Sound Card Packet

by **Ralph Milnes, KC2RLM**

last updated: 09/27/2004 **What's new on the site?**

Information on this site is also available in PDF files (English only)

Most recent AGWPE version available is: 2003.308 (Mar. 8, 2003)

This amateur radio web site explains how to use the AGWPE utility program to send and receive packet using the *sound card* of your PC instead of a TNC. It offers:

- instructions for configuring AGWPE, Windows, and some compatible packet programs
- advice about building or buying a sound card-to-radio interface
- troubleshooting advice

Introduction

The key to sound card packet is a **free** utility called **AGWPE.** AGWPE, which stands for " **AGW's P**acket **E**ngine", was written by George Rossopoulos, SV2AGW. AGWPE was originally written as a TNC management utility which has many super features of interest to packet users, but this web site deals primarily with its ability to encode and decode packet tones using your *computer sound card*. AGWPE is the only program that I know of that can do this, other than MixW and Flexnet32.

AGWPE is particularly adept in acting as a server (or host) program for client programs that don't have sound card modem capabilities of their own.

Packet Engine Pro: In June 2003, George SV2AGW released a new program, **Packet Engine Pro**, based on the original, freeware AGWPE program. The 'Pro' version:

- runs more efficiently
- has an improved interface
- has a setup 'Wizard' that simplifies new sound card (and TNC) configuration
- has several new features, such as Radio Port Sharing
- for Windows XP users, allows PTT control via the parallel port and has support for YAM modems -- features not found in AGWPE.

The Pro version costs $49 US after a free 30 day trial period, and it will work with any program that works with the AGWPE freeware version.

Why use a sound card instead of a real TNC? First of all, it can be much cheaper. You only need to obtain a sound card interface, which is a set of cables to connect your sound card to your radio. Interfaces can be made for a few dollars or purchased for as little as $30-40 US, while the cheapest external TNC costs at least 100 US. And if you use the stereo qualities of the sound card to simulate two TNCs, so you could be saving the cost of two TNCs! Other good reasons are that an interface is lighter and less bulky than a TNC and an interface usually doesn't require external power.

In addition, the program author, George SV2AGW, claims that the AGWPE soundcard modem gives better results than a TNC . George says the 300 baud HF modem is so sensitive that it decodes packets you cannot hear; the 1200 baud modem can decode packets even with S3 or less signal strength; and the 9600 baud modem is better than the original G3RUH. (But to be fair, other users claim they get better results with a TNC.)

Note that most packet programs will *not* work with AGWPE. Only **compatible programs** that have been specifically written to take advantage of AGWPE's host services will work, but there are several good ones.

The sound card features of AGWPE should work with most 16 or 32-bit sound cards, although it will not run on all cards. You should also have up-to-date drivers for your sound card; see **compatible sound cards**.

AGWPE will run in Windows 95, 98, ME, XP and 2000. It will *not* run in plain old DOS or Windows 3.1 or NT 4.0.

There is no specific minimum required processor speed. Some users have used it on a 486, but other users have found it will not run on a Pentium I without MMX. See **More About AGWPE** for more information about processor requirements.

AGWPE will allow you to:

- Use "on air" baud rates of 300 (HF), 1200, 2400, and 9600. (See the **Baud Rates and Modes** page for additional info about 300 baud SSB operations and 9600 FSK operations.)

- Use the stereo (2 channel) features of your sound card to **connect to two radios** on different frequencies at the same time using one sound card.
- **Install additional sound cards** that can be used exclusively for sound card packet. Your first sound card can then be used by Windows for other sound-producing programs and devices, such as your CD player.
- Use a **Sound Card Tuning Aid** feature for accurately tuning signals, particularly on HF, and for setting the correct RX (receive) audio volume.
- **Access AGWPE remotely** over a network or the internet!

Getting AGWPE to work correctly can be tricky, since you'll need a radio-to-computer interface with 3 wires and some circuitry, **plus** you'll need to configure three different programs correctly -- Windows, AGWPE, and your packet application. Hence, this web site. (Note that the AGWPE **Help** file included with the program is becoming out of date; in some cases it is wrong. George is so busy programming, it's hard for him to find time to fix the Help file!)

There are 5 basic steps in getting AGWPE and your sound card to handle packet. These steps are discussed in 5 different sections on this site:

1. Install and configure the AGWPE program.
2. Build or buy a radio-to-soundcard interface -- one wire each for RX, TX, and PTT.
3. Configure Windows
4. Setup client applications to work with AGWPE
5. Troubleshoot problems - but hopefully this won't be necessary.

If you get hung up, you can **e-mail me, KC2RLM**. I'll try to answer your questions, but I won't pretend to be the complete AGWPE sound card expert. I'm more of a technical writer than a technician. In fact, if you find any errors or omissions on these pages, please **let me know**. For the best troubleshooting help, I suggest you **subscribe to a special AGWPE Yahoo Group email list** to ask for help from other AGWPE users and even the author, George, SV2AGW.

> **Download This Web Site in PDF files** (English Only ... sorry)
>
> You can get all the pages of this "Sound Card Packet" web site in an Adobe Acrobat PDF file. **Go to the PDF File List page** to select what you need.

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Sound Card Packet

More About AGWPE

Background
Other AGWPE features
Hardware requirements (processor, RAM, etc)
Compatible Sound Cards
Compatible Packet Programs
Baud Rates and Operating Modes

Background

This web site discusses only the sound card features of AGWPE, but AGWPE was originally written as a multi-TNC management utility. Before AGWPE, a packet device such as a TNC (Terminal Node Controller) or radio modem could only be used by one program at a time. Likewise, a packet program could only use one packet device at a time. AGWPE changed all that. It lets a program access multiple packet devices at one time, and lets a packet device be shared by multiple programs at one time.

AGWPE performs this magic by placing TNCs in KISS mode and assuming responsibility for handling most of the logic functions built into the TNC. The TNC is left to handle just tone modulation/demodulation, or modem, functions. AGWPE also works with radio modems, such as the YAM and Baycom, which already lack logic functions and must rely on the logic functions of a control program such as AGWPE. In time, the program author, George SV2AGW, realized that a computer sound card could emulate all the functions of a radio modem, so he added the logic in AGWPE that allows a sound card to act as a radio modem.

For AGWPE to work with packet programs, the program must have an option to use AGWPE for TNC control functions, i.e. the program becomes a client of AGWPE, the host. Many program authors have added this option to their programs because AGWPE relieves them of the need to write all the programming code that would be needed to control many different possible packet devices. It's much easier to let AGWPE do it!

To use AGWPE and its TNC management services, authors only need add a simple link to AGWPE using either the Windows DDE Manager (Dynamic Data Exchange) or, better yet, the Windows TCP/IP Socket interface, which permits *network* access to AGWPE. (Program authors: see open development information).

Note that when a packet program is using AGWPE's host mode, any settings that may be in the packet program to control a TNC or radio modem are usually no longer functional since AGWPE is now controlling the device.

Other AGWPE Features

To learn more about AGWPE's super capabilities, I suggest you read the info pages at the AGWPE web site and the program's integrated Help files (Help is on the AGWPE popup menu). Then explore the program's various menu options. For example, you'll discover that:

- AGWPE can automatically launch your packet programs after it loads - from the AGWPE menu select **Startup Programs**
- AGWPE will automatically adjust TNC timing parameters as it senses packet traffic on the frequency (although you can over-ride this) - from the AGWPE menu select **Properties** and then the **TNC Commands tab.**

- You can <u>use a network or the internet to tie into the feed from a remote TNC running under AGWPE</u> providing your packet program can link to the remote computer and AGWPE via TCP/IP protocols

- There is a special <u>"TCP/IP Over Radio" feature</u> which allows you to use packet radio to create a wireless TCP/IP network to exchange email, surf the web, etc. For example, with this feature a station with internet access could provide internet access to a station that doesn't have it. **Note**: there is a fee for this feature, however.

- AGWPE can direct specific packets to specific AGW-written programs. For example BBS packets can be directed only to the AGWTerm program, while DX cluster packets can be directed only to the AGWcluster program. The secret? Using a different callsign SSID in each program, e.g. KC2RLM-2 for AGWTerm and KC2RLM-3 for AGWClusters.)

- You can <u>access and control AGWPE from a remote computer</u> on your network or even over the internet.

AGWPE Hardware Requirements

It's impossible to give a definite minimum requirements for running AGWPE. There are many variables that have an effect on operations including processor speed and type, RAM, video card, sound card, sound card drivers, etc.

George SV2AGW, the program author, wrote once: It depends on what you are using, but generally the minimum requirements are Pentium 100MHZ and 64MB RAM and Win98SE.

Note that Win95 has been a problem for George, and even Microsoft has now stopped supporting it. So, if you haven't upgraded, you might want to consider it. Future versions of AGWPE may not be compatible.

Here's a posting from one user successfully running AGWPE on a 486 66 MHz computer with Windows 95 and 28 MB of RAM:

"For 1200 baud AFSK digital signal processing (DSP) algorithms (i.e. packet) you do **not** need a lot of CPU power. If you're into real time video processing, yes, but in general a 486/66 is plenty for the DSP algorithms used in packet radio. Thomas Sailer who developed the algorithms considers a 486/66 as a minimum.

"Also, keep in mind that even at a 44KHz sampling rate and at 16-bit resolution, you only need 88Kb to store 1 second of audio. The applications that we are talking about do not store huge amount of data, so a lot of RAM is not necessary for these applications. The only reason you might want to consider more RAM is to keep Windows running at a reasonable speed, leave more processing resources for user space algorithms, and prevent your packet applications from being swapped out to the swap file on the hard drive."

"The real problem is how Windows handles resources, and how the drivers are being accessed by the applications. George mentions this on his web site. At this time I have AGWPE running on a small 486/66/28Mb/Win95 with no problem. I can surf the net and start other applications with no problem. WinAPRS and AGWPE keep humming."

And paraphrasing Stephen: "I run AGWPE very nicely on a mere classic Pentium MMX 166. If I put a P200 chip without MMX in the same machine, it won't run AGWPE reliably. Ham sound card programs are one of the few real-world applications where MMX actually does make a difference. In nearly every case, the presence or absence of MMX is the critical processor "horsepower" threshold that determines whether a sound card application will run or not. By the way, all Pentiums after the original "Pentium with MMX", in other words, all P-II, P-III, and P4 processors incorporate the MMX instruction set as a matter of course."

Compatible Sound Cards

AGWPE will work with most 16-bit or better sound cards, but not all. For more information, see the **Sound Cards** page on this site.

Compatible Programs

AGWPE will work with dozens of Windows program, but not DOS, UNIX or Mac programs (at least none that I know of). On the **Compatible Packet Programs** page on this site, there is a partial listing of programs that will link to AGWPE. For some of those programs, there is also an AGWPE configuration help page on this site. Just click on the "**yes**" next to a program's name.

Baud Rates and Operating Modes

AGWPE handles baud rates of 300 (HF), 1200, 2400, and 9600. The **Baud Rates and Operating Modes** has additional advice about operating at those baud rates.

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AGWPE and Sound Cards

AGWPE will work with most 16-bit and 32-bit sound cards, but not all. You are likely to have less problems with a newer PCI-bus sound card.

This site does not maintain a list of sound cards that "will not work with AGWPE", mostly because it would be hard to say definitely that the card was the problem, as opposed to the card's driver, or interface, or signal, or interference, or operator problem. Reports of "receive" problems with some versions of on-board/integrated sound "cards" are, however, common. (Generally speaking, laptops do not have high quality sound "cards". Many have poor SNR (signal-to-noise ratio) due to large amounts of background noise picked up from the hard drive, various buses, etc., and this makes reception and decoding of packet signal difficult. Transmitting is less of a problem).

George SV2AGW the program author has reported that some cards, such as the first versions of the SoundBlaster PCI128, have trouble with stereo channels, so you can only use them in AGWPE's **Single Port** sound card mode. He also found that the SoundBlaster SB16 inverts the channels during transmission -- if you send something to the left channel it will end up on the right channel.

Some older ISA cards are not **Full duplex**-capable and are troublesome. **Full Duplex** means a card can playback while recording.   Imagine this situation: AGWPE wants to transmit, so it uses the sound card to listen to the frequency, hears that it is clear and, using the slottime/persist algorithm, picks a time to start the transmission. In full duplex mode, the transmission would start immediately. But if the card is not full duplex-capable, AGWPE has to tell the soundcard to stop recording (listening) and wait for the soundcard to finish recording and switch to playback. This is important for packet, since RX-TX switching times are critical. Card that are not Full Duplex-capable will usually have problems maintaining a connection with another station and may just stop working with AGWPE a few hours. For more information about FULL DUPLEX testing, visit the Problems with Packet Connections page

Some users have reported their cards that will work with other sound card programs, such as MixW or Digipan, but not with AGWPE. George SV2AGW, the program author, says that one explanation may be that AGWPE uses the sound card in STEREO mode and at 22050 or 44100Khz sampling rates. Other programs use it only in MONO mode at a lower 11025 kHz sampling rate. The higher demands of AGWPE and packet may be too much for some cards/drivers/CPUs.

So, it's not uncommon to have a sound card problem, but most sound cards should be compatible with AGWPE.

Problems?

If you experience problems that may be related to your sound card:

1. Temporarily plug in your speakers to the LINE IN jack, so you hear your packets. If your computer/or driver is not fast enough, you will here interruptions or

stuttering on the packet stream. In that case use only the left sound card channel in AGWPE. Also, set your VGA card accelerator a click below full level and adjust your soundcard sampling rate and quality until you find an optimum setting.

2. Make sure you have the most recent drivers of the card for your version of Windows. Those drivers should be on the card manufacturer's web site (as opposed to the computer manufacturer's site) or, for on-board sound "cards", contact the mother board manufacturer.

3.
Another thing that you must have in mind is IRQ sharing. When your computer starts watch what IRQ assigns to Soundcard and if this IRQ is used by another device. If this is the case adjust from bios and or change the pci slot where your soundcard is.

2. Other possible fixes reported by users are:

- **upgrade to a newer version of Windows**

- **for Win98SE and later try the VXD drivers for Win95/98OEM instead of the WDM drivers** see 1 below

- **Remove conflicting devices or drivers that access the sound card or its IRQ setting, e.g. the Philips WebCam audio driver was reported to be a problem. Use the BIOS or Windows to change the IRQ settings or ...**

- **plug the card into a different slot on the computer** see 2 below

- **contact the sound card manufacturer directly and ask for a "raw" driver that might fix the problem. You can determine what soundcard chipset is being used in on-board, built-in sound "cards" with the Windows Control Panel Device Manager. You can then possibly go to the motherboard maker's website -- not the computer maker's -- and download a driver for that particular chip and your version of Windows.** see 3 below

3. If the card still will not work, install a second sound card. For desktops, you can purchase an inexpensive but compatible sound card for about $30 US. Or look for "used" cards at hamfests, computer stores, and in discarded computers. There are also now USB sound cards, which may be an attractive option for a notebook computer. Note that Windows and AGWPE will support multiple sound cards, so you can continue using the original card for playing CDs, Windows' sounds, etc., while the second card can be used exclusively for AGWPE.

4. You can try using [MixW's TNC emulation mode](#) if your sound card will not work with AGWPE. If MixW works with the sound card, install the MixW virtual serial port emulation drivers mentioned on that page. Your application programs or AGWPE can then hook to one of the virtual serial ports and thus to MixW and its packet modems. So you could use MixW for the TNC modem and still use AGWPE's hosting services to share the MixW modem with multiple programs while it also manages any other "real" TNCs.

Remember, if your sound card won't work with AGWPE, it's not really AGWPE's fault. AGWPE uses Windows to do the actual hardware reading and writing in

conjunction with the sound card's Windows device driver. In fact, it is the driver that has the hardware specific code in it, not Windows or AGWPE. With a well-written driver linking the sound card to Windows, a Windows program like AGWPE can operate under different versions of Windows and work with a wide range of sound cards without any sound card-specific program code. Since AGWPE doesn't link to the card directly, there is no way to add a "fix" in AGWPE for your card. AGWPE expects a sound card to have basic features and behaviors. Most cards do. Those that don't are the problem. (This is a bit of an oversimplification, but I hope you get the picture.)

For more information about sound cards in general, visit this site:

http://www.epanorama.net/links/pc_sound.html

Some programs to test your sound card are:

> Right Mark Audio Analyzer http://audio.rightmark.org/index_new.shtml
> Sound Check   http://www.passmark.com/products/soundcheck.htm

[I have not worked with these programs, so I can't advise you about how to perform card tests or what to test for. Email me if you come up with some simple instructions for using either program.]

Footnotes:

[1] Chris has advice for installing VXD drivers instead of WDM drivers in Win98SE/WinME:

I will not take credit for this. These fixes came from this group, the net and from a little experimenting.

It seems that many of us are using sound cards with Windows operating systems of 98SE and beyond. I see that WIN95 and the WIN98 doesn't have as much problems as the others systems. I'm not sure about XP, but I do work with the other operating systems.

I tried this on 3 computers and ran 98SE, ME, 2000 on these computers to check the drivers. If you have Win98SE, ME or 2000 and are having receiving problems.... check and see what drivers you are running for the sound card. You may need to run the VXD drivers, and not the WDM type (used by 98SE and above). Here are the steps to find out what driver you have:

1: On the desktop, right-click the "My Computer" and select "properties"

2: Click on the "Device Manager" tab.

3: Scroll down until you see "Audio (or Sound), video and game controllers" and click the "+" sign to expand it if it isn't expanded already.

4: Look to see if the audio driver (usually the first one) states WDM in it's name or any of it's associated files.

> (a) If your files don't say anything, then click the the audio driver and select the "Properties" button.
> (b) On the new pop-up window select the tab "Drivers"

(c) If this doesn't say WDM on anything (which is rare), then click the button "Driver File Details...".

(d) If you have any drivers in the WINDOWS\SYSTEM32\DRIVERS directory, then assume they are WDM.

If you do have WDM drivers, you might try downloading and using the WIN95 drivers. These drivers are VXD type. You may have noticed that some of your drivers may say VXD, but that may not be the case as I found out.

You may be able to remove your existing drivers with an un-install program or my manually removing them. I recommend removing these files with the supplied un-install program if possible. Even with the uninstall program, you may have to remove the INF file in the WINDOWS\INF directory. You will need to know the INF file name.

Download the drivers for Windows 95 for your specific sound card. The reason I mention downloading is that most supplied sound card drivers on the disk/CD that came with the card are already out of date. Better to get the latest version. Remember WHERE you stored the driver. I recommend making a directory in your root drive called AUDIO and storing your driver file there on download. Then make sure you unzip, expand or whatever is required to that directory as well.

After you do this, it is recommended that you reboot the computer.

Once you do this, windows will boot up and state that it has found some new hardware or sound card. Tell windows WHERE you placed your driver, rather than having it search for the driver. If you let it search, it will load the WDM drivers and you will have to start all over again.

Hope this helps... Chris N0TTW

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2 Ramon reported "My video card is an AGP card located in the AGP slot. Now it seems, that often (because of the lack of interrupt), the AGP card shares resources with PCI Slot 1, which is the PCI slot next to the AGP slot in many systems. I read somewhere, that the first thing to try is moving any card from PCI slot 1.

So I moved my second audio card (for PSK31) from slot 1 to slot 6. I booted the computer, and it looks already a lot more stable after about 18 hours uptime. Note, that this was pure "trial and error", and that I didn't confirm that the IRQ overlap was a problem. If you have a rewriting problem, you could try this and see if it helps."

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3 The Via website says: install onboard sound drivers provided by (your) motherboard manufacturer in preference to these (generic) audio drivers. This is because of the ID process in the Microsoft certification guidelines. Microsoft require a four part ID for PnP device drivers. If VIA has not received the appropriate ID from motherboard manufacturers, then the drivers from this package will use the generic ID instead. In some instances users may receive an error message or may even not be able to install the drivers. If this occurs, please contact your motherboard manufacturer for updated AC97 drivers.

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What's New on this Site?

Some users have asked that I identify changes to the site to help them determine if anything new is pertinent to them, either on the site or in the PDF file:

24 September 2004
1. Major editing and reorganization of website
2. Major overhaul of the **"Problems?"** pages on troubleshooting
3. Added and corrected information about **9600 baud operations**
4. Numerous minor deletions, additions and corrections
5. Added information about configuring the **TCP/IP Over Radio** feature
6. Added "**Tips and Tricks**" and info on "**Traffic Parameters**"
7. Added page about interfacing **MixW** with AGPWE.
8. Added option to download parts of **PDF file or complete site in HTML format**
9. Changed primary web site host to former mirror site; not using QSL because of chronic slowness
10. Added eight-language translator option (AltaVista Babel Fish) at top of **home page**

1 June2004
Added info on **configuring XASTIR for AGWPE**

19 November 2003
Changed URL of mirror site; changed email address for author.

6 August 2003
1. Changed the page formatting so pages will better fill the screen and the left margin menu doesn't wrap on resolutions greater than 800x600 (I hope).
2. Minor changes in the "AGWPE on a Network" page

3 June 2003
1. Added info on running AGWPE with **HamScope** and **Radio Mobile Deluxe**.
2. Added information about AGWPE Pro version.
3. Updated the PDF file.

13 April 2003

1. New version of AGWPE released 2003.308
2. Additional cable interface vendors added
3. New troubleshooting fixes added

25 Nov 2002

Changed web site to reflect changes in Version 2002.1120:
1. On AGWPE's Sound Card Modem/TNC Setup window:
    a. Added switch to stop full duplex use on sound cards
    b. Added switch to change sound card receive sensitivity
2. On AGWPE's Sound Card Tuning window, new Set Volume button
   leads to new Sound Card Volume Settings window to:
    a. set TX and RX volume of sound card directly (without going
       to Window's Sound Card Volume Control program)
    b. set RX input source (jack) and mute other sources
    c. tell AGWPE to restore previous volume settings on exit

7 Oct 2002

1. Added page explaining how to interface with AGWPE over a network.

30 Sept 2002

1. Added new European vendor of pre-assembled sound card
interfaces
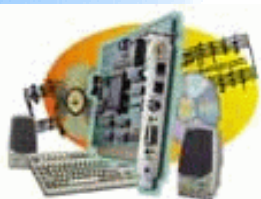2. Revised the instructions for the Windows 95 Winsock2 update.

17 Sept2002

1. Revised the schematic for the PTT circuit: Added "shunt" diode path to
protect IC from reverse voltage.
2. Added link to small program written by Roger G4IDE which resets COM
port lines to "low" (no voltage) if Windows' incorrectly sets them "high"
(with voltage) at startup.
3. Some "problem & solution" additions to the Trouble Shooting sections.

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Last Updated: 09/25/2004

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Last Updated: 09/29/2004

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The file you download is actually a self-extracting "zip" file. You do not need to run a "zip" program to unzip it. The self-extracting program will give you an opportunity to select the folder for the unzipped file.

If you need to download a PDF file reader, **go to the Adobe Acrobat Reader Site.**

Use the table below to select what you need:

Chapter	File Name	Zip Size KBs	Unzip Size Kb	Updated
All - The entire website	**scpacketpdf.exe**	1,352	2,248	25 Sept 2004
Introduction	**introscpacketpdf.exe**	116	129	25 Sept 2004
1. Interfaces	**1scpacketpdf.exe**	232	301	25 Sept 2004
2. AGWPE Set Up	**2scpacketpdf.exe**	248	276	25 Sept 2004
3. Sound Card Setup	**3scpacketpdf.exe**	296	347	25 Sept 2004
4. Windows™ Setup	**4scpacketpdf.exe**	88	61	25 Sept 2004
5. Troubleshooting	**5scpacketpdf.exe**	160	219	25 Sept 2004
6. Using AGWPE (Modes, Networking, TOR)	**6scpacketpdf.exe**	512	738	25 Sept 2004
7. Application Setup (WinPack, WinAPR, etc.)	**7scpacketpdf.exe**	308	450	25 Sept 2004

Go to alternate **download site at QSL**

Sound Card Packet

You can contact the owner of this web site, Ralph Milnes KC2RLM, at

kc2rlm@patmedia.net

Note that the address above is simply a graphic picture and not a text file or hyperlink. You will need to type this address into you email address field. You can not paste it because it is not text.

Text email addresses were removed from this site to try to prevent them from being harvested by programs that scan websites looking for email addresses to sell to spammers.

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Interface (Computer-to-Radio Cables) Getting Started

To connect your radio to the sound card, you'll need an interface consisting of three (3) cables, one each to handle the RX, TX, and PTT functions. If you want to use your sound card with **2** radios, you'll need a more complicated interface. See cable2radio.htm

The basic AGWPE radio-to-computer interface is the same as one as would be used for other sound card digital programs such as PSK31 or Slow Scan TV. So, if you already have such an interface, you probably can just use that for AGWPE.

You can either build your own interface or you can also purchase kits and pre-assembled interfaces. (**Note for 9600 baud operations:** the small isolation transformers used in TX and RX audio lines probably do not have the correct frequency response range for 9600 baud FSK operations. So, if a kit or pre-assembled interface uses isolation transformers, it may not work well at 9600 baud.)

If you build your own:

- Make sure you build the interface long enough to reach from your radio to your computer sound card jacks, especially for fixed position radios and computers!

- Be sure to use cables with a shield in them to help prevent stray RF (radio frequencies) from entering the cables.

- Try to use isolation transformers in the Receive (RX) and Transmit (TX) Audio cables (except for 9600 baud packet) and an opto-coupler/photo-transistor in the PTT cable to break the ground path between the radio and computer.

- At least two of the cables will need small circuits. You'll find other variations at WM2U's PSK31 site. Circuit components should be readily available at local electronics store or online. For example, you'll find some very attractive prices for components at Buck's online store.

Going beyond my simple circuits, you'll find instructions for home-brewing the "Cadillac of sound card interfaces" in the March 2002 QST, p 31. Bob Lewis describes how to build an interface for ICOM HF rigs with many deluxe features.

> **Special Tip**: If you want the flexibility of easily switching your interface between different radios, you might be interested in this cable construction trick.

Last Updated: 09/27/2004

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Kits and Pre-assembled Interfaces

If you don't want to build your own computer-to-radio interface, you can purchase a pre-assembled interfaces .. or buy a kit with all the necessary parts.

I haven't used interfaces from all the sources listed below, so I won't vouch for any of them. The list is merely a service for those who are shopping.:

- **Bux CommCo™ (Buck Rogers, K4ABT)** sells the **RASCALGLX** kit which has all the parts and cables you'll need to make a well-designed interface. The price was around US$30 the last time I checked and includes shipping to US addresses (extra for non-US). The kits use isolation components on each line...a very nifty extra. It would be difficult to purchase all the components on your own for such a price! One nice feature is the ability to quickly change the GLX-to-radio cable. One comes free (you pick your radio model) but you can order cables for additional radios for $15.

  Buxcomm also sells completely assembled GLX RASCAL interfaces for US$39.

- **Tigertronics** sells the **SignaLink**™. This pre-assembled interface features an auto-PTT circuit, so you don't need to use a COM or LPT port for a PTT activation signal, a feature that might be of particular value to anyone who needs those ports for other devices! It does require some external power to operate [6.75 - 15 VDC @ 10 ma (max)], but you may be able to get this from the mike connection on some radios; otherwise from another DC power source, such as a cigarette lighter jack.

- **West Mountain Radio** has several models of pre-assembled interfaces. The RigBlaster (Std, Plus and Pro models) let you keep both your microphone and sound card connections attached to the radio's microphone jack. The Nomic (No Mike) doesn't have that feature, but it is smaller in size, less expensive, and doesn't require a power connection. See **West Mountain Radio's web page** for additional information and current pricing.

- **MixW RigExpert** - (two versions) is a **USB** Soundcard Transceiver Interface! **http://www.mixw.net/**

- **MFJ** also sells a pre-assembled interface in two models: the **1275** (round connector) and **1275M** (modular connector).

- **Donner's -** Interfaces for about $40 plus shipping
  http://home.att.net/~n8st/

VA3TO Echolink Interface -
http://home.cogeco.ca/~hduff/Echo_Main.htm
Sells both kits and assembled kits.

WB2REM-G4CDY All Mode Interfaces - http://www.wb2rem.com/

Also,

GD16 MI from G. Dierking **http://www.gdierking.de/gd16mie/**
DIGI-1 From WIMO **http://www.wimo.de/s90_e.htm**
ISOTERM-MULTI CON from G3LIV
http://www.melvin2.freeserve.co.uk/psk31isoterm.html
Several from **ASTRORADIO** (España):
http://www.astroradio.com/t/tenda/301001.html
http://www.astroradio.com/t/tenda/302007.html
http://www.astroradio.com/t/tenda/302000.html

Please **contact me** if you know of other sources for kits or pre-assembled interfaces.

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Sound Card Packet

Receive (RX) Audio Cable

Radio RX Audio to Sound Card "Line In" or Microphone Jack

This page has advice for those building their own interface. The RX audio cable connects the radio's Microphone jack or data jack or speaker jack to the sound card's LINE IN or MIC jack.

At the radio, it is best to use the packet data jack if one exists. Otherwise use the microphone jack or speaker jack.

> **Does your radio have a 6-pin mini-DIN data jack?** Then you might want to read this page about such jacks.

At the sound card, you want to use the LINE IN jack. It is normally a good match to a typical radio's RX audio voltage. If you need to use the sound card's more sensitive MIC jack, see the MIC schematic below for more information including a schematic that adds in a voltage divider circuit. You may also have success using the Volume Control program (instead of the divider circuit) to limit RX audio into the MIC jack (requires some fine adjustments), but the divider circuit will make it easier to regulate.

In the RX audio cable, I strongly recommend the use of an **in-line transformer** to break the ground path between the radio and computer grounds for two reasons:

- to eliminate any potential ground loop hum on the signal,
- and more importantly, to reduce the risk of any damage to the computer or radio from any difference in voltage potential

Note that the simple RX cables that may come with some commercial interfaces, for example, the Rigblaster Plus and Nomic (and maybe other models), do not have isolation transformers. These simply cables are generally shielded but do not have any additional circuitry or transformers, so you may want to build a cable that does have the transformers.

If you're curious, there's an interesting discussion of proper connections of shields and grounding at: http://www.epanorama.net/documents/groundloop/cable_shielding.html

> **Note for 9600 baud packet:** There's a general consensus that that the RX and TX audio lines in your interface must **NOT** have audio isolation transformers for 9600 operations. Generally , small, inexpensive audio or power transformers do not have the correct frequency response range. For example, Radio Shack's #273-1374 (1:1 600 ohm audio line transformer) has a 300 Hz to 5 kHz frequency response range which is not low enough. Until someone sends me an isolation circuit with suitable components (please do!), take these precautions when running without isolation:
>
> - make sure the computer and and the transceiver's power supply are connected to the same AC power circuit (i.e. sharing the same ground).
>
> - connect/disconnect the sound card interface to the transceiver or computer only when both devices are unplugged from the AC power circuit.

You should also use shielded cable to reduce the risk of any RFI (Radio Frequency Interference) getting on the RX signal.

Here's the schematic for an isolated RX cable:

Receive Audio to Sound Card LINE IN Jack

To build your RX cable:
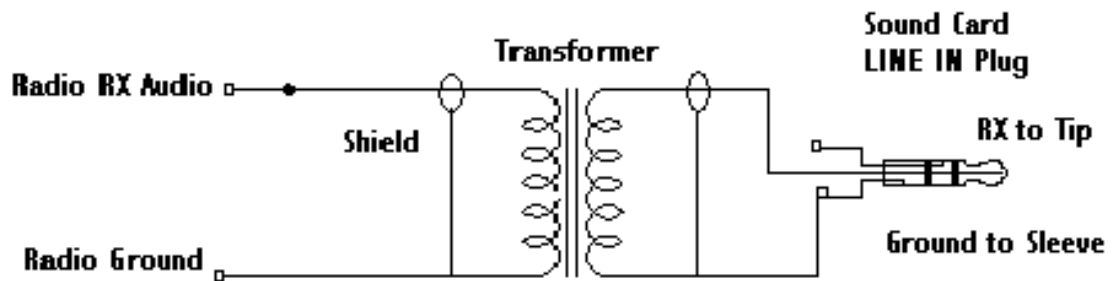
Cable material: Use a cable with a single insulated wire and a braided shield. Small coaxial cable like RG-174U should work well; even RG-58U would work. The shield can act as ground line if you are using a transformer. If you aren't using a transformer, attach the shield at the radio ground only, and not at the computer/sound card ground.

Sound card connector: You will need a plug that will fit the sound card LINE IN/Microphone jack, probably a 1/8" (3.5mm) **stereo** 3 conductor male mini-plug (e.g. Radio Shack part #274-284). Do not use a mono 2 conductor plug.
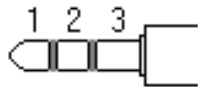
1. Left channel +
2. Right channel +
3. Left and right channel -

Radio connector:

If you need your radio's "pinout" information, you'll probably find it at **Buck's packet site**. Remember that in addition to the RX line, you will also need to attach the **TX** and **PTT** lines to the radio, so all three inputs could be sharing the same plug.

Mobiles or Base Radios: You can use either the microphone connection or preferably the radio's special "data" plug jack, if it has one. Or you can use the speaker jacks.

For Receive (RX) audio it's best to use the pin on the radio's data jack, since it provides a constant audio output level and -- usually -- no squelch (AGWPE needs to hear an un-squelched signal) . If you use the radio's microphone or speaker jack instead, remember the audio output level will be affected by both the radio's "volume" and "squelch" settings and not having these set correctly is often a source of problems for AGWPE.

Handhelds: Most HTs have a 'Speaker' jack that requires a 1/8" (3.5mm) mono (2 conductor) mini-plug. If your radio's user manual says to use a stereo plug instead of a mono plug, be sure you do.

Check either **Buck's packet site** or **Gloria's KA5ZTX site** for pin-out information. (On Buck's site to see the schematic you will either have to click on the "order" button or the equal sign (=) next to it; you don't have to order anything.)

9600 baud use: The newer 9600-ready radios often have a data jack that has a special "9600 baud receive" pin or a combination "9600/1200 receive pin" that is different from the 1200 receive.

Transformer: The type of transformer is determined by the source of the RX audio. If you take it from the radio's microphone or data jack, you'll use a 600 to 600 Ohm (1:1) transformer. If you take it from the radio's speaker jack (8 Ohm impedance), you'll need a 1000:8 transformer. (No isolation transformers for 9600 baud operations.)

Note for 9600 baud users: see notes at top of page. Generally, you should **NOT** use isolation transformers for 9600 baud operations.

Sources: Isolation or audio transformers can be obtained from most electronics parts stores, for example, Radio Shack #273-1374 for a 1:1 or #273-1380 for a 1000:8. Peter PE1MHO/G7ECN says another source for 1:1 transformers is an old internal telephone modem that a computer store might be glad to give you.

Attaching the transformer: Be sure you use the proper lead wires on the audio transformer as identified by any accompanying schematic for the transformer or by using an Ohm meter to determine the leads for the same coil (windings) of the transformer. Note that if the transformer has 6 leads, two will be center tap wires that won't be used. (Don't cut them until you know you have the 4 other leads correctly wired.)

One lead from the **primary** coil of the transformer will connect to the **center conductor (tip)** of the **sound card** plug. The other lead from the **primary** coil will connect to the sleeve (outer conductor) of the **sound card** plug. In this circuit, it doesn't matter which lead connects to the tip and which connects to the sleeve, so long as they are from the same coil. (If you are using a 1000:8 transformer, it is important to connect the 1000 Ohm primary coil of the transformer to the sound card and not the radio.)

On the **secondary** coil of the transformer, one lead will attach to the RX pin of the **radio**. The other lead will attach to **radio** ground. Again, it doesn't matter which of the connects to the radio RX and which to radio ground, so long as they are from the same coil. (Again, if you are using a 1000:8 transformer, it is important to connect the 8 Ohm secondary coil of the transformer to the radio and not the sound card.)

The **middle conductor (ring)** of the sound card plug should be left **unwired,** unless you are **building a RX cable for a second radio**.

When you're done, tape a "Line In" (label on the sound card end of the RX audio cable so that you don't confuse it with the TX "Line Out" cable.

## Circuits without an isolation transformer:

You will find other schematics (at various web sites and even in AGWPE **Help**) that do not use isolation transformers. The danger with any circuit directly connecting the computer and radio is that the devices could develop different ground potentials which could lead to damage to the devices. This risk is inherent for both a dual wire connection (RX-to-RX and Ground-to-Ground) or a single wire connection (RX-to-RX, no common ground wire). Either method provides a route for current that could develop because of different potentials. For this same reason, never connect the shield of a wire to both both devices; ground it only to one device.

If you're curious, there's an interesting discussion of proper connections of shields and grounding at:
http://www.epanorama.net/documents/groundloop/cable_shielding.html

RX Audio to the "Microphone" jack on your sound card

If you want or need to use the sound card's Microphone jack instead of the LINE IN jack, then you will probably need to add an attenuation circuit on the RX audio line so that you do not overdrive the sound card. The exact attenuation will depend on the maximum output voltage of your radio RX line **and** the maximum input voltage on the MIC jack of your sound card. (The Sound Blaster card I have has a maximum of 200 mVpp on the Microphone jack, where the Line In jack has a maximum of 2 Vp-p. Other cards accept a maximum of 100 mV.)

Warning: On most sound cards, the Microphone (MIC) jack **does not** allow stereo input, i.e. a left and right channel. Typically, the ring in the MIC jack is used to provide a +5 bias voltage to power electret microphones. It is **not** used for stereo (right channel) input. For that reason, you can't use MIC input if you want to interface one sound card to two radios.

```
1  2  3
┌──────────
│▭▭▭▭────
└──────────
```
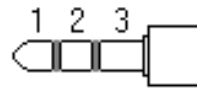
1. Signal input
2. +5v
3. 0v

3.5mm plug

If you do use the MIC jack, it is better to use a stereo plug instead of a mono plug. Just leave the ring unwired. A mono plug can be used, but it will short circuit the ring (+5V) to the sleeve (0V), although the card's circuitry is designed to cope with this -- a resistor severely limits current flow.

Here's a schematic for a 10:1 attenuation circuit that should work fairly well in many microphone jack setups. The 1:1 audio transformer provides an electrical separation of the computer from the radio and may be especially important on cables used in microphone jacks and laptops.

Receive Audio to Sound Card MIC Jack with 10:1 Attenuation
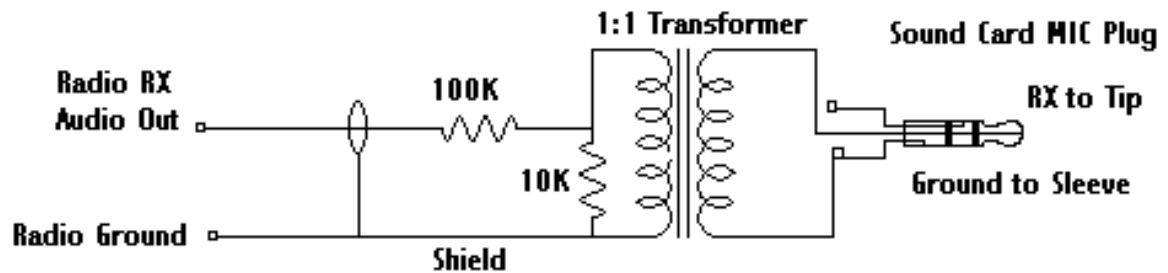
When you're done, tape a "MIC" label on the sound card end of this RX audio cable so you don't confuse it with the TX "Line out" cable.

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Last Updated: 09/27/2004

Sound Card Packet

Transmit (TX) Audio Cable

Sound Card "Line Out" to Radio TX Audio

This page has advice for those building their own interface.

The TX audio cable can be a little more complicated then the RX audio cable. Normally, this cable must have a circuit to attenuate the voltage leaving the sound card's LINE OUT jack, otherwise the radio's transmit circuit will be overdriven.

Note: Use the LINE OUT jack, do not use the SPEAKER jack (which is found on some older sound cards). If your card or laptop only has a HEADPHONE jack, it can be used, but you will need to lower the sound card's TX audio volume. Quality will usually not be quite as good as a LINE OUT.

The exact attenuation will depend on both your radio and sound card. An approximation is a 100:1 attenuation (40 dB) which will reduce the sound card output level (max. 2 Volt $_{p-p}$) down to the level your radio normally would expect for microphone (20 -40 milliVolt $_{p-p}$). For example, a 50:1 attenuation works better for me, since I use my my radio's data jack which has a maximum input voltage of 40 mV $_{p-p}$.

> **Don't Overdrive Your Radio!** If a sound card (or a TNC) overdrives a radio's input circuit (i.e. it is too loud), the radio may distort the true packet tones as it tries to limit the signal to a maximum deviation of approx. 5 kHz. The attenuation circuit described on this page attempts to prevent such overdriving and distortion. Interestingly, a 1200 baud packet station that is properly adjusted with 3.25 kHz of deviation (+/- .25) should sound softer than channel noise!

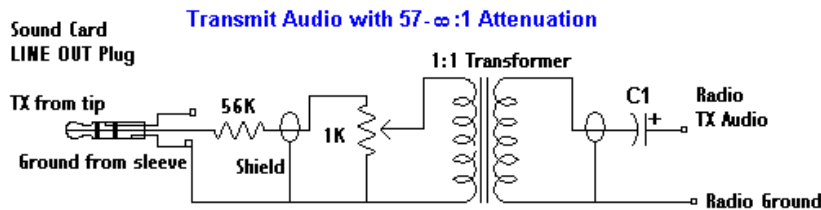Here's a schematic for the attenuation circuit:
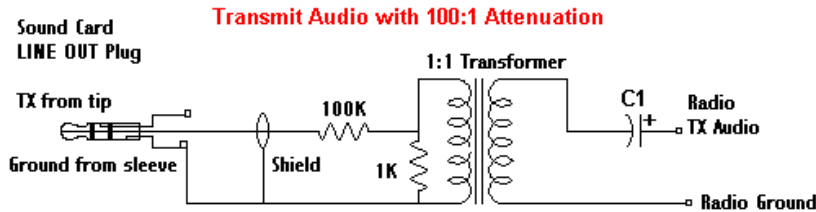
Transmit Audio with 100:1 Attenuation

C1 = optional capacitor blocks DC voltage; may be required for radios sharing TX and PTT lines, e.g. hand held radios

Option #1: Instead of the two resistors, you could use a 4K7 (4.7K) Ohm variable resistor (potentiometer/pot). The pot would actually give you more control over the attenuation, although a pot is bulkier.

Option #2: Or here's a schematic of a circuit that combines a pot with a fixed resistor to give the pot a less delicate range of settings and make is easier to adjust:


Transmit Audio with 57-∞:1 Attenuation

C1 = optional capacitor blocks DC voltage; may be required for radios sharing TX and PTT lines, e.g. hand held radios

To build your TX cable:

- **Sound card connector:** You will need a plug that will fit the sound card LINE OUT jack, probably a 1/8" (3.5mm) stereo 3 conductor male mini-plug (e.g. Radio Shack part #274-284 -- pkg. of 2). Do not use a mono plug 2 conductor plug.

  Note: The middle conductor (ring) of the sound card plug (right channel) should be left unwired, unless you are building a TX cable for a second radio
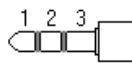
  1. Left channel +
  2. Right channel +
  3. Left and right channel -

Radio connector:

- If you need your radio's "pinout" information, you'll probably find it at Buck's packet site or Gloria's KA5ZTX site.

> **Does your radio have a 6-pin mini-DIN data jack?**
> Then you might want to read this page about such jacks.

- **Mobiles or Base Radios**: You can use either the microphone connection or preferably the radio's special "data" jack, if it has one. You'll be using the same connector as the one used for your PTT and RX line, unless you're using the speaker jack for RX audio).

  Handhelds: TX audio will go to the radio Microphone jack, which usually require a 3/32" (2.5mm) stereo (3 conductor) or mono (2 conductor) sub-mini plug. If your radio's user manual says to use a stereo plug instead of a mono plug, be sure you do. You'll also be feeding your PTT line into this plug.

  Check your radio's instruction manual or either of the web sites mentioned above for pin-out information and any **resistor and/or capacitor that may be required for the PTT and TX lines of your radio.**

- **HF Band Use:** Some radios may use different TX audio pins for HF and VHF/UHF. The ICOM 706 is one. Consult your radio's user manual for pin out instructions. This can be the solution if your interface transmits correctly for HF digital modes such as PSK31 but won't transmit audio on VHF/UHF, or vice versa

- **9600 baud use:** The newer 9600-ready radios might have a data jack pin for "9600 baud transmit", although many have both 1200 and 9600 on the same pin. The radios will however most probably have a menu choice for "data speed" that affects the radio's input voltage sensitivity, i.e. the menu selection may amplify or attenuate the TX audio. (Check your radio's user manual.) For example, the "9600" choice allows the pin to accept full 2V maximum, where "1200" accepts only approximately 40mV maximum. That means, to get things right, you will have to experiment with the:
  - radio's menu setting (1200 or 9600)
  - the sound card's playback volume setting
  - any voltage divider circuit or potentiometer that is in the TX audio line to get the right match.

Cable material: Use a cable with a single insulated wire and a braided shield. Small coaxial cable like RG-174U should work well; even RG-58U would work.

Capacitor: The value of capacitor C1, if used, is often specified in the radio's user manual in the section on MIC/Speaker accessory plug wiring. [The value will depend on the input type of the radio... resistive, capacitive, or direct coupling. Resistive will require a higher value cap (4 to 10 uF), while capacitive a bit less. Direct I/O are best coupled at 1 uF, as RF might become a problem if they go too high in capacitance.]

Transformers: 1:1 audio transformer can be obtained from either parts stores (for example, Radio Shack #273-1374) or Peter PE1MHO/G7ECN suggests another source is old internal telephone modems that a computer store might be glad to give you.

> **Note for 9600 baud packet:** There's a general consensus that that the RX and TX audio lines in your interface must **NOT** have audio isolation transformers for 9600 operations. In general, the available small and inexpensive audio or power transformers do not have the correct frequency response range. For example, Radio Shack's #273-1374 600 ohm 1:1 audio line transformer has a 300 Hz to 5 kHz frequency response range which is not low enough.
>
> Until someone sends me an isolation circuit with suitable components (please!), take these precautions when running without isolation:
>
> - make sure the computer and and the transceiver's power supply are connected to the same AC power circuit (i.e. sharing the same 110/220 V ground).
>
> - connect/disconnect the sound card interface to the transceiver or computer only when **both** the transceiver and computer are unplugged from the AC power circuit.

Attaching the transformer: Be sure you use the proper lead wires on the audio transformer as identified by any accompanying schematic for the transformer or by using an Ohm meter to determine the leads for the same coil (windings) of the transformer. Note that if the transformer has 6 leads, two will be center tap wires that won't be used. (Don't cut them until you know you have the 4 other leads correctly wired.)

One lead from the **primary** coil of the transformer will connect to the **center conductor (tip)** of the **sound card** LINE OUT plug by way of the pot/voltage divider circuit. The other lead from the **primary** coil will connect to the sleeve (outer conductor) of the **sound card** LINE OUT plug. In this circuit, it doesn't matter which transformer lead connects to the sound card LINE OUT and which connects to sound card ground, so long as they are from the same coil/winding of the transformer.

On the **secondary** coil of the transformer, one lead will attach to the TX pin of the **radio**. The other lead will attach to **radio** ground. Again, it doesn't matter which of the connects to the radio TX and which to radio ground, so long as they are from the same coil/winding of the transformer.

When you're done, tape a "Line Out " label on the sound card end of the TX audio cable so that you don't confuse the RX and TX cables.

> **Handheld Radios: Did you know?**
>
> Most handheld radios use the **microphone jack** to feed **both** the TX audio signal (AC) and the PTT signal (DC) into the radio.
>
> To make sure the TX audio signal goes into the radio and not back out the PTT line, **a resistor is often put in the PTT line** (AC will follow the path of least resistance).
>
> And to make sure DC power doesn't go back up the TX audio line to ground, **a capacitor is often put in the TX audio line** (capacitors block the DC but allow AC to pass). If your handheld radio goes into constant PTT when the plug is put in its MIC jack, the lack of the capacitor is often the answer. (Note that the schematic above includes such a capacitor for just that reason. It's a good precaution to take to block any DC on the TX line.)
>
> These components still need to be used in AGWPE cables for handheld radios.

Sound Card Packet

PTT (Push to Talk/Transmit) Cable

This page has advice for those building their own interface.

AGWPE will generate the transmit audio, but you also need a way to open the radio's PTT circuit so that the audio can be transmitted. AGWPE and other sound card programs provide for this by sending a signal to:

- the serial (COM) port's RTS pin (#7) and
- the parallel (LPT) port's Data Bit 0 and 1 pin (pins #2 and #3)

For those home-brewing a PTT cable, this gives you several options:

1. **Build a cable with an isolated 'gate' circuit** that opens the radio's PTT circuit when it receives a signal from the serial or parallel port.

   > **Note for Windows XP and 2000 users**: The parallel port will **not** work for PTT control in Windows XP or 2000 using AGWPE. It will only work with **Packet Engine Pro**. Only Windows 95, 98, and ME users can use the parallel port in AGWPE.

2. Use the cable above with a **serial-to-USB port adapter** connected to the computer's USB port instead of the serial port.

3. **Build a TX audio-activated circuit** to trigger the PTT, no COM or LPT port needed.

   Trying to operate packet using the radio's VOX is likely to be very unsatisfactory because the VOX probably won't key up fast enough. Unlike PSK31, RTTY, MFSK, etc where you key up and stay keyed for extended periods, packet normally uses very short bursts that require that the radio key up fast (i.e. ideally than 50-100 ms or less) ...and then un-key fast at the end of the data burst. Even if it did, another problem is the need to guard against room/computer noises if the VOX also opens the microphone. For this reason, experienced sound card users don't use the radio VOX method even for non-packet sound card modes .

A. Building A Cable With An Isolated Gate Circuit

Note: Because a sound card has two audio channels, it is possible to interface two (2) radios to a single sound card. This page describes how to make a cable to control the PTT for a single (1) radio. See the **Interfacing 2 Radios to 1 Soundcard page** for a dual PTT cable.

You may find other variations of the circuit below, most commonly one using a simple transistor (in fact, there's one in the AGWPE 'Help' file). While these circuits will work, they do create a direct ground connection between the computer and radio, and thus create a risk of radio/computer damage in the event of different voltage potentials between the two components. For that reason, **I don't recommend them**.

