



# PACKET STATUS REGISTER

## President's Corner



I am writing this in early February as we are making plans for Dayton. This year marks a departure from our usual Dayton Bash, as we will be joining with AMSAT to bring you a special evening at The National Museum of the United States Air Force.

Not only will we be having our joint dinner there, but we will also have access to the museum for four hours that evening.

In the past, people have been able to sign up for the dinner right up to the last minute. However, this year the caterer will need a head count 72 hours beforehand, so we will need to make this an advance registration affair. Come join us for an

inaugural event that is long overdue! We plan to make this a regular affair - the format will of course be different from either the old TAPR Bash or the AMSAT dinner ... by and large, we'll be putting business aside and will be enjoying a fine keynote speaker, the pleasant and historic surroundings, and best of all, old (and not so old) acquaintances.

We are pressing ahead with our support of the HPSDR project ... please see elsewhere in this issue for a report from the developers. TAPR has accepted the responsibility for the manufacture of assembled and tested Ozy (Ozymandias) and Janus boards. These two boards together provide a high-performance switching and audio interface to go onto the Atlas backplane, replacing the ubiquitous (and less sexy) sound card as a connection to an SDR-1000. However, if that were all there was to it, it would hardly be the exciting (and did I already

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mention sexy) project that it is. The Atlas backplane allows for future expansion to incorporate SDR receivers, transmitters and other add-ons yet to be developed. With Janus and Ozy out of the Alpha phase and TAPR readying for production, the developers are off working on new projects to add to HPSDR. We will be gauging interest and then we'll be announcing final pricing within the next seven to ten days, so please check the web site <[www.tapr.org](http://www.tapr.org)> frequently for updates.

Information regarding HPSDR can be found at [www.hpsdr.org](http://www.hpsdr.org). We are targeting for production to get underway very shortly, so please take the time to familiarize yourself with this cutting-edge project. This is a unique project for us insofar as all orders will be pre-paid because of the cost involved in parts procurement. In return, you receive ASSEMBLED

and TESTED (A&T) boards for the price of what you would pay for a bare board and parts procured by you in quantities of 1 or 2. AND, you have the satisfaction of knowing that any monies left over will be available to seed additional projects in the HPSDR line, as well as other TAPR projects. In this way, you aid in the development project simply by being there ... kind of like getting the boards for free when you look at it that way, isn't it (OK, maybe not QUITE that sweet, but close) ...

I look forward to seeing all of you at the TAPR booth at Dayton ... please stop by and see what other surprises we'll have in store for you ... if parts procurement goes as planned, you should see some of these projects in the booth!

As always, I look forward to hearing from you at [ve3gyq@tapr.org](mailto:ve3gyq@tapr.org) ...

Dave VE3GYQ/W8

Spencerville, OH

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## Open Source Hardware License

There are a lot of licenses available for Open Source software. There's never been a similar license for developers of open, shared hardware designs. Until now.

The TAPR Open Hardware License (OHL) and its companion Noncommercial Hardware License are the first licenses specifically designed to put a legal structure around documentation and products that result from open hardware development projects.

John Ackermann, N8UR, an attorney who specializes in software licensing, with review and substantial input from a group of those most concerned ~ active hardware developers ~ as well as several lawyers and Open Source Software activists, drafted the licenses. The TAPR board has voted its support of this project, and has agreed to lend its name to the licenses.

The Open Hardware License is designed to be compatible with Open Source Software principles, and will be submitted for certification to the Open Source Initiative. The Noncommercial Hardware License is identical to the OHL except that it limits products to noncommercial use; this limitation moves it out of the pure Open Source philosophy, but is an important issue for some hardware developers.

The licenses are now in a 30-day public comment period, which will end on March 7, 2007. After considering that feedback, the official "version 1.0" documents will be released. While these licenses are sponsored by TAPR, they are available for anyone to use.

The draft licenses are available for download at [www.tapr.org/OHL](http://www.tapr.org/OHL), and a link there will take you to the comment forum. We look forward to your input.

###

## HPSDR.org

By Bill Tracey, KD5TFD <kd5tfd@ewjt.com>

One of the most exciting new technologies to emerge for Amateur Radio experimenters in the past few years is Software Defined Radio (SDR). Gerald Youngblood's (K5SDR) QEX series "A Software Defined Radio for the Masses" and the Flex-Radio SDR 1000 showed the possibilities of the technology for experimenters. Tony Park's (KB9YIG) SoftRock line of receivers has brought SDR technology to thousands of amateur experimenters.

