
396	Novell Netware over IP
443	HTTPS
444	Simple Network Paging Protocol (SNPP)
445	Microsoft-DS
458	Apple Quick Time
546	DHCP Client
547	DHCP Server
563	SNEWS
569	MSN
1080	Socks

IP ADDRESSES

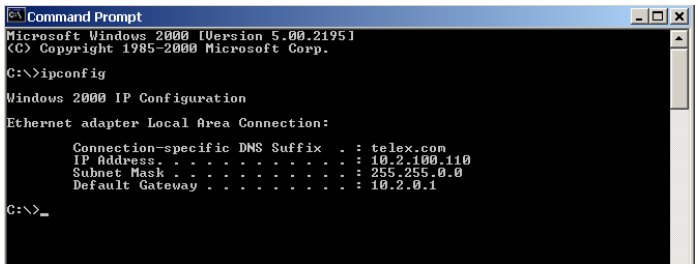
If you do not know your IP Address, you can open a DOS screen in a Windows®- based environment and bring up the ipconfig screen.

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

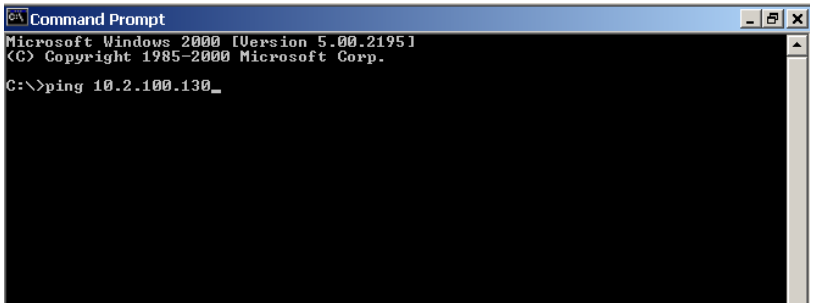
Pinging a computer on the network makes sure it is able to be “seen” and receive messages on the network.

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.

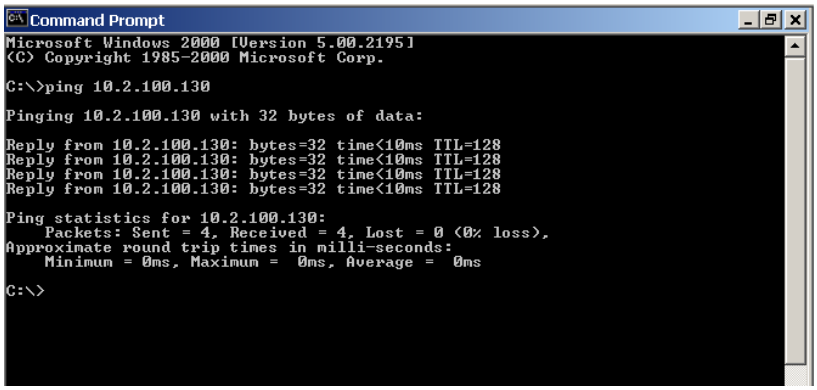
To Ping a computer on the network, do the following:

1. From the Start menu, select **Run...** .

2. At the Run command, type **CMD** to open a **Command Prompt** screen.



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



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.

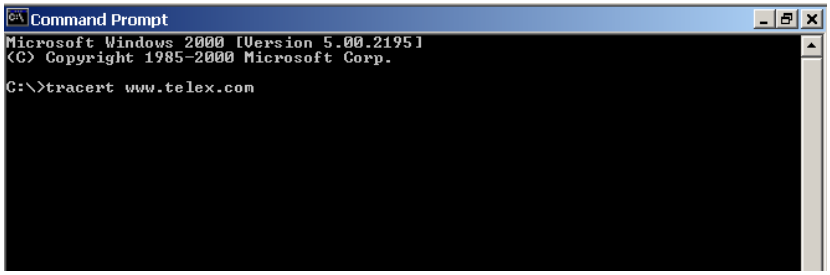
POSSIBLE PITFALL WITH ROUTERS, GATEWAYS, AND SWITCHES

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.

