Sound-Card Packet

BY DON ROTOLO,* N2IRZ

Packet radio isn't dead yet. It's not even on life support. In fact, AX.25 networks seem to be experiencing somewhat of a rebirth. Although not quite to the level of packet's heyday of the late 1980s, just before the internet, there is more activity out there than you might think.

The Automatic Packet Reporting System ("APRS," a trademark of Bob Bruninga, WB4APR) today consumes a significant portion of the bandwidth being used for AX.25 packet. As a tactical system, it can't be beat, as evidenced by its staying power after some 17 years. If you want to track assets or exchange small amounts of data such as weather reports or short messages, it is an excellent tool. It has proven its value in emergency communications as well.

There are still several large networks out there running FlexNet, TheNET X1J, FPAC, and even ROSE, in many cases supplemented by internet connections via AMPRnet or similar tunneling systems. These networks carry traffic from keyboard-to-keyboard enthusiasts, the Bulletin Board System (BBS) for moving e-mail, and a few chat nodes for online meetings. Most networks also support TCP/IP traffic, allowing for seamless integration with the internet and the resources it offers, particularly software such as MS Outlook® for e-mail.

While many of these networks still run at 1200 baud, sometimes with backbones at 9600 baud, they may be slow but they seem to be a lot more robust than the hastily planned and implemented proliferation of nodes that sprung up 20 years ago. I had written about planning and building networks for reliability and performance, and it seems that these universal lessons learned by commercial network builders has finally caught on with our wireless systems. It's either that, or the effort involved is sufficiently high that people are starting to think carefully about how to best use the limited resources at hand.

One last area where packet is still seeing considerable use is in emergency communications (EmComm). While the very first responders to a disaster can accept lossy communications paths —that is, methods that do not absolutely guarantee error-free communications, such as voice, CW, or even PSK31—after the initial efforts start to solidify into a larger, more coordinated activity, the need for lossless communications (for e-mail, image or data files, and the like) becomes more and more important. PACTOR and the WinLink2000 system are great resources for this, but some are unable to afford a PACTOR III modem, so they turn to AX.25 packet instead. For one approach to using packet effectively for EmComm, see the article "EcomScs and GateWayScs: Easy-to-Use Packet Radio Software for Emergency Communications," by John Blowsky, KB2SCS, elsewhere in this issue.

In the past, when a typical home PC used an 80486 processor running at 33 MHz, packet could only be done with a dedicated piece of hardware known as a Terminal Node Controller, or TNC. Mostly based on the Tucson Amateur Packet Radio (TAPR) TNC-2 implementation, there were several TNCs on the market, all costing about $100 to $150. Today, you can buy a new TNC in some form or another from several companies—including Kantronics, MFJ, PacComm, Coastal Chipworks, Timewave, and Symek (in Germany) —for prices from under $50 (for a kit) to over $200.

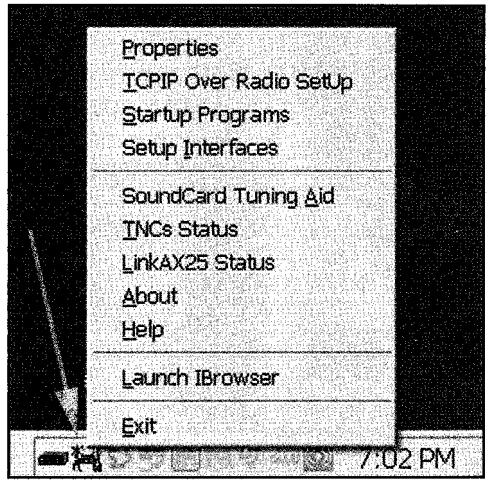

Fig. 1– Once installed, AGWPE drops an icon onto the Windows® system tray, two tiny radio towers connected by a TNC. Right or left clicking this icon brings up a menu, which is used to set up and control the application. Remember that AGWPE is just "middleware," filling the gap between a host program and your radio with a "virtual" TNC, which handles the AX.25 protocol and your sound card. The icon to the left shows up once a virtual TNC is configured.

Today, with multi-GigaHertz processors the norm, we can utilize the power of the personal computer and sound card to replace the hardware TNC. The hardest part is usually the interface between the sound card and the radio, but several companies (such as West Mountain Radio) offer ready-built interfaces from a few dollars and up, or you can build one with components from your junkbox or at most for just a few dollars at RadioShack. More on that in a moment.

If you want a hardware TNC, you can check eBay for used ones (I have seen them sell for as little as $50) or visit your local hamfest (winter is finally over!) and ask around. I'd be surprised if someone there didn't have one gathering dust that they were willing to let go for cheap.

