President's Corner
By Steven Bible, N7HPR, President, TAPR

You will find everything you want to know about the ARRL and TAPR Digital Communications Conference (DCC) in the following pages of *PSR* and on our website at www.tapr.org/dcc.html, where you can register for the event and make reservations at the hosting hotel, Sheraton Gateway Hotel at the Atlanta, Georgia airport.

The DCC team worked very hard for months organizing the event, so I hope to see you at DCC and I hope you enjoy it and get a lot out of it.

Perhaps DCC will inspire you to do something new and if you do, TAPR is here to support your efforts. All you have to do is ask.

In the last *PSR*, the TAPR board members and officers were asked to write briefly about what they were doing.

In this *PSR*, they were asked to list and briefly describe any websites, blogs, etc. (if any) that they webmaster and/or blog.

I myself don't blog or webmaster a website, but I do e-mail sitreps (situation reports) regularly. As for the other TAPR directors and officers, here goes...

John Ackermann, N8UR – www.febo.com – Nearly all my current stuff shows up in various folders under www.febo.com/pages and the easiest way to see what I've been up to recently is to prowl around there and look at the dates (some topics are nested a few folders deep).

Tom Holmes, N8ZM – I don't do anything of the blog variety, but I do author a monthly column in the Midwest VHF / UHF Society's (www.mvus.org) newsletter, Anomalous Propagation. It is the President's monthly commentary on club activities, and occasionally there is some humor thrown in. Well, I think it is humor; Ackermann may have other ideas.

Stan Horzepa, WA1LOU – I write *Surfin'* weekly for the ARRL website (www.arrl.org). I blog at http://horzepa.blogspot.com. I also webmaster www.wolcotthistory.org, the website of my town's historical society.

John Koster, W9DDD – John doesn't blog. John doesn't do facebook. John doesn't do linkedin. John doesn't twitter (or tweet or toot or whatever it is). John kits PennyWhistle and tries to answer any questions submitted to the TAPR Office. John is guilty of any errors etc. on www.tapr.org pages.

Jeremy McDermond, NH6Z – I contribute hosting space and resources for www.nasota.org. There are trip reports and such about my SOTA adventures and such up there. I also have some trip reports on http://sota.nh6z.net. My main website is www.nh6z.net. It has some blog-ish posts on my ham radio experiments.

Darryl Smith, VK2TDS – http://blog.radio-active.net.au/ and www.thecrazyengineer.com

73,

Steve Bible, N7HPR, President TAPR

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TAPR is a community that provides leadership and resources to radio amateurs for the pur-

Schedule at a Glance

Friday, 21 Sep

8:00 AM	Conference Registration and Demonstration Room Open
8:45 AM	Welcome
9:00 AM	Technical Presentations
Noon	Lunch
1:00 PM	Technical Presentations
5:30 PM	Friday Night Social
10:00 PM	Demonstration Room Closed

Saturday, 22 Sep

8:00 AM	Conference Registration and Demonstration Room Open
8:45 AM	Welcome
9:00 AM	Technical Presentations
Noon	Lunch
1:00 PM	Technical Presentations
4:00 PM	TAPR Membership Meeting
7:00 PM	Dinner Banquet
10:00 PM	Demonstration Room Closed

Sunday, 23 Sep

8:00 AM	Sunday Seminar
Noon	

Rooms at a Glance

Registration – Paris Foyer
Demonstration Room – Bahamas/Bermuda
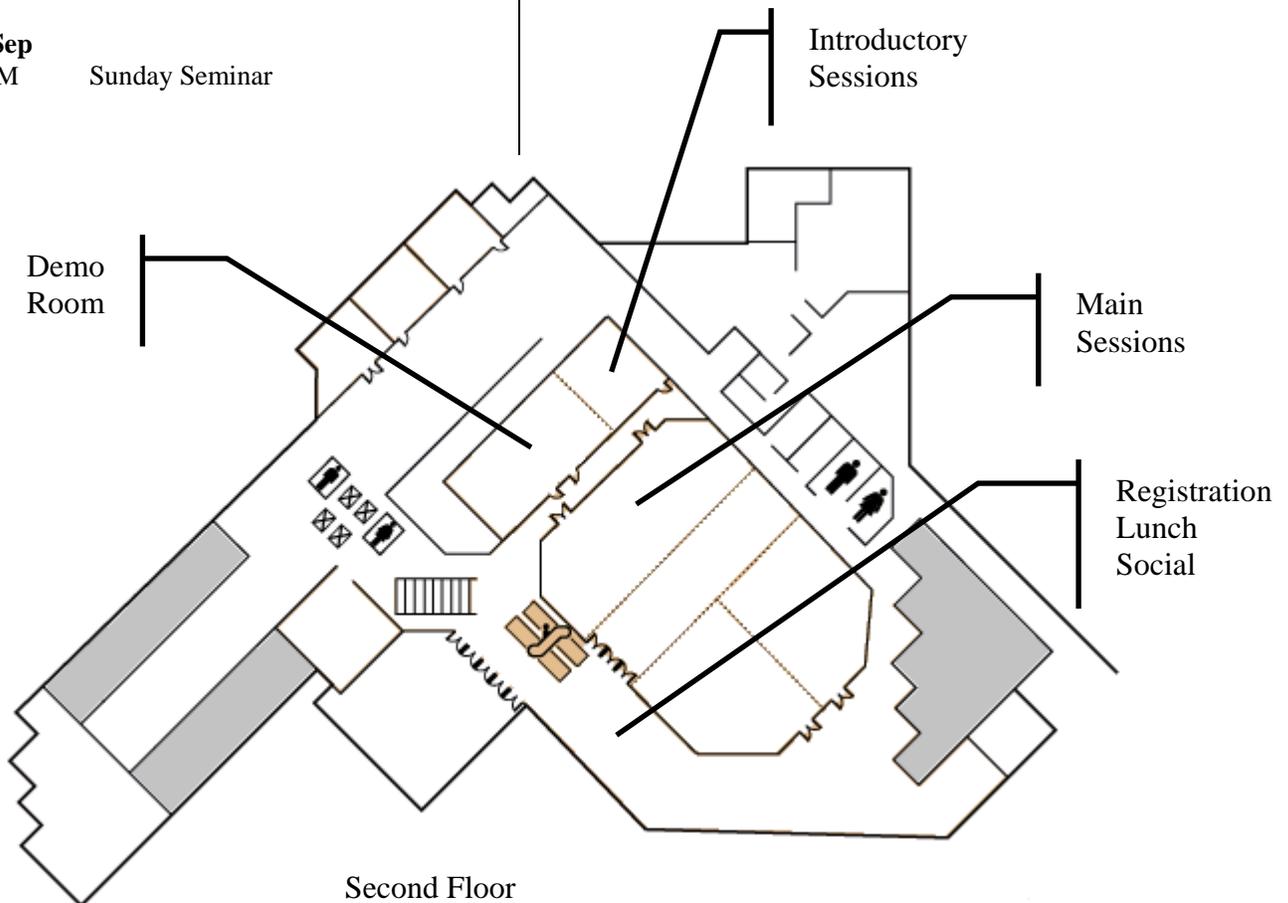
Friday
    Main Session Technical Presentations – London/Amsterdam
    Lunch – Paris Foyer
    DCC Social – Paris Foyer

Saturday
    Main Session Technical Presentations – London/Amsterdam
    Introductory Sessions – Jamaica
    Lunch – Paris Foyer
    Dinner Banquet – London/Amsterdam

