# PACKET STATUS REGISTER

Tucson Amateur Packet Radio Corporation

*A Non-Profit Research and Development Corporation*

**Winter 2000**

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## President's Corner

When the last issue of the *PSR* was published I had written most of what appears in this column. Due to a score of issues (all personal) I was not able to get it completed and left it out of the issue. Looking back on it, I goofed badly not having this in that issue. What am I talking about you ask? Basically the OEM agreement between TAPR and the Dandin Group, Inc. (DGI) (http://www.dandin.com). Let me take the time in this column to bring the membership up to date on what has happened in the past year with the radio project and also cover some other pressing issues in the organization. I also want to say that with hindsight we should have addressed some of these issues earlier. Although I firmly believe that TAPR is doing -- and has done -- the right thing with respect to this project, we should have been more forthcoming. As noted near the bottom of this column, the Board recognizes that we need to improve communications on organizational matters, and we're taking actions to address that.

The TAPR 900Mhz FHSS radio was made an official project in May 1997. The FHSS web page, which you can access from the TAPR home page has chronicled the progress of the development. If you have read the various papers, talks, and presentations made by the development group you might want to skip over this section. It has been the goal of the project team to develop a FHSS radio operating on 900Mhz. As many know, there

### Look for TAPR at these Upcoming Events

| | |
|---|---|
| May 19-21, 2000 | Dayton HamVention |
| Sept. 22-24, 2000 | ARRL & TAPR Digital Communication Conference<br>Orlando, Florida |


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is potential interference on 900Mhz, but that is why the radio includes error-correction technology which will make it more robust against interference. Why 900Mhz and not 2.4G or 1.2Gs? 900Mhz is a good band because you get a good tradeoff between distance and speed. Yes, 2.4 or 1200 might be better amateur radio bands, but from the start we knew that we had to be on a band that could be made available to both Part 97 and Part 15 in order to be attractive to possible OEMs. Production size has been a key to keeping the price affordable and not making these radios cost $1000 or more each. Another reason 900Mhz was picked is because 1) the parts can be bought and for the most part are not on allocation and 2) 900mhz is a cheaper band to buy RF parts for. Also the production issues at 900Mhz are much easier to deal RF wise.

From the beginning of the project group had planned to make the radio open source. We felt that this would allow the amateur radio community a better opportunity to experiment with it. The development team picked Xinu for that specific reason. The FPGA code for the modem will be made available. The only thing not being made available will be the PIC chip code that controls the hopping sequences, and this is due to legal restrictions on the export of SS technology. This doesn't mean that you can't program your own PIC chip based on the SPI definitions defined in the source code (should be a simple enough task for those PIC gurus out there). This only means that we can't make it available if selling the radio outside the US. I am sure several PIC chips will appear on people's web sites once the radio is available for those that would want to change the sequence for operations under Part 97. The digital and RF board sections are on two different boards, so that someone could design additional RF platforms. Based on all the RF design I have seen happening by members, I will be happily surprised when someone else designs an alternate board for the project that is reproducible. I know I am very interested in developing something on 1.2G and 2.4G myself.

Finally, why this design? As Lyle Johnson explained to me when I first came into TAPR all those years ago "Those who build or code, rule." That simple statement drives most of what TAPR is about. The group or person that shows up and puts the time, energy, and effort decides what the final outcome is. All TAPR can do is provide tools, equipment, software, and a little cash here and there to help. I know of people on this list that have said they were going to do this or that that never delivered on those statements. That is fine; this is a hobby and we all have to recognize that. However, you have to applaud the people who do deliver on both the small and enormous projects such as this radio.

In December of 1997, I began the first talks with potential manufacturers regarding the radio. That began

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**Advertising:**
Contact the TAPR office.

**TAPR Officers:**

| | |
|---|---|
| President | Greg Jones, WD5IVD |
| Vice President | John Ackermann, N8UR |
| Secretary | Bob Hansen, N2GDE |
| Treasurer | Jim Neely, WA5LHS |

**TAPR Board of Directors:**

| Board Member | Term | Internet |
|---|---|---|
| Greg Jones, WD5IVD | 2000 | wd5ivd@tapr.org |
| John Koster, W9DDD | 2000 | w9ddd@tapr.org |
| Mel Whitten, K0PFX | 2000 | k0pfx@tapr.org |
| John Ackermann, N8UR | 2001 | n8ur@tapr.org |
| Barry McLarnon, VE3JF | 2001 | ve3jf@tapr.org |
| Doug McKinney,KC3RL | 2001 | kc3rl@tapr.org |
| Steve Bible, N7HPR | 2002 | n7hpr@tapr.org |
| Bob Hansen, N2GDE | 2002 | n2gde@tapr.org |
| Steve Dimse, K4HG | 2002 | k4hg@tapr.org |

Date is expiration of term on Board of Directors.

The Tucson Amateur Packet Radio Corporation is a non-profit scientific research and development corporation [Section 501(c)(3) of the U.S. tax code]. Contributions are deductible to the extent allowed by U.S. 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.

**Article submission deadlines for upcoming issues:**

| | |
|---|---|
| Spring 2000 | March 15, 2000 |
| Summer 2000 | June 15, 2000 |
| Fall 2000 | September 15, 2000 |
| Winter 2000 | December 15, 2000 |

**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 communicators, please contact the editor so that your work can be shared with the Amateur community.

The preferred format for articles is plain ASCII text; the preferred graphic formats are HPGL or PCX. However, we can accept many popular word processor and graphic formats. All submissions on diskette should be formatted for MS-DOS.

a long series of discussions with various manufacturers about the radio project for over two years. We attempted several OEM deals with other companies (those that contacted us and those that we contacted). There were several reasons why these agreements failed: 1) TAPR couldn't maintain control of the final design for later use, 2) companies couldn't live with the possibility that TAPR might default on the agreement and not deliver anything for the money paid, 3) the development team had to buy off on whom they were dealing with for the technology transfer, both personally and because of potential conflicts of interest in their professional lives, 4) TAPR wanted access to any production run based on the design, or 5) the potential companies all wanted to basically pay nothing for the technology transfer because not enough of the design was available for production (i.e. their investment from getting to a completed unit was far greater then they were willing to pay for the license fee TAPR was asking). I think these problems point to some of the reasons why amateur radio groups like TAPR can do small scale productions with success, but face major hurdles for doing large scale projects such as this one.

After several failed attempts to reach agreement with these potential manufacturers, I actually began working up a business plan for TAPR to do the production. In the Spring of 1999 I approached the board with the first of two deals. I was asked by a company to go to work for them and head up a commercial development of the radio project. When this happened, I approached the board about the potential deal. In this case, the Board recognized the potential conflict, discussed it at the May 1999 Dayton meeting, and voted to (a) pursue the deal and (b) have John Ackermann handle the contract and agreement. Several weeks after the May board meeting this commercial deal also failed. Then in September of 1999, Dewayne Hendricks, WA8DZP, asked me to join the founding team of DGI. We discussed the radio project as a possible deal that would fit well into the company concept. We both thought it would go well with the other technology that the group was developing. I then approached the Board again and a final discussion regarding the agreement and potential conflict of interest was covered in detail at the Phoenix, AZ September 1999 board meeting. The board was in consensus to move forward with the deal. An agreement with the DGI was signed the weekend of the Board meeting in Phoenix covering the TAPR FHSS Radio project.

Since the announcement was made about the agreement between DGI and TAPR (October 16th, 1999), some members have questioned the organizational responsibility of myself or the board regarding the issue. You (the membership - those on this list at least) elect the board of directors to run the organization and the board elects the officers that carry out the day to day operations. Personally, I have been a member of TAPR since 1985, an officer since 1988, and served as the organizations 5th President since 1993. TAPR makes deals every year with someone, even active officers and board members on occasion. In those cases, the board discusses the potential for a conflict of interest and measures are taken to avoid those possibilities. Since I have been involved in TAPR the board has acted in the highest interest of the organization.

One of the reasons I think members were justified to ask these questions was because of the lack of published board minutes in the *PSR*. Steve Stroh, N8GNJ, has been the TAPR secretary since the Fall of 1996. Due to personal reasons, Steve was unable to get the minutes done for the Board to review and publish in the *PSR*. Steve recently explained this issue on the TAPR Spread Spectrum list:

> Posted Thu, 06 Jan 2000
> To: TAPR Spread Spectrum Special Interest Group
> From: Steve Stroh <steve@strohpub.com>
> Subject: [ss] Re: TAPR conflict of interest?
>
> I'll answer one of the implied allegations. As TAPR Secretary, it was my job to record the minutes for the 1998 and 1999 Board of Directors meetings where the issues of potential conflict of interest and The Dandin Group's participation in the TAPR Spread Spectrum Radio Project were discussed.
>
> Although I took notes, at these meetings, I was negligently tardy at converting them into polished, formal minutes suitable for review and publication. The fact that no minutes from these meetings have been published in the TAPR Packet Status Register newsletter is my fault. This issue has since been corrected by the TAPR Board of Directors - I was asked to resign as Secretary and I agreed that was best. My notes have been furnished in raw form to the TAPR Board of Directors, who will convert them into minutes to be published as appropriate (in the *PSR*, the official TAPR membership publication).
>
> I'll take this opportunity to add several personal observations on this issue.
>
> The potential for conflict of interest was recognized and addressed VERY early and discussed thoroughly. It's my PERSONAL opinion that TAPR's best interests in the matter were THOROUGHLY represented. I'll leave it to the TAPR Board of Directors to elaborate if they feel it appropriate.
>
> It's my PERSONAL opinion that, had The Dandin Group not gotten involved in the TAPR Spread Spectrum Radio project, that there would not BE a TAPR Spread Spectrum Radio Project. It simply became too big a project for a purely volunteer effort. It had a very promising start and was making great progress until a major redesign was required from the obsolescence of several key parts and some key personnel changes. ....
>
> Steve Stroh N8GNJ

While Steve Stroh explained about the minutes, as President it was truly my fault that those minutes didn't appear in a timely fashion in the *PSR*. I let that item slip far too long and I should have been on top of that issue. As someone pointed out, Steve is a volunteer like all of us, and therefore I was giving him as much time as I could -- in this case a little too much. As you might have guessed, Steve has resigned from the position of Secretary. I personally didn't want Steve to resign, but until his personal schedule and new family addition gets cleared up the board needs a secretary that has the time for the job. I look forward to the time when Steve has those extra cycles to get back into the flow of the organization. Steve always brought a fresh look and new ideas to the table when the board and officers were discussing issues. In the meantime Bob Hansen, N2GDE, will be serving as secretary of the organization.