Instead, I recommend an isolated 'gate' circuit. Here's a schematic for a single port (one Radio) AGWPE setup which uses a phototransistor/optocoupler as the gate:

**PTT Circuit Using Optocoupler**
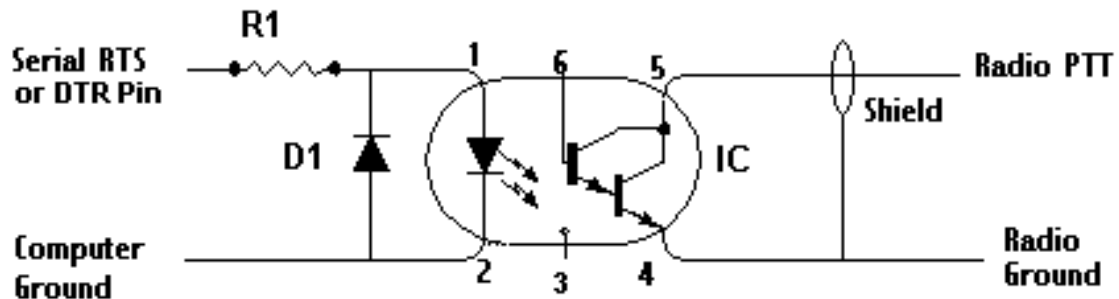
R1 = **Resistor, e.g. 1K2, to reduce voltage on the IC pin 1**
IC = **Integrated Circuit; this sketch shows an IC, such as a 4N33**
    or PS2603 Optocoupler, which uses a Darlington pair transistor.
    (Note: to identify pin #1, look for a small embossed circle on
    the top of the IC above pin 1; or looking into the notch in one
    side of the IC with the pins down, pin #1 is to the right of the notch.)
D1 = **Diode, e.g. IN4001, would shunt any potential reverse voltage**
    that might damage the sensitive diode/emitter in the IC.
    (Note: the band printed on the diode marks the cathode end,
    which attaches to the Serial Port/IC Pin 1 line in the sketch above.
    The opposite/anode end attaches to Ground.)

The ideal components for your circuit may vary because of your radio's requirements. For example, you might be able to use a different type of IC, such as a 4N25 or PS2601, but that may require a different value for R1.

If you plan to build your own interface, **Bux CommCo** can provide advice on components for your radio (**Bux CommCo components page**). You might also want to consider a Bux CommCo's **RASCAL kit** . It will have all the right components for your radio for a good price.

   Other U.S. outlets for parts include , **Radio Shack, Digikey**, and **Newark Electronics**.

   Use a cable with a single insulated wire and a braided shield. Attach the shield on each side of the optocoupler to either the radio or computer ground, but **do not connect the grounds together**.

   If you have a **DB9 Serial** port (COM), **use RTS (Request To Send) pin # 7** for PTT control on a one radio cable. **Ground** will be **pin #5**
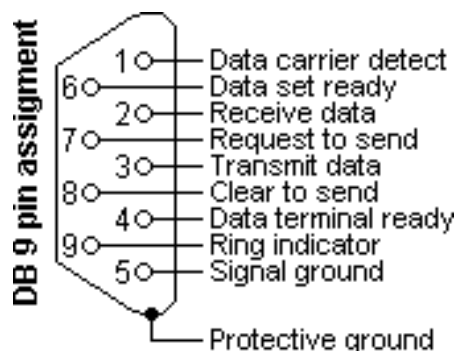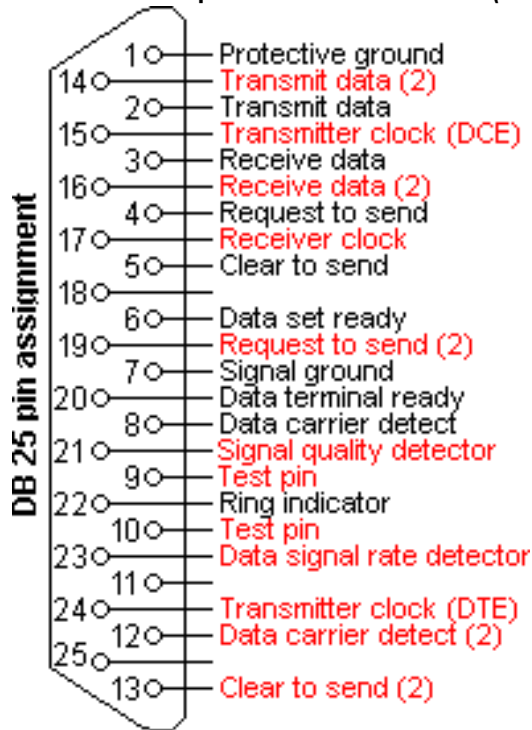
Do not use the #4 DTR (Data Terminal Ready) pin for single port PTT control despite what the AGWPE **Help** file or AGWPE web site may say. The DTR pin is used by AGWPE only if you **interface a second radio** and use AGWPE's **Dual Port** feature to control PTT on a radio attached to AGWPE port #2. DTR will not be
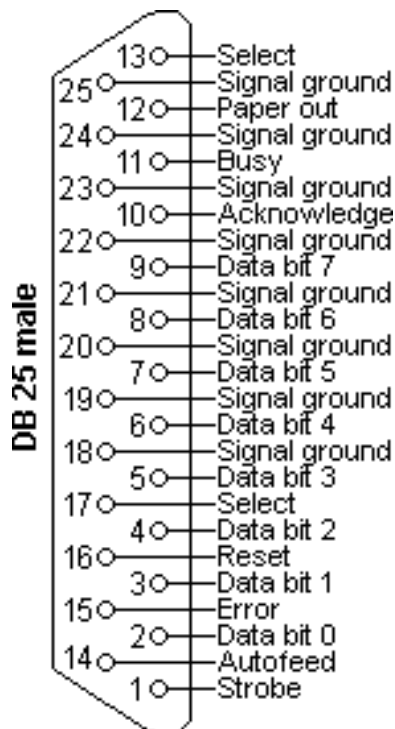
triggered if AGWPE is set to use only a single port/radio.

If your serial port uses a **DB25 COM** connection (rarer), use RTS pin 4 for PTT control and pin 7 for ground. Note this is the pin-out for a DB25 *serial (COM)* port not a DB25 *parallel (LTP)* port.

```
DB 25 pin assignment

14○     1○──── Protective ground
        2○──── Transmit data (2)
15○          ── Transmit data
        3○──── Transmitter clock (DCE)
16○          ── Receive data
        4○──── Receive data (2)
17○          ── Request to send
        5○──── Receiver clock
18○          ── Clear to send
        6○──── Data set ready
19○          ── Request to send (2)
        7○──── Signal ground
20○          ── Data terminal ready
        8○──── Data carrier detect
21○          ── Signal quality detector
        9○──── Test pin
22○          ── Ring indicator
       10○──── Test pin
23○          ── Data signal rate detector
       11○
24○          ── Transmitter clock (DTE)
       12○──── Data carrier detect (2)
25○
       13○──── Clear to send (2)
```

If you want to use the parallel port (**DB25 LTP**) for PTT control instead of the serial port, use LTP pins 2 or 3 for the PTT line and any pin 18 thru 25 for the GROUND.

```
DB 25 male

       13○──── Select
25○          ── Signal ground
       12○──── Paper out
24○          ── Signal ground
       11○──── Busy
23○          ── Signal ground
       10○──── Acknowledge
22○          ── Signal ground
        9○──── Data bit 7
21○          ── Signal ground
        8○──── Data bit 6
20○          ── Signal ground
        7○──── Data bit 5
19○          ── Signal ground
        6○──── Data bit 4
18○          ── Signal ground
        5○──── Data bit 3
17○          ── Select
        4○──── Data bit 2
16○          ── Reset
        3○──── Data bit 1
15○          ── Error
        2○──── Data bit 0
14○          ── Autofeed
        1○──── Strobe
```

Check either **Buck's packet site** or for radio pin outs and the location of the PTT pin.

To test your completed circuit, hook up the cable to your radio and then use a 9 volt battery to simulate the computer signal. Connect the positive **+** side of the battery to the signal pin in the COM/LTP connector and the negative **•** side of the battery to the ground pin in the connector.

Note on handheld radios: Most handheld radios use the microphone jack to feed **both** the TX audio signal (AC) and the PTT signal (DC) into the radio. To make sure the TX audio signal (AC) goes into the radio and not back out the PTT line, **you will need to include a resistor in the PTT line between the radio's PTT pin (#5 in the schematic above) and the IC.** An AC signal will follow the path of least resistance and stay off the PTT line. See your handheld's user manual or consult **Gloria's KA5ZTX site** for the needed resistor values and circuit information. (In addition to the resistor, **HTs often require a capacitor on the TX audio line** to block DC voltage on the PTT line from getting on to the TX audio line. See the **Transmit Audio Cable page on this site**.)

A Special Trick: To make it easy to **use** *either* **the serial port or printer port**, Bill, WB6JAR, came up with this clever design: run a short 2 wire "pigtail" cable from the cable's serial DB9 connector to a parallel DB25 connector.

- Connect the serial's pin 7 (RTS) to the parallel's pin 2 or 3
- Connect the serial's pin 5 (GND) to the parallel's pin 18 or 19-25

Only connect one connector to the computer at a time.

B. Serial-to-USB Adapters

It's becoming easier to find a fairly inexpensive serial-to-USB adapters. In fact some computers now come with USB ports but no serial port. If this is your case or if you prefer to make use of the USB port to leave your serial and parallel ports free for non-AGWPE purposes, a serial-to-USB adapter may work for you.

To use a serial-to-USB adapter:

- first install the adapter driver
- then go to the Windows **Device Manager** (**Start: Settings; Control Panel: System**) and click on the **+** next to **Ports** to expand the list and see which COM port the adapter is using
- **change your AGWPE Port setting** to use the adapter's COM port
- plug your serial port PTT cable into the USB adaptor

I had mixed results with two such adapters. The first adapter I bought, a **Belkin** for about US$30, would not work on either my desktop or laptop. The RTS pin was always left "high" and triggering the radio's PTT line. Belkin may not have been at fault; it may have been a problem with my computer hardware or my version of Windows (XP). Belkin may have corrected the problem since then.

I then bought an **IOGear adapter (GUC232A)** (apparently made by ATEN International Co.) for about $30 US. It works fine on my desktop using Windows XP.

Some users have reported problem with other USB adapters working but changing COM port assignments on each computer boot-up.

So, it's possible such an adapter may work on your computer, but you may have to experiment with different brands.

Here some other possible serial-to-SB adapter choices:

- **http://pfranc.com/usb/usb.shtml**
- **http://www.packetradio.com/cgi-bin/shopper.exe?preadd=action&key=CBL_USB2SC**

C. TX Audio-activated Circuit

It's also possible to open the PTT by using a special circuit that opens the PTT when it "hears" tones on the TX audio line, without any COM, LPT or USB port connection .

Stephen Smith's, WA8LMF, **Tone Keyer web page** describes how to make such a device. If you need your COM or LPT ports for other devices, you should look into this creative solution.

Another option to avoid using a COM or LPT port is the **Tigertronics SignaLink pre-assembled unit** which also uses a TX audio tone-activated PTT circuit.

> **Watchdog Timer:** Most TNCs have a timer that prevents continuous transmission in the event of some TNC or software failure. This "watchdog" timer stops transmission that last more than 2 or 3 minutes. With AGWPE's sound card, you don't have such a timer, so here is a **page describing how to build a watchdog timer circuit** for your PTT cable.

Two radio modification to the PTT cable

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Sound Card Packet

Interfacing to Two (2) Radios to One (1) Soundcard

AGWPE can use one sound card to interface with **TWO** different radios at the same time. It does this by using the left and right stereo channels of the sound card, in effect making the sound card a "dual port" TNC (see the **AGWPE: 2 Radio Setup** page on this site for more information about configuring AGWPE for this feature.)

This means you can have 2 different packet programs running, each one sending and receiving data with a different radio on a different frequency. If you use WinAPRS, UI-View, or APRSplus, you could have one radio tuned to the local APRS frequency and the other to the local DX cluster frequency or to an HF APRS frequency.

To run a second radio with the sound card, you'll need to use:

- for PTT control, the **DTR** pin on the COM port or pins 8 or 9 on the LPT port
- for TX and RX audio, the **ring** of your stereo sound card jacks

Note this dual radio feature will not work if use the **Microphone jack** of the sound card (for RX audio), since that jack typically has **mono only input** and not stereo. You must use the LINE IN jack if you want to interface to two radios.

Here's the pin and plug assignments for "dual port" sound card use:

AGWPE Port	Card Channel	Stereo Plug	PTT Pin	DB9 serial pin #	GND	DB25 serial pin #	GND	DB25 Parallel* pin #	GND
1	Left	Tip	RTS	7	5	4	7	2 or 3	18-25 (any)
2	Right	Ring	DTR	4	5	20	7	8 or 9	18-25 (any)

NOTE 1: Do not use the computer ground pin unless:

- You are wiring the shield to the computer ground instead of the radio ground (don't wire to both!); or
- You are using an isolation transformer and need to wire one side to computer ground.

NOTE 2: If you are running Windows XP/2000/NT, you **can not use the LPT/parallel/printer** port for PTT control. You must use the serial port. The parallel port option will work only with Windows 95, 98 and ME in AGWPE. If you use Windows XP, and want to use the parallel port for PTT control, you can purchase **Packet Engine Pro**.

1. RX and TX Audio Cables

The **RX Audio Cable** and **TX Audio Cable** pages of this site describe how to make cables for a radio which would use the **left** channel of the sound card and Port 1 in AGWPE. Such cables uses the **tip** of the stereo TX and RX plugs and the **RTS** pin on the serial/parallel port plug for PTT control. If you already have a set of cables, they are probably wired in this manner.

If you want to use a second radio with the sound card, you would attach a second audio cables to the **ring** of the stereo plugs (the **right** channel of the card or port 2 in AGWPE).
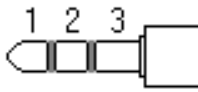
1. Left channel +
2. Right channel +
3. Left and right channel -

Here are two different approaches for the audio cables:

➕ **Cheaper but harder -- wire it yourself:** Using the cable schematics on the RX Audio Cable and TX Audio Cable pages, add a second cable (single wire shielded) to each sound card plug. The single insulated wire will run from the unused **ring** (middle conductor) of the sound card plug to the proper pins (RX or TX) on radio #2. The shielding should attach to the ground on the radio but NOT attach to the ground on the computer.

You'll need to make this alteration for **both** the RX **and** TX Audio plugs. You'll also need to add a separate attenuation circuit (see TX Audio Cable) for the second TX audio cable.

➕ **Easier but a little more expensive -- buy two "Y" adapters (Bill's, WB2JAR, idea):** Rather than try to squeeze the wires from both radios into the same sound card plug, use a "Y" adapter. The "Y" plugs into the sound card jack and will accept two sets of audio cables, one for each radio, into the arms of the 'Y'.

Separates left and right-channel signals. Has a 3.5mm stereo phone plug & two 3.5 mm mono phone jacks.	Bill suggests Radio Shack part #274-375 ($3.59 each) which even does the channel separation for you! Of course, you'll need 2 of these adapters -- one for the sound card's LINE IN jack (RX audio) and one for the sound card's LINE OUT jack (TX audio).

These adapters accept simple **mono** plugs into their jacks. No need for stereo/3 line cables and no need to worry about "tip" or "ring" assignments. The adapter handles that.

The **silver** plated jack on the 'Y' is used for the cable coming from **radio #1**. It's wired to the **tip** of the adapter's stereo plug and provides the connection to the **left** channel of the sound card (AGWPE Port 1).

The **gold** plated jack on the 'Y' is for the cable coming from **radio #2**. It's wired to the **ring** of the adapter's stereo plug and provides the connection to the **right** channel of the sound card (AGWPE Port 2).

If you come up with still another method for the audio cables, let me know.

2. PTT Cable

To control the PTT on the second radio, you'll need to add a wire that will run from the **DTR** pin of the serial or printer port to the radio and includes a second PTT circuit (see **PTT Control cable page**).

You might try one of these methods:

A. Wire both PTT cables into the same DB25 (or DB9?) connector.   Here's a diagram that Bill, WB6JAR, created for a DB25 for the printer port. (I don't know if you could shoehorn all of this into a DB9 for the serial port.) To simplify the soldering, he broke off some of the pins going out of the DB25 (that would normally plug into the computer) and used the resulting stubs inside the DB25 as solder points. The downside of 2 cables into one DB connector is that, if you want to use just one radio, the PTT cable for the second radio will always be attached to the DB25 and this might be cumbersome.

Click on the graphic for a larger view. If you do, use your browser's BACK button to return to this page.
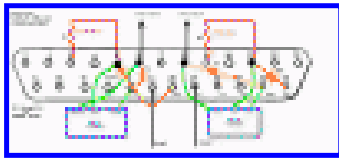
ç   Click to enlarge

B. Make a two cable adapter from DB9 plugs. This "Y" arrangement allows you to split the RTS and DTR signals to different DB9 male plugs. You can then plug standard PTT control cables with DB9 female jacks into the DB9 males plugs. (Could also work with the LPT port.)

Solder the DTR wire to the RTS pin in the DB9 male for radio #2. This allows you to use either radio's PTT control cable on either male plug, since both male plugs will be sending the PTT signal on pin #7, even though radio #2 is really getting its signal from the DTR pin on the computer.

This "Y" arrangement also lets you easily remove the second PTT cable if you're not using it.

Hint: Put a label on each DB9 to specify if it is for radio port 1 or 2.
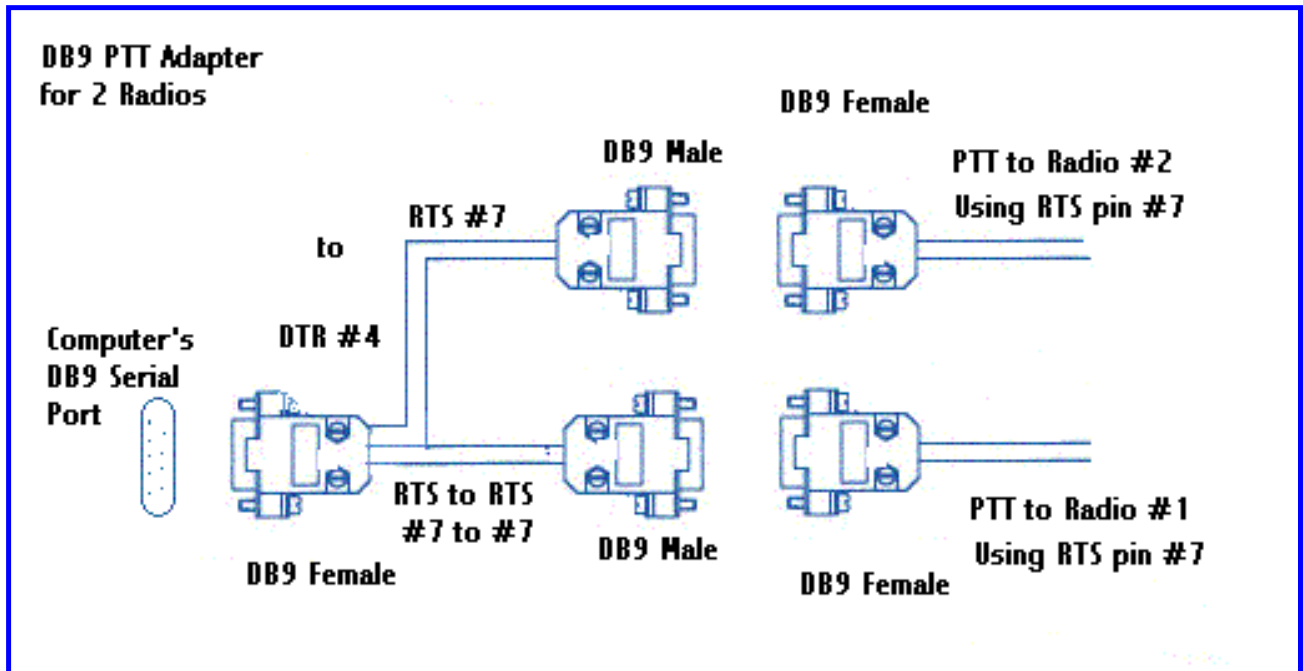
Don't forget to change AGWPE's settings to a "dual port"

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Remove Pins:
5, 6, 8, 11 with a pair
of needle nose pliars.

2.2K Resistor

R-1

Center Conductor

Center Conductor

2.2K Resistor

R-2

D-2

D-3

D-4

1 2 3 4 5 6 7 8 9 10 11 12 13

14 15 16 17 D-1 18 19 20 21 22 23 24 25

Gnd Gnd Gnd Gnd Gnd Gnd Gnd Gnd

D-1 through D-4
are
1N4001 Diodes

Collector Base Emitter

2N2222
Transistor

Collector Base Emitter

2N2222
Transistor

Ground

Ground

Sound Card Packet

A Cable Construction Trick

I have several TNCs and several radios, and sometimes "mix-and-match" them. The problem is that I didn't want to make a unique cable for each radio/TNC combination. Instead I made just one cable for each radio which terminates in a *male* DB9 connector. And I made just one cable for each TNC which terminates in a *female* DB9.

Then, depending on which radio and TNC combination I want to use, I plug the DB9 connectors together.

The key is to establish a common wiring plan for the DB9 connectors, something like:

Radios	TNC or Sound Card
TX audio pin--> male DB9 pin 1	1 pin DB9 female <--- TX audio pin
PTT pin---------> male DB9 pin 2	2 pin DB9 female <--- PTT pin
RX audio pin--> male DB9 pin 3	3 pin DB9 female <--- RX audio pin
Ground pin----> male DB9 pin 5	5 pin DB9 female <--- Ground pin

For my packet sound card cables, I just adopted the TNC (DB9 female) scheme. I can now plug my sound card cables into *any* of my radio cables and run sound card packet on my mobile, base VHF, base HF or portable rigs! I don't need to build a separate sound card interface for each radio...just a separate radio connector.

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Back to Cables: Getting Started

The 6-pin Mini-DIN Data Connector

This is adapted from postings that Stephen H. Smith WA8LMF has made on various groups and mailing lists.

The 6-Pin Mini-DIN "DATA" or "PACKET" connector is an industry standard adopted by all the Japanese ham radio manufacturers. It is now superseding the various proprietary 7, 8 and 13-pin full-sized DIN connectors used by various manufacturers.
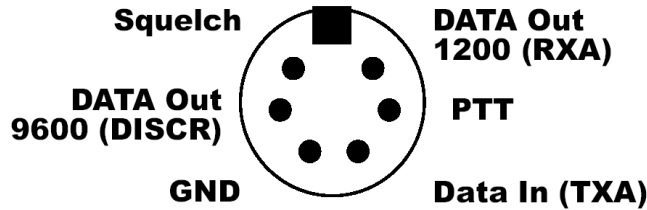
This diagram from Stephen's site at website at: http://members.aol.com/wa8lmf/miscinfo

This connector is the perfect point to connect packet TNCs, soundcard interfaces, phone patches, IRLP/EchoLink controllers, APRS trackers, paging encoders, or any other device that needs access to the transmit and receive audio of a radio.

> Note that this connector type is the same one used on PS/2 keyboard and mouse cables. A PS/2 keyboard extension cable or a KVM (Keyboard Video Mouse)-to-computer cable (has males plugs on both ends) is an excellent source of a plug-and-cable assembly that will mate with the jack on the radio, at a fraction of the cost of the optional manufacturer's cable assembly!
>
> You might also have luck with a dead mouse or keyboard, but most mice do not have all pins wired through, since pins 2 and 6 are not required for mouse operation. And most keyboard cords only use 5 wires and a shell ground. The omitted wire on some is the 9600 disc out. (This means that many keyboard cables can be used for 1200 operation, but only a few "special" ones can be used for 9600 operation).
>
> Note that you can buy the plug as a stand-alone product to make your own line, but the plug housing may not fit into the radio's jack nicely (the housing is too large).

Note that despite the misleading labels referring to data input and output, the jack only carries audio, not data. There is no actual RXD or TXD DATA in the sense of RS-232 or TTL-level streams of 1s and 0s anywhere on this connector.

On most radios with this a data jack, grounding the DIN-6 PTT line mutes the front panel MIC input to prevent extraneous shack noises from getting mixed with whatever you feed into the transmit audio input.

More About the Pins On This Connector

DATA OUT - there are two received data out pins which are really carrying RX audio. Both usually output audio at a level similar to what comes out of a speaker but at a fixed level unaffected by the volume control dial, e.g. 500 mV but check your User Manual:

- **1200**: this pin has de-emphasized[1] and squelched audio. This audio pin is sometimes labeled "RX Data 1200 Baud", RXA, RXD, or PR1. This is the audio most suitable for 1200 baud packet. (Side note: On multi-mode radios such as the Yaesu FT-817, Yaesu FT-100, and Icom 706, only the "1200 baud" output will be live on AM, SSB or CW, since the 9600 baud output is associated only with the discriminator of FM receivers.)

- **9600**: this pin has non-deemphasized[1], direct discriminator output most suitable for 9600 baud packet. This audio pin is sometimes labeled "RX Data 9600 Baud", DISCR, or PR9. For most radios, the discriminator output is always live regardless of squelch setting or PL mode.

  The discriminator output is also perfectly usable for 1200 baud RX packet audio, although you may have to play around with a de-emphasis[1] network consisting of a capacitor and resistor to get the best results with TNCs that have been optimized for receiving de-emphasized audio. And of course the TNC must be capable of operating open squelch; i.e. have it's own true DCD (Data Carrier Detection) to sense when the frequency is carrying data signals and it should not transmit.

> [1] **Emphasis and de-emphasis:** To help overcome an inherent audio "hiss" on FM signals, all FM transceivers will emphasize, or increase in amplitude, the higher audio frequencies during transmit. On receive, they de-emphasize, or decrease in amplitude, the higher audio frequencies. This emphasis and corresponding de-emphasis produces normal sounding speech, but with less "hiss".
>
> The key of course is that the sending radio must emphasize the high tones and the receiving radio must de-emphasize them. If one of the radios is not "doing its part", then the "high" packet tone (2200 Hz) will be at a different amplitude than the "low" packet tone (1200 Hz), and the receiving TNC or sound card may have trouble decoding the packet. This is the reason why the direct discriminator audio may need to be de-emphasized by a separate circuit for 1200 baud packet -- to make the amplitudes of the high and low packet tones more nearly equal.

DATA IN - sometimes misleadingly labeled "TX Data Input" ,"TXD" or "PKD". This is the pin for your transmitted audio. In some radios, a menu choice of "1200" or "9600" baud will determine how this audio input is processed:
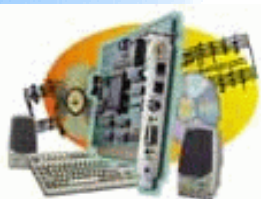
- **1200**: will go into the same channel as the MIC input for 1200 baud packet, SSTV, EchoLink, AFSK RTTY, etc. This menu selection typically means that you should use low level input, e.g. 40 mV.
- **9600**: will be DC-coupled directly into the TX modulator for 9600 baud packet. This menu selection typically means you should use a higher level input, e.g. 500- 2000 mV.

Your menu selection will affect your card volume control settings and your cable attenuation circuit. For 1200 you should use lower volume/some attenuation and for 9600 you should use higher volume/no attenuation.

TX PTT is the normal ground-to-transmit line, just like that found on most MIC inputs (confusingly labeled "Standby" or "PKS" by Kenwood).

SQUELCH - is the receiver squelch status line. Normally "no signal/squelch-closed" equals 0 V, and "signal active/squelch open" equals 5 V. Your radio may label this pin as "SQC", "COR" (Carrier Operated Relay - an archaic term from the early days of FM repeaters), "COS" (Carrier Operated Switch), "CD" (Carrier Detect), "Activity" or "Busy".

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Sound Card Packet

Download and Install AGWPE

1. Download the AGWPE Program

The AGWPE web site is at **http://www.raag.org/sv2agw/index.html**
There's a mirror site at **http://www.elcom.gr/sv2agw/**

You can download the AGWPE program at either of those sites:
http://www.raag.org/sv2agw/agwpe.zip
http://www.elcom.gr/sv2agw/agwpe.zip

Another **good site for AGWPE downloads** is Dave's M1AGN. He usually has the most recent version **plus some older versions,** in case you want to revert to an older version to test for or resolve bugs in a newer version.

I also keep a **copy of AGWPE** on this site, but it may not be the most recent version if a new version has just been released.

The AGWPE setup file comes in "zip" format. If you need an unzip program, **visit the WinZip site** for the latest copy of WinZip.

Note that George SV2AGW will often release "beta" upgrades of the program as he experiments with improvements. (For example, you may hear of another user using a higher numbered version of AGWPE, and that would be one of the betas.)

George does not publish betas on the main AGWPE sites, only tested versions. So if you want to obtain a copy of any current beta to help test it, join the **AGWPE email reflector/list server**.

Also note that beta files are usually released without the supporting files necessary for a first time AGWPE installation. A beta file usually has just a new **AGW Packet Engine.exe** file. For a first time installation, you'll need to download the last full release of AGWPE, then substitute the new beta **AGW Packet Engine.exe** file.

---

2. Install AGWPE

Extract the zipped files into a new directory/folder. I always create a new folder for each version of AGWPE that I download. The program uses the same file names, and I want to be able to properly identify each program version and not confuse them.

You do not need to unzip any unneeded alternate language files.

Note that the main AGWPE program is called **AGW Packet Engine.exe** You may want to create a Windows shortcut to this file on your desktop.

You may also want to add a link to **AGW Packet Engine.exe** on your Windows **Start Menu** by dragging and dropping a copy of the AGWPE shortcut icon onto the Windows **Start** button on the Task Bar at the bottom of your screen.

Do I need to install special drivers for parallel port PTT control?

Not any more. Earlier versions of AGWPE **did require** special parallel drivers, but they are **no longer necessary**. For the most recent versions of AGWPE, e.g. since version 2001.38, it is **not necessary** to download or use the drivers.zip file from the AGWPE site despite what the AGWPE program **Help** file or the **AGWPE web site** may say.

Next step:

Basic Setup for AGWPE (1 sound card & one 1 radio)   or

Setup AGWPE for 2 radios   or

Setup AGWPE for 2 sound cards

Last Updated: 09/25/2004

Sound Card Packet

Basic AGWPE Program Setup

One Radio to One Sound Card

Navigating in AGWPE
Configuring the Radio Port Properties
Configuring the Sound Card

AGWPE uses the concept of **Radio Ports** to define how it will interface with a radio. An AGWPE radio port is created for each sound card channel, TNC or radio modem that AGWPE will manage. This page will show you how to setup an AGWPE sound card radio port in just a few minutes. Note that to complete your configuration, you will need to decide which RS-232 port (COM or LPT) you plan to use for PTT control, in other words, where your PTT cable will connect to the computer. Usually is an unused COM port. See **PTT Cable** for more information.

Before starting AGWPE, always close:

     any programs that might be using the *serial or parallel port* you plan to use for PTT control
     any programs that might be accessing the *sound card*

a. Navigating in AGWPE

When you start the **AGW Packet Engine.exe** program for the first time, you will be greeted with a **Packet Engine** banner all in gold and a Software License Agreement which you must accept. The banner will disappear in a few seconds or you can click on it once to speed things up. At this point, you will discover that AGWPE does not put an open Window on your desktop, nor will there be a button on the bottom Task

Bar of your screen. Instead, all you will find is the AGWPE tower icon on your Windows System

Tray at the bottom right of your screen. This icon is your only access to AGWPE when it is running! To help you find it, a yellow pop-up 'balloon' message points to the icon when AGWPE starts.

To change any of AGWPE's configuratons, left or right click on the **AGWPE** icon to bring up

AGWPE's pop-up menu:
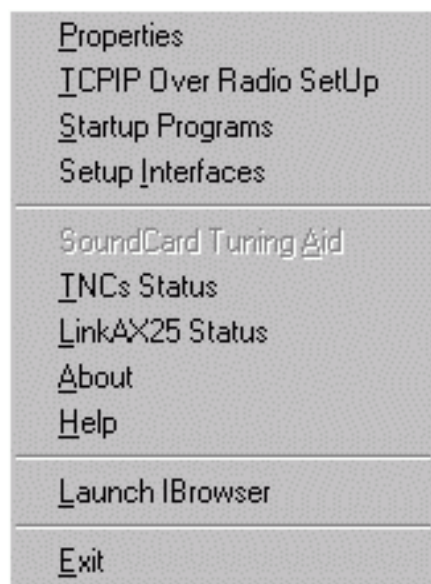
Note: The Sound Card Tuning Aid option on the menu will be grayed out until you create and configure a "radio port" as described below.

b. Create and Configure an AGWPE Radio Port

The first step in working with AGWPE is to create and configure a radio port for a sound card channel and its associated radio. From the AGWPE menu, select **Properties**. A blank **RadioPort Selection** window will open. Press the **New Port** button on the right. A message window will appear: **A New TncPort File Has Been Created**. Click **OK** to close the message and move on.

The **Properties for Port`1** window should now appear. Remember that AGWPE also can manage TNCs and radio modems, so some of the fields on this screen will not pertain to sound cards. The field outlined in red will be the key fields for a sound card radio port. Follow the step below in filling out the fields:
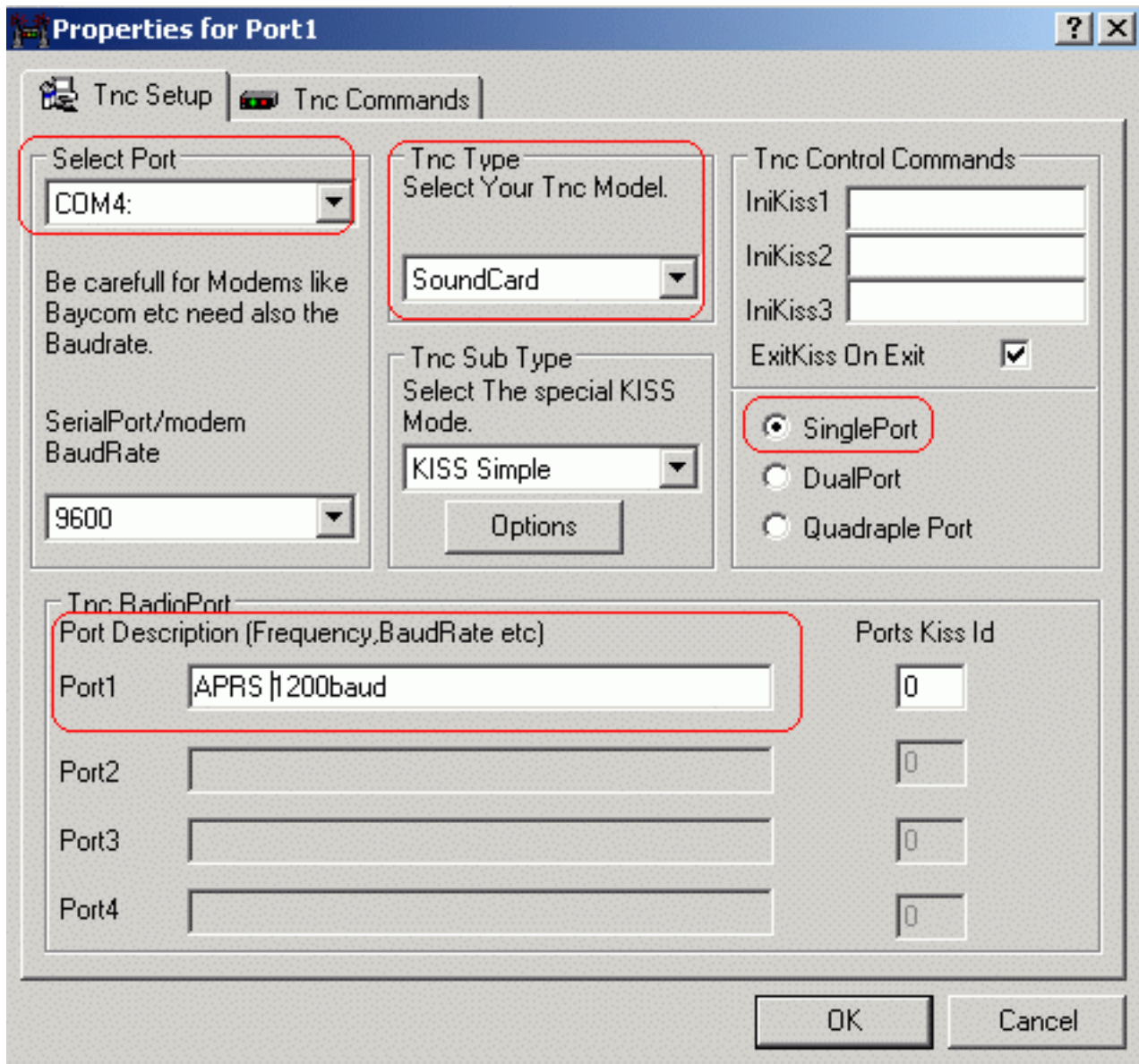
1. Make the following selections first on this screen (i.e. TNC Setup tab):

Select Port	enter the port where you will attach your <u>PTT cable</u>, e.g. COM1 or LPT1; see notes below *
TNC Radioport: Port Description	you can overwrite the current description for Port 1 and enter a description of your own choice, e.g. **Icom 1200 Packet**

* Notes about Port selections (COM & LPT):

> **To select a parallel port** scroll to the bottom of the port list
>
> **If you are setting up a receive-only installation** or using a SignaLink interface or other audio-controlled PTT interface and don't want to tie up a real port for a PTT line you won't be using, the AGW software **will accept non-existent parallel port** assignments, but not non-existent serial ports.

2. You can leave all other selections at their defaults, including Serial Port/ Modem Baud Rate, which is

not used for sound cards.

3. Now go to the TNC Type field in the top middle of the screen and use the pull down list to select "Sound Card".

c. Settings on the Sound Card Setup screen:

When you select "Sound Card" for your TNC Type (or if press the Options button in the middle of the TNC setup window, underneath TNC subtype), the program will bring up the SoundCard Modem/TNC Setup window which looks like this:

1. Baud Rates: Note that your sound card is capable of supporting two radio ports using its left and right audio channels. If you are only using one radio, it will be Port 1 on the left channel. Set the left channel baud rate for the rate you plan to use, i.e. 300 baud for HF SSB work; or 1200, 2400, 4800, or 9600 for VHF/UHF work.

Assuming that you will not be using the right channel for a second radio connection, set the right channel

rate for a baud rate different from the one you have chose for the left channel. This may prevent the possibility of future problems. (If you will be connecting to 2 radios, see Configuring AGWPE for 2 Radios.)

2. Sound Card Selection: Use the pull down menu to select the sound card device you will be using with AGWPE. You may see other choices, such as a telephone modem (don't use) or another another card if you have two.

3. For now leave the other fields at their defaults:

- **Full Duplex Driver: The Full Duplex Driver box should be checked. Most recent sound cards are full-duplex capable. If you later encounter transmitting problems, you may need to un-check the Full Duplex Driver box. This is likely to apply only to older sound cards; see Problems with Connections for more about this.**
- **Sound Card Clock: This setting is used if you have problems receiving distant stations; see the Problems with Receiving page for more information, but for now leave the setting at 4, the default.**

Now press the OK button to return to the Properties for Port1 window but do not close it yet.

4. Note that, by default, AGWPE has created two sound card radio ports. To avoid future operating problems, change the setting from Dual Port to SinglePort in the TNC Control Commands section of the Properties for Port1 window. (Doesn't apply if you really will be connecting to 2 Radio).

For a simple, first time installation, all other selections can remain "as is" (use the default selections), including those in the Tnc Commands tab window in the Properties for Port1 window and any other selections on the AGWPE menu.

5. Now press the OK button at the bottom of the Properties for Port1 window. You should get a popup message telling you to restart the program, so click on the Packet Engine icon once again and select 'Exit'. Now restart AGWPE. The Packet Engine icon should once again appear, but in addition you should now see a TNC icon next to it. This new icon represents your new sound card Radio Port.

d. Editing a Port's Properties

If you want to change a setting in the Radio Port's configuration, click on the AGWPE icon to call up the menu, select Properties, and then click on the radio port you want to change. Then click OK and edit the fields in the Properties for Portx window.

e. Problems?

- **Any time you have trouble starting or configuring AGWPE, it is often best to close AGWPE and delete all port*.ini files and the agwpe.ini file in your AGWPE directory/folder. Then restart and re-configure AGWPE from the very beginning.**

If you don't see this TNC icon **, you probably have a conflict with another program or device:**

- Make sure that the COM or LPT port you have select in AGWPE is not already dedicated to another device, for example, an internal modem or printer) or has been "captured" by another program (for example, your Palm Pilot's "Hot Sync Manager". You'll have to resolve any conflicts by either closing the other program, disabling the device, or selecting another port for AGWPE's PTT control.
- Make sure that no other program is running and using the the sound card.

For further help in resolving **port conflicts**, go to the **Problems with Program Behavior** page on this site.

Configure AGWPE for one sound card and 2 radios
Configure AGWPE for 2 Sound Cards

Return to Top of Page

Sound Card Packet

Configuring AGWPE for Two Radios on One Sound Card

AGWPE is able to use the stereo capabilities of the sound card to **interface with two radios simultaneously!** One possible use of this would be to listen to the DX Cluster frequency on one radio while you are operating on a APRS or other packet communication frequency (including HF) on the other radio.

To make the appropriate cables, see the 2 Radios Cable page.

To handle the second radio, you'll need to configure AGWPE as if it were "dual port" TNC:

- **Click on the Packet Engine icon** [icon] **in the System Tray at the bottom of your screen to bring up AGWPE's pop up menu.**

- **Click on Properties and then, with Port 1 highlighted, click on OK.**

- **When the Properties box opens make these changes:**
  - Click on the **DualPort** choice in the far right column of the window.
  - The **Port2** field at the bottom of the window should now be active (turns from gray to white). In this field, type in a name of your choice for Port 2, e.g. the name of the radio and/or frequency and/or application. You can also edit Port1's name at this time if you want.

Click to enlarge

- **Set the Baud Rate: Under the TNC Sub Type, click on the Options button to bring up the SoundCard Modem/TNC Setup window that lets you change the "on air" baud rate for each channel. Here's an example:**
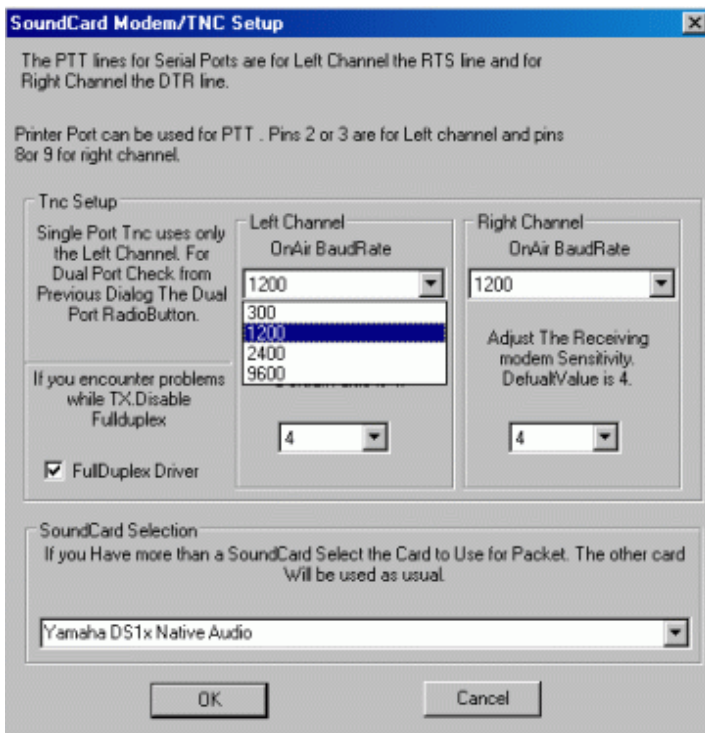
By default, the "on air" rate is set at 1200 for both channels.

Note About PTT control: In earlier versions of AGWPE which did not have the two radio option, AGWPE used *both* the RTS and DTR pins on the COM or LPT port for PTT control. You could wire your PTT cable for either.

Current versions of AGWPE don't do this. If you select **SinglePort,** only the RTS pin will be used; the DTR pin isn't used. If you select, **DualPort,** the RTS pin will be used for the radio on port 1 (the left channel) and the DTR pin will be used for the radio on port 2 (the right channel).

How Do You tell your applications which AGWPE port/radio to use?

In **WinPack,** for example, when you issue the connect command, put the port number between the connect command and the target station's callsign, for example:
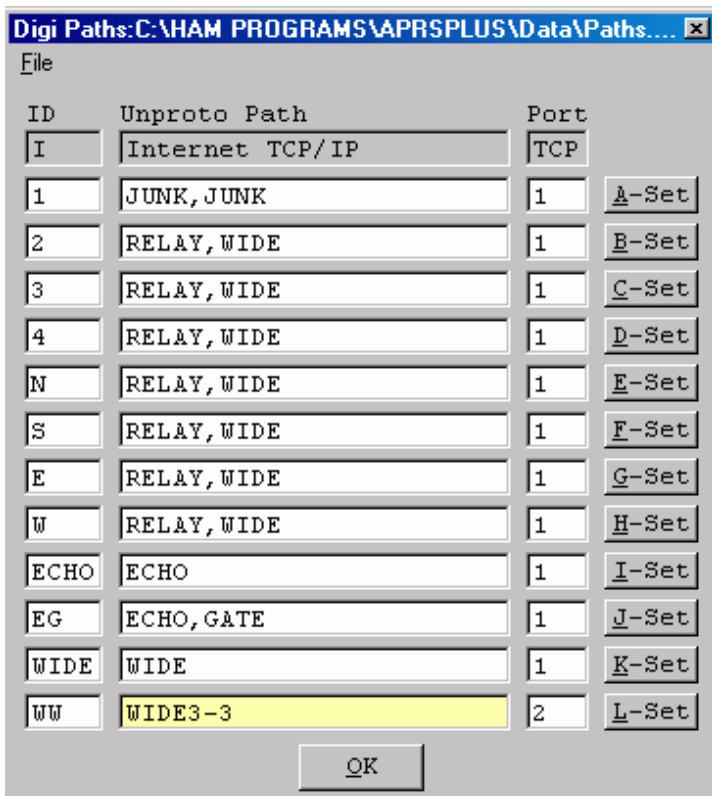
> **C 2 KC2RLM**

In **UI-View,** go to the **Setup** menu and then **Station Setup.** UI-View *transmits* on the ports you specify under **Unproto Ports.** For example, if you only enter **1,** then UI-View will only transmit your station beacon through AGWPE port 1. To specify multiple ports, enter e.g. **1,2 .**

UI-View *receives* by default on all ports. To change that, go to the **Setup** menu and then **Comms Setup.** When you select a host mode of **AGWPE,** a **Setup** button will appear to the right of **AGWPE.** Press that button that to bring up the **AGWPE Setup** window. Then press the **Ports Mask** button to bring up the **AGWPE Port Mask Monitor** window. Check or uncheck ports to control which AGWPE ports UI-View will receive on.
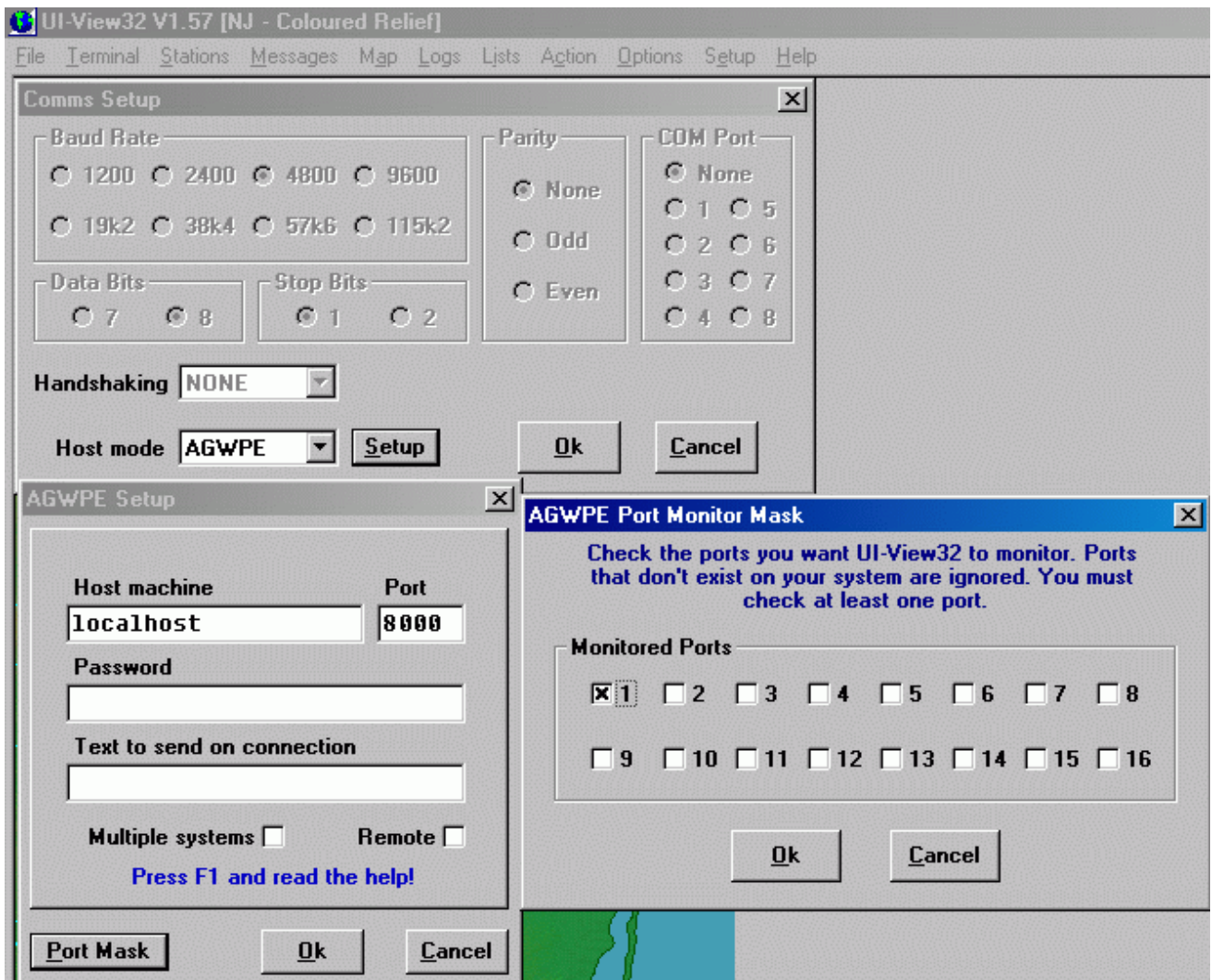
WinAPRS has a special way of handling it. See the **WinAPRS setup page**.