Sunday
    Sunday Seminar – London/Amsterdam

Introductory Sessions

Demo Room

Main Sessions

Registration Lunch Social

Second Floor

Preliminary 2012 DCC Conference Schedule

Last Revision: August 27, 2012

	Friday	Saturday		Sunday
8:00 AM	**Conference Registration** Demonstration Room Open	**Conference Registration** Demonstration Room Open		**Sunday Seminar** **8:00 AM – 12:00 AM** **Exploring GNU Radio: From Filters to Digital Demodulators** Tom Rondeau, KB3UKZ
8:45 AM	**Main Session** **Welcome and Introductions**	**Main Session** **Welcome and Introductions**	**Introductory Session**	
9:00 AM	**ARISSat-1 Operational Survey Results** Steven Bible, N7HPR	**Experimenting with High Speed Wireless Networking in the 420 MHz Band** David Bern, W2LNX	**Intro to D-Star** John Davis, WB4QDX	
9:45 AM	**AMSAT Fox Update** Bdale Garbee, KB0G	**On-line Alternation of Modulation Techniques using a Dynamic Switch RadioPlus** Shashank Gaur		
10:30 AM	**openHPSDR Update** Scotty Cowling, WA2DFI Jeremy McDermond, NH6Z	**Design of a Practical Handheld Software Radio** Chris Testa, KD2BMH	**Intro to APRS** John Gorkos, AB0OO	
11:15 AM	**SDR Architectures for Digital Communications** Stephen Hicks, N5AC	**Digital Amateur Radio in Support of Situational Awareness, Common Operating Picture and Community Resilience** Aleksandra Rohde, W3JAG		
Noon	Lunch	Lunch		
1:00 PM	**A Hailing Channel for Packet Radio** Bryan Hoyer, K7UDR	**Is the unlicensed band "good enough" to deploy a muni Wi-Fi network without mesh infrastructure?** Devabhaktuni Srikrishna	**Intro to SMT Soldering** Larry Wolfgang, WR1B	
1:45 PM	**aprsc, An Open-Source High-Performance APRS-IS Core Server** Heikki Hannikainen, OH7LZB	**HF DV with the new FDMDV2 and CODEC2** Dave Witten, KD0EAG Mel Whitten, K0PFX		
2:30 PM	**The Development of "Yet Another APRS Client" an Open Source Cross Platfrom Application** Andrew Pavlin, KA2DDO	**DV Access Point Dongle** Moe Wheatley, AE4JY		
3:15 PM	**Behind the Curtains of aprs.fi** Heikki Hannikainen, OH7LZB	**Using D-STAR High Speed and Low Speed Data** John Davis, WB4QDX		
4:00 PM	**Play Time** in the Demonstration Room	**TAPR Annual Meeting**		
		Play Time in the Demonstration Room		
5:30 PM	**Friday Night Social**			
7:00 PM	**No-Host Bar**	**Dinner** **No-Host Bar** **Banquet Speaker** Bdale Garbee, KB0G Sharing the Joy of Making **Awards Presentation** **Prize Drawings**		
10:00 PM	Demonstration Room Closed			

Sharing the Joy of Making
Bdale Garbee, KB0G

There's nothing more exhilarating to me than making something useful that actually works, except possibly seeing the same exhilaration in the eyes of someone else I've inspired to make something useful themselves! This is the main reason I'm so pleased to have forged a career in Free Software, started a successful small business building high power rocket avionics where *everything* is open source, and it's why many of my hobby projects end up as talks given at high-profile international conferences. In this talk, I'll share some of what I've learned in the process of making things and sharing them with others, hopefully inspiring you to make more things yourself, and help others to do so too!

Biography - A contributor to the Free Software community since 1979, Bdale's background also includes many years of hardware design, Unix internals, and embedded systems work. He was an early participant in the Debian project, helped port Debian GNU/Linux to 5 architectures, served as Debian Project Leader, is chairman of the Debian Technical Committee, and remains active in the Debian community.

Bdale serves as President of Software in the Public Interest, and on the boards of directors of the Linux Foundation, the Freedombox Foundation, and Open Media Now. He is a frequent speaker at Linux and Open Source conferences, and works closely with various projects in the Open Source community.

In 2008, Bdale became the first individual recipient of a Lutece d'Or award from the Federation Nationale de l'Industrie du Logiciel Libre in France.

Now retired from his work at HP, Bdale engages in a wide variety of personal activities. His most significant hobbies are high-powered model rocketry and amateur radio, where he is widely known for his contributions to packet radio, weak-signal communications, software defined radio, and building amateur satellites.

Sunday Seminar

Exploring GNU Radio: From Filters to Digital Demodulators
Tom Rondeau, KB3UKZ

Abstract - The GNU Radio seminar will cover the basics of using the GNU Radio software radio development platform to manipulate digitally modulated signals. The goal of this seminar will be to build a QPSK transmitter and receiver. In doing so, we will explore GNU Radio's features and available tools to help us understand the development and debugging process of software radio.

The seminar is split into three parts:

 - Part I is a basic overview and introduction to GNU Radio that will explain where to get the code, requirements, basic usage, and where to go for information and help.

 - Part II will dive into some of the fundamental building blocks of GNU Radio. Some of the most important pieces of GNU Radio are the visualization and data source generation. These are fundamental in being able to explore, simulate, experiment, and debug signals and radio transceivers. The second half of this part will cover the basic filter tools available in GNU Radio. As filtering is such an important tool for signal processing, we want to understand how to build and use filters as part of a GNU Radio flowgraph. This part serves not only to expose these fundamentals of the software platform but will also be a basic introduction to building GNU Radio applications.

 - Part III will deal with building of QPSK transmitters and receivers. We will start by creating a simulation environment for modulating and demodulating bits. This will involve the use of a simulated channel model to explore different aspects of signal degradation like noise, frequency offset, timing offset, and multipath effects. We will then look at various ways to look at the signal and how to use existing blocks in GNU Radio to compensate.

The conclusions of the seminar will involve the use of real radio hardware to transmit and receive QPSK signals over the air. This will explore a couple of different RF front ends used in GNU Radio and the considerations given to the hardware/software mix.

By the end of the seminar, participants will have a better understanding of how to work with and explore GNU Radio. They will have to tools and knowledge to build transmitters and receivers on their own and a better understanding of the debug tools and techniques used.

2012 ARRL/TAPR Digital Communications Conference

September 21-23 in Atlanta, Georgia

Make your reservations now for three days of learning and enjoyment at the Sheraton Gateway Hotel Atlanta Georgia. The Digital Communications Conference schedule includes technical and introductory forums, demonstrations, a Saturday evening banquet and an in-depth Sunday seminar. This conference is for everyone with an interest in digital communications —beginner to expert.

Call TAPR at:
972-671-8277, or go online to www.tapr.org/dcc

The following is an excerpt of a paper submitted to the The 31th Annual ARRL and TAPR Digital Communications Conference to be held on September 21-23, 2012 in Atlanta, Georgia:

Experimenting with High-Speed Wireless Networking in the 420 MHz Band

David Bern, W2LNX

Montgomery College, Rockville, Maryland

W2LNX at arrl.net

This paper reports on our testing the Doodle Labs DL435-30 and Xagyl Communications XC420M wireless networking miniPCI cards. They behave like IEEE 802.11 wireless networking cards but operate in the 420 MHz band. We have successfully tested these cards over 10 miles at about three Mbit/s data rate at a 5 MHz bandwidth in the 420 to 426 MHz ATV sub-band. Our test applications were a Webcam video streaming program and a file download server program that ran on inexpensive netbook computers.

Keywords: 420 MHz, DATV, IEEE 802.11, miniPCI, TCP/IP, wireless networking

Conclusions and recommendations

We can confidently claim that the Doodle Labs DL435-30 and the Xagyl Communications XC420M wireless networking cards on 420 MHz work as advertised. They have comparable performance since they easily passed our acceptance test of one Mbit/s data rate over a 10 mile distance. The Doodle Labs cards appear to have a faster data rate, but in North America, the Xagyl cards are more conveniently available since they are shipped from a U. S. address or a Canadian address and they were 35 percent less expensive than the Doodle Labs cards at time of purchase.