The way I see it, there are four groups of users out there: Those who have tried packet and still use it; those who have tried it but are not active today; those who have never tried it but might like to, and those simply not interested. The remainder of this month's column is for that third group: Here is a way to get on packet and see what the mode has to offer, for cheap. Of course, if you

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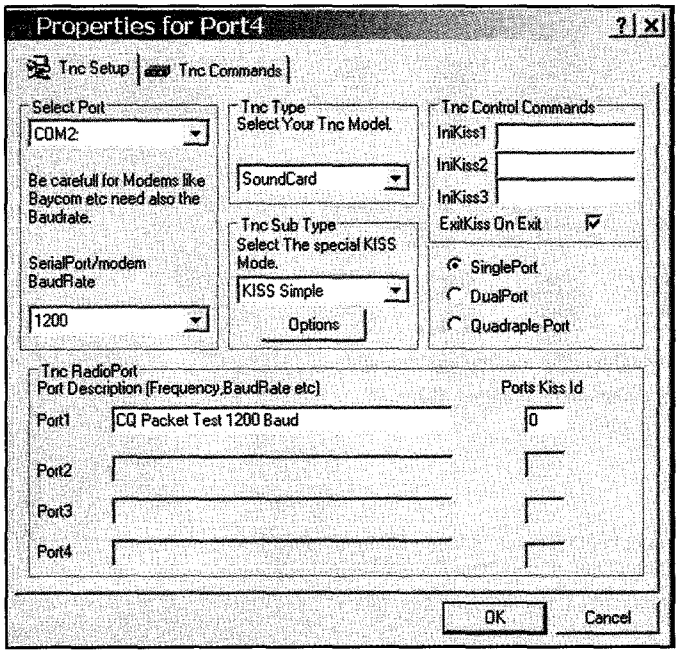

Fig. 2– Each port must be configured before it can be used. Here we see the New Port TNC Setup dialog window. What's important here are the settings for the computer port (here COM1), TNC Model, baud rate, and "Single Port" operation. See the text for details.

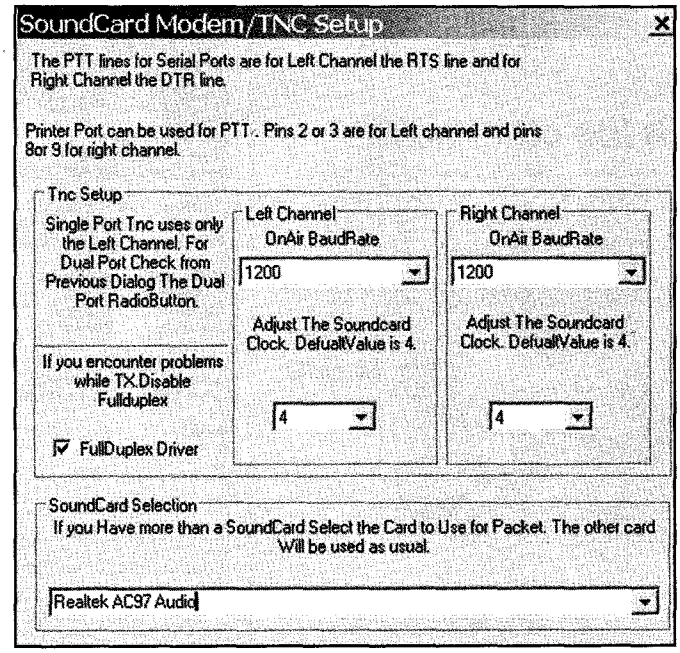

Fig. 3– As soon as "sound card" is selected for TNC type, this window opens. What's important here is the on-air baud rate for the left channel, and that your correct sound card is shown at the very bottom. Once this window is configured, return to the TNC setup window of fig. 2, finish setup, and restart AGWPE to complete setup.

used to operate packet, I also encourage you to either dust off that old TNC and see what's out there, or just follow along to learn more about the sound-card method. Remember, half the fun of packet is operating; the other half is making it work and learning something.

Sound-Card Packet

There are a few pieces of software available that allow you to use your PC and sound card to operate AX.25 packet (*Note:* Some applications may require the use of a hardware TNC). In my December 1999 *CQ VHF* "Digital Data Link" column, I republished an article by John Hansen, W2FS, about using PC/FlexNet's sound-card utility. It also appeared during 1999 in the TAPR *Packet Status Register,* but unfortunately that info isn't available on the internet as far as I can tell. (Note that John is the fellow behind the TNC-X, available from Coastal ChipWorks). A visit to <http://www.afthd.tu-darmstadt.de/~flexnet/> will allow you to download all the files and instructions to make this happen, but just be advised that it is like using a bazooka to kill a fly, as FlexNet is a serious network application,and using it for its TNC emulator is a bit of overkill.

