PACKET STATUS REGISTER

PSR #84 SUMMER 2002

president's corner
the FHSS radio project

BY JOHN ACKERMANN, N8UR

Several years ago, TAPR began development of a frequency-hopping spread spectrum (FHSS) radio. The project has had a pretty high profile within TAPR, and probably the most frequent question I'm asked is, "How is the radio project doing?"

If you've been following the updates published in PSR and on the TAPR Web site, you'll know that we've had problems with component obsolescence, and with troubleshooting the RF portion of the radio.

To summarize what's happened, after a lot of development and debugging that resulted in almost-working prototypes of both the digital and RF boards, the first disaster struck. The design used quite a few specialized ICs, many sourced by Motorola. Motorola discontinued eight chips on the digital and RF boards. Some of them were not garden-variety parts

with readily available substitutes, and we literally had to go back to the drawing board to design around them.

Tom McDermott, N5EG, ultimately redesigned the digital board, replacing the discontinued parts with a field-programmable gate array (FPGA) device that he programmed to do all the work of the old chips. That was a major undertaking and it took quite a while. It wasn't until last winter that the newly designed digital board was debugged and working more-or-less as it should.

Along with debugging the digital board, Tom did a tremendous amount of work in developing the radio's software. That was a major project in itself.

In the meantime, the RF board languished. Despite many good intentions, we were unable to find volunteers with both the skills, and the considerable time required to get

Packet Status Register

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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 digital communications, please contact the editor (**psr@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, please save the document as Rich Text Format - .RTF). 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.

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the RF problems solved. We were reminded of the lesson that we learned from our earlier packet radio project, i.e, RF is awfully hard to do; creating a manufacturable product is a lot different from making a one-off unit in your basement.

Finally, to add insult to injury, we discovered a couple of months ago that Qualcomm was discontinuing one of the chips that was crucial to the project. Although we might be able to design around this, it would be another large, costly, and time-consuming effort, and staring this in the face caused us to reconsider the project.

At this point, TAPR and the design team have determined that the only realistic course is to move the FHSS radio project to "inactive" status. Simply put, we have exhausted the volunteer resources that were supporting the project and we've been told that buying the engineering work necessary to finish the project would cost well into the six figures.

Our hope is that the work that we've done on the project may be the basis of further development work. We will package up the project's intellectual property (schematics, software, etc.) and make it available under an open-source-like license.

Although we won't see the result from the project that we'd hoped for, I don't consider it a failure. TAPR is a research and development

organization and R&D is inherently risky. Not all projects yield the desired results. In my view, the FHSS project in many ways was an example of exactly what a TAPR project should be.

The project started when Bob Strickland, N5BRG, outlined a fairly detailed proposal for a radio; others had kicked-around the idea of an SS project, but Bob took the ball much further. He put together a team including Tom McDermott, N5EG, and that group did the groundwork. They came to TAPR with a well-thought out idea and volunteered to lead the project and do the great bulk of the work. They asked TAPR to provide a very modest amount of financial support, and to figure out how to manufacture and market the radio.

TAPR was able to provide that support. We helped obtain software development tools, and funded production of prototype boards. It was clear that the amateur community would not be able to generate enough volume to reduce the radio's price to an affordable level, so TAPR entered into a long search for a partner who could help with the manufacturing. We found one in the Dandin Group, and entered into a development and licensing agreement that would serve both TAPR's and Dandin's needs. Dandin was a supportive partner and while confidentiality prevents me from going into detail, their involvement in the project was a real boon to TAPR. In short, TAPR's financial risk in the

project was minimal and the potential benefit great.

In the end, we didn't put a finished radio into the amateur community. But we did support a group of dedicated hams who were trying very hard to advance the state of the art. Because of their generosity in supporting TAPR's commitment to open development, all the work that they did will be available to the community. Hopefully, it will find its way into other projects that will carry forward the vision that drove Bob, Tom and the others on the team.

lessons learned

In my business life, I've found that every project, win or lose, offers lessons to be learned in order to do a better job next time. What have we learned from the FHSS project?

First, we learned that we need to judge carefully when a project is simply too big for an organization like ours to handle. This project was right on the edge and the time scale involved because of its size and complexity clearly contributed to the second lesson.

Which is: parts obsolescence is a real problem. Product life cycles are shorter and shorter and our volunteer-driven development speed means there is a danger that our designs will become obsolete before they're even finished. We've seen a similar problem, by the way, in the DSP arena where manufacturer commitment to low-cost evaluation

kits has put a couple of our project ideas at risk.

The third lesson isn't new, but a necessary reminder: RF is hard. You'd think that RF expertise would be the least of a ham group's concerns, but there are few people who have both the skill to do reproducible, manufacturable, RF design work and the time (and willingness) to do it for free. We'll think long and hard before we take on another RF-based project that doesn't come to us in a finished state (the way the DSP-10 did).

The last big lesson we've learned is that we need to do a better job communicating the progress of high-profile projects. There are several issues here. Either first and simplest, we need to make sure that there is someone, on the core project team or connected with it, who provides regular updates with enough "meat" to satisfy TAPR's technically curious audience. We also failed to ensure that all the updates (and there were quite a few) the team provided were made adequately available to our members. That's a process problem that was exacerbated by changes in roles within TAPR; we will make sure that doesn't happen again.

Second, and harder, is the question of when and how to communicate problems and setbacks. We need to keep members updated, but at the same time, we don't want to be negative in what is, after all, a hobby

that's supposed to be fun. Most of all, we don't want to publicly discourage or embarrass the volunteers who are doing the hard work. I think as TAPR's leaders, we just have to exercise the best judgment we can in what we report and how we report it.

