PACKET STATUS REGISTER

Tucson Amateur Packet Radio Corporation
A Non-Profit Research and Development Corporation

In This Issue...

President's Corner

As a number of you know, Andy Freeborn, N0CCZ, passed away on February 4th in Colorado Springs. Andy was a past president and board member of the organization and was responsible for much of the direction of the latter part of the 80s and early 90s. This was a sad loss to many in TAPR, since Andy was directly responsible for the current and past activity of many within TAPR. If it were not for Andy's influence and arm twisting, I would not have gotten as involved in the organization as I am currently. Andy's departure will be felt by both Amateur Radio and TAPR. Andy asked for donations to be made to either the American Cancer Society or the First Lutheran Church, Colorado Springs.

[Memorial contributions may be made to First Lutheran Church Memorial Fund, 1515 N. Cascade Ave., or to the American Cancer Society, 1445 N. Union Blvd., B100, Colorado Springs, CO, 80909.]

The 1994 Board Meeting and Annual Membership Meeting went well this March in Tucson. If you didn't make it this year, you missed one of the best in several years. To spread the word early, next year's annual meeting will be held in St. Louis. (See news on date and location elsewhere in this issue). From past packet forums in St. Louis, we expect about 300 - 400 people to attend next year's annual meeting, a marked increase from the normal 100+ that attend at Tucson. The current plan is to alternate locations every other year always returning to our roots in Tucson. This should allow more people to participate in the TAPR experience around the U.S. The more the merrier! For an insight as to what occurred at the annual meeting this year, read Dave Wolf's article on the 1994 Annual Meeting. Also, we have TAPR 1994 Annual Meeting Proceedings available at the office for those that want a copy of the technical papers presented (54 pages).

I am very happy to say that the response on voting this year for board members was outstanding! From a little more than 1000 ballots mailed, 429 ballots were received (representing 43% of the membership). In the past, 100 to 150 ballots returned was a good response. This was the first year that the organization sent out individual ballots and we learned one or two things. The following people were elected to the board: Ron Bates, AG7H, Greg Jones, WD5IVD, Mel Whitten, K0PFX, Jack Davis, WA4EJR, and John Koster, W9DDD. Both Ron and Jack selected the 1 year term of office. A big welcome to all the new board members. I would also like to thank Bill Beech, NJ7P, and Jack Taylor, N7OO for running this year. Having this good a selection for the membership to choose from

was a dream come true. I hope that this level of excitement in TAPR continues and we see as good a ballot selection next year!

During the board meeting, the board set the following goals for 1994: increase membership, work on SIG activity, continue to watch spending, gain closure on current projects, and increase activity in national issues. Long range goals will continue to be discussed. The board elected the following officers: Greg Jones, WD5IVD, President, Keith Justice, KF7TP, Vice President, Gary Hauge, N4CHV, Secretary, and Jim Neely, WA5LHS, Treasurer. I believe that the board will be as active this coming year as this past. Leaving the board was Bob Nielsen, W6SWE, Dan Morrison, KV7B, and Jerry Crawford, K7UPJ.

The other good news from the annual meeting was the response to the formation of two new special interest groups: BBS SIG and NET SIG. BBS SIG is headed up by Dave Wolf, WO5H, and will focus on nationally oriented BBS issues. NET SIG is headed up by John Ackermann, AG9V, and will examine issues related to regional networking in the US. Both of these groups will have active mail lists on the TAPR Internet server, as well as with the help of members in each group who will redistribute many of the threads on packet radio. The goal of these groups is to generate information, recommendations, and publications that will help build consensus in each area and help bring a larger group of folks in each area to the table for discussion. Both SIGs have writeups in this issue. In person meetings are schedule three times a year: TAPR Annual Meeting, Dayton, and the ARRL DCC (Digital Communication Conference).

TAPR also formed a committee on FCC regulatory issues headed up by Dewayne Hendricks. The FCC committee will work towards providing TAPR with the ability to respond and represent our membership regarding various digital issues presented by the FCC.

I am very excited by the formation of all three of these groups. Information on how to join the Internet mailers for the BBS and NET SIGs appears later in the PSR.