In **APRSplus**, use the **Commands: Unproto Paths** menu option (or Ctrl+Shift+U) to call up a list of UI paths. By default the TCP port for all path choices is set to 1, ie AGWPE port 1. To use AGWPE port 2, pick an unused line and change the TPC port to 2; also edit the path to one of of your choice. Now press the **Set** button to the right of the port you want to use. <mark>It will then be highlighted in yellow.</mark> Press the **OK** button.

Digi Paths:C:\HAM PROGRAMS\APRSPLUS\Data\Paths.... ☒

File

ID	Unproto Path	Port	
I	Internet TCP/IP	TCP	
1	JUNK,JUNK	1	A-Set
2	RELAY,WIDE	1	B-Set
3	RELAY,WIDE	1	C-Set
4	RELAY,WIDE	1	D-Set
N	RELAY,WIDE	1	E-Set
S	RELAY,WIDE	1	F-Set
E	RELAY,WIDE	1	G-Set
W	RELAY,WIDE	1	H-Set
ECHO	ECHO	1	I-Set
EG	ECHO,GATE	1	J-Set
WIDE	WIDE	1	K-Set
WW	WIDE3-3	2	L-Set

OK

Problems in setting up two ports in AGWPE? **If you have any unusual difficulties in changing from single port to dual port operation, it may just be easier to:**

- **exit from AGWPE**
- **delete all port*.ini files and the agwpe.ini file in the AGWPE directory/folder**
- **restart and re-configure AGWPE from the very beginning-- it doesn't take long.**

Possible Problems with Stereo Channels and 2 Ports/Radios

- **Some users have reported the RX audio from one channel may somehow "spill over" on to the other channel. The only reported solution is to reduce the radio's RX volume on the originating channel/port, so that it is just loud enough for AGWPE to decode -- watch the green blinking pixel in the modem icon.**

- **George SV2AGW says there may be a problem running AGWPE in 2 port sound card mode if your soundcard is not full-duplex capable. Most cards are, but if yours is not, then while one channel transmits, the other channel will stop receiving.**

  If you want to check if your soundcard is full-duplex:
  1. Run AGWPE (using the soundcard as a TNC, of course)
  2. Run the Windows Sound Recorder program:
     Start/Programs/Accessories/Entertainment
  3.Press the record button.
  If your soundcard works in full-duplex mode it will start recording. If it does not, you will get a pop-up message warning you that your soundcard is in use by another program, i.e. AGWPE.

**Last
Updated:
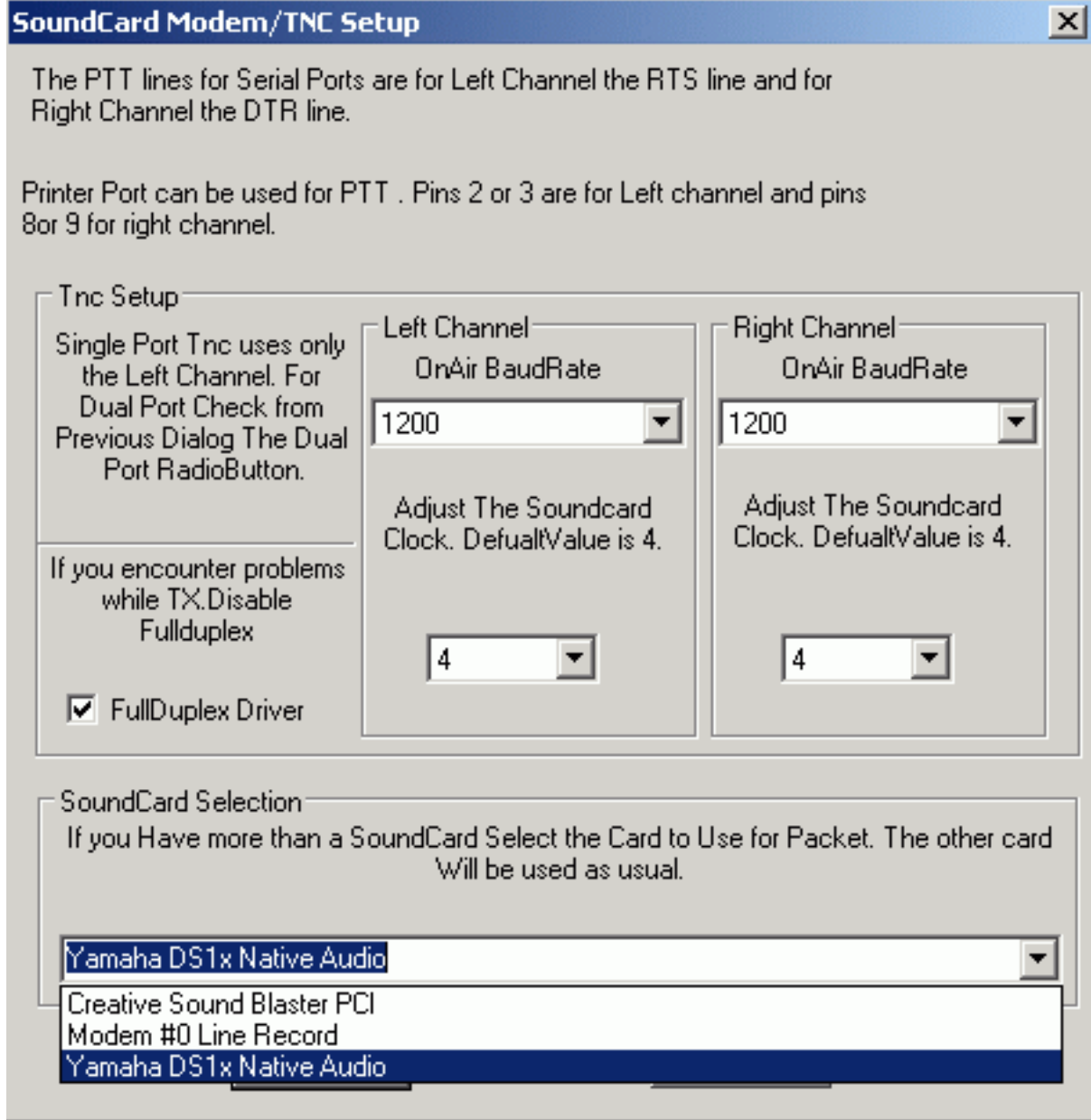09/24/2004**

Sound Card Packet

Using a Second (or more) Sound Card with AGWPE

Recent AGWPE versions let you use unlimited **additional** sound cards in your computer. This lets you use one sound card for Windows programs and devices, such as a CD player, while your second sound card can be dedicated to AGWPE. In fact, you could even install a third sound card (or more!) for more packet ports. Your only limitation will be card slots and PTT signaling ports (COM, LPT or USB) in your computer.

Ideally your additional sound cards will be "plug-and-play" and Windows will automatically recognize them when you boot up after installing it. Otherwise you will need to use the Windows Control Panel option, "Add New Hardware", to tell Windows about the sound card and install the appropriate drivers. After the additional sound card is installed in Windows, AGWPE will automatically recognize all cards.

[Note: For more information about compatible sound cards see the More About AGWPE page.]

To select the sound card you want to use for sound card packet, call up AGWPE's main menu, select Properties and then, with Port 1 highlighted, click on OK. The Properties for Port1 box will then open. Under the TNC Sub Type choice field there is an Options button. Click on the Options button to bring up the SoundCard Modem/TNC Setup window. At the bottom of this window is a Sound Card Selection dialogue box where you can select the sound card you want AGWPE to use. Click on the down arrow to the right of the box to see your choices.

SoundCard Modem/TNC Setup

The PTT lines for Serial Ports are for Left Channel the RTS line and for Right Channel the DTR line.

Printer Port can be used for PTT . Pins 2 or 3 are for Left channel and pins 8or 9 for right channel.

Tnc Setup

Single Port Tnc uses only the Left Channel. For Dual Port Check from Previous Dialog The Dual Port RadioButton.

If you encounter problems while TX.Disable Fullduplex

☑ FullDuplex Driver

Left Channel

OnAir BaudRate

| 1200 | ▼ |

Adjust The Soundcard Clock. DefualtValue is 4.

| 4 | ▼ |

Right Channel

OnAir BaudRate

| 1200 | ▼ |

Adjust The Soundcard Clock. DefualtValue is 4.

| 4 | ▼ |

SoundCard Selection

If you Have more than a SoundCard Select the Card to Use for Packet. The other card Will be used as usual.

| Yamaha DS1x Native Audio | ▼ |

Creative Sound Blaster PCI
Modem #0 Line Record
Yamaha DS1x Native Audio

How to specify the Windows Default Sound Card

This procedure is essentially the same for Windows 98/ME/2000/XP:

- Open the Windows Control Panel
- Select Sound and Multimedia (or Sounds and Audio Devices)
- Select the Audio tab
- In the Sound PlayBack box, select the sound card that you wish to set as the Windows default card from the drop down list
- Repeat this in the Sound Recording box

If you don't specify a default, typically the first sound card listed in the AGWPE list is the Windows default card , but to test which sound card is being used by Windows, you can temporarily attach speakers to the LINE OUT jacks on each sound card. Play some Windows sound or a CD to see which sound card is being used. Then select the other card for AGWPE.

Note that AGWPE may also report other devices that are not sound cards, such as telephone modem devices, so be sure NOT to select one of those. (If you do, you will receive an error message: " Your Sound Card Drivers can not Support the Wave Format".)

When you set the **volume settings for the card**, be sure to select the AGWPE card in the **Mixer Device** field.

Known and Possible Bugs

- AGWPE has a **Volume Control Settings** window where you can adjust the transmit and receive settings. Unfortunately, as of Versions 203.308, the settings will only adjust the first card listed, which might not be the one for AGWPE.

- One user has reported Windows lock-ups when trying to use 2 sound cards of the same manufacturer or the same drivers.

Return to the top of the page
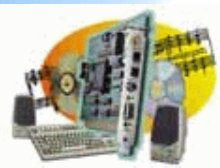
Last Updated: 09/25/2004

Sound Card Packet

Basic Sound Card Settings for AGWPE

For AGWPE to work, you need to set four basic sound card settings correctly:

The **receive** audio **source**
The **receive** audio **volume level**
The **transmit** audio **source**
The **transmit** audio **volume level**

You can adjust these sound card settings in two ways:

1. AGWPE's SoundCard Volume Settings screen
 a. Receive Audio Settings
 b. Transmit Audio Settings

2. Windows' Volume Control Program
 a. Transmit Audio Settings
 b. Receive Audio Settings

Other information on this page includes:

3. Configuring Two Sound Cards
4. Preserving Your Volume Settings (QuickMix)

There are some advanced sound card settings that may also affect you. These include "Speaker Type", "Hardware Acceleration", and "Sample Rate". These are discussed on the Additional Settings page of this web site.

1. Using AGWPE to Adjust Basic Sound Card Settings

To set the volume controls from within AGWPE, right click the AGWPE tower icon to bring up the AGWPE menu and then click on Sound Card Tuning Aid. The Tuning Aid is a great way to adjust your RX (receive) volume. Note that the Tuning Aid screen window will remain on top of all other windows. You can drag it with the blue Title Bar if it gets in the way, but it's handy to keep in displayed throughout the volume adjusting process:
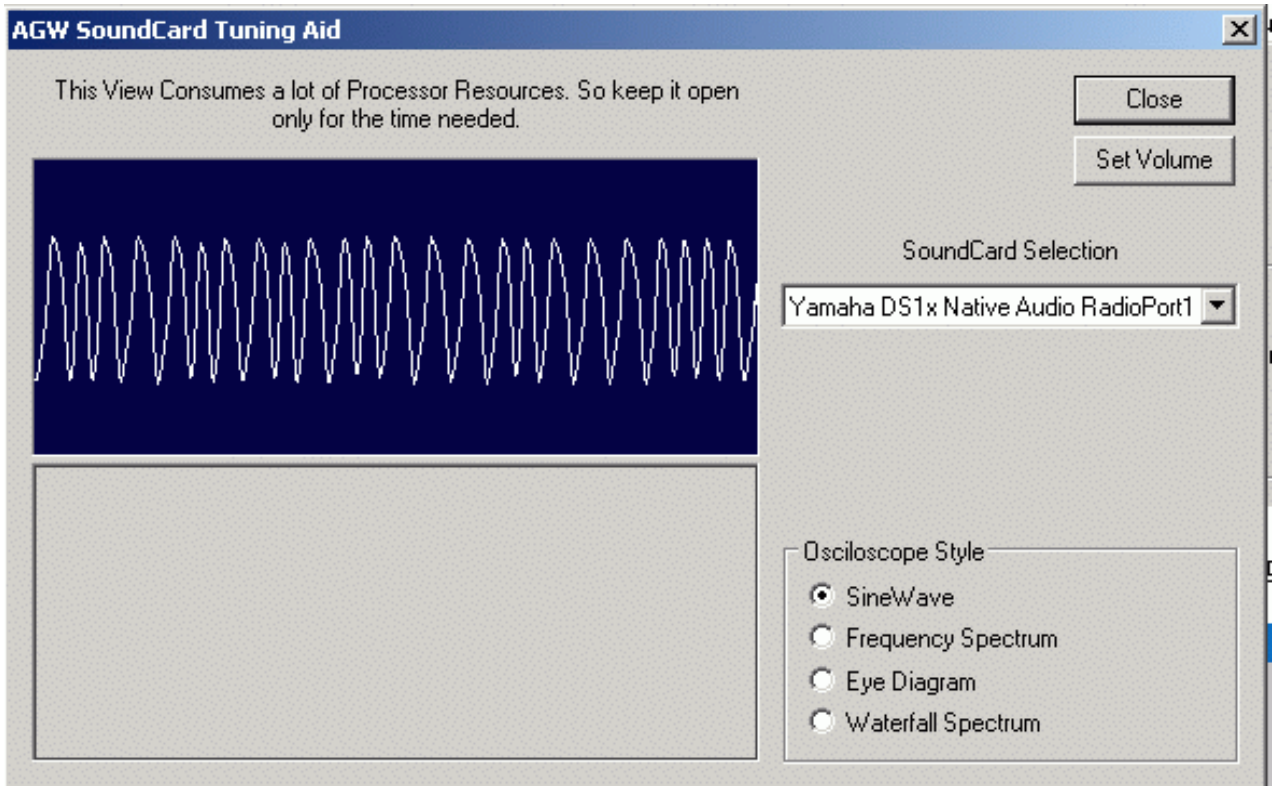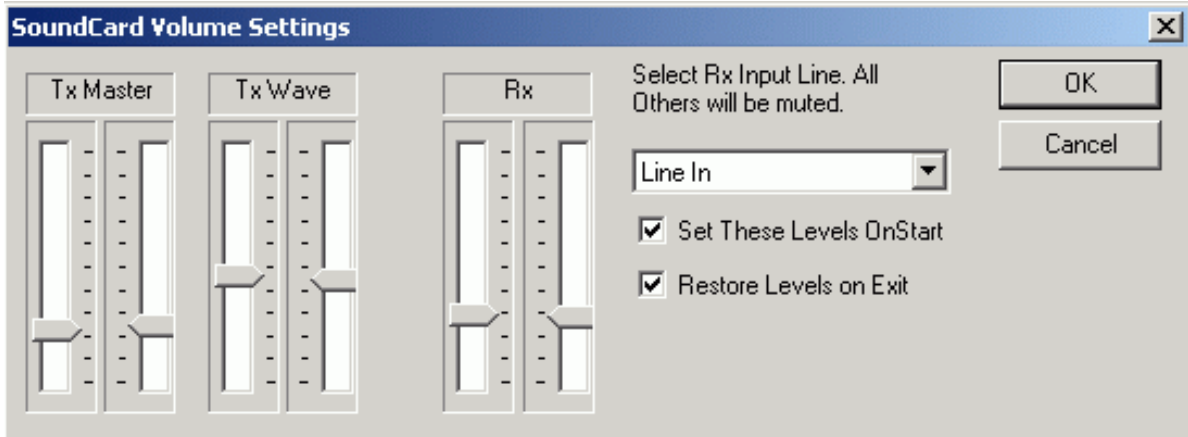
Then in the AGWPE **Sound Card Tuning Aid** window, click on the **Set Volume** button to get to this window:

Bug Report: There are still some problems with this AGWPE feature as of 2003.308:

- it does not "select" the Rx Input Line (audio source) as advertised. It will control the volume sliders to the source you select, but it does not change the selected audio source to that source. For example, if the source is currently "MIC", changing it to LINE IN with AGWPE will not work.

- if you have two sound cards in your system, AGWPE only controls the volume settings on the first sound card, even though you may have set AGWPE to use the second sound card.

If these problems affect you, then you need to use the **Windows' Volume Control Program (see below)** to adjust your settings. **See #2** below.

a. Receive Audio Settings (via AGWPE)

Receive Audio Volume: The left **Rx** slider controls the receive volume (recording volume) of the left channel or port 1 of the sound card. The right column sliders control the right channel or port 2. (If you are using only one radio port in AGWPE, it will be the left slider).

I've had good success with the sliders set 1/3 up from the bottom. Be sure not to set them too low since it may stop all input (they don't have to be to the very bottom for audio input to be stopped). Use the sound card tuning aid's Sine Wave scope to see the results of your settings. The sine waves should fill about half the scope as in the Tuning Aid screen shot above. Use the volume slider to adjust the wave size. If you get the output from the radio's speaker jack, you can also adjust the radio volume. AGWPE is pretty tolerant of RX volume levels, but conceivably it is possible for the volume to be too loud or too soft.

If you don't see any waves, then your audio source setting is probably incorrect (see next paragraph) or, if you are using the radio's mike or speakers for RX audio, your radio's squelch in on; turn it off so you can hear the channel noise.

> Visit the Sound Card Tuning Aid page for more information, including screen shots of signal problems.

Receive Audio Source: See **Bug Report** above. The Rx Input Line (audio source) does not work as advertised in version 2003.3008. You need to use the **Windows' Volume Control Program (see below)** to adjust your settings.

[When the bug is corrected, you will be able to select the source of your receive audio, either **Line** (meaning LINE IN) or **Microphone**, depending where your RX audio cable is plugged. As the screen says, other sources will be muted and that's good.]

(If you opt to use the Microphone instead of the Line In for RX in, be sure that you **do not use the Microphone Boost option** of your sound card. See **Windows' Volume Control Program** below for **instructions on how to configure boost**.)

Set/Restore Options: If you use your sound card for programs other than AGWPE, the **Set These Levels on Start** and **Restore Levels on Exit** will be helpful. They allow you to set the volume especially for AGWPE and then return them to their previous settings when you exit AGWPE.

b. Transmit Audio Settings (via AGWPE)

Transmit Audio Volume: The **Tx Master** sliders and two **Tx Wave** volume sliders work together: **Wave** means **Program,** in this case AGWPE and the packet tones it generates. The **Tx Master** sliders are a master control that will further adjust the **Wave** volume.

As with the RX sliders, the left column sliders (for both Master and Wave) control the left channel or port 1 of the sound card. The right column sliders control the right channel or port 2.

I've had good success with the sliders set 1/3 up from the bottom. Your setting will depend largely on how well the attenuation circuit in your TX audio cable matches the optimal microphone input level of your radio. See **How Much TX Volume?** below for some further advice.

It's essential that none of these two sliders be at the absolute bottom or near the bottom, as that may stop all output.

> ### How Much TX Volume?
>
> You can get a rough idea of your TX volume by temporarily plugging your computer speakers into the LINE IN jack. But that will not tell you how what your TX audio sounds like on the air. It would be better to listen to your transmitted audio with a second radio.
>
> But the best way to check your transmit volume is with a deviation meter. The correct deviation is 3.75 kHz of deviation (+/- .25). But since most of us don't have a deviation meter, Jim K6CCC offered this alternate suggestion:
>
> My standard advice for people who do not have access to a deviation meter is to set your path to digipeat through a single local digipeater (e.g. TEST VIA WIDE), then go into converse mode (UI mode) and transmit a single carriage return. Watch to see if your single packet gets digipeated by that one local digipeater. If it doesn't get digipeated on your first attempt, try several more times because it may not have gotten through because of a collision. **If it does not** get through after a few attempts, turn up the volume just to that point where it gets through reliably.
>
> Conversely, if the packet **does** get digipeated, turn down the transmit audio level a little and try again. Keep doing this (turning down the volume) until your packet **does not** get digipeated reliably. Then turn it back up **just a little bit** and verify you can get the packet reliably digipeated.
>
> It's FAR better to have your volume too low than too high!

When you are done, press OK to save your settings and then close the Tuning Aid window.

2. Using Windows' Volume Control Program to Adjust Sound Card Settings

It's also possible to set the volume control settings with the Windows' Volume Control program, but the AGWPE method above in #1 is much easier. However, there may be some settings, such as Microphone Boost, that can only be controlled by Windows' Volume Control program and not AGWPE. The The sections below discuss how to configure Windows' Volume Control for :

- Tx source and audio (outgoing packet tones)
- Rx source and audio (incoming packet tones)
- two or more sound cards
- preserving your volume control settings

To start, you should see the volume control icon ![icon] in the system tray on the lower right of your screen. If you don't, follow the directions on the sound settings page to display it.

a. Transmit Audio Settings (via Windows)

To set the source and volume level of your outgoing packet tones:

- Left click twice very quickly on the Volume Control icon ![icon] (or go to the Control Panel and Sounds: Audio). The Volume Control window should open . It initially displays settings for just the Playback or TX audio (sound card-to-radio). Here is what that window looks like in my system; it may be somewhat different in your system because of the sound card type:
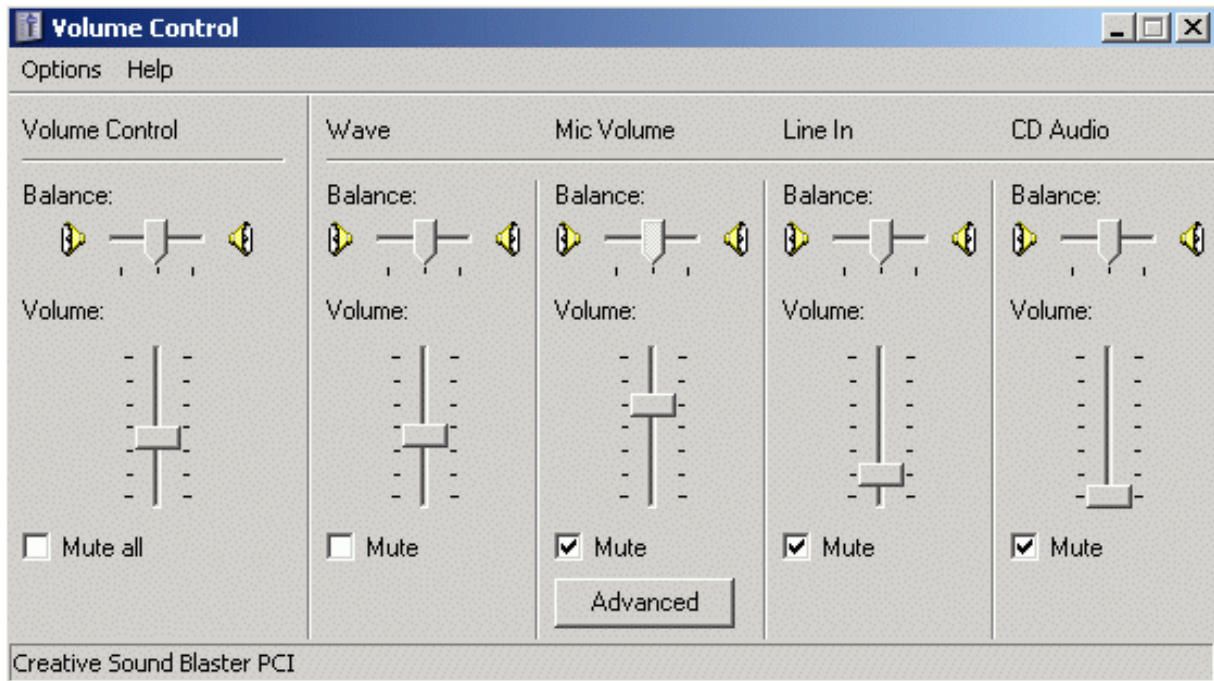
- The settings of importance on this window are:

  - The left most Volume Control volume slider and the Wave volume slider work together. Consider Wave to mean Program, in this case AGWPE, which is creating the outgoing packet tones. The Volume Control slider is a master control that will further adjust the Wave volume.

    I've had good success with both sliders set 1/3 up from the bottom. Your setting will depend largely on how well the attenuation circuit in your TX audio cable matches the optimal microphone input of your radio. See How Much TX Volume? below for some further advice.

    It's essential that neither of these two sliders be at the absolute bottom or near the bottom, and it's essential that the Mute boxes are not checked.

  - Leave all Balance sliders in the middle. They are for stereo channel control and setting the slider to the wrong side could mute outgoing sounds to one of the two possible sound card channels/radioports.

■ I mute all other audio output sources (Mic, Line In and CD) so that only AGWPE (wave) outputs sound to the radio and not other sources.

b. Receive Audio Settings (via Windows)

To set the source and volume level of your receive or RX audio is a bit more difficult to find. These settings are found in a different Volume Control sub-window, the Recording Control window, whereas the outgoing sounds (see A. above) are set in the Playback window. This is very important. Many people do not realize this Recording window exists. Failure to get the recording settings correct results in problems receiving packets. To get to the Recording Window:

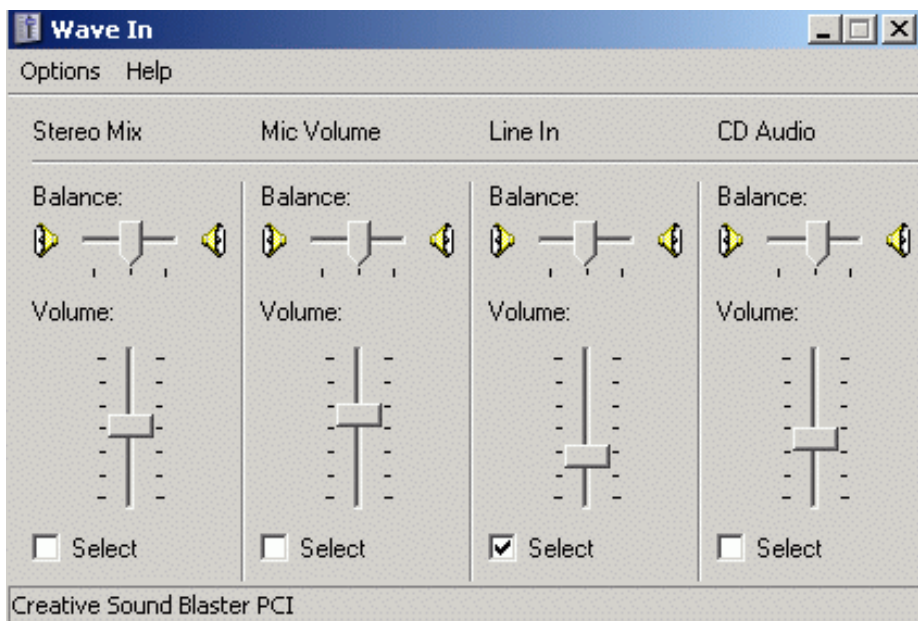✛ From the Playback Volume Control window shown above, select the Options menu choice, then Properties.

✛ Click on the Recording radio button to bring up the list of volume controls. Make sure that there's a check mark ☑ next to the jack where you plugged in your radio RX audio cable -- either Line In (preferably) or Microphone. Here's what this window looks like on my system.
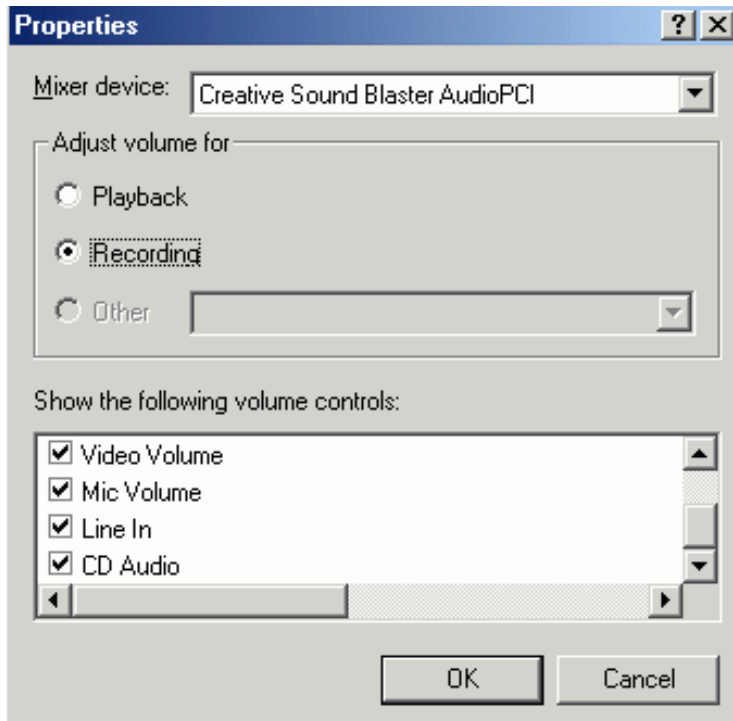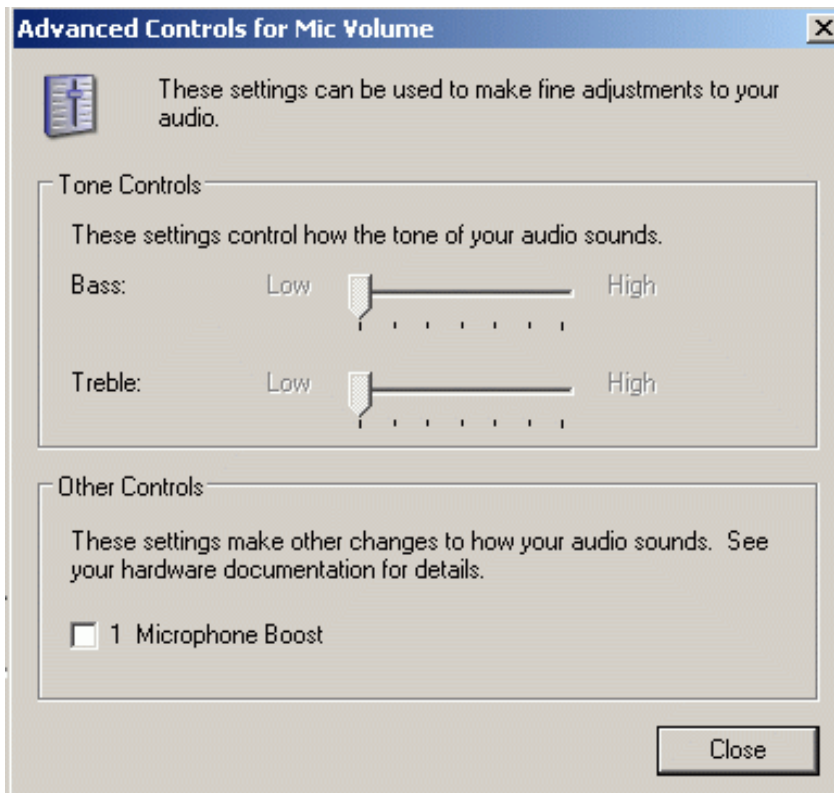

✛ When you're done, click on the OK button.

✛ You should now see the Recording Control window (or the Wave In window as it is called in my system). Since I use the Line In jack for Radio RX audio, here's what my settings look like. Notice the Select check mark ☑ under Line In:

Wave In

Options   Help

Stereo Mix	Mic Volume	Line In	CD Audio
Balance:	Balance:	Balance:	Balance:
Volume:	Volume:	Volume:	Volume:
☐ Select	☐ Select	☑ Select	☐ Select

Creative Sound Blaster PCI

- Click the **Select** box for the jack where you will plug in your **radio RX audio** cable, either the **Line In** (preferably) or **Microphone**.

- Set the volume slider about **1/3** up (soft). This should work for you, but note that AGWPE can probably handle any setting other than "off/quiet". See **How Much RX Volume?** below for some further advice.

- Leave the balance slider in the middle.

- After you've made your choices, click the 'X' in the top right corner of the window to close the window and the Volume Control program. Your settings will be saved automatically.

Microphone Boost: If you opt to use the Microphone instead of the Line In for RX in, **do not use the Microphone Boost option** if it is offered by your system. I found this option by clicking on the **Advanced** button found under the **Microphone** slider in the **Recording Control** window. The "boost" feature typically adds a 20 dB increase in audio volume and is designed to amplify the weak signal form a computer electret microphone. The audio from your radio is normally already too high for input into the MIC jack (that why you are advised to add an attenuation circuit to the RX cable). So using the boost feature can make the problem worse.

Advanced Controls for Mic Volume

These settings can be used to make fine adjustments to your audio.

Tone Controls

These settings control how the tone of your audio sounds.

Bass: Low ———————— High

Treble: Low ———————— High

Other Controls

These settings make other changes to how your audio sounds. See your hardware documentation for details.

☐ 1 Microphone Boost

Close

3. Configuring the Volume Control program for a Second (or more) Sound Card

If you have two or more sound cards installed, you will need to set the playback and record settings for the additional cards (those used by AGWPE). Here's how to do it:

➕ Left click twice very quickly on the Volume Control icon 🔊 in the System Tray. The Volume Control window should open.

➕ Select the Options menu choice, then Properties to bring up the Properties Window.

➕ At the top of the Properties window, you'll see a Mixer Device field. Click on the down arrow ▼to the right of the field to call up a list of mixer devices.
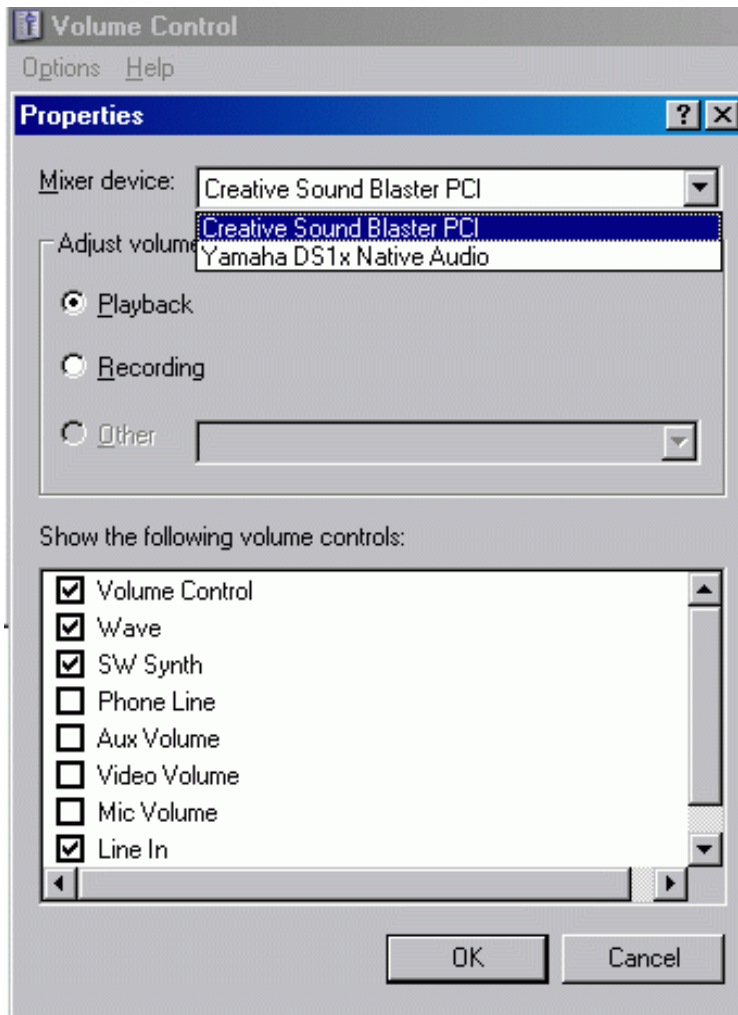
ç Click to enlarge

➕ Click on the second sound card to select it. Then after making sure the Playback button below it is selected, press the OK button. This will return you to the Volume Control playback sliders for the second card (the sound card's name will be in the lower left of the window). Make your settings as you did above in Transmit Audio Settings.

➕ When your done with the playback settings for the second card, select the Options menu choice again and then Properties to bring up the Properties Window again.

➕ Once again click on the down arrow ▼to the right of the Mixer Device field to call up a list of mixer devices.

➕ Click on the second sound card again to select it. Then after making sure the Recording button below it is selected this time, press the OK button. This will bring you to the Volume Control recording sliders for the second sound card . Make your settings as you did above in Receive Audio Settings.

4. Preserving your volume control settings

When most systems reboot, the volume control settings will remain as they were when you shut down. This is more likely if you use the Set and Restore Options in AGWPE's SoundCard Volume Settings screen, see Receive Audio Settings above.

However in some sound cards/systems, when Windows reboots, your Volume Control settings may automatically be reset to a default and something other than you want. This happened to me with one sound card. Even though I would chose **Line In** as my desired 'audio in' recording source, as soon as I rebooted, **Microphone** became the recording audio source! I'm not sure why this was happening -- perhaps it was the sound card mixer program.

Or your settings may be changed by another program that uses the sound card and you want an easy way to return them to the settings you use for AGWPE

You have two main options if this is happening to you:

1. Each time you run AGWPE after a Windows boot/reboot, re-configure the Volume Control **Recording Control** properties as above.

2. Use a utility program that, on startup, automatically sets the Volume Control settings the way you want them. I used a small (260 kb) freeware utility called **QuickMix** to do this. You can **download the program from the Quick Mix web site**.

Using QuickMix

1. Install QuickMix by running the QuickMixIn.exe program that you downloaded.

2. Set the Windows Volume Controls the way you want.

3. Run the QuickMix program and 'save' the Volume Control settings to a AGWPE.QMX file in the directory of your choice.

4. Then you can run QuickMix (or just click on the .QMX file) to restore your AGWPE settings.

If you want to have this .QMX file automatically load at boot-up, put a shortcut to this .QMX file in your Windows startup folder. For me, that would be:

  C:\WINDOWS\Start Menu\Programs\StartUp

In Windows Explorer, go to this directory and, from the Menu bar, select **File,** then **New**, then **Shortcut**, and then **Browse** to the AGWPE.QMX file you want. (Make sure you set the Browse directory window to show **All Files,** not Programs.)

5. Now whenever you start Windows, it will automatically read the AGWPE.QMX file, load and run QuickMix, reset the Volume Controls, and then close QuickMix.

Sound Card Packet

Additional Sound Card Settings for AGWPE

Related Multimedia Properties
Displaying the Volume Control Icon
Turning Off Window's Sounds

This page has additional sound card/multi-media properties that may be help in operating AGWPE successfully. (See the Sound Card Settings page on this site for basic sound card settings.)

1. Related Multimedia Properties

Three additional Windows multi-media properties can affect AGWPE performance:

Speaker Type - affects TX audio; generally, **Desktop Stereo Speakers** should be selected

Hardware Acceleration - can affect both TX and RX audio; generally, the highest rate the computer can handle should be selected but if AGWPE is having packet decoding or connection problems, set it to a lower speed.

Sample Rate Conversion Quality -- affects both TX and RX audio; generally, the highest rate the computer can handle should be selected

These settings are usually made from the same general area in version of windows.

Windows 95: There is little to set in the **Multimedia Properties** window. I'm not sure if the Recording **Preferred quality** or **CD Quality** setting makes a difference. Click on the **Apply** button (if not gray-ed out) and then the **OK** button to close the window.

Windows 98/ME: Go to **Start: Settings: Control Panel** and select **Multimedia** (98) or **Sounds and Multimedia** (ME). With the default **Audio** tab showing:

Click first on the **Advanced Properties** button under the **Playback: Preferred Device**. On the resulting **Speaker** tab, select **Desktop Stereo Speakers** (or lap top mono, maybe). According to George SV2AGW, anything else will distort the TX sound.

■ Then click on the **Performance** tab next to the Speakers tab. **Hardware Acceleration** should be set one stop before **Full,** at least at first to see if your computer can handle it. If AGWPE is having packet decoding or connection problems, you can try setting it to a lower speed.

■ Below the Hardware acceleration settings is the **Sample Rate Conversion Quality** setting. Set this to **Best**. Then click **OK** to close the Playback Advanced Properties.

■ Back on the **Audio** tab, click on the **Advanced Properties** button under **Recording: Preferred Device**. On the **Performance** tab, once again set the **Hardware Acceleration** one stop before **Full,** at least at first to see if your computer can handle it. If AGWPE is having packet decoding or connection problems, set it to a lower speed. And set **Sample Rate Conversion Quality** to **Best**. Then click OK to close the Sound Recording Advanced Properties.

■ Back on the **Multimedia Properties** window, click on the **Apply** button (if not gray-ed out) and then the **OK** button.

■ On the **Audio** tab, click on the **Advanced** button for **(Sound) Playback**

■ Click **OK** to save the settings and leave the **Sounds** settings.

Windows XP: Most of the default settings should be as described below but you should check them. Go to Start: Settings: Control Panel and select Sound and Audio Devices. On the Audio tab, press the Advanced button under Sound Playback

On the resulting Speaker tab, select Desktop Stereo Speakers, even if this is a lap top.

Then click on the Performance tab next to the Speakers tab.

Hardware Acceleration should be set one stop before Full, at least at first to see if your computer can handle it. If AGWPE is having packet decoding or connection problems, you can try setting it to a lower speed.

Sample Rate Conversion Quality must be set to Best.

Then click OK to close the Playback Advanced Properties and return to the Sound and Audio Devices: Audio tab.click on the Apply button (if not gray-ed out) and then the OK button.

Windows 2000: the default hardware acceleration and sample rate conversion sliders are in the middle position. Follow the general instruction for XP above and move these to the right for best performance.

2. Displaying the Volume Control Icon

If this icon is not currently in your Windows System Tray (bottom far right of your screen), you may want to add it. It lets you quickly access the Windows volume and audio source settings of the sound card, including some that can not be controlled by AGWPE's SoundCard Volume Settings screen.

In Windows 98 it's , Start: Settings: Control Panel: Multimedia: Audio tab and check ☑ Show volume control on the taskbar.

In Windows ME it's: Start: Settings: Control Panel: Sounds and Multimedia: Sounds tab; Sound Volume box and check ☑ Show volume control on the taskbar.

In XP, it's Start: Control Panel: Sounds and Audio Devices: Volume tab and check ☑ Place volume icon in the taskbar.

I'm not sure how it's done in Windows 95, but it's probably very similar to Win 98.

3. Turning Off Window's Sounds

On some computers you may have conflicts between a program and Windows itself over the use of the sound card. (A typical crash message is "an application caused an invalid page fault in module WINMM.DLL"). To avoid this, try turning off Windows' sounds.

In Windows 98 it's: Start: Settings: Control Panel: Sounds: Schemes field = No Sounds

In Windows ME it's: Start: Settings: Control Panel: Sounds: Sound Events: Scheme = No Sounds.

In XP, it's Start: Control Panel: Sounds and Audio Devices: Sounds tab: Sound Scheme field = No Sounds.

I'm not sure how it's done in Windows 95, but it's probably very similar to Win 98.

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Sound Card Packet

Sound Card Tuning Aid

The Sound Card Tuning Aid screen is accessible from the AGWPE menu and can be used to "see" the quality of received signals and, for HF packet particularly, help in tuning the radio to the correct frequency. At least one oscilloscope will appear on the left side of the screen. A second scope below the first only appears if you have selected Dual Port use of the sound card on the Properties screen.

This page gives describes the Tuning Aid and gives some examples of good and bad signals as seen on the tuning aid's oscilloscope.
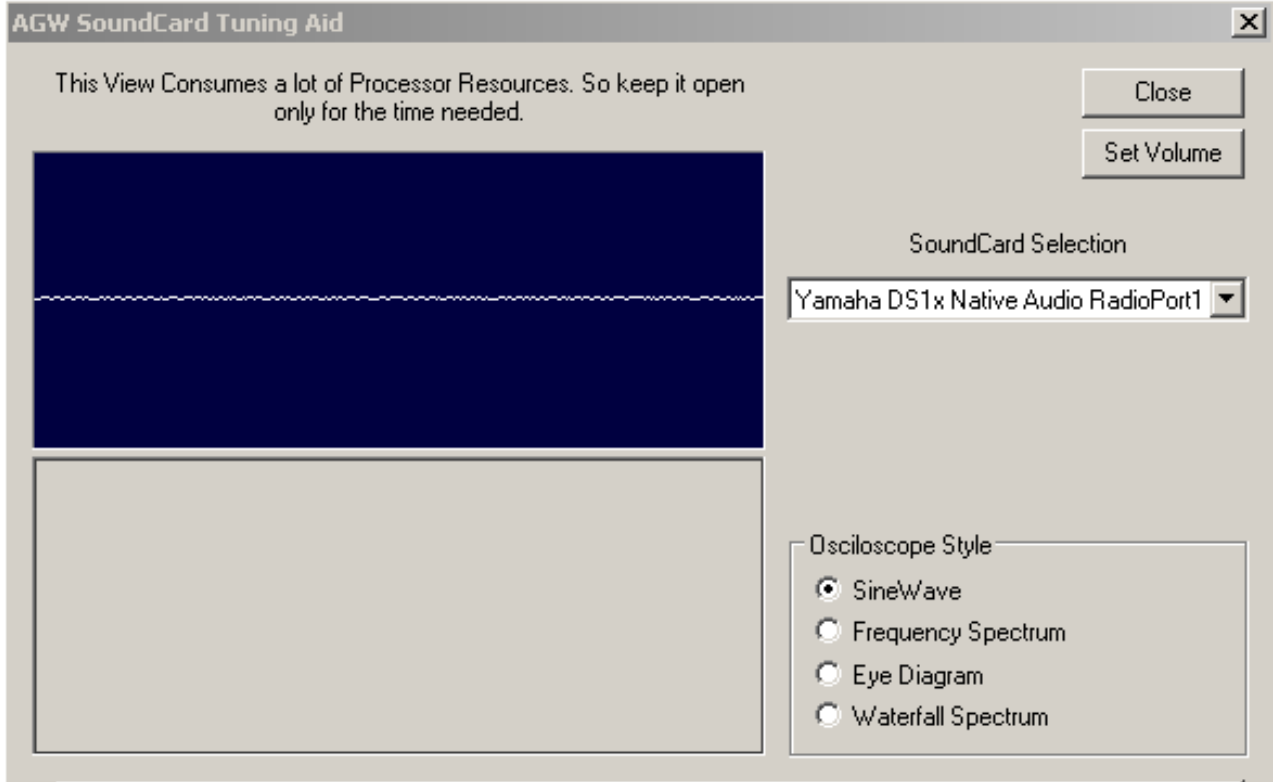
Only one oscilloscope is visible since the sound card is running in Single Port mode. In Dual Port mode, another scope would appear beneath the first. Note the sine wave in the scope above. This is what a quiet 1200 baud packet channel looks like, i.e.only noise. It verifies the audio connection to the sound card and radio is working.

Had sine wave shown even less activity (as shown below) , it would indicate there was no audio input from the sound card, either because of a problem with the audio feed from the radio or incorrect sound card volume settings (source or volume):

AGW SoundCard Tuning Aid

This View Consumes a lot of Processor Resources. So keep it open only for the time needed.

Close

Set Volume

SoundCard Selection

Yamaha DS1x Native Audio RadioPort1

Osciloscope Style

◉ SineWave
○ Frequency Spectrum
○ Eye Diagram
○ Waterfall Spectrum
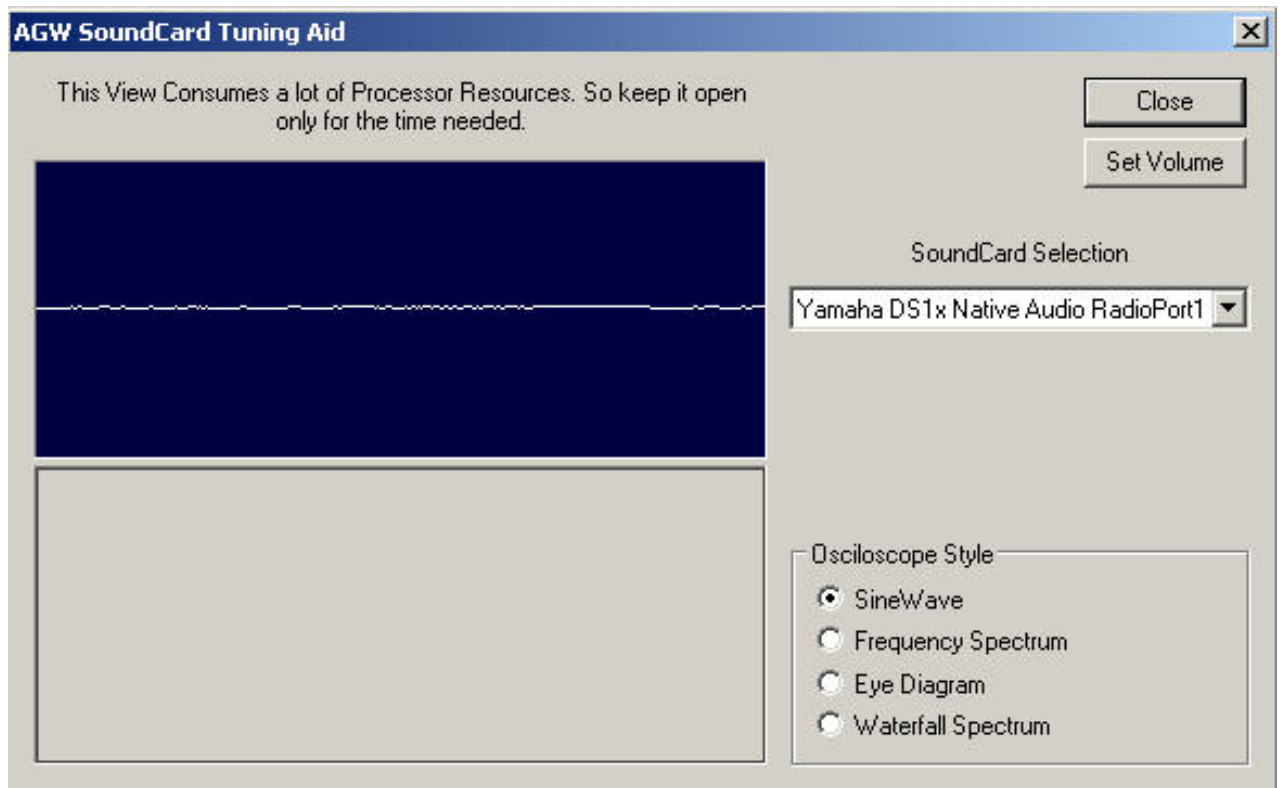
Oscilloscope Styles

There are four (4) display styles available for the Oscilloscope. The first two are generally the most useful.