A web search brings up a few other entries, but the uncontested leader in this area is AGWPE, the AGW Packet Engine written by George Rossopoulos, SV2AGW. This is not a full TNC in itself, as it requires a user interface (such as a terminal emulator or other "host" application). There are several such applications available, ranging from the Sproul Brothers' WinAPRS <http://www.winaprs.com/> to Roger Barker's, G4IDE (SK) WinPack and UI-View <http://www.apritch.myby.co.uk/uiv32.htm>, as well as several other applications such as DX Clusters, digipeaters, network nodes, and more. I'll explain where to find these applications in a moment.

Let's just take a quick look at getting, configuring, and using the software, and then learn about an excellent online resource with far greater detail on these topics.

There are five basic steps to using AGWPE: Download the software; configure it; buy or build a radio sound-card interface; set up your sound card; and set up some kind of "host" program. Once complete, you can also configure AGWPE for TCP/IP operation, as well as for a second radio on the same sound card.

You can download the free AGWPE software at <http://www.sv2agw.com/>, where you can also find a link to the PacketEngine Pro version which offers several advantages over the free program, including a setup wizard, more efficient operation, a better user interface, and several new features such as radio port sharing and alternative KAM-style tones for HF packet. It comes with a 30-day free trial, after which a registration fee of $49 is necessary. We'll stick with the free version this month.

Installation is as simple as unzipping the downloaded file. Double-click the "AGW Packet Engine.exe" file that unzips, agree to the license, and the AGWPE icon will appear on the system tray. In the future, you may want to add an icon to your desktop, but most host applications automatically call up AGWPE as necessary.

Configuring the free AGWPE software is not difficult either: Right- or left-click on the icon in the system tray and select "Properties" and then click on the "New Port" button. Click OK (but ignore for now) in the window reminding you to restart the program, and then select the serial or parallel port which will be used to control the radio's Push-To-Talk (PTT), for example COM1. (If you want to operate in receive only, without PTT control, you may select a nonexistent parallel port .) Next set the on-air baud rate to 1200. For "TNC Type" select Sound Card, and in the window that immediately opens verify that channel 1 is set to 1200 baud and your sound card is

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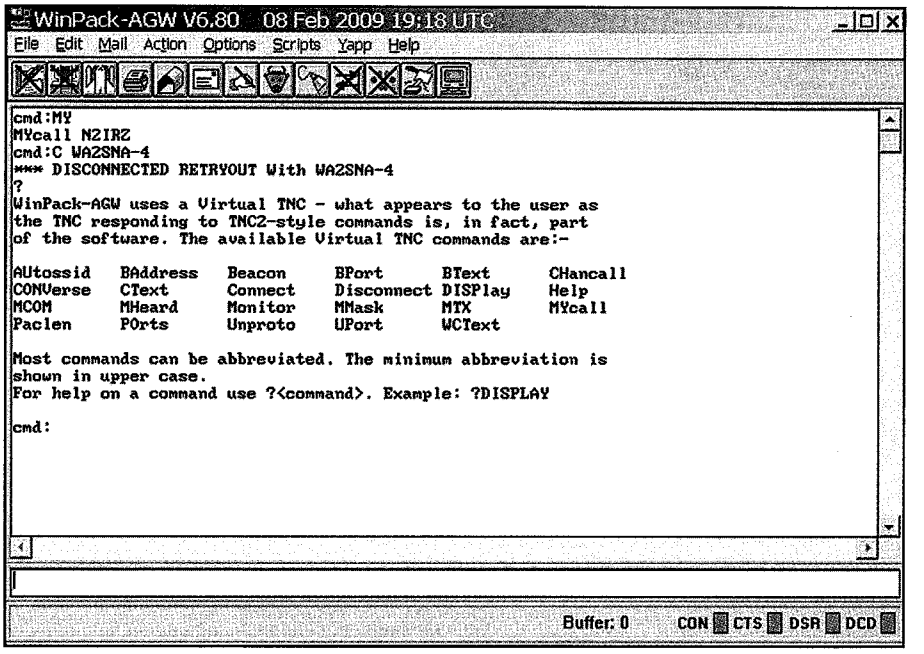

Fig. 4– The main screen of WinPack, a typical "Host Program" that utilizes AGWPE. There are several other such host programs available, including WinAPRS and more specialized applications such as DX Clusters, network nodes, and more. Here I issued the commands to verify my callsign setting, and attempted to connect to a local Bulletin Board system WA2SNA-4 (which timed out) and the WinPack help file.

listed. If you have more than one sound card, select the one you want to use here and then click OK. With the TNC setup window open again, click on the "Single Port" setting and give the TNC/Radio Port a helpful description.