I also want to share a post made by Steve Dimse to the Spread Spectrum list:

> Date: Sat, 8 Jan 2000
> From: Steve Dimse , K4HG
> To: TAPR Spread Spectrum Special Interest Group
> Subject: [ss] Re: [OT] TAPR conflict of interest?
>
> The commonality was never hidden, nor was any reason seen to publicize it. There are many issues discussed by the board that do not make it to the *PSR*. The whole point of having a Board of Directors is to delegate authority to a few people who have a better chance of making things happen in a small group setting. When you vote for a Director, you vote for someone to represent you. I believe I have acted in the best interest of TAPR, its members, and ham radio in general by approving this deal.
>
> ....
>
> Like many contracts, both parties feel it is in their best interests that the details remain private. The details of the TAPR-2 licensees are not public knowledge either, even after all these years, so this is not an unusual case. Decisions like these are why the board was empowered in the first place. As Steve Stroh pointed out, the board recognized the potential for conflict of interest from the start, and took great pains to assure that none occurred. No external pressure was applied, everyone voted their conscience, and the vote was unanimous.

The bottom line is that DGI is willing to take the risks and pay for the TAPR technology transfer that no other commercial company was either willing or able to do with the clauses TAPR wanted in the agreement. One of the most important aspects of this deal was that the development team was willing to go along with it and felt that DGI was in a unique position to make the transition of technology between the two groups much easier with a high level of communications and little or no hassles involved. Without the development team buying into the mechanism for technology transfer, any agreement was doomed to failure. As mentioned above, this was one of the reason two of the potential commercial agreements failed before this one. The bottom line is that with this deal TAPR is reimbursed for the project development cost to date, makes a bit of money now on top of that, and hopefully makes more money from royalties when the radio goes into production. In addition, the radio will be available to the amateur community through TAPR at a price far better than we would be able to obtain if we manufactured the radios ourselves. DGI gets access to a great radio design and those of us in DGI who have been involved with TAPR can help gain closure on this project and make something come to life that was about ready to die from the lack of cash. It is a good match.

There have been several questions raised about TAPR agreements. For the record, TAPR has never made available contracts regarding OEM deals or information about who are licensees. This dates back as far as the founding of the organization and is a requirement of doing business with commercial entities who are concerned about the confidentiality of their business plans. We don't normally disclose even who has signed agreements, but both TAPR and DGI felt it was important to show the connection between the two groups. It should be noted here, that if DGI hadn't decided to recognize the connection between TAPR and DGI on this project, I wouldn't be talking about this in the *PSR*. As member, you would have seen a note in the minutes that the board discussed an OEM deal concerning the radio and that I abstained from the vote. OEM agreements are confidential until the OEM partner decides to make the information available. The reason you know many of the TNC-2 OEM licensees is because they used the TAPR TNC name in their products or in marketing. All of the other OEM agreements TAPR has done over the years have been confidential deals and the name of the OEM partner have never been disclosed.

Several have asked about licensing and commercial availability of the FHSS radios. Until the actual technology transfer is complete, TAPR is not at liberty to discuss further the license agreement. When that time comes, I am sure DGI and TAPR will formally announce how the radio will be made available both to the amateur radio community and commercially.

Since the agreement with DGI has been signed, development on the radio project has moved into high gear. The RF design will be coming out of fabrication and should be under testing by the time of this printing and the new digital board design will be in the midst of layout and fabrication. The agreement put new life into the project team, when many of the team members

were approaching a point well past burnout. There will be more posted to the FHSS web page as the project progresses. We are discussing how to do beta testing now. One plan is to take group purchases from members, much like the TNC-1 was done. That a group of members in a local area will do a minimum buy of say four or five radios. This will allow a critical number of members in an area to participate and give input. That way one of the members will be a group coordinator to help with the testing of the radios. If you have ideas regarding this, drop me an e-mail.

There have been questions recently about the bylaws and how the board of directors operates asked by some of the members. For several years now, all a member had to do was contact the office and Dorothy would mail them the bylaws for the organization. I am instructing Bob to publish the bylaws in this issue. With the merger of the DCC and TAPR Annual Meeting, we now hold the annual membership meeting one evening at the ARRL and TAPR Digital Communications Conference each year. I personally can say that the merging of the TAPR and ARRL meetings has been a great success. As I hoped when I started that process in 1993, the focusing of effort on one yearly meeting instead of two has helped the quality greatly. We had a lively discussion at the membership meeting this year. Questions concerning the APRS Working Group and TAPRs involvement, issues concerning access to working materials for the PIC-E project, and other items were discussed by those members present. The current method of the membership meeting I think provides far more interaction with the board and officers then in the past when it was a much more static presentation with a few questions at the end. As to board meetings, the TAPR board has always held a board meeting at the annual meeting. This annual board meeting is always open and any member can attend. The annual board meeting happens on the Friday of the TAPR and ARRL DCC, since the merging of the two conferences. It should be noted, that during issues of license agreements and employee relations the TAPR board can and will go into closed session for the purpose of confidentiality on these issues.

Once about each quarter, someone brings up the issue of group Spread Spectrum equipment purchases. If someone can get something arranged we would be glad to look at doing it through TAPR. We were very close on the Freewave Technologies, Inc. (FTI) deal (now several years past). One of the driving forces for FTI to deal with TAPR was to be the pipeline into the amateur community so they wouldn't have to handle customer support. We have tried doing other deals, but the simple fact is that no Part 15 (aka license exempt) company is going to sell in bulk to amateur radio operators who, because they can use more power and better antennas, are likely to interfere with their primary customer base, or spend time dealing with what they perceive to be a market outside their business plan. That was at least the situation before the recent Report and Order and I doubt that it's changed. Also, there isn't any reason to do a buy unless we can get a deep discount to make it worthwhile in doing. The price points on many of the radios are just too steep for the "amateur radio operator" to buy. Some people don't find it difficult to plop down $1500 here or there for SS equipment, but at $550 each we didn't have that many orders for the TALNET systems. If you want or can spend the time to find a bargain that TAPR can make available to the membership, please let me know when you have something. After five plus years, I am eager for someone else to "push that cart" on this issue.

A major item to be announced in this *PSR* is how to solve issues like the conflict of interest one which cropped up on the SS technical list. I am sure that several good technical people during the exchange of messages unsubscribed to the list, which is a shame. Some of this might have been corrected with the minutes getting published, but I am sure now that additional comments and feedback from the membership would have resulted and is a good thing that our membership wants to provide input. Traditionally, in TAPR, the board is available at the TAPR annual membership meeting held during the ARR and TAPR Digital Communications Conference. With the growth of the organization, the once a year meetings like the DCC and Dayton don't seem to handle membership issues quick enough. We had up to this time just been using the various lists to handle issues as they came up, but the result of those postings have several times been to the technical detriment of the list that was handling it and sometimes turned the list moderator's job into a nightmare. The board has recommended the creation of a membership issues list that all Board members would be on. This would be similar to the in-person meetings we try to do at DCC each year. In this way, members can post to the list and get responses from the Board that can later be searched in the archives. In addition, this experience has taught us that we need to do a better job communicating TAPR's activities, while balancing the business confidentiality issues that really do exist. We're taking that message to heart and will do our best to improve our outbound communications.

Until next quarter and lots more fun!

Cheers - Greg, WD5IVD

# Bylaws Of Tucson Amateur Packet Radio Corporation (1985. rev. March, 1994)

## ARTICLE I
## Identification

**1.1 Name.** The name of the corporation shall be Tucson Amateur Packet Radio Corporation, and it is sometimes referred to in these Bylaws as the "corporation".

**1.2 Principal Office.** The principal office of the corporation shall be at Tucson, Arizona, and additional offices may be maintained at such other places within or without the State of Arizona as the Board of Directors may from time to time designate.

**1.3 Seal.** The seal of the corporation shall be circular in form and mounted upon a metal die, suitable for impressing on paper. The name of the corporation shall appear about the outer periphery of the seal, and the words "Corporate Seal Arizona 1982" shall appear in the inner portion.

**1.4 Fiscal Year.** The fiscal year of the corporation shall be as determined by the Board of Directors.

## ARTICLE II
## Purposes

**2.1 Purposes.** The purpose for which the corporation is formed is that set forth in its Articles of Incorporation as from time to time amended; namely, for scientific and educational purposes within the meaning of section 501(c)(3) of the Internal Revenue Code. In the pursuit of that purpose the corporation will perform scientific testing and research into development and improvement of technological systems for use in the amateur radio service, including, but not limited to, digital packet radio communications; research and testing of systems, hardware and software, for packet radio local area networks and computer network systems; and disseminating to the public information obtained as a result of such research and testing. The corporation is not formed for a pecuniary gain, and no part of the assets, income, or profit of the corporation is distributable to, or will inure to the benefit of its directors or officers except to the extent permitted under the Not-for-Profit Corporation Laws of the State of Arizona.

## ARTICLE III
## Membership Classes - Dues, Voting Rights and Annual Meetings

**3.1 Membership.** (a) Any individual who subscribes to the purposes and basic policies of the corporation may become a member subject to compliance with the provisions of the Bylaws.

(b) Persons may be admitted to membership at any time.

**3.2 Classes of Membership.** There shall be two classes of members, designated as CHARTER MEMBERS and MEMBERS. CHARTER MEMBERS are those persons who became members of Tucson Amateur Packet Radio prior to formation of the non-profit corporation and paid an initiation fee of $15.00. MEMBERS are those persons who joined Tucson Amateur Packet Radio prior to its incorporation having paid no initiation fee and those persons who became members subsequent to incorporation. Both classes of membership in existence prior to incorporation are herewith transferred to Tucson Amateur Packet Radio Corporation by these Bylaws.

**3.3 Annual Dues.** The annual dues for all members shall be as determined by the Board of Directors and shall be posted in the Corporation Newsletter.

**3.4 Payment of Annual Dues.** The dues for the first year of membership for all members are payable upon admission to membership in the corporation. The annual dues thereafter of all members are payable on the first anniversary of admission to the corporation. Members who fail to pay their dues within thirty days of such anniversary shall be dropped from the membership rolls and thereupon forfeit all rights and privileges of membership.

**3.5 Membership Rights.** Only members in good standing shall be eligible to exercise their right to cast their votes for directors as set forth in this Article and in Article VI herein.

**3.6 Certificates.** The corporation will issue certificates evidencing membership.

**3.7 Annual Meeting.** An annual meeting of voting members will be held once per calendar year as determined by the Board of Directors. Notice of the annual meeting will be included in the Corporation Newsletter sent to all members in good standing at least one month preceding said meeting.