Finally, we have a similar question with respect to commercial negotiations and agreements that we may enter into for some projects. Virtually every time we discuss commercial relationships, the people on the other side of the table expect the details to remain confidential. It's a commercial requirement for them. So, we can't always tell you all the details you might like to know about those arrangements. But as a Board and officers, we will always act in what we truly believe to be TAPR's best interests and we will inform you to the extent we can.

I realize I've been long-winded, but I wanted not only to tell you about the FHSS project, but also to provide some insight into how and why TAPR works. I hope you found it helpful.

a thought on enabling technology

I recently had the opportunity to speak at the Radio Amateurs of Canada convention (in fact, I'm writing this on the plane home from British Columbia). In putting together my presentation, I had the idea to pose a question to the audience. It provoked some interesting discussion, so I'll ask you: What's

the single radio component that's had the most technical impact on ham radio in the last ten years?

Stumped? It's the sound card, which I think is the classic example of an enabling technology. Think of all the new modes that have been developed in the last couple of years: PSK31, PUA43, MSK8, MT63, THROB, MFSK16, FSK441, C-BPSK and more. All these were developed on or ported to the PC sound card. It's standardized, it's relatively easy to program, it's cheap, and it's everywhere. I suspect that the sound card has led to more new digital modulation schemes in the last three years than in the entire earlier history of radio.

I called it a "radio component" above partly to stop you from answering "the PC," but also because the sound card has integrated itself into not just our stations, but directly into our radios as well. Today's generation of Software Defined Radios are built around DSP units that are not much different than the sound card in your computer.

Now, I'm not saying the sound card is the end of the road. In fact, it's becoming a bottleneck because we need more performance than designed-for-music cards can provide. But it is a great example of the power of enabling technologies. As we think about the projects and products that can keep ham radio moving forward, we could do much

worse than strive to develop something that's as useful as that $20 board in your computer.

see you in Denver

The 21st Digital Communication Conference is just around the corner. I'm excited to see how the program is shaping up; I think we'll have a great conference this year. I'm particularly pleased that the Bruce Perens, K6BP, will be our keynote speaker at the Saturday night banquet. Bruce is always an interesting and provocative speaker. I'm also pleased that the Sunday Seminar will be an in-depth look at software-defined radios (SDR). I continue to become more convinced that SDR technology is the "next big thing" not just in Amateur Radio, but in radio, period. This seminar will give you a solid grounding in this newest area of radio research and development.

I'll see you in Denver!

73, John

www.findu.com backup server status

BY GUY STORY, KC5GOI

Here are the technical specifications that I promised everyone. The final order is pending a response from Dell. I do not have the shipping price as of this date. There will be over a thousand dollars left over. Until I know the shipping, I do not know that total. We will use the extra funds for tapes for the tape backups and any repairs/upgrades once the server gets out of warranty. I did not post the specifications on the CD-ROM, network interface card, modem, keyboard and mouse.

The RAID and tape drive are redundant to a certain extent. The reasoning was if the primary data drive dies, we just tell the Linux box to go to the new data disk and we install a replacement; no data lost (except for the down time). If the entire system craters, we will have backups on tape that we can use to rebuild the entire system.

Why are three hard drives and a hardware RAID? As per Steve's specifications, the first drive is the OS (RH Linux 7.3 with all its patches installed) and a second for the database. The third disk will be copying the database disk. The drives are SCSI, not IDE. SCSI will improve the disk access times, i.e., how fast the processors get the data and render the page. You might not see it on a 72-hour history, but you will on a multiple week, month or full-year basis.

Originally, I indicated we would purchase the server with a small amount of memory and upgrade it with local memory. Since then, Dell dropped its prices on memory to the point that there was no advantage to going with aftermarket memory.

On the connectivity issue, the site has two OC3 connections.

Specifications:

PowerEdge 1400SC with Pentium III Processor: PowerEdge 1400SC, Intel Pentium III 1.13GHz w/512K Cache 14113SC

Additional Processors: 2nd Processor, 1.13GHz/512K,P3

Memory: 1GB SDRAM, (2X512MB)

First Hard Drive (All drives must match for RAID): 36GB 10K RPM Ultra 160 SCSI Hard Drive

Second Hard Drive (All drives must match for RAID): 36GB 10K RPM Ultra 160 SCSI Hard Drive 36GB10

Third Hard Drive (All drives must match for RAID): 36GB 10K RPM Ultra 160 SCSI Hard Drive 36GB10

Hard Drive Configuration: Add-In Raid Card, Raid 5 AR5 [340-1955]

Tape Backup Unit: PV100T, Travan-5, 10GB, Internal TBU, IDE

Hardware Support Service: 3-year BRONZE Support, Next Business Day On-site

Uninterrupted Power Supplies: APC SmartUPS 700, 700VA APC700B

$5,025.00 (without shipping)

election of TAPR board of directors

BY ED.

The following three TAPR members have agreed to run for the three available positions on the TAPR Board of Directors. You may vote for these candidates and/or write-in candidates using the election ballot. Board members elected will serve three-year terms.

The TAPR office will mail ballots to all TAPR members in mid-August. The deadline for balloting is September 7.

Steven Bible, N7HPR

Steve has been involved with amateur digital communications since 1985. He began work with TAPR in 1995 serving as board member and presently serves as vice president. Steve enjoys the research and development side of the amateur radio hobby. He has been involved in the development of several TAPR kits helping bring them to the amateur population. The TAC-2, DGPSIB, PIC-E, T-238, to name only a few. Steve has lectured extensively at clubs and hamfests on spread spectrum and software radio helping amateurs begin experimentation and exploration of these technologies.