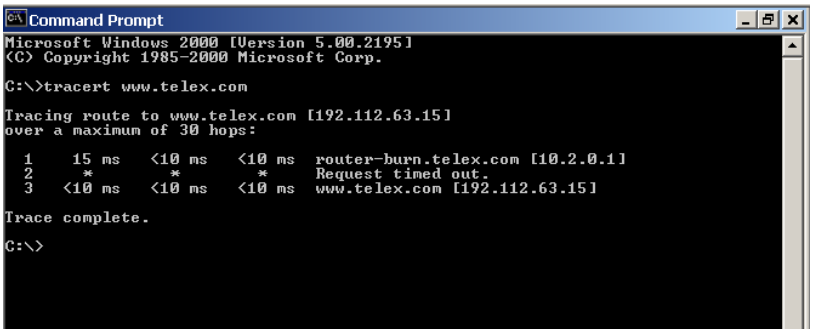
To view the path an IP Address takes to retrieve information, you can execute a tracert from the Command Prompt Screen.

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.



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



NOTE: You will 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.

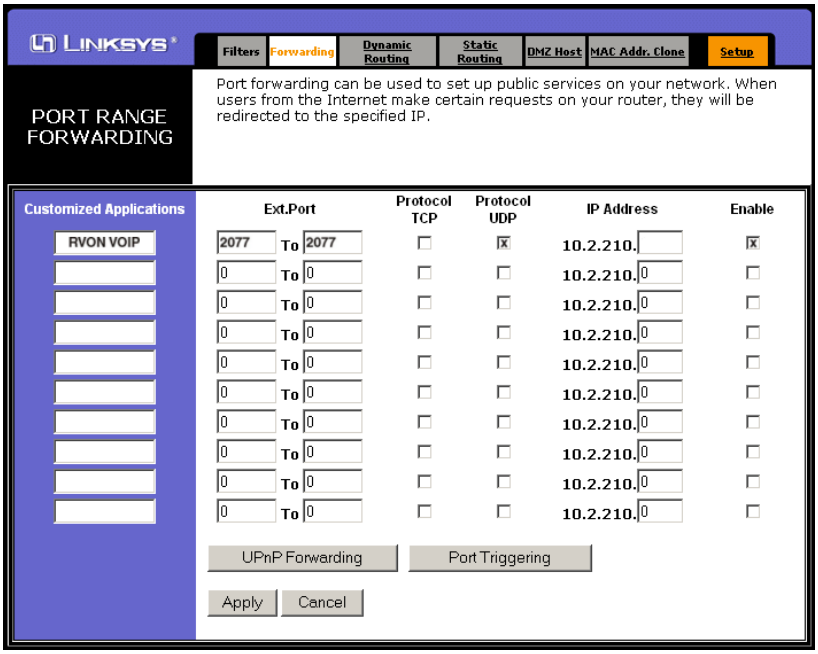
RVON Configuration

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.

Port	Port Description
2076	UDP Call Control Signalling
2077	UDP Audio Packets
2079	UDP Telex Proprietary Signalling
2080	TCP Telex Keypanel Protocol
2081	UDP Pass Through Serial
2082	TCP Firmware Download
2100	Remote Administration
2102	Authentication Server

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.



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.

CHAPTER 5

Telnet & Serial Port Programming

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 DB-9 J2
  The backcard DB-(must be disabled/enabled via a DIP Switch because it can also be used for serial port pass-through. The backcard DB-9 can be used for a debug terminal when DIP switch 6 is switched to the ON position.
- Backcard RJ-45 J1 (Telnet Only)