HPSDR.org is an effort started by a number of SDR enthusiasts who wanted to experiment with SDR and try to build a high performance SDR. Many of the initial HPSDR contributors have been involved with the SDR 1000 community and the SoftRock community the last few years and would like to try and incorporate some of the lessons learned from those radios as well as newer technology.

HPSDR.org is an informal organization; composed of people interested in developing, building and experimenting with high performance SDR. The group has a web site, mailing list, wiki, and SVN server. Folks

### *An Open, Collaborative Community to Experiment with High Performance Software Defined Radio*

interested in a particular project can propose it on the mailing list, find folks interested in working on it on the list, document it on the wiki, and manage code development using the SVN server.

The first HPSDR project was the Atlas board, currently available from TAPR, which is a passive backplane that other HPSDR boards are plugged into. Most boards for HPSDR will have a connector that mates with the Atlas so we can take a building block approach to building projects. Also currently available from TAPR is the Pinocchio board, which is an extender card that allows an Atlas bus card to sit above the other cards plugged into Atlas. This allows for easy probing with test equipment. This has proved to be a valuable aid in developing some of the other Atlas connected boards. Pinocchio was designed a laid out by Lyle Johnson, KK7P.

The next two boards from HPSDR will be the Ozymandias (Ozy, for short)

USB2/IO board and the Janus sound board. Ozy provides local logic on the Atlas bus, and connects back to a PC via a USB 2 connection. The board has a Cypress FX2 EZ-USB microcontroller to handle the USB 2 connection and a large Altera FPGA to



FIGURE 1. JANUS

provide logic and control. A DB25 and DB9 connector are provided on the Ozy board for connection of other devices. Phil Covington, N8VB, did all of the design and board layout work on the Ozy board.

The Janus board is a high quality sound card designed specifically for SDR applications. It has a 24-bit 192-kHz AKM AK5394A A/D converter for digitizing down sampled RF. In an SDR, the A/D converter is one of the most critical items determining the performance of the receiver; the AK5394A is probably the best audio codec available today (See <http://hpsdr.org/hpsdr.org/wiki/images/4/46/Janus-DCC-2006-paper.pdf> for details on the different A/D converters tested). The Janus board also contains a TI TLV320AIC23B 16-bit 48-kHz codec for handling microphone input and speaker output, as well as an FPGA based PWM D/A converter for transmitted signal.

There is provision on Janus for phase locking the codec sampling clock to a 10 MHz reference signal for excellent frequency accuracy. There's also a small CPLD to allow for soft configuration of what lines to use on

the Atlas bus, as well as limited local logic on the Janus board itself. Phil Harman, VK6APH, is the designer behind Janus with some Verilog and software work from Bill Tracey, KD5TFD. Lyle Johnson, KK7P, did the board layout work.

As of this writing, Ozy and Janus are up and running and have been through two revisions. Initial testing is showing the sensitivity of the Janus board to be excellent, getting an ENOB of 20 (ENOB is the Effective number of bits, it essentially tells how many of the bits are not covered up by the noise of the A/D converter and its input stage). Check [www.tapr.org](http://www.tapr.org) for pricing and availability of the Janus and Ozy boards.

There are some additional HPSDR projects currently under active development. One of these is the Mercury receiver being worked on by Phil Harman, VK6APH, and Phil Covington, N8VB. Mercury is a direct sampling receiver based on an

LT2208 16-bit 130-ms/sec A/D converter. The data stream from the converter is too much to send to a PC to process via USB 2, so an FPGA on the Mercury board will be used to decimate, and down-convert portions of the 65 MHz of spectrum the A/D converter sees to send to the PC for processing. Phil Harman has jury-rigged an LT evaluation board and Ozy to build a prototype Mercury receiver and