**3.8 Chairman.** At all membership meetings, the President of the corporation shall serve as chairman and in his absence a Vice President shall preside.

**3.9 Election by Mail.** Elections of directors by the membership may be conducted by mail.

## ARTICLE IV
## Board of Directors

**4.1 Number.** The business and affairs of the corporation shall be managed by a Board of Directors. The Board of Directors shall have the sole voting power except as delegated to the Executive Committee and as allowed to the membership in good standing as provided in Article III herein. The Board of Directors shall consist of nine members. All directors shall be elected by the membership in good standing.

**4.2 Requirements to Serve on the Board of Directors.** All directors must be members in good standing and have attained the age of 18 years or older.

**4.3 Terms.** All directors shall serve for terms of three years.

**4.4 Vacancies.** In the case of any vacancy among directors through death, resignation, or other cause, the remaining directors may elect a successor to hold office for the unexpired portion of the term of the director whose place shall be vacant, and until election and qualification of his successor.

**4.5 Annual Meeting.** The annual meeting of the Board of Directors shall take place in person once per-year at a location to be determined by the Board of Directors. Notice of the board meeting will be included in the Corporation Newsletter sent to all members in good standing at least one month preceding said meeting. Additional meetings of the Board of Directors may be held without notice.

**4.6 Special Meetings.** Special meetings of the Board of Directors may be held when called by one tenth of the members of the Board of Directors upon a minimum of five days written notice to each member of the Board, any and all business may be transacted at a special meeting. Special meetings may be conducted by way of telephone conferencing or by the use of telecommunication systems. When telecommunication systems are used, special meetings may remain in continuous session.

**4.7 Quorum.** A majority of the directors shall constitute a quorum for the transaction of business. All acts of the Board of Directors shall require the affirmative vote of a majority of the directors present.

**4.8 Chairman.** At all meeting of the Board of Directors, the President of the corporation shall serve as chairman and in his absence a Vice President, as designated by the Board of Directors, shall preside.

**4.9 Committees.** From time to time the Board of Directors may appoint committees for any purpose, who shall have such power as specified in the resolution of appointment.

**4.10 Removal of Directors.** At any special meeting of the directors called for such purpose, any then serving director may be removed from the Board of Directors, for any reason, by an affirmative vote of a majority of the directors present.

## ARTICLE V
## Executive Committee

**5.1 Number.** There shall be an Executive Committee consisting of the officers of the corporation and such other directors as the Board of Directors may from time to time designate, but not to exceed six members.

**5.2 Responsibility.** The Executive Committee shall be responsible for overseeing the implementation and execution of the plans and policies expressed by the Board of Directors.

**5.3 Terms.** Officers of the corporation shall serve on the Executive Committee for the term of their office. Directors shall serve on the Executive Committee at the pleasure of the Board of Directors.

**5.4 Conduct of business.** The Executive Committee will be guided by the rules established for the Board of Directors in connection with Special Meetings, Quorum, Chairman and Committees.

**5.5 Limits.** The Executive Committee shall have a maximum spending authority of $5,000.00.

**5.6 Reporting.** The Executive Committee shall report its actions and expenditures to the Board of Directors on a monthly basis.

## ARTICLE VI
## Officers

**6.1 Officers and Qualifications.** The officers of the corporation shall be a President, one or more Vice Presidents, a Secretary, a Treasurer, and such other officers as the Board of Directors may determine. Any two offices, except the offices of President and Secretary, may be held by the same person.

**6.2 Election.** All officers of the corporation shall be elected annually by the Board of Directors at its annual meeting.

**6.3 Term of Office.** All officers shall hold office until their successors have been duly elected and have qualified, or until removed as hereinafter provided.

**6.4 Removal of Officers.** Any officer may be removed either with or without cause by a vote of a majority of the Board of Directors.

**6.5 Duties of Officers.** The duties and powers of the officers of the corporation shall be as follows and as shall hereafter be set by resolution of the Board of Directors:

**6.5.1 President.**

6.5.1.1. The President shall preside at all meetings of the corporation and of the Board of Directors at which he may be present.

6.5.1.2. He shall present at the annual meeting of the directors a report of the condition of the business of the corporation.

6.5.1.3. He shall appoint, discharge, and fix the compensation of all employees and agents of the corporation other than the duly elected officers, subject to the approval of the Board of Directors.

6.5.1.4. He shall sign and execute all contracts in the name of the corporation.

6.5.1.5. He shall designate, subject to the approval of the Board of Directors, those individuals, in addition to the Treasurer, who shall be responsible for executing notes, drafts or other orders for payment of money. Individuals so designated shall execute this authority under the direction of the President, Executive Committee, or the Board of Directors.

6.5.1.6. He shall cause all books, reports and statements to be properly kept and filed as required by law.

6.5.1.7. He shall enforce these Bylaws and perform all the duties incident to his office and which are required by law, and, generally, he shall supervise and control business and affairs of the corporation.

6.5.1.8. The President shall have a maximum spending authority of $1,000.00.

**6.5.2 Vice Presidents.** During the absence or incapacity of the President, a Vice President, as designated by a majority of the Board of Directors, shall perform the duties of the President, and when so acting, he shall have all the powers and be subject to all the responsibilities of the office of President and shall perform such duties and functions as the Board may prescribe. The duties of the Vice Presidents shall be designated by the Board of Directors prior to their election. A Vice President, as designated by a majority of the Board of Directors, shall perform the duties of the Secretary in the absence of the Secretary.

**6.5.3 Secretary.**

6.5.3.1. The Secretary shall keep the minutes of the meeting of the Board of Directors in an appropriate book.

6.5.3.2. He shall attend to the giving of notice of special meetings of the Board of Directors of the corporation.

6.5.3.3. He shall be custodian of the records and seal of the corporation and shall affix the seal to corporate papers when required.

6.5.3.4. He shall attend to all correspondence and present to the Board of Directors at its meetings all official communications received by him.

6.5.3.5. He shall perform all the duties incident to the office of Secretary of the corporation.

**6.5.4 Treasurer.**

6.5.4.1. The Treasurer shall have the care and custody of and be responsible for all the funds and securities of the corporation, and shall deposit such funds and securities in the name of the corporation in such banks or safe deposit companies as the Board of Directors may designate.

6.5.4.2. He shall make, sign, and endorse in the name of the corporation checks, drafts, notes and other orders for the payment of money, and pay out and dispose of such under the direction of the President, the Executive Committee, or the Board of Directors.

6.5.4.3. He shall keep at the principal office of the corporation accurate books of account of all its business and transactions and shall at all reasonable hours exhibit books and accounts to any director upon application at the office of the corporation during business hours.

6.5.4.4. He shall render a report of the condition of the finances of the corporation at each regular meeting of the Board of Directors.

6.5.4.5. He shall further perform all duties incident to the offices of Treasurer of the corporation.

6.5.4.6. If required by the Board of Directors, he shall give such bond as it shall determine appropriate for the faithful performance of his duties.

## ARTICLE VII
## Amendments

These Bylaws may be amended, repealed or altered in whole or in part by a majority vote at any regular or special meeting of the Board of Directors of the corporation.

## New Mailing List Created: Organizational Issues

As Greg mentioned in his column, the TAPR Board has realized from recent email discussions that we need to provide a better forum for communicating with members about organizational issues.

To do that, we're creating a new mailing list -- tapr-org@lists.tapr.org -- that will be open to all TAPR members, and will include all the Board members and officers as subscribers. Anyone may join the list through the usual means of sending mail to the Lyris listproc address, or using the form on www.tapr.org.

The purpose of this list is to improve communications between TAPR and its members. This will be the place to raise and discuss organizational issues. To improve the signal-to-noise ratio on our technical mailing lists, we ask that all discussions about TAPR as an organization be moved to the tapr-org list.

TAPR's Board members and officers commit to read the messages on this list, to consider them, and to respond as appropriate. However, both to maintain some degree of order, and to recognize the fact that, like you, TAPR's leadership are volunteers with limited time to spend on their hobby, there are a few guidelines we ask you to observe:

1. To reiterate: we do take this seriously, and all the Board members and officers will remain subscribed to the list and read the messages there on a regular basis.
2. Although we're not limiting list access to TAPR members (mainly because there's no practical way to do so), this list is intended for members to communicate with their organization. Members will be much more likely to receive responses than non-members.
3. Board members and officers should be presumed to be speaking for themselves; unless they specifically say so, don't assume that they are speaking for TAPR. Particularly on controversial issues, it may take time for the Board to discuss an issue and reach a consensus on a reply. As a result, if you ask for an "official" reply, be prepared to wait, probably for a week or more, so that our decision-making process can run its course.
4. Finally, not every message may get a reply. Weighed against our desire to be open and communicative is a need to use our TAPR time to best advantage. It's not the best use of our time to get bogged down with holy wars, questions that are obviously framed to provoke rather than discuss, and postings that aren't relevant to TAPR's activities, and we're not likely to reply to such messages. There are also a few things, such as pending commercial deals, that may not be suitable for public discussion because of confidentiality requirements.

In addition to this mailing list, we're posting TAPR's Bylaws and other organizational documents on the web site, and we will continue to publish Board meeting minutes on the web site and in the *PSR*.

And, about our meetings: TAPR's annual membership meeting is held every autumn in conjunction with the ARRL/TAPR Digital Communications Conference. The membership meeting is open to any TAPR member, and the agenda is normally a question and answer period where all the Board members and officers are present and answer questions from the floor.

The Board typically holds two face-to-face meetings per year, one at the DCC and the other at the Dayton Hamvention in May. The DCC meeting is the annual Board meeting required by the Bylaws. Although Board meetings are technically not open, we have historically invited members to sit in except for those few items (mainly dealing with commercial deals or personnel matters) that require confidentiality, and we plan to continue that policy. In between the face-to-face meetings, the Board is in continuous electronic session via email.

The TAPR Board of Directors is elected by the membership. One third of the Board stands for election every year, with voting taking place electronically and through ballots printed in the *PSR*. The Board elects officers (who need not be Board members) annually at the autumn Board meeting.

We hope that the new mailing list will provide a place to constructively discuss matters that concern our members. We look forward to seeing you there!

## Y2K Version of AA4RE on TAPR FTP Site

Mike Fahmie, WA6ZTY
MPFahmie@lbl.gov

The Y2K update for AA4RE bbs software is now available via FTP from TAPR at:

ftp://tapr.org/software_lib/bbs/aa4re/bb21t.zip

There is a "community" (mailing list) for AA4RE sysops at onelist, the new software can also be downloaded there (look in FILES section). The list is intended as a place where sysops can present problems and solutions unique to the AA4RE system.