Have you seen any of TAPR's ads in CQ, QST, 73, World Radio, or other publications? TAPR started a membership drive in January and since that date we have gained over 200 new members. This year's goal is to reach 2000 total TAPR members. To do this, we need your help. The advertising alone will not be enough to double our membership in one year. If you have a friend who might be interested, drop a letter or call the office to have a *PSR* sent to them. Lone your *PSR* to folks after you get through reading it. Request handouts from the office for your local club meetings or local hamfests. During the 'early days,' TAPR was well known by all who were active in packet radio.

Despite over a decade of explosive packet growth, there are many 'converts' to this medium who know virtually nothing of the history of TAPR's contributions, or that TAPR even exists! Just as businesses need customers to buy products to keep their company healthy, TAPR needs a growing membership base to make its continuing contributions to Amateur Radio digital communications possible. A little work in distributing information goes a long way to get new members. Help TAPR reach its goal of doubling its membership base. I personally want to see 3000 members by the start of 1996, so we have to make our goal this year.

Technical Support for kits is causing some problems. The new voice system might be too successful in handling information and giving TAPR a professional appearance, since many that call the system get the impression that a large technical support staff is just in the next room taking their lunch break. TAPR does not offer anything approaching commercial technical support. We really only have one person, in one back room, running the day-to-day show: Dorothy. If you didn't know, technical support for TAPR kits is handled on a volunteer basis. Each kit has a technical support specialist and all questions are sent to this person. Replies are then mailed or FAXed back as soon as possible. Since our volunteers are also holding down jobs, have to meet family commitments, and the other sundry things that daily life presents, it typically takes a week or more for an answer to make it back to the builder. Just be aware of this. If you can find someone locally to help you with your kit, it might be faster to get help there first. We are looking at ways to speed up the feedback loop, but probably will not have anything

implemented until the end of the year.

I believe technical support is becoming a larger and larger issue as kits become more mature. The reason being, when a kit is first introduced, more individuals with kit building experience have access to the initial kit release. As a kit matures, less experienced kit builders get the units and have more technical issues to overcome. This is a problem, since new members, who have problems with their kits, later become ex-members. With any kit in the future we need to examine closely the prior knowledge and experience required to build the unit. We should possibly look at rating the kits in order of difficulty and requirements. At the last Board Meeting, we did recognize the first authorized TAPR repair center. If all else fails to get someone's kit operational, TAPR can provide information concerning the authorized person who independently examines and repairs kits. You have to contact Dorothy about this option and it is provided after someone on the technical support group looks over your problem. Kit building frustration is a major issue we have to overcome.

TAPR projects are busy. The Beta-testing of the DSP-93 units is a little over a month off from beginning. The beta group has been formed and parts and board orders have been placed. We have 23 total people participating in the beta test. The LAPA (AX.25 v 2.2) standard has been moved from TAPR along to the ARRL for handling. Hopefully we will have news to report that it has been adopted in the near future. The TUC-52 has had a delay in the board layout and we are continuing to work through that delay. Paul has a preliminary design for the personality board, but is waiting until we get the board done on the TUC-52 before proceeding. Hard to say how this delay will impact the PCON project alpha and beta-testing period.

To finish, TAPR wants to start offering regional packet groups space in the *PSR* to report on regional news. If you want to take advantage of this, contact me or Bob Hansen (*PSR* editor). We believe that the more we can help communicate information between different groups the better job can be done in helping groups avoid and solve problems. One of the things that I think TAPR should be doing as a national organization is providing this conduit between regional groups. I also want to start publishing a list of regional networking contacts so that one region will know who to contact about issues. This list will be established by NETSIG, so if you want to be on the list, be sure to contact John Ackermann, NETSIG chairperson.

Until next Quarter,
    Greg, WD5IVD

TAPR Office Voice System

We have been amazed by the usage of the TAPR voice system. We expected a slight increase in telephone activity, but nothing close to what the usage logs have shown. Just keep in mind that at the old office, we had one phone line and an answering machine. Heather used to handle between 50 to 80 calls a week, so these numbers represent a big jump in phone activity into the office. This is one reason why Dorothy is feeling the pressure of startup a lot more. Here are the numbers for your examination.