Steve is also involved with satellite communications since 1988. His first satellite QSO was on AO-13 and he has been active on various analog and digital satellites since. In 1994, Steve created the first World Wide Web Amateur Satellite Ground Station where users on the Internet could access messages from UO-22,

KO-23 and KO-25. He has worked on two small satellite projects, the Naval Postgraduate School PANSAT and AMSAT Phase-3D projects, both of which are in orbit as PANSAT OSCAR-38 and AMSAT OSCAR-40 respectively. Steve authored the satellite information Web pages on the AMSAT Web site that have found their way into the ARRL Satellite Anthology books. Steve participates in many AMSAT activities including Area Coordinator, Vice President Education Liaison and a member of AMSAT's Strategic Planning committee.

Steve resides in Chandler, AZ and works as a Principal Applications Engineer for Microchip Technology Inc.

Stan Horzepa, WA1LOU

Born 1951, Waterbury, CT

BA, University of Connecticut (1973); JD, Western New England College (1977)

Lead Technical Writer at C-COR.net (that's lead as in "in charge," not lead, the heavy metal)

Resides on Compounce Mountain, Wolcott, CT

Married with child plus 3 cats, 2 fish, and 1 dog

Amateur Extra Class, first licensed in 1969 (WN1LOU)

TAPR member since 1985

TAPR Packet Status Register editor since 2002

TAPR SIG administrator of APRSNEWS, APRSSAT, APRSSIG, APRSSPEC, HTAPRS, MIC-E

APRS QSY Committee, 1997-98

APRS Working Group, secretary

ARRL Life Member

ARRL headquarters staff, 1977-1979

QST contributing editor, 1979 to present (FM/RPT, On Line, Packet Perspective, Digital Dimension)

www.arrl.org contributing editor, 2000 to present (Surfin')

Author: *Your Gateway to Packet Radio* (ARRL, 1987, 1989), *Practical Packet Radio* (ARRL 1995), *Getting on Track with APRS* (ARRL 1996), *APRS: Tracks, Maps and Mobiles* (ARRL 1999), *The ARRL Operating Manual* (ARRL, 1980, 1985, 1987, 1991, 1995, 1997, 2000)

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Darryl Smith, VK2TDS

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Darryl Smith is a 31-year-old Electrical Engineer, based in Sydney, Australia. He has been licensed as VK2TDS since 1993, when he gained his license in order to experi-

SM2496 TNCs available

BY MARK M. JOHNSON, AC7PU

ment with Packet Radio. For his Electrical Engineering thesis, he investigated Spread Spectrum Data Communications - with the work now available via the TAPR WWW site.

Professionally Darryl has been working in the Electricity Genera-tion industry for 12 years, doing a cadetship with the state owned electricity generator. Since gradua-tion he has worked as an electrical plant owner in a large coal power station, and more recently working in the IT group managing drawings within the organization.

Darryl recently left the electricity industry to work full time on his own engineering consultancy com-pany - Radioactive Networks. Through this company, he has worked on a number of important projects - such as using APRS in the Sydney Olympics, Paralympics, and more recently taken APRS to Holly-wood.

Darryl has been a member of TAPR since 1997. He presented a paper in the 1997 DCC, and has written a number of papers since then. Darryl has been an active member of the APRS community for a number of years and has been heavily involved in setting up the Australian and New Zealand APRS networks. He sees that by becoming a board member of TAPR will help make TAPR a more global organiza-tion.

Due to the level of interest in TNC/APRS applications for the SM2496, we are introducing two non-MP3 module versions immedi-ately.

The $99 SM2496-02 uses the TMS320VC5402 100-MIPS DSP with 16k words of RAM. This represents the smallest, most power-ful, programmable DSP module ever produced at this price. It is available for non-MP3 applications only.

The $199 SM2496-16M uses the TMS320VC5416 160-MIPS DSP with 128k words of RAM. This is the module that some of you have been Beta-testing for both MP3 and TNC/modem applications. It is currently available as a TNC/modem only. An MP3 software upgrade will be available later in 2002 for an additional fee.

Both modules use the same high-quality TLV320AIC23 24-bit 96-kHz codec from Texas Instruments and limited quantities of both modules are immediately available at www.sm2496.com. Full production is scheduled for later in 2002.

This is a totally open source platform, both hardware and soft-ware (except MP3*). Schematics of the modules will be available online at www.shinemicro.com. All DSP and Palm OS source and executable

code is available online along with starter applications and a software development kit. A JTAG interface version with cable is available for serious DSP developers.

The SM2496MP3 and SM2496MP3R versions are still in Beta-testing and will be available later in 2002.

Which module should you buy? It depends upon your application. If you are interested in 1200/9600-baud packet or APRS opera-tion, either module will do the job. Are you interested in future applications that are still in devel-opment and require a lot of memory or DSP processing power such as multiple PSK31 decoders, OFDM modems, SSTV or MP3 applications? In that case, the SM2496-16M is the right solution. If you are still not sure, call us a 360-437-2503 and we will help you decide.

Thanks again for all of your comments and helpful suggestions. There are literally hundreds of potential applications for the SM2496 and many of you have suggested ones we had not thought of. We are counting on hams and open source program-mers to pitch in and develop these applications with us.

21st annual ARRL and TAPR Digital Communications Conference

September 13-15, 2002, Denver, Colorado

Mark your calendar and start making plans to attend the premier technical conference of the year, the 21st Annual ARRL and TAPR Digital Communications Conference, September 13-15, 2002, in Denver, Colorado. The conference location is the Denver Marriott Southeast Hotel (see detailed hotel information below).

The ARRL and TAPR Digital Communications Conference is an international forum for radio amateurs to meet, publish their work and present new ideas and techniques. Presenters and attendees will have an opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results and practical applications.