1. Sine Wave - shows strength of the signal (audio volume) and the quality of the signal. A signal with good strength will have waves that fill about 1/2 of the screen (relative distance between the peaks and valleys of the wave). You can use the Volume Control settings for RX audio to adjust them.

Signal samples for 1200 baud:
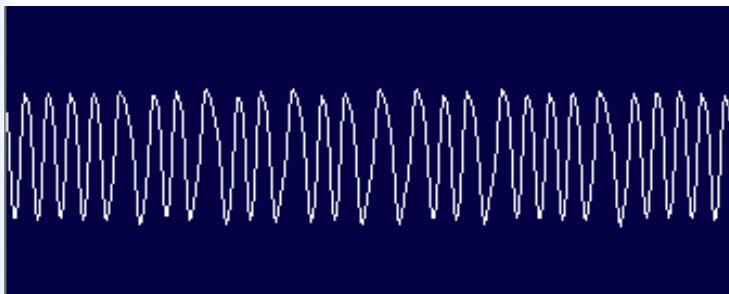
**Sample of a good signal;
packet decoded.**
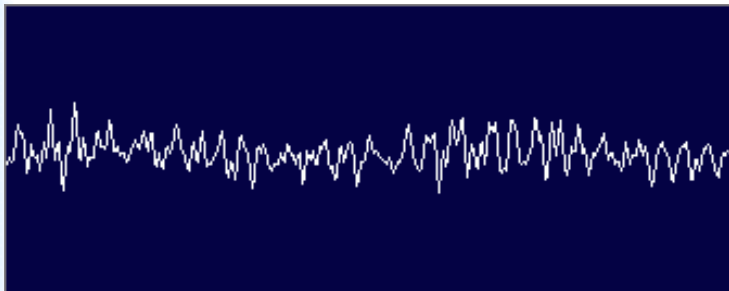
**Too weak or distant;
packet was not decoded**

Collision of packets;
packet was not decoded

This is from a Yaesu FT209 transceiver with bass boost activated. The boost creates incorrect pre-emphasis: the low tone is emphasized, not the high tone. These packets can only be decoded about 80% of the time. The sending station must turn off the radio's bass boost option to correct this.

Below, a 9600 baud signal sample:
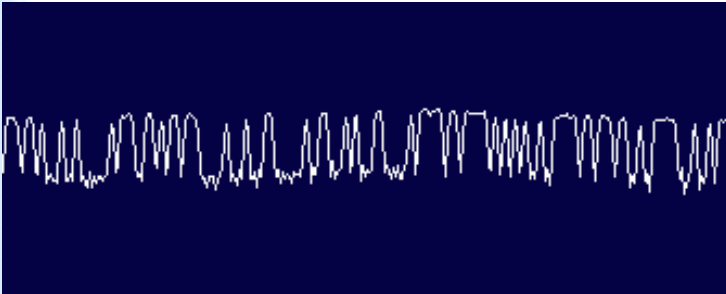
This is a generally good signal that was decoded, but you can see small sparks caused by some "bug" at either the transmitting station or receiving radio or sound card.
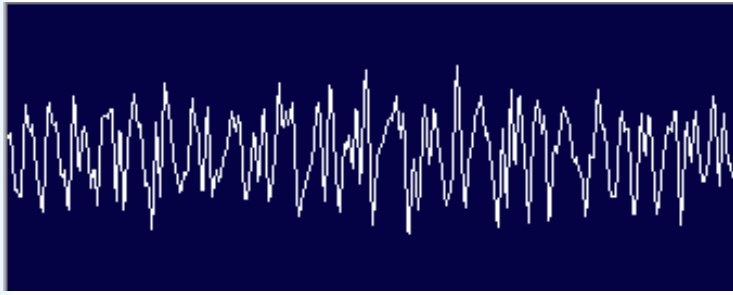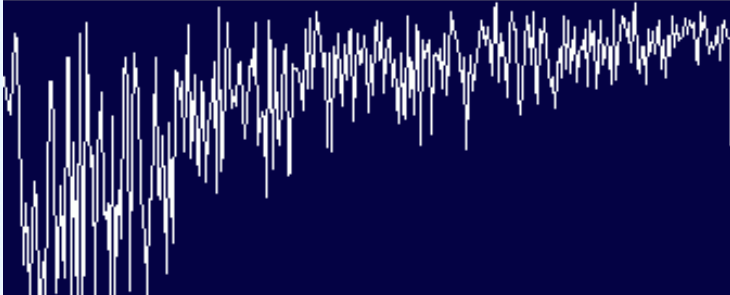
2. Waterfall - This is a frequency spectrum display that shows activity in the audio pass band over the last few seconds. Received signals create color streaks which will 'fall' down the display as time progresses. Relative signal strength is indicated by the colors, which are -- weakest to strongest -- blue, green, yellow, red. Black indicates no signal.

The waterfall should be centered between the two vertical white lines. For AFSK (UHF/VHF), it should center automatically. For HF operations (FSK), adjust the radio's receive frequency to center the waterfall. Centering is critical for accurate decoding of HF packets. The strongest signal (yellow/red color streak) must lie between those two lines, as this next screen shot illustrates:
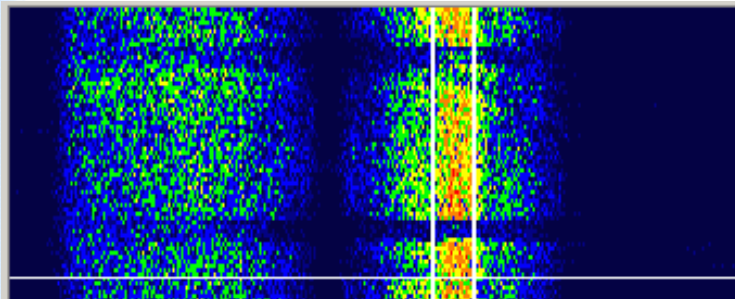
The screen shot below shows an HF radio that needs tuning. The yellow area showing packet activity is below the tuned frequency marked by the two vertical lines:
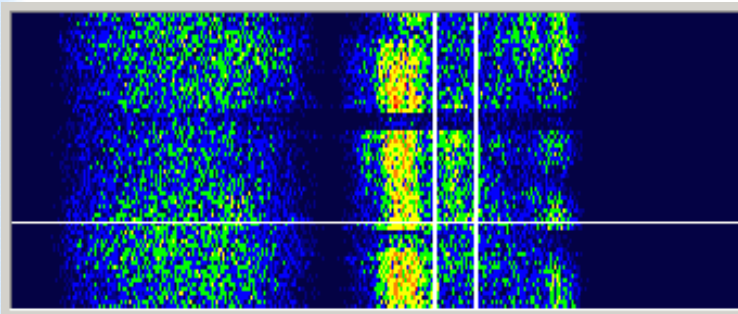
This sample below is a waterfall display showing two 1200 baud packets. The packets have black areas to their left and right of the two vertical white lines.

The upper packet has fair modulation and was decoded. Also, note in the black area above the packet that there are small green vertical lines. This is the result of TXDelay, i.e. a short interval of carrier with no modulation.

The bottom packet has very low modulation (little color; similar to a carrier with no modulation), but the packet was still decoded.

3. Eye - is really a scatter diagram. The closer together the scattered points, the better the signal.
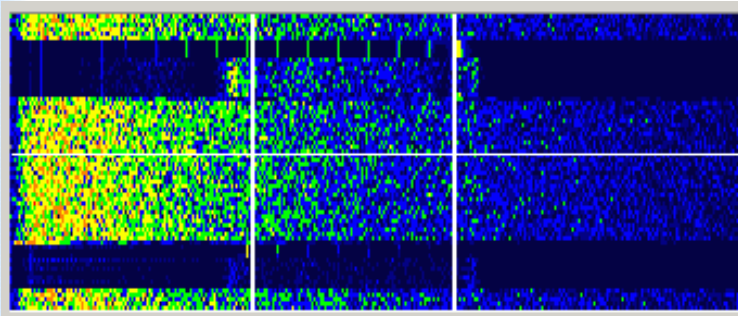
4. Frequency - a real-time display of where signals are being heard along a frequency scale. The TWO white vertical lines are centered around the dialed frequency, and the majority of signal peaks and valleys should fall between the left line (lower tone) and the right line (upper tone). If they don't, you'll need to change the radio's dialed frequency to center the signal between the white lines.

Set Volume Button

Pressing this button takes you to the sound card Volume Settings window where you can adjust TX audio levels, RX audio levels, and the RX input source jack.

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Last
Updated:
09/24/2004

Sound Card Packet

Windows: Enabling the TCP/IP Protocol

AGWPE can use either the DDE or the Window's Winsock TCP/IP Application Interface to communicate with packet applications. Except for WinPack and a few other programs using the DDE link exclusively, most programs use the TCP/IP interface. For the TCP/IP interface to work, TCP/IP must be enabled in both Windows and AGWPE:

1. Enabling TCP/IP in Windows : If you use the internet, then the TCP/IP protocol has been activated in Windows, either through the installation of a network interface card or Windows' Dial-Up Networking (DUN).

If you are not sure if it is installed, see the Testing the TCP/IP Setup in Windows box just below.

If it is not installed, install Windows' Dial-Up Networking component: from the Control Panel, select Add/Remove Programs. Then click on the Windows Setup tab and then select (one click) Communications. Now press the Details button and then click on/check mark Dial Up Networking. Press the OK button twice. (You then may be prompted for your original Windows installation disks for the required files.)

Now, with the Dialup Adapter installed, install the TCP/IP protocol. Select Control Panel again, then Network. Now select Add, then double click on Protocol, then Microsoft, then TCP/IP, then OK.

2. Enabling TCP/IP in AGWPE: This was previously covered on the AGWPE: Basic Setup page. But to repeat ... check that AGWPE's Enable Winsock TCP/IP Application Interface is set to active: Open the AGWPE menu, click on Setup Interfaces, and then on Winsock Interface tab, make sure there is a check mark in the box next to Enable Winsock TCP/IP Application Interface.

Testing the TCP/IP Setup in Windows

Thanks to Roger Barker, G4IDE/SK, for the following: If you have any doubts that the TCP/IP interface is working properly, here's a very simple way to check it:

1. Start AGWPE. Click on the Packet Engine icon on the system tray. On the menu, click on Setup Interfaces. Make sure Enable Winsock TCP/IP Application Interface is checked. Click OK to close the menu

2. Click again on the AGWPE icon and then click on About. The last two lines should say "SocksAPIServer Active" and "SocksAPIConnections 0".

3. Run the Win95 Telnet program, TELNET.EXE. Quite a lot of people don't realize it exists; it's in the main Windows folder.

4. From the menu, select Connect, Remote System; then Host Name: 127.0.0.1, Port: 8000 (type 8000 over the menu choices); Term Type: VT100

5. If the program title bar changes from Telnet - [None] to Telnet - 127.0.0.1, then everything is fine. TCP/IP is working in Windows. Go to #6.

If instead you get a message "Could not open a connection to 127.0.0.1", then there's something wrong with your Windows TCP/IP set-up. Review the steps at the top of this page.

6. Click the Packet Engine icon again, and select About. It should now say "SocksAPIConnections 1". TCP/IP is working in AGWPE.

7. Go back to In Telnet. Select Connect, then Disconnect, and close the program. Another check on SocksAPIConnections in AGWPE should show 0."

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Last Updated: 09/25/2004

Sound Card Packet

Last Updated: 09/24/2004

Update Windows

A. Windows 95, 98 and 2000 Users

You will need the most recent version of the Window's "Common Controls". If you've installed Internet Explorer (IE) version 5.0 or later, then the controls should be installed.

If you haven't upgraded to IE 5.0 or later -- or want to check that the controls are installed -- search for sites that offer "Comctl32.dll". Here's one site.

Also, make sure you have the most recent drivers for your sound card. You will need to visit the sound card manufacturer's web site to verify this.

B. Windows 95 Users only

You must have the Winsock 2 update installed, otherwise the TCP/IP interface will not work correctly with AGWPE. Here's the correct order to do that (I hope):

- First make sure you have the Dial-Up Networking (DUN) and the TCP/IP Protocol installed in Windows.
- Download and install the DUN 1.3 Performance & Security upgrade.
- Download and install the Winsock 2 update from the Microsoft web site.
- Then go to the Microsoft web site to download and install the DUN 1.3 Networking and Winsock2 Year 2000 Update

If you have any problems or get an error message during this process, see the Winsock 2 update release notes for information about what went wrong and how to correct it.

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Sound Card Packet

Problems with Program Behavior

1..Problems with the AGWPE Program
2. Linking to Client Applications
3. Extra packets seen
4.

Note: **Please make sure you are using the latest version of AGWPE before troubleshooting problems. Your problem may have been fixed by the most recent version of AGWPE!**

As you troubleshoot receive problems, remember that AGWPE provides you with a some visual aids:

If AGWPE loads successfully, you will see the AGWPE tower icon at the bottom right of your screen in the Windows System Tray.

If a "radioport" has been successfully configured, you should see the AGWPE modem icon next to the tower icon. There will be one modem icon for each working radioport. A green pixel in the modem icon will flash once if AGWPE successfully decodes a packet. A red pixel in the modem icon will flash once if AGWPE has sent a packet to the soundcard and radio for transmission.

1. General Program Problems

General Troubleshooting Hint: **Any time you have trouble with a configuration setting in AGWPE, it may be best to just start fresh: close AGWPE and delete any port*.ini files and the agwpe.ini in your AGWPE directory/folder. Then restart and re-configure AGWPE from the very beginning. It doesn't take much time.**

When I try to start AGWPE, I get an error message that says "Can not find WS2_32.dll"

Sounds like you're running Windows 95. You need the Winsock 2 Update from Microsoft. See the Windows update page on this site for the full solution.

I'm running Windows 98 SE. After I configure AGWPE for my sound card and restart AGWPE, I get Windows' blue crash screen saying "A fatal exception 0E has occurred at (some address) in VXD KMIXER. The current application will be terminated."

You have a problem with your sound card driver and the KMIXER.SYS, Windows' audio mixer kernel. I don't know of a sure-fire solution. Windows 98 used VXD drivers in its original version but then switched to WDM drivers in SE (Second Edition). I suspect there's a problem with Windows calling the correct driver file. You might try totally uninstalling the card and drivers from Windows and then, when it restarts, point it to the new WDM drivers. On the other hand, some users have found success, with the opposite, counter-intuitive strategy -- uninstall the newer WDM drivers and install the VXD drivers**. Tell me if you find a solution.**

The AGWPE banner comes up, but then I get an error message that says: "Your SoundCard Driver cannot Support the Wave Format".

One of two things maybe wrong:

- Most likely AGWPE is configured to use a device other than a sound card, most commonly, a **telephone modem**. To fix this, go to the **Sound Card Modem /TNC Setup** window, and select a sound card in the **Sound Card Selection** field.

- Your sound card driver really can not support the wave format. Make sure you have the most recent version of the driver for your version of Windows.

AGWPE tries to start but then a "Copyright Violation" box appears. I click "OK", but the program then closes.

The **AGWPE.SYS** file is missing from your AGWPE folder. You can reinstall the entire program from the zip file or just the **AGWPE.SYS** file. (The AGWPE.SYS file has the date of the program, so don't use the AGWPE.SYS file from another version. It will display the wrong version date when you start the program.)

AGWPE starts and runs but first I get a message that says: "AGWTCPIP.SYS Not Found! TCPIP Over Radio will be IDLE!"

You have turned on AGWPE's special **"TCP/IP Over Radio" (TOR)** feature but have not installed the special TOR software adapter. If you really meant to use this feature, **see the TOR pages** on this web site for information about installing the adapter. Most people do not need or use this feature. It is NOT needed for normal packet functions or to interface with your applications (applications use the **TCP/IP Application Interface** to connect to AGWPE, not **TCP/IP Over Radio).**

To turn **TOR** off and stop the message, go to the AGWPE menu (click on the AGWPE tower icon) and select **TCP/IP Over Radio Setup.** In the resulting window select "**Thank's NO TCP/IP**".

I can run AGWPE and my packet program on my laptop for about 30 (or 15 or 60) minutes and then it just crashes.

Turn off the computer's energy saving mode.

When I drag my mouse over AGWPE's modems icon in the system tray, a message pops up telling me how the port is configured and how many frames (packets) I have received and sent. But even when I haven't sent any frames, as time goes on, AGWPE says that I have been sending more and more frames. Is that normal?

It is normal. In its default mode, AGWPE calculates the "best" traffic parameters (slot/persist, resptime, etc.), every 2 minutes and these recalculated values get reported as sent frames even though nothing is actually transmitted by the radio. Don't worry. AGWPE is not keying up your radio and transmitting on its own.

AGWPE loads but then my system just freezes. I need to power off to reboot.

One user said that new sound card drivers fixed the problem.

AGWPE starts but then gives a message that it is closing down abnormally.
    or
AGWPE is behaving very strangely, particularly my radioport configuration.
    or
AGWPE won't start and locks my system.

In the AGWPE folder, delete the AGWPE.ini file and all port?.ini (port0.ini, port1.ini, etc.) files and then restart and reconfigure AGWPE.

The problem may have developed when you configured a radioport to use a COM or LPT port that was already claimed by another program or device; or the TNC was not plugged into the COM or LPT port; or you may have tried to delete and add a port without restarting the program after deleting one port and trying to add another.

I'm running Windows 95 and when I start AGWPE, the AGWPE tower icon appears in the Task Bar *not* the System Tray. If I right click on the icon, I get the usual AGWPE menu, but "Setup Interfaces" does nothing; the popup menu just closes. I can't seem to make AGWPE do anything.
    or
I fill in the new port information, close the program and restart it, but the port shows "IDLE" and I can't open the Properties window for that port by clicking on OK.

You need to update the Windows "common controls" file, COMCTL32.DLL file. See the Windows update page on this site for the full solution.

AGWPE closed and the Packet Engine icon **disappeared, but the modem icon** **remained on the System Tray!**

This may happen if AGWPE is closed down unexpectedly. Usually restarting AGWPE will correct it, although a reboot may be necessary. If AGWPE fails to start (you may get a "Fatal Exception Error" message), go to the AGWPE folder/directory and delete all files ending in .ini; then restart and reconfigure AGWPE.

Modem Icon Never Appears: The modem icon won' t appear until you configure an AGWPE port and then closed and restarted AGWPE. If the modem icon doesn't appear then:

Double check the properties for the AGWPE port to make sure you have done it correctly. Use the **Port Settings** information on this site for guidance.

Look for possible port conflicts with the PTT port you have selected. See next section:

Port Conflicts

It's possible that some other device is affecting the COM/LPT port you have chosen for PTT control. For example, one user forgot that he had an unused phycial adapter "installed" in Windows that was conflicting with the PTT port. Another user reported a conflict with the Palm HotSync Manager, which loads on startup and puts the COM RTS pin high; Windows didn't report that the COM port was being used by the Palm device driver, but it was. Another user had both the COM port and an infrared port assigned to the same IRQ. Another user suggested that, if your XP machine is running an NVIDIA graphics adapter, some of its drivers are reported to tie up COM1 for no reason -- so disable Nview 2.0.

It may be difficult to identify port conflicts, since AGWPE may start and run despite the conflict, i.e. no error message. Conflicts may arise either from a device, such as a printer, or from a program that uses the same port.

Try this first: temporarily force AGWPE to a port where there CAN'T be a conflict with another program. Reset the **Serial or LPT Port** in **AGWPE's properties window** to a **non-existent parallel port**, perhaps LPT 3 (scroll down past all the COM options to the LPT options).

If AGWPE now receives packets and your other program now works, then you know you did indeed have a port conflict. Fix the conflict (see below) and then change the AGWPE PTT port settings back to a real port, i.e. not the non-existent one.

To search for a device that might be causing the problem, first go to the **Start menu** and then **Settings: Control Panel: System.** On the "**Device Manager** tab, select "**View devices by Connection**" and double click on "**Computer**". This should tell you which devices are using each IRQ. Look for a conflict with your chosen AGWPE PTT physical port (COMx, LPTx) and some other device.

If there is a device conflict, you'll need to either reset the port used by the conflicting device (could be hard) or tell AGWPE to use a different PTT port (might be easier). To change the port AGWPE uses, move the PTT cable to a different physical COM or LPT port. Then make the corresponding change in the **Port Properties** in AGWPE.

If only one device is assigned to each COMx and LPTx port

"serial port IRQ", then there is no conflicting *device*, so there is probably a conflicting *program* which is using the port. Either:

- reconfigure the conflicting program to use another port
- just close the offending program before working with AGWPE
- change the PTT port in AGWPE (see paragraph above).

2. Linking to Client Applications

I am having trouble configuring my client application to link to AGWPE.

There may be instructions in the **Help** section of your client application; or you can try the **Application Setup** page on this website.

If you're having trouble getting a particular application to work with AGWPE, first make sure AGWPE works with **AGW Terminal Program.** If AGWTerm won't work with AGWPE, then you have a problem with AGWPE that needs to be resolved first.

I see the little green pixel flashing on the TNC icon ▬▬ **so it appears AGWPE is receiving packets, but the packets don't seem to be getting from AGWPE to my packet program; my program isn't showing any packet activity.**
        or
When I try to run a client application, I get an error message from the client indicating the IP connection was refused.

Check for these problems:

- Make sure AGWPE's **TCP/IP Application Interface** is active: from the AGWPE menu select **Setup Interfaces** . On the **Winsock & HTTP Interface Setup screen; Winsock Interface tab**, enable the **Winsock TCP/IP Application Interface** with a checkmark. Also make sure the **TCP** field is set **8000**.

- Any application linking to AGWPE with the TCP/IP Application Interface should have a corresponding field to specify AGWPE's TCP port number (8000, by default); see the **Application Setup** page for advice about selected programs. The application should also have a field to specify the IP Address of the computer where AGWPE is running. That address will be "127.0.0.1" or "localhost" if AGWPE is on the same computer as the application. Read the application's **Help** section or see **AGWPE on a Network** for advice when AGWPE is on a different computer.

- Make sure the application is listening to the correct AGWPE radio ports. The application may be linked to AGWPE but not linked to all of AGWPE's radio ports. For example, some programs, such as UI-View, allow you to block access to specific AGWPE radio ports (UI-View calls it "masking"). Read the application's **Help** section or see the **Application Setup** page for advice about selected programs.

■ **Make sure the TCP/IP Protocol is installed on your computer. If you use the internet successfully, then it is. If you don't have either the Window's Dialup adapter or a network card installed on your computer, then the protocol may not be installed. To correct this, just create a Dialup connection (see Windows' Help for advice; you can use a dummy telephone number for the connection).**

If you still have a problem, make sure the "Internet Protocol (TCP/IP)" is installed for the Dialup connection or the network adapter. Normally it is installed by default and active, but it may have been deleted somehow (see the Windows: Enabling the TCP/IP Protocol page for advice).

■ **If you have a firewall program and/or router running, turn off the firewall temporarily to see if this fixes the problem. If it does, configure the firewall and/or router so that AGWPE can accept and respond to requests from other programs via AGWPE's TCP/IP Application Interface port (default is 8000).**

My packet program suddenly closed and I got this error message from Windows:

(The Application) caused an invalid page fault in module WINMM.DLL

You probably have a Windows sound scheme in effect and there was a conflict over use of the sound card. To prevent this from happening, set the Windows' Sound scheme to No Sounds. See the Window Sound Settings page on this site for further advice.

I seem to have the AGWPE program working fine. My problem is when I run certain packet programs, such as RXClust or AGWTerm, a box opens saying:

Object Windows Exception

Failure in common control DLL

OK to resume? YES / NO
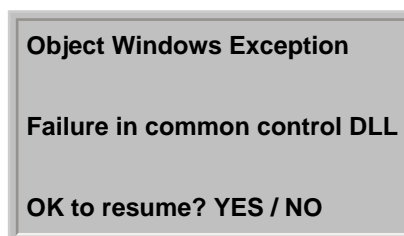
This is a Windows 95, 98, and ME problem. Be sure you have the latest COMCTL32.DLL Windows file by downloading and applying a patch from Microsoft called 50comupd.exe. Or by installing the most recent edition of Internet Explorer.

I have two applications sharing an AGWPE sound card radio port. But Application A is not seeing packets sent by Application B and vice versa.

It is a feature of AGWPE that the received frames it sends to an application do not include frames transmitted by other applications using the same instance of AGWPE. So if you have this:

```
App A -------- |
               |
      AGWPE -------- radio(s) etc.
               |
App B -------- |
```

Then, using KISS frames, App A will not see the original frames transmitted by App B.

If you do want App A to see App B's transmission, then a work-round is to configure a loop-back port in AGWPE. Then transmit the beacons from your application(s) to the RF radioport **and** to the loop-back port, and configure your application(s) to "listen" on both the RF radioport and the loop-back port so they can hear what the other program asked AGWPE to send.

3. Extra Packets Seen

If your packet application displays duplicates of every received packet, reasons can be:

- the second sound card radioport is active in AGWPE even though it is not being used. To correct this, select **Single Port** (not Dual Port) on the **Properties screen**
- you are using a mono plug instead of a stereo plug for the LINE IN jack

If your packet application displays packets that are from another frequency:

- you are probably running two radio ports from the sound card (left and right channels) and audio from one radio port is being heard on the other port. The reason for this is not clear. The best known solution is to reduce the RX audio input on each radioport to the minimum needed to decode packets using the **volume control settings**.

If your problem is not resolved by the problem solving pages on this website, join the AGWPE Yahoo Group to ask a question or search the archives for previous postings that may relate to your problem: **http://www.egroups.com/group/SV2AGW**

Troubleshooting page on this web site:
Program Behavior
Receiving
Transmitting
Connections

Sound Card Packet

Problems with Receiving

As you troubleshoot receive problems, remember that AGWPE provides you with a some visual aids:

- The Sound Card Tuning Aid screen is accessible from the AGWPE menu. It can be used to "see" the quality of received signals and, for HF packet particularly, help in tuning the radio to the correct frequency.
- If AGWPE successfully decodes a packet on a radioport, then the **green** light on that radioport's modem icon will flash once .

Note: Please make sure you are using the latest version of AGWPE before troubleshooting problems. Your problem may have been fixed in the most recent version of AGWPE!

1. No Sine Wave in Oscilloscope
2. Oscilloscope Activity But No Decoding

1. No Sine Wave in Oscilloscope

Tune to a busy packet channel and select the Sine Wave oscilloscope mode in the Sound Card Tuning Aid. If you do not see sine wave activity, look for a reason at one of five places along the RX audio path:

- a. Radio/antenna
- b. AGWPE's radioport settings
- c. Volume Control settings
- d. RX audio cable
- e. Sound card or driver

a. Radio/antenna

First confirm that audio signals -- preferably packets! -- are are being received at the radio. Disconnect the sound card interface temporarily and see if you can hear packets from the radio's speaker and/or see the radio's 'S' bars or the 'Busy" indicator light up.

- **If you don't see or hear packet activity:**
    - is the squelch too high? Since AGWPE prefers no squelch for **transmitting**, it's best to leave the squelch off (even though AGWPE will still **receive** with the squelch on, providing the squelch is not set too high).
    - is tone squelch (CTCSS and DTSS) turned off?
    - if dual VFOs, is the correct VFO/band selected?
    - is the antenna connected?
    - is the radio tuned to the right frequency?
    - can you hear packets by using a different antenna (more gain)? or by moving the antenna to another location (higher, away from possible EMI interference)?
    - can you hear packets using a different radio with a different antenna? with a different radio but the same antenna?
- **If you can't hear packets from the radio's speaker (internal or external):**
    - Is the speaker volume knob set too low? Low speaker volume would only affect sound card receiving if your interface's RX cable connects to the radio's external speaker or microphone jack, not a data jack.
    - If your interface's RX audio connects to the radio's external speaker jack, is that radio jack known to work with speakers? Plug in a different speaker or use a meter to test the jack.

b. Radioport settings

Check the following in the **Properties settings** for the sound card:

- Make sure you have selected the correct sound card device

- Make sure you have selected the correct packet baud rate for the radioport channel

c. Volume Control settings

Use the **Volume Control screen** to check your sound card settings:

- If you happen to have more than one sound card (i.e. mixer device), make sure you are working with **Recording** settings for the **correct sound card**. (Program Bug: if you have more than one sound card, AGWPE's Volume Control Screen can be used to set the first card but not a second card. To control the second card, you will need to use the **Windows Volume Control Program**.)

- Make sure you are working with the Volume Control **Recording** settings, not the **Playback** settings.

- Make sure you have selected the correct input jack -- LINE IN or MIC -- where your RX interface cable is attached.

- Make sure the vertical volume sliders for the selected input jack is not at or near the bottom (about 1/3 up is fine). If you see Balance sliders, make sure they are centered.

- If there are still no signals, try selecting the other input source -- **Microphone** or **Line In**. You may have the plug in the wrong jack. If this was the problem, move the plug back to the correct jack and reset the input source.

See the RX audio cable page for wiring schematics and other hints.

- Is the RX cable plugged in completely at the sound card jack? Make sure you haven't used the wrong sound card jack or haven't confused the RX cable with the TX or PTT cable. (Hint: put labels on the ends of all cables.) If you are using two sound cards, is the RX cable plugged into the right one?

- Are you using a stereo jack at the sound card plug? You should use a stereo plug for most sound cards.

- You can not interface two radios to the sound card using the microphone jack. The Microphone jack on sound cards is not stereo capable, so you will probably only receive audio from the port 1 (left channel) radio. Use the LINE IN jack instead (see Rx audio page).

- Test the cable:
  - Unplug it from the sound card jack and plugging it into a speaker (if the speaker has a plug and not a jack, use clips leads or an in-line coupler to join the two plugs). If you hear RX audio in the speaker, the RX cable is OK, or
  - Use a multi-meter:
    - test for continuity and short circuits. Check your solder connections if you find a problem.
    - Is the RX audio line wired to the tip of the stereo plug? The ring of the stereo plug should be unwired, unless you are interfacing to two radios. The sleeve should be wired to the sound card ground.
  - Is the RX line securely soldered to the correct pin in the radio plug?
  - If the RX cable has an in-line isolation transformer, make sure it is a 1:1 transformer, unless you are using the radio's external speaker for RX audio. If you are using the external speaker, then you should be using a 1000:8 transformer and the 1000 Ohm primary coil of the transformer should be wired to the sound card side, not the radio side.

- Try using another cable without a transformer.

e. Sound card or driver

- Does the sound card work with other Windows' sound generating programs? If not, in the Windows Control Panel under Sounds/Multimedia, make sure the sound card is installed and there are no conflicts with other devices.

- Sound card suddenly stops working after a few minutes and always about the same number of minutes: This probably a power management issue; your computer or laptop is going into power saving mode and is turning off the sound card.

- Driver: Make sure you have the latest driver for your version of Windows. You can the latest version from the sound card/chipset manufacturer's website (better source than the computer manufacturer).

- **Card: Some cards may not work with AGWPE** even with the correct driver. (Read the section on Compatible Sound Cards on the More About AGWPE page on this site.)

  If the problem appears to be your sound card, consider replacing the card or adding another. New cards are fairly inexpensive or you may find a "used" sound card at a hamfest/computer show or in a discarded computer. PCMCIA and USB sound cards are also available. A second sound card dedicated only to ham programs may actually be very useful. Your first card then be used for Windows and other programs.

Note: If receiving works for a while but then stops, your computer's power management settings may be turning off the sound card.

2. Oscilloscope Activity But No Decoding

If AGWPE is receiving signals but is not decoding them, look at these possibilities:

- **f. Recording volume settings**
- **g. AGWPE settings**
  h. Poor Signal quality
  i. Interference
  j. Sound card or driver
  k. Radio Settings

f. "Recording" Volume Settings

AGWPE is very tolerant of RX audio volume levels, but your volume settings may still be too loud or too soft.

- **Too soft/muted:** try raising the receive volume sliders until you see more deflection (peaks and valleys) in the Tuning Aid's Sine Wave. If the sliders don't change the wave significantly, try turning up the volume at the radio. If the RX audio from the radio is still too low:

  - make sure you are pulling audio from the correct radio pin/plug. Some radios have different RX audio pins/plugs for different modes or packet baud rates. Make sure you are using the one for your packet baud rate. (Example: the Yaesu FT-847 has a Data In/Out stereo plug jack for HF modes and a 6 pin mini-DIN jack for packet. Audio from the HF jack will be too weak for packet. If you buy a sound card interface, you may get only the Data In/Out plug and not the 6-pin mini-DIN plug.)
  - remove any attenuation circuit you may have in the RX line
  - try plugging the RX audio line into the MIC jack instead of the LINE IN
  - install an audio pre-amplifier in the RX line.

- **Too loud:** If the sine pattern has very thick and tall waves (nearly fill the scope top to bottom), try lowering the volume settings. (If the sliders don't change the wave, try turning down the volume at the radio.)

MIC input: If you are using Microphone input, note that most sound cards expect a maximum input voltage on the microphone line of about 200 mV, which is much less than most radio's maximum output, e.g. 500 mV. For this reason, you should probably use a voltage attenuation circuit in a microphone RX cable. The ideal attenuation will depend on the sound card's input and radio's output specifications. You can try to use the volume sliders to find an ideal spot, but the setting is likely to be very delicate without the attenuation circuit.

In addition, check that your are not using the Microphone Boost or the 20dB option on our sound card, if available. This option is not found in the AGWPE Volume settings, but it may be found as a button in the Windows' Recording Volume Setting window under the Microphone slider (you may need to use the Option: Advanced menu option to have it display). This option will increase the MIC input by 100 times, which could distort your packet even more.

g. **AGWPE Settings**

Baud Rate: Make sure you have selected the correct packet baud rate in the Sound Card Setup screen

Ports: If you are only using one port, set AGWPE for Single Port (not Dual Port) on the Properties screen

h. **Poor Signal quality:**

1200 baud packet: To successfully decode a packet, you need about an S3 signal at minimum.

9600 baud packet: To successfully decode a packet, you need nearly an S9 signal. (see 9600 Packet Operations on the Baud Rates and Modes page. for additional advice about 9600 baud packet operations.)

300 baud packet (HF SSB): Use the Sound Card Tuning Aid's Waterfall Scope to accurately tune the signal. (see HF Packet Operations on the Baud Rates and Modes page. for additional advice about HF packet operations.

Are you tuned to the correct frequency exactly? Do you have tone squelch on? Do you have manual squelch on?

Is the radio's squelch set too high and blocking many signals. (The squelch should not be operating when using AGWPE. For transmitting, AGWPE needs to hear the frequency at all times.)

Packet collisions -- two or more transmitting stations send packets at the same time, making both unintelligible. This is a common problem on busy frequencies, e.g. APRS. No real solution is available although network members could experiment with traffic reduction and collision avoidance schemes and settings, such as slotting.

The other station's packets are too distant, faint, or noisy:

- Increase your radio knob's volume control if the radio knob controls RX audio volume; or increase your **RX Volume Setting** for **LINE IN** (or MIC, if you are using that).
- Poor radio signal path: You may be experiencing multi-path refraction/ reflection problems (signal waves arriving out of phase) or a Fresnel null (part of the signal wave is blocked) because of the antenna's poor position. Try moving your antenna.
- Use a better antenna (more height, more gain, more separation from noise or interference sources).
- Ask the other station to increase power.
- Ask the other station to try a different antenna or a different antenna location.
- Consider an antenna feed-line problem at your station if there is any other evidence of weakened signals, e.g. moving the antenna doesn't help and you experience low audio and static on your RX signal compared to the signal someone nearby is receiving.

The packets the other station is sending are are poorly formed:

- The sending station sent the packet without sufficient TX delay. Its radio didn't have sufficient time to power up or switch from receive to transmit. As a result, the beginning of the packet was lost. Ask the sending station to increase TX delay in his station's TNC or sound card.
- The sending station's TNC or sound card was over-driving the radio (sending packet tones that were too loud) and his radio had to "clip" the signal (reduce the deviation). This results in a poorly formed packets at the receiving end (low tone is louder than high tone). Ask the sending station to reduce his station's TNC drive level.
- Some radios offer a bass boost function that will distort a packet signal. Make sure the sending station is not using this feature.

Are you using the MIC jack on the sound card instead of the LINE In jack? Then you probably should have an attenuation circuit in the RX cable. See the RX audio cable Help page for such a circuit.

i. Interference

Signal interference from EMI, RFI, and ground loops can distort received packet signals so much that they can not be decoded. Radios such as the Yaesu FT-290 are known for being susceptible to computer noise interference.

EMI, electro-magnetic interference, can come from any nearby AC-powered source, such as your monitor. Turn off the monitor temporarily and then turn it on to see if your packet program recorded any signal when it was off. You may be able to reduce EMI by:

- change the monitor scan rates or screen size or combinations of both in:
  Windows Desktop > Right Click > Setting Tab > Monitor ----- etc....
- replace outdated or incorrect monitor driver software
- place a ferrite slug on the monitor cable, close to the computer and another close to the monitor
- re-locating either the device or your interface cables
- using shielded interface cables
- using ferrite cores (split or toroids) on the interface cables.
- using shielding on the radiating device

RFI, radio frequency interference, can be reduced by
- limiting the length of your interface cable
- using interface cables with shielding
- using ferrite cores (split or toroids) on cables.

Ground loops can result when DC current flows between your computer and your radio. Normally, DC current should not flow between the devices, but it will if there is a voltage potential difference between the devices. Unfortunately, a sound card interface can become that direct connection.

If you have your computer and radio plugged in to a different branch of the AC wiring in your house you may have problems. Plug your computer in to the same AC outlet strip as your radio so they share the same electrical ground. For laptops, which use an AC-to-DC transformer, you may be more likely to have problems.

To break the ground loop, you should use isolation transformers on your RX and TX audio cables, plus a phototransistor, or optocoupler, in the PTT line (a simple transistor in the PTT line does not does provide isolation). You must isolate all three connecting cables. Note that manufactured interfaces may or may not provide isolation on all three cables (For example, the West Mountain NOMIC does not provide isolation for a RX cable). You'll need to verify if they do by visual inspection or by contacting the manufacturer.

Below are screen shots from the Tuning Aid's Sine Wave scope showing a ground loop:
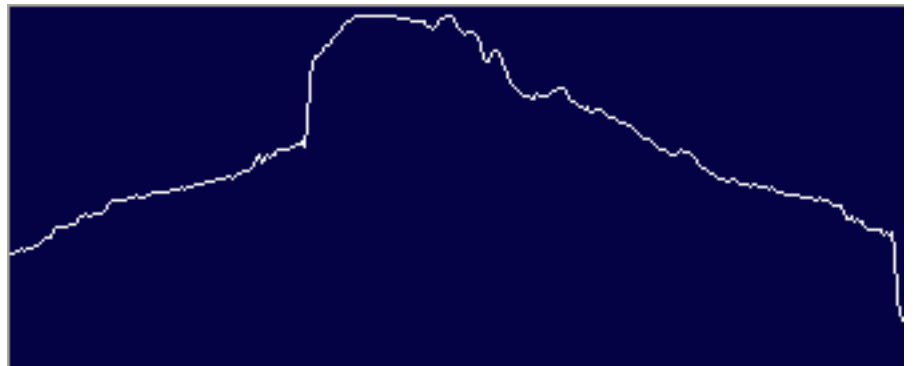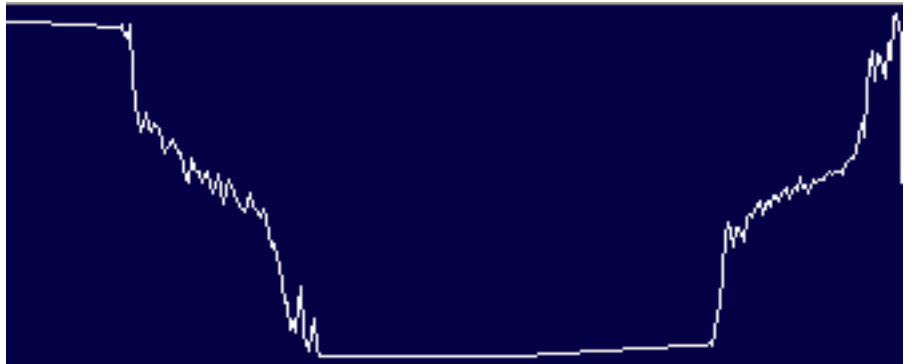
EMI or RFI on Your Receive Audio Cable?

You can use the Sound Card Tuning Aid to "see" if you have interference or some other problem affecting your RX audio cable. Here is a way to hear it:

- Temporarily plug your computer speakers into LINE OUT jack of the soundcard.
- Open AGWPE's Soundcard Volume Settings screen
- If you can't hear the radio's RX audio in your computer speakers, increase the RX volume sliders'
- When you do hear RX radio audio, tune to a quiet frequency and lower the RX volume slider to its minimum (you may need to also turn down the radio' speaker volume dial if you get RX audio from the radio's mic or speaker jack.)
- Now increase the TX Playback volume (WAVE & TX Master) to maximum.
- You should hear no radio signals or radio noise. If you hear any Hummmmmm or Hissssssss it should be very, very slight. If it very distinct, you probably have a RFI, EMI or ground loop problem with your RX audio cable. Just to be sure, compare the sounds from your computer speakers with the sounds from your radio's speaker to see if the sounds are the same as the radio's (no problem) or unique.

j. Sound Card or Driver

- You can try adjusting the sound card clock from the Sound Card Modem Setup screen. Sound cards have a reference "clock" that oscillates at approximately 11025 Hz. The exact speed usually varies for each person's sound card. The clock setting in AGWPE can be used to better match AGWPE to the actual sound card clock speed.

> All TNC try to adjust their receiving clock (a software component) to match the bit rate they receive thus follow the clock changes of the receiving signal. The AGWPE soundcard modem does the same using the soundcard clock. In certain cards, that clock may be very wrong (fast or slow). The clock setting value you can set in AGWPE tries to adjust that clock using software inside AGWPE's modem code and doesn't change the soundcard hardware control.

The default clock setting is "4", which is no adjustment. Using trial-and-error, you can try to find a setting that is better (I do not know in absolute terms how much change in Hz there is for each setting; or even if "2" is slower or or faster than "4".) For your experimentation:

■ after you select a new clock setting, you must restart AGWPE. Setting changes are NOT immediate.

■ test reception of a weak station (less than S8)

Interestingly, you may find the perfect setting for some stations may change with the seasons if those stations are outdoors and exposed to heat fluctuations.

If AGWPE appears to be receiving good quality packet signals that are not being decoded, then you may have an incompatible sound card. (This seems to be more prevalent with integrated, "on board" sound "cards".) See "e." above.

k. Radio Settings

If your radio has signal processing settings, turn them off. For example, some Yaesus have a "bass boost" function. Others radios such as the ICOM IC-706MKIIG, have a "DSP" setting. These settings should be turned off/disabled.

Make sure you are using the correct RX data output source on the radio. For example, on a Yaesu FT-8500, AGWPE can not decode 1200 bps through the data port . It does work through the speaker-out jack. The "problem" with the data port is that it has no de-emphasis circuitry and so the tones are skewed by at least 6 dB. "You would need to add the right value capacitor." (Sorry I can't help much beyond that.)

Hand-held radio often have a "battery saver' or "power saver" setting that turns off the radio's receiver circuit for a few seconds or parts of a second. It that setting is on, your may be missing the first part of packets.

If your problem is not resolved by the problem solving pages on this website, join the AGWPE Yahoo Group to ask a question or search the archives for previous postings that may relate to your problem: http://www.egroups.com/group/SV2AGW

Troubleshooting page on this web site:
Program Behavior
Receiving
Transmitting
Connections

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Sound Card Packet

Problems with Transmitting

As you troubleshoot transmit problems, remember that AGWPE provides you this visual aid:

If AGWPE receives a packet transmission request from a client application and then successfully passes that packet to the sound card and radio for transmission, the red light in the transmitting radioport's modem icon will flash once   and your radio should transmit.

To Force a Transmission through AGWPE, use the **AGWTerminal (TCPIP version)** program to send a QRA packet: From AGWTerm tool bar, press the "Tower & Question mark" button, and then select the radioport you want to test.

Note: Please make sure you are using the **latest version of AGWPE** before troubleshooting problems. Your problem may have been fixed in the most recent version of AGWPE!

1. Radio Doesn't transmit
2. Radio Locks in Transmit mode
3. Intermittent Transmissions
4. No audio or poor audio on transmit

1. Radio Doesn't Transmit

A. No Red Light Seen: My application program sent a packet, but I do **not** see the red light in the AGWPE modem icon indicating it has transmitted the packet to the radio.

> Make sure the radio's squelch is fully open at all times. AGWPE needs to hear the frequency noise level at all times -- no squelching! -- otherwise it may not transmit.

> Make sure you application program is correctly linked to AGWPE. See the section above about **Linking to Client Programs**.

> Make sure the application program really is requesting a packet transmission. For example, a terminal program will not send anything if it is linked to AGWPE in COMMAND mode (unless you use the CONNECT or DISCONNECT commands). Try a CONNECT command if you are not yet connected or go to CONVERSE mode (K) if you are connected.

B. Red Light is Seen: I saw the red light blink in the AGWPE modem icon, but the radio isn't transmitting.

- Are you using the parallel port (LPT) for PTT control and running Windows XP or 2000? It won't work with AGWPE. You would need to purchase **Packet Engine Pro**. (Windows XP and 2000 use a port addressing scheme that is different than the scheme used in Win 95, 98, and ME, which do let you use the LPT port for PTT control.) Alternatively, you can use the following PTT signaling methods instead of the LPT if you have Windows XP/2000:
  - use a serial (COM) port
  - use a USB port: obtain a USB-to-Serial Port (COM) adapter
  - use a TX audio tone keyer that uses detected audio to trip the PTT circuit

  These are all described on the **PTT cable page**.

- Are you using the parallel port (LPT) with Windows 98SE/ ME? It should work but, if it doesn't, some users have success configuring the LPT1 port to a "legacy" I/O address, i.e. IRQ 7 and address 0378-037F. To do this, go into Settings, Control Panel, System, Device Manager, Ports, Printer Port and select the Resources tab. Configure manually to the above settings and reboot. Check that there are no conflicts with other devices.

- Your application program may be configured for the wrong AGWPE radioport. If you need instructions for changing the radioport, look in the Help section of the client application; or you can try the **Application Setup** page**.**

- Another reason for a transmit delay is if the sound card is busy processing other sounds from Windows or your application programs. For example, UI-View has an option to announce received callsigns. Usually there is an option to turn these sounds off in the application, as there is for Windows' sound schemes.

- Is the PTT cable tightly connect at the radio AND to the RS-232 (COM or LPT) port that you have selected for the radioport?

- It may be that the physical COM or LPT port where your PTT cable is connected isn't really the port you think it is: e.g. you think it's COM1, but your mouse or internal modem is on COM1, so your PTT is really plugged into COM2 . Try changing the port for **PTT Control** in the **Port Properties** or move the PTT cable to another COM or LPT port.

- Is there a problem with your PTT cable and circuit? You can test it by using a 9 volt battery to apply voltage to the connection for the RTS/DTR pin (in the DB9 or DB25 connector) and then using a voltmeter to test for voltage on the radio end of the cable or, if the cable is connected to the radio, look to see if the radio is transmitting.

■ Is your PTT cable wired to the correct pin at the computer's RS-232 port (COM or LPT)? AGWPE sends the PTT signal **to the RTS pin only** if you have chosen **Single Port** in the **Port Properties** window. It does **not** also send it to the **DTR** pin, as some other sound card programs do or as earlier versions of AGWPE did. If AGWPE is set for **Dual Port** then the radioport 1 radio (left channel) will use the **RTS** pin, while radioport 2 (right channel) will use the **DTR**. See the **PTT Cable page** for wiring schematics. Possibly so some manufactured interfaces may have wired the PTT cable to the **DTR** pin only and not the RTS.

■ Occasionally there is a problem with the physical port. You can use a voltmeter to test the COM/LPT port pin. There should be DC voltage on the pin when the red pixel in the AGWPE modem icon lights.

Note: When Windows boots, it tests all COM and LPT ports by momentarily putting a signal on the port pins (Windows XP does it 5 times). If you have your PTT cable connected and your radio "on" when Windows boots, then the radio PTT will activate for a few short bursts during the boot sequence. This is a good indication that your PTT cable is working correctly.

■ Many new transceivers, e.g. Yaesu 8100, won't transmit if the TX audio level is too high. Use the **Volume Settings screen** to lower the **TX Master** and/or **TX Wave** volume. Or adjust the potentiometer on the line, if thre is one.

■ Some radios may use different TX audio pins for HF and VHF/UHF. The ICOM 706 is one. Consult your radio's user manual for pin out instructions. This can be the solution if your interface works correctly for HF digital modes such as PSK31, but won't work for VHF/UHF packet, or vice versa.

■ If AGWPE seems to run fine for a set time (15, 30 minutes) and then stops transmitting, your computer's power management scheme may be turning off the COM/LPT port that controls PTT.

2. Radio Locks in Transmit mode

First try closing and restarting the packet application and AGWPE; or try rebooting.

If you are using a hand held radio:
   ■ Remember that, in addition to the usual PTT circuit components, you will still need all the PTT components recommended by the radio manufacturer for MIC and Speaker jack data use. Many handhelds need a capacitor on the TX audio line between the radio and the PTT gate circuit (as well as a resistor on the PTT line). Without that capacitor, the PTT circuit may be active at all times.
   ■ If the manufacturer says to use a stereo plug for the radio's MIC jack, don't use a mono plug!

You may have a short circuit in the PTT cable. Double check the wiring, components, and circuit routing. Make sure the PTT line isn't touching the shield or ground and that you have wired the PTT line to the correct pin on the transistor or optocoupler. See **PTT Cable** for a schematic.

- Windows can start up leaving the COM port handshaking lines "high" (with voltage) instead of "low" as it should. This has been reported happening with Windows ME and XP; also in other versions of Windows when using a USB-to-Serial Port Adapter. Look first on the Microsoft web site for a Windows fix;

  Roger Barker, G4IDE/SK, wrote a free 20 kb utility, HSOFF, that can be used to reset the handshaking lines of a COM port if they are left "high" when Windows starts. HSOFF come in a zip file that includes a .TXT file of instructions. (Note that the program needs the Microsoft runtime libraries MSVBVM60.DLL and MSCOMM32.OCX to run. These libraries are installed if you install UI-View32; and they are also available at some web sites -- do a web search to find them.)