To subscribe, send an empty email to 4RE-subscribe@onelist.com

## TAPR 900MHz FHSS Radio Design Update January 1st, 2000

A digital board design review was held January 1st, 2000 in Dallas, Texas.

Attending the meeting:

Greg Jones
Steve Bible (Conference Call)
John Schoreder
Bob Stricklin
John Koster

### 1. PIC Code

The meeting started with a conference call made to Steve Bible regarding the current status of the PIC chip for the RF board. Steve reports that his is about completed with the programming, but requested some additional information in order to complete the project. Discussion covered the table look up issues and we would send the information regarding the double indexed look up table as soon as possible. Steve feels he will be ready when the RF boards are available for testing.

### 2. PIC and RF Testing

The group discussed testing of the RF board and PIC chip. John S will post information that was discussed on testing the RF board. The group agreed that the most effective way would be to lift two pins on the PIC chip and connect a Max232 interface board to allow a program to simulate the SPI calls that the controller board would provide.

### 3. Digital Board Schematic Review

The digital schematic was reviewed. The group proceeded to move through the list of issues to be covered on the digital board. A lot of the changes took place on the new circuits required to support the new Lvl1 Ethernet interface chip we are changing to. Changes made as a result of the meeting where made at the time and reviewed by the group. It helped doing this meeting at Bob's house so he could pull up the necessary files for review and change. Action items reflect the additional changes or information needed. Once these items are provided and solved we should be able to send the schematic capture to Steve L for layout to begin.

### 4. RF Board

Steve L will be sending the cadence files to David C and John S for final review before the next board run/fab takes place. John S requested further information from Steve L regarding the state of the RF boards that will be delivered for testing, so that he and David could begin to develop necessary test equipment interfaces.

### Summary

Overall the project proceeds well. We had hoped to have the current version of the RF Board in alpha testing before January 1st, but with the additional changes in parts on board (to help with fabrication later in the process) the RF board alpha sliped into first quarter 2000. Once the final review of the new layout is complete, the process of board production and then fabriation to get us to testing should be quick. When the RF board goes into fabrication the digital board will be starting into the layout process at the production house. This will allow the digital board to come out about the time we have the RF board testing completed. This is the plan for now.

## International Online Amateur Radio Club

Gwen Patton, KB3DVJ
Maggie Leber, KB3DXS

You're invited to join IOARC, the International Online Amateur Radio Club! There are no dues or membership fees at this time, because we don't need them. If you are a Radio Amateur, or are just interested in Amateur Radio, please join us!

There are thousands of Amateur Radio Clubs, but few that work to integrate the new technologies of the Internet and the new digital radio modes being made available. There are also few clubs that are truly international in scope, allowing Radio Amateurs and those with interest in Amateur Radio to augment their on-the-air experience with online resources.

Some Amateurs fear the Internet, feeling it will kill Amateur Radio. This site is dedicated to erasing those fears, and to showing how the Internet can make Amateur Radio more powerful and more pervasive in our global society.

Come on in! This club is for YOU!

Follow this link:
www.vicinities.com/ioarc/index.cfm?key=783-AKF

If you experience problems using the above link, proceed to www.vicinities.com/ioarc and enter this invitation key when signing up: "783-AKF".

This is a private and interactive website for the group. Registration is free and your privacy will be respected.

## APRS Draft Protocol Specification Released

### TAPR announces release of the second public draft of the APRS Protocol Specification.

It's finally here! The APRS Working Group has completed the second public draft of the APRS Protocol Specification.

This document covers the core functionality of APRS Protocol Version 1.0 as it works today. This is the base level specification that all implementations should comply with, and it was unanimously adopted by the Working Group members, which includes the authors of APRS-DOS, WinAPRS, MacAPRS, X-APRS, PocketAPRS, APRS+SA, javAPRS, and APRServe, and the developers of the Mic-E and Pic-E products.

The Specification forms the basis for future Working Group projects, including APRS test suites and the APRS Certification Program. The WG also hopes to use this document as the basis for further speci- fications, including IGate and APRS digipeater operation.

Over the last 8 weeks the specification has grown from 18 pages to 93. It now includes packet format diagrams, the APRS symbol tables, full details of the Mic-E encoded format, the compressed lat/long position format, plus weather report and telemetry formats. Above all, the specification contains many examples of how APRS data is formatted to make it easier to understand.

The APRS Protocol Specification is now available on the APRS Working Group web page at: www.tapr.org/tapr/html/Faprswg.html.

It is available in PDF format, both zipped and unzipped. The zip file is a little under 1.5MB. You can read it with a PDF reader such as Adobe Acrobat 3 or 4.

This document is still a draft. There will now be a 15-day public discussion period in which anyone may feed back comments, criticisms and suggestions for improvement. Full information on how to do this is contained within the document.

The final cutoff for comment is midnight U.S. Pacific time on Sunday 19 December (i.e. 0800 UTC on Monday 20 December).

After this date the Working Group will consider all the comments, and will issue the final approved version of the Specification as soon as possible thereafter.

John Ackermann, N8UR (jra@febo.com)
Administrative Chair
APRS Working Group
4 December 1999

## APRSdos Version 846 Released

Bob Bruninga, WB4APR

Some exciting new features in the latest released APRSdos(846):

1) Can transmit selected stations for display on stand-alone Tracker's GPS displays. An all new capabilty for APRS! See details below.

2) Now identifies HF stations on the D-Page and supports JUST-HF sorting on all pages (HEARD, DIGIPATH, and POSITIONS)

3) Improved RESOURCES PROMPTS for sending "resource" data to the DX LIST in Kenwood radios. (Ideas on how to use these lists?)

4) XMIT-MSG command now resets schedule timer, so you can un-stick a stuck message, instead of just a one-time retry.

5) Added capability to parse WX from a dual port KPC-3 or Pico with a PEET Bros. WX station on the GPS port. This is untested since I do not have such an arrangement. Feedback welcomed.

6) Improved ACK processsing for more rapid turnaround in dialogs.

WAYPOINT DETAILS: Just like the Kenwood radios, now any stand-alone Tracker can display special received stations and objects on its attached GPS if the station/object is transmitted on the air in the NMEA WPL format. APRSdos allows you to mark any VIP or special event station on the P-LIST to be transmitted over the air in this format.

Note that only one station at an event needs to do this as a service to all Trackers on frequency. Also, since this doubles the nmber of posits for these selected stations, this feature should only be used sparingly and as needed or it will add too much duplicative QRM.

CAUTION: A related function permitting APRSdos to "accept" waypoints from the GPS port of a Kenwood radio was added to APRS845. This means, those stations will also receive these Waypoint stations off-the-air too and will create duplicate posits. For this reason the capture of WAYPOINTS off-air is now selectable in the CONTROLS-FILTERS menu or in the alt-S-MODES-WAYPOINTS command.

WARNING: And unfortunately, there is a bug in the 845 waypoint code, so it will actually cause an error. Thus, all users of 845 need to upgrade.

## A Perspective on Open Source, XASTIR, Amateur Radio and Linux

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*Reprinted from the 1999 ARRL and TAPR Digital Communications Conference Proceedings*

Linux and the Open Source way of thinking have recently been in hot debate throughout the world. Open fighting on this subject has brought out merits on either side of this discussion. Each point of view is applicable in different ways. This is my attempt to discuss how Open Source may be used to benefit Amateur Radio, and how I have used these ideas in my own project.

### What is Open Source?

Open Source can be briefly described as a freely open development of a piece of software or any product containing computer code. That is, one where the author or producer gives out his/her code and/or schematics for those interested in using that product or software. The idea is to give anyone interested all the information that was used to produce that product or software. In this case, Open Source can refer to knowledge of the inner workings of a product.

Differences in the definition of Open Source are where the battles come in to play. On one end of the spectrum, some feel that Open Source also means free in all terms: freely available source, free to download, free to use in any way. Some feel that this is the only way software should be distributed, and that large companies, such as Microsoft, are surely evil for asking money for their software, and even more so because they don't give the software's code out for all to see. On the other end of the spectrum are those who feel that there should be limits on what users have rights to, and want to see income for their time and hard work.

Over time, I think that people will discover that there is a way to incorporate all of these views, as each has its own applications. Commercial ventures can limit their licenses to benefit from Open Source without freely giving their product to users; hobbyists can work their particular ideals into a license to accomplish their goals. Open Source should be considered the means of getting people involved with a project and allowing anyone to help the project grow and change. This can be accomplished according to the preferences of each project's creators.

Allowing many different people the opportunity to add their knowledge to your project can be a great resource. Having them add code, fix problems, or work on documentation can save you time and add new ideas and perspectives. With Open Source, contributors to the project tend to work on their own areas of expertise or interest, which allows you to concentrate on what you want to do with the project and the things that you enjoy. It also forces you into the role of project manager or team leader, where you decide which properties to add and what new directions the project will take.

In every flavor of an Open Source development, no matter what perspective, source code or major parts of it are freely open. It is merely the end user license that has differences in restrictions.

### Open Source and Linux

Linux is an operating system that has also been in hot debate. It is a well-known example of what Open Source thinking can do: Linux was thought up by one man, then grown by thousands, gaining the strength to seemingly threaten even the multi-billion dollar company, Microsoft. Being able to make that claim is a feat on the same scale as that of those flaky startups, Microsoft and Apple computer, who revolutionized the computer industry in their time. Just as Apple and Microsoft created then, Open Source ideals have created a new way of thinking that may bring on a revolution of new possibilities.

When Linux was first developed, it was just part of a solution. It was the core part of an operating system, but it lacked many of the things that people would need to use it. Even before Linux, GNU was formed, with a mission to build a Unix-like operating system that was completely free. This was a strange idea at the time, but suddenly GNU had most of the pieces that Linux was missing, such as services, compilers and support-level software. In turn GNU found that Linux provided the necessary operating system. The two together form the basis of the Linux system, while hundreds and thousands of other pieces make up the rest. A large group of people, spread around the world, are freely making Linux what it is today, and making it better all the time. The idea was not new, but the idea of developing a project of this type on such a large scale certainly was new!

A common interest and Open Source ideals have brought together a great resource of people with real knowledge to build upon an open-code base. In this environment their many egos and talents collide, and somehow they manage to produce something. People with new ideas place them out for all to discuss; programmers create a product; others fix the mistakes

they left behind; still others make it run faster and add new features; together they inspire those that can port it to other operating systems; somewhere in between are the artists who make it look nicer and work better. All these people work together, and in the process create a standard on a global level, all in plain view.