Topics include, but are not limited to software-defined radio (SDR), digital voice, digital satellite communications, Global Position System (GPS), precision timing, Automatic Position Reporting System (APRS), short messaging (a mode of APRS), digital signal processing (DSP), HF digital modes, Internet interoperability with Amateur Radio networks, spread spectrum, Amateur Radio use of 802.11 technologies, using TCP/IP networking over Amateur Radio, mesh and peer-to-peer wireless networking, emergency and homeland defense backup digital communications, using Linux in Amateur Radio, updates on AX.25 and other wireless networking protocols.

introductory and technical sessions

The ARRL and TAPR Digital Communications Conference is for all levels of technical experience, not just the expert. Not only is the conference technically stimulating, it is a weekend of fun for all who have more than a casual interest in any aspect of amateur digital communications. Introductory sessions are scheduled throughout the DCC to introduce new technical topics for beginners and experts alike.

This is a must attend conference for technically in-clined amateurs. Now, more than ever, Amateur Radio needs this great meeting of the minds to demonstrate a continued need for our current frequency allocations by pushing forward and documenting our achievements. The ARRL and TAPR Digital Communications Conference is the best way to record our accomplishments and challenge each other to do more.

banquet speaker Bruce Perens, K6BP

Well-known Linux advocate and radio amateur Bruce Perens, K6BP, will speak at the DCC banquet Saturday night. Bruce is presently Senior Strategist, Linux and Open Source at the Hewlett-Packard Corporation.

two-day conference, Saturday banquet and Sunday seminar

Friday — For the first time, Friday will be an all-day event. Technical and introductory sessions will be presented on Friday and Saturday. The DCC will also host the Sixth Annual APRS National Symposium with expanded coverage both days. APRS enthusiasts are highly encouraged to submit their presentations to be printed in the annual DCC proceedings.

Friday Evening Social — Join us for a Friday evening social get-together hosted by the Packet Radio User Group (PRUG) of Japan **(www.prug.or.jp)**. During the social, PRUG will present a seminar of their work for the past year.

Saturday — Technical and introductory sessions continue throughout the day.

Saturday Evening Banquet — This year, the DCC banquet speaker is Bruce Perens, K6BP. Concluding the evening will be an awards presentation and prize drawing.

Sunday — Sunday will feature the ever-popular "Sunday Seminar." The seminar topic this year will be an in-depth look at software-defined radios (SDR).

hotel

Conference presentations, meetings and seminars will be held at the Denver Marriott Southeast Hotel, 6363 E. Hampden Ave., Denver, CO 80222. It is highly recommended that you book your room prior to arriving. A special DCC room rate of $59/single and $59/double per night has been blocked for 50 rooms and is available until September 1st, 2002. Once the 50 rooms have been reserved, room rates will increase. So be sure to book your rooms early!

Transportation to and from the hotel is via shuttle. One-way cost is $17.00 or two-way is $30.00. Please contact the hotel to arrange specific transportation needs.

Denver Marriott Southeast Hotel

6363 E. Hampden Ave.

Denver, CO 80222

Phone 303-758-7000

Fax 303-691-3418

www.marriotthotels.com/DENSO

* Denver's 2-meter voice networks.
* Denver's ham radio attractions.

area attractions

Distance from the conference hotel:
* Coors Brewery (18 mi)
* Denver Art Museum (10 mi)
* Denver Botanic Gardens (9 mi)
* Denver Zoo (9 mi)
* Museum of Natural History (9 mi)
* Park Meadows Shopping (5 mi)
* Pikes Peak (75 mi)
* Red Rocks Park & Amphitheater (20 mi)
* The Denver Mint (10 mi).

welcome to Denver

Thanks to Will Beals, N0XGA, the following details of the Denver area are at **www.beals5.com/dcc/**:
* GPS coordinates for important places.
* Map of the hotel area.
* Local driving conditions
* Pictures of hotel entrance.
* Local APRS stations and weather
* Denver's APRS network.
* Denver's non-APRS digital network.

registration fees

Note: Student pricing (17 years and younger) is 50% off regular price

Pre-registration before September 1, 2002

* Two Day Conference - $70.00

* Friday Only Conferece - $40.00

* Saturday Only Conference - $40.00

Late Registration after September 1, 2002

* Two Day Late Registration after Sept. 1 or at door - $80.00

* Friday Only Late Registration after Sept. 1 or at door - $50.00

* Saturday Only Late Registration after Sept. 1 or at door - $50.00

* - Conference registration includes conference proceedings, sessions, meetings.

Saturday Evening Banquet

* Dinner with guest speaker, awards ceremony, prize drawing - $30.00

Sunday Seminar: Software-Defined Radios (SDR)

Sunday 8:00 AM - 12:00 PM

* Seminar topic to be announced - $25.00

You may register a number of ways:

On-line Registration is accessible at **www.tapr.org/tapr/dcc/dccregistration.html** or download the registration form (a 27k-.pdf) from **www.tapr.org/tapr/dcc/DCC%202002%20Flyer.pdf** and mail or fax the completed form to the TAPR office.

what you can expect at the DCC

* Two full days of papers and breakouts for the beginner to the advanced

* Sunday technical seminar

* A banquet with special guest speaker

* Informal get-togethers throughout the weekend

* TAPR membership meeting

* An event at which the most important new developments in amateur digital communications are announced

* Digital 'movers and shakers' from all over the world in attendance

There are few activities where your participation can be so much fun and important! What a great way to share and renew your enthusiasm for digital amateur radio! A get-together with colleagues and bringing each other up-to-date on your latest work. All this and more, for an unforgettable weekend of Amateur Radio and digital communications. We hope to see you at the ARRL and TAPR Digital Communications Conference on September 13-15, 2002!

Dayton 2002 board of directors meeting

BY STEVE BIBLE, N7HPR

(May 16, 2002) Note that because of the lack of quorum, no votes were taken.

1. Board of Directors Elections this summer. The incumbants are Steve Dimse, K4HG, Doug McKinney, KC3RL, Bob Hansen, N2GDE. Steve Dimse has indicated that he does not want to run. Doug McKinney has indicated that he will run. Bob Hansen has not replied if he will run. Possible new candidates are Stan Horzepa, WA1LOU, and Darryl Smith, VK2TDS.