	Jan		Feb		Mar	
Number of Incoming Calls:	640		551		690	
Number of Calls on LINE 1:	449	70.16%	375	68.06%	484	70.14%
Number of Calls on LINE 2:	191	29.84%	176	31.94%	306	44.35%
Office Manager Mailbox:	289	45.16%	267	48.46%	355	51.45%
Technical Support Mailbox:	10	1.56%	19	3.45%	15	2.17%
Service Support Mailbox:	114	17.81%	122	22.14%	130	18.84%
Order Mailbox:	103	16.09%	80	14.52%	101	14.64%
Membership Order Mailbox:	24	3.75%	11	2.00%	34	4.93%
Information Request Mailbox:	42	6.56%	10	1.81%	20	2.90%
Calls during Office Hours:	217	33.91%	249	45.19%	296	42.90%
Calls After Office Hours:	267	41.72%	171	31.03%	155	22.46%
Calls during Lunch:	131	20.47%	131	23.77%	151	21.88%

FAX support
As a reminder, the TAPR voice system currently only supports FAX-back capability on (817) 383-0000. We currently do not have the money budgeted to purchase FAX support for the second line. The only problem you might have if dialing into the 383-0000 number is that if that number is busy, you will be forwarded to the second line, which does not support FAX capability.

TAPR 1994 Annual Meeting

Dave Wolf, WO5H

[Portions reprinted from Packet Power Newsletter, Copyright 1994.]

The sun was nice and hot as I exited the terminal at Tucson International. Abandoning all other responsibilities, I joined about 100 die-hard digital fans over the weekend of March 4th through the 6th at the Best Western Inn at the Airport to share what works, talk politics, learn about the latest in digital technology and enjoy being immersed in what has become probably my longest-running enthusiasm, Amateur Radio.

Friday afternoon, people filled the TAPR hospitality suite. There were plenty of folks visiting, finding out where everyone was from, old acquaintances were renewed, and there was a great air of expectation. As afternoon grew into evening, we adjourned to a pizza joint at a nearby shopping center for more pizza than we could consume and liquid refreshment of choice. After dinner, we gathered in the hospitality suite for the first of several organizational experiments. This one was to determine if there was interest in forming a special interest group (a sort of ongoing virtual committee, linked by packet and other e-mail) to address networking issues. This discussion took place for several hours. The chairman of the networking group, or NET-SIG, is John Ackerman, AG9V. When you start seeing bulletins over the packet and Internet networks referring to NET-SIG, know that these relate to the discussions and resolutions being made by this committee. [See the NET-SIG article in this issue for more information]. Here are the four points the NETSIG agreed would be the initial focus of their activity: 1. Establish a collection of networking case studies for the benefit of those implementing networks. 2. Establish a database of people interested in networking. 3. Get discussion going on how we're going to interconnect regional networks, and provide input to the ARRL 219 Committee. 4. Discuss the role of packet/Internet gateways in the network scheme.

Saturday's sessions were most lively, with presentations on several key TAPR projects, including the TAPR/AMSAT DSP-93 (digital signal processing), presented by Bob Stricklin, N5BRG, a new multi-purpose networking/hardware interface dubbed the TUC-52, the Metcon-1, presented by Ron Bates, AG7H, and the surprise announcement by Lyle Johnson, WA7GXD, of a major financial commitment by TAPR to the next Phase III-D satellite project sponsored, in part, by AMSAT. Hopefully, TAPR's early commitment to the satellite project, will help Lyle generate the additional money needed to complete the alternate digital experiment on Phase III-D.

Other presentations included several case studies of the successes (and the long learning curves involved in making them successful) in network and software development. One very interesting presentation was made by HAL founder Bill Henry. He reported the results of some extensive empirical testing done on the CLOVER HF communications system, complete with comparisons to other digital modes. It is important to note that HAL has been presenting the CLOVER system to the military and to FEMA (Federal Emergency Management Agency). HF communications is still a very vital resource. While most of Amateur digital development has been concentrated on moving to higher-speed systems on the UHF bands, people like Bill Henry recognize the importance of developing reliable slow-speed, error-free long-distance HF communications. We shouldn't overlook this aspect of digital communications. HAL has come up with some fascinating findings that the optimum Minimum Usable Frequency (MUF) for voice is different than the optimum MUF for digital communications.

Views into the future were presented by TexNet guru Tom McDermott, N5EG; Phil Karn, KA9Q; and Remi Hutin, F6CNB. The packet network is rapidly moving to seamless integration with the Internet, while advances in improved RF networking continue to ensure that we will not become entirely dependent upon a landline-based network only because it has the bandwidth to handle the traffic load of a burgeoning packet population.