This paper can be found at www.tapr.org/pdf/DCC2012-Experimenting-...-Wireless-Networking-in-420-MHz-Band-W2LNX.pdf

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TAPR, PSR and Other Initialisms
By Stan Horzepa, WA1LOU

Late in 1981, the Tucson Amateur Packet Radio Corporation (TAPR) was founded in Tucson, Arizona, by Den Connors, KD2S. TAPR immediately embarked on a project to build a packet radio terminal node controller (TNC); their first effort, the TAPR alpha board was introduced early the following year. The alpha board was based on the 6502 microprocessor. It was short-lived however, as the TAPR beta board premiered in the autumn of 1982. The beta board was based on the 6809 microprocessor and was the forerunner of the TAPR TNC 1, which was introduced one year later.

Early on, TAPR began documenting its efforts in a regularly-published newsletter called *Packet Status Register* (*PSR*).

Over the years as packet radio matured, TAPR moved on to other new pursuits and other locales becoming an international membership organization for Amateur Radio research and development. As a result of these moves, the organization shed its Tucson and packet identities and simply became known as "TAPR," while its newsletter simply became known as "*PSR*."

And so it goes.

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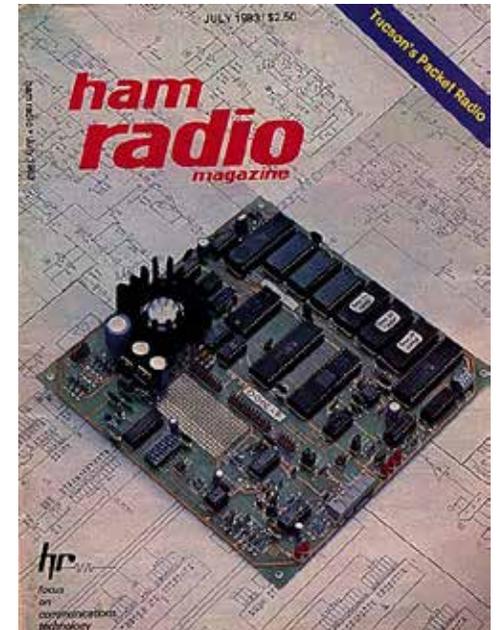
TAPR at Hamvention

By George Byrkit, K9TRV

I was at Hara arena on Thursday, Friday and Saturday.

On Thursday, I worked for the Hamvention as a volunteer, patrolling the North Hall dealing with exhibitor questions and issues. I did wander over to the Ball Arena to visit the TAPR crowd as they were setting up and preparing for the evening's board meeting.

The forum early Friday morning went well. David Rowe (VK5DGR) from Australia spoke well about his Codec2 project. Steve Bible (N7HPR) and Scotty Cowling (WA2DFI) spoke about TAPR and HPSDR stuff. John Ackerman (N8UR) spoke about TimeNuts related TAPR stuff. A mention of David (W2LNX) Bern's 450-MHz broadband-over-hamband mesh net was made. David was on hand at the booth on Friday and Saturday demonstrating his hardware by sending video from one side of the booth to another.

Jeremy McDermond (NH6Z) was showing his iPad app on his shiny new iPad 3 (gorgeous display! Best of any tablet, easily!) app, connected to Hermes. Scotty was showing an unconnected Hermes board, an unpopulated Apollo board, an unpopulated Munin board, and his SDR-Stick. The SDR-Stick is the HF equivalent of the FunCube Dongle (which is for VHF/UHF). Scotty had his FunCube Dongle there as well. David's presentation was running continuously on Bruce (K6BP) Perens' computer. Bruce was present handing out flyers covering the Codec2 project.

The booth was staffed by the usual suspects (Jeremy, Scotty, Dan Babcock (N4XWE), John Ackermann, the TAPR office crew, the presenters at the forum) plus myself also answering questions. Many hams with OpenHPSDR hardware stopped by and chatted. Dave Larsen (KV0S) was unfortunately apparently not able to make it. Warren Pratt (NR0V) was there, and I got to meet him on Friday. Didn't see him on Saturday, though.

Flex did announce their new radio and software. However, that's a non-issue as OpenHPSDR is for the experimenter and FlexRadio is not for the experimenter. Our open hardware and open software put us in a different product space. Not to mention that we're non-commercial and FlexRadio is clearly commercial.

Last year was clearly quite special, with Phil Harmon (VK6APH) and Kjell Karlsen (LA2NI) both present. It was different, but similar, with the group present this year.

We did manage to sell an OpenHPSDR board set to a German ham that I spent some time talking to. After I talked with him, I think he went over to Flex, maybe some of the SDR receiver people, and came back and bought a board set from John Koster. Unfortunately, I guess we didn't have any Pandora boxes for sale at Dayton.

(Editor's Note: See the TAPR Hamvention photo gallery on page 13.)

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Mel Whitten, K0PFX, manning the TAPR booth at the 2012 Hamvention.

Scotty Cowling, WA2DFI, demonstrating HPSDR in the Hamvention TAPR booth.

VK5DGR to Receive ARRL Technical Innovation Award

Southgate Amateur Radio News (www.southgatearc.org/)

The ARRL Board has awarded the 2012 ARRL Technical Innovation Award to David Rowe VK5DGR for his work on the Amateur Radio Codec2 low bit rate speech Codec.

The ARRL Board minutes for July 20-21 say: "On motion of Mr. Norris, seconded by Dr. Weaver, the following was ADOPTED with applause:

"Whereas David Rowe, VK5DGR, has been a major leader and the primary technical author of an open-source CODEC2 protocol, designed to address the impediment to the development of amateur digital-voice posed by closed sources protocols; and Whereas the open-source nature of this work is a major step forward in the development of digital voice communications;

"Therefore, the ARRL Board of Directors awards the 2012 ARRL Technical Innovation Award to David Rowe, VK5DGR."

On hearing of his award David Rowe VK5DGR said, "When I first became interested in Ham Radio as a 12 year old in the late 70s my grandfather bought me the 1979 ARRL handbook. Quite an honor to one day be contributing back to this fine hobby that was my start in a communications and electronics career."

"That version of the handbook even had a chapter on "Narrow Band Voice Modulation" - an esoteric analog technique to compress speech by removing chunks of audio bandwidth. Who would have thought that 30 years later I 'd be contributing in the same area..."

Read the full ARRL board minutes for the meeting

www.arrl.org/files/media/News/2012_Second_Meeting_ARRL_Board_Minutes_Final.pdf

Video of a Codec2 presentation by VK5DGR www.southgatearc.org/news/january2012/codec2_presentation_video.htm

Read the David Rowe VK5DGR blog at www.rowetel.com/blog

Join the Codec2 e-mail list at https://lists.sourceforge.net/lists/listinfo/freetel-codec2

(Editor's Note: TAPR has been a big supporter of VK5DGR's Codec2 effort from approximately the get-go.)

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David Rowe, VK5DGR, speaking at the TAPR Forum at the 2012 Dayton Hamvention.

Hardware News

Hermes

TAPR sold out its one production run of Hermes is a single-board digital up and down conversion (DUC/DDC) full-duplex HF plus 6-meter multi-mode transceiver. It is basically the HPSDR Mercury, Pennylane, Metis and Excalibur (less TCXO) boards rolled into one PCB. The board communicates to an associated computer via 100T/1000T Ethernet.

The Hermes board is completely assembled and tested. Estimated delivery is October 15, or earlier if possible.

More information is available at www.tapr.org/kits_hermes.html and www.openhpsdr.org/wiki/index.php?title=HERMES.

Motorola Oncore GT+ GPS

TAPR has used Motorola Oncore GT+ GPS receivers available for sale at www.tapr.org/gps_GT-UT.html.

The receiver makes a great spare for an existing system or a great hack for something new.

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Advances in Software Defined Radio Usage
By Alan Hill, W6ARH

Software Defined Radios (SDRs) have enjoyed a considerable improvement in the technologies applied to their design, which results in increased functionality with a decreased footprint in board usage and with the operating features useable with these radios. Today's SDRs are notable for their improved performance associated with small costs compared to top-of-the-line commercial ham radios.