- It's possible that some other device is affecting the COM/LPT port you have chosen for PTT control. For example, one user forgot that he had an unused adapter "installed" in Windows that was conflicting with the PTT port. Another user reported a conflict with the Palm HotSync Manager, which loads on startup and puts the COM RTS pin high; Windows didn't report that the COM port was being used by the Palm device driver, but it was. Still another user had both the COM port and an infrared port assigned to the same IRQ. Another user suggested that, if your XP machine is running an NVIDIA graphics adapter, some of its drivers are reported to tie up COM1 for no reason -- so disable Nview 2.0.

- Try disabling the Full Duplex mode of the card. On the Sound Card Setup screen, un- check Full Duplex.

- On older/slower computers, the default sound card sampling rate may be too high for the computer to process. You can try using the Windows Control Panel to adjust the soundcard hardware acceleration and sample rate quality until you find an optimum setting (For example, in Windows XP, you get there by clicking on Sound and Audio Devices, then click on the Audio tab. Under Sound Playback, click on the Advanced button then click on the Performance tab.)

3. Intermittent Transmissions

- Sometimes AGWPE will not transmit immediately if AGWPE's automatic timing features are in effect. AGWPE monitors the frequency and uses "slotting" to send your packet when the frequency is not likely to be busy. So, AGWPE is holding the packet for a few seconds before transmitting it.

  If this delay really bothers you, you can override this feature by setting the timing parameters yourself. Call up the Properties screen for the radioport, click on the the Tnc Commands tab, select Let me Control Parameters. , and then change the Persist and Slot parameters. But remember that AGWPE usually does a very good job of adjusting the timing to match traffic conditions on the frequency. You may make matters worse by controlling them yourself. For example, you may not be as prompt to change parameters when frequency traffic changes.

Problem: I can send and receive a few packets, but pretty soon transmitting stops, especially if I try to send packets too rapidly. This clears up if I close and restart AGWPE and the packet application, but it just happens again.

Solution: This seems to happen mostly on computers with older processors. It's possible your computer isn't keeping up with the quick switching that is taking place between the sound card and AGWPE. The computer may have missed a "hand shaking" data segment from AGWPE, so it's waiting for a signal from AGWPE that will never come again. This may mean you need a faster processor or perhaps a sound card driver upgrade to run AGWPE, although you can try to cut the processor load by shutting down other programs and background tasks. Also, see the paragraph above about interruptions of the packet stream.

Note: If transmitting works for a while but then stops, your computer's power management settings may be turning off the sound card and/or the serial ports.

4. No audio or poor audio on Transmit

How does my transmit audio sound?

The surest test of your transmitted audio is to use a second radio to listen to the audio transmitted by your first radio. A hand held radio is great for this. Or ask a nearby friend to listen. You should be hearing packets signals from your station that sound similar to the packets you hear from other stations (although perhaps a bit louder and with less noise).

Remember that your audio signal must pass through four (4) devices that could modify it:

- the sound card's mixer,
- the interface cable,
- the radio and
- your transmission system, i.e. antenna and feed line.

For example, you can test the audio coming from the sound card mixer by temporarily putting your computer speakers back into the LINE OUT jack. This will give you a fairly good indication of whether you have good volume level settings, but it isn't how your final audio will sound.

Your interface's TX cable has an attenuation circuit or potentiometer that could reduce the audio significantly -- or maybe not enough. As a result, your radio may be receiving audio that is too weak or too loud.

Even your radio may have audio modification circuits in it. Some VHF radios have a "bass boost" option (should be off), and HF radios have speech compression settings (should be off), drive settings (should be turned all the way up) and microphone gain settings (should be left at normal).

And of course your transmission system -- feed line and antenna -- could attenuate your signals.

So the best way to test your audio is to listen to how it sounds on another radio.

If you might have a problem with your TX audio:

⊞ Re-check AGWPE's <u>volume settings for Playback (TX audio)</u>. Make sure the TX Master and TX Wave settings are not muted and that none of the four sliders is too close to the bottom of the scale (remember that sliders 1 and 3 control the transmit audio for radioport 1, while sliders 2 and 4 control audio for radioport 2).

⊞ The <u>attenuation circuit</u> in your TX cable may be over/under attenuating your TX audio. If you have a variable resistor (pot) in the attenuation circuit, try adjusting it.

Adjusting Your Transmit Audio Level

With TNCs and sound cards you want a transmit audio level that is decodable but not too high. One of the biggest reasons for poor packet performance is too much audio. If you do not have access to a deviation meter to set the level (you want about 3 KHz of deviation), use a local digipeater and "trial-and-error" to get the lowest audio level that works reliably.

Use a program that can send unconnected packets or a beacon (AGWTerm can send a beacon; UISS can send unconnected packets). Set the beacon PATH to relay through the digipeater (e.g. TEST VIA LOCALDIGI), then go into converse mode and transmit a single carriage return. Watch to see if your single packet gets digipeated by that one local digipeater. If it doesn't get through, try several more times because it may not have gotten through because of a collision.

If it does get through, turn down the transmit audio level a little and try again. Keep turning down the audio until your packet reliable DOES NOT get digipeated ... and then turn it back up just a little bit until it does once again.

Remember, in packet, soft is better than loud.

⊞ Are the TX Audio cables connected tightly to the LINEOUT jack on the sound card of a desktop computer (or the headphones jack on a laptop?)

⊞ Make sure you are using a stereo plug (has 2 bands below the tip) for the LINE OUT (TX audio) jack. If you use a mono cable (has 1 band below the tip) you may get only half the audio volume on transmit or you may even short out one channel of the sound card.

- Re-check the soldering and component placement in the **TX cable**.

- **EMI or RFI:** The strong magnetic fields in your monitor may be distorting the signal, or there may be electro-magnetic interference (EMI) from your computer or other nearby devices, or there may be radio frequency interference (FRFI):
  - Use a shielded audio cable. Connect the shield to either the sound card ground or the radio's ground but not both.
  - Try using ferrite chokes on the audio cable
  - If you antenna is near your computer, move it further away

- If you have unusual sounds in your transmitted audio or experience delays before AGWPE transmits a packet, it may be that your sound card is getting input from sources other than AGWPE:
  - Turn off any sound schemes for Windows.
  - Turn off any sounds that might be generated by your packet applications, for example voice announcements in UI-View.

- Some radios offer a bass boost function that will distort a packet signal. Make sure you are not using this feature.

- **HF:** Speech compression should probably be off for digital modes and the Drive adjustment should be turned all the way up (use the **Volume settings** to control transmit power output). Microphone Gain should be set to normal.

- **If you hear interruptions, or stuttering, of the packet stream**, it may be because:
  - your sound card is not fully capable of full duplex operations (sending and receiving). This is mostly a factor on older 16-bit sound cards. To turn off Full Duplex, go to the AGWPE Port properties' **Sound Card Setup screen** and uncheck the **Full Duplex** box.
  - your computer/or driver is not fast enough. In that case, **set the Port Properties** for **Single Port** use and use only the left channel.

    Also, set your VGA card accelerator a click below full level and adjust the soundcard hardware acceleration and sample rate quality until you find an optimum setting (these sound card settings are made through the Window Control Panel. For example, in Windows XP, you get there by clicking on **Sound and Audio Devices**, then click on the **Audio** tab. Under **Sound Playback**, click on the **Advanced** button then click on the **Performance** tab.)

  Listen! ---> Sample Wav files: one with **no stuttering** in packet and one **with stuttering**.

- If you hear other noises mixed in with your packets, our sound card is getting input from sources other than AGWPE, such as you CD player or another application:

  - Go to the **Volume Control program** and mute other input sources for playback, e.g. CD or microphone.

  - **Turn off any sound schemes for Windows**.

  - Turn off any sound generated by you applications (varies by program; see the program's Help file for possible advice).

If your problem is not resolved by the problem solving pages on this website, join the AGWPE Yahoo Group to ask a question or search the archives for previous postings that may relate to your problem: http://www.egroups.com/group/SV2AGW

Troubleshooting page on this web site:

Program Behavior

Receiving

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Connections

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Sound Card Packet

Problems with Packet Connections

A. Connections not made
B. Connections not maintained
C. Slow Exchanges

A. Connections not made

First, make sure you don't have an underlying problem receiving or transmitting.

I can see on my radio that the PTT has been opened and the radio is transmitting, but I can't connect with another station.

> Are you tuned to the right frequency? Are you operating in duplex mode and transmitting on the offset frequency
>
> Does one of the station have tone squelch turned on?
>
> Consult the No Audio or Poor Audio section of the Problems with Transmitting page.

It looks like the other station heard my connections request and is responding since the radio is receiving packets, but AGWPE is not decoding the packets.

> Consult the Problems with Receiving page.

I'm having difficulty connecting at 9600 baud.

Read the 9600 baud section of the Baud Rates and Modes page for a discussion of the difficulties or operating 9600 baud packet. Problems could be: your radio is not 9600 capable without modification; incorrect radio settings; using audio transformers in the audio cables; and poor signal quality.

I having difficulty connecting on HF at 300 baud.

Use the Sound Card Tuning Aid to help tune your radio to the correct frequency. Also read the 300 baud section of the Baud Rates and Modes page for a discussion of the difficulties or operating 300 baud packet.

B. Connections not maintained

When I connect, the other station immediately disconnects me.

You probably have **Dual Port** selected in the **port properties screen** and probably have the same baud selected for both ports. Try changing the second port's baud rate to something other than the first. Better yet, if you are not using the second port, select **Single Port,** close AGWPE, delete the **port1.ini** file from the AGWPE folder (retain **port0.ini**, do not delete it) and restart AGWPE.

What seems to be happening is that there is not adequate audio channel separation in the sound card, so the two AGWPE radio ports can hear each other and the BBS. In this scenario, port 1 asks for a connection and the BBS sends a connect confirmation. This is heard by port 2, which responds -- using port 1 --by saying "I didn't ask for a connect; please disconnect".

I can send and receive a few packets, but pretty soon transmitting stops, especially if I try to send packets too rapidly. This clears up if I close and restart AGWPE and my packet application, but then it just happens again.

It may be that your computer isn't keeping up with the quick switching that is taking place between the sound card and AGWPE. The computer may have missed a "hand shaking" data segment from AGWPE, so it's waiting for a signal from AGWPE that will never come again. This may mean you need a faster processor (or perhaps a sound card driver upgrade) to run AGWPE, although you can try to cut the processor load by shutting down other programs and background tasks. (**George, SV2AGW, talks about this problem on his web site.)**

C. Slow Exchanges

The other station doesn't seem to hear all my transmission, so my station is sending many repeats.

Try disabling the **Full Duplex** mode of the card. On the **Sound Card Setup screen**, **un-**check **Full Duplex**. Some sound cards (usually older ones) have only one 16-bit and one 8-bit channel, so they can not handle both receive and transmit (i.e. full duplex) at 16-bit rates. They compensate by moving one function -- usually transmit -- to the 8-bit channel where the audio signal is not as good. By un-checking Full Duplex, you force the card to alternate between receive and transmit, but it will always use the 16-bit channel.

Is Your Sound Card Full Duplex Capable?

Can your sound card send and receive simultaneously? In Windows, you can test for full-duplex capability by launching two copies of Sound Recorder. You'll find Sound Recorder from the Start button: Programs > Accessories > Entertainment > Sound recorder

Repeat the process to launch two copies of the program. You can test for full duplex by playing a file on one Windows Sound Recorder and, while that file is playing, making a recording with the Sound Recorder.

Another way to test is with an AGWPE debugging log. AGWPE asks soundcard drivers if they have Full Duplex capabilities. To see the results of this query:

- **Open the agwpe.ini file in Notepad and edit the file to add these lines:**
     [DEBUG]
     TRACE=3
- **When AGWPE restarts it will create an agwpe.log file. If you open that file with noted pad, you should find a SOUND CARD: FULLDUPLEX line that says either YES or NO.**

I'm receiving many REJ packets.

Increase your TXDelay parameter on the TNC commands tab of the Properties for Portx screen.

I'm sending many REJ packets.

Ask the other station to increase his TXDelay.

I'm receiving many RR packets in the same transmission.

Increase your FRACK parameter on the TNC commands tab of the Properties for Portx screen. Consider letting AGWPE resume controlling the parameter.

I'm sending many RR packets (R1, R2, R3, etc.) in the same transmission.

Increase your RESPTIME parameter on the TNC commands tab of the Properties for Portx screen . Consider letting AGWPE resume controlling the parameter.

After receiving a burst of data, AGWPE usually responds, for example, with "RR R3", "RR R4", "RR R5", all in ONE burst. But with this one BBS, AGWPE frequently responds with a short break between "RR R3" and "RR R4". During the break, AGWPE releases the PTT and that results in the BBS sending more data. This new data causes a collision with AGWPE's transmission of "RR R4", and the whole packet exchange slows down dramatically. Why does AGWPE insert that break?

This problem usually results when the sender -- the BBS in this

case -- isn't using the AX.25 ver. 2 protocol and has a PACLEN of less than 255 characters. This creates a timing problem in the acknowledgement of packets.

Since you are seeing multiple "RR"s, this means you are probably setting the timing parameters yourself and not letting AGWPE control the timing (AGWPE would probably only send one "RR"). **Increase** the value of the **RespTime** until the problem goes away. Or select let the AGWPE "program adjust parameters"

If your problem is not resolved by the problem solving pages on this website, join the AGWPE Yahoo Group to ask a question or search the archives for previous postings that may relate to your problem: **http://www.egroups.com/group/SV2AGW**

Troubleshooting page on this web site:

Program Behavior

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Sound Card Packet

AGWPE Over a Network

IP Address of AGWPE Computer
Configure AGWPE
Configure Client Applications
Allowing Remote Access to AGWPE

It is possible to run AGWPE on one computer in a network and have it send packets to and from applications on *other* computers on the network. The usual application is a home/local network, but you can even configure AGWPE to work with computers anywhere on the internet!

> Note: This exchange will work only if your application program uses the TCP/IP interface to interface with AGWPE. Programs such as WinPack don't use the TCP/IP interface. They use the DDE interface, so they can not do this. (UI-View can be configured to use either the TCP/IP or DDE interface to link to AGWPE.)
>
> A work-around for WinPack users: purchase the PE Pro version for both the local and remote sites and use PE Pro's radio port sharing feature. With this feature, instances of PE Pro can share radio ports and thus the radios and TNCs on those ports. So, WinPack could link to an instance of PE Pro running on the same computer and that instance of PE Pro could then link to an instance of PE Pro running on a remote computer that has been configured to "share" its radio ports.)

First, some definitions:

- **host** - the computer running AGWPE
- **server** - a device or application that can exchange data with other devices or applications. When AGWPE is configured to send and receive data over a network to other applications, it is acting as a **server** application.
- **client** - any computer / application wishing to access the AGWPE server.
- **IP Address** - a number with three dots in it, for example 192.168.0.1 or 169.254.0.1, which is assigned to each computer connected to a network. IP Addresses are needed to router data across networks running TCP/IP protocols (which most local networks and the Internet run).

Second, a caution: This page will not be able to discuss all possible network configurations. You will need to adapt this basic explanation to match the specifics of your ISP (Internet Service Provider), your network hardware, and any installed network software, including Windows network configurations.

To start, make sure you have AGWPE running successfully on the host and that your network connection is running correctly.

1. Obtain the *IP Address* of the *host* computer where AGWPE is running.

Your host computer will have three IP addresses of importance:

- a local address of 127.0.01 or "local host", which means "this computer". This is the address you would use to connect to AGWPE if the client application is running on the same computer as AGWPE.

- a private IP address such as 192.168.x.x. This is the address someone would use to connect to AGWPE if the client application is running on a different computer but on the same local area network, e.g. your home network.

- a public IP address which is assigned by your Internet Service Provider. This is the address someone would use to connect to AGWPE if the client application is running on a remote computer on a different network or over the internet.

A. Learning the private IP address of a computer on your home network :

- Windows 95/98/ME: from the Windows' Start button, select Run, then in the Open box, enter winipcfg and press OK. In the resulting window, note the IP Address. Press OK to exit.

- Windows XP/NT: from the Windows' Start button, select Run, then enter CMD to bring up a DOS window and prompt. Enter ipconfig and in the resulting window, make a note of the IP Address. Then enter Exit to close the DOS window.

  Note: A computer's IP address may change every boot-up if Windows is set to obtain an address automatically from the network router each time it starts. This is called dynamic addressing. You can also assign an unchanging "static" IP address to the computer (see Windows' Help for advice on how to do this: search for "static address" or "specific IP address"). This may be useful if you use AGWPE regularly on a private network.

B. Learning the public IP address of a computer as it is identified on the internet:

Note that if your subscription is for a dynamic IP address, your public IP address can change each time you connect to the ISP. This can be a problem for others trying to connect to you; they would have to ask you for your current public IP address. If you don't want to pay for a static (unchanging) IP address, you can subscribe to a "dynamic DNS" service that will automatically link your clients to your current dynamic IP (see Dynamic DNS Service below)

If you are connected **directly** to a broadband (DSL, cable. etc.) modem, use the method described just above in "A." to learn your public IP address.

If your connection is through a router or gateway, your router or gateway can tell you the IP address assigned to it by the ISP. For example, I can use my browser to access my wireless gateway/router. I enter the *gateway's* IP address as specified in the User Manual (default is often 192.168.0.1). The gateway then displays a screen that shows the public IP address assigned to my network by my ISP.

Another way to learn you public IP address is to send an email to yourself. Look for your IP address in the headers* of the email you receive back. Look for the **bottom-most** header line that begins with "Received:" (there may be several "Received:" lines.). For example:

Received: from **296-999-999-64**.c6-0.hlb-ubr1a.hlb-ubr.cable.etn.com ([**296.999.999.64**] helo=DellDesktop.etn.com)

This line shows where the email originated -- your computer. The numbers in blue above would indicate your IP address. (Numbers above are not real; IP address segments are never higher than 255.)

* Revealing Email Headers: In Outlook Express, right click on the message in your inbox and select **Properties,** then **Details**. In Eudora, open the message, then click on the **Blah Blah Blah** icon to show all headers. For other readers, do a Help search on the word "headers" to learn how to display them.

2. Configure AGWPE on the *host* computer to act as a *server*:

Start AGWPE and call up the AGWPE menu (right click on AGWPE System tray icon)

Select **Setup Interfaces**. This brings up the **Winsock and HTTP Interface Setup** window and the **WinSock Interface** tab.

Make sure the **Enable Winsock TCP/IP Application Interface** is checked (default setting) and, in the **Setup** section, note the **TCP Port** number. Leave the port number at the default of **8000** unless you have other software running in your computer that also uses that port (this would be unusual). If another application is using that port, you can configure AGWPE to use a different port number.

■ **Now click on the WinSock Interface Security tab.**

<-- Click to enlarge

Note the three enable/disable connection options at the top of the screen. These options control which *clients* can access AGWPE on the *host* computer and whether or not they need to use a LOGIN name and PASSWORD to gain access.

For example, the second choice specifies that:
- **clients on your local area network (LAN) can use the host's AGWPE server without a LOGIN name or PASSWORD, but**
- **clients outside of the LAN can use AGWPE only with a LOGIN and PASSWORD that matches an entry in the User Setup list at the bottom of the WinSock Interface Security screen. (Use the New User button next to the list to add LOGIN and PASSWORD for other users.)**

Note: If you are thinking of controlling access by using LOGIN name and PASSWORD, be aware that most AGWPE-compatible programs are not able to send a LOGIN and PASSWORD, so they wouldn't be able to get access to AGWPE over a network. Even AGW's programs don't have this provision! In fact, as of Sept 2004, I believe that only UI-View and PacLink have such a provision.

■ **Press the OK button to save the changes. AGWPE will now act as a *server*.**

3. Configure your packet application on the *client* computer so it can find the *host* computer and the AGWPE *server* on the network.

Only applications that connect to AGWPE with the TCP/IP protocol can be configured to do this. Those that use the DDE protocol to link to AGWPE cannot, for example, WinPack. As examples, here's how to do it for 4 applications that can, UI-View, WinAPRS, APRSplus and AGWTerm.

a. UI-View: From UI-View's top menu bar, select **Setup>Comms Setup**. In the **Comms Setup** window, for **Host Mode** select **AGWPE**. When you do, a **Setup** button will appear next to the AGWPE field. Press that button to reveal the **AGWPE Setup** window.

Please -- as the screen note suggests -- press **F1** to read the **Help** file. Roger, G4IDE, the program author, has some terrific additional information in the file.

- For the **Host Machine**, fill in the IP address of the *host* computer running AGWPE which you identified in **#1. above**.
- The **Port** number should be 8000 unless you elected a different port in **#2. above**.
- The **Password** can be left blank unless you turned on security in AGWPE as described in **#2. above**. If you did, enter the password. (**Note for UI-View users**: if AGWPE is using security, UI-View sends your *call sign* as the LOGIN name all in **upper case** letters, minus any SSID number, for example, KC2RLM-4 is sent as KC2RLM. Therefore, when you create a LOGIN name in AGWPE, it should be the callsign used in UI-View in upper case letters, minus any SSID.)
- The **Text to send on connection** can be left blank.
- Generally, the **Multiple Systems** check box can be left blank unless you want to connect to more than one remote instance of AGWPE. Press **F1** for more info about this feature.
- The **Remote** check box can be left blank unless the AGWPE host is not on your LAN. Again press **F1** for more information; also **see #4. below**).

The **Port Mask** need not be changed. By default, no ports are masked, i.e. UI-View will use all AGWPE ports it finds. You would use this option only to limit the AGWPE ports that UI-View will use to get data. For example, if AGWPE Port 1 is on a VHF frequency and AGWPE Port 2 is on an HF frequency and you want only VHF data, you would use the Port Mask to limit data to just AGWPE port 1.

b. WinAPRS: You first need to create a new .prt file in the PORTS folder under the main WINAPRS folder. It might be helpful to read the basic WinAPRS/AGWPE configuration page on this site for advice on how to do this.

The name of this file might be AGWPE_LAN.prt or something similar -- your choice. The file contents would similar to:

```
// Created by Me on 10/1/2002
NAME	AGWPE on My LAN
TYPE	TCP
PARSER	AGWPE
HOST	192.168.0.101:8000
BAND	VHF
PATH	WIDE,WIDE2-2
AGWTNC	0
```

Remember that the field name -- the first word in each sentence (e.g. PARSER) is separated from the following word (e.g. AGWPE) by a **TAB character not a space**.

The key items in this file are:

NAME: Enter your choice of a port description. This is what will be displayed in WinAPRS.
HOST: Enter the IP address of the *host* computer (see **#1. above**) and the AGWPE server TCP port number (see **#2. above**)
PATH: Enter the PATH you want AGWPE to use when it sends out a packet.
AGWTNC: Enter the AGWPE radio port you want to use. Use 0 for AGWPE port 1; 1 for AGWPE port 2; etc.

After this file is created and saved in the **PORTS** folder, restart WinAPRS. From WinAPRS's top menu, select **Settings,** then **Port List.** In the resulting **Port Definitions List** window, you should now see a port with the **NAME** you entered in .prt file. Click on that port and then click on the **Open** button at the top of the window to activate it. If everything works correctly, then the **Status**, **Open #** and **Comments** fields will **all** fill in, indicating that WinAPRS has successfully found the AGWPE server (if the **Comments** field remains blank, there is a problem):

 <-- Click to enlarge

Note that **WinAPRS has no way to send a LOGIN or PASSWORD to AGWPE,** so it will not work with AGWPE over a network if you have AGWPE set to check for passwords.

You can create additional .prt files to link to additional remote computers.

c. APRSplus: The critical setting is in the KipSSPE program. Start that program and look for the **IP Address** field at the bottom of the screen. Enter the host's IP address (as determined in **#1. above**) in this field.

Note that **APRSplus has no way to send a LOGIN or PASSWORD to AGWPE**, so it will not work with AGWPE over a network if you have AGWPE set to check for passwords.

d. AGWTerm: First, please note that SV2AGW has created two versions of AGWTerm. If you want to run AGWTerm over a network, **you must use the TCP/IP version** (download **Agwtermtcp.zip** dated 14Feb2002 to find a AGWTerm.exe file dated 16Aug2001) .

In the folder where install AGWTerm, you will find a file called **AGWterm.ini** (this file is only created after you run AGWTerm for the first time). Use a text editor, such as Notepad, to open this .ini file. By default, AGWTerm creates an IP address entry (what it calls **SOCKSADR**) that assumes the AGWPE will be running on the same computer as AGWTerm, i.e. **localhost.** This is a alias for an IP Address of 127.0.0.1, which is a special IP address that means "this computer". It also assumes that you are using the default AGWPE server TCP port address (what it calls **SOCKSPORT**) of 8000 (see **#2. above**).


```
[Packet]
SOCKSPORT=8000
SOCKSADR=localhost
```
<-- change "localhost" to IP address of host

 example: `192.168.0.2`   see **#1. above**

Note that **AGWTerm has no way to send a LOGIN or PASSWORD to AGWPE**, so AGWTerm **will not work** with AGWPE across a network **if** you have AGWPE set to check for passwords.

4. Allowing Remote Access beyond your Local Area Network:

a. Dynamic DNS Services: If you want to let clients outside of your LAN access the AGWPE server, they will need to know the IP address assigned to your computer or network by your ISP (Internet Service Provider). If your subscription to your ISP is for a **dynamic** IP address, your public IP address can change each time you connect to the ISP. This can be a problem for others trying to connect to you; they would have to ask you for your current public IP address. If you don't want to pay for a **static** (unchanging) IP address, you can subscribe to a "dynamic DNS" service that will automatically link your clients to your current dynamic IP:

>   First, obtain a personal domain name (for about USD $35/year). Example: **www.sv2agw.org**

>   Then, find a dynamic DNS (domain name system) service that will match your domain name with your current dynamic IP network address. This is done by running a special utility from the service which periodically contacts the service over the internet to tell it the dynamic IP address your AGWPE computer has been assigned. Users then can just enter your personal domain name to connect to you; they need not worry about entering your actual network IP address. The dynamic DNS service will make the translation.

>   To find a dynamic service provider, do a web search for "dynamic DNS". Some offer free services or free services if you buy your domain name from them.

b. Firewalls and security considerations: If your computer or local network has an open internet connection, you should be taking precautions to prevent unauthorized access to it. Gateways or routers may have an integrated firewall, or you can use a firewall program, such as Zone Alarm, McAfee Firewall, Norton Personal Firewall or even Windows XP's internal **Internet Connection Firewall**.

Note that firewalls will also prevent outside access to the AGWPE server, *unless* the firewalls are configured to permit an exception for the AGWPE server. You will need to read the documentation for your firewall to learn how to do this. For example, my router has a place where I can configure "Virtual Servers" and another one that has "Port Forwarding". I specify the port I want to open (8000) and the IP address of the computer that will handle that port, which is the 192.168.x.x address of my AGWPE computer.

Explaining how to do this for each possible firewall or gateway is beyond the capabilities of this web site, but here are some considerations when allowing remote access:

>   The firewall should limit remote access solely to the computer running AGWPE and solely to that computer's port 8000; do not allow access to other ports or other computers on your network.

>   Remember that a remote user who achieves access to the AGWPE server can use it to both receive and *send* packets. In effect the remote user will gain control of the radio connected to AGWPE and will be able to initiate transmissions. In most countries, this has a serious implication -- you will be held accountable for *any* transmissions made by others using your radio.

>   For this reason, you may want to configure your firewall to limit incoming access from specific, trusted IP addresses. In addition, you should use the LOGIN / PASSWORD security feature in AGWPE (see **#2. above**), if the client's application can send them ... but remember most applications can not.

Sound Card Packet

AGWPE Sound Card Packet Modes

1200 and 2400 baud (VHF/UHF)
9600 baud (VHF/UHF)
300 baud (HF)

> Interesting fact: The maximum potential packet baud rate for a sound card is approximately half the sound card's maximum sampling rate. Since most sound cards have a maximum sampling rate of 44100 Hz, the maximum packet baud rate they could support would be 22050. This is closest to the 19200 baud packet standard. The maximum rate currently provided by AGWPE is 9600 baud.

1200 and 2400 Baud (VHF/UHF)

The AGWPE sound card modem is capable of either 1200 or 2400 baud AFSK operations. 1200 baud is perhaps the most common rate used on VHF frequencies. It is more common than 2400 baud because of the far greater number of TNCs and radio modems which are only capable of 1200 baud. The 2400 baud modem is compatible with a TCM3105 modem chip modified with a 8Mhz crystal for the modem clock.

9600 Baud Operations (VHF/UHF)

9600 baud is frequently used on the UHF bands and uses Frequency Shift Keying FSK) instead of the Audio Frequency Shift keying (AFSK) used for 1200 or 2400 baud mode. Because of this, and because of the very quick TX-to-RX switching times required, you need a radio that will handle 9600 baud packet correctly. Most radios do not!

For best results, you can use a radio designed especially for 9600 baud mode, e.g. PacComm's TEKK KS-900 (440 band, 2 watt) or KS-1000 (440 band, 5 watt) radio; or SYMEK's TNC2H.

Or you can also use one of the new multi-mode transceivers labeled as "9600 baud-capable", such as the Kenwood TM-V7 and D700; Yaesu FT-817; or the ICOM IC-275. A web page listing 9600-capable radios can be found at **http://www.sinister.com/radio/9600.html**), but I've heard conflicting reports about whether some new "9600 capable" radios really work well at 9600. (They will tend to drift, have long TX delays, or not be able to do long packets.) Let me know if you have another type of radio that definitely works with 9600 baud.

The newer 9600-ready radios often have a data jack that has a special pin for 9600 receive and maybe one for transmit. Consult your User Manual to find out which pins these are and then attach your sound card interface wires -- TX audio and RX audio -- appropriately.

The radio will probably also have a special menu selection for a "9600" data mode which may regulate TX audio attenuation/amplification and RX/TX switching times. Typically, the

"9600" mode adds attenuation to the TX line so that the radio can accept full sound card LINE OUT voltages, e.g. 500-2000 mV, rather than the approx. 40 mV maximum for "1200". If you select "9600", your **TX audio cable** may be better **without an attenuation circuit**. If your cable does have an attenuation circuit and it has a pot (potentiometer), turn the pot to reduce the attenuation. You may also need to **increase** the sound card's "playback" volume settings ... or wire the TX cable without an attenuation circuit.

> **Yaesu FT-847 Users:** Some interesting notes on 9600 baud mode use can be found at **http://www.supercontrol.de/cat/ft847faq/digital.htm#9600bps**

Most users report that the RX and TX audio lines in your interface must **NOT** have audio isolation transformers for 9600 operations. Generally , small audio or power transformers do not have the correct frequency response. For example, Radio Shack's #273-1374 1:1 600 ohm audio line transformer has a 300 Hz to 5 kHz frequency response range which is not low enough. Until someone **sends me an isolation circuit** with suitable components (please!), take these precautions when running without isolation:

- make sure the computer and and the transceiver's power supply are connected to the same AC power circuit (i.e. sharing the same ground).
- connect/disconnect the sound card interface to the transceiver or computer only when both devices are unplugged from the AC power circuit.

Older transceivers will need modifications to work properly at 9600 baud. You **cannot** use the microphone input for TX audio on most radios; likewise you **cannot** use the speaker output for RX audio. For TX audio you must connect directly to the VCO and for RX audio you must connect directly to the discriminator output. See these web sites for advice on radio modifications:

- TAPR: **ftp://ftp.tapr.org/general/9600baud/**
         http://www.tapr.org/tapr/html/Fpub.9600.html (non-ham radios)
- Buxcomm: **http://www.packetradio.com/9600mods.htm**
- Sinister Radio: **http://www.sinister.com/radio/9600mods/**

Some notes about 9600 baud use:

- Successful 9600 packet operations may require a near full-scale S-meter reading. 9600 signals are far more susceptible than 1200 baud to multi-path conflicts, phase distortion, and noise. As a result, you may need 5 to 10 times the signal strength for it to work reliably compared to 1200 baud. Another way to look at it is that the usable range for 9600 will be far less than 1200 for the same antenna and transmit power. Note that if your 9600 packet exchange is slowed by signal problems and data repeat requests, you won't gain any speed over 1200 baud use.

- Likewise, unless your radio has fairly fast RX-to-TX switching time (less than 50 ms) you won't gain much from 9600 use. Any increase in baud rate will not make much difference if the radio has lengthy RX-to-TX switching delays.

- You will probably need to set the volume controls almost to the maximum

- Some soundcards do not have an adequate audio response range for 9600.

- What can you expect for an approximate maximum operating distance for 9600 baud at 440 MHz? Approx. 15 km / 10 miles @ 10 watts in urban areas with a good antenna and radio.

For more on 9600 baud operations, see:

- 9600 Baud Packet Handbook by Mike Curtis, WD6WHR
- http://www.amsat.org/amsat/articles/g3ruh/109.txt
- http://members.gbonline.com/~kb9aln/wapr/wiscnet/part20.html

300 baud (HF)

300 baud HF packet operations are quite different from 1200 baud VHF/UHF operations:

- frequency shift keying (FSK) on SSB is used instead of audio frequency shift keying (AFSK) on FM (UHF/VHF)

- tuning is more difficult - the incoming audio tones from the receiver have to match the frequencies AGWPE is expecting within 20 or 30 Hz (i.e. within 10-15% or so of the 200 Hz shift) in order to be reliably decoded. Since the receiver tuning directly affects the frequency of the recovered audio, this requires very precise manipulation of the receiver tuning knob. Since most modern HF rigs tune in synthesized steps of 10 Hz, that means nudging the knob barely one or two clicks either way from center is enough to completely kill reception. [The majority of hams still have problems tuning in an SSB signal so a voice sounds reasonably natural, and that requires "only" a tuning accuracy of 50-100 Hz, not 20-30 Hz!].

  Note: this extreme sensitivity to frequency error means that any traditional analog VFO rig will be virtually unusable on a fixed HF frequency (such as for APRS), since they are unlikely to stay within 10 Hz for very long. For this reason, your radio should have a very stable VFO if you hope to stay exactly on frequency.

- signals are more easily affected by interference and propagation conditions and by low signal-to-noise ratios and spurious noise

- the tone shift is 200 Hz rather than the 1000 Hz used on UHF/VHF

- digipeating is not generally used (3rd party traffic concerns)

Configuring AGWPE for 300 baud HF packet isn't much different than for 1200 or 9600. On the AGWPE Properties for Port 1 window, push the Options button to call up a Sound Card Modem/TNC Setup window with baud choices for the left channel (port 1/radio1) and right channel (port 2/radio 2). Just select 300 baud for the left channel (see also the AGWPE setup page).

> Processor Tip: George SV2AGW suggests that to save some processor resources, it's best to operate 300 baud in Single Port mode (see the AGWPE setup page.)
>
> For example, if you selected dual port, the Sound Card Tuning Aid window (see below) will show 2 active tuning windows and the program may run slow. To close (gray out) the lower window, change the AGWPE port properties to Single Port. (Note: If you've messed around a lot with the AGWPE port configuration, it is a good idea to delete the AGWPE.INI file and all PORTx.INI files from the AGWPE directory and start again.)

To aid tuning, AGWPE includes a Sound Card Tuning Aid. You can find it on the AGWPE pop-up menu accessible by clicking on the AGWPE tower icon in the System Tray. For HF tuning, select the Waterfall Spectrum style. Signals are represented by blues, greens,

yellows, and reds (weaker to stronger) on a black background (black =no signal). Tune your transceiver so that the colorful portion of the screen scrolls down between the two vertical lines. To get good copy, the tone must be precisely centered between the two lines.
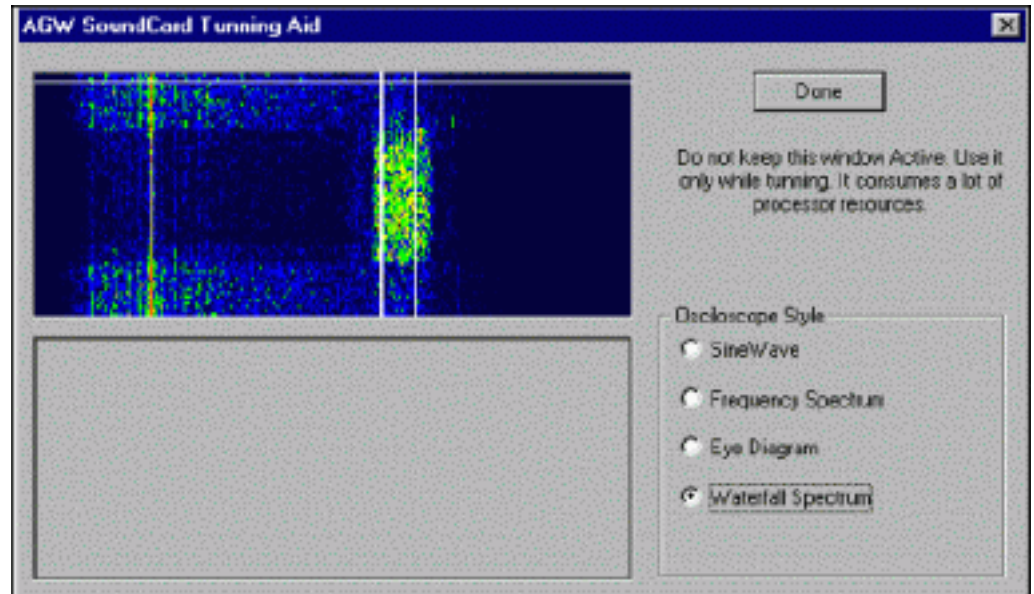
The sound volume (represented by the colors) in the Waterfall Spectrum can be adjusted by the TX audio volume. But it's better to use the SineWave style to see the volume of the incoming signals. The wave heights should only be 1/3 to 1/2 the screen. If necessary, adjust the Line In slider in the Recording window of the Volume Control program.

Note: AGWPE emulates a PK-232 HF modem and uses tones of 2110Hz and 2310Hz for a center frequency of 2210 Hz (has the standard HF packet tone shift of 200 Hz). If you are accustomed to KAM tones of 1600Hz and 1800Hz, you'll need to adjust your radio tuning an additional 510 Hz (+510 Hz for Lower Side Band and -510 Hz for Upper Side Band).

> The Packet Engine Pro version offers both the PK-232 tones and the KAM tones.
>
> For some radios, the KAM tones may be a better choice since the PK232 tones (2110/2310) land right on the upper edge of the passband of the typical SSB filter, where they could experience differential phase shift and unequal amplitude output; i.e. severe distortion. In fact, the tones may not make it through the passband of many HF transceivers with sharp cutoff SSB filters. (For example, many "contest grade" SSB filters have a cutoff at 2100 or 2200 Hz.) On the other hand, the KAM 1600/1800 Hz tones land in the flat part of the pass band of any SSB rig and will be unaffected by the filter.
>
> Note that on some HF rigs the passband tuning provided on RECEIVE allows you to shift the pass band to a higher band of audio frequencies, but it may not effect the TRANSMIT side. If so, your transmitted tones will still be affected by the filter and may be distorted or may not even be transmitted.

Another option for HF packet is the **MixW program**, a $50 shareware program. It has a few advantages over AGWPE, including easier tuning, unlimited user-selectable tone pairs, and different types of packet modems, such as, Q15X25. MixW can also link to AGWPE.

For more information, see the **MIxW info page** on this web site.

PTT: If you are able to use your VOX key up on your HF rig and you will not need a separate PTT cable, although many users find VOX troublesome and prefer a hardwired PTT circuit and cable. If you use VOX, set the AGWPE PTT port (COM or LPT) to some unused port so you don't conflict or tie up a real port. Also remember that VOX is subject to other noises that it hears, such as **Windows sounds**, program sounds, etc. It is probably best to turn those off if you run with VOX. Also, depending on your microphone setup, watch out for room noise, talking, etc.

For an overview of HF packet operations see **Tuning HF Digital Signals de Gloria, KA5ZTX.** For that matter, **Gloria's site** is a great packet tutorial.

HF Packet - LSB

Band	Suggested Frequencies* (channel centers = RF between the 2 tones)
80	3580-3635, priority at 3620-3635
40	7035-7050, priority at 7040-7050 and 7100-7120 with Americas
30	10.130-10.150, priority at 10.140-10.150
20	14.070-14.112, except 14.100 (beacons); priority at 14.095-14.0995
17	18.100-18.110, priority 18.104-18.110
15	21.070-21.125, priority 21.090-21.125
12	24.920-24.930, priority 24.925-24.930
10	28.070-28.189, priority 28.120-28.189

* AGWPE tones have a center frequency of 2210 Hz, so for LSB you would set your radio dial + 2210 Hz higher than the frequencies listed above. (For LSB, remember that the higher the frequency shift, the **lower** the resulting LSB frequency.)

20 Meters is the most active HF packet band.

Look for APRS beacons at:
- **7.035.5**
- **10.151.51 MHz LSB (North America)**
- **14.105.51 MHz LSB (Regions 1 & 2 only)**
- **18.102.5**
- **21.103.5 (Africa)**
- **29.250.5**

These are the suppressed-carrier (radio dial) frequencies for AGWPE (and PK-232 TNCs) with a +2210 Hz center frequency. Users of other TNCs may refer to these APRS dial frequencies as 510 Hz less than AGWPE's tones, for example 14.105.0 instead of 14.105.5.

Example for 30 Meters APRS using LSB
The radio dial frequency is listed first in blue. The actual transmit RF frequencies for the Mark and Space tones are in red:
10.151.51 - 2.310 = 10.149.200
10.151.51 - 2.110 = 10.149.400

Or if using USB, set the radio to 10.147.09:
10.147.09 + 2.110 = 10.149.200
10.147.09 + 2.310 = 10.149.400

Note that some HF radios with "DATA" or "FSK" modes automatically offset the indicated dial frequency to account for the difference between the suppressed carrier freq and the actual mark or space frequency, but they typically assume tones different than 2310/2100 tones used by AGWPE. You'll need to get the data mode offset from your user manual and then calculate the correct offset for AGWPE.

*

Last Updated: 09/27/2004

Sound Card Packet

Remote Control of AGWPE with Your Web Browser

George SV2AGW has started to develop a web browser interface for AGWPE which lets you access AGWPE over a LAN or the internet. Using your browser (Internet Explorer, Opera, or Netscape), you can:

- change some AGWPE settings
- see radio channel activity

Here's how you do it:

1. First, make sure that you have an **http** folder (with files) in your main AGWPE folder. This should have been created when you installed AGWPE.

    ☐ AGWPE 2001.38
        📁 http

2. Second, start AGWPE. Then call up the AGWPE menu and select **Setup Interfaces**. This brings up the **Winsock and HTTP Interface Setup** window.

- Make sure the **Enable Winsock TCP/IP Application Interface** is checked.
- Then click on the **HTTP Interface** tab (see picture below).
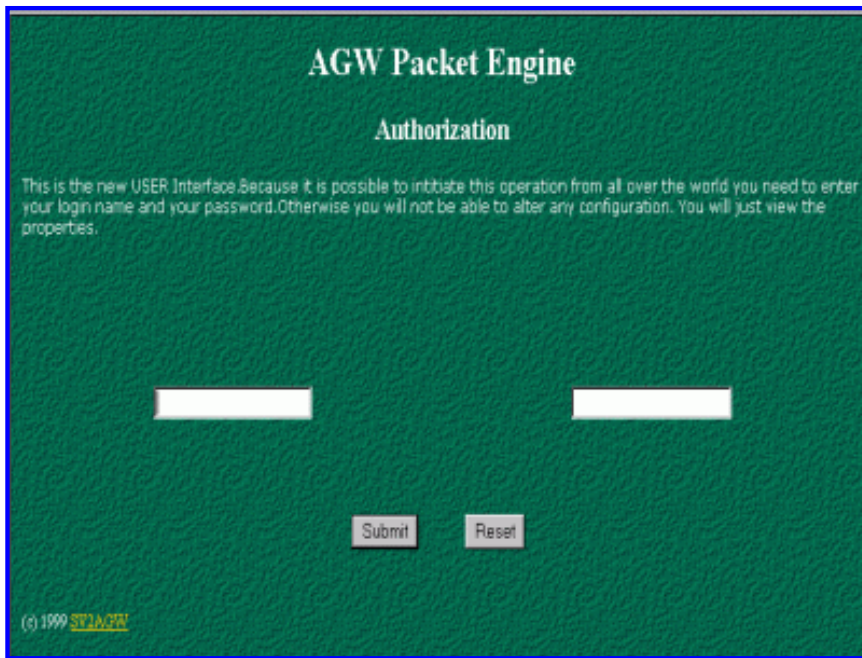- Checkmark ☑ **Enable the HTTP Interface**.
- Note the port number. The default of **8000** should be fine. You would only need to change it if some other server or program in your computer was using port **8000** and that would be unusual (for example, port 80 is normally the default TCP port for web browsers).
- Optional: Under **Password,** either leave the **LOGIN** and **PASSWORD** name defaults or enter new words of your choice. Use of a LOGIN name and PASSWORD are suggested in order to prevent others from changing your AGWPE settings.
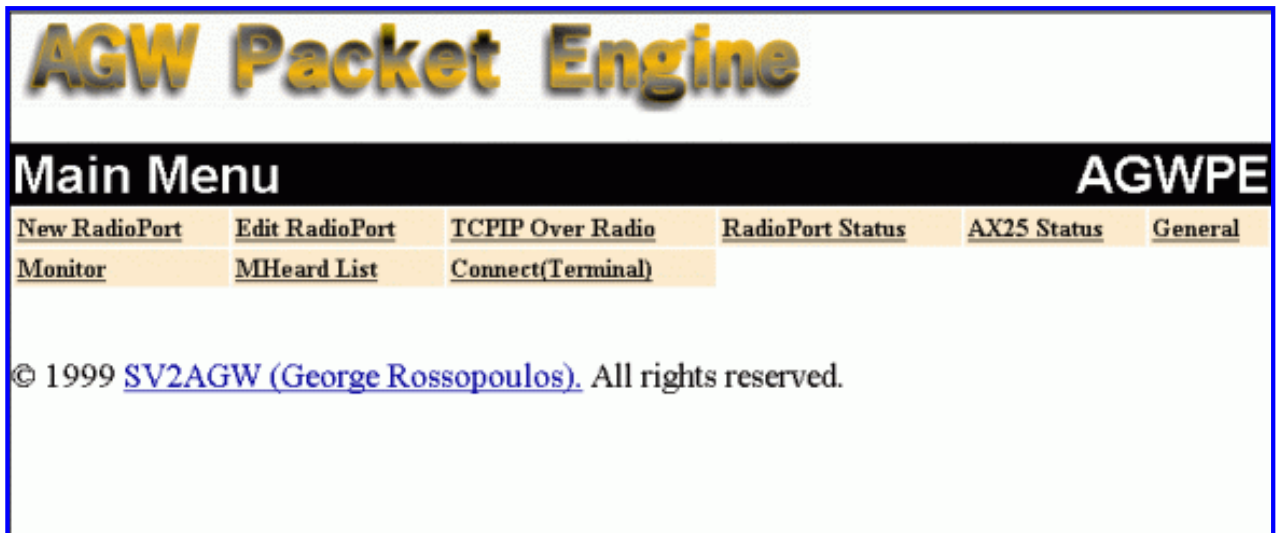- Press the **OK** button to save the changes.
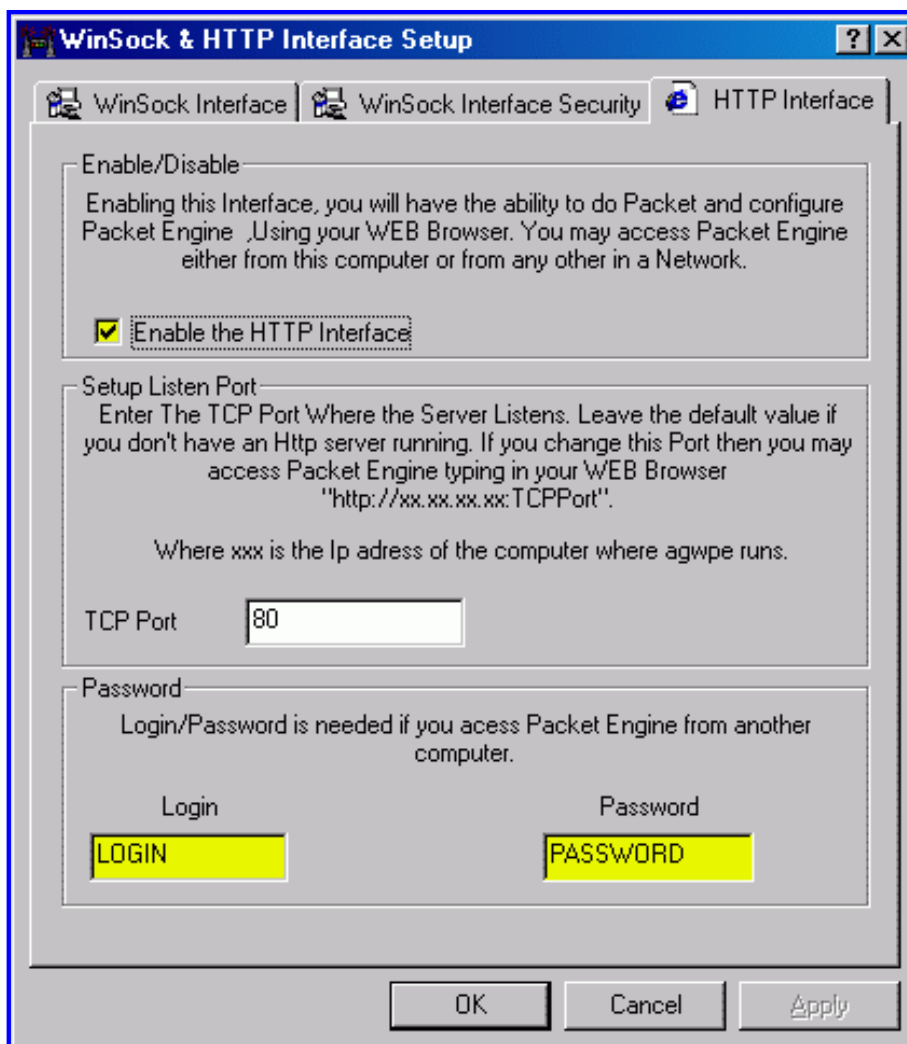
3. Call up the AGWPE pop-up window again and this time select Launch IBrowser; or with AGWPE running, launch your Internet browser.
- If you are working from a remote computer, in the browser's address bar enter the IP address of the computer running AGWPE
- If you are working from the same computer where AGWPE is running, enter http://127.0.0.1:8000 or http://localhost:8000).