During the banquet Saturday evening, TAPR presented plaques to Dan Morrison, KV7B (1983 to 1994 as a long time contributor and board member), Bob Nielsen, W6SWE (1989 to 1994 as an officer and board member), Jerry Crawford, K7UPJ (1991 to 1994 as a board member), and Heather Johnson, N7DZU (1983 to 1985 as an officer and from 1989 to 1994 as Office Manager). After the banquet, a lively "ask the President" session featuring Greg Jones, WD5IVD, gave members an opportunity to express their views on where they thought the organization should be headed, as well as to hear from Greg, some insights into where TAPR's Board of Directors is leading the organization.

After the President's session, the first meeting of the BBS Special Interest Group meeting took place. This discussion took place for several hours. The chairman of the BBS group, or BBS-SIG, is Dave Wolf, WO5H (myself). When you start seeing bulletins over the packet and Internet networks referring to BBS-SIG, know that these relate to the discussions and

resolutions being made by this committee. It would be great to report that we solved all of the problems associated with BBS operation and created world peace during our late-night meeting. If only it were that easy. The BBS-SIG decided to initially consider these issues:

1. hierarchical addressing,

2. education of users to get the most from the local bulletin boards,

3. education of sysops to get the most from their software, and

4. establishing a library of case studies so we're all not constantly "reinventing the wheel" when we set up or upgrade a BBS.

[See the BBS-SIG article in this issue for more information.]

Johan Reinalda, WG7J, was the featured presenter on a Sunday-morning session highlighting his version of NOS (network operating system) called JNOS. Johan was absolutely swamped with questions from seminar attendees about the inner workings of his code. It is a reasonable assumption that Johan made several converts to NOS during his seminar. NOS software may be configured as a TCP/IP terminal used by an individual to a full-blown bulletin board that will accept connects from stations running TCP/IP and AX.25 (garden-variety packet). In addition, NOS can be used as network-layer software, like G8BPQ, NET/ROM, ROSE, etc.

If you missed the TAPR annual meeting, and would like to get more exposure to the latest in digital technology, then attend the ARRL Digital Conference in August. Next year's TAPR Annual Meeting will be held in St. Louis. It should be a really big event!

LA/Chicago Wormhole

Donald Lemke, WB9MJN
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[Reprinted from the Summer 1993 issue of The NCPA Downlink, published by the Northern California Packet Association.]

Hi, I helped set up the LA / Chicago wormhole, building the Chicago side RF link. At present, the link is a 1.2 GHz 9600 baud radio channel, using no-tune transverters, and DVR2-2s. Although we started with back to back NETROM TNC-2 nodes, the configuration has changed. At present the WORM node (WB6WEY-7) is running G8BPQ code, and has ports on the LA 6-meter backbone (4800 / K9NG), the 2-meter Simi Valley LAN Channel, and a port for each of the three wormhole links: Chicago (Naperville, IL), St Louis, and New Jersey (Secaucus).

Recently, the port to Naperville, IL was converted to a KISS link, over the commercial wire. The TNC-2 NETROM at Naperville could not deal with the additional node load of the new NJ links. It would operate very sluggishly, and stop working for many minutes at a time. So, we converted the TNC-2 to a KISS TNC, and WB6WEY had its ports upgraded to use 16550 SIO chips. The Simi Valley, CA port, and 6-meter / 4800 baud port were switched to KISS at WORM:WB6WEY-7, shortly after the improvement gained by switching to KISS was apparent. This change gives a few more years of service to our TNC-2 based hardware in the Naperville office of the wormhole sponsor. We converted the TNC-2 to 19.2 Kb on the RS-232 port, which goes through the local statistical multiplexer, a 56 KB data wire, and the sponsor's headquarters site statistical multiplexer, to get to the WORM node. Through this

arrangement, WORM can send packets right to the ILNAP:K9VXW-1 PacketTEN node, over 1.2 GHz, at 9600 baud in Naperville.

We are using 1.2 GHz because of the noisy office environment, and because 440 is used at K9VXW-1 site already. Using 440 would create a hidden station situation, and retard throughput. I believe this is how the St. Louis link is done, however, on 440/9600 with Kantronics D4-10s. The hidden station problem has been noted however, and they live with it.