Setup

Serial Port	38,4000 baud, No-flow control
Telnet	IP Address, port 23

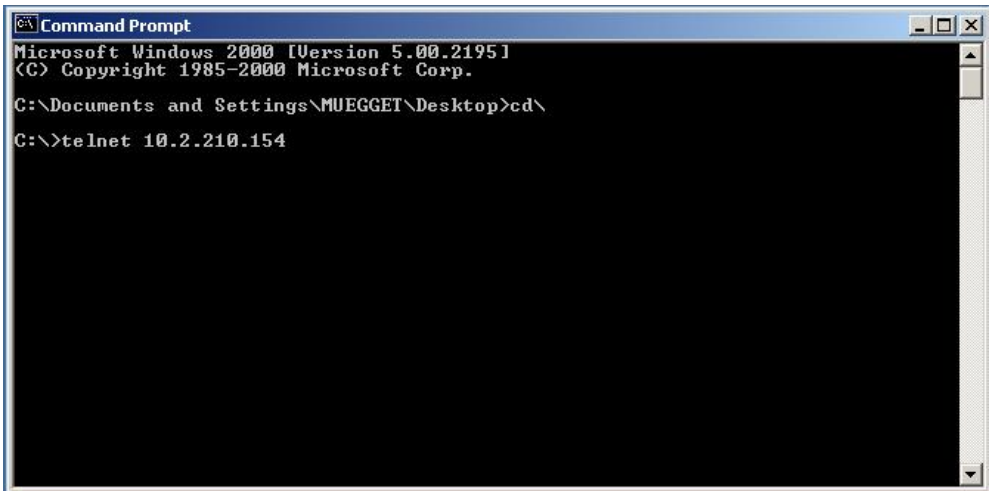
How to Configure the RVON-1 using Telnet

Without access to the physical KP-32 with RVON-1 installed on it, you can still configure the card through the use of Telnet. The following instructions will show you how to access the Telnet screen and show you some of the information you can see and edit.

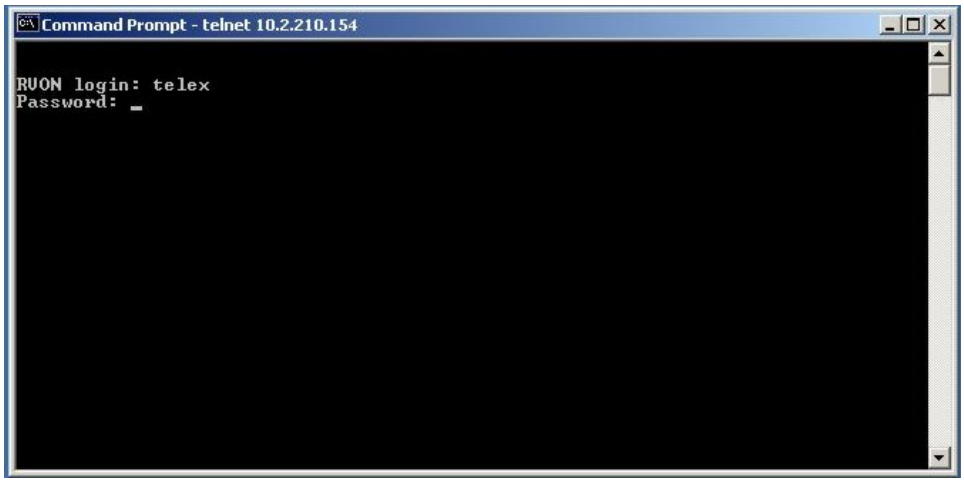
NOTE: These instructions are to help you get to the Telnet screens and give you an overview of what can be done. This is NOT an all inclusive document. Not every action that can be performed are contained within the document.

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).