2. New Web server. John Ackermann will turn on server side. Steve Bible to get access and start building new pages.

3. Discussion on the state of TAPR. Discussed concerns regarding membership, Web services, marketing and office.

4. Discussion of TAPR FHSS Radio status. John Ackermann will talk to Dewayne Hendricks to negotiate an exit strategy that will result in making the IP freely available.

5. Project Discussion

6. Office Discussion

THIS IS THE CREW MANNING THE DAYTON TAPR BOOTH BRIGHT AND EARLY FRIDAY MORNING: (L TO R) GUY STORY, KG5GOI, JOHN ACKERMANN, N8UR, STEVE BIBLE, K7HPR AND SHEILA BIBLE.

STEVE BIBLE, N7HPR, FIELDS A QUESTION DURING THE TAPR FORUM AT THE DAYTON HAMVENTION.

BDALE GARBEE, NB0G, WAS THE FEATURED SPEAKERAT THE TAPR DIGITAL BASH DURING HAMVENTION WEEKEND.

office move postmortem

BY LAURA AND JOHN KOSTER, W9DDD

Last August, as most of you are aware, the TAPR office moved from Denton to Richardson, Texas.

At the May 2001 TAPR Board of Director's meeting, we volunteered to take over the office operations, which Dorothy and Bill Jones had hosted in their home in Denton for many years.

Discussions on timing led to the conclusion that moving at the end of July would allow the necessary planning, ordering of phone lines, etc. The date was set, the truck reserved and volunteers lined up. Now Denton and Richardson are only about 40 miles apart, so we are thinking that one well-packed truckload and we are done, but if necessary, we can still make two trips in the allotted time.

Well nothing goes as planned and on move day morning, the rented truck broke down in front of the Jones' house. No replacement was available since we had unwisely chosen the last weekend in the month to move. Anyone who has moved understands why.

We borrowed an open trailer and moved about 60% of the office on the planned day. We managed to get the computer and telephone system up and running on that day. Due to schedule conflicts, the rest of the move occurred two weeks later. On Sunday, after the dust has settled, we are staring at tons of boxes wondering what did we get into. Although Dorothy religiously attached notes to everything, there is only so much information that can pass that way particularly if you are starting at ground zero.

We start getting orders and start filling them. Sometimes, we must go through several boxes to find the stuff to fill the orders. Oops, we are out of shipping boxes... where do we order them? Oh, that is the last of that kit... who is responsible for kitting that one? Then we start getting reservations for DCC for 2001... hmm, the computer is not set up for that product code yet. After 9-11, we start getting cancellations... how do you do a credit card refund and be sure it went through? Next problem: what do we need to ship to DCC in the way of kits and publications?

During the first few months, we tried to operate the office with evening hours because Laura was in the process of shutting down the office of a social services agency.

We made it to DCC and back. It was good to see old friends and make new ones. It was nice to be able to put a face on those you talk to on the phone or exchange e-mails with.

October arrives ... darn we were just getting some of the post DCC paperwork and orders caught up and here comes envelopes of parts, enclosures, PCBs, etc. for 150 DSP10 kits. Where do we put them? Where do we order shipping boxes? How much to ship to this country or that country? How long will it take to get there?

Then, at the end of October, Laura had officially close the social services office, so we switched to daytime hours.

Around the first of the year, we felt we were getting the hang of things (little did we know). About that time,

John started having back problems that eventually resulted in back surgery in May, which prevented us from attending the Dayton Hamvention. (We missed seeing a lot of you.)

In the middle of that, Laura lost her brother, which required her traveling to Colombia. While there, she got sick and had to extend her stay. So, things got pretty far behind again.

About that time, we had to bite the bullet and take on a task that had never floated to top. We ran the renewal letter batch process. Lots of work getting those out, and more when we started getting responses. Of course, we like getting the responses. Some of those that returned with bad addresses were not welcome news. John learned that an old friend, W9RI, had become a silent key after his reminder letter came back.

We now seem to have recovered from that flood of renewals and processed the Dayton sales. We think we see a little daylight, but it will end when the next batch of DSP10 kits is ready and everyone is looking for their winter projects.

A number of you have had requests and orders fall through the cracks during the past year. We are sorry we did not measure up. Most of you were very understanding however, and we appreciate that.

Given a little more time, I think we can make it look easy like Dorothy and Bill did. Whenever we visited them in Denton, it sure looked like they had everything under control. That is how we were suckered in!

KB0THN wins IEEE Presidents' Scholarship

True Tax Facts

TAPR is required to file with at least four taxing agencies: Arizona, because it is incorporated there; Texas, because it currently reside there (and the lucky Texas citizens have the privilege of paying sales tax on their TAPR purchases); Ohio, because of sales taxes on the Hamvention sales. In addition, we have to report to the IRS. Since we are a non-profit organization, we do not pay taxes to any of these agencies, but do act as a collector of sales tax for two of them.

Future Reports

We do not promise to report quarterly (look at our record so far!), but we will try to do so more often in the future. We think it helps the membership to know what it takes to run an organization such as TAPR.

Thanks to Guy Story, Greg and Bridget Jones, Dorothy and Bill Jones for their help in getting things moved. (We think Dorothy and Bill stayed up all night before the original move date packing last minute items.)

P.S. Office hours are listed on the Web pages and several publications. Most publications carry out-of-date information, so please ignore them. We try to be near the phone from 9 to 5, Monday through Thursday. Many things, such as trips to the bank, post office, office supply, etc. can take us out of the office from time to time. We find that most people are using e-mail today and frankly, that is the best way to communicate with us.