An added advantage to the KISS changeover, is that someday with either newer G8BPQ or NOS software on the WORM site, we will be able to send IP packets right from K9VXW-1 to WB6WEY-7, without the need to gateway through NETROM.

Interfacing the TAPR 9600 bps modem to an AEA PK88

Lyle Johnson, WA7GXD

I have been in touch with a fellow via CompuServe who was having trouble interfacing a modem to his PK88 following the instructions in my article in PSR #47, July, 1992, page 3.

On page 4 in the section "Performing the Modifications" Step 4, please add the following checkbox:

☐ JP4 bottom row pin "A" to pin "B"

The purpose of this is to ensure that TXD from the HDLC chip is routed to the internal modem as well as to the external modem. If this is not done, Step 8 (verify operation of PK88 internal modem) will not work because the internal modem will not have transmit data applied to it!

Silent Key: Andy Freeborn, N0CCZ

Tom Clark, W3IWI: It is with great sadness that I report that an old friend of TAPR and AMSAT has become a silent key — Andy Freeborn, N0CCZ of Colorado Springs. Andy succumbed this past February to cancer at age 71.

Andy was an Air Force pilot who retired to Colorado Springs where he became an Amateur and then became involved in packet radio activities. For a number of years he was a member of TAPR's Board of Directors and he served for a couple of years as the TAPR President. In that role he did yeoman duty for AMSAT coordinating TAPR's involvement in the MicroSat development and he helped kick off the joint TAPR/AMSAT DSP development activities.

Andy, you will be missed!

Phil Karn, KA9Q: I remember Andy best as a calm, moderating influence on what could have been some pretty raucous TAPR Board of Directors and general meetings. Whether the topic was virtual circuits vs. datagrams, TheNET vs. NET/ROM, AMSAT and TAPR, TAPR finances and internal politics, or any of the dozens of other topics that we passionate young guys always seemed to turn into heated discussions, we could always count on level-headed Andy to keep things under control.

Maybe I didn't know Andy as well as some of you, but I don't think I ever saw him get angry or lose his temper. (If he did, he concealed it pretty well.) And by so doing he kept subtly remind-ing us that it's all just a hobby, and that it's the sense of personal satisfaction from having done something to help your fellow ham that makes a volunteer job worth doing. It's a hard lesson to learn, and one that's all too easy to forget.

Bdale Garbee, N3EUA: N0CCZ was the first non-hotel employee I talked to on 22 June 1986 when I arrived in Colorado Springs to work for Hewlett-Packard. Like any fanatic, I set up the packet gear before unpacking the rest of the car, and found N0CCZ-1, a digipeater on Pikes Peak. Andy saw my AX.25 connect, and hit me right back when I disconnected from the digi. What began that afternoon was a friendship and working relationship that included our having the first-ever TCP/IP connection using KISS TNCs later that year (using code for the TNC-2 that K3MC was writing and I was helping debug with the logic analyzer in my back bedroom). Andy introduced me to John Conner, WD0FHG, with whom I have worked, and continue to work, on many things radio related and not. Andy was single-handedly responsible for convincing me to go to my first TAPR annual meeting, talking me into running for the board, and twisting my arm to serve as Vice President during part of his tenure as President. He did all the hard work organizing the ARRL Digital Conference we held here in Colorado Springs a few years back. His organizational skills made a huge difference to TAPR at Dayton, where he was infamous for his early-morning wake-up calls to folks who were scheduled to work the booth, insisting we join him for the breakfast buffet first.

And he was a mover and shaker locally, involved with the Pikes Peak FM Association, superbly managing the membership records and being instrumental in motivating this voice repeater association to become involved in packet.

Andy's leadership at TAPR is a significant part of why the organization still exists. He took over during a period of transition, and as Phil Karn, KA9Q, has pointed out, his even temper and commitment to the hobby helped to keep many board meetings, that might otherwise have been boxing matches, under control and productive. Whether it was virtual circuits versus datagrams, the NET/ROM controversy, or what to do when the 9600 baud and DSP projects got bogged down, Phil is right in saying that Andy never let us forget that this was all supposed to be a hobby, something that's all too easy to forget.

Andy was one of the finest individuals I have had the pleasure of knowing. He touched the lives of many of us in this hobby. We're going to miss him, a lot.