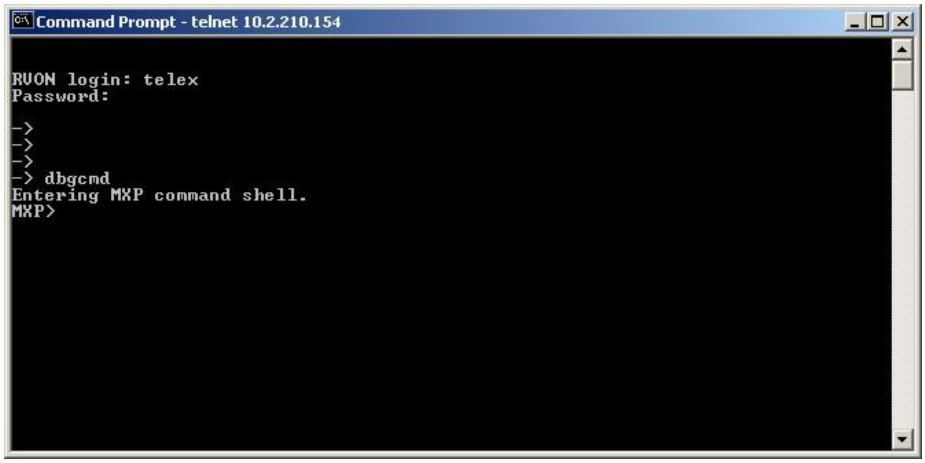


3. Press **Enter**.
   The RVON logon screen appears.

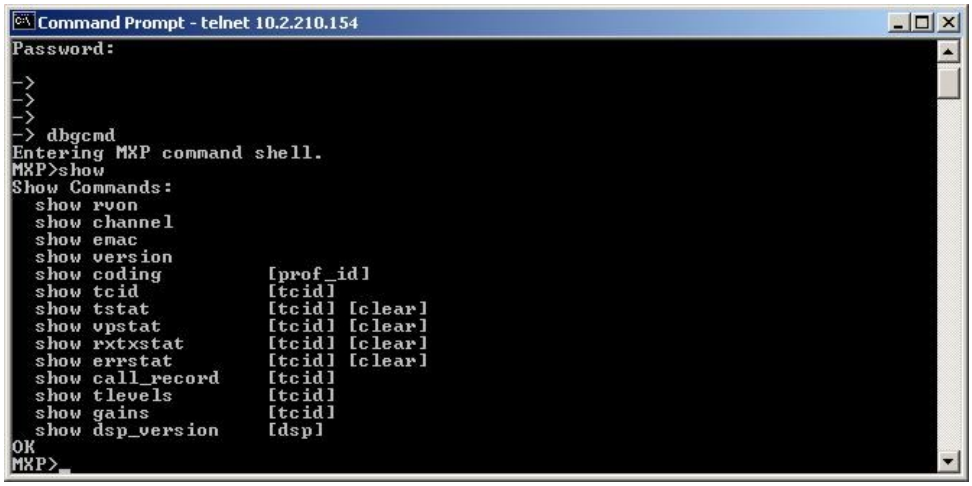


4. In the logon field, type the **RVON logon** (default = telex).
5. Press **Enter**.
6. In the password field, type the **RVON password** (default = password).

7. Press **Enter**.
   A prompt appears.
8. Type **dbgcmd** to access the debug command screens.



9. Press **Enter**.
   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**.

```
MXP>set rvon

RVON CARD RELATED:
  set rvon ip_addr <ip address (x.x.x.x)>
  set rvon netmask <netmask (x.x.x.x)>
  set rvon gateway <default gateway (x.x.x.x)>

  set rvon serial_ip <ip address (x.x.x.x)>
  set rvon serial_baud <baud rate (50-38400)>

  set rvon user <username>
  set rvon password <password (8-40 characters)>

  set rvon vad_threshold <adaptive|value -- In dBm (-20 to 10)>
```

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.

```
MXP>set channel

RVON CHANNEL RELATED:
  set channel [chan] dest_ip <ip address (x.x.x.x)>
  set channel [chan] dest_type <type (0-2), 0=RVON-8, 1=RVON-1, 2=RVON-IO>
  set channel [chan] dest_chan <chan (0-7)>
  set channel [chan] chan_codec <prof_id (0 to (max_prof - 1))>

  set channel [chan] input_gain <gain (-14 to +14 dB)>
  set channel [chan] output_gain <gain (-14 to +14 dB)>

  set channel [chan] onhook
  set channel [chan] offhook
```

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 stat will have no effect (it is already onhook if idle.
set channel offhook	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).

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