FROM *THE ARRL LETTER*

Eighteen-year-old James J. Jefferson, KB0THN, of Winona, Minnesota, has won the $10,000 IEEE Presidents' Scholarship. For his winning project, "Automatic Packet Reporting System (APRS): Building a large-scale geospatial database," Jefferson collected and cataloged the entire APRS Internet stream into a relational database.

A ham since 1995 and an ARRL member, Jefferson said it struck him that "something useful could come from all this data, if it could be collected and analyzed." For the purposes of the project, he concentrated on the Los Angeles freeway system. The data are reported in a variety of ways, so Jefferson had to write a program to translate the data into a common format. He also developed software to analyze the position data and wrote another program to search digital maps for the distance to the nearest road, in order to offer options to people stuck in traffic.

The project involved writing some 10,000 lines of code, and Jefferson worked completely on his own. His software collects more than 600,000 data points a day. A friend helped him locate space for a series of computers he linked together (called a Beowulf cluster) to work the data. The rest of the work he does in his basement. Jefferson (who prefers to use his middle name instead of his legal surname, Jarvis) plans to continue with his project, investigating the use of neural networks to detect road anomalies such as traffic jams.

(KB0THN is a regular participant on TAPR's APRSSIG. - Ed.)

K4HG wins EarthLink R&D grand prize

EarthLink's Research and Development department has announced that TAPR Board of Director member Dr. Steve Dimse, K4HG, is the grand prize-winner of its open standards-based Automatic Vehicle Location (AVL) device application development contest. The competition explored new and future vehicle telematics applications.

Dimse won the overall, grand prize for his proposal to integrate the AVL device into the existing Automatic Packet Reporting System (APRS) world-wide tracking system. Dimse's proposal would extend the reach of the APRS by allowing it to be used by anyone with an AVL device and access to the Internet.

"The far-reaching benefits of this type of service include anything from keeping up with your kids to tracking down a stolen car," said Dimse.

the Linksys USB wireless LAN adapter

BY DON ROTOLO, N2IRZ

After spending a few fruitless days trying to get an older Lucent WaveLAN Bronze card to work with my laptop, I got angry enough to just go to Best Buy and pick up a Linksys USB Wireless Network Adapter. You see, a neighbor graciously offered me whatever excess bandwidth I could catch leaking from his wireless LAN (WLAN). Since I live with a 33.6 k dial-up connection, I thought that Ralph's connections via cable modem and DSL might speed things up a little. OK, a lot. For that, I was willing to spend a few dollars.

I'm getting ahead of myself. Some months ago, a friend gave me the aforementioned Lucent card. It was new in the wrapper, but a few years old. Until my conversation with Ralph, I never had a use for it. Let me make a long story short and state that I still can't get the @%#*& thing to work. After a frustrating week, including Ralph verifying that his laptop could connect from my front yard, I drove to Best Buy and paid $90 for Linksys Wireless USA Network Adapter, Model WUSB11, version 2.6.

After connecting the Linksys box to my USB port, I couldn't get more than a faint flicker out of the "link" LED. So, I tried to 'optimize' the Linksys adapter's antenna. This tiny box - about the size of a pack of cigarettes - has this cute little flip-up antenna at the back. Measuring the approximate size of the antenna, I concluded it must be a simple dipole inside that plastic wand. Well, a dipole makes a great driven element in a Yagi, right? So, I got a cardboard tube, the kind used for toilet tissue, and built the rest of the parasitic elements for a 6-element Yagi out of #14 copper wire and hot-melt glue. I carefully slipped it over the antenna dingus. Pointing it at Ralph's house (only about 150 feet away, with a house between), it didn't make a bit of difference. Not a single bit more of flicker off that LED. Sigh.

I got involved in other things, and let it drop for a few weeks.

Then, late at night, I woke up and had a sudden urge to work on it again. I got my trusty Swiss Army knife, pulled off the 'warranty void if removed' tag and figured out how to open that puppy up. By the way, if you want to try this at home, first remove the once screw holding it all together. It's under the small rubber foot nearest the indicator LEDS. Just peel up the foot and remove the screw. Then, remove the 'warranty' label, push the bottom of the case inwards along that edge, and it'll kind of pop open. There's only one latch in the corner next to the corner with the screw, and three on the other end near the USB port.

The PC Board came out easily, but the antenna was still encased in its housing. After a few moments with the knife, and some broken plastic later (It's glued), the antenna revealed itself as well. Have a look at Figure 1.

inexpensive high-speed packet is here

BY STEVE LAMPEREUR, KB9MWR

The antenna is a folded 1/2 wave as you can see in the photo, constructed from 1/32" FR4, and there's a 1/2-wave 'ground plane' strip on the other side. For a sense of scale, the whole antenna board is 52 mm long.

The best part was that the antenna was connected to the main board with a piece of coax! I carefully unsoldered the coax from the board, making sure I didn't also desolder the very tiny capacitor, about the size of a grain of salt. I connected a slightly longer length of Teflon coax that terminated in a TNC connector. I used it because it was handy, and I had the matching female end as well. I suppose there would be better choices for 2.4 GHz. Something small, like an MCX, would probably be better.

By the way, you really should read and understand the FCC rules, especially Parts 15 and 97, before you go changing antenna systems on Part 15 gear like this one.

As I write this, I haven't yet built of obtained a suitable Yagi antenna. I am assuming that all I need to make the connection to Ralph's house is more gain. I saw an antenna design based on a Pringle's can, a kind of horn feed arrangement, at www.oreillynet.com/cs/weblog/view/wlg/448. I had a look at Down East Microwave's catalog www.downeastmicrowave.com/ and found a 17.5 dBi loop Yagi for $99, assembled. I haven't found a published design in any of my books yet, but the loop Yagi designs I keep finding for 1296 MHz should scale up to 2.437 GHz (the middle of the 'band') or so fairly well.