Did you miss the TAPR Annual Meeting?

TAPR still has proceedings of the annual meeting available. Contact the office today to get your copy of the 1994 Proceedings. 54 pages covering TUC-52, DSP-93, TNOS, G-TOR, and papers on the future of packet radio! Available for $6. Don't forget, TAPR members get 10% off kits and publications.

Commission Amends Rules Concerning Message Forwarding Systems In The Amateur Service

The FCC has relaxed the amateur service rules to enable contemporary message forwarding systems to operate at hundreds of characters per second while retaining safeguards to prevent misuse.

A message forwarding system is a group of Amateur stations participating in a voluntary, cooperative, interactive arrangement where communications from the control operator of an originating station are transmitted to one or more destination stations via forwarding stations, which may or may not be automatically controlled.

Currently, the control operator of each station is held individually accountable for each message retransmitted, resulting in unnecessary content review and delays. The American Relay League, Inc. (League) stated that the obligation of the control operator of the first forwarding station should be the establishment of the identity of the station originating the message. Only when this is not done should these control operators be held accountable for improper message content. Also, there is currently no central supervisory authority in an ad hoc Amateur service digital network, making these unsupervised systems easy targets for misuse by uncooperative operators and non-licensees. Moreover, the Commission said that it could be difficult to establish after the fact that a particular VHF station originated a fleeting high speed digital transmission. For these reasons, the Commission said there must be on-going oversight of the system and the control operators of the first forwarding stations are in the best position to provide such oversight.

Therefore, the Commission will hold accountable only the licensees of the station originating a message and the license of the first station forwarding a message in a high speed message forwarding system. The licensee of the first forwarding station must either authenticate the identify of the station from which it accepts communications on behalf of the system, or accept accountability for the content of the message.

The Commission also clarified that the station that receives a communication directly from the originating station and introduces it into the message forwarding system is the first forwarding station.

The League and the Colorado Council of Amateur Radio Clubs suggested that the Commission substitute the word "simultaneously" for "instantaneously" in the redefinition of a repeater. The Commission concurred and adopted this modification.

The Commission believes that these rule changes will enable contemporary high speed message forwarding systems to operate as their designers intended, while retaining the minimum safeguards necessary to prevent misuse.

Action by the Commission March 30, 1994, by Report and Order (FCC 94-76). Chairman Hundt, Commissioners Quello and Barrett.

TAPR Internet Update

The TAPR Internet server has been getting more and more activity recently. In addition, TAPR has started three mail lists: these are BBSSIG, NETSIG, and TAPR-BB.

- BBSSIG is the mail group for the BBS Special Interest Group
- NETSIG is the mail group for the Network Special Interest Group
- TAPR-BB is the mail group for TAPR bulletins

To subscribe to these lists, simply send mail to listserv@tapr.org, include in the message body the command:
```
join groupname
```
Example:
```
join bbssig
join netsig
join tapr-bb
```
When you get tired of one of these groups, the command to remove yourself is:
```
unjoin groupname
```
Example:
```
unjoin bbssig
```

File Requests
```
listserv@tapr.org
```
can now be used instead of
```
file-request@tapr.org
```
when requesting files. The electronic edition of the *PSR* is now being made available via the server as a file. Note that the list server is an Internet host and not a node, therefore, it does not support direct live connection from the Internet.

The address tapr@tapr.org is used for office related mail needing the attention of the office. Please do not send file requests or mail-list requests to this address.

Software Library
The TAPR Software Library is now available via anonymous FTP. You can access the library by ftp access to
```
ftp.hereford.ampr.org
```
in the directory
```
pub/hamradio/tapr.
```
Login in as "anonymous," with a password of "your_account @internet_address."

The site is still working on getting some bugs worked out, so it might be up and down over the next month. Thanks to Bill Beech, NJ7P, and company for providing this space and service.

NET-SIG

John Ackermann, AG9V
jra@lawdept.daytonOH.ncr.com

At its March board meeting, TAPR agreed to create two Special Interest Groups (SIG) to help exchange information among packet radio users. One SIG is devoted to BBS issues, and the other — NET-SIG — to information about building, maintaining, and extending packet radio networks.