### How can Hams Benefit

In some ways HAM radio is uniquely suited for Open Source projects. HAM is specifically aimed at the art and science of communication. Open Source is also about communication and doing collaborative work. Its ideals bring into play open standards for communications between unlike systems. Most of the Internet's ability to communicate across diverse machines is based on open software ported from one platform to another. Programs we use every day (like sendmail, pop3d, old NCSA httpd, Rpd, and more recently Apache and perl) were created in the spirit and ideals of Open Source and were distributed, almost solely, with source code. Anyone who downloaded these programs could freely modify the application, fix problems or add functionality to better suit their needs. Those who couldn't add to the code benefited as well by receiving faster fixes, more stable code, and new features. These are things that small groups working on weekends or evenings can particularly benefit from. Freely available source code can bring many small groups or individuals together to form larger groups with the same interests, which would benefit almost any project.

Since Hams commonly communicate (or at least attempt to) with people all over the globe, using Open Source thinking can make projects available to many more people. Anyone can make modifications so those programs or devices work with their native language and local equipment. If there are standards to follow, doesn't it make sense to have them available to all Hams, not just to the ones who can work in the English language? In the APRS(tm) arena alone, how many others can't use the system because it is not in their native language? And since Ham radio is about communication, doesn't it make sense to allow anyone the ability to use and add to these projects?

Recent predictions that Ham radio is getting stale, that it is not interesting enough to recruit new Hams, make this issue even more important. Open Source allows people who may not be programmers or even involved in Ham radio an opportunity to look at some technology. Those who play with the code or device may find the talent within and make a contribution, creating more interest in Ham radio. It may even make some of us a little smarter in the process. Open Source provides the benefit of spreading knowledge, allowing technology that is usually hidden to become available to anyone who cares. If one person is inspired to add to the community effort, then many more interesting projects may develop to entice people. This can only add wealth to the Ham community and to the hobby.

### Commercial Projects

Most groups opposed to Open Source projects feel that their intellectual property is at risk. This certainly may be the case in most industries. The Open Source model may not function well in all business environments. Commercial businesses selling products to the Amateur Radio community, on the other hand, may owe their existence to the hobbyists themselves. While this doesn't happen in all cases, there are many occasions when the devices available were inspired by a Ham or a group such as TAPR, BayCom, or the Ottawa Amateur Radio Club. It is the work and inspiration of many individual people that grant us such wealth in Amateur Radio operation. Many companies were started thanks to such people who had the good sense to add to the community.

Companies can use the Open Source model to allow Hams to help find errors and resolve them. As Hams have done in the past with solving electronic quirks in equipment and kits, now too they can find software quirks. As more and more equipment has the need for computers and embedded controllers, so too the need arises for people to spot software problems. This industry serves a community perfectly suited to this type of open exchange. Rather than the company using resources tracking down some obscure bug, we may find that some Ham has the answer the company didn't see. The company gets an easy fix and more time for other business, and we all get a better product. And as laws have protected companies' electronic designs in the past, so too can new and existing laws protect their software.

### My Project, XASTIR

XASTIR came about for two reasons. First, I wanted to build a tracking station for my local balloon group. Second, I use Linux and didn't see any signs of getting a typical APRS(tm) program, that is, one with graphic display, maps and messaging. Also by typical I mean with source code according to the Unix/Linux model. If such a program was available, for which I could modify the source code, I would have gladly paid the registration fee and sent my meager additions to the author. Since there was not so much as a binary version on the horizon, I proceeded on my own.

XASTIR stands for X windows Amateur Station Tracking and Information Reporting, and is an

APRS-like program. Although it is unfinished, it does fulfill a need, and many people in the Ham community are using it. This project wasn't necessarily going to be an Open Source project. I was writing it for myself and my club, but due to the many requests for a Linux version of APRS, I finally decided to make my project available for all to see. It is distributed as Open Source to reap the benefits of this model, both for me and for any other person interested in this project.

This project is fairly young and has been Open Source for a very short time, but I have received nothing but positive response from the community. Many have helped this project along with little things here and there, offering what knowledge or code additions they could provide. Hams from around the world have conveyed interest, all offering whatever help they can. From Germany, a Ham sent suggestions and code to help me change my software to function within a Unix-type file standard. From various locations in the United States, I have received faxes and code pieces for adding Weather Station decoding. In the Northwest US, I hear that my program has been ported to BSD and Sparc, with progress on a Solaris version. All of these contributions will help me add to my software.

With the source code available, conversions to various languages can be worked on. Unknown types of weather equipment, TNCs, operating systems, and local preferences can be added. It should allow more talented people than myself a base to work from and improve upon.

### Conclusion

Open Source can mean many things to many people. At its core is the idea that with freedom of open code development, benefits will come from interested users and programming professionals. These can affect a project's development in more ways then just the code itself. Time and trouble from bugs in development can be reduced by some members of the community interested in your project. Larger teams can be formed to better test and implement your requirements. Open knowledge can better your project and inspire others to create their own.

*APRS is a Trademark of Bob Bruninga*

## Latest Version of XASTIR

XASTIR is an APRS-like program for linux that is Open Source and free to use. The latest version (0.1.3) has many new features and fixes.

Some are as follows:

- US and Canadian Callsign Lookup with Support for the new FCC file format.
- Support for other languages (currently, English, French, Dutch).
- Better tracking display.
- Better I-Gate Support.
- More alarms.

XASTIR is available on the web at:

www.eazy.net/users/fgiannan/xastir

or on the TAPR ftp server (ftp.tapr.org) in:

/software_lib/Linux/ham/xastir/

## NEWQPSK (Q15X25) for Linux Released

Tomi Manninen, OH2BNS
oh2bns@sral.fi

I just uploaded newqpsk-0.0.1.tar.gz, a Linux / soundcard implementation of the 15 tone parallel AX.25 compatible HF modem to ftp.hes.iki.fi. The original modem was by Pawel Jalocha, SP9VRC for the DSP56002EVM and my work is a port of that code to Linux.

This is to be considered a beta release. All features of the original modem are not yet implemented, setting up the modem might be a bit tricky and there are still some issues to be solved. However it is functional and I have used it for real life QSOs with performance comparable to Pawels original modem. So please test it and report any success or failure to me!

Here is the URL:

ftp://ftp.hes.iki.fi/pub/ham/linux/ax25/newqpsk-0.0.1.tar.gz

Please read the README and INSTALL files first and have fun!

# Proposal for a Spread Spectrum Transponder Payload On the International Space Station

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*Reprinted from the ARRL and TAPR 1999 Digital Communications Conference Proceedings.*

## Abstract

A satellite payload for the International Space Station is proposed, which would provide high bandwidth, wide-area data communications capabilites for radio amateurs. Key features of the system are a simple space segment and low-cost ground stations. Varying tiers of service can be provided depending on end-user equipment investment, from low-cost paging, through digital voice, video, and high-speed data communications.

## 1 Introduction

### 1.1 Vision and Goals

The design, construction, and deployment of an experimental payload for the EXPRESS Pallet on the International Space Station (ISS) is proposed. The payload, to be known as the Spread Spectrum Wideband Transponder (SSWBT), is designed with the following goals in mind:

- Low cost digital voice communications
- Digital Videoconferencing for the masses
- High bit rate, low-latency data transfer
- Development of Spread Spectrum technology in the amateur community
- Open space communications to the average amateur
- Room for future growth and expansion

We envision four general tiers of use for the SSWBT:

**Ultra-low bit rate ( < 1 kilobits/second)**

These would be handheld-size stations, with simple patch antennas. These would be useful for paging, position reporting/homing (APRS), emergency distress beacons, and vehicle and property location systems. These systems could be made without receiving equipment if that functionality was not needed.

**Low bitrate (~10 kb/s)**

Full duplex digital voice and data communications. With modern vocoders, 10 kb/s can provide quality better than that typical of FM repeaters. The system will be capable of both user-to-user (QSO style) full duplex, as well as roundtable (repeater or traffic net-style) communications. These stations could be mobile-mounted, portable, or simple home stations. Small patch antennas would be used, thus avoiding the need for aiming or moving the antennas.

**Medium bitrate (~150 kb/s)**

Digital Videoconferencing, web serving, and other modern internet-style applications. These will be stations which are more well-equipped, and most likely, not mobile. These will require moderately sized (~1 foot) dish antennas and some mechanism for aiming them.

**High bitrate (1 - 1.5 Mb/s)**

There will not be many of these stations, perhaps 6-10 per continent, placed at strategic locations so at least one is visible during any part of a satellite pass. These stations can transmit large quantities of data, typically requested by the lower bandwidth user stations. These could be internet access points, and could also broadcast (or multicast) high quality video feeds. This would be ideal for applications such as broadcasting meetings or other important amateur events. These stations may require large dishes with accurate pointing systems, and higher power amplifiers

One of the greatest features of the SSWBT concept is that while more complex and expensive systems with high power and gain will be necessary to transmit at the higher bit rates, nothing extra will be necessary to receive these transmissions. Thus, the low bandwidth systems, besides being useful for voice communications between comparable users, can be effectively used for such applications as web browsing, and file retrieval (ftp). Ten kilobits per second is plenty of bandwidth for requesting web pages, which would be served by the medium or high bandwidth systems. Highly asymmetric links are very useful for these applications.

### 1.2 Why ISS and EXPRESS Pallet

What has often held back amateurs from deploying more advanced digital communications systems has been the problem of critical density. High bandwidth often requires microwave frequencies and line of sight propagation. These axe difficult to achieve in terrestrial systems unless there are enough users in a particular area. By using a satellite, these good paths can be guaranteed, while at the same time providing tremendous coverage area which would be impossible otherwise. The need to reach critical densities for deployment is avoided.

The International Space Station represents the ideal satellite carrier for the SSVVBT- Because it will

be placed on the ISS, the SSWBT can be quickly and inexpensively deployed, without the development of its own launch vehicle. It will serve as an ideal testbed for a possible future network of microsatellites, and local terrestrial transponders to provide complete earth coverage. Since the satellite will be accessible worldwide, technology and development can be shared, improving the economics of scale, and making it more likely that the system will catch on in significant numbers.

The EXPRESS Pallet is ideal for this type of experimental payload. The SSWBT will be small and light, due to its tiny patch antennas and very simple electronics. It will consume little power, probably less than 100W, due to the relatively low and nearly circular orbit of the ISS. It will require no interaction with other systems on the ISS, and its only controls will likely be to enable or disable it. The SS transmissions of the SSWBT will not interfere with the other experiments on the Pallet or the rest of the ISS. The nadir-pointing attribute of the Pallet makes line of sight contact possible.