While the hardware has been under development with the benefit of groups of experienced hams that have engineering and computer expertise, this has kept the family of competitors rather constrained.

Software needed to make the radios useful has had a larger variety of competing offerings. The genealogy of the operating software has its roots at the offerings from FlexRadio Systems, which was the commercial entry best known for an off-the-shelf SDR product. Since it was imperative for the FlexRadio to have a computer-based management system, a full-capability, graphic-oriented radio console program was created and distributed free of charge. This product was named *SDR-Radio* and served as the standard for testing the emerging hardware SDR systems.

Since it was not designed to fully integrate the newer experimental radios, there has been a multitude of folks developing their own open source (free) software to interface with the SDRs. Some of them are: *Rocky*, *SDR-Radio*, *SDR#*, *HPSDR*, and *PSDR* to name a few of the more common ones.

What primarily drives the computer usage is the fact that SDRs are not useable without software to do Digital Signal Processing (DSP). The computer also is used to set the oscillator, filters, power amps and other miscellaneous components to make the SDR useable as functional VHF/UHF/HF radios. While there are many capabilities in use with software, the fact that the computer generally has an Internet interface opens up a whole new array of capabilities provided by the SDRs. Recently, many of the hundred thousand SDRs in the world have become accessible over the Internet. This would seem like a novel, interesting, but unexciting development in ham radio, but I profess there is more to it than what may be apparent on the surface.

An Internet client on a PC or tablet allows the user to select SDR servers for connecting a display on your device. See the accompanying figure for a sample display. This allows any user to remotely see the received transmission using the client. One can instruct the remote radio to change what band and frequency it is listening to. As I noted before, you do not have to have a ham license to have access to these capabilities. The tablet client has been ported to run on Android-based computers which includes many of the cell phones.

This provides some less than obvious advantages for all users. One can operate any of the various types of SDRs, experience the difference in what is received in various countries, observe the differences in filtering and pre-amps, compare differing antenna arrangements and many other combination of ham shack configurations. See the accompanying figure for a sample of the client output.

Late breaking news is that remote transmit is being implemented. This introduces lots of other opportunities while also opening a can of worms regarding legalities and restrictions. It will be interesting to see how it sorts itself out.

Keep tuned for further developments. More information is available on a wiki: http://openhpsdr.org/wiki/index.php?title=Ghpsdr3

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SDR Client Display on Windows, Linux or Android OS

The Packet Node Project
By Dick Sisson, W5ONL

How I Became Involved in Packet

I used to be an HF (mostly cw) operator, with some interest in DX. My original motivation for getting into packet was to utilize the DX Packet Cluster for spotting new countries, and my occupation was Computer Consultant.

In 1990, I was sent to Wisconsin. We kept our home in Texas and leased a condo in Racine, literally on the shore of Lake Michigan. Although I took along a modest ham station, it did not have near the capabilities I had at home, so the DX Packet Cluster was no longer a big factor. As a result, I became involved with "mainstream" packet. (Many DX Packet Cluster users know little or nothing about "mainstream" packet, and probably could care less. I don't know whether or not the reverse is true.)

My packet station (then and now) consists of a crystal-controlled ICOM IC-20 (12 watts), a PK-88 TNC, a Ringo Ranger antenna, and a dumb terminal. The usual fare found on a packet BBS never interested me much. As a former DXer, I was more interested seeing how far I could go node traveling cross-country over the packet network. As my skill developed, I could travel well over 20 nodes away from Racine to such places as Dauphin, MB; Dickinson, ND; Omaha, NE; Indianapolis, IN; and the suburbs of Detroit, MI.

In 1993, I was sent to Akron, Ohio. We gave up the condo in Wisconsin and took an apartment in Akron, still keeping our permanent home in Texas. I discontinued my HF operations altogether (except for my 75S-3 receiver), but found packet to be particularly suitable for apartment dwellers. It took a very modest and inconspicuous antenna (the Ringo Ranger), and if I had any TVI, it

was in the form of extremely short bursts. My neighbors didn't know what it was or where it was coming from!

Soon I was node traveling to such places as Charlotte, NC; Chicago, IL; and Toronto, ON. The University of Akron had an Internet Gateway node (UAKRON:W8UPD) to which I could connect from our apartment, and through it, I could connect to other Internet Gateway nodes in such places as Sonoma County, CA; Alamogordo, NM; Corpus Christi, TX; Tampa, FL; Plymouth, NH; and Montreal, QC; then go node traveling over the air from each of those places. Later, I was able to map nodes in New Mexico, Colorado, Wyoming, and in the Republic of Mexico from Akron using this technique.

I also found that although western Pennsylvania wasn't far from Akron at all, it was a virtual brick wall so far as node travel was concerned. To node travel from Akron to Washington, DC, I found I had to go southeast to Burlington, NC, and then back north to Washington. The shorter direct path was impassable. It wasn't the terrain – I think it was politics. All stations west of an imaginary line operated on 145.01; all stations east of it operated on 145.03. They didn't talk to each other! I eventually found a very roundabout path between one station west of that line and one east of it that were just 35 miles apart. Despite my best efforts, I never did get them on a common frequency.

How The Packet Node Project was Founded

I don't recall exactly how Phil Isard, WF3W, and I got together to co-found The Packet Node Project. One individual in Arizona had done a surprisingly good job

of generating a paper map of the western half of the United States overlaid with the packet node network of that day. We set out to build a team to go node traveling and collect data on the nodes we visited, which we would use to generate such a map for all of North America. We recruited a number of hams across the country, and had each of them sign an agreement not to use the data we compiled for commercial purposes or to release it outside the team until it could be copyrighted. Phil maintained our file of signed agreements.

The Packet Node Project Evolves

Jim Strong, N8QCB (now W8SIW), wrote the initial software to import data from packet messages, e-mails and floppy disks, into an *MS Access* database. Although I was a computer professional, in those days I did not own a personal computer. I was, meanwhile, collecting a lot of the data we have on the packet network in Ohio, then 311 known nodes. I also collected data for the surrounding states and provinces as much as time permitted.

Jim dropped out early on, and progress on the software and the database ground to a halt. Meanwhile, data continued to trickle in from other team members. My task became to get the database built and loaded, while Phil, WF3W, was to line up suitable mapping software.

Using various borrowed computers, I finally accomplished my task. The data importing software was upgraded from *Visual Basic 3.0* to *Visual Basic 4.0*. About that time, The Packet Node Project was written up in *QST* magazine (December, 1994; p99).

In 1996, my wife and I gave up the apartment in Akron and returned to our home base in Texas, but we continued traveling on business through the end of 2000. We finally

bought our first personal (laptop) computer (*Windows 95*) in 1997, and it traveled with us. The same year, the packet database was upgraded from *Access 2.0* to *Access 97*, and by 1999, the data importing software was upgraded from *Visual Basic 4.0* to *Visual Basic 6.0*.

Release 1.0 of our database contained 1,407 nodes and was mailed out on floppy disks to team members. The release date was 9/24/97.

Phil became involved in editing a monthly online Amateur Radio newsletter and did little about mapping software. His failure to send agreement forms to several new recruits resulted in their leaving in disgust. It was clearly time to part ways with him. By then, Release 4.0 of the database had been mailed out to members. The file of signed agreements disappeared with Phil. The rest of us decided to discontinue requiring signed agreements, and to await getting the database and software copyrighted before releasing anything further. Phil and I still exchange e-mails occasionally, but he has no further involvement in the project.

Several hams who are also attorneys were contacted regarding help with securing copyrights for the database and software, but all declined. Understandably, all non-ham patent attorneys contacted want to charge a hefty fee for the service. All team members were contacted, and agreed to my offering to license TAPR for unlimited use of our data in return for their assistance with copyrights. Finally, in 2004, through assistance from John Ackermann, N8UR, then President of TAPR and an attorney who works frequently with copyrights, the copyright issue was laid to rest.