Now exit AGWPE before doing anything else. If you don't, the software may behave erratically or shut down unexpectedly. Restart AGWPE to continue.

Note that you can also set up AGWPE for two radios, even operating at different baud rates, if you have a stereo sound card (and who doesn't?). In this case, the left channel is for one radio and the right channel for the other. That's a task for later, once the first port works properly.

You may already have a sound-card-radio interface, used to control the radio's PTT and get the audio to and from the radio, and if so it will work fine with AGWPE. As an alternative, an interface can be built for a few dollars from commonly available parts, or you can buy one for a reasonable price. Take a look at the RigBlaster line from West Mountain Radio <http://www.westmountainradio.com/>; the Rascal GLX from BuxComm <http://www.packetradio.com/>; The SignaLink from Tigertronics <http://www.tigertronics.com/>; MFJ's 1273, 1275, and 1279 interfaces <http://www.mfjenterprises.com> (look under "Computer Accessories"), and the MixW RigExpert <http://www.mixw.net/> (look toward the bottom of the page).

For those who prefer to build their PTT interface, visit the MixW web page mentioned above or <http://www.w5bbr.com/soundbd.html> for simple circuits you can build. You may also need two 3.5-mm phono "patch" cables, such as RadioShack #42-2387 or similar for the transmit and receive audio. Connect the sound-card interface according to the instructions.

Now you should configure the sound-card audio levels. The Receive Audio (RXA) from the radio going in to the sound card needs to be connected to Line In. Then you need to set the audio level so the AGWPE software is decoding it happily, somewhere around one-third full volume, using the Sound Card Tuning Aid. If you must use a different sound card input, then you'll have to set the RXA level using the Windows® sound-card settings window—double click on the speaker icon in the Windows system tray.

The Transmit Audio (TXA) from the sound card to the radio input is a critical setting. If it is even slightly too "loud," your packets will not be readable by other stations. It is better to set TX Audio too low than too high. If possible, listen to the transmitted audio on another radio, and set the audio so the packet

tones sound musical and not at all harsh or raspy. If you have a deviation meter, the ideal is 3.5 kHz peak deviation. Again, use the AGWPE Sound Card Tuning Aid and transmit into a dummy load for this step.

Last, we need to select a Host application and set it up. I downloaded and installed WinPack <http://www.apritch.myby.co.uk/uiv32.htm>, which offers a decent terminal emulator. Note that registration is optional. After running the self-installer and starting the application, I selected "Comms Setup" from the Options menu and set the Host Mode to "AGW" and then I completed my Personal/BBS Info to set my on-air callsign. Assuming that AGW is properly set up, you should start seeing monitored packets appear on the screen (try around 145.01/.03 or 144.39 to see activity). Try connecting to a station that you hear (indicated on the screen by an asterisk) by typing "C N2IRZ" (substitute the call you hear for mine), and see what happens. If it is a live person, he or she can see your messages and respond; if it is an automated station, typing "?" will usually bring up a help file. For an application such as EcomSCS (see elsewhere in this issue), the connection to the local mail server/BBS is automated.

The above description is admittedly somewhat general and abbreviated, so you will almost certainly have to think a little about what you are trying to accomplish and set about the task accordingly. This process is similar to other digital sound-card modes, such as PSK31, so I am hoping it is at least familiar to you. For a very detailed, step-by-step guide to setting up AGWPE and some troubleshooting tips, visit the Sound Card packet web page built by Ralph Milnes, KC2RLM, at <http://www.kc2rlm.info/soundcardpacket/>. This is an excellent resource and the basic reference I used to learn about AGWPE when preparing this column. It also covers setup for TCP/IP operation, which I was unable to try. This website covers in great detail all the aspects of using AGWPE and a host program, so I urge you to visit and see what is there.

I hope this brief introduction piques your interest in packet radio. If you have any questions, please feel free to write and ask. CQ's "Getting Started in Packet Radio" video is still available as part of the "VHF Specialty Pack" DVD (call or visit the CQ store online). You can also ask around locally to learn what network facilities are available, or scan the internet for info. I hope to see you on the air! Until next time . . . 73, Don, N2IRZ

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