## 2 Technical

### 2.1 Features

- Direct Sequence Spread Spectrum (DSSS) Modulation
- 5.7 GHz Band Uplink
- 3.3 GHz Band Downlink
- 50 MHz wide signal bandwidth
- Automatic Power Control
- Scalable bit rate

### 2.2 Capabilities

This system will be able to accommodate over 500 digital voice conversations, dozens of high bit rate video conferencing sessions, and a T1-class data link, all at once. Stations within 400 miles of the point directly below the ISS will be able to access these facilities, providing a coverage area of about half a million square miles. It can provide high data rate, asymmetric data links to small mobile users, with tiny patch antennas. User systems will have low power consumption.

### 2.3 General Architecture

In order to receive and demodulate SS signals from hundreds of users at one time, hundreds of demodulators would be necessary on the ISS. Instead, the SSWBT simply amplifies and retransmits the signals which it receives. This allows the ground stations to each pick out and demodulate their own signals.

A key advantage of the SSWBT is its very simple space segment. The payload will consist of a linear transponder, and a simple "carrier" signal generator. All of the complexity will be in the ground stations. This allows for easy changes to the modulation format, and avoids the need for complex and expensive radiation-hardened DSP components.

#### 2.3.1 Modulation and Coding

DSSS Modulation will be used, with binary phaseshift keying (BPSK). The manner in which spreading codes are assigned will be discussed below. Whatever the bit rate which a station is transmitting at, it will always use the same chipping rate, 25 MHz. Thus, all signals will have the same occupied bandwidth of 50 MHz, and processing gain will be inversely proportional to bit rate. Nyquist filtering will be used to keep the occupied bandwidth to less than 50 MHz. Effective radiated power will be in direct proportion to bit rate, so that energy per bit is constant for all stations.

In order to provide more reliable communications, with lower power, and higher user capacity, forward error correction (FEC) will be used extensively. The most likely candidate is Convolutional coding and Viterbi decoding. ASICs are commonly available now which are capable of high data rates with rate 1/2, and 1/3 codes and constraint lengths of 7 or 9. Other options might include combining convolutional codes with Reed-Solomon codes, or even using turbo codes. Again, these are all issues for the ground stations, and so could be changed without touching the transponder. Different FEC systems could even be used for each of the different data rates, although that would probably not effectively reuse components. Multiple schemes could be used concurrently, allowing experimentation to coexist with normal use.

Different spreading codes correspond to different "channels" of communications. Each station will have an assigned "hailing code," to which it will always be listening. When station A wishes to transmit to station B, station A will transmit using B's hailing code. In this first packet, A will send a code pair, one for A to use when talking to B, one for the reverse link. They will then use these codes for the duration of their communication. As long as the set of all codes is sufficiently large, collisions (different transmitters using the same codes at the same time) can be avoided. (Note 1)

#### 2.3.2 Automatic Power Control

Automatic power control (APC) is necessary to make this system work. Without it, stations closer to the satellite would swamp out the ones further away

APC guarantees that all signals will be received at the same strength, maximizing the number of them that can be decoded successfully.

The pilot signal will be used as the reference power level. When a station is transmitting, it must simultaneously receive and decode its own signal, as well as the pilot signal- The transmitting station must constantly adjust its power up or down to make its downlink signal equal in power (Note 2) to the pilot signal. The actual downlink power received will vary, but the relative levels of the many signals and the pilot signal will remain the same.

### 2.3.3 Space Segment

The space module, the SSWBT itself, is a simple linear transponder, with only one addition. A simple (and small) 10 dBi, circularly polarized patch antenna receives the many uplink signals at 5.7 GHz. After being amplified and filtered, they are downconverted to IF. At IF, the signal passes through a 50 MHz wide channel filter, and an AGC amplifier. Then a pilot signal is injected, and the combined signal is then upconverted to 3.3 GHz. After it is amplified (about 25W output), it is retransmitted back to earth via another 10 dBi circularly polarized patch antenna.

The pilot signal is very crucial to the operation of the system as a whole. It allows the ground stations to have a reference power so that they are able to provide near perfect power control. It also provides a signal timing and doppler reference which the ground stations can also use to ease the problem of getting code and data synchronization.

### 2.3.4 Ground Segment

A minimal ground station, capable of transmitting digital voice, will be the typical end-user system. Such a station will use circularly polarized patch antennas, just like the satellite. It must have at least three de-spreading channels. One to monitor the pilot signal, one to monitor the station's own transmitted power and timing, and one for useful reception of signals from other stations. Since all of the signal processing associated with de-spreading channels will be done in digital logic in FPGAs or ASICs, adding more will not be difficult. Additional channels will be useful for receiving many datastreams at once.

For transmitting, a power output of 1 Watt (and the capability to reduce that output power) is all that is necessary for communication. Stations of this class should cost well under $1000, and could easily be made mobile. Again, while these stations will only be able to transmit at low bit rates, they can receive at the highest rates.

A high end home station, if it is to transmit at 150 kbit/s, would need to produce 15 times the effective power output. Most of this gain would to be provided by the antenna, so that commonly available integrated power amplifiers in the 3-5 W range could be used. This implies the need to point the antenna, however, and that may add to the cost of some installations. Otherwise, all hardware would be the same as the standard end user system. The receive antenna could still be the same patch as used by low-end stations.

High bandwidth, regional base stations, which need to transmit in the 1 Mbps range, would have to have moderate sized dishes, and power outputs in the 10-25W range (this can be traded off against antenna gain). The receive antenna could again be the same small patch, but better results on distant passes, near the horizon, could be had with small, aimable dishes. This would give a regional base station more coverage, increasing the probability that one is always in view of the satellite.

Receive equipment on the regional base stations would be similar to the user stations, with the addition of many more de-spreading channels in the hardware. This would allow many more simultaneous connections and requests, allowing the station to keep its transmitter busy supplying data.

## 3 Conclusions

The SSWBT will open up a whole new world of digital communications to the amateur radio community. By taking advantage of underutilized spectrum, and advanced communications techinques, we will finally be able to interconnect the ham world with a high bit rate, integrated network. This will open up the possibility of digital video conferencing, digital voice communications, and high speed data transfer. The ISS and the EXPRESS Pallet will make this all possible by solving the problems of line-of-sight propagation and geographic coverage.

## Notes

1. In the case of two stations transmitting on a third's hailing channel at the same time (a collision), both should detect it. Normal random backoff procedures would be used. High bandwidth, high utilization base stations should have multiple hailing channels to avoid this.
2. Actually, energy per bit will be controlled. This will allow signals with varying bit rates on the same channel.

## TAPR Board of Directors Meeting Minutes 9/25/98 Chicago, IL

Meeting called to order 8:30am

Present:
Greg Jones, WD5IVD, President
John Ackermann, N8UR, Vice President
Mel Whitten, K0PFX
John Koster, W9DDD
Bob Hansen, N2GDE
Steve Bible, N7HPR
Barry McLarnon, VE3JF
Doug McKinney, KC3RL
Steve Stroh, N8GNJ, Secretary

Not Present:
Jim Neely, WA5LHS, Treasurer
Gary Hauge, N4CHV

### 1. Reports

#### Treasurer

The board reviewed the report sent by Jim Neely, WA5LHS, concerning the financial status of the organization. The report was accepted.

#### Office

Greg Jones, WD5IVD, reviewed the office report with the board. The report was accepted.

#### PSR

Bob Hansen, N2GDE reported on the current status of the *PSR*. The printer has been slow at times getting the *PSR* out on time and Dorothy at the office will be working on this issue. Bob now has the software that will allow him to print directly to the office printer without having to send the *PSR* each issue by mail.

#### FCC Regulatory

Dewayne Hendricks, WA8DZP, gave an overview of the current status of the TAPR STA and SS proceedings. TAPR will be getting involved in UWB (Ultrawideband) issues by participating in a filing in the future. He is not sure when the Report & Order on spread spectrum will be released. The recommendation was made not to file comments on Amateur Restructuring.

#### TAPR.ORG

The server has been running well since the last major upgrade. There will be a major site revamp come the first of the year.

#### Project Reports

**SS Radio - Tom McDermott, N5EG & Greg Jones, WD5IVD**

The operating system and TCP/IP stack are now operational and ported onto the fully operational digital board. This is a huge milestone in the project. The team is focusing on the Qualcomm and Harris chips remaining on the digital board which provide interfaces to the RF board. After this, the RF board will be focused on. Greg discussed the upcoming donations drive for the project. Greg continues to look for potential commercial sponsors or technology transfer deals in order to fund the project fully.

**Flash Card - John Koster, W9DDD**

The Linux Flash Card project is about to rollout. He hopes this will be another project like the TAC-2, where we reach a new potential member outside of amateur radio to get them into what we do. Fifty kits will be available without the flash-card before Christmas.

**PIC-E - Steve Bible, N7HPR**

Software written by Byon Garrabrant, N6BG, uses a 16F84 PIC, idea is to create a board that's a universal encoder board. Byon has his board working fine. Could be used as: universal PIC encoder, differential GPS, Weather, KISS TNC, etc. Would like to publish the specifications on how to program it and write a book on HOW to program it. Goal is to keep hardware cost low. While using APRS on PIC-E, WB4APR wants a couple of bucks for trademark, but admits that the APRS protocol isn't license issue.

Bible motioned that PIC-E become an official TAPR project, John Koster and John Ackermann simultaneously seconded. Discussion about price followed. Motion was passed.

**MIC-E - Greg Jones, WD5IVD & Steve Bible, N7HPR**

Greg and Steve gave an overview of the current situation of the MIC-E. Sales were still continuing.

**TUC-52/METCON-II - Greg Jones, WD5IVD**

Greg Jones, WD5IVD, reported the status of the TUC-52/METCON-II project was still moving forward but at a continued slow rate.

**GPS (TAC-2 / TOC / DGPS / Interface) - Steve Bible, N7HPR**

Steve updated the Board on the status of the various GPS related projects.

**9600 baud modem**

We are looking at some method to make the 9600b modem kit easier to produce and have more use of the bit-regen feature. FPGA technology was discussed.

**EVM Interface - Steve Bible, N7HPR**

The EVM kit is nearing completion and should be available as a kit shortly.

**Publications - Greg Jones, WD5IVD**

Greg updated the Board on the following publication issues:

- SS Book - finally completed
- Wireless Digital Communications - reprint coming soon
- CD-ROM - work will begin on the 1999 CDROM beginning in December.
- Wireless TCP/IP book - John working on last chapter.