In 1999, my wife and I were in Yarmouth, Maine, and visited the headquarters of DeLorme, the cartographers. I was sharing with an employee there our interest in mapping the Amateur Radio packet node network of North America. Soon I was introduced to David DeLorme, one of the principals of the firm. David put me on a list of people they use to Beta test DeLorme software, and promised they would have a product to meet our needs out shortly.

Somewhat later, I received a copy of *DeLorme XMap-Business 1.0*. This did a fair job, but since I did not have a DVD drive on my laptop, it required a library of about 10 regional CDs to run. It was fine for the United States, but did not cover the rest of North America.

Somewhat later, I acquired a copy of *DeLorme XMap 4.0*, which is only slightly better outside the United States, but requires only a single CD to run. This was the mapping software of choice for a while. It could import data direct from our database or from an *Excel* file for the points representing node locations, but it still requires the mouse and keyboard to draw lines between the points. Maps can be viewed on the screen or printed on paper, but cannot be saved to disk or e-mailed; nor can the lines be drawn directly from a computer program. We continued looking for mapping software without these limitations that we could afford.

In 2005, Brian Webster, N2KGC, joined our team. Brian is a professional cartographer and was using state-of-the-art GIS mapping software (www.manifold.net) for the maps that accompanied our database. Brian took our mapping capabilities to a whole new level. In December, 2008, I upgraded *XMap 4.0* to *XMap 6.1*, which improved my compatibility with Brian and also improved our capabilities for mapping Canada considerably.

Brian's mapping software had rather stringent server requirements, such that many potential web hosts simply did not qualify. We found one that did, but we could not afford the $350/month the ISP wanted, so we were at an impasse for a while.

The initial version of *Pathfinder* was developed in 2000. *Pathfinder* is a software program originally written in *Visual Basic 6.0* that can find a path between any two nodes in our database, if one exists. The original *Pathfinder* had limited capabilities, but helped spot errors and omissions in the database. The software survived one hard drive crash in 2001, but a second hard drive crash, also in 2001, finally got it. The database had been backed up to floppy disk and survived. Fortunately, all the source code had been printed out, and the software was restored "better than before." I also had a quadruple coronary bypass, and semi-retired in 2001.

In 2003, we bought a second personal (desktop) computer (*Windows XP Professional*), and transferred the database and software to that, upgrading the database to *Access 2000* format. (It is actually *Access 2002*, but I maintain the database in *Access 2000* format for compatibility with team members. It could be easily upgraded). The old laptop finally died completely in 2005.

I retired gradually between 2001 and 2004. This gave me more time to devote to my interests, including The Packet Node Project. By 2004, the trickle of data from team members had trailed off to almost nothing. Some new nodes were added from data supplied in old packet newsletters, and we were concerned the data might no longer be current. Some of the data was so old that the credibility of the database was coming into question.

Moreover, we had kept such a low profile that many in the packet community did not realize The Packet Node Project existed. Several of the team members that we recruited in the early days became inactive with the project during this period, and most have never re-activated.

The decision was made to begin a routine update of the database on a state-by-state and province-by-province basis. This time, we would attempt to contact known SYSOPs directly to let them know of our existence and to assure the most accurate data. We started with states and provinces where our data had been most in need of improvement.

This database update was finally completed in January, 2006, and involved attempting to contact over 7,500 SYSOPs by e-mail or snail mail. Shortly thereafter, another update pass was begun; this time adding fixed APRS nodes. This update was completed in March, 2010. Soon, yet another update pass was begun. This update pass was interrupted for a while when we started to create a web site. After a time, the update pass was resumed. At this writing, it is still in progress.

What is a node?

The definition of a node is not entirely clear. In classical packet, nodes needed a personal computer and/or a special chip in the TNC, and functioned as a switching center, BBS, or DX Packet Cluster. Some forms of classical packet, such as Rose, are not completely compatible with the rest of the classical packet world.

The Packet Node Project has attempted to include all kinds of nodes, but has attempted to exclude ordinary packet stations from listing in the database. In other

forms of packet, such as APRS, Winlink, Echolink, etc., other technological differences tend to obscure the definition of "What is a node?" Currently, all long-term fixed APRS stations are eligible to be listed, including Winlink, but no Echolink stations are intentionally listed. This could change in the future when the definition of "What is a node?" is clarified.

The Present and the Future

Clearly, Skywarn and Homeland Security concerns have spurred a new round of packet network growth in some states and provinces that go a long way toward offsetting the attrition that is normal. Generally, states and provinces with an active packet organization are faring better than those without.

We found during one database update that the state of Florida led North America in conventional packet network growth, probably as a result of their 2004 hurricane season. Similarly, the province of New Brunswick lead Canada in conventional packet network growth, but we don't know precisely why.

In the latest database update pass, the state of Texas emerged as leading the US in packet growth and also is the state with the most total packet nodes. Only in a few places, Alberta and Montana, to name two, is classical amateur packet radio dwindling to the verge of extinction. Even these two places still have APRS activity.

In August 2010, Brian announced he had developed a new set of maps based upon *Google Maps* that opened up considerably more possibilities for website hosts than his previous maps had. Almost immediately, we set out to plan a website. Brian and I knew we needed help to

accomplish the task, and began recruiting.

Very shortly, we were joined by Mike Staines, WM1KE, and Corey Reichle, KC2UGV. Corey's expertise was in the area of webpage design and development, but his day job soon got in the way, and Corey had to leave us.

Mike is a very talented guy in a number of areas, and he surprised us by having some unused servers available. He offered one of them to us indefinitely for our website. We have migrated the database from *MS Access* on my computer to *MySQL* on the server, where we all have access to it. We have also built a repository for all project files and documents on the server.

During 2011, Mike and I decided to upgrade all our software from *Visual Basic 6.0* to *Visual Basic.NET*, which is expected to be supported by Microsoft for years to come. This turned out to be more of a challenge than we expected, because some statements and constructs in *Visual Basic.NET* behave differently than they do in *Visual Basic 6.0*, and have proved more difficult to debug. Moreover, the FlexGrid display software in particular has become obsolete and requires replacement with newer DataGrid display software.

In my opinion, the newer DataGrid display software simply does not work nearly as well as the older FlexGrid software. We are unsure how much longer we can keep the FlexGrid software working because of compatibility issues. We also have implemented parallel grid displays using *MS Excel* so as to have an alternative should all else fail. The plan is to phase out the *Excel* display when we can get DataGrid working satisfactorily.

During the winter of 2011-2012, Mike Staines became

TAPR Hamvention Gallery

seriously ill and had to leave the project for several months. We were spread thin anyway, and this left a devastating hole in the project that has impacted our timeline for getting the web site operational.

During this period, Frank Howard, WB1USN, has joined us. Frank has been assigned to work on updating the non-APRS nodes in our database. There is plenty of work still to be done on this project, and we are actively seeking computer-literate hams to help. To apply, contact me at w5onl@hotmail.com.

Although The Packet Node Project is not affiliated with the ARRL, some ARRL officials have begun to take note of our project. They are part of our Steering Committee, and we are providing monthly updates to each of them. One is a Division Director, Dr. David Woolweaver, K5RAV, and another is his Vice Director, John Stratton, N5AUS. They have joined our team as enthusiastic members.

In the event of my death, all documents and computer files about The Packet Node Project will go to them for safekeeping and to keep the project alive. Another member of our Steering Committee is Patrick Boyle, K0JPB.

Today, there are 19,000 nodes in our database, representing all 50 US states; all provinces and territories of Canada except Labrador and Nunavut; and many states of Mexico. The number is growing daily. When a node quietly goes inactive, we don't find out about it until somebody lets us know. We'd like to improve that aspect of our system.

We have done special studies for Washington State ARES/RACES and a few other organizations working on Homeland Security.