The SIG held its first meeting on Friday evening, March 4, 1994, in conjunction with the TAPR annual meeting. About 25 people attended, and 19 signed up with their e-mail addresses. Those 19 people are the charter subscribers to the mailing list. I was the lucky guy who became the coordinator of NETSIG for the next year.

After a couple of hours of discussion, the group agreed first that it wanted to exist, second to create a mailing list for information exchange, and third to establish four primary focus areas for the coming year. Those areas are listed below, with my own comments included. Hopefully they'll stimulate some conversation and give our mailing list a good start. In other words, LET'S HEAR WHAT YOU THINK ABOUT THESE ISSUES!!!

1. Establish a collection of networking case studies for the benefit of those implementing networks.

Comment: This could either be a simple collection of e-mail messages, or a more complete book, depending on the response and the editing effort. I'm willing to edit the material to create something like "The TAPR Guide To Building Packet Radio Networks," but that'll only be possible if lots of groups are willing to write up what they have done, and are doing.

2. Establish a database of people interested in networking.

Comment: The idea here is to provide contacts for folks wanting to interconnect local or regional networks. In other words, "who do I call to link up with the guys in the next state?" This mailing list is a start, but we need to add LOTS of names to make it a useful resource.

3. Get discussion going on how we're going to interconnect regional networks, and provide input to the ARRL 219 Committee.

Comment: Different networks use different protocols, have different standards, and often don't use common frequencies or even bands. We need to come up with guidelines to help connect these dissimilar networks. We also need to talk about the problems that larger, longer networks will face — setting consistent network parameters, agreeing on how far nodes will propagate, etc.

Since the (possible) new 219 MHz band will be used for networking, it seemed appropriate to include in this goal a provision for adding our input to the ARRL 219 Committee to help them shape their recommendations for the band. Jim Fortney, K6IYK, is a member of the Committee, and is a member of NETSIG. We can provide input through him.

4. Discuss the role of packet/internet gateways in the network scheme.

Comment: In the last year, there has been an explosion of gateways. They are neat toys, offer a lot of new functionality, and give us the opportunity to link together the world of packet radio. But they raise questions as well, including the fundamental one of the role of non-ham-radio links in a ham radio network. We need to think through the role that the gateways should play as the network grows.

SIG Meetings
The NET-SIG met at the Radisson Hotel in Dayton on Saturday evening, April 30, after the McNasty's packet dinner. See the article elsewhere in this issue about what happened.

There will also probably be a meeting at the ARRL Computer Networking Conference in Minneapolis (or thereabouts) next August. Because of other commitments, I will probably be unable to attend that meeting, so I'd appreciate a volunteer to serve as coordinator.

And, we'll meet again at the TAPR Board Meeting next year in St. Louis.

Mechanics of the List
The NET-SIG mailing list charter is to provide a forum for the exchange of information about packet radio networking and network building. We want a free and open exchange, so the only rules are that messages be at least marginally related to the charter, and (because we want to be able to repost traffic from here to the PBBS world) that messages avoid obscenity and commercial content.

The mailing list is maintained at the TAPR Internet system. Messages should be sent to netsig@tapr.org. [See the "TAPR on Internet" article elsewhere in this issue for information on how to join the mailing list.] Both TAPR and I will attempt to maintain a permanent archive of mailing list traffic.

As mentioned, we'd like to gateway this list to the packet BBS world, but that requires a) screening all messages from the Internet before they hit the radio, and b) someone volunteering to be the collection point for incoming packet messages. Any takers?

Once we have the mechanics for subscribing to the list figured out, I'll post articles to the appropriate Usenet newsgroups, some other mailing lists (like tcp-group), and on the packet network, announcing the group. I'll also repost this article (with updates) to the list every now and then for the benefit of new subscribers.

My primary e-mail address (at work) is:
jra@lawdept.daytonOH.ncr.com

I also can receive mail at (my home machine, with internet mail access):
jra@ag9v.ampr.org
or via packet at:
AG9V@N8ACV.#DAY.OH.USA.NOAM
My home phone number is (513) 372-7884 (before 9:30PM Eastern, please).

A Final Word

Thanks for being involved in NETSIG! We'd like this to become the forum that helps shape the growing national packet radio network, but we can't do that without input from the people who are doing the building.

Landline BBS Provides STS-59 SAREX Information

[From the AMSAT News Service.]