## 2. Old Business

### TALNet Radios - Greg Jones, WD5IVD

TAPR has worked a deal with a group concerning a surplus of TALNet radios/routers to be used under the SS STA. The deal will be for $550 per radio/router, plus shipping/handling. These are 160Kbps DSS TCP/IP based systems on 2.4G. There could be some issues regarding the password burned in flash, but we don't know the full details yet. The units received so far have had generic passwords in them and have been easily changed and put into operation.

## 3. New Business

### MIC-E Repeater Issue

Steve Bible, N7HPR, covered the recurrent MIC-E repeater issue and how TAPR can move forward on a possible project. The issue is that there is no "automute" on repeater systems to mute the APRS data burst. This is felt to be one of the reasons why the MIC-E sales are slow. Needs to be done right, standardized, documented. No action was taken on this item.

### SIGs and listservs

Greg covered the need to upgrade the current TAPR.ORG system in order to be easier to manage. Lee and Greg have both recommended the Lyris system. The board approved the purchase of the Lyris system. The TAPR web page needs to be reorganized; update ftp site so that it's more conventional, faq's, search engine, etc.

### APRS QSY

Greg covered the upcoming issues regarding the potential for a APRS frequency change that Frank Bauer would be presenting at the conference. He feels that there is some real potential at this time for this concept to move forward. The Board took no action on this item at this time.

The board discussed the following project concepts and proposals:

### GPS: Enclosure and Garmin Filter for DGPS

The board asked Doug McKinney to move forward on the enclosure issue. Garmin products don't like the serial output of a TNC, pic-based systems filter header out so that Garmin GPS units are not affected. No action was taken on the Garmin Filter for DGPS.

### Dennis Rosenauer VE7BPE, scalable digital system

Steve Stroh, N8GNJ, presented information concerning a high speed radio design that Dennis had been doing. The Board moved that further discussion would occur with Dennis to see if something was possible with this project. The Board felt that this could be an exciting project.

### AO-16 APRS Manchester Encoder

Steve Bible, N7HPR, presented a proposal for this project. The Board asked Steve to further investigate the potential.

### Ottawa PI Card

It was presented to the board that TAPR take over the production of the Ottawa PI card. Barry will follow up with Ottawa group, will provide inventory, costs, and propose to BoD electronically.

Adjourned to online session.

Minutes generated from meeting notes of Greg Jones, Steve Stroh, and Bob Hansen.
Submitted January 22, 2000, Bob Hansen, Secretary.

## 2000 ARRL and TAPR DCC Update

Orlando will be the site of the 2000 ARRL and TAPR Digital Communications Conference. Contracts are underway with the hotel and the conference should be held on the weekend of September 22nd-24th. No local host has been found yet. PRUG (Packet Radio Users Group of Japan) will again be hosting a Friday evening social and technical presentation. More information will be disseminated in the coming weeks as the hotel, schedule, workshops, and registration prices are fixed by the conference committee. Keep an eye on the web page for the latest details: www.tapr.org/dcc.

There will be a National APRS Symposium held on Friday and Steve Dimse, K4HG, will coordinate the event. If you have suggestions for the Sunday seminar, please let the office know. Student papers will again be accepted and the deadline is in June. We hope that this year's DCC will continue the positive trend witnessed over the last several years.

# TAPR Board of Directors Meeting Minutes 5/13/99 Dayton, OH

Meeting called to order 7:30pm

Present:
Greg Jones, WD5IVD, President
John Ackermann, N8UR, Vice President
Mel Whitten, K0PFX
John Koster, W9DDD
Bob Hansen, N2GDE
Steve Bible, N7HPR
Barry McLarnon, VE3JF
Doug McKinney, KC3RL
Steve Stroh, N8GNJ, Secretary
Steve Dimse, K4HG

Not Present:
Jim Neely, WA5LHS, Treasurer

## 1. Reports

### Secretary
Steve Storh didn't have the minutes from the last meeting available. The board moved to postpone the issue until Steve posted them during the electronic session.

### Treasurer
The board reviewed the report sent by Jim Neely, WA5LHS, concerning the financial status of the organization. The report was accepted.

### Office
Greg Jones, WD5IVD, reviewed the office report with the board. The report was accepted.

### PSR
Bob Hansen, N2GDE reported on the current status of the *PSR*.

### FCC Regulatory
Dewayne Hendricks, WA8DZP, gave an overview of the current status of the TAPR STA and SS proceedings. The TAPR STA was not renewed.

### TAPR.ORG Report
The server has been running well since the last major upgrade. The major site upgrade has been a huge success. A secure server will be added when we have cash.

### Project Reports
The following project reports were covered:

### SS Radio -- Greg Jones, WD5IVD
Since the last meeting little major progress has been made. In order to help the development of the RF board, the project has brought on two new RF experts to help correct the issues related to the RF board.

### TALNET
The TALNET radio deal is concluded because of the lack of usable systems.

### PI Card
The Board discussed again the possibility of taking over production of the PI Card. The Board decided to at least take the inventory from the PI Card group and then look at developing kits from that.

### APRS Working Group
A report by Steve Dimse was made concerning the APRS WG formation and the recent meeting held outside Baltimore. The meeting went well, and with some hard work, the APRS community will be well served by the money expenditure TAPR made in hosting the meeting that resulted in the group.

### Kits and Publications
The board reviewed all the current kits and publications and discussed futures and other issues related to them.

## 2. New Business

### Board Elections
The following board members were elected as Officers for a one year term

Greg Jones, WD5IVD - President
John Ackermann, N8UR - Vice President
Steve Stroh, N8GNJ - Secretary
Jim Neely, WA5LHS - Treasurer

### TAPR FHSS Radio OEM Deal
The board was presented with information regarding a possible OEM deal concerning the radio project. Past commercial deals concerning the radio had been turned down due to issues related with delivery of technology or TAPR's ownership at the end of the deal. Based on the information provided, the Board gave the go ahead to continue negotiations on this proposal. Since there is a potential conflict of interest with Greg Jones, WD5IVD, President of TAPR, John Ackerman, N8UR, was given the responsibility of drawing up the TAPR OEM agreement. Greg Jones, WD5IVD, abstained from the vote.

### 9600 baud modem Project
A proposal was made for the design of a FPGA based modem. This is a continued discussion from the last Board meeting regarding the future of the 9600 baud

modem. A motion was made and passed to fund the development.

### PIC and GPS Projects

Steve Bible gave an update on PIC and GPS related projects. The Board authorized funding for him to continue development.

The Board adjourned and will meet Sunday afternoon for a "future of TAPR" brainstorming session.

Minutes generated from meeting notes of Greg Jones and Bob Hansen.
Submitted January 22, 2000, Bob Hansen, Secretary.

## TAPR Board of Directors Meeting Minutes 9/24/99 Phoenix, AZ

Meeting called to order 8:30am

Present:
Greg Jones, WD5IVD, President
John Ackermann, N8UR, VP
Steve Bible, N7HPR
Barry McLarnon, VE3JF
Doug McKinney, KC3RL
Steve Stroh, N8GNJ, Secretary
Steve Dimse, K4HG

Not Present:
Bob Hansen, N2GDE
John Koster, W9DDD
Jim Neely, WA5LHS, Treasurer
Mel Whitten, K0PFX

### 1. Reports

### Secretary

Steve Storh didn't have the minutes from the last meeting available. The board moved to postpone the issue until Steve posted them during the electronic session.

### Treasurer

The board reviewed the report sent by Jim Neely, WA5LHS, concerning the financial status of the organization. The report was accepted.

### Office

Greg Jones, WD5IVD, reviewed the office report with the board. The report was accepted.

### FCC Regulatory

Dewayne Hendricks, WA8DZP, discussed the Report and Order on Spread Spectrum. The board moved not to file a motion for reconsideration.

### TAPR.ORG Report

The installation of the secure server is waiting for Lyris to come out with a Linux version of their software so that we can move the NT system over to Linux to run both the Lyris system and the secure system.

### Project Reports

The following project reports were covered:

#### SS Radio -- Greg Jones, WD5IVD

A lot has happened since the last board meeting. The RF board has moved ahead a lot. The potential for a cash infusion to get the final closure on the project looks very good.

#### APRS Working Group

The APRS Working Group was supposed to have the first draft of the specification out before the DCC. For whatever reason the specification is not ready. A meeting will be held during the DCC in order to bring the group together and determine how we can get closure on the issue. The group does need to find a full time editor and we should use the time during the DCC to see if anyone is interested.

### 2. New Business

### TAPR FHSS Radio OEM Deal

John Ackermann, N8UR, presented the details of the OEM deal concerning the FHSS radio project. The final proposal is to be with The Dandin Group, Inc (DGI) which includes Dewayne Hendricks, WA8DZP, and Greg Jones, WD5IVD. John presented the issues related to a potential of conflict of interest as well as the positive and negatives of the deal presented. The TAPR Board had a discussion about this in May (at Dayton) and the possibility of a conflict of interest was then not thought to be a problem. The Board reviewed the issues again, since several members were not present at the May meeting. All the board members present were satisfied that the arrangement would not be a problem. Based on this decision by the Board, John Ackermann then reviewed the details of the OEM Agreement and the Board decided that the agreement was acceptable and that TAPR should move ahead. Greg Jones abstained from the vote.

### CD-ROM Duplication

The Board discussed the current strategy regarding CD and disk duplicating. The Board agreed that TAPR needs to get CDs going again and that it would make sense to again (i.e. we took the disk library to CD) replace the disks that get shipped out with kits to a single CD of some sort. The ability to do in-house CD generation and burning in some automated way that would not impact volunteer time and allow small production (less then 1000) is

needed. Greg Jones, will investigate further and report back to the Board.

### DCC 2000

The board discussed the DCC 2000 meeting. It is planned to be held in Orlando. The Ohio group from 1998, has already submitted a proposal for hosting 2001. That leaves 2002 and out available for other groups to host. 2002 would be on the West Coast. 2003 would be on the East coast again.

Minutes generated from meeting notes of Greg Jones. Submitted January 22, 2000, Bob Hansen, Secretary.

## TAPR Board of Directors Elections

The following three members have agreed to run for the three available positions on the Board of Directors. You may vote for these individuals and/or any write-in candidates using the ballot printed on the next to last page of the *PSR*.

**Deadline for balloting is March 31st, 2000.** Board members elected will serve a three year term.

The following TAPR members have been nominated for election to the TAPR Board of Directors.