The Packet Node Project is not attempting to steer amateur packet radio in any particular direction; rather, to provide additional tools to facilitate network management, with names and call signs to support our statistics. We'd like to help the holes and gaps in the packet network disappear, by identifying precisely where they are. The rest is up to SYSOPs near the problem areas. We prefer to leave the political issues to others.

###

The audience for the TAPR Forum.

Jeremy, NH6Z, demonstrates his iPad SDR software.

John, W9DDD, (far right) mans the TAPR booth "cash register."

John, N8UR, shows a new timing project at the TAPR Forum.

TAPR is a community that provides leadership and resources to radio amateurs for the purpose of advancing the radio art.

Golden Packet – Maybe Next Year?

By Bob Bruninga, WB4APR

For the last 30 years, packet radio just ain't got no respect at the national Field Day events, so a few years ago we began our own outdoors VHF packet radio field event. The APRS Golden Packet event consists of APRS individuals on very high and widely separate peaks from Georgia to Maine, San Diego to Seattle, New Mexico to Montana attempting to relay text messages from hikers using handheld radios the 2000-mile length of the Appalachian, Pacific Crest, Continental Divide or other long national mountain trails.

APRS normally does not do long haul RF due to the omni-directional flooding of packets, which causes QRM. But for *linear* trails, there are *no* dupes to worry about and long haul along a trail is a great demonstration of emergency point-to-point communications.

To make it more exciting, this year we joined with Scouting's Operation On-Target to attempt to activate more of the western states as in Figure 1. Our goal was connectivity along the national mountain chains including the Pacific Crest Trail, the Continental Divide, or New Orleans to Chicago, Texas to the Dakotas or Lewis and Clark's national trail.

Utah and Idaho are big players in the On-Target exercise as you can see from the map. On-Target is an annual Ham Scouting event using mirrors and ham radio to communicate from mountaintop-to-mountaintop. Out west there are may dozens of active troops doing On-Target, but are just beginning to apply APRS to their

event and conversely, back east we do the APRS Golden Packet (see right side of Figure 1) from the mountaintops, but this year will add signal mirrors to help Eastern Scouts participate!

94% Success in 2012 for the Appalachians!

We got all mountaintops manned and had successful links from Alabama/Georgia to Massachusetts and from New Hampshire to Maine, but had one break in the chain in New Hampshire. In Figure 1, you can see the 15 APRS portable digis arranged from Alabama to Maine. Figure 2 attempts to graphically depict the situation at each peak.

Every year since our first attempt in 2009, we have gotten better. This year we were so focused on improving our stations along the way, we overlooked the need for a New Hampshire relay station to close the 150 mile separation between Mt, Greylock in Massachusetts and Mt, Washington in New Hampshire. We had been

Figure 1 - 2012 Golden Packet results

mislead in 2011 that a direct shot was possible. Unfortunately, the link did not work. However, good connectivity was reported from all other stations. Again, our thanks to Tim D'Apice, KA1YBS, who climbed 4100 feet up the rocky Mt. Katahdin this year and last.

The Golden Packet Award

This annual event is called the Golden Packet event in commemoration of the AMRAD proposal back in the early 1980s offering an award to the first trans-continental AX.25 packet to go from coast-to-coast. Well, anyone that remembers those heady days of packet radio also remember that it did not take hams long to figure out where to dig up wormholes and gateways and Internet links to better cover the long distance problem. With almost all ham radio AX.25 traffic beyond local VHF line-of-sight now going by Internet, the idea of the Golden Packet Award fell into oblivion.

Although APRS has global connectivity between any two APRS radios anywhere on the planet via the Internet global outreach, it is still a local VHF network on RF. We have re-instituted this annual event to demonstrate our ability to establish *ad-hoc* APRS network connectivity at any time.

Next Year

This combined Golden Packet and Operation On-Target is an ideal outdoors activity for both hams and Scouts alike. Come join us next year. It sure is fun.

Typically we target the third weekend in July, and from now on will make sure to coincide with the Scouting's On-Target exercise. Scouters and hams in Arizona, on the other hand, hold their On-Target event in September to avoid the summer high temperatures.

Experiment

Not just mirrors and APRS and AX.25, this event is a great opportunity to try your latest RF project over great distances with a team that is ready and willing to get out there and try. David Bern, W2LNX, plans to test his UHF wireless networking gear in Northern Virginia next year.

For more info see: www.aprs.org/at-golden-packet.html

###
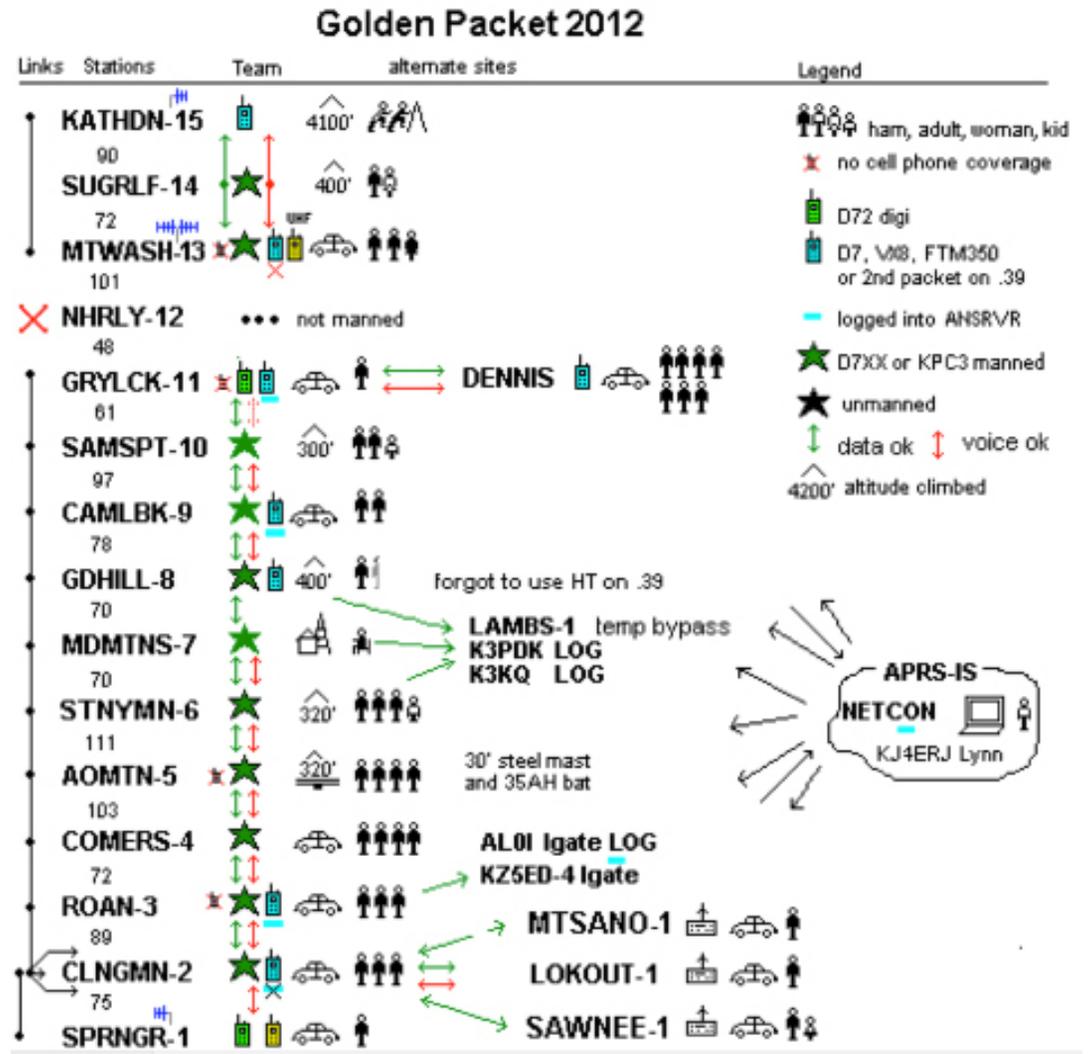
Figure 2 - East Coast 2012 Golden Packet links

DIXPRS – New APRS IGate/Digipeater Software

By Béla Márkus, HA5DI (ha5di@hasix.org; https://sites.google.com/site/dixprs/)