And so it goes with my first foray into wireless networking at speeds in excess of 38k4. I sure could use that bandwidth - being a ham, I just can't bring myself to pay more than $15 a month - but the next step to that borrowed connection is a good antenna. If anyone has any good ideas, please write. Anyone who has taken their WLAN card apart and learned something is hereby encouraged to let the rest of us know about it. Just write to TAPR and they'll get it to the right people. Meanwhile, as I think about antennas, I'll let you know how it turns out. ▌

Yes, that's right. It is so close to home you may not even realize its potential ham implementations.

What I am talking about is all of the Part 15 spread spectrum wireless Ethernet devices. There are numerous manufacturers of these devices. They operate on the shared 900-MHz, 2.4-GHz and 5.7-GHz bands with speeds between 1.5 and 11 Mbps! The common 802.11b devices are 11 Mbps and six of the 11 user settable channels operate in overlapping ham allocations.

The beauty of this kind of operation is that those with no desire to "get technical" can do it Numerous hams have reported successful 10 to 15-mile paths by attaching nothing more than a higher gain antenna to the devices.

This idea is nothing new. In fact, 13 years ago Al Broscious, N3CFT, suggested this very idea at a computer conference. But at the time, amateur spread spectrum rules were more restrictive and prohibited certain spreading codes. Nonetheless, TAPR attempted to urge interested hams to obtain Special Temporary Authorization (STA) from the FCC.

Well, a few years have past, the ham rules have been relaxed and the price of this technology has come down considerably. Now, for about $150, you can pick something up locally and throw in a $60 to $70 24-dB parabolic antenna. Then, you are all set to build that high-speed affordable RF network, where you can mimic the Internet with Web pages, conferencing, FTP and so on.

There is absolutely no reason not to explore this technology. You can port existing AX.25 traffic over a wireless Ethernet link using AXIP encapsulation.

For further information and details, refer to:

Using Part 15 Wireless Ethernet Devices for Amateur Radio (**www.qsl.net/kb9mwr/projects/wireless/plan.html**)

Amateur Broadband Radio Network (**www.abrn.org**)

Green Bay Professional Packet Radio (**www.gbppr.org**) ▌

APRS at Arkansas 2002 Search and Rescue

BY SCOTT RATCHFORD, W5JSR

During the weekend of June 1, 2002, Search and Rescue (SAR) teams from all over Arkansas, met for Rescue 2002. Held in the sleepy southern town of Nashville, the annual conference met for the fourth time in a beautiful city park. Teams arrived from all four corners of the state on Friday afternoon and evening. By Saturday morning, more than 80 SAR members had arrived.

The Howard County Search and Rescue (HCSAR) team sponsors this event for training teams across the

"I teach ham radio classes each month in Benton County and I wanted to show the SAR members at the seminar a simple way to study for the Technician class license and show them some of the new equipment available today. I used the ARRL Now Your Talking handbook for the class and explained how to use the book," Scott said. He also touched on Amateur Radio's role in emergency services and about ARES and RACES.

"After the class, I had several SAR members ask

state to use similar methods and procedure and to share new ideas. Several training classes were held during the weekend and included two classes about Amateur Radio. In fact, of the 80 SAR members present, one-third or more were Amateur Radio operators! One of the requirements for membership in HCSAR is that you hold an Amateur Radio operators license or are in the process of obtaining one.

The HCSAR team communications officer and ARES EC is J.B. Davis, N5THS. This year, J.B. asked two hams, Scott Ratchford, W5JSR, ARES EC for Benton Co., and Mike Engelke, KD5DGT, Asst. ARES EC for Benton Co., to come down and give two classes. Scott and Mike accepted the invitation and presented classes on Introduction to Ham Radio and APRS.

Friday night, Scott, gave a short Amateur Radio class.

further questions and they presented a real interest in obtaining their license!"

Saturday morning, Scott and Mike worked together to present a program on APRS.

"Last year we came down for the first time to give this class and we were successful. This year we came down to again present the class, and to test the program in a 'real-world' situation. Our class was well attended and we presented an overview of the APRS program features," Scott said.

APRS, the Automatic Position Reporting System, is a program created by Bob Bruninga, WB4APR, that uses GPS receivers and Amateur Radio to track objects. APRS uses a connectionless form of packet radio to transfer information and is capable of tracking objects

in real-time. This program has many uses, and is capable of delivering messages instantly to any other APRS station.

"This program is perfect for situations like this, where you need to know where your SAR teams are at any given moment," mentioned J.B. "We can track our teams out there that are two miles away and show it on our laptop computer here in the command vehicle. I

APRS program captured the path that the teams took and we used that data to overlay a track on the map that would show us where the teams had been and areas where they missed."

The field test lasted about 2-1/2 hours. That evening after the mock search and BBQ chicken, it was time to hold a debriefing. The debriefing began with an overview of what was seen on APRS. Scott began with a map of the area searched and outlined the path of each team. After the debriefing, a question was asked of the

think this technology will help us on our searches and we will add this to our setup."

A good portion of Saturday afternoon was dedicated to field-testing and a mock search. There were four K9 and search teams tasked with finding several lost persons in the woods.

"We put three tracking devices (made up of Kenwood TH-D7A radios and Garmin GPSs) on search teams and used the APRS program in the HCSAR command vehicle to present a visual clue of team locations to the Incident Commander. The three teams that we tracked were taken about two miles away to a staging area. We were able to watch each team as they left the area and began their track," Scott said. "We set the tracking devices to beacon a position every 30 seconds. The

SAR teams, "What would you like to see more of next year? What can we do to improve the conference? The answers were, "Communications," "Ham Radio," "GPS" and "APRS"!