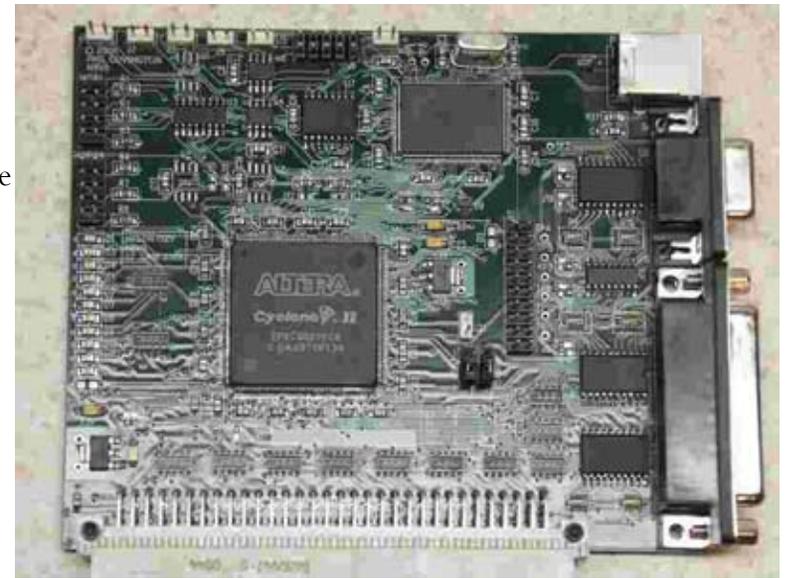


FIGURE 2. Ozy

reports good results with it feeding a slightly modified version of PowerSDR.

To go with the Mercury receiver, Phil Harman is also working on a transmitter board called Penelope. This board is in the early stages of design and prototyping. The design at the moment calls for an FPGA to do up-conversion and interpolation to feed a high speed D/A converter, followed by switchable bank of low pass filters and a 1-watt power amplifier. The board also contains provisions to phase lock a 10 MHz reference to the D/A clock, as well as input provision for mic and line in. One interesting experiment going on with the Penelope prototype is use of an Envelope Elimination and Restoration (EER) power amplifier.

Along a somewhat independent development track is the Odyssey project. This is a low power handheld SDR implementation based on a QSD, QSE, and dsPIC33 targeted at SuitSat2. This project is composed of four boards: Siren, Odysseus, Cyclops, and Circe. Siren is the basic QSD/QSE based transceiver with a dsPIC33 for DSP work. Odysseus is a

PIC24-based board that encodes packet and SSTV, as well as providing recorded voice to be fed to Siren. Cyclops is a video capture board to provide video for Odysseus to SSTV encode and Circe is a mixer/amplifier board to 2m transmit and 70 cm receive. The designers of Odyssey are: Joe Julicher, N9WXU, Steve Bible, N7HPR, Frank Brickle, AB2KT, Bob McGwier, N4HY, and Lou McFadin, W5DID.

With the development of Janus and Ozy wrapping up, these boards should be available to the community soon. I encourage folks to get involved and experiment with this technology when it becomes available. There are excellent opportunities to experiment with hardware, firmware and software with these boards. As a community, we certainly have the skills and capabilities to build an excellent High Performance SDR. Who said the age of experimentation in Amateur Radio was over; we're only just starting!

For more information on HPSDR visit the web site <http://hpsdr.org>.

#### **Inquiry: 802.16 Metro Area Networks**

Are there any Amateur Radio folks interested in putting up 802.16 towers? If so, contact Ralph Hyre, N3FGW, at [n3fgw@arrl.net](mailto:n3fgw@arrl.net).

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## “FatPPS” Pulse Stretcher

By John Ackermann N8UR <jra@febo.com>

Is your PPS signal too short to trigger your serial port? Is that what's troubling you, Bunkie?

If so, the new TAPR FatPPS is the answer you've been looking for...

The FatPPS is another of TAPR's products aimed at time and frequency experimenters. High performance time systems use one pulse per second (PPS) signals for synchronization. The pulse coming out of some equipment is too short to trigger other gear, notably PC serial ports.

The FatPPS is a DB-9 “dongle” that implements a pulse stretcher. Input signals as short as 20 nanoseconds produce an output pulse about 30 milliseconds wide (the width can be changed by changing a few component values). It can be powered from the host computer's serial port, and so requires no external connections at all. It works with either TTL or RS-232 level input pulses (the output is always TTL level), and can invert input or output pulse polarity if needed.

I designed the FatPPS because the ~20 microsecond wide PPS signals from several of my time sources (like the Z3801A GPSDO, and HP frequency standards) was too short to reliably work with the serial ports on my NTP servers. Hopefully, it will be of use to some of you as well.

The FatPPS is available only as a fully assembled and tested unit, and is shipping now. The price is \$44 for TAPR members, and \$49 for non-members.