In August 2010 I decided to setup an APRS IGate and digipeater to reuse my mostly turned off 2-meter transceiver. Preferred platform was LINUX as I have a 7/24 home server with broadband net connection. After testing different software I was unsatisfied due to missing features and bugs, so decided to write my own from scratch. Design goals:

- Platform independent
- Low memory footprint
- Modular design
- Standard compatibility
- WIDEn-n digipeating
- Gating messages from IS to RF
- Supports wide range of modems
- Multiple radio ports
- Remote commands
- Monitoring (telemetry, remote commands, etc.)
- Data import to handle WX data, objects, etc.
- Data export for third-party applications

To fulfill these goals Python language is chosen. It makes possible to run DIXPRS on Windows, Linux and any other system where Python is available including small embedded routers. Serial KISS and AGWPE/UZ7HO IP interface is available on all platform. On LINUX native AX.25 stack also supported to reuse old packet radio modems like USCC card, BAYCOM modem, etc.

First version of DIXPRS was ready in May 2011 but I was not satisfied with its performance so it was kept in the cupboard. After intensive rewrite first public release, DIXPRS 2.1 becomes available in June 2012. It is available in source and as a 32-bit binary for WINDOWS and works fine in not only PC's but also routers like ASUS WL-500 or RouterBoard running OpenWRT with as low memory as 32-MByte RAM.

How It Works

DIXPRS runs several OS processes, one for each radio interface, Internet server, main program, WEB server and other optional services. It offers not only modularity but optimal use of multi core CPU's if available. Processes are communicating to each other with UDP packets. Received packets, DX lists and many other data is stored in SQLite3 databases to implement complex searches and lookups easily and to remember data after restart. Databases can be read by third-party applications also. Import is done with text files placed in a spool directory by external applications.

Message Gating

Messages addressed to local stations within two hops are gated from IS to RF as well as sender's following position packet. An additional range filter can be setup to reduce unwanted traffic on the channel. Gating of NWS/BOM weather date will be available soon.

Queries

Additionally to queries defined in APRS Specification document there are new queries
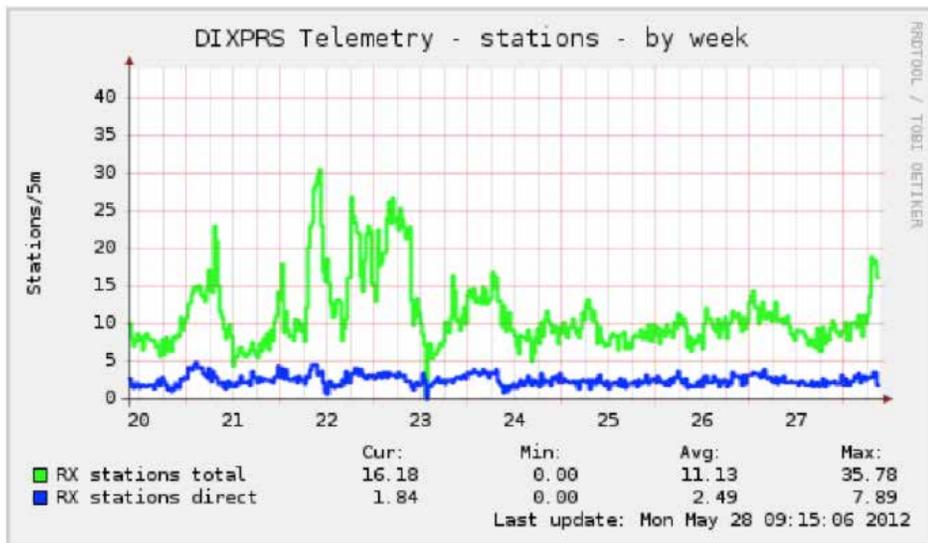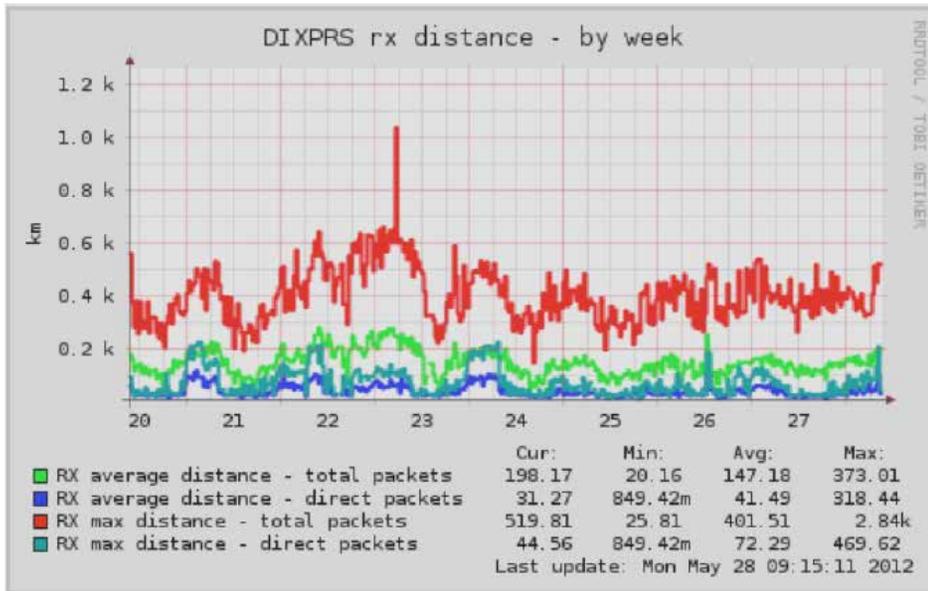
?DATE	Date and time of station
?DX	List of DX stations
?IGATE	IGate capabilities
? INFO station	Info on particular station
? OWNER	Owner of station
? PORTS	Ports configured
? TIME	Same as? DATE
? TYPE	Type of system
? UPTIME	Uptime

introduced:

Using !APRS !IGATE !WX queries it is possible to send out ?APRS? ?IGATE? and ?WX? queries to the radio ports to interrogate nearby stations.

Monitoring

DIXPRS sends telemetry data of radio port including number of received packets and stations direct and all plus number of sent packets. Reading SQLite3 databases more

DIXPRS rx distance - by week

	Cur:	Min:	Avg:	Max:
RX average distance - total packets	198.17	20.16	147.18	373.01
RX average distance - direct packets	31.27	849.42m	41.49	318.44
RX max distance - total packets	519.81	25.81	401.51	2.84k
RX max distance - direct packets	44.56	849.42m	72.29	469.62

Last update: Mon May 28 09:15:11 2012

DIXPRS Telemetry - stations - by week

	Cur:	Min:	Avg:	Max:
RX stations total	16.18	0.00	11.13	35.78
RX stations direct	1.84	0.00	2.49	7.89

Last update: Mon May 28 09:15:06 2012

complex monitoring can be implemented to get a picture on your RF situation. One live example is MUNIN:

DIXPRS STATUS PAGE

SETUP	
Callsign:	HG4FC-2
Version:	DIXPRS 2.2.0i 14-08-2012
Platform:	Linux 2.6.32.27 (mips), Python 2.6.4
Location:	47.1210N 18.3670E
Owner:	Toni, HG4FC, hg4fc(at)ceger.hu
Port(s):	144.800MHz 1200Bd, AX.25 stack (KISS-TNC)
SYSTEM	
Time:	14-08-2012 09:47:07z
Started:	14-08-2012 08:24:10z
Uptime:	0 days 1 hours 22 mins
INFO	
Positions stored:	243
Heard direct in last hour:	HA3KZ-11 HA5KHC-2 HG4FC-9 HG5PBD-2
IGATE counters:	MSG_CNT=8 LOC_CNT=25 DIR_CNT=4 RF_CNT=34
DX (1h)	HG5PBD-2 14-08-2012 09:46z 42.2 mi
	HA5KHC-2 14-08-2012 09:13z 14.4 mi
DX (24h)	OM3KII-3 14-08-2012 07:07z 124.3 mi
	HG6PGA-1 14-08-2012 03:55z 90.9 mi
DX (all)	OM3KII-3 14-08-2012 07:07z 124.3 mi
	HG6PGA-1 14-08-2012 03:55z 90.9 mi

Page generated in 0.593 seconds

Version 2.2 provides a WEB interface for fast check of health status with a cell phone or tablet:

Conclusion

DIXPRS systems now are running on different hardware and software platforms in different countries. In Hungary it is the dominating IGate solution which helps to improve APRS network giving new life to old hardware, reduce QRM and with its monitoring features to know network better.