Search and Rescue 2002 was a success for Amateur Radio as much as it was for the SAR teams that were present. There were too many hams there to mention individually but among them were N5THS, W5JSR, KD5DGT, KA5ZYY, KC5BYB, KB5SSW, N5YKL, N5XFW. Also present were representatives of the Arkansas Department of Emergency Management (DEM), Arkansas Fire Academy and several county level DEM managers. A lot of information was passed, a lot of training programs offered, and it was made clear that Amateur Radio will remain a vital part of Search and Rescue in Arkansas!

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Membership	Price	Number of Years	Total
United States	$20.00		
Canada/Mexico	$20.00		
International	$25.00		

○ New Member   ○ Renewal

SubTotal

Membership 10% Discount
Member #: _____ (Place new if joining)

Total Sales (Subtotal minus discount)

Texas Residents (8.25% tax)

Membership (New or Renewal)

Shipping and Handling
For Total Kit Codes Between

1 - 7	8 - 15	16 - 27	28 - 55
Add $6	Add $7	Add $8	Add $9

Kit Codes above 55 or International orders must contact TAPR for amount.

TOTAL Order Amount

Except were noted

☐ Charge my credit card (check one):
☐ VISA ☐ MasterCard
Acct. # _____
Expiration Date: _____
Signature on card: _____
Name / Call: _____
Street Address: _____
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Country: _____ Phone Number: _____
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Kits	Price	Qty	Total	Kit Code	Information
PIC-E(ncoder)	$65.00			16	
CompactFlash Card Adapter	$59.00			16	A FlashCard is not included in the kit
Motorola EVM56002 Interface	$150.00			16	http://www.tapr.org/tapr/html/dsp56002evm.html
APRS T-238 Weather Station	$134.00			16	
TAC-2 (Totally Accurate Clock)	$139.00			16	Requires a GPS to operate
Differential GPS (Member Price)	$199.00			16	Requires a GPS to operate
DAS (DTMF Accessory Squelch)	$68.00			8	As seen in Dec 95 QST
TAPR 9600 bps Modem	$80.00			8	
Bit Regenerator	$10.00			1	used for regenerative repeater operation
Clock Option	$5.00			1	used for regenerative repeater operation
PK-232 Modem Disconnect	$20.00			2	simplifies connection of external modems
PK232MBX Installation Kit	$20.00			2	for installation of 9600 modem in PK-232MBX
XR2211 DCD Mod.	$20.00			2	
State Machine DCD Mod.	$20.00			2	
State Machine DCD w/Int Clock	$25.00			2	For KPC2 or other TNC w/o 16X or 32X int clock
Firmware					
32K RAM w/ TNC2 update docs	$20.00			2	
TNC-2 1.1.9 w/KISS EPROM	$15.00			4	includes 1.1.9 Commands booklet (below)
1.1.9 Commands Booklet (only)	$8.00			2	full TNC-2 command set for 1.1.9
TNC-2 WA8DED EPROM	$12.00			2	8 connect version for ARES/Data standard
TNC-1 WA8DED EPROM	$12.00			2	
TNC-2 KISS EPROM	$12.00			2	
TNC-1 KISS EPROM	$12.00			2	
PK-87 WA8DED EPROM	$12.00			2	
TrackBox	$15.00			2	
Publications					
ARRL/TAPR DCC 17-19/98-2000 CD	**$50.00**			**4**	**CD w/ 98 and 2000 Proceedings**
ARRL/TAPR DCC 17-19/98-2000 CD	**$33.00**			**4**	**CD only**
ARRL/TAPR DCC 11-16/92-97 CD	**$33.00**			**4**	**CD with available Proceedings**
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TAPR Spread Spectrum Update	$18.00			16	200+ pages on ARS Spread Spectrum Topics
TAPR Software Library	$20.00			4	ISO 9660, 650 Megs of info! w/ html nav pages
Wireless Digital Communications	$39.99			28	300+ pages w/disk by: Tom McDermott, N5EG
Packet Radio: What? Why? How?	$12.00			8	130 pages. TAPR's Packet Radio book.
BBS Sysop Guide	$9.00			4	60 pages. by: Barry Buelow, WA0RJT
TAPR's 94 Annual Proceedings	$7.00			4	Papers from the Annual Meeting (Tucson)
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PSR Set Vol 1 (#1 - #17 '82 - '85)	$20.00			16	
PSR Set Vol 2 (#18 - #36 '86 - '89)	$20.00			16	
PSR Set Vol 3 (#37 - #52 '90 - '93)	$20.00			16	
PSR Set Vol 4 (#53 - #68 '94 - '97)	$35.00			16	
ARRL/TAPR 2001 DCC	**$10.00**			**8**	**2001 DCC**
ARRL/TAPR 2000 DCC	$15.00			8	2000 DCC Orlando, FL
ARRL/TAPR 1999 DCC	$15.00			8	1999 DCC Proceedings Pheonix, AZ
Other					
TAPR 11oz Coffee Mug logo	$11.00			4	Logo in black and microwavable gold
TAPR Badge	$10.00			0	include Name and Call for badge
TAPR Shirt - 4 styles					http://www.tapr.org/tapr/html/shirts.html
GPS					
TAC-32 Software Registration	$55.00			0	
Garmin GPS-25	$150.00			28	(data cable included)
Garmin GPS-20/25 Interface/Power Kit	$40.00			8	No Discount.
Garmin GPS-20/GPS-25 Data Cable	$15.00			2	
Garmin GA-27 GPS Antenna	$75.00			8	mcx connector, mag and sunction mounts
Oncore UT+ GPS	$169.00			28	
Oncore VP Interface/Power Kit	$40.00			8	
Oncore GT+ GPS	$149.00			28	
Motorola Antenna 97	$65.00			8	bnc connector, mag mount
MCX Rt-Ang Connector w/coax pigtail	$15.00			2	No Discount.

Subtotal: _____   **Added Total Kit Codes** _____

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