Possible Problem: 127.0.0.1 is an IP address that refers to your own machine. But if you are on a network/connected to a router and your computer has been assigned a different IP address, you may need to enter that address, e.g. 192.168.0.xxx via the address window in your browser.

If everything is working correctly, you should now get a green textured "AGWPE web page" with login slots.

AGW Packet Engine

Authorization

This is the new USER Interface. Because it is possible to initiate this operation from all over the world you need to enter your login name and your password. Otherwise you will not be able to alter any configuration. You will just view the properties.

Submit   Reset

(c) 1999 SV2AGW

If you kept the defaults on the **HTTP Interface** page, just enter **LOGIN** in the left window and **PASSWORD** into the right one; otherwise enter the words you selected for **Passwords**.

Your browser will then display a **AGW Packet Engine Main Menu** page.

AGW Packet Engine

Main Menu					AGWPE
New RadioPort	Edit RadioPort	TCPIP Over Radio	RadioPort Status	AX25 Status	General
Monitor	MHeard List	Connect(Terminal)			

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If you click on the **MONITOR** option, you should soon see incoming lines of packet data scrolling across your browser!

You can also call up a **MHEARD LIST** and even edit you AGWPE ports... but **not all the menu choices are working** (as of version 2003.308).

Trouble Shooting:

If you can't get your browser to display the AGWPE green web page:

Check your AGWPE folder. You need to have a "HTTP" folder in it and it should have some files in it -- those files come with the original AGWPE zip file for all major releases, such as 2003.308. They usually are not included with beta release zip files.

Make sure you have the HTTP Interface activated on port 8000 -- see #2 above.

Your firewall program (ZoneAlarm, etc.) may be blocking access to port 8000. Temporarily turn off the program to test this. If everything then works, you will have to configure the program so it allows access to AGWPE's port 8000.

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Sound Card Packet

AGWPE's TCP/IP Over Radio Feature

On this page:	On Related Pages:
Overview	**TOR Virtual Adapter**
How it works	**TOR Windows Settings**
How fast is it?	**TOR AGWPE Settings**
To Pay and Register	**TOR Gateway Setup**
Setup Overview	**TOR Application Setup**

Overview

AGWPE's special TCP/IP Over Radio (TOR) feature (extra fee required) lets you send and receive TCP/IP data using amateur radio. It's not needed for normal sound card packet operations, however.

You can run TOR using AGWPE with TNCs and modems, not just sound cards packet operations. I've added it to this sound card site because questions about TOR come up frequently.

With AGWPE's TOR feature you will be able to:

- act as an internet 'gateway' letting others use your computer to get on the internet
- get internet access as a 'client' by using a 'gateway' station!
- let other radio users access any FTP, SMTP, and POP servers you host on your computer
- access FTP, SMTP, and POP servers hosted at a distant station

Please note that:

- TOR does *NOT* have to be activated in AGWPE for normal packet operations. AGWPE does use the TCP/IP application interface to link to other programs and users, but this TCP/IP application interface should not be confused with TCP/IP Over Radio (TOR). For this reason the TOR driver does not need to be installed for normal packet use.
- TOR is somewhat difficult to set up, especially for those with little or no experience with networking and TCP/IP
- For TOR to work, both the sending and receiving radio station must be running AGWPE with TOR
- You may use TOR for up to 45 minutes at a time without paying a fee. This gives you time to experiment. But to use TOR for longer than 45 minutes at a time, you must register and pay a US$28 fee
- This web site will not be able to give you very precise details about configuring applications other than AGWPE for TOR

How it works

A key TOR requirement is the installation of a special SV2AGW TOR network driver on both the sending and receiving station. This driver creates a virtual (software) network adapter that acts just like a physical network interface card (NIC) or the Windows dialup adapter. With your applications properly configured, TCP/IP data packets that normally go to the NIC or dialup-adapter are instead routed to the SV2AGW TOR adapter. The TOR adapter places the TCP/IP packets inside AX.25 packets, which are then sent to AGWPE to be transmitted by radio to another TOR-capable radio station. The TOR adapter at the receiving station removes the TCP/IP packets from the AX.25 packets and forwards them to the appropriate TCP/IP program.

How Fast is TCP/IP over Packet?

TOR is only as fast as the "on air" baud rate of your TNC and radio (minimum 300 baud, maximum 9600 baud with AGWPE). For applications needing fast transfer rates, such as high-content web browsing or audio and video streaming, this rate will be much too slow. But for other applications where high transfer rates are not as important, such as email, ICQ, small file transfers, or simple web pages, this rate may be adequate.

To Pay and Register

AGWPE is free and you can use it's TOR feature without a fee for up to 45 minutes at a time. But to run TOR for more than 45 minutes at a time, you will need a registration number that comes after paying a registration fee of $28 US.

If you run AGWPE with TOR for more than 45 without a registration number, you will get this notice from AGWPE:
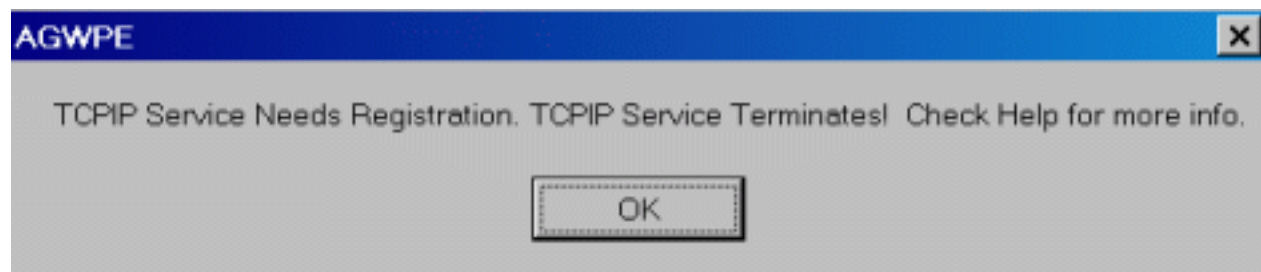
To pay and obtain a registration number go to this secure web site:
https://secure.bmtmicro.com/ECommerce-OnSite/00356/35601.html

Please include the following information in your order:
1. your name
2. your callsign
3. the way you wish to receive your registration number (Email or Postal Address).
4. your phone number (in case of a problem)

If there is a problem or delay in receiving the registration number, you can email the AGWPE author, George Rossopoulos SV2AGW

> **Note:** The TCP/IP Over Radio (TOR) feature is available in both **AGWPE and Packet Engine Pro** (PE Pro) and TOR will work between a station running PE Pro and one running AGWPE.
>
> PE Pro is the advanced version of AGWPE with many additional features. It costs $49 US after a 30 day trial period. **The TOR feature is included free with PE Pro.** For that reason, if you plan on running TOR, you should consider purchasing PE Pro instead of purchasing just the TOR registration for AGWPE. For only $21 US additional, you will get all the advanced features of PE Pro (see the **PE Pro page** for a listing).

Steps To Implement TOR

To run TOR, you must already have AGWPE working correctly and be able to conduct normal packet exchanges with the other TOR station. Listed below are the basic steps to then setup TOR. Links on this page will take you to other pages on this site with more details.

1. **Decide on IP address for each station in your TOR network**. If your network will be relatively simple and will not tie into other TCP/IP networks, you can pick your own IP addresses. Since Amateur Radio has been assigned the block of IP addresses beginning with "44.", you should begin your addresses with that (example: 44.1.1.1 and 44.1.1.2). If your network may be heard by or tie into other ham TCP/IP networks, you should instead obtain unique addresses from your **local TCP/IP coordinator**. This will prevent the routing problems that could develop when two or more stations use the same IP address.

   > **Note:** Never use an IP address that begins with "192.168." for your SV2AGW IP address. This is the addressing scheme used on LANs and home networks. If you have another network adapter or wireless card in your computer and use a 192.168-type IP address for the SV2AGW adapter, Windows will probably not route to it correctly.

2. **Download and install the special TOR driver** to create the special SV2AGW "virtual" network adapter. See **TOR Virtual Adapter** for instructions for each version of Windows.
3. **Activate the TOR feature in AGWPE**. See **TOR AGWPE Settings** for further information.
4. **Configure Windows**. Some additions to Windows' IP Routing and ARP tables are needed to direct TCP/IP data to the virtual adapter, the correct radioport, and the correct station callsign. **See TOR Windows Settings**.

   In addition, on any computer that will act as an **internet gateway** for other stations, you must:

5. **Configure Windows' Internet Connection Sharing feature** (or run a proxy server program). See **TOR Gateway Setup** for further information.

Note that you normally do not need to configure your TCP/IP client applications (browser, email reader) in any special way for TOR (**Additional notes on application setup**)

Note: The **MixW program** is also reported to be able to send TCP/IP by packet. The MixW website says that a MixW user and an AGWPE TOR user should be able to communicate with each other using TCP/IP over radio.

Go to:

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Sound Card Packet

Installing the TCP/IP Over Radio Virtual Adapter

A "TCP/IP Over Radio" / TOR Adapter is **not needed for normal packet use** of AGWPE. It should only be installed if you plan to use AGWPE's special **TCP/IP Over Radio feature** to send and receive TCP/IP information via packet radio. **Most users will not use this feature or need the TOR adapter installed.**

1. Downloading the Adapter

You can download a zip file with adapter files for all versions of Windows from:

http://www.raag.org/sv2agw/tcpip.zip
http://www.elcom.gr/sv2agw/tcpip.zip

Note: These zip files are **also** included in the **drivers.zip** file at those addresses.

The Sept. 10, 2004 version of the tcpip.zip file expands to the following files and folders:

Name ▲	Modified	Size
agwtcp.INF	9/3/1999 5:29 PM	2,306
Agwtcpip.sys	7/17/2000 10:17 …	27,472
intnet.txt	10/19/2000 4:10 …	212
Oemsetup.inf	2/16/2000 6:53 PM	27,733
readme agwtcpip.txt	2/26/2000 9:33 AM	474
tcpip2000.zip	10/3/2000 6:14 PM	13,557
tcpipXP.zip	9/11/2004 8:11 PM	5,649

The **tcpip2000.zip** folder within **tcpip.zip** expands to the following files:

Name ▲	Modified	Size
agwax25.inf	8/15/2000 6:36 PM	2,980
Agwax25.sys	9/13/2000 11:21 AM	8,023
Agwtcp2k.inf	8/7/2000 11:00 PM	1,893
Agwtcpip.sys	9/12/2000 10:59 PM	7,424
smdot.gif	2/10/2000 10:21 PM	72
tcpip2000.htm	10/3/2000 6:10 PM	5,592

The **tcpipXP.zip** folder within **tcpip.zip** expands to the following files:

Name ▲	Modified	Size
🔲 AGWTCPIP.sys	9/19/2002 8:24 PM	24,320
🔣 AgwtcpXP.inf	9/10/2004 9:11 PM	2,008

Note: The 0 Sept. 2004 **tcpipXP.zip** file with a new **agwtcpXP.inf** fixes a problem with the SV2AGW adapter not displaying in "Network Connections" after Windows XP Service Pack 2 is installed. If you develop this problem after applying Service Pack 2, uninstall the current SV2AGW adapter from the Windows **Device Manager** and then re-install the adapter using the new **agwtcpXP.inf** file.

2. Installing the SV2AGW TOR Virtual Adapter in Windows

After you follow the instructions below, you can check that the adapter was installed correctly by using the Windows **IPCONFIG.EXE** program: from the **Start** button, select **Run** and then enter **IPCONFIG**. (For Windows XP, after **Run**, enter **CMD**, and then **IPCONFIG**.

Use the links below to find adapter installation instructions for your version of Windows:

Windows 95
Windows 98
Windows ME
Windows 2000
Windows XP

Installing the TOR Adapter in Windows 95

I haven't installed the adapter in Windows 95. There are instructions in the "Help" for AGWPE for this. I do not know how well they will work. In the Help INDEX, read all entries beginning with "DialUp", particularly "DialUp Setup" . If you install it on Windows 95 and have any suggested improvements to the installation instructions, please tell me **KC2RLM**.

Installing the TOR Adapter in Windows 98

1. Unzip the **tcpip.zip** file into an empty folder of your choice. Note the folder location.
2. Open the **Windows Control Panel** and double click **Network**.
3. Press the **Add** button
4. Select **Adapter** and press the **Add** button
5. On the **Select Network Adapter** screen, press the **Have disk..** button and browse to the folder where you unzipped the **tcpip.zip** file. Highlight the **agwtcp.inf** file and press **OK**
6. Select the **SV2AGW TCP/IP Adapter** and press **OK**.
7. After Windows copies the files, it may ask for the WIN98 CD-ROM and then copy more files
8. In the list of installed components you should have a new entry for **TCP/IP->SV2AGW TCP/IP Adapter**. Highlight it and press **Properties**.
9. On the **IP Address** tab specify:

   IP address: enter the amateur radio IP address you will use for TOR, See Note **[1]** below
   Subnet: enter **255.0.0.0**
10. On the **WINS** tab, check **disable**
11. On the **Gateway** tab:

New Gateway = add the amateur radio IP address of the distant station that you will use as a gateway; if you are the gateway, enter nothing

12. On the DNS tab, check mark disable DNS.
13. On the Bindings tab, check Client for Microsoft Networks
14. Leave NETBIOS disabled and Advanced blank
15. Press OK repeatedly and restart your computer

Installing the TOR Adapter in Windows ME

I haven't installed the adapter in Windows ME but the instructions should be similar to Windows 98 above. If you install it on Windows ME and have any suggested improvements to the installation instructions, please tell me KC2RLM.

Installing the TOR Adapter in Windows 2000

1. Unzip the tcpip2000.zip file (which is inside the tcpip.zip file) into an empty folder of your choice. The The key files are agwtcp2k.inf and agwtcpip.sys. Note the folder location.
2. Open the Windows Control Panel and select Add/Remove Hardware.
3. Press NEXT and select "Add/troubleshoot Device". Press Next and wait while windows searches for devices.
4. Select the first item from the resulting list, Add a new device, and press Next.
5. Select No, I want to select the hardware from a list and press Next.
6. Select from the resulting list Network Adapters and press Next.
7. Press the Have disk.. button and browse to the folder where you unzipped the tcpip2000.zip file.
8. Select the AGWTCP2k.inf file and press OK to return to the Add hardware Wizard.
9. Select the SV2AGW TCPIP Over Radio Ndis Driver and press Next. It will warn you about a digital signature. Ignore this by pressing Yes. and then press Finish.
10. Now from the Control Panel select Network and Dial-up Connections.
11. You should have a new entry entitled TCP/IP Over Radio adapter. Double click it and press Properties.
12. Select the TCP/IP protocol and fill your:

    * IP Address: enter the amateur radio IP address you will use for TOR. See Note [1] below
    * Gateway's IP Address: enter the IP amateur radio address of the distant station that you will use as a gateway; if you are the gateway, enter nothing.
    * DNS Name: enter the Gateway IP Address or leave blank
13. You have finished with the installation of the TCP Virtual Ethernet Card.
14. Now From the same TCP/IP Over Radio adapter properties dialog, press the Install.. button.
15. Select protocol and press Add...
16. Again press Have Disk.. and browse to the driver directory and select the AGWAx25.inf file.
17. Select the SV2AGW IP Over Radio Protocol and press OK. Now you have this new protocol checked on EVERY Adapter you have. This is harmless for the other adapters, but adds a bit overhead. So go to the properties page and for any other (non-SV2AGW) adapters, uncheck the "SV2AGW IP Over Radio Protocol.
18. Close all windows and restart your computer.

Installing the TOR Adapter in Windows XP

1. Unzip the tcpipxp.zip file (which is inside the tcpip.zip file) into an empty folder of your choice. The key files are agwtcpXP.inf and agwtcpip.sys. Note the folder location.
2. Open the Windows Control Panel and select Add Hardware.
3. On the Add Hardware Wizard screen, select Next and wait for Windows to search for hardware.
4. When the search is complete, select Yes, I have already Connected the hardware and then press Next.
5. In the resulting Installed Hardware window, use the scroll button to go to the bottom of the list and

select the last item, **Add a new hardware device,** and press **Next**.

6. On the next screen, select **Install the hardware that I manually select from a list (Advanced)** and then press **Next**.

7. In the resulting **Common Hardware Type**s window, use the scroll button to go to **Network Adapters** and press **Next**.

8. On the resulting **Select Network Adapter** window, press the **Have disk..** button and on the next screen use the browse button to go to the folder where you unzipped the **tcpipxp.zip** file.

9. Select the **AgwtcpXP.inf** file and press **Open.** You'll then see a **Install from Disk** window with the path to the folder where the file is located. Press **OK.** On the next screen, select the **SV2AGW TCPIP Over Radio NDIS Driver** and press **Next.**

10. You will get a screen saying The Wizard is ready to install your hardware. Press **Next.**

11. The next screen will warn you that the hardware has not passed Windows logo testing. Press **Continue Anyway**.

12. Press **Finish** when the **Completing the Hardware Wizard** screen appears.

13. Now call up the **Windows Control Panel** and then select **Network Connections.** You should see a new Local Area Connection entry. [**Hint:** right click on this entry and select **rename**. Pick a new name for this connection, for example, **TCPIP Over Radio**, to help you recognize it more easily.]

14. Double left click on the entry and in the resulting **Status** window press **Properties**. On the **General** tab, under **This connection uses the following items:**, select the **Internet protocol (TCP/IP)** entry and then press **Properties**.

15. On the **General** tab, select **Use the following IP address:**

   ▮ **IP address**: enter the amateur radio IP address you will use for TOR. See Note [1] below.

   ▮ **Subnet Mask**: accept the default **255.0.0.0**

   ▮ **Default Gateway**: enter the IP address of the remote gateway station; if you are the gateway, enter nothing.

   ▮ **DNS Server Addresses:** leave blank, otherwise enter the IP address of the distant gateway station.

   ▮ **Advanced**: for now, do not use. Only use this if you understand Windows networking and have a need to change the IP addressing, DNS, WINS, or Options parameters.

16. Press **OK** repeatedly to close all windows and restart your compute**r**

[1] **IP address for each station in your TOR network**. If your network will be relatively simple and will not tie into other TCP/IP networks, you can pick your own IP addresses. Since Amateur Radio has been assigned the block of IP addresses beginning with "44.", you should begin your addresses that way (example: 44.1.1.1 and 44.1.1.2). If your network may be heard by or tie into other ham TCP/IP networks, you should instead obtain unique addresses from your **local TCP/IP coordinator**. This will prevent the routing problems that could develop when two or more stations use the same IP address.

> **Note:** Never use an IP address that begins with "192.168." for your SV2AGW IP address. This is the addressing scheme used on LANs and home networks. If you have another network adapter or wireless card in your computer and use a 192.168-type IP address for the SV2AGW adapter, Windows will probably not route to it correctly.

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Sound Card Packet

Configuring AGWPE for TCP/IP Over Radio (TOR)

Note: Before configuring AGWPE for TOR, you must install the SV2AGW virtual adapter in Windows. If you don't, AGWPE will still work, but you will get this message every time you start AGWPE:
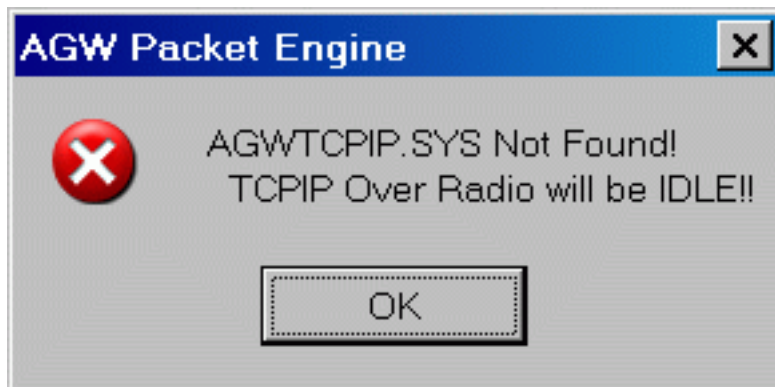
To configure AGWPE for TOR, right click on the AGWPE tower icon in the Windows Desktop System Tray to bring up the AGWPE menu. Then select TCPIP Over Radio Setup to bring up the Dialup <> AX.25 Setup window.

DialUp <>AX25 Setup

Check one of them or nothing to disable TCPIP

○ Enable DIALUP   ◉ Enable TCPIP (Recommendend Method)

○ Thank's NO TCPIP   [Setup Routes]

[OK]

[Cancel]

[Help]

RegiStration
Enter Your Registration Number Here.Else the TCPIP will Work only for 45min. Normal AX25 Packet needs no Registration.

Registration Num
[_____]

Radio
Select The Default RadioPort for TCPIP Access.
[Port1 with SoundCard On COM5: VHF 1200 baud; ▼]

PacLen

(MSS or MTU). Recommende Value 576

Calls and Ip Adresses
MyCall   [SV2AGW]   MyIp   [ ][ ][ ][ ]
ServerCall [SV2DXC-8] ServerIp [ ][ ][ ][ ]
Via Path   [_____]

☐ Pass All IP Trafic to MSTcpip Stack

☐ Allow Broadcast Messages.

[576]

✚ Check **Enable TCPIP (Recommended Method)** - remember that if the **TOR adapter** has not been successfully installed, you will get an error message when you close this window. (The **Enable DIALUP** method is for Windows 95 and is not discussed on this website; it emulates a modem in Win95).

✚ **Setup Routes**: Only used if you want exchange information with other TOR stations using a radioport different from the default radio port (see below). Even so, it would be better to use the **Windows ARP table** to specify a different radio port for a different callsign.

✚ **Registration**: If you have paid for a number, enter it here (the number ties to your callsign). As the screen says, you don't need a number for normal AGWPE use and you don't need a number to run TOR for less than 45 minutes at a time. See **obtaining a registration number**.

✚ **Radio**: Use the drop down list to select the AGWPE port you wish to use for TOR. To avoid possible problems, **do not select "use all ports"**. If you do, you may get a message similar to this: THE SYSTEM DETECTED A CONFLICT AT ADDRESS IP 44.000.00.80 WITH THE SYSTEM THAT HAS THE HARDWARE ADDRESS 98:BB:BB:BB:BB:BB.

✚ **Calls and IP Address**: Enter the callsign you will use for TOR. enter your callsign; add a SSID number if you wish, e.g. SV2AGW-4. The other fields you see to the right of this entry field will be grayed out for TOR (they appear only if you use the Windows 95 DIALUP method.)

- **VIA Path**: Enter the callsign of any station/digipeater that may be needed to relay your packets. If more than one is needed, use a comma to separate the callsigns.

- **PacLen** (on the right): Enter the maximum length of the packets. AGWPE will break TCP/IP sentences larger than PacLen into additional packets into desired Paclen. Suggested values are **300** for 1200 baud and **576** for 9600 baud. (PacLen equates to MTU or MSS values in a wired network, for those of you familiar with these terms.) If your signal path is good and there is little traffic, you can try increasing the PacLen. Alternatively, decrease PacLen if your path or traffic is creating difficulties (slow downs). (Note: Windows may ignore your settings and pick its own.)

- **Pass All IP Traffic to MS TCPIP Stack:** generally this should be left unchecked. If you check it, PE Pro will forward **all** received TCP/IP packets to Windows, including supervisory packets and packets not addressed to you. This is usually not necessary and may slow down your connection. You should only enable it if you understand the implications and have a good reason to use it, e.g. you are routing / digitpeating packets.

- **Allow Broadcast messages**: Generally you will leave this unchecked. Broadcast messages are network management TCP/IP packets that Windows "broadcasts" over a network. They will result in very long packet transmissions. These are not necessary for TCP/IP Over Radio, unless you intend to allow others to access a shared folder on your hard drive.

- **Help:... was not working in ver. 2003.308**

You must close and restart AGWPE for any changes you make to take effect.

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Sound Card Packet

Configuring Windows for TOR

ARP Table Entries
IP ROUTE Table Entries
HOSTS File Entries
Ping Test
Diagnosing Routing Problems

Windows has three internal tables which it uses to direct TCP/IP data to the correct network adapter and to the correct remote computer:

- The **IP Routing Table** directs TCP/IP packets to a particular gateway/network interface card.
- The **ARP (Address Resolution Protocol) table** associates an IP address with the physical address -- in this case the callsign -- of a remote computer.
- The **HOSTS Table** can be used to associate an IP address to a domain name and vice versa.

The **ARP Table** entries are probably the most critical for TCP/IP over radio (TOR) clients and gateways, but entries in the other two tables can be useful in some situations.

> Routing and ARP are somewhat complex subjects and complete explanations are beyond the scope of this **Help** section. If you want more information, do a web search for information about "IP Routing Table" and "understanding ARP table".

ARP Table

AGWPE's TOR feature uses Windows' ARP entries to associate a particular IP destination address (such as your gateway) with a ham callsign.

With an ARP entry, AGWPE knows immediately which callsign to use in addressing a packet destined for a particular IP address. But when Windows first boots up, the ARP table is empty and Windows must rebuild the **IP address=callsign** entries from network exchanges. So the first time a packet to a specific IP address needs to be sent, AGWPE must first send out an **ARP** request packet to "**QST**" asking for the station using the destination IP address to respond with its ham callsign. If a response comes back (it might not!), the **IP address=callsign** entry is put in the ARP table.

To simplify things, you can pre-enter the **IP address=callsign** information in the ARP table for any stations you are likely to be contacting with TOR. You can do that with a DOS batch file that runs automatically after AGWPE initializes.

The ARP entry can also be used to tell AGWPE to use particular radioport to contact this

callsign. Normally AGWPE uses the default port that you specified on the TOR configuration page. The ability to specify a different port can be useful if some of your contacts are made on alternative radioports.

1. Determining the Correct ARP Entry Format for the Batch File

Each ARP entry includes an internet address and a hex physical address (call sign and radioport). In order to calculate the correct hex address for a station, use the free AGWsoft utility AGWARP.EXE   You can download this in zip format from:
http://www.raag.org/sv2agw/arpagw.zip or http://www.elcom.gr/sv2agw/arpagw.zip

Unzip the utility and run it. It will ask you to:

1. Enter a callsign (for example SV2AGW-8)
2. Enter the AGWPE radioport to use to connect to that station (e.g. 2)
3. Enter the IP address used by that callsign (e.g. 44.1.1.8)

The utility will then return a hex physical address. For the example above it would be ab:ac:0d:2c:44:86 . Finally it returns a closing message, such as "Type now <ARP -s 41.1.1.8 ab:ac:0d:2c:44:86>". Rather than type it, write down everything in between the brackets < >. Press the Return key to close the utility. If you need physical addresses for any other stations, you will need to re-run the utility .

2. Create an ARP Entry Batch File

Open a DOS-prompt box (Start: Run: CMD) and type EDIT ARPROUTE.BAT (or another .bat name of your choice). If there is no existing file with that name, the edit program will create a new file named ARPROUTE.BAT with no data in it.

On a blank line in the edit window, enter an ARP entry, i.e. the information you wrote down from the AGWARP utility, except replace any colons (:) in the physical IP address with dashes (-). For example:
   ARP -s 41.1.1.8 ab-ac-0d-2c-44-86

If you have other ARP entries, add each on a separate line. When done, save the file to a folder of your choice, making note of the path. Test the file by double clicking on its icon and make sure no error messages occur. You can also see the ARP table and your new entry by opening a DOS-prompt box (Start: Run: CMD) and at the DOS prompt enter: ARP -a   [You can also manually enter ARP entries from the DOS prompt instead of a batch file.]

3. Add the Batch File to AGWPE's Auto Start Feature.

From the AGWPE's menu, select Startup Programs. Use the ADD button to navigate to and select the ARPROUTE.BAT file you created. Once entered into the auto start application list, the file will run each time AGWPE starts up and it will put your ARP entries into the Windows ARP table.

IP ROUTE Table

The IP Routing Table helps Windows decide which network adapter to use to send a TCP/IP packet. It's choices might be the SV2AGW TOR virtual adapter, the hardware network interface card (if one exists), or back to your own computer via a loop back port. For many users, no additions to the IP Routing table will be necessary, however, in some cases, Routing Table additions will help your TOR communications.

By default, Windows will build the Routing Table anew at each reboot. It's primary source of information is the Internet Protocol (TCP/IP) property settings of your network adapters, including the SV2AGW TOR adapter. The key information is the IP address assigned to the adapter. If you also have a hardware network card installed, Windows will make that IP address the default gateway adapter, but the IP address of your SV2AGW TOR adapter will create a special route for your ham radio network (those would be addresses that begin with 44, assuming you are using an IP address yourself that begins with 44).

For example, say your settings for the SV2AGW TOR adapter looked like this example ...
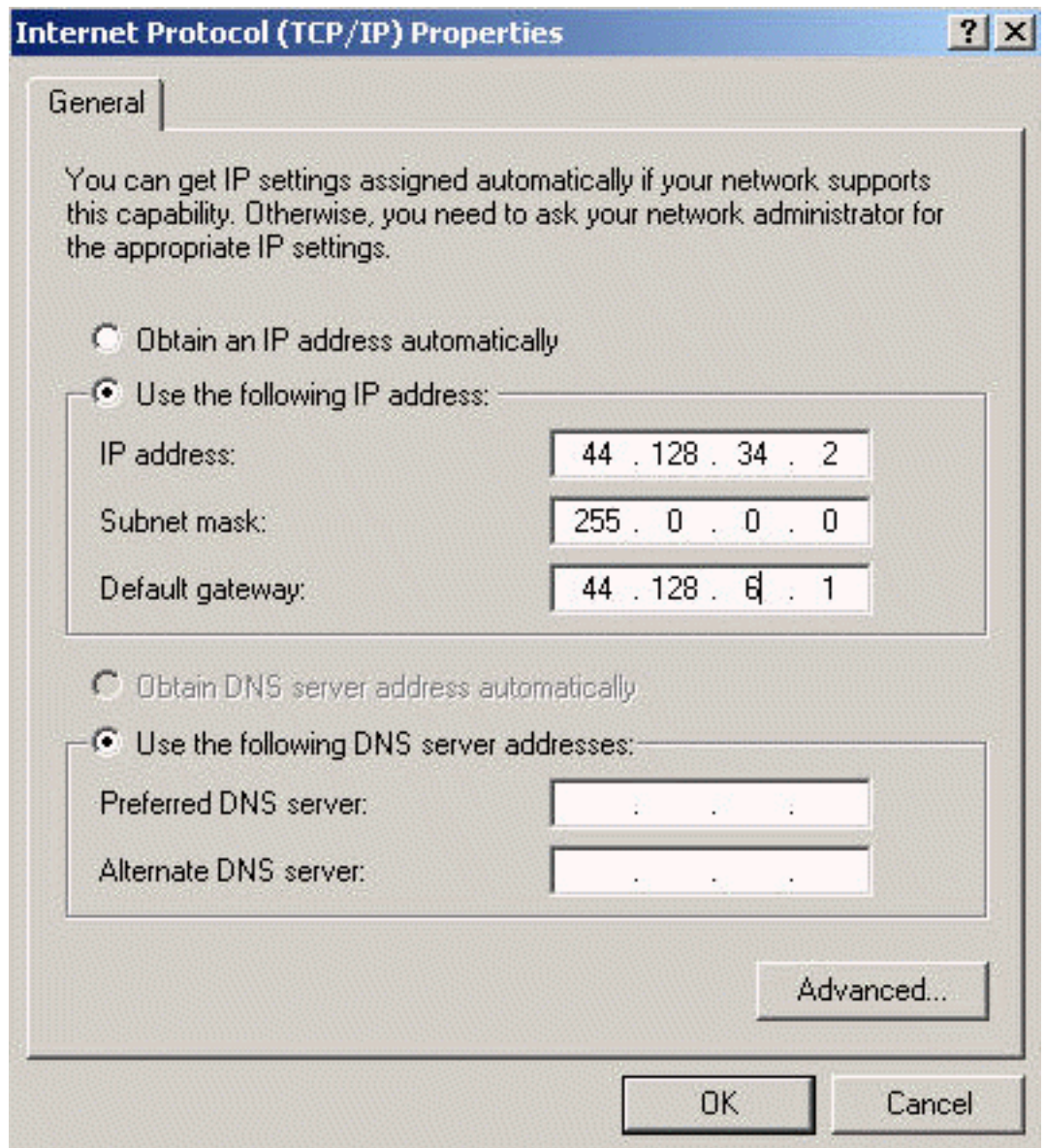
An entry is automatically placed in the IP Routing table indicating that any IP packet with a destination IP addresses beginning with 44 should be routed to your SV2AGW TOR adapter at IP address 44.128.34.2 (and then onto your gateway station at 44.128.6.1).

Why 44? That's determined by the subnet mask values under the four octets (44, 128, 34, and 2) in the IP Address. A subnet mask value of 255 means "match all the binary digits of this octet"; a value of 0 means "no need to match any of these digits". In our example, only the first octet, 44, has a subnet mask value of 255. The other octets have a mask value of 0. So the Routing table will contain an entry that says, in essence, send all destination IP addresses beginning with 44 to the 44.128.34.2 adapter.

For addresses that don't begin with 44, Windows will use the Routing Table to determine the correct routing. For example, if you also have a network card in your computer, then the Routing Table will probably suggest that packets for all non-44 addresses should be routed to the network card (the default gateway adapter) instead of the SV2AGW TOR adapter. If you don't have a network card installed, then the Routing Table will send packets go to the SV2AGW TOR adapter.

If you have a network card and will regularly contact stations using TOR that don't have an IP address beginning with 44, then you should add them to the Routing Table so that packets are sent to them via the SV2AGW TOR adapter and not the network card. The easiest way to do this is to add those routes into the batch file created for ARP entries (see above, Create an ARP Entry Batch File) or create a batch file as above if one doesn't exit.

To add a route to the IP Routing Table using your ARP Entry Batch file, enter a new line that begins with ROUTE ADD followed by the full IP address of the remote station followed by the IP address chosen for your SV2AGW TOR adapter (your IP address), for example:

ROUTE ADD 133.275.12.6 44.128.34.2

This tells windows to route any IP packets addressed to 133.275.12.6 to the SV2AGW TOR adapter at 44.128.34.2. Of course you would replace the number in green with the address of your distant station and replace the number in red with your SV2AGW TOR adapter's address (your ham radio IP address).

To add a route without using a batch file, open a DOS-prompt box (Start: Run: CMD) and enter your ROUTE ADD sentence as above.

To see your complete IP Route Table, enter ROUTE PRINT at a DOS prompt (Start: Run: CMD)

HOSTS Table

The HOSTS file can be used to help translate an IP address to a name and vice versa. For example, if you had a HOSTS table entry that said 44.0.0.2 is the same as "My Web Page", you could enter "My Web Page" as a URL address in your browser and Windows would know to go to 44.0.0.2 to find it.

This same IP Address-Name translation can be performed by a domain name server, but the HOSTS files is especially useful when a domain name service (DNS) server is not available (common on many amateur radio networks) or when you want to use an easily remembered name in place of a hard to remember IP address or lengthy domain name.

Location of the HOSTS file on your computer:

Windows 98/Me	c:\windows\hosts
Windows 2000/XP Pro	c:\winnt\system32\drivers\etc\hosts
Windows XP Home	c:\windows\system32\drivers\etc\host

Note: the **HOSTS** file has no extension to its name.

You can open the existing **HOSTS** file with a text editor. Instructions for adding entries to file are included in the file. [In some cases you may find only a **HOSTS.SAM** (sample) file and not a **HOSTS** file. If you do, make a copy of the **HOSTS.SAM** file calling it **HOSTS** (no extension).]

Usually the **HOSTS** file already has one entry in it: **127.0.0.1   localhost**

Any new entries would follow the same simple format: IP address, a space, name. For examples:

> **41.1.1.8   SV2AGW-8**
> **41.1.1.8   mail.sv2agw.net**

Ping Test

After you make your **HOST, ROUTE** and **ARP** entries, you can test them by using the Windows **PING** command. **PING** simply sends four packets to the destination station asking it to respond. **PING** then reports how long each response takes or, if no response is heard within a given length of time, **PING** reports the "request timed out".

To send the **PING** command, open a DOS-prompt window (**Start: Run: CMD**) and enter the command in this format:

> **PING <destination IP>**   **<--- substitute actual IP address for <destination IP>**

You can use the **-w** option on the ping command to increase the time PING waits for a response (default is 1 second). For example, to wait for each response for 5 seconds (5000 milliseconds), use -w 5000. e.g. **PING 44.0.0.1 -w 5000**

If you get a reply with a response time, then all Windows applications using TCP/IP, i.e. Internet Explorer, Outlook Express, will also be able to communicate with the **PING-ed** destination. If all four requests time out, then Windows is not hearing a response from the destination IP and it is useless to try any other TOR applications.

Diagnosing Routing Problems

Download and use the **AGWTerminal program** and watch the packets that AGWPE is sending when you execute the **PING** command. They should look like this:

> **2:Fm SV2AGW To SV2BBO <UI pid=CC Len=60 >[21:59:26]**
> **IP:len:60 44.0.0.2->44.0.0.1 ihl:20 ttl:128 prot ICMP**
> **ICMP:type Echo Request id:768 seq:7680**
> **abcdefghijklmnopqrstuvwabcdefghi**

- If you don't see anything, then the **ROUTE table** is not configured to route packets to the SV2AGW TOR adapter for this destination IP address.

- If the packet is addressed to **QST** instead of the expected callsign, then the **ARP table** entry associating the destination IP address with the destination callsign is missing or incorrect. Add or correct it.

If the number that begins the packet (e.g. 2:) is not the correct radioport for TOR, then the **ARP table** has a hex address with the wrong radioport. Rerun the **AGWARP.EXE** program to get the correct hex address.

If the **PING** command reports the the request timed out:

The response time may have been too short. Increase it by using PING's " -w " parameter described above.

The radioport number may be incorrect so you are transmitting on the wrong frequency. Either the default radioport in **AGWPE's TOR settings** is incorrect; or the **ARP table** entry for this callsign has a hex address with the wrong radioport (rerun the AGWARP.EXE program and re-enter the correct hex address in the ARP table).

You are using the wrong callsign and/or SSID number for the destination station.

There may be a transmission problem at your station (no power, cables not connected to TNC or radio, etc); the other station simply can not hear your packets (poor signal); or the other station is not working properly or it is off the air. [In that case, try to successfully exchange a standard packet before trying a TOR packet exchange or PING test.]

The other station can not respond to PING requests because its AGWPE configuration and/or its SV2AGW TOR adapter configuration is incorrect.
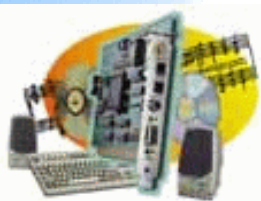
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Configuring Your Computer as a TOR Gateway

An Example
Gateway Configuration using Internet Connection Sharing
Alternative Configuration using a Proxy Server Program

A "gateway" TCP/IP over Radio (TOR) station is one that has access to the internet and is willing to relay internet data by radio to and from client stations who do not have access to the internet.

Using a Gateway: An Example

Let's assume SV2BBO (a client station) does not have access to the internet, but a nearby station, SV2DFK, does have dialup access to the internet and is willing to act as SV2BBO's internet gateway. The stations already know that they can exchange standard AX.25 packets by radio.

Both stations have also configured their computers to use the TCP/IP Over Radio (TOR) feature:

- **TOR adapter** installed and configured with their respective amateur radio network IP address **Note 1**
- **AGWPE configured for TOR**
- **Windows network tables** updated

In addition, SV2DFK (the gateway) has configured his Windows XP computer using the Gateway Configuration instructions below.

Now let us say that SV2BBO (the client) uses his browser, Internet Explorer 6.0, to request the TAPR web site's home page at http://www.tapr.org. Windows automatically forwards this HTTP request to the SV2AGW TOR adapter on SV2BBO's computer, which encodes the request in an AX.25 packet which is sent to SV2DFK.

At SV2DFK's station, the packet from SV2BBO is first goes to the SV2AGW TOR adapter, where the HTTP data request is extracted. The data is then routed to SV2DFK's dialup adapter which establishes a connection with SV2DFK's internet service provider and forwards the HTTP request to www.tapr.org. The requested HTTP data from www.tapr.org is returned first to SV2DFK and then to SV2BBO using the process in reverse. This same process could also be used for any other internet TCP/IP service (FTP, SMTP, POP, etc.).

Note that this process is automatic and requires no intervention from the gateway, SV2DFK, after he has setup TOR correctly.

Note 1: **IP address for each station in your TOR network.** If your network will be relatively simple and will not tie into other TCP/IP networks, you can pick your own IP addresses. Since Amateur Radio has been assigned the block of IP addresses beginning with "44.", you should begin your addresses that way (example: 44.1.1.1 and 44.1.1.2). If your network may be heard by or tie into other ham radio TCP/IP networks, you should instead obtain unique addresses from your local TCP/IP coordinator. This will prevent the routing problems that could develop when two or more stations use the same IP address.

Gateway Configuration Instructions

With TOR installed and configured, the gateway computer will have two network adapters:

1.) the SV2AGW TOR adapter for the radio network connection

2.) a network interface card (or dialup adapter) for the internet connection.

1. Configuring the SV2AGW TOR Adapter

The SV2AGW TOR adapter for a gateway computer should be configured as described in the TOR driver instructions, except the setting for your Default Gateway should be blank (no entry). To check or change it...

In Windows XP: use the Windows Control Panel to go to the Settings: Network Connections list. Click on the entry for the AGWPE TOR connection; it may be labeled Local Area Connection or Local Area Connection 2 (when you open it you should see "Connect using: SV2AGW TCPIP Over Radio NDIS Driver"). Click on the the Properties button and then click on Internet Protocol (TCP/IP). Remove any IP Address entry next to Default Gateway.

In Windows 98: use the Windows Control Panel to go to Network. On the Configuration tab's component list, highlight the TCP/IP-> entry for your network adapter and press the Properties button. Open the Gateway tab and remove any Installed Gateways.

2. Configuring Your Internet Connection Adapter

Assuming that your connection to your Internet Service Provider (ISP) has been working OK, don't make any changes in the settings for this adapter (network card or dialup) other than to enable Internet Connection Sharing (ICS).

In Windows XP: Open the network connection you use for internet service (either Dialup Connection or your network card/ Local Area Connection) and then press its Properties button. Open the Advanced tab (at the top) and then check the box for Internet Connection Sharing. If it is not there, start the Network Setup Wizard: click Start, point to Settings, click Control Panel, and then double-click Network Setup Wizard.

(Note: If you are not using a hardware or software firewall on your internet connection, you may also want to check the Internet Connection Firewall (ICF). ICF may do some good, but first try TOR without it. If TOR works OK, then try ICF.)

In Windows 98: Open Internet Explorer and from the menu select Tools:

Internet Options. At the bottom of the window, below the **LAN Settings** button, press the **Sharing** button.

If you do not see a **Sharing** button, then ICS is not installed. To install it:

- From the **Windows' Control Panel** open **Add/Remove Programs**. Select **Windows Settings** and then, from **Components List**, select **Internet Tools**. Press the **Details** button and make sure there is a checkmark next to **Internet Connection Sharing**. Press the **OK** button and then the **Apply** button. You will then be prompted to insert the Windows 98 CD-ROM. After ICS is installed, the **ICS Setup Wizard** runs automatically. Fill in the choices as in the paragraph below.
- In the **Internet Connection Sharing** window, select **Enable Internet Connection Sharing** and **Show Icon** (if you want)
- For **Connect to the Internet using**, select the **network interface card** that you use to connect to your ISP or **Dial-Up Adapter** if you connect by telephone.
- For **Connect to my home network using**, select the **SV2AGW TCP/IP adapter.**

Alternative To ICS: Use a Proxy Server Program in Windows 98/ME

If you can not get Windows' **Internet Connection Sharing** feature to work correctly in Win98/ME, use a proxy server program on the gateway. The proxy server will handle the data exchange between the TOR adapter and the dialup/network adapter. You should be able to find a shareware or freeware proxy server on the internet. SV2AGW has suggested HHPROXY, which is freeware. The proxy server program must be configured and running on the gateway computer when the client station wants access to the internet from the gateway.

1. Proxy Setup on the Gateway Computer

At the gateway station, the proxy server must be configured with the gateway's radio network IP address, a "port" to listen for requests from clients (example: 8080), and information about the gateway's internet access (dialup info or network card).

As an example, here's the key points in configuring the **HHPROXY** program (more info and examples are in the **HHPROXY** zip package; do a web search to find a download site):

1. Set the line Local Name to the radio network IP address of the station acting as the gateway station.

2. If you are using a dialup connection, use the examples to help you configure the line below for your setup:

Dial "T-Online" "" "" 0007777777770888888888#0001 ASK "" 180 194.25.2.129 3 30

If you are not using a dialup internet connection, put the word REM in front of that line.

3. Configure all other protocols as in the sample configuration file.

2. Proxy Setup on the Client Computer

The client station must now be configured to use the gateway station's proxy server. In the client's Internet Explorer 6.0, select Tools, then Internet Options, then select the Connections tab.

Then check Use a proxy server for your LAN and then enter the IP radio network address for the gateway station and the port number on the gateway station where the proxy server program can be accessed. (Ask the gateway ham for these numbers.)

Sample Internet Explorer 6.0 screen shot on the client workstation:
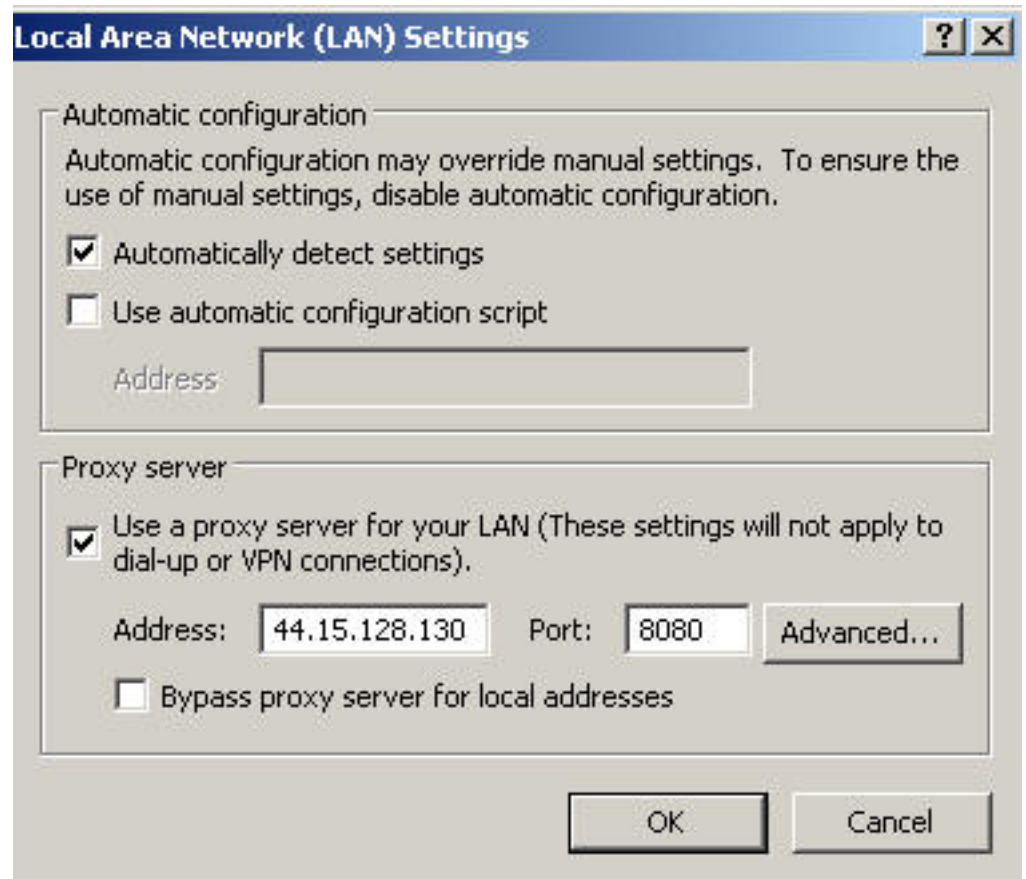
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Configuring Your Applications for TOR

Generally, you should not need to modify any settings in your TCP/IP applications (browser, email program, etc) if you have configured the Windows' IP ROUTE, HOSTS and ARP tables correctly and have successfully run a PING test to the distant station.

If you experienced problems with an application not using the correct network, i.e. radio network vs. internet, look for a solution in the entries in your Windows IP ROUTE, HOSTS and ARP tables.

For example, if you are trying to communicate with a mail server on the radio network, make sure that the email account setting in your email program either specifies the mail server's IP address (beginning with 44) or that there is an entry in the HOSTS table that translates the server's name, e.g. mail.SV2AGW.net, to an IP address, e.g. 44.0.0.6.

For all IP packets with addresses beginning with 44, Windows should send them to the SV2AGW TOR adapter. If if doesn't do that, then add a route in the IP Route Table linking the mail server's IP address, e.g. 44.0.0.6, with the SV2AGW TOR adapter, e.g. 44.0.0.2.

And finally make sure there is an ARP table entry that links the server's IP address, e.g. 44.0.0.6, with the server's correct packet callsign, e.g. SV2AGW-8. Without that entry, Windows will send a packet to "QST" asking for the station with that IP address to report back with its callsign.

If your use a gateway station and that station is running a proxy server program, then you may need to configure your internet programs for that. See the Gate Setup page for an example of how to do this in Internet Explorer.

See also Diagnosing Routing Problems

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Tips and Tricks

Selective Packet Routing: For some of the AGWsoft client programs, such as AGWTerm or AGWDXCluster, the callsign and SSID you use in the program will be noted by AGWPE. If you use different SSIDs in each program, then AGWPE can route packets to the proper program.

As an example, let's say that you are running a BBS program with a callsign of SV2AGW-1 and a DX Cluster program with a callsign of SV2AGW-12. AGWPE will know that packets to SV2AGW-1 must be directed to the BBS program and packets to SV2AGW-12 must be directed to the DX Cluster program. Neither program gets packets intended for the other.

Auto Start Applications: Use AGWPE's auto start feature to automatically load application programs or utilities as soon as AGWPE is finished loading. For example, if you mostly use UI-View with AGWPE, you could add UI-View as an auto start client. Then when you start AGWPE, UI-View will launch immediately, too. The auto start feature is found on the AGWPE menu under Startup Programs. Configure the StartUp Programs window to start the applications you want.