For more information visit DIXPRS WEB site, join to mailing group or contact author.

###

John Bennett, N4XI, RIP
By Stan Horzepa, WA1LOU

TAPR remembers John Bennett, N4XI, who died Sunday morning, July 22 after a year-long bout with cancer.

A long-time member of TAPR, John created kits that interfaced with the TAPR T-238+ APRS Weather Station and his own Linux-based WXN weather server over APRS. His kits included the X1W-1 1-wire weather sensor, the X1W-2 outdoor humidity and temperature sensors, and the X1W-2 EMP sensor.

John was a regular at TAPR's Dayton Hamvention booth and on the TAPR WXSIG patiently handling all questions concerning his kits and weather stations, in general.

This past May, John dropped by the TAPR Hamvention booth briefly just to say "Hello" to his old friends at TAPR.

TAPR now says, "Goodbye, old friend."

***

From the Boone Funeral Home website (www.boonefuneralhome.net/):

John A. Bennett, 65, of Evansville, passed away at 1:15 am, Sunday, July 22, 2012 at VNA Charlier Hospice Center. John was born July 4, 1947 in Washington, D.C. to Wilmer and Miriam (Souther) Bennett. He graduated from the University of Evansville with a Bachelor's Degree and received a Master's Degree from Murray State University, both in Music Education. John was a member of Phi Mu Alpha Sinfonia Professional Mens Music Fraternity and the American Guild of Organists.

John worked at ITT Technical Institute for 23 years as an instructor and as the Chair of the School of Information Technology. He also worked 6 years at WEVV Channel 44 as Chief Engineer. John was a Ham Radio Operator, Extra Class, with a special interest in digital communications. He was a charter member of the Evansville Bicycle Club and an avid cyclist. John was a member of the French Lick Historic Railroad Society and an amateur photographer. He was a member of Trinity Anglican Church, where he served as a Vestry member and on the Building Committee.

###

TAPR on the Net
By Mark Thompson, WB9QZB

Facebook

As you may know, TAPR has a Facebook page, www.facebook.com/TAPRDigitalHam.

However, recently I also created a TAPR Facebook Group, www.facebook.com/groups/TAPRDigital/.

One of the things that Facebook groups offer are events. For example, 2012 ARRL/TAPR DCC, www.facebook.com/events/370538442992724/

If you have a Facebook account, "Like" the TAPR Facebook page and join the TAPR Facebook Group.

If you join the group click on the Events link and indicate you're Going to the events.

On Twitter, Too

Access the TAPR Twitter account at www.twitter.com/taprdigital.

Also on YouTube

TAPR now has its own channel on YouTube: the TAPR Digital Videos Channel: www.youtube.com/user/TAPRDigitalVideo.

At this time, there are over 30 videos on our channel including many from the TAPR-ARRL Digital Communications Conference (DCC) that you may view at no cost, so have at it!

###

Vic Poor, W5SMM, RIP
By Steve Waterman, K4CJX

It is with much sorrow that I announce the passing of the founder of the *Winlink 2000* radio e-mail system. As a 99.9 percent CW operator in the early 80s, I met Vic Poor during a presentation of his pre-*Windows*, *DOS* version *ApLink* (AMTOR/Packet Link) that he used to bridge local VHF packet communities while sailing on the high seas. A year later, it was all over the ham bands and from that moment on, was instrumental in assisting the maritime amateur and as some may recall, our own military in the first Kuwait War (a three-part, 30-minute CBS documentary is on the Winlink web site.) His most recent creation, *Winlink 2000*, has saved many lives and much property and is still in the enhancement stage as it moves to meet the demands of its users, both on the ham bands and elsewhere. See www.winlink.org/node/1

Vic was a self-educated genius, who was responsible for the generation of the single chip microprocessor, RTTY advancements, and many other aspects of digital communication well beyond what we do in Amateur Radio. He was involved with the beginning of "over-the-phone lines, non-IBM, networking with the first point-of-sale inventory replenishment system for a major International multiple unit wholesaler," involved with the first cell phone technology and much more. With the advancement from *DOS* to *Windows*, Vic was one of the first to come up with *Winlink Classic*, which ran on the new *Windows 3.1* operating system, and I can still remember seeing that first demonstration at Dayton years ago.
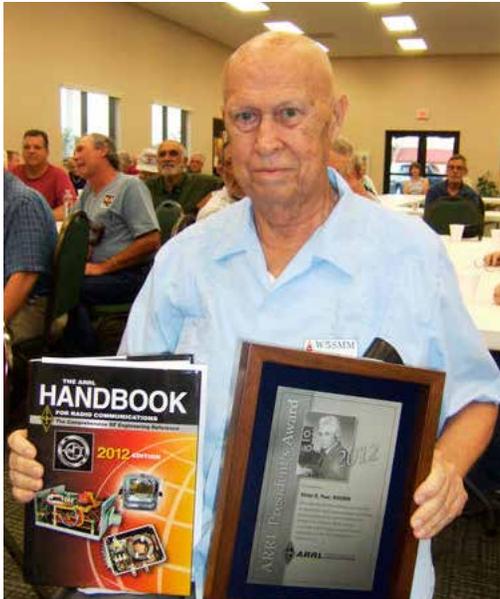
I worked with Vic just about every day as did many of us on the Winlink Development Team and after a very short period, understood the power of his ability to create. He was a very practical visionary and with every conversation, well ahead of the current technology curve. Much of his work is contained in his interview with the Computer History Museum, articles in *Business Week*, and other such publications (www.winlink.org/node/1).

Vic did not actively participate with our more recent developments, but was always there to provide encouragement and advice. We will all miss our mentor.

(Editor's Note - Vic was a TAPR member since 1990 and contributor to past Digital Communication Conferences. In July, Vic received the ARRL President's Award for his contributions to the development of digital communications systems in the Amateur Radio Service.)

###

Write Here!

PSR is looking for a few good writers, particularly ham radio operators working on the digital side of our hobby, who would like to write about their activities here.

You don't have to be Hiram Percy Maxim to contribute to *PSR* and you don't have to use *Microsoft Word* to compose your thoughts.

The *PSR* editorial staff can handle just about any text and graphic format, so don't be afraid to submit whatever you have to wa1lou@tapr.org. The deadline for the next issue of *PSR* is October 15, so write early and write often.

###

Submission Guidelines

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 (wa1lou@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 (OpenOffice or *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 DPI.

Production / Distribution

TAPR is a not–for–profit scientific research and development corporation [Section 501(c)(3) of the US tax code]. Contributions are deductible to the extent allowed by US tax laws. TAPR is chartered in the State of Arizona for the purpose of designing and developing new systems for digital radio communication in the Amateur Radio Service, and for disseminating information required, during, and obtained from such research.

Membership Application

TAPR

P. O. Box 852754, Richardson, TX 75085–2754

Phone 972–671–TAPR (8277), Monday–Friday, 9AM–5PM Central Time

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