There are more details, and you can place an order, at [www.tapr.org/kits\\_fatpps.html](http://www.tapr.org/kits_fatpps.html). You can view the installation and operations manual (which is still a work in progress) at [www.tapr.org/~n8ur/FatPPS\\_Manual.pdf](http://www.tapr.org/~n8ur/FatPPS_Manual.pdf).



## Gwyn Reedy, W1BEL, Silent Key

Gwyn Reedy, W1BEL, the former editor of this newsletter and the founder and president of PacComm Packet Radio Systems, died in a vehicular accident in Painted Post, NY, on December 17, 2006. Gwyn was a packet radio pioneer and besides producing TNCs, packet modems, and related equipment through his company, PacComm, he was also instrumental, working with the Florida Amateur Digital Communication Association (FADCA), in promoting packet radio throughout the Sunshine State and beyond. Gwyn was 62 years old at the time of his death.

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*Dayton Hamvention News*

## TAPR and AMSAT Combine Dinners at US Air Force Museum

On Friday, May 18, TAPR and AMSAT will break bread together by combining their annual Dayton Hamvention dinners at The National Museum of the United States Air Force <[www.nationalmuseum.af.mil/](http://www.nationalmuseum.af.mil/)> at Wright-Patterson Air Force Base. In addition to a buffet meal with three main courses (for \$35 per head) and an after-dinner speaker, attendees will be able to tour the museum for up to four hours.

Standby for more detailed information to be published in the next issue of PSR and at [www.tapr.org](http://www.tapr.org).

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*Dayton Hamvention News*

## Official TAPR Hamvention Hotel

By John Koster, W9DDD <[w9ddd@tapr.org](mailto:w9ddd@tapr.org)>

I don't know if we ever had an official hotel at Dayton. We did seem to have a number of members all staying in the same location there at the Best Western/Radisson's/Imperial House North at I-75 and Needmore Road. The TAPR board members all stayed in the same place in order to meet in someone's room for a board meeting. It seems though that we had a lot more members dropping in to listen or say hello than in recent years.

After several changes in ownership, the place became unbearable. We moved across I-75 to the Courtyard and then the Drury Inn. Both nice places, but the room rates got to be a little high. But, we didn't do a very good job of telling the membership where we were meeting. Last year, we checked the rates at the Dayton Airport Hotel and were surprised to find them to be very reasonable. It isn't a new property, but has been renovated. As many of you know, we held the TAPR Digital BASH there last year.

The location turned out to be a few tenths of a mile further from the Hara Arena, but the drive time and stress was less. So, we're going back there this year. (The digital BASH won't be there though, see the AMSAT/TAPR dinner announcement on the left.)

In order to pull things back together so we have more membership synergism, we've had the hotel hold a block a of rooms for TAPR members. The "Hamvention TAPR Member Group" room rate is \$69.00 single/double. This special rate is good until April 30, 2007 or until the block of rooms is all sold out.

Be sure to book your rooms early!

The Dayton Airport Hotel is located at 3330 Terminal Drive, Vandalia, OH 45377, phone 1-800-543-7577, URL [www.cwbpm.com/dayton\\_airport\\_hotel.htm](http://www.cwbpm.com/dayton_airport_hotel.htm)

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## Second (Decade) Down and Third to Go

By Jay Slough, K4ZLE <k4zle@fuse.net>

The 21st Southwest Ohio Digital and Technical Symposium was held on January 13, 2007 and is now history. This venue for sharing technical information began in the infant days of packet radio. Carl Morgan, K8NHE, (now K8CM) made a proposal on the local WORLI bulletin board to have some sort of technical conference to help everyone understand this new technology. Since he was a professor at Miami University, Middletown, he further proposed that we have it there in early January between school sessions. As I remember it, Carl, Ernie Howard, Jr., AG8Y, (now W8EH), Hank Greeb, N8XX and I somehow agreed to be involved.

And the games began.

At that time we had an organization in Ohio that was trying to help coordinate packet activity called Ohio Packet Council. They agreed to be one of the sponsoring organizations. Since then, that organization has ceased to exist and the local Middletown ham organization, Dial Radio Club, has become the local sponsor. The symposium has become an ARRL sanctioned convention. Other organizations that have contributed over the years are AMSAT and TAPR.

Past topics have ranged from basic to state-of-the-art. Of course, in the early days there was much discussion on basic packet, APRS, BBS operations, network development, keyboard-to-keyboard etiquette and similar subjects. Most of those topics still show up on the program, but with modern insights applied. In addition, we have had presentations on up-to-the-minute technological happenings, like software defined radio development, High Speed Multimedia Networks, WinLink 2K, PacketCluster operation and more.