Alternate Languages: AGWPE has language support for many languages other than English (the default). The alternate language files were created by other AGWPE users and they are included in the AGWPE zip file, e.g. french.zip.

Note: Not all words in the menu and dialog box will translate. Also, if you want to create an alternate language file for your language, see the instructions in AGWPE's Help file (Help > Index> Multilingual Support).

To use an existing alternate language file:

1. In the AGWPE folder, unzip the language file of your choice, e.g. French.zip, into the AGWPE folder. The three unzipped files of importance that will appear are files ending in " .lng", ".hlp" and " .cnt" So if you unzip the French.zip file you will now see these new files: 1036.lng, agwpe_f.hlp, and agwpe_f.cnt (the first file has menu and dialog translations, the second is the translation of the AGWPE 'Help" file and the third is the help file's table of contents).

2. Open the agwpe.ini file in the AGWPE folder. You should see a language code number line, e.g.

   LANGUAGE=1033

This is the code for the default language you have selected in Windows (1032=Greek, 1003=English, 1044=Norwegian, etc.) and it is the .lng file AGWPE expects to find in the AGWPE folder. If it does not find that language code file, it uses English. (Note: you can not permanently edit the LANGUAGE line in the agwpe.ini.)

3. Rename the " .lng" file you unzipped, e.g. **1036.lng,** to match the language code specified in the **agwpe.ini** file. In our example, we would rename **1036.lng** to be **1033.lng.**

4. Rename the " .hlp" file you unzipped, e.g. agwpe_f.hlp, to **agwpe.hlp**

5. rename the " .cnt" file you unzipped, e.g. agwpe_f.cnt, to **agwpe.cnt**

The next time you restart AGWPE, it will use the replacement language files

Time Display: AGWPE can use either GMT or Local (Computer) time in reporting packets received. To change the time zone, you will need to edit the AGWPE.ini file: under the [TNC] section, add either **GMT=1** for the GMT time stamp or **GMT=0** (the default) for a local time stamp. If there is no entry, then it uses local time. Example of GMT time setting:

[TNC]
GMT=1

Different AGWPE Configurations: There may be times when you want to start AGWPE in a specific configuration, say for different TNCs or to auto start different programs. The easiest way to do this is to create duplicate AGWPE folders. Each folder will have the full program but different AGWPE configuration ".ini" files. Then use shortcuts that point to the AGWPE programs in the different folders. Use shortcut names that describe the configuration files, for example, "AGWPE PacLink" or "AGWPE ICOM 706" or "AGWPE Loopback".

Traffic Parameters: Note that AGWPE automatically monitors frequency traffic and can adjust TNC timing parameters to match that traffic level. You can override this feature from the **TNC parameters screen,** but generally it would be to your advantage to use this feature, since it relieves you of the chore of determining and implementing the best timing parameters.

Deciphering Packet Headers: If you really want to understand what is happening when you make a connection to another station, you need to be able to interpret the header information in the packets being exchanged. **AGWTerm and AGWMonitor** and other programs let you see them. The **Deciphering Packet Header page** on this website will help you interpret and understand them.

LoopBack port: For off-air testing of two programs, create a LoopBack port. For instance, you could run both AGWTerminal and WinPack and use the LoopBack port to "connect" WinPack to AGWTerm.

To create a LoopBack port: from the AGWPE menu, select **Properties**, then **New Port**. In the new port's **Properties for Portx** screen, select a **TNC Type** of **LoopBack Port**. Connect both of your applications to that same AGWPE radio port and they can communicate with each other without going on the air.

Example: Say your LoopBack port is radio port #3. Start AGWTerm and WinPack; make sure they are using different callsigns. Then, on WinPack's command line enter this connection request: "C 3 XXXX" , where 3 is the LoopBack port and XXXX is the callsign you are using in the AGWTerm program. The two programs should now be connected to each other via the LoopBack port.

Watchdog Timer: Most TNCs have a timer that prevents continuous transmission in the event of some TNC or software failure. Typically such a watchdog timer stops transmission that last more than 2 or 3 minutes. With AGWPE's sound card, you don't have such a timer, so here is a **page describing how to build a watchdog timer circuit** for your PTT cable.

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Last Updated: 09/28/2004

Sound Card Packet

Adjusting Traffic and Timing Parameters

On the **Properties** screen for each sound card radio port, there is a second tab entitled **TNC Commands**. Selecting that tab brings up a screen where you can edit various traffic flow parameters. By default, AGWPE automatically resets seven of the parameters every few minutes or, if you prefer, you can opt to manually set those seven parameters.
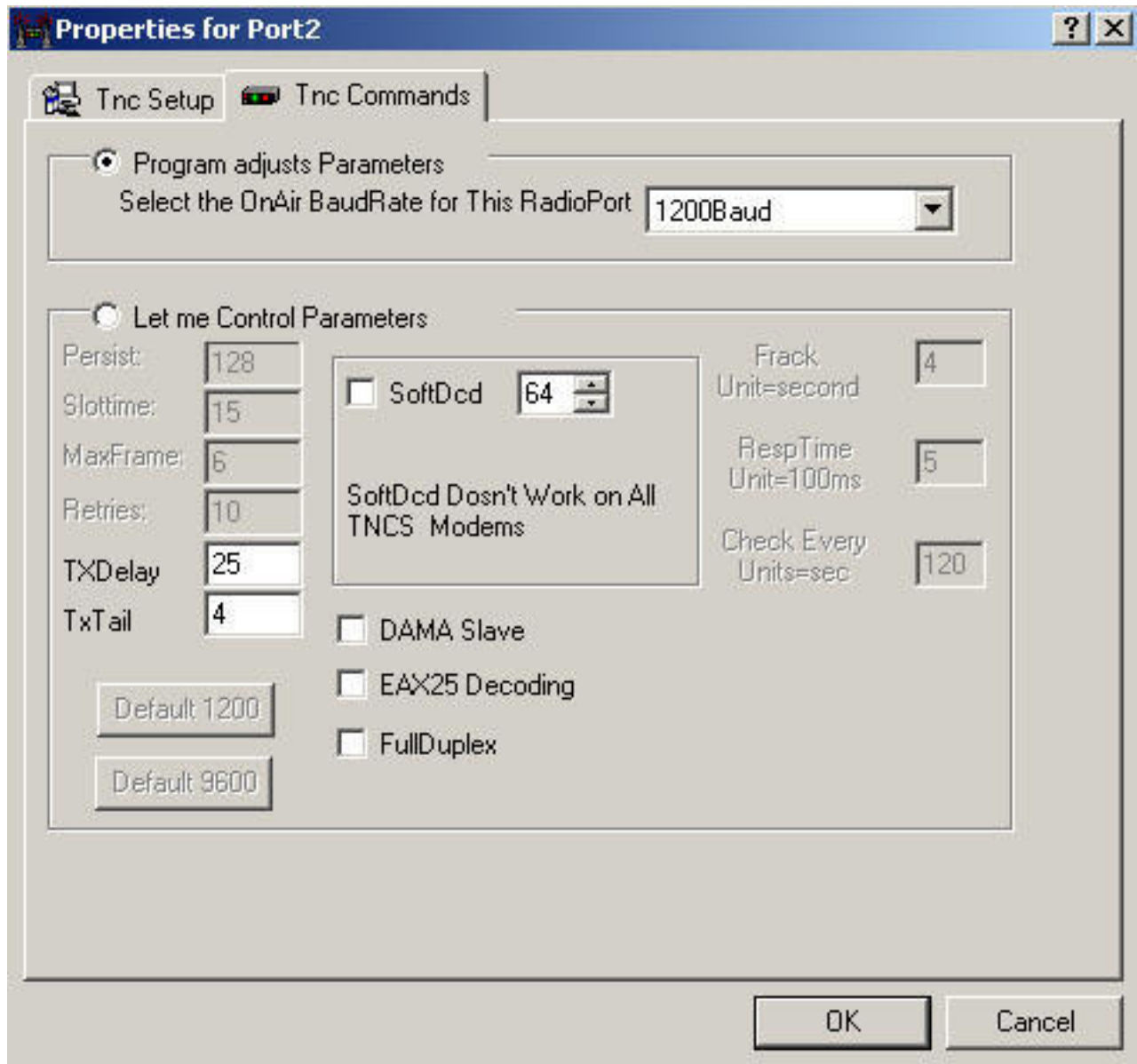
1. Program Adjusts Parameters

This default choice offers s a valuable feature: AGWPE monitors the packet traffic level and will automatically adjust all packet parameters every two minutes to match the traffic level AGWPE has detected.

> You can read more about how the program adjusts these parameters by reading the AGWPE **Help** file: from the AGWPE menu, select **Help** and then in the **Help Index**, chose **Self Adjust Parameters**.
>
> For example, AGWPE uses 8 traffic levels based on the number of packets AGWPE has heard in the last 2 minutes: "1" is little traffic and "8" is full channel capacity. The parameters associated with each level are embedded in the program, but you can override some or all of those values with additions to the AGWPE.INI file.

If you keep this default setting, seven of the parameters on this screen will be 'grayed-out' and inaccessible, as will the **Default 1200** and **Default 9600** buttons.

Note: The **'on air' baud rate** field is not used by the program.

Properties for Port2

Tnc Setup | **Tnc Commands**

○ **Program adjusts Parameters**
  Select the OnAir BaudRate for This RadioPort `1200Baud ▼`

○ Let me Control Parameters

Persist:	`128`
Slottime:	`15`
MaxFrame:	`6`
Retries:	`10`
TXDelay	`25`
TxTail	`4`

□ SoftDcd `64 ▲▼`

SoftDcd Dosn't Work on All TNCS Modems

Frack Unit=second `4`

RespTime Unit=100ms `5`

Check Every Units=sec `120`

□ DAMA Slave

□ EAX25 Decoding

□ FullDuplex

`Default 1200`

`Default 9600`

`OK` `Cancel`

The parameters you can always adjust are:

➕ **TXDelay - the time in 10ths of a millisecond between when the PTT circuit is activated and packet data is sent. This delay gives your radio's transmitter time to come up to full power and gives the receiving radio time to switch from 'transmit' to 'receive'. A minimum delay increases traffic flow, but too little delay may result in the loss of the beginning of the packet and thus retries and decreased traffic flow. The default is 35 for 1200 baud; 20 for 9600 baud. Older radios may need a bit more; newer radios may need 15 or less.**

➕ **TXTail - the time in 10ths of milliseconds between the end of packet data and the closing of the PTT circuit. Only needed on some modems. Can be set to zero for most TNCs. Default is 4.**

Soft DCD - DCD is Data Carrier Detect. Some TNCs/modems must rely entirely on the radio's squelch to sense when there is a carrier/packet on the air (hardware DCD). If your radio does this, leave this unchecked. Other TNCs have software logic to detect when there is a carrier/packet in the noise, so you can leave the radio squelch open (software DCD). In fact, many TNCs are designed to run open squelch and use soft DCD automatically. Still other TNCs/modems let you choose which method to use. Check mark this box this if you want software DCD. The relative signal-to-noise threshold amount to the right can be changed. The default is 64.

DAMA Slave - check this if you are working with DAMA stations. It will put the port in DAMA mode when it detects that the station you have connected to is a DAMA node or BBS (DAMA Master). DAMA is common only in Germany/Europe. DAMA replaces SlotTime and Persist timing.

EAX25 Decoding - if there another station is operating in EAX25 mode, then checking this box will allow you to monitor its traffic correctly. EAx25 is not a standard protocol and many stations don't support it. Incorrectly activating EAX25 decoding could result in problems.

Full Duplex - default is OFF, which means AGWPE uses the DCD signal to determine when the frequency is clear and when to acknowledge packets. When turned ON, AGWPE ignores the DCD signal and sends acknowledgements immediately; may be useful in split frequency operations such as through satellites or when doing loop-back tests, but only if both stations are operating full duplex.

Note: This field does not control the Full/Half Duplex setting of the sound card. That setting is made on the **Sound Card Setup screen**

Note: **PacLen,** the number of characters to place in each packet, is determined by your application program, not AGWPE. AGWPE can sent up to 255 characters per packet. If traffic is light (collision risk is low), you can send more characters per packet and exchanges will be quicker. If traffic is heavy, use less characters per packet because shorter packets will have a better chance of getting through without collision. This means the need for retries will be less and exchanges will be quicker in heavy traffic situations.

2. Let me adjust Parameters

This choice lets you change seven additional parameters: **Persist, SlotTime, MaxFrame, Retries, Frack, RespTime, and Check Every** (see **Parameters** information below). In addition, the **Default 1200** and **Default 9600** buttons become active.

You should only make this choice if the program is not handling the timing parameters to your satisfaction and you understand channel traffic and the affect of each parameter. Remember that AGWPE can adjust the parameters automatically as traffic levels change, something that would be difficult to do manually.

The screen will look like this (default values for all fields are shown) :
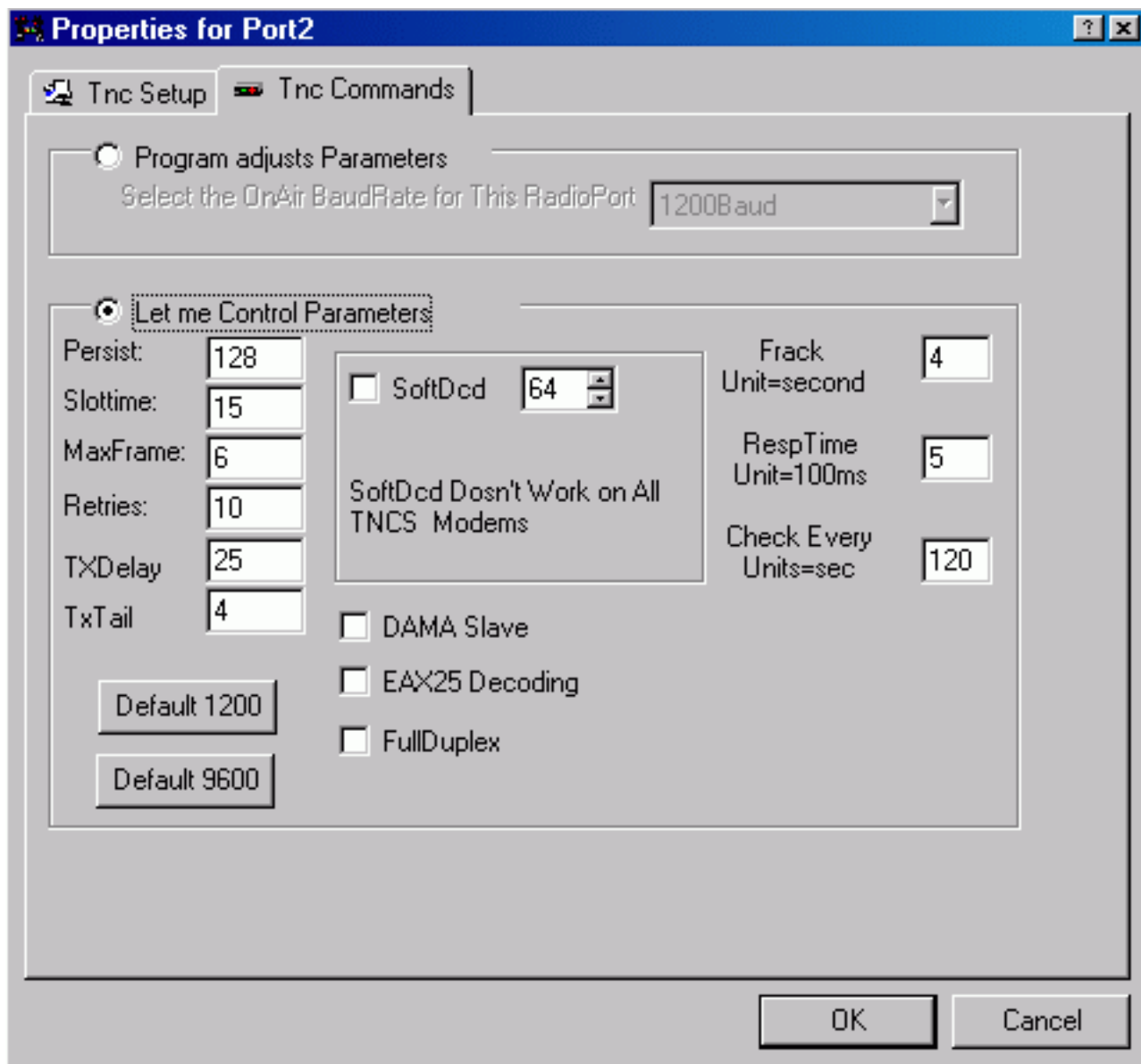
Here is more information about each of the parameters you can set only if you select "Let me Control Parameters":

- **Persist -** works with the SlotTime parameter to determine the frequency of transmissions. SlotTime sets the time between slots (transmission opportunities). Persist sets the odds (the number of times in 255) that AGWPE will actually transmit when a slot come up. Use lower Persist numbers during heavy traffic (so AGWPE misses some turns and lets other stations transmit). Try higher numbers if traffic is light (AGWPE will transmit at most slots). Persist can be from 1 to 255. Default is 128 (50%) for 1200 baud; 190 (75%) for 9600 baud.

- **SlotTime -** works with the Persist parameter to determine the frequency of transmissions. After detecting a clear channel, the SlotTime is the time in 10 milliseconds that AGWPE waits for the next slot (transmission opportunity). The Persist parameter sets the odds that a transmission will actually be made at that slot. Default is 10 for 1200 baud; 5 for 9600 baud.

MaxFrame: the number of packets (frames) of unacknowledged packets that can be outstanding at one time. When MaxFrame is reached, AGWPE will stop sending packets and wait for an acknowledgement from the other station that ALL packets were received. If traffic is light, use a higher MaxFrame -- packets will get through more quickly. If traffic is heavy, use a lower value. Otherwise, a lost frame will result in a request from the receiving station to re-send ALL frames after the lost frame. This adds traffic to the channel. The maximum MaxFrame value is 7.

Retries: if a packet is not acknowledged by the receiving station, AGWPE will re-send the packet up to the maximum number specified by Retries. After that, the connection with the other station is assumed to be broken and it is closed. Default is 10 for 1200 baud; 15 for 9600 baud.

Frack: increment to wait for an acknowledgement from the other station before re-sending the packet. Allow more time if you have more VIA stations in your packet address path. Default is 10 for 1200 baud; 8 for 9600 baud.

RespTime: the minimum delay to wait after a clear channel before sending an acknowledgement packet. This delay helps ensure all the sending station's frames have been sent. Increments of 100 milliseconds. Default is 5 for 1200 baud; 3 for 9600 baud. Increase this if your ACK packets may be colliding with the other station's last info packets.

Check Every: the amount of time to wait after hearing nothing from a 'connected' station before sending a 'check' ("are you still there?") frame. Default is 180 (3 minutes) for 1200 baud; 120 (2 minutes) for 9600 baud.

Default 1200 Button - will set all the parameters to AGWPE's default settings for 1200 baud 'on air' packet.

Default 9600 Button - will set all the parameters to AGWPE's default settings for 9600 baud 'on air' packet.

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Last Updated:
09/24/2004

Sound Card Packet

Deciphering Packet Headers

AGWPE follows the AX.25 protocol that is the standard for ham radio packet, however, AGWPE does not use the standard TNC2 packet frame display status protocol, but a more comprehensive custom protocol developed by George SV2AGW.

If your terminal program (e.g. AGWterm) is set to display packet frame headers, you will see these status indicators and can follow what AGWPE is doing and how it is interacting with another station. This can sometimes be helpful in diagnosing connection problems.

Listed below are the explanations for each type of packet frame header.

Note that within the packets, there may be these additional indicators:

PID is the "protocol identifier". PID=F0 means the frame contains text "F0". If the frame contained TCP/IP data, the ID would be "CC". Other identifiers are used for NET/ROM , Flexnet, Apple Talk, etc.

P and F mean Poll and Final. The P and F "bits" are used to indicate when a reply or ack (acknowledgement) is desired. For example, when the sending station includes a P bit in the packet header, it means "respond immediately to this packet". If the P bit is missing, the destination station will wait for additional packets until one appears with the P bit and then acknowledge all of the packets at once. The sending station controls how many packets AGWPE will send without a P bit by setting the MAXframe parameter. For example, if MAXFrame is set to 5, four (4) packets will be sent without the P bit and the fifth will contain the P bit. The destination station will respond to the fifth packet with an ack that includes the F bit to indicate the last number of the packet frame sequence which is received.

Note that all packets frames sent are identified by number, the first number being 0 (zero) and the last being 7. After 7, the numbering sequence restarts at 0 (zero). The numbering system is used to track packets, so that each station knows can compare how many packets were sent to it and how many it has received. If a packet is missing, the station will request a re-transmission of numbered packets.

Examples of packet frame headers:

<UI pid=F0 Len=32> - an unconnected frame (e.g. beacon) sent to no station in particular but to everyone, i.e. . The PID is "F0" since it contains simple ASCII text. (UI frames are used in APRS.) Len=32 means the packet contains 32 characters.

<SABM P> - a request from station A to station B for a connection. The P bit is used to request an immediate reply. (Set Asynchronous Balanced Mode)

<UA F > - the reply from station B to station A accepting the connection request. It is also used to accept a disconnection <DISC> request. The F is used to tell station A that all packets were received successfully. (If station B could not accept the request, it would send a **DM** frame; see below.)

<DISC P> - a request from either station to disconnect from the other.

<DM F > - a refusal to accept the original connection request, perhaps because another connection in in progress.

<I P R3 S0 pid=F0 Len=28 > - this in an information (**I**) packet contain data (text, etc). The **P** requests an immediate acknowledgment. If the **P** were absent, then the receiving station would delay its acknowledgement until it received a frame with a **P** in it. **R3** indicates that the station last received the other station's packet #2 and is ready to receive #3. **S0** indicates that this packet being sent is # 0 (zero). **Len=28** means the packet contains 28 characters.

<RR P/F R1 > - this is a "ready to receive' (RR) packet simply acknowledging receipt of packet #0 and ready to receiver #1.

<REJ P/F R1 > - this is reject (**REJ**) packet meaning that the packet just received was out of sequence or a duplicate; ready to receive packet #1 instead.

 [The REJ can also be sent by a TNC to indicate its buffer is full and it is not ready to receive (NRN)]. Also, some AX.25 implementations (e.g. BPQ -DOS node) use a REJ packet instead of P, i.e. immediately after the last packet in a sequence (maxframe) is sent a REJ also sent to force an acknowledgement by the receiving station.

Another frame that is rarely seen is a FRMR (Frame Reject). It would be sent if the packet received had an invalid control field, an illegal data field, a data field that was too long, or other problem. In general, you will not see such a frame unless you are writing your own AX.25 code and testing it.

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Last Updated: 09/28/2004

Watch Dog Timer Circuit

Date: Sun, 17 Nov 2002 21:36:14 +0000
From: Roger Barker G4IDE (now SK)
Subject: Re: UI-View and AGWPE

Someone asked
>I certainly would not leave a packet system unattended if it used a PTT
>arrangement that did not include a hardware watchdog timer - it's asking
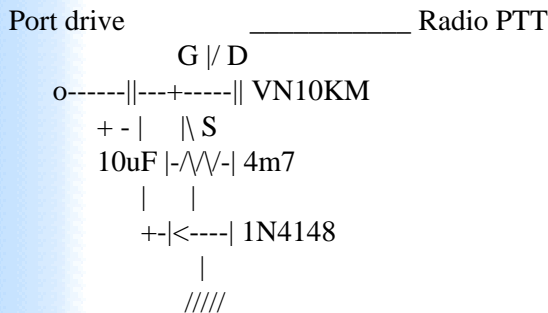>for trouble.
>
>Anyone got a circuit for a watchdog timer which I can build to use with my
>soundcard, please?

G8AMG,- one of the great UK packet "gurus", once sent the circuit below in
a packet bulletin.

Disclaimer - I have never tried it.

***** Paraphrasing G8AMG *****

Might I suggest that this device be a MOSFET, such as a VN10KM. These can be
driven by a capacitor and, using a high gate resistor to ground, will prevent
the MOSFET from staying switched on and screwing the channel AND your radio.

```
     Port drive              _____ Radio PTT
                    G |/ D
      o------||---+-----|| VN10KM
            + - |    |\ S
          10uF |-/\/\/-| 4m7
              |    |
            +-|<----| 1N4148
                  |
                /////
```

When the Port drive line (TTL) goes high, the uncharged capacitor presents 5V to
the MOSFET, which turns ON. However as the capacitor charges via the
4m7 resistor, the voltage on the gate reduces until the MOSFET turns off.
This is not a fast change, so the PTT circuit needs to be capable of
working with this slow switch-off. A logic gate (most radios today) or a
relay (older radios) both work.

The timing of the above is between 30 &40 seconds, quite long enough for
ANY packet (even IP). I use 2m2 and 4.7uF on a 9600 packet link. This is
probably good enough for 1200, too.

Regular operation is allowed for by the diode which allows the capacitor to
discharge quickly once the port drive is removed. This does however mean
that the port drive needs to be TTL- compatible, in order to present a l
ow resistance ZERO state to ground. If you are concerned about damage to
the port drive line, then include a 220 Ohm resister in series with the port line.

Ideas gleaned from the 9600 tips &tricks list published by me in 1994.

****

Sound Card Packet

AGWPE-compatible Programs

The chart below shows some of the programs and utilities that will work with AGWPE. In addition, the AGWPE site has information about a few other programs. Click on the "Yes" next to a program for additional help on this web site. Otherwise, visit the program's web site listed in the last column.
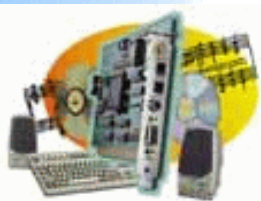
If you're having trouble getting a particular application to work with AGWPE, first make sure AGWPE works with AGW Terminal Program. If AGWTerm won't work with AGWPE, then you have a problem with AGWPE that needs to be resolved first; see the troubleshooting guide.

Type	Name	Help on this site?	Program Web Site
AGWPE Utilities	**AXIP** - link AGW Packet Engines or other apps together via TCP/IP	**No**	**http://www.qsl.net/lu7did/** **http://www.qsl.net/lu7did/bin/axipdrv/axipdrv.txt**
	KISS-Mode TNC Emulator - interface WiSP, JNOS or other KISS-mode programs and MixW to AGWPE	**No**	**http://members.surfbest.net/kb9vqf@surfbest.net/**
	TelMgr - access AGWPE via a Telnet connection	**No**	**http://www.qsl.net/lu7did/telmgr.htm**
	XGlue - interface AGWPE to PC/Flexnet32 and thus to programs that work with Flexnet	**No**	**http://www.qsl.net/lu7did/xglue.htm**
APRS	**AGWTracker**	**No**	**Info: http://www.raag.org/sv2agw/tracker.htm** **Download: http://www.raag.org/sv2agw/inst.htm**
	APRSPoint	**No**	**http://www.aprspoint.com**

	APRSPlus	**Yes**	
	OziAPRS; netAPRS	No	http://www.radio-active.net.au/web/gpsaprs/oziaprs.html
	UI-View32	**Yes**	
	WinAPRS	**Yes**	
	XASTIR	**Yes**	
BBS / PMS	**AIZBBS 7.10**	No	http://www.spiros.gr/download.htm
	HamServ 2.65 a multi mode BBS/PMS	No	http://www.gb7abc.net/hamserv.html
Digipeater	**AGWUIDigi**	No	Download: http://www.raag.org/sv2agw/agwuidigi.zip
	Digiplex	No	http://www.qsl.net/lu7did/digiplex.htm
DX Cluster	**AGWCluster**	No	Info: http://www.raag.org/sv2agw/agwclust.htm Download: http://www.raag.org/sv2agw/agwclust.zip
	RXClus	No	http://rchalmas.users.ch/rxclus/index.html
	IZ4AFW AGW Packet Engine Telnet Interface - DX Cluster support for Logger program		http://www.qsl.net/iz4afw/english/sub-index.html
	UI-DX Bridge - Receive or relay internet DXCluster info on APRS	No	http://www.apritch.myby.co.uk/uidx.htm
Satellite	**PCSAT Telemetry Decoder**	No	http://www.ui-view.com/
	UISS - sends UI / APRS packets to satellite digipeaters	No	http://users.skynet.be/on1dht/uiss.htm

Signal Path Predictions (VHF/UHF)	**Radio Mobile Deluxe -** plots APRS stations on topographical map	**Yes**	
Terminal Programs	**AGWTerm**	**Yes**	
	AGWMonitor - Receive only	**Yes**	
	HamScope	**Yes**	
	NBF	**No**	**http://www.hut.fi/~jtuomi/nbf_index.html**
	WinPack	**Yes**	
	WinSTOP	**no**	**http://www.winstop.de/en/winstopinfo.html**
	WinTNC	**no**	**http://www.g7jjf.demon.co.uk/wintnc11.htm**
TNC Emulation	**MixW -** also has sound card modem that AGWPE can access; good HF packet mdoem	**Yes**	
Winlink Utilities	**TelPac; PackLink -** access WinLink system with packet	**No**	**http://winlink.org/Emergency.htm**

Last Updated: 09/29/2004

Sound Card Packet

AGWPE's Suite of Companion Programs

George, SV2AGW, the AGWPE author, has written several packet programs that will work with AGWPE. You can download them from **http://www.raag.org/sv2agw/inst.htm** or **http://www.elcom.gr/sv2agw/inst.htm**

These programs are perfect for testing or troubleshooting AGWPE, since they are practically guaranteed to work with AGWPE. Other than entering your personal info (e.g. callsign, etc), you don't need to make any special setting to interface with AGWPE. They should work 'as is' with AGWPE.

AGW MONITOR - a program that simply displays incoming packets; it doesn't transmit. (link to download it). Note: Sometimes AGW Monitor freezes on startup. Use the Alt-Ctrl-Del key combo once to call up the Close Program window to close it. Then try to start it again. It usually starts on the second try.

Hint 1: Even though this program doesn't transmit, it helps to enter your call sign. If you do, any packets with your call sign will be displayed in red! That includes packets from any of your stations with a different SSID, any digipeated packets, etc.

Hint 2: Increase the font size at the Tool Bar or Fonts menu.

AGW TERMINAL- is a terminal program you can use to receive and send packets. It lets you "connect" to other stations, including a bulletin board (BBS). This is a good program for troubleshooting and testing AGWPE problems since it both receives and transmits.

Note: There are two versions of AGWTerm. The older version uses the Windows' DDE link to programs. The newer, better version uses the TCP/IP Interface to AGWPE and can be run over a network, where the older version can't. The newer program is called AGWTermTCP (link to download it) .

You can also configure AGWTerm (TCP/IP verson) to connect to an instance of AGWPE running on a different computer on your home network or any where on the internet. See the AGWPE Over a Network page.

AGW CLUSTERS - a program that collects and organizes incoming DX spots from a DX Packet Cluster frequency. (link to download it)

AGW UIDIGI - one of the logic functions in a TNC is the ability to act as digipeater, i.e. relay packets for other stations. This function is lost when AGWPE works with a TNC because AGWPE puts the TNC in KISS mode, turning off the TNC's digipeater funcion. By running the AGWDigi program, you can provide a digipeater function to your station while running other packet programs. In fact, AGWDigi has additional "smart" digipeating functions which are not found on most TNCs. (link to download it)

Problems:

AGWTerm Closes Unexpectedly

I had just made a connection with another station when AGWTerm suddenly closed and I got this error message: *AGWTERM caused an invalid page fault in module WINMM.DLL*

You probably have a Windows sound scheme in effect. When you connected to the other station, Windows played the DING.WAV file. To prevent this from happening, set the Windows' Sound scheme to No Sounds. See the Window Sound Settings page on this site for further advice.

I am trying to run AGWTerm and I keep getting a "GDI File Read Failure". It also happens when I try to run AGWBBS and AGWFWD.

All of these programs need a corresponding *.SYS file in the directory. For example, to run AGWTerm.exe, you must have the AGWTRM.sys file (not AGWTerm.sys) in the same directory. For AGWBBS and AGWFWD you need the agwbbs.sys file. The *.sys file is included with the main program file in the program's *.zip file. If necessary, you can re-download the zip file at http://www.elcom.gr/sv2agw/inst.htm .

I've got AGWPE running and I can view the received packets using agwmon and AGWTERM, but I can't get AGWTERM to connect to anything. It acts like it's going to connect but the radio never transmits a packet. However, it *does* transmit a packet when I hit the "Ask QRA" button in the toolbar of AGWTERM.

There was a problem in some older versions of AGWPE. Make sure you are running the latest version of AGWPE to fix the problem.

I can't enter a long PATH in AGWTermTCP.

This is program bug. Long PATH setting can't be entered on screen and are altered. Same is true if you enter path in .*.ini file. For example, APRS,WIDE,WIDE goes out as "To APRS-9" according to AGWTermTCP.

I'm seeing two report of every packet in AGWTerm; one preceded by a 1: and one by a 2:.

You have AGWPE set for Dual Port mode. Change it to Single Port and delete the appropriate port.ini file; for example, if it's port 2 that you want to delete, delete port1.ini (in other words, a number one less than the port number).

My AGWTerm has been working fine, but for some reason now when I click Properties, I get "agwterminal.exe has generated errors and will be closed by windows. I have reloaded it and it does the same thing!

Delete the agwterm.ini file, then restart and reconfigure AGWTerm

Return to the "Compatible Programs" page

Sound Card Packet

APRSplus and KipSSPE with AGWPE

APRSplus is another Windows-based program for receiving and plotting APRS position packets. It was written by Brent Hildebrand, KH2Z, and works in combination with Delorme's **Street Atlas** program (or **Map 'N Go**). APRSplus handles the APRS packet management and then generates icons that are placed on the Street Atlas maps.

Note: APRSplus only works with Street Atlas versions 4 through 9. It will not work with the Road Warrior Edition and Deluxe versions, including SA-2003 and SA-2004.

To make APRSplus work with AGWPE you also need Brent's free program, KipSSPE, which will link the two programs using their respective TCP/IP interfaces. **Note that KipSSPE only works with a registered version of APRSplus !** So, you'll need to send Brent the registration fee to get a registration code (info in APRSplus files) if you want to use APRSplus with AGWPE.

Stephen Smith, WA8LMF, gets all the credit for working out all the instructions below for running APRSplus with AGWPE.

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Configure APRSplus
Getting it All to Work
Settings for 2 Radios
Automating the Startup Process
Troubleshooting APRSplus-specific problems

Setting Up APRSplus and KIPSSPE to work with AGWPE

No changes are needed in your **cables**, **windows setup**, and **AGWPE program settings**. They are the same as for other applications.

1. Install and configure **Delorme Street Atlas** and verify that it works normally.

2. Download and install APRSplus and KipSSPE:

APRSplus files can be found at the TAPR site: **ftp://www.tapr.org/aprssig/winstuff/aprsplus/**

The main APRSplus installation file usually has a name like APRSPLUS2xx.zip.

 APRSplus documentation

From the same TAPR directory also **download KipSSPE** (don't confuse it with the similarly named KipSS.zip.) KipSSPE is a middleware program that connects the TCP/IP interface of the AGW Packet Engine to the TCP/IP interface of APRSplus. In effect, KipSSPE makes APRSplus "think" it is receiving data from from a TNC instead of a TCP/IP source or LAN. (APRSplus can do this in addition to connections from a "real" hardware TNC and/or Internet connections. Part of APRSplus' confusing complexity is it's incredible versatility!)

Unzip **both** zip files into the same directory on your computer. After you do that, run the **Setup.exe** program in the directory to initialize and install APRSplus.
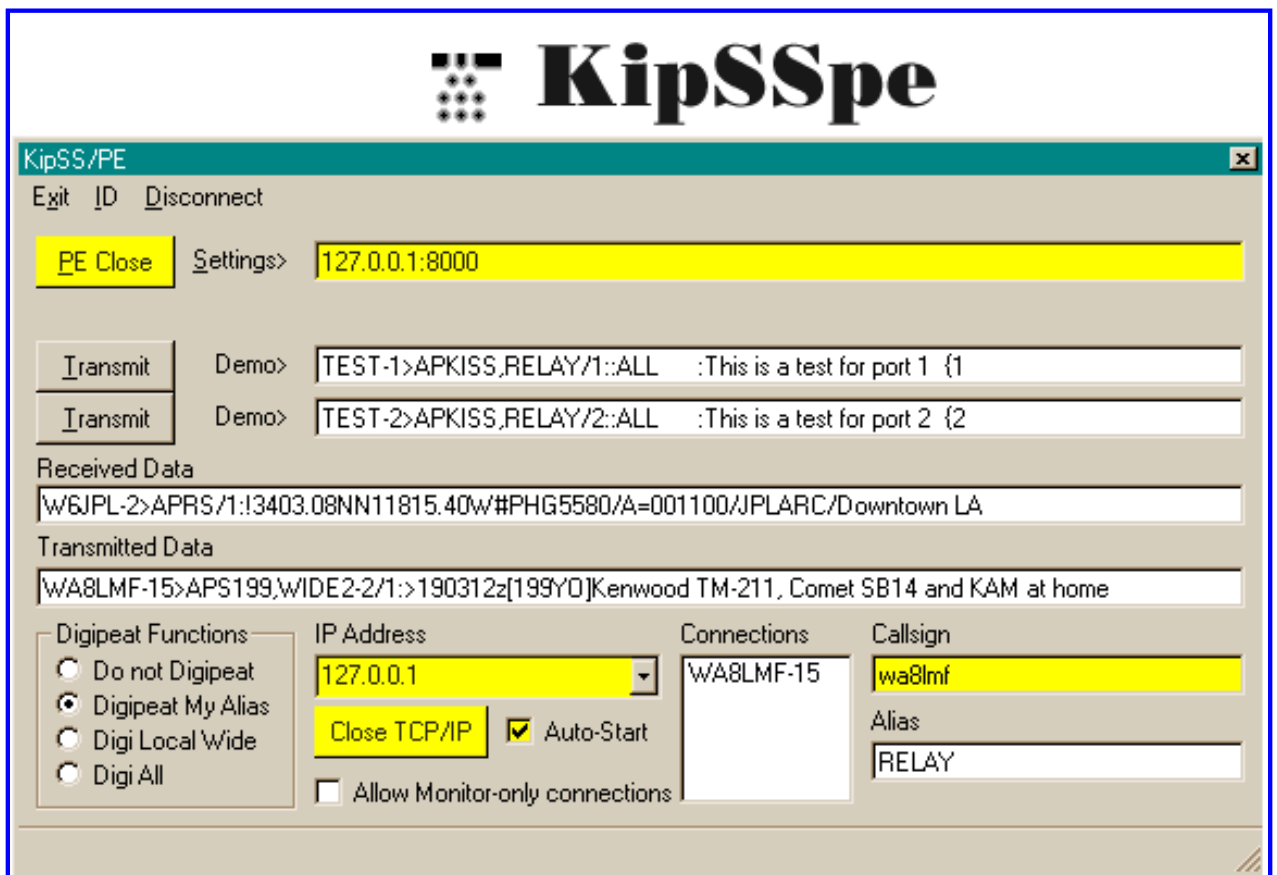
3. Configure KipSSPE

For future convenience, first create a Windows shortcut to **KipSSPE.exe** on your desktop.

Start AGWPE.

Now start KipSSPE. A dialogue window will open that looks similar to this:

Don't worry about the values in most of the fields. Just make the following changes:

- At the bottom of the window, for the IP Address choose 127.0.0.1.
- (If you have a network address, you could perhaps also use that. Just make sure the address you enter in this field is same the address you enter in APRSplus (below).)
- Insert your callsign into the Callsign box in the lower right corner.
- Check the box for Auto-Start to open the TCP/IP connection to AGWPE automatically whenever KipSSPE starts.
- Now click on the Open TCP/IP button below the IP Address box.
- Then, at the top of the window, click on the Open button to the left of Settings>.

   After you press the buttons, they should say Close TCP/IP and PE Close, respectively, as in the picture above.

Is it working? At this point, you should be able to see packet data appearing in KipSSPE's Received Data window whenever you hear packets bursts from the radio's speaker or see the radio's BUSY indicator/"S" meter light up or see the little green pixel in the AGWPE modem icon ▰▰▰ in the System Tray.

Likewise, you can test transmitting by pressing one of the Transmit buttons and checking to see if your radio transmits. The info in the Demo> field should be duplicated in the Transmitted Data field and your radio should transmit.

 KipSSPE Program Notes: As you'll learn, the labels on the KipSSPE button tops do not indicate current status, but instead show what the setting will change to when clicked, so PE Close on the button means it is currently in the PE Open state and clicking on the button will close it.

Also note that some of the Windows controls for KipSSPE program do not follow convention. For example, clicking the ✖ button in the upper right corner of the window does not shut down the program. It only minimizes it into the system tray where the KipSSPE icon ("KISS" in Morse

code) ⠊⠊⠊ will appear. This is how you will probably want to run the program -- with the dialogue window closed and only the program icon

showing in the system tray. To recall the KipSSPE dialogue window, just click on the system tray icon ⠊⠊⠊ .

To truly shut down the program, use the menu bar and select Exit. When you exit, all your settings will be saved, although if you did not check the "auto start" checkbox, the next time you start KipSSPE you will have to press both buttons.

4. Configure APRSplus

Remember: You must obtain a registration number for APRSplus from Brent, KH2Z, before you can run APRSplus with KipSSPE and AGWPE.

There are multitudes of setting screens and options in APRSplus, so I can't tell you how to configure APRSplus entirely on this page (see instead the unofficial APRSplus documentation web site). But here are the key settings for working with KipSSPE and AGWPE:.

A. From the menu bar **at the top of the main APRSplus screen, click on** Setup **. Make sure that the following settings are entered:**

B. On the Main Parameters **tab, insert a** callsign, **your** registration number **(include the dashes between numbers), and your latitude and longitude.**

C. On the Program **tab, check mark the** version **of Street Atlas you are using. If you don't, APRSplus won't be able to start Street Atlas automatically.**

✚   **On the** Internet **tab, the items in the bottom** Interlink **section should look like the following:**

(If your PC has an IP address assigned to it by networking software or a cable modem or DSL, if may have a different IP address to the right of the Link-1 **and** UDP-Open **buttons. If so, that's OK; leave them as they are.)**

✚   **Check the** ⊗ **Open KiSS on startup** if **you want APRSplus to automatically open a connection to KipSSPE when it starts. (Alternatively, you can leave it** ○ **unchecked and start the connection manually in APRSplus by using the** Commands **menu option and selecting** KipSS Connect**.)**

✚   **In the field to the right of the** KipSS-Open (Close) **button, enter** 127.0.0.1:7301 **(or the IP address you may have entered in the KipSSPE field for** IP Address**).**

✚   **Leave "as is" the values to the right of the** Link-1,- 2,-3 and UDP-Open (Close) **buttons. They are not important for KipSSPE connections.**

✚   **Save your setting by using the** File: Save **(or** Save As**) option in this window to save your** Setup.reg **file in APRSplus'** Data **folder.**

✚   **Now click on the** KipSS **button until it says** KipSS-Close**. This will open the link to KipSSPE.**

Program Notes: As with KipSSPE, the labels on the button tops are not **"current status" indicators. Instead, the button shows what the setting** will change to **when the button is clicked; so when it says** KipSS-Close **on the button, it is currently in the** KipSS-

Open state and will close if you click on it.

+ You can also configure APRSplus to connect to an instance of AGWPE running on a different computer on your home network or any where on the internet. See the AGWPE Over a Network page.

5. Getting it All to Work

To make it all work, first start the AGW Packet Engine, then KipSSPE, and then APRSplus. After the three programs have started, you should see 4

icons in the **system tray** at the bottom of your screen: 🐴🔌⣿▽ 4:11 PM

The icon with two towers and the icon of a TNC are created by AGW. The icon showing a stack of dits and dahs (Morse code for KISS) is created by KipSSPE. The inverted triangle is created by APRSplus.

Now, in APRSplus, choose **Commands** and then select **Start Street Atlas** to start Street Atlas. (You can also right click on the APRSplus system tray icon to call up the **Commands** menu.)

If you did not select the "auto start KipSS" function, use the **Commands** menu (Alt+C) to select **KipSS Connect**.

If your radio is on, the cables are attached, and the Volume Control settings are correct, you should start to see station icons in the APRSplus **Positions** window and then eventually in Street Atlas (depends on what timing interval you chose for writing the APRSplus overlay file to Street Atlas; see the **Maps** tab and the second field to the right of the **1- All Reports** field).

6. Settings for 2 Radios

Use the **Commands: Unproto Paths** menu option (or Ctrl + Shift + U) to call up a list of UI paths. By default the TCP port for all path choices is set to 1, i.e. AGWPE port 1/radio 1. To use AGWPE port 2/radio 2, pick an unused line and change the TCP port to 2; you can also edit the path to one of of your choice.

Now press the **Set** button to the right of the path and port you want to use. <mark>That line will then be highlighted in yellow to indicate it is the active path/port</mark>. Press the **OK** button.
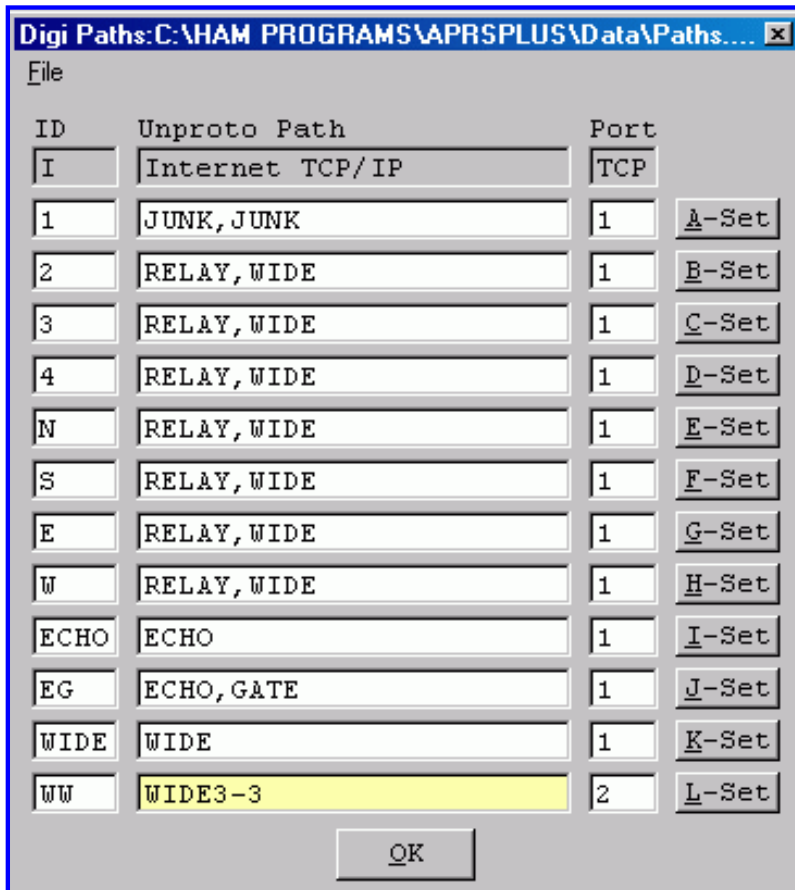
7. Automate the Entire Startup Process via AGWPE

Want to get the AGWPE program to automatically start KipSSPE and then APRSplus when AGWPE finishes loading? Here's how:

Locate the file **AGWPE.INI** in the AGWPE program directory.

Open the file in the Windows **Notepad** or any other ASCII editor and add the following paragraph to the bottom of the file:

> **[RUNPRG]**
> **RUN0=C:\APRSplus\KipssPE.EXE**
> **CMD0=0**
> **RUN1=C:\APRSplus\APRSPLUS.EXE**
> **CMD1=0**

Note: Be sure to edit the file paths in the paragraph to match the drive and directory where you have installed the KiPSSPE and APRSplus programs.

Then save the file and close the editor. This automated process will begin the next time you start AGWPE.

8. Troubleshooting APRSplus specific problems:

➕ **To see if AGWPE and KipSSPE are working together**, start AGWPE and then KipSSPE (without starting APRSplus). Assuming that **AGWPE** is working correctly and receiving packets, you should see packet data appearing in KipSSPE's **Received Data** window whenever you hear packets bursts from the radio's speaker or see the radio's BUSY indicator or "S" meter light up or see the little green pixel light up in the AGWPE icon 🔲 in the System Tray.

➕ **To see if APRSplus and KipSSPE are working together,** transmit your status or position from APRSplus. Use the APRSplus **Send** menu option or **Ctrl-P** or **Ctrl-S.** Your position or status packet should then appear in the **Transmitted Data** field in **KipSSPE.** (If they don't, go to the "transmit" troubleshooting hint below.)

➕ **To see if APRSplus and Street Atlas are working together,** temporarily use either an internet connection or TNC instead of AGWPE to receive packets and display them in Street Atlas. (If you can't do that, at the very least your own icon and position should display in Street Atlas.)

➕ Note that Windows **Systems Resources** are an issue for Win95/98/ME users running APRSplus. If your system resources get too low (below 25%?), you may encounter unexpected errors in APRSplus and your **Setup** values may become corrupted. You can check your current **System Resource** level by going to the Window's **Control Panel** and selecting **System** and then the **Performance** tab.

➕ **Problem: I can't Transmit from APRSplus. I tell APRSplus to send a packet and I can see that the packet made it to the "Transmitted Data" field in KipSSPE, but the radio doesn't key up even though KipSSPE is sending and receiving data from AGWPE and AGWPE will successfully transmit data from other programs.**

Solution: The port settings for the Unproto Paths in APRSplus is wrong. It may be set to **0** or it may be set to an AGWPE port that is attached to a different radio. Pick a different UI path or change the path's port number:

In APRSplus, use the **Commands: Unproto Paths** menu option (or Ctrl+Shift+U) to call up a list of UI paths. Press the **Set** button to the right of a suitable path which uses the AGWPE port and radio that you want to use; or edit an existing entry to create a path of your choice and the AGWPE port of your choice and then press the **Set** button.

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Last Updated: 09/24/2004

Sound Card Packet

HamScope and AGWPE

HamScope is a digital communications interface that supports many modes including PSK31, RTTY, MFSK16 and packet (both HF and VHF). To run packet, HamScope 'connects' to an AGWPE 'port'. AGWPE does all the communication with the sound card or TNC for HamScope. HamScope is simply the terminal program that lets you "see" what is being received and transmitted.