- Greg Jones, WD5IVD, wd5ivd@tapr.org
- John Koster, W9DDD, w9ddd@tapr.org
- Mel Whitten, K0PFX, k0fpx@tapr.org

#### Greg Jones, WD5IVD (Board Member, President)

A ham since 1977, I originally got involved in packet radio due to TAPR's efforts during the great TAPR TNC II development in 1985 and have been active ever since. My primary interest in amateur radio is digital communications. I have served as an officer or a board member of TAPR since 1989. I hope to get reelected in order to continue the various initiatives that were started the past several years.

I check my Internet mail daily, so that is the best way to contact me. Call me or write me if you have input - we are always looking for folks to get involved or help out with problems. My two primary amateur goals are to see TAPR improve and grow as an organization and see more educational items disseminated, like Tom McDermott's recent TAPR publication.

#### John Koster, W9DDD (Board Member)

A ham since 1959, I've always been interested in digital forms of communications starting with RTTY in 1960. The past 11 years I have been very active in packet, and was deeply involved with the TexNet Support Group until elected to the TAPR board. I was the head of the Software Group and supported the TexNet code from 1989 to 1992. I am interested in the development of radios and modems for high speed operation. I now handle printed circuit board production issues with the local board houses TAPR uses.

I'd like to thank everyone for the opportunity I was given to serve as a board member. During my terms as a board member of TAPR, I feel that I have received more than I was able to give the organization. Getting the opportunity to work with a number of dedicated and experienced people at the national level has been a learning and rewarding experience. I am asking you to elect me to a third term so that I may use that knowledge and experience to help TAPR meet its objectives of improving the speed and performance of the digital modes.

#### Mel Whitten, K0PFX (Board Member)

My amateur radio career began at age 12 with continued interest in all the digital modes from high speed CW and Teletype to Packet Radio. I have served as an officer in various radio clubs and I am currently vice-president of the Missouri Amateur Packet Society. Working with MoAmPS and other packet groups, I was instrumental in developing the high speed backbone of eastern Illinois and Missouri. As a sysop for the MSYS BBS in St. Louis and a node operator for a Gracilis switch and the MO-CALIF worm hole, I remain active in day-to-day packet activities.

My interest in Packet Radio began when St Louis was chosen as one of the beta sites for TAPR's TNC. This was the beginning of a long time association with TAPR and engineering support in the development of the TNC 1 and TNC 2 and currently supporting user's questions on TAPR's 9600 baud modem. As a board member, I would utilize my past experience and knowledge in making those decisions that will help TAPR meet its goals and vision for the coming years.

Professionally, I have worked for a large telecommunications company for the past 26 years and I am currently a senior development engineer. It is because of these qualifications that I ask for your support toward my election to TAPR's board of directors.

### Voting for the TAPR BoD

Please find the mail-in ballot on page 23. You will need to include your membership and check numbers on it so that we can ensure no duplicate ballots. (Both numbers are printed on your mailing label for this issue.) Electronic ballotting will not be available this year.

## New PSK31 Program

Moe Wheatley, AE4JY
ae4jy@mindspring.com

I posted a new Windoze Soundcard-based PSK31 terminal program called "WinPSK" at:

www.mindspring.com/~ae4jy/winpsk.htm

This was sort of a "science project" I've been working on and off of for the last year in order to gain some more experience in DSP and Windows programming.

It's not full featured, but is well documented and I think could be useful as a starting point for other programs or just as a learning tool. All the VC++6.0 project source code is there (for better or worse) as well as a fairly descriptive technical discussion of design decisions and implementations.

I would appreciate any feedback on the technical descriptions since I'm a bit out of my element here. Please let me know of any mis-information or outright lies that may be in the documentation.

It doesn't have a lot of HF air time on it but it seems to do OK in the AWGN simulator. Wouldn't trust it yet for mission critical use.

It may find some use just as a PSK31 signal analyzer due to it's fairly high resolution spectral display and assorted other signal views.

Hope this is of some interest.

My el-cheapo web site is only good for 225Meg transfers per month. So if you can't get it from the above link try this mirror site:

leden.tref.nl/~nl9222tv/software.htm

## Dayton 2000

**2000 Dayton Hamvention**
**Digital Communication Events!**

We are currently setting the schedule for the TAPR Forum at Dayton HamVention. It will again be Friday morning like last year. It should again be followed by the APRS Forum. Keep an eye on the TAPR web page for full details as Dayton approaches:

www.tapr.org/tapr/html/confI.html

Make your plans now for the 2000 "Packet BASH" sponsored by TAPR and the Miami Valley FM Association to be held on Friday of the Dayton Hamvention. The BASH will again be held at the NCR location south of Dayton. It is a great location.

A buffet dinner, a raffle for some neat prizes, a great program, and lots of fun will cost approximately $20 per person. More on the final price once we have a contract on the dinner. Keep an eye on TAPR-BB and the Web pages.

We hope that this will provide an opportunity for packet and digital radio enthusiasts to have a great night out while at Hamvention.

The schedule of events is still tentative, but will look something like this:

19:00 Dinner
19:45 Welcome
20:00 Keynote Address
20:30 Raffle
20:45 TAPR SIG Meetings

For more information, send email to "packbash@n8ur.ampr.org" or stop by the TAPR booth at Dayton for schedule and map.

## Mail-in Ballot for TAPR Board of Directors Election

| All Information Must be Provided: | Vote for up to three: |
|---|---|
| Name (printed): | _____ Greg Jones, WD5IVD |
| Member Number: | _____ John Koster, W9DDD |
| Check Number (from mailing label): | _____ Mel Whitten, K0PFX |
| Signature: | |

**Mail to: TAPR, 8987-309 E. Tanque Verde Rd. #337, Tucson, AZ 85749-9399. Must be received by March 31,2000.**

Tucson Amateur Packet Radio
8987-309 E. Tanque Verde Rd #337
Tucson, Arizona • 85749-9399
Office: (940) 383-0000 • Fax: (940) 566-2544
Internet: TAPR@TAPR.ORG • www.tapr.org
Non-Profit Research and Development Corporation

**January 2000**

www.tapr.org • ftp.tapr.org • tapr@tapr.org
Office Hours: Tue-Fri 9am-12pm, 3pm-5pm CT

| Kits | Price | Qty | Total | Kit Code | Information |
|---|---|---|---|---|---|
| PIC-Encoder© | $65.00 | | | 8 | |
| CompactFlash Card Adapter | $59.00 | | | 8 | A FlashCard is not included in the kit |
| Motorola LVM3602 Interface | $150.00 | | | 16 | http://www.tapr.org/tapr/html/kpc3602.html |
| TAPR APRS® MIC-Encoder® | $149.00 | | | 28 | |
| TAC-2 (Totally Accurate Clock) | $139.00 | | | 10 | Requires a GPS to operate |
| Differential GPS (Member Price) | $179.00 | | | 16 | Requires a GPS to operate |
| DAS (DTMF Accessory Squelch) | $68.00 | | | 3 | As seen in Dec 95 QST |
| AN-93 HF Modem | $90.00 | | | 4 | Revised kits available. |
| TAPR 9600 bps Modem | $80.00 | | | 6 | |
| Bit Regenerator | $10.00 | | | 1 | used for repeater/tnc repeater operation |
| Clock Option | $5.00 | | | 1 | used for repeater/tnc repeater operation |
| PK-232 Modem Disconnect | $20.00 | | | 2 | simplifies connection of external modems |
| PK232MBX Installation Kit | $20.00 | | | 2 | for installation of 9600 option 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 8MX or 12X in clock |
| **Firmware** | | | | | |
| 32K RAM w/ TNC2 update does | $20.00 | | | 2 | |
| TNC-2 1.1.9 w/KISS EPROM | $15.00 | | | 4 | Includes 1.1.9 Command 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 | 2.0 update version for AX25/Net/Rom enabled |
| 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 | | | 4 | |
| **Publications** | | | | | |
| TAPR Spread Spectrum Update | $18.00 | | | 8 | 200+ pages on ARS Spread Spectrum Topics |
| 1998 TAPR CD-ROM | $20.00 | | | 4 | ISO 9660, 650 Megs of info! w/ 2000 raw pages |
| 1997 TAPR CD-ROM | $10.00 | | | 4 | ISO 9660, 650 Megs of info! w/ 1000 raw pages |
| Wireless Digital Communications | $39.99 | | | 8 | 300+ pages w/disk by: Tom McDermott, N5EG |
| Packet Radio: What? Why? How? | $12.00 | | | 5 | 150 pages. TAPR's Packet Radio book. |
| BBS Sysop Guide | $9.00 | | | 4 | 60 pages. By: Barry Bachow, WA8SIT |
| NOSIntro, Intro to KA9Q NOS | $23.00 | | | 8 | by Walt, G1NRW, TCP/IP over Packet Radio |
| TAPR's 94 Annual Proceedings | $7.00 | | | 4 | Papers from the Annual Meeting (Tucson) |
| TAPR's 95 Annual Proceedings | $7.00 | | | 4 | Papers from the Annual Meeting (St. Louis) |
| PSR Set Vol 1 (#1 - #17 '82 - '85) | $20.00 | | | 8 | |
| PSR Set Vol 2 (#18 - #36 '86 - '89) | $20.00 | | | 8 | |
| PSR Set Vol 3 (#37 - #52 '90 - '93) | $20.00 | | | 8 | |
| PSR Set Vol 4 (#53 - #68 '94 - '97) | $35.00 | | | 16 | |
| ARRL/TAPR 1999 DCC | $15.00 | | | 4 | **1998 DCC Proceedings Chicago, IL** |
| ARRL/TAPR 1998 DCC | $15.00 | | | 4 | 1997 DCC Proceedings Baltimore, MD |
| ARRL CNC Proceedings 1st - 16th | call | | | | Individual Proceedings, call for prices |
| Entire Set ARRL DCC 1st - 16th | $120.00 | | | 144 | 12 Proceedings from 1981 to 1997 |
| **Other** | | | | | |
| TAPR 11oz Coffee Mug logo | $11.00 | | | 4 | Logo in black and microwavable gold |
| TAPR Badge | $10.00 | | | 0 | includes 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 | |
| Garmin GPS-20/GPS-25 Data Cable | $15.00 | | | 2 | No Discount. |
| Garmin GA-27 GPS Antenna | $75.00 | | | 8 | Info Sheet/kit, mag and suction mounts |
| Oncore UT+ GPS | $260.00 | | | 28 | |
| Oncore VP Interface/Power Kit | $40.00 | | | 8 | |
| Oncore GT+ GPS | $189.00 | | | 28 | |
| Motorola Antenna 97 | $65.00 | | | 8 | Info sheet/kit, mag mount |
| MCX Rt-Ang Connector w/coax pigtail | $15.00 | | | 2 | No Discount |

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