This year's program is representative of the typical breadth of topics covered. The presenters and their topics were: John Ackerman, N8UR - An overview of the TAPR sponsored High Performance Software Defined Radio project; Tony Parks, KB9YIG - The SoftRock SDR project; Mark Thompson, WB9QZB - An introduction to D-Star; Jim Everly, K8IKE - A PSK audio beacon project; Mike Murphy, KB8ABR - 10 GHz EME using the Bethany VOA satellite dish; Gerd Schrick, WB8IBM, and Steve Coy, K8UD - AMSAT update; John McDonough, WB8RCR - The Michigan (digital network) Experience; Greg Zach, WG8Z - WinLink 2K implementation in SW OH; Jay Slough, K4ZLE -

Using the R-X noise bridge and of course an ARRL forum/presentation by our Great Lakes director, Jim Weaver, K8JE and Ohio Section manager, Joe Phillips, K8QOE.

For a regional event, we have attracted attendees from west of the Mississippi River, as far north as Michigan, as far east as Pennsylvania and from southern Kentucky. Number wise, we usually have about 100 participants. As mentioned earlier, the venue has been the Middletown Campus of Miami University. Because we are at a university, we have access to audio/visual/network facilities that would not otherwise be available.

This year we took advantage of that capability and used technology as a means to convey technology. Two of our presenters made live presentations, but from remote locations. Early in the week of the symposium, Mark, WB9QZB, opted for a remote presentation, because he lives in the Chicago area and the weather was looking "iffy" for travel by car. We used WinEx for the video and Skype for the audio. From the beginning, John, WB8RCR, and I had planned for him to use Microsoft Net Meeting or Messenger for his presentation. On the day of the conference we could not get audio

through Messenger or Net Meeting. However, the video component worked well. Thanks to having high-speed Internet access, I quickly installed Echolink on my laptop and we did his video over Net Meeting and audio through the Echolink QRP conference. Ed Hare, W1RFI, was originally scheduled to do a remote technical presentation but had a last minute family issue that required him to bow out.

This symposium is unusual in that there are no attendance fees. There is no flea market. There is no commercial sponsorship. It is not a way to raise money; rather, it is a way to raise the knowledge level of ham radio related technology. In addition to the formal presentations, we encourage informal sharing through a demonstration room. In coming years we plan to expand this “in vivo” component by emphasizing a “Science Fair” format and allowing more time for one to one interaction.

We are looking forward to moving even further forward in 2008. Now that we have successfully proven the remote presentation concept, we plan to incorporate this medium to bring additional “heavy hitter” presenters to the symposium to share with us. Who knows what lies just over that technological

horizon? Whatever it is we plan to explore it and share it at the 22nd Southwest Ohio Digital & Technical Symposium. Mark your calendars for Jan 12, 2008 and come see “what God hath wrought” in the 21st century.

## *Digital Communications Conference News*

### **‘07 Dates and Site**

September 28-30 are the dates and Windsor Locks, Connecticut the site for the 2007 installment of the TAPR and ARRL Digital Communications Conference (DCC). The conference will be held at the DoubleTree Hotel Bradley International Airport, 16 Ella Grasso Turnpike, Windsor Locks, CT 06096, which is about one mile from Bradley International Airport (BDL).

Bradley serves the Hartford, CT - Springfield, MA metropolitan area and is located 16 and 20 miles from each city, respectively, and 18 miles from ARRL Headquarters in Newington, CT.

The room rates will be \$79.00 single/double. Reservations can be made by calling the hotel directly at 860-627-5171. Be sure to mention group code “DCC” when making reservations.

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TAPR is always interested in receiving information and articles for publication. If you have an idea for an article you would like to see, or you or someone you know is doing something that would interest TAPR, please contact the editor ([wallou@tapr.org](mailto:wallou@tapr.org)) so that your work can be shared with the Amateur Radio community. If you feel uncomfortable or otherwise unable to write an article yourself, please contact the editor for assistance. Preferred format for articles is plain ASCII text (Microsoft Word is acceptable). Preferred graphic formats are PS/EPS/TIFF (diagrams, black and white photographs), or TIFF/JPEG/GIF (color photographs). Please submit graphics at a minimum of 300 DPL.

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