HamScope is different from most client applications in that it requires that the AGWPE files be located within the HamScope folder. They can't be in an AGWPE folder within the HamScope folder, and they can't be in a folder outside of the HamScope folder. The key AGWPE files -- AGW Packet Engine.exe, agwpe.sys, agwpe.ini, agwtcpip.sys, and all port*.ini files -- must reside with the other HamScope files in the HamScope folder. If you prefer, you could install AGWPE both in the HamScope folder (to work with HamScope) and in a second, separate folder (to work with other client programs.)

To make it work:

1. Download and install HamScope: http://www.qsl.net/hamscope/

2. Install the AGWPE files in the HamScope directory. Configure AGWPE and then test that it works with another program, such as AGWTerm.

3. In HamScope, from the Setup menu, select General Setup to bring up the General Setup screen. In the far right column enter the following:

- For AGWPE Address, enter the IP address of the computer where AGWPE is running. The default is 127.0.0.1, the IP address for the computer where HamScope is running. If AGWPE is running on a different computer, enter that computer's IP network address.
- For AGWPE Port, select the AGWPE port that is controlling the sound card, but note that you would select 0 for the port AGWPE calls 1; or 1 for the port AGWPE calls 2.
- Click on the OK button.

You do not need to change any other values on this screen, such as PTT Control Setup or Sound Card selection. Those values are only used for other modes, such as PSK31. Since AGWPE controls those values for packet, changing them in HamScope will have no effect.

4. Back on the main HamScope screen, on the bottom half of the screen there is a Mode field. Use the drop down list to select Packet. HamScope should then start AGWPE.

5. If HamScope successfully hooks to AGWPE:

- in HamScope's top receive window, the words **'Registered callsign'** will appear next to the **CMD:** prompt
- and at the bottom of the screen, in the Data Synch tab, you'll see information about the AGWPE port (the port description you entered in AGWPE).

If you want to see the commands that AGWPE will respond to, then in Hamscope at the "cmd: " prompt, type in **help** and press enter.

Windows XP Bug with HamScope 1.51: I've found that if you are running HamScope on Windows XP, it will not work using the steps above. To make it work in XP, do the following:

1. Install AGWPE in both the HamScope folder and again in a separate folder outside of the HamScope folder.

2. Start AGWPE from the non-HamScope folder, before you start HamScope.

3. Start HamScope. It will automatically start a *second* instance of AGWPE from the HamScope folder, but it will successfully hook to the *first* instance of AGWPE running in the non-HamScope folder (???).

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Last Updated: 09/28/2004

Sound Card Packet

MixW and AGWPE

AGWPE and AGWPE Pro are not the only programs that you can use for sound card packet. AGWPE was the first to provide host services to client applications and continues to be the best application for that need. Other sound card packet programs are MixW and Flexnet32.

I do not have any experience with Flexnet. The web site is at http://dl0td.afthd.tu-darmstadt.de/~flexnet/index.html . There is a Flexnet/32 to AGWPE linking program called XGlue (XGlue Setup Guide) if you want to couple the two programs. If someone wants to send me a layman's description of Flexnet/32 (its advantages and disadvantages and why you would want to run it), I would really appreciate it. The Flexnet website isn't very helpful to me.

MixW, however, does have some features of interest to packet users and even AGWPE users.

MixW (http://mixw.net/) is a $50 multi-mode sound card program that includes 300 and 1200 baud packet. Some users feel MixW does a better job with 300 baud HF packet than AGWPE or Packet Engine Pro. But even if you use MixW for HF packet, you should still be able to link it to AGWPE via virtual serial ports (see below). This lets you continue to use AGWPE for its multi-program/multi-device management services while using MixW's HF packet engine.

Paraphrasing Stephen WA8LMF: "MixW far outperforms any hardware or software on noisy HF packet. It produces a waterfall display on HF packet that makes tuning extremely easy (similar to the PSK31 programs it evolved from). You can click on the center of the lingering waterfall display even AFTER the packet burst has ended to adjust the tuning and be ready for the next packet. (AGWPE has a waterfall display but you can't tune using the display. You must tune the radio and then wait for the next packet to see how the waterfall now aligns.) MixW is also far less cantankerous to configure than the AGW Packet Engine sound card modem.

On HF, the 300 baud 200-hz-shift mode is fully tunable to any arbitrary tone pair -- not just KAM or PK-232 pairs. Since the HF modem is tunable and not locked to any arbitrary tone pair, you can switch in a 500 Hz CW filter on SSB, and then make the HF tone pair fit whatever audio band pass results. (The shape and position of the band pass of various SSB, RTTY and CW filters, and the effect of band pass tuning, shows dramatically in the waterfall display of background HF noise.) If anything, the main problem is that Mix is "too good"; the brick wall steep-skirted selectivity of the mark and space channel filters cause problems with the many users not exactly on frequency. However, if they ARE on frequency, it will FAR out-copy a KAM, PK232 or AGW.

At the click of a mouse, you can select almost a dozen different packet modems including the specialized ones used for satellite operations. If you want to try weird new baud rates and shifts, MixW will let you define your own combinations of baud rate and shift. If you REALLY want to turbo charge HF APRS, try the add-in Q15X25 modem which is an simultaneous multi-tone FSK system mated to standard X25

packet protocol that can deliver a reliable 1200 or 2400 baud throughput on HF in a 1 KHz bandwidth! At the input/output of the TNC emulator, it looks just like any other packet mode, just faster.

It also seems to work on a much larger variety of soundcard hardware than AGWPE, including many of the cheapie built-in-to-the-motherboard ones that won't work with AGWPE. The audio level adjustments are much less critical and easier to set. The only thing you lose is the ability to operate VHF and HF simultaneously."

MixW now has the capability of allowing client programs, including AGWPE, to connect to MixW using it's "TNC Emulation" feature. In TNC Emulation mode, MixW appears as a TNC to a client packet program. MixW sends and receives packet data to one serial port, either actual or virtual, while the client application attaches to a different serial port, actual or virtual. If actual serial ports are used, a null modem cable is used to connect them (one port could even be on another computer). If virtual serial ports are used, they are automatically connected in software. In this way , UI-View or AGWPE can hook to MixW and use MixW's sound card packet modem!

To create the virtual serial ports, you'll need another add-on component, the MixW Serial Port Emulation Driver, downloadable from the MixW website at http://mixw.net/related.htm#tncemu . The software will install two virtual serial ports on your computer. You then assign MixW's "TNC emulation" feature to one of these virtual ports, and configure the client application to connect to the other.

Unfortunately, the MixW emulator only works on Win2000 or XP, but Windows 95/98/Me users can find a virtual serial port driver at http://members.surfbest.net/kb9vqf@surfbest.net/

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Options window to make an APRS station in the left column become an RMD network "unit": check mark an available unit name/number in the right column, then highlight the APRS unit in the left column and press the arrow key between the two columns.

You can also add the APRS stations into a RMD "network" if you want to further examine APRS coverage and the APRS digipeater network, but explaining how to do that is beyond the scope of this page. You'll have to work with and learn RMD.

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Last Updated: 09/24/2004

Sound Card Packet

Radio Mobile Deluxe and AGWPE

Radio Mobile Deluxe (RMD) is a program that predicts radio propagation and signal path quality over specific terrain using digital elevation maps. It is quite an amazing and powerful program.

One of its features allows you to capture and plot APRS packets on the elevation maps using AGWPE. You can then "see" how well APRS digipeaters, home stations, and mobile stations will "hear" other's packets.

You can download the RMD files at:

Français: http://www.cplus.org/rmw/index.html
English: http://www.cplus.org/rmw/english1.html

Note that RMD is difficult to setup and learn, and downloading digital elevation map data can be time consuming if you only have a dial-up internet connection. General instructions for program use are beyond the scope of this web page, but the specific setup for AGWPE is as follows:

1. Install and configure AGWPE and first test that AGWPE is working with AGWTerm.

2. Install and configure RMD. Create an RMD map for the APRS coverage area you wish to examine (see RMD's Help file).

3. From the RMD menu, select Options, then APRS Options. In the resulting APRS Setup window, do the following:

- Enter a check mark for Enable APRS.
- For AGWpacket Host enter the IP address of the computer where AGWPE is running. The default is 127.0.0.1, a special IP address that means 'this computer', in other words the same computer where RMD is running. If AGWPE is running on a different computer, enter the AGWPE computer's IP network address.
- For Port, use 8000, the default IP port that AGWPE uses. (It would only be different if you changed the port number in AGWPE's TCP/IP interface settings.)
- Press the Apply button and close the window.

APRS station callsigns should begin to appear on the RMD map and then disappear when a new station is heard. After the positions of relaying digipeaters are also received, RMD will then display the station originating the packet, the digipeater(s) it was heard through, and signal path lines connecting all of them.

To "permanently" display an APRS station position, use the lower half of the APRS

Sound Card Packet

UI-View and AGWPE

UI-View and UI-View 32 were written by Roger Barker, G4IDE/SK. Both are packet-based position plotting programs similar to other APRS software, but they also support TNC in KISS mode and BPQ host mode (besides AGWPE host mode). You can download both at http://www.uiview.com

Since Roger's death in September 2004, registration for the more powerful UI-View 32 version is free, however, in lieu of the former registration fee of £10 (about $15 US), you are asked to make a suitable donation to a cancer organization of your choice. Registration gives you the right to upgrade from UI-View 16 to UI-View32, which has some additional features. To register, do not contact Roger's address as the program or his web site may suggest; instead use the URL below to find the name of someone who can issue you a registration number:

    http://www.apritch.myby.co.uk/uiv32.htm

Simply state your request for a registration number in an email that includes your first and last name on a separate line, plus your callsign on another line.

Basic UI-View Setup

Here's how to configure UI-View to work with AGWPE -- it's really not hard. Roger did a great job in explaining it all in the UI-View Help.

With AGWPE running, start UI-View. On the top menu bar, select Setup, then Comms Setup. The resulting window should look like the graphic below. Set the Host Mode for AGW. (UI-View has context sensitive Help, so press F1 to call up help for this window.)
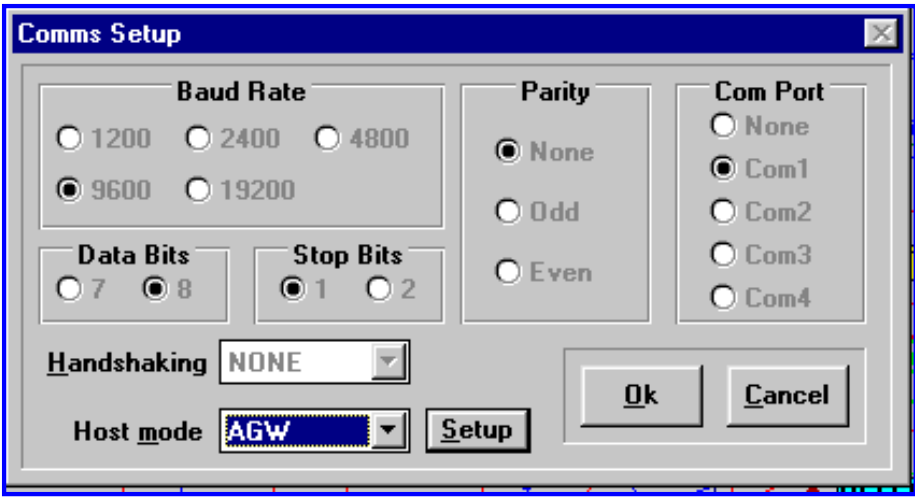
With UI-View 32, you are done. Press OK and you should see a pop-up window with AGWPE ports info.

But for UI-View, press the Setup button next to AGW for one further selection.

On the resulting AGWPE Setup window, for mode, you can select either DDE or TCP/IP. Press F1 again to call up a very informative Help dialogue about AGWPE.
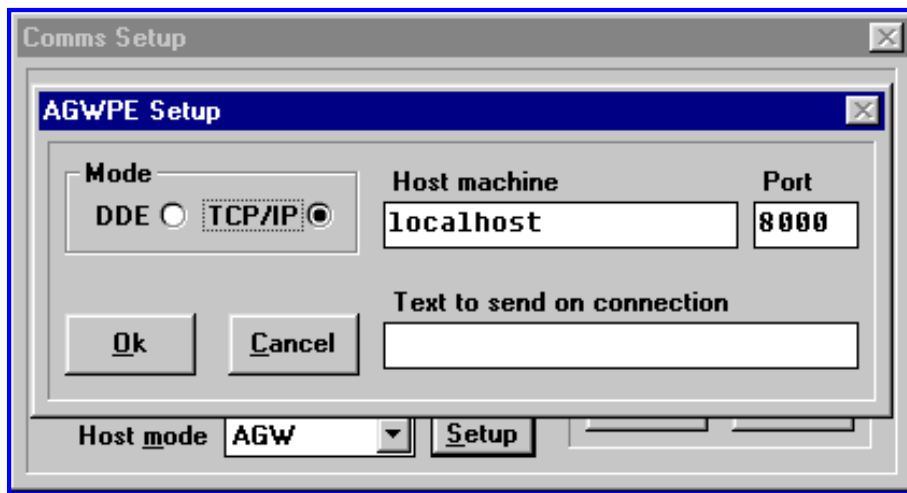
UI-View will work in DDE mode just fine with AGWPE, but the advantage of using TCP/IP mode is that you could connect UI-View to an instance of AGWPE running on another PC accessible via a network or the internet.

For TCP/IP to work with UI-View, you must running AGWPE version 2000.15 or later and you must have the Windows **Winsock 2 update**. Also make sure you have AGWPE's Winsock TCP/IP interface working: On the AGWPE menu, click once on **Setup Interfaces**. On the resulting **WinSock Interface** tab, make sure the **Enable Winsock TCP/IP Application Interface** box is check marked ☑ . Click in the box to check/uncheck it.

After you have made your selection, press the **OK** button on both the **AGWPE Setup** and **Comms Setup** windows and UI-View should be working with AGWPE and receiving packets.

You can also configure UI-View to connect to an instance of AGWPE running on a different computer on your home network or any where on the internet. **See the AGWPE Over a Network page.**

Connecting to more than one instance of AGWPE:

UI-View32 can connect to more than one instance of AGWPE. From the UI-View32 menu, select **Setup** and then **Comms Setup**, and then press the **Setup** button next to **Host Mode: AGWPE**. Check mark the **Multiple System choice** and you will now have tabs for 2 AGWPE systems to configure. (Press F1 for UI-View Help!) You can specify your own instance of AGWPE (running at 127.0.0.1, i.e. your computer) and a remote instance, or you can specify two remote instances.

If you want to connect to more than 2 systems, open the UIVIEW32.INI file and search for the [AGWPE] section. Under it, change the SYSTEM_COUNT= 2 parameter to the number of your choice (max. 16).

Roger Barker, the author of UI-View wrote:

UI-View32 can simultaneously connect to more than one AGWPE system via TCP/IP. The default limits it to two systems (but that can be altered in UIVIEW32.INI). The ability to connect to multiple systems is entirely within UI-View32, it is not part of AGWPE, and you do not need to be running AGWPE locally in order to connect UI-View32 to one or more remote AGWPE systems.

The ports on the AGWPE systems will appear sequentially in UI-View32, so if you connect to two systems, one with three ports and one with two, the ports in UI-View32 will number from one to five.

The ports behave exactly as if they are all on one AGWPE system. So, for instance, you can configure the UI-View32 digipeater to have ports on different AGWPE systems, which gives the possibility of having an APRS digi with ports in different parts of the world.

You lose no functionality by connecting to multiple systems, so whatever you can do with an AGWPE port on a single system, you can do exactly the same thing with a port when you are using multiple systems.

Two "gotchas" -------------

1. When connecting to remote AGWPE systems, do not forget that AGWPE has "Winsock Interface Security".

2. UI-View32 uses AGWPE with KISS frames. It is a feature of AGWPE that the received KISS frames it sends to an application do **not include** frames transmitted by other applications using the **same** AGWPE system. So if you have this:

```
   AppA --------|
              | AGWPE ------ radio(s) etc.
   AppB --------|
```

Then, using KISS frames, AppA will not see frames transmitted by AppB. (Of course, with APRS, it will see them if they are digipeated by another station.)

If that is a problem, then an easy work-round is to configure a loop-back port in AGWPE, and transmit the beacons from your UI-View32 systems both on the RF port(s) and on the loop-back port.

Disable Sounds

If you don't have two sound cards: It's possible that the speech and sound options in UI-View could create a conflict with AGWPE's use of the sound card, so you should disable all the sound/speech options in UI-View. With recent versions of UI-View, there's a Sound Enabled option on the Options menu that allows you to turn off all UI-View sounds in one go. If you're using a version without that option, then you should update to a newer version!

Running UI-View in AGWPE 2 port/2 radio mode

UI-View *receives* by default on all ports. To change that, go to the Setup menu and then Comms Setup. When you select a host mode of AGWPE, a Setup button will appear to the right of AGWPE. Press that button that to bring up the AGWPE Setup window. Then press the Ports Mask button to bring up the AGWPE Port Mask Monitor window. Check or uncheck ports to control which AGWPE ports UI-View will receive on.
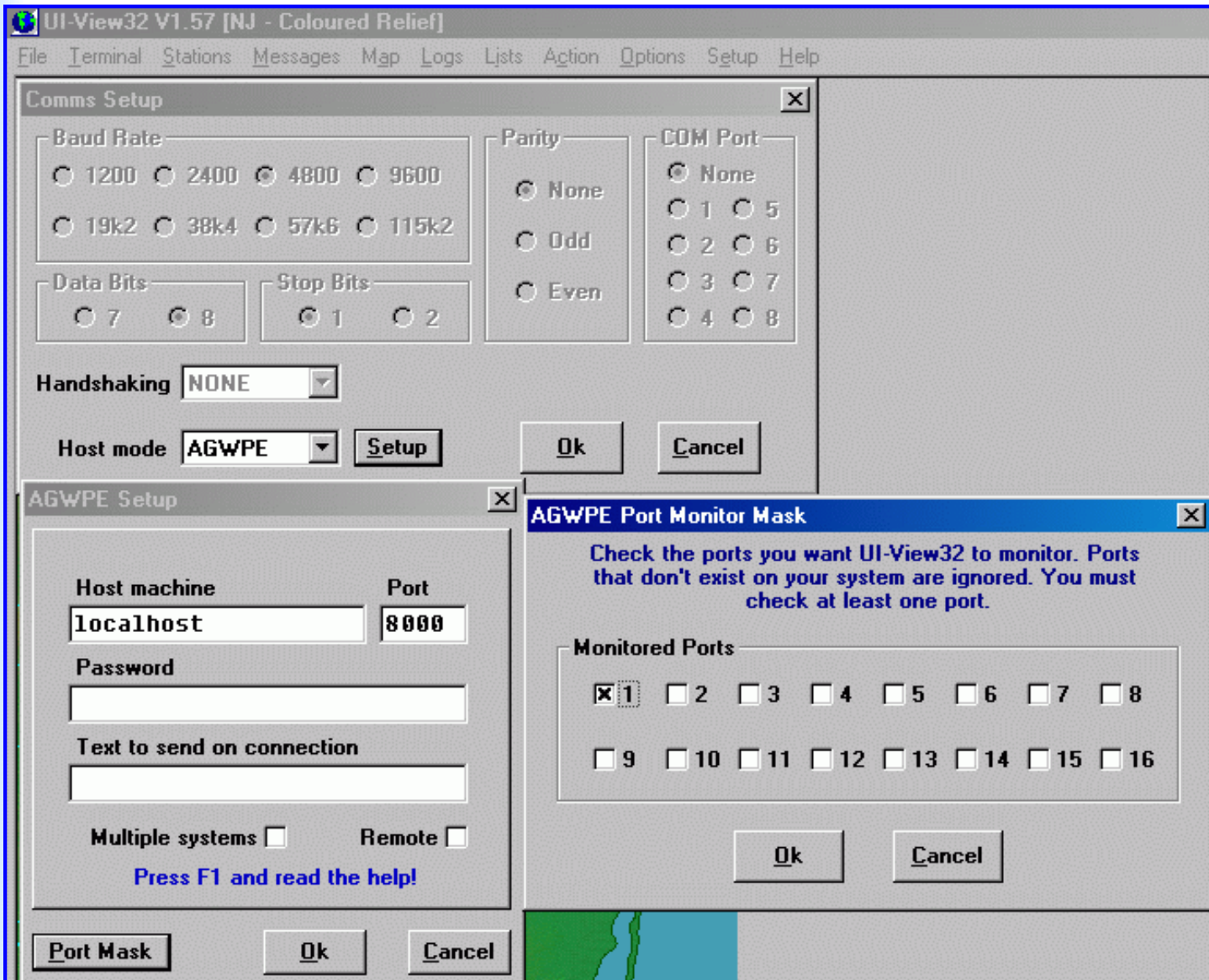
To control which ports transmit, from the menu go to the Setup: Stations Setup window and the Unproto port field. For example to transmit only on the AGWPE port 1 radio (even if you have other ports/radios) enter 1   To specify multiple ports, use a comma to list the ports, e.g. 1,2 If you use multiple port transmitting, use the "beacon pause" so the radios don't transmit at the same time: from the Setup menu then select Miscellaneous.

Hint: you can use UI-View's digipeat function to relay HF packets onto the VHF frequency by configuring AGWPE for 2 sound card ports (one for VHF, one for HF) and making a 2 port - 2radio cable. Then set up the digipeater function in UI-View to use the "Digi Routes" function: "1=2" . Then anything heard by UI-View on AGWPE port 1 would be digipeated on AGWPE port 2, and vice versa. To make sure VHF traffic is not routed to HF (HF can't handle the load), either:

- **configure the HF PTT port to an non-existent LPT or COM port (in AGWPE's Properties for Portx screen), so there is no PTT activation for the HF radio**
- **do not include a TX audio or PTT cable on the cable going to the HF radio; use only an RX audio cable.**

UI-View32 vs. UI-View

Other than for the fact that it is a true 32 bit app, the main advantages of UI-View 32 over UI-View are:

1. The map refresh is faster than on the 16 bit version. On a K6-2/450, it will redraw at a rate of around 1,000 station icons a second.

2. It is an ActiveX server and provides a rich interface for external applications. Roger realized with his WinPack program that providing an open interface to encourage other software authors to write add-ons was a good idea in a ham radio application. UI-View32 takes the idea to a new level. If you have a look at these two sites, you can see some of the excellent add-ons that have been written for UI-View:

http://welcome.to/uiview

http://www.qsl.net/g7jgq/uitool.htm

The downside of UI-View32 compared to the 16 bit version is that:

- **you have to register it, and**
- **it needs a more powerful PC; a P120 with 32Mb is probably the minimum.**

An unregistered copy of UI-View also has these further limitations:

- **You cannot input an APRServe (APRS packets via internet) validation number. If you log on to APRServe, it will always send the default validation number of "-1". This doesn't stop you using APRServe, it just means that no IGATEs will gate your traffic from the internet to radio.**
- **You cannot use UI-View as an IGATE.**

If you upgrade to UI-View32: DON'T install UI-View32 on top of UI-View(16), or you'll finish up with a big mess. They are separate program and by default they install into separate directories. There is absolutely no problem with having them both installed on the same PC. You can put your registration in them both, and, if you use AGWPE, you can even run them both at the same time.

Of course, if you want to uninstall UI-View(16), you can, and it won't delete your maps, which you can move or copy into the UI-View32 program folder. (NOTE - make sure you uninstall, not manually delete.)

Problems:

I have AGWPE running but when I try to start UI-View, I get this message:
"**An error occurred initializing AGWPE system 1.   Address Family is not supported.'**"

The TCP/IP protocol is not installed on your computer. Create a Dialup Networking (DUN) Connection in Windows (use a dummy telephone number) and the TCP/IP protocol will be installed automatically.

If the message was "Connection is forcefully rejected", then that means one of the following -

1. AGWPE isn't running.
2. AGWPE doesn't have the Winsock interface enabled (from the AGWPE menu, select "Setup Interfaces" and on the default WinSock Interface tab, checkmark "Enable Winsock TCP/IP Application Interface".
3. Whatever you have put in AGWPE Setup in UI-View32 is incorrect (see top of this page).
4. You have a firewall that is blocking connections to "localhost"/127.0.0.1.

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Last Updated: 09/24/2004

Sound Card Packet

WinAPRS and AGWPE

Only WinAPRS versions 2.4.0 and above are able to use AGWPE.

New WinAPRS Users:

You can download the most recent version of the WinAPRS program (written by the Sproul Brothers, Mark, KB2ICI and Keith, W2UZ) at http://aprs.rutgers.edu

Installation and operating instructions are explained at the web site and come with the download. WinAPRS is shareware. You can run it without registering but with some limitations, most significantly the ability to save all your program settings (callsign, TNC, etc). Registration is $60 and well worth it if you continue to use WinAPRS.

Experienced WinAPRS Users:

If you've been running WinAPRS (2.4.0 or higher) with a TNC **and have WinAPRS set to automatically open the TNC port on startup, don't start AGWPE before starting WinAPRS.**

WinAPRS will crash if it finds AGWPE using the COM port where WinAPRS expects to find a TNC attached! You can't correct this problem until AGWPE is shut down and WinAPRS is allowed to open normally.

When it does open, de-select any **Automatic Input** devices that are on the port which AGWPE will be using for PTT control:

Using the WinAPRS menus, click on **Settings,** then **WinAPRS.**

When the **WinAPRS Settings** window opens, under the far right **Automatic Input** section, uncheck any device that was using the port where you have now told AGWPE to find the PTT cable.

For example, if you had a VHF TNC on COM1 set for Automatic Input, but now have the AGWPE PTT cable on COM1, you need to **deselect** the **VHF TNC** (you can deselect a check-marked box by clicking on it). After it's deselected, click on the **OK** button to save the settings.

A. Configuring APRS for one AGWPE port / one Radio

Start AGWPE.

Start WinAPRS. First click on **Settings** in the menu bar, then on **Ports List**.

On the resulting **Ports Definition List** window, you should see a choice for **AGWPE on LOCAL**. Click once to highlight that choice, then click on the **Open** button. If WinAPRS finds AGWPE, the **Status** field will indicate **ACTIVE** and the **Comment** field will show the AGWPE version, for example, **AGWPE V2001.38**

It's most important that you see the AGWPE version notice in the **Comment** field. If you don't, then WinAPRS wasn't able to connect with AGWPE, even if the **Status** field says '**ACTIVE**'. This means that AGWPE isn't running or it isn't set right (for example, be sure the **WinSock Interface** option is

checked ☑ on the AGWPE menu).

✚ If you have everything set right, then you should start to see packets at the bottom of the active WinAPRS window. If you don't see packets and your radio's "S" meter indicates it's receiving packets and the AGWPE modem icon's **green** pixel flashes [◆◆◆], then something else is wrong and you'll need to go to **troubleshooting.**

✚ Note that, when using AGWPE, you can't change your packet PATH using the normal WinAPRS menus (**Settings: TNC** or **Settings: Positions Report Rate**). Instead you must edit the **AGWPE_Local.Prt** file in your **WinAPRS\Ports** directory. The second to last line of this file will have a line that looks like this:

PATH WIDE,WIDE

You can change the PATH value to any path you'd like. Note that the space after PATH is **not created by the <space> key** but by the **<TAB>** key. Also note that any PATH changes will not become effective until you save to your .prt file and then restart WinAPRS.

✚ Problem with WinAPRS communicating with AGWPE? Make sure the **AGWPE_Local.prt** file is in your **WinAPRS\Ports** directory.

✚ You can also configure WinAPRS to connect to an instance of AGWPE running on a different computer on your home network or any where on the internet. **See the AGWPE Over a Network page.**

B. Configuring WinAPRS for two AGWPE ports / two Radios

WinAPRS is able to interface with two different AGWPE ports, and thus two different radios. For example, your could have one radio on the regular APRS frequency and another radio on the DX Packet Cluster frequency. (WinAPRS can then post both types of info, APRS packets and DX spots, to the WinAPRS maps!) Or you could have an HF radio to receive long distance APRS packets.

AGWPE has always been able to do this using TNCs, but now it can handle 2 ports/two radios using just the sound card; plus it can now handle 300 baud HF packet with the sound card.

Here's how to setup AGWPE and WinAPRS to use two sound card ports:

✚ First, you'll need to built **cables suitable for two ports/two radios**

✚ Next, **setup AGWPE for two ports/two radios**

✚ Now you need to create an additional **.prt file** in the **Ports** sub-directory of your **WinAPRS** directory. The new file will be very similar in content to the existing **AGWPE_Local.prt** file that is already in the **Ports** folder.

Make a copy of the current **AGWPE_Local.prt** file using a different name. Edit the file as below using a simple text editor such as Windows' **Notepad.**

The new .prt file will be identical to the **AGWPE_Local.prt** file except for the following:

✚ **NAME line** - the descriptive name you pick; your choice
✚ **AGWTNC line** - **AGWTNC # = AGWPE port # minus 1**,
  e.g. to use AGWPE Port 1, enter AGWTNC 0.

Also, please note that the "*space*" between the FIELD name (1st column) and the FIELD data (everything after the FIELD name) is created by the **TAB** key, not the space bars. For example, the second line in the file below would be typed:

NAME<TAB>**DXClusters**<space>**on**<space>**145.03**".

Here's what the second .prt file might look like:

// Created by WinAPRS on 2/2/2
NAME DXClusters on 145.03   <-- a new name for each port
TYPE TCP
PARSER AGWPE
HOST 127.0.0.1:8000
BAND VHF
PATH WIDE,WIDE <-- change UI path for this radio if you like
AGWTNC 1   <-- port # minus one; this is AGWPE port 2

Hint: You can also edit the NAME line of the original **AGWPE-Local.prt** file. You can change the name from "**AGWPE on Local**" to something like "**APRS on 144.39**" to help you better understand what each AGWPE port and radio is doing.

✚ Save the new .prt file.
✚ Re-start WinAPRS
✚ Click on **Settings**
✚ Click on **Ports List.** You should now see an additional AGWPE port.
✚ Select and then **Open** the two (2) AGWPE ports one at a time:
  >PORT #1 (AGWPE ON LOCAL)
  >PORT #2 (DXClusters on 145.03)

WinAPRS should now be receiving packet data from both ports/radios/frequencies.

WinAPRS Hint: To better see DX cluster or HF packets, have WinAPRS display both a local map (state, region, US) and a world map :

First, from the **Maps** menu, open both maps

Then, click on the **Windows** menu option, then on **Tile**.

Warning: There is a bug in WinAPRS related to transmitting and AGWPE ports. As of version 2.4.7, WinAPRS will transmit APRS beacons on both AGWPE ports/radios. Listeners on the Packet Cluster frequency might not appreciate this. If you intend to run WinAPRS on a DX Cluster frequencies, you might want to disable transmitting to the Packet Cluster frequency by unplugging the PTT cable to the DX Cluster radio.

C.Troubleshooting Problems

WinAPRS: I open AGWPE first, but then when I start WinAPRS, it causes a system crash.

WinAPRS is probably configured to automatically open a TNC on startup. It crashes when it finds AGWPE using the COM port and not the TNC it expects to find! You can't correct this problem until you exit AGWPE and let WinAPRS open without AGWPE running. Then, in WinAPRS, deselect any **Automatic Input** devices that are on the port which AGWPE will be using for PTT control:

When the **WinAPRS Settings** window opens, under the far right **Automatic Input** section, uncheck any device that was using the port where you have have the AGWPE's PTT cable attached. For example, if you once had a TNC on COM1, but now have the AGWPE PTT cable on COM1, you need to **deselect** the **VHF TNC** (you can deselect a check-marked box by clicking on it).

After it's deselected, click on the **OK** button to save the settings.

Then close WinAPRS, start AGWPE, and restart WinAPRS.

Last Updated: 09/24/2004

Sound Card Packet

WinPack and AGWPE

WinPack, written by Roger Barker, G4IDE/SK, is a great Windows-based packet terminal program. You can download it at http//www.peaksys.co.uk (or do a web search for other download sites).

Since Roger's death in September 2004, registration is now free, however, in lieu of the former registration fee of £10 (about $15 US), you are asked to make a suitable donation to a cancer organization of your choice. Registration gives you the right to upgrade from UI-View 16 to UI-View32, the 32-bit version which has some additional features. To register, do not contact Roger's address as the program or web site may suggest. Instead go here to find the name of someone who can issue you a registration number:

http://www.apritch.myby.co.uk/uiv32.htm

Simply state your request in an email that includes your first and last name on a separate line, plus your callsign on another line.

****

To configure WinPack to work with AGWPE:

Start AGWPE before starting WinPack.

On the WinPack menu, select Options; then Comms Setup.

In the resulting Comms Setup window, there is a field for Host Mode in the lower right corner. Click on the options arrow and select AGW (see picture below). When done, click on the OK button.

Comms Setup (Press F1 For Help)

Baud Rate
○ 1200　○ 2400　○ 4800
◉ 9600　○ 19200　○ 38400

Data Bits
○ 7　◉ 8

Stop Bits
◉ 1　○ 2

Parity
◉ None
○ Odd
○ Even

Com Port
◉ Com1
○ Com2
○ Com3
○ Com4

Connect String
*** CONNECTED to

Disconnect String
*** DISCONNECTED

Editor Line Length
74 characters

Handshaking XON/XOFF ▼

DCD shows con YES ▼

Host mode AGW ▼

[Ok]　[Cancel]

If you will be using AGWPE as your only packet input source, then you don' t need to worry about setting the normal TNC parameters such as baud rate, parity, etc. AGWPE handles all that! In fact, the TNC parameters on this screen will 'gray out' (become inaccessible) since there is no need for them when you use AGWPE host mode.

AGWPE should be running before you start WinPack in AGW mode or try to toggle to AGW host mode. If you start AGWPE after WinPack, WinPack won't recognize AGWPE -- unless you toggle WinPack's host mode to NONE and then back to AGW. (Or you can close WinPack, start AGWPE, and restart WinPack.)

For specific help about AGWPE, read the Winpagw.txt file located in the main WinPack directory. You'll also find more information in program Help: select the Help Contents option from the Help menu and then, in the right index under Fundamentals, click on the third item down, Host Mode Support. On the resulting page, you should also look in the right index for additional topics about AGWPE and host modes in general.

Disable Sounds in WinPack

It's possible that the speech and sound options in WinPack could create a conflict with AGWPE's use of the sound card, so you should disable all the sound/speech options in WinPack (unless you're using two sound cards in the PC).

Using WinPack with Different AGWPE radio ports

When you issue the connect command, put the AGWPE port number between the connect command "C" and the target station's callsign, for example:

C 2 KC2RLM

If no port number is inserted, WinPack will connect to AGWPE port #1.

Known Problems & Limitations of WinPack

1. WinPack uses a Windows DDE protocol to link to AGWPE and not the TCP/IP protocol. As a result, you can not link WinPack to an instance of AGWPE running on a different computer.

(One workaround, albeit a bit expensive; purchase Packet Engine Pro ($49 US) for both the WinPack computer and the distant computer. PE Pro's Radio Port Sharing feature will let the two instances exchange radio port data.)

2. WinPack is not able to send "unconnected"/<UI>/APRS-style packets.

3. If you execute the MHeard (MH) command in WinPack to request a list of stations heard, AGWPE will shut down if no stations have been heard. So the MH command will only work if at least one station has been heard.

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Last Updated: 09/25/2004

Sound Card Packet

XASTIR and AGWPE

(X Amateur Station Tracking and Information Reporting)

XASTIR is program for receiving and plotting APRS position packets. XASTIR runs on Windows, MacOSX, Linux, FreeBSD, Solaris, and Lindows. It supports 124 map formats, several types of TNC's and weather stations, Festival speech synthesizer, AX.25 networking (Soundmodem/Baycom/SCC!) and seven languages! On Unix-like operating systems, you can run your weather station or GPS on a separate computer as well, which is good for those hams who are already short on serial ports. XASTIR is FREE and available at http://www.xastir.org

Wes Johnston KD4RDB kindly provided these instructions for configuring XASTIR to run with AGWPE:

1. Click on INTERFACE -> PROPERTIES to bring up the Installed Interfaces screen. At the bottom of that screen press Add to bring up the Choose Interface Type screen:
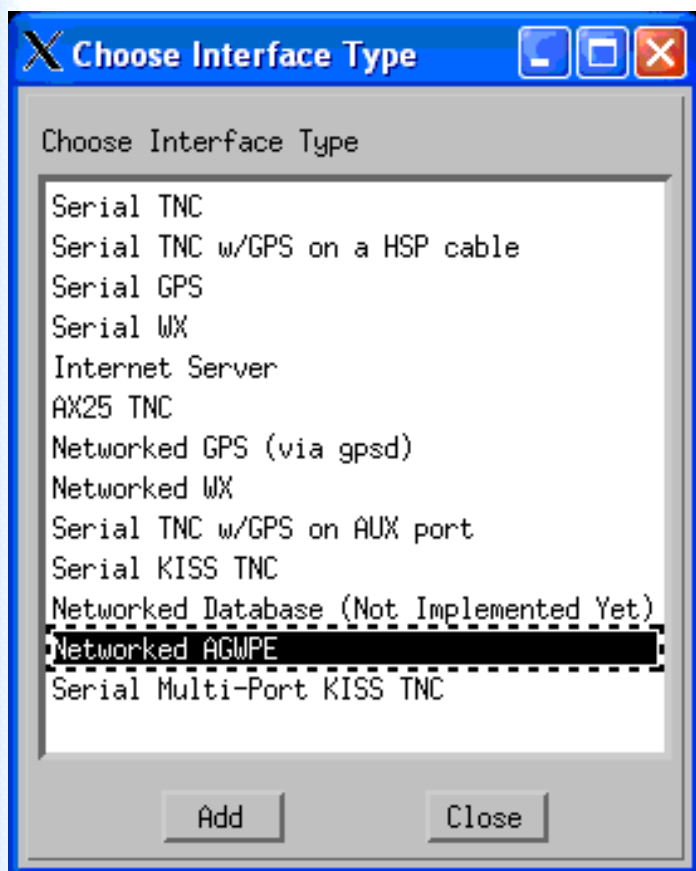
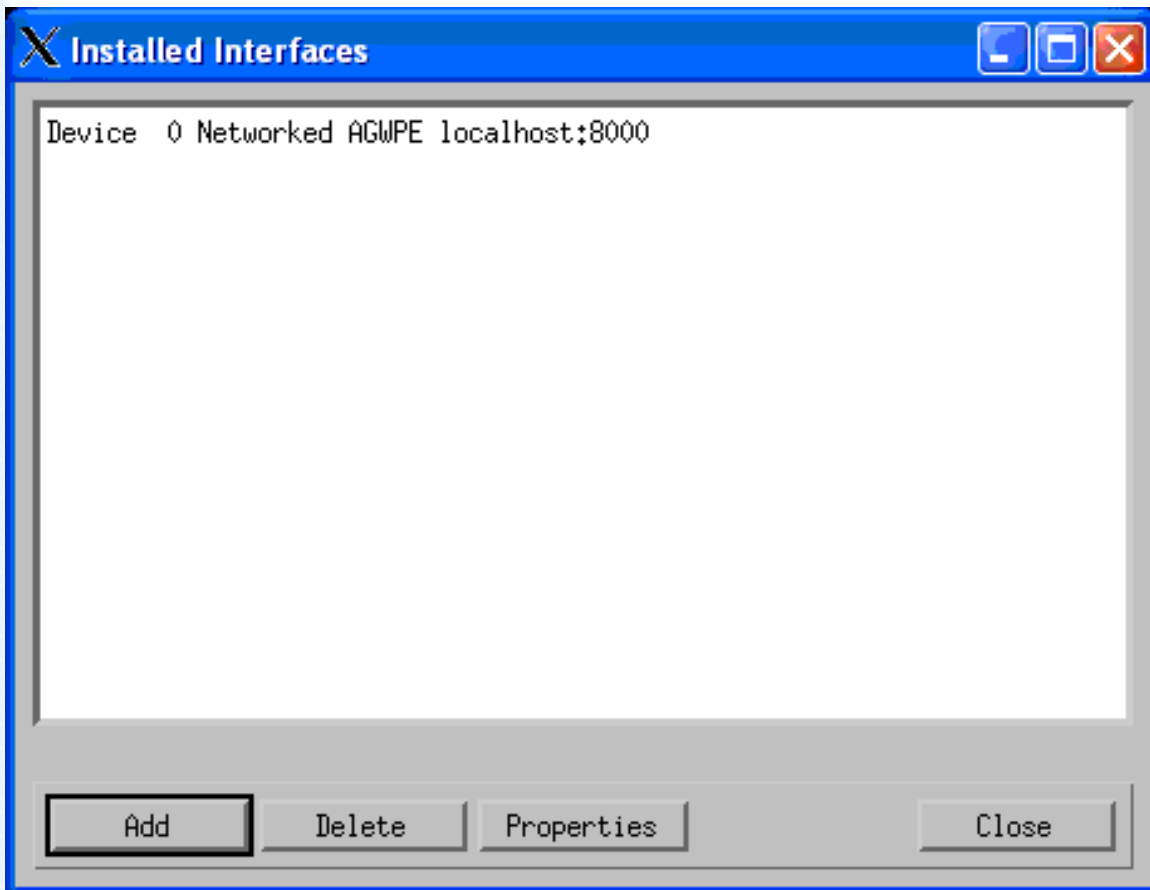Select **Networked AGWPE** and press **Add**

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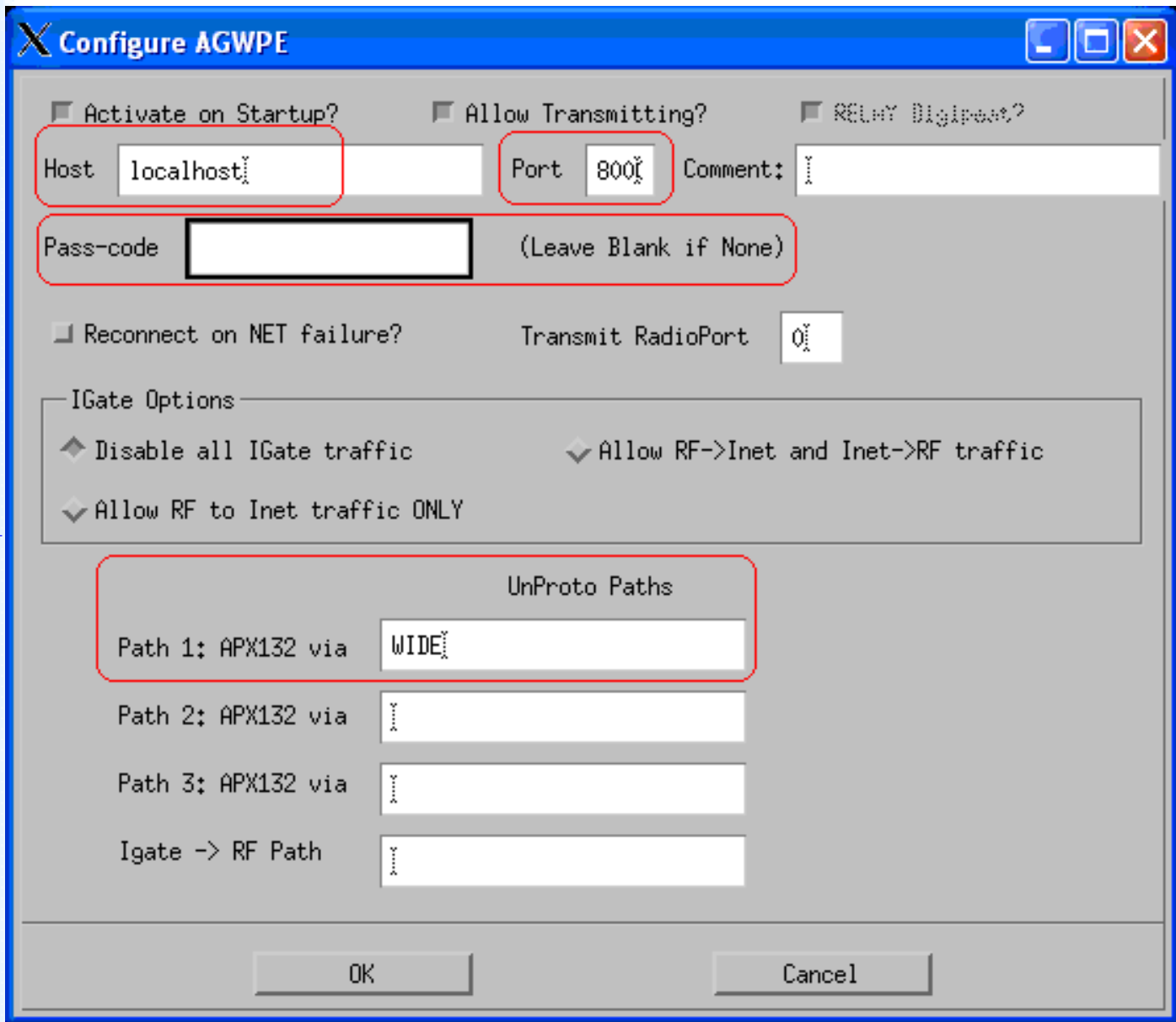
Enter the AGWPE Host information:

- **Host: enter the IP address of the AGWPE computer. Use LOCALHOST or 127.0.0.1 if AGWPE is running on the same computer as XASTIR; otherwise enter the LAN or web IP address of a remote computer.**
- **Port: by default, AGWPE uses port number 8000. Use this unless you have changed the port number in the AGWPE setup (see AGWPE over a network)**
- **Pass-code: optional; only needed if AGWPE was configured to require a user name and password to access port 8000 (see AGWPE over a network)**
- **Path: Enter at least one APRS path (the example above uses a path with one WIDE)**

Press OK and you should see the newly created interface as below.

Installed Interfaces

```
Device  0 Networked AGWPE localhost:8000
```

Add   Delete   Properties   Close

Press Close

To activate the new interface, in the XASTIR main view, click on INTERFACE -> START/STOP

Interface Control

```
Device  0    DOWN    Networked AGWPE localhost:8000
```

Start   Stop   Start All   Stop All   Close
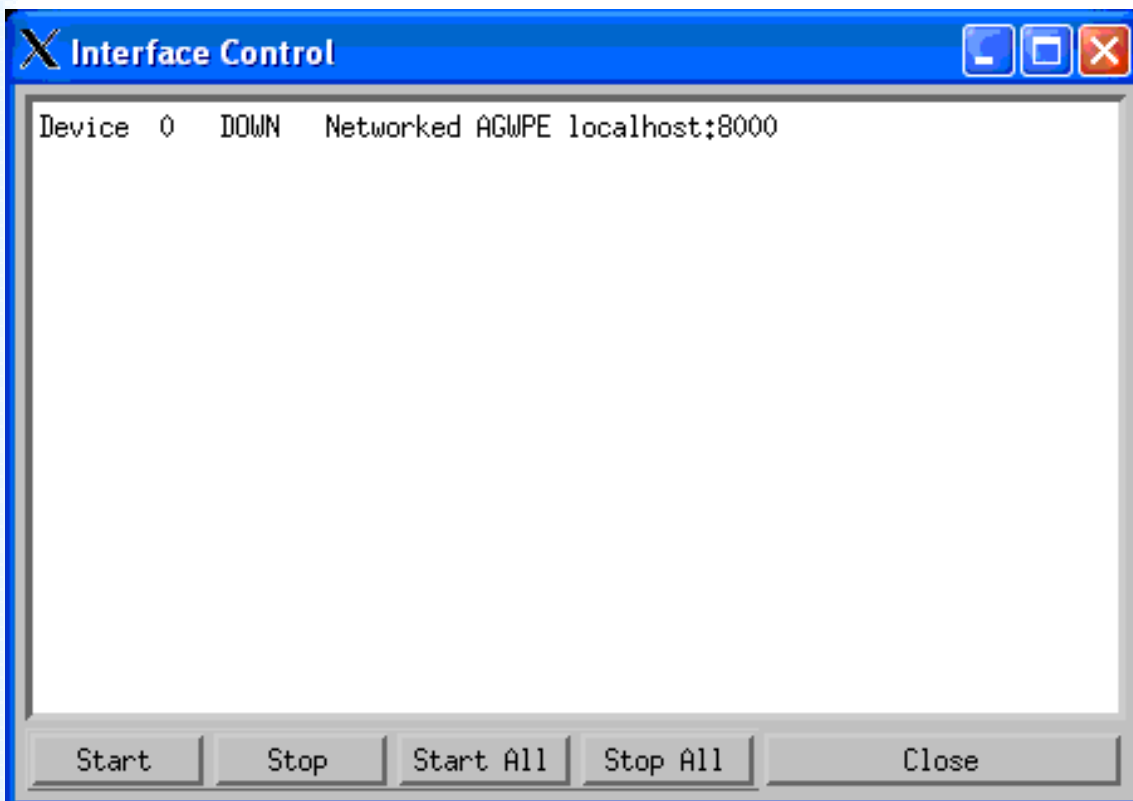
Select the Networked AGWPE interface and press START.

Port Definitions List

Open	Close	Close all				

Name	Type	Parser	Band	Status	Open #	Comment
Standard VHF TNC	SERIAL	APRS	VHF	--	--	
AGWPE Sound Card & COM1	TCP	AGWPE	VHF	--	--	
www.aprs.net:10151	TCP	APRS	TCP	--	--	
AGWPE on My Local Network	TCP	AGWPE	VHF	ACTIVE	1	AGWPE V2002.10

VP5WX-1>APRS,GATE,KB2EAR-1*,WIDE:!!0000005F031D041D27D10353--------011300

WinSock & HTTP Interface Setup

WinSock Interface | **WinSock Interface Security** | **HTTP Interface**

Enable/Disable

Enabling this Interface, you will have the ability to do Packet and configure Packet Engine ,Using your WEB Browser. You may access Packet Engine either from this computer or from any other in a Network.

☑ Enable the HTTP Interface

Setup Listen Port

Enter The TCP Port Where the Server Listens. Leave the default value if you don't have an Http server running. If you change this Port then you may access Packet Engine typing in your WEB Browser "http://xx.xx.xx.xx:TCPPort".

Where xxx is the Ip adress of the computer where agwpe runs.

TCP Port   `80`

Password

Login/Password is needed if you acess Packet Engine from another computer.

Login   Password
`LOGIN`   `PASSWORD`

[OK]   [Cancel]   [Apply]

AGW Packet Engine

Authorization

This is the new USER Interface.Because it is possible to initiate this operation from all over the world you need to enter your login name and your password.Otherwise you will not be able to alter any configuration. You will just view the properties.

[Submit] [Reset]

AGW Packet Engine

Main Menu   AGWPE

New RadioPort   Edit RadioPort   TCPIP Over Radio   RadioPort Status   AX25 Status   General
Monitor   MHeard List   Connect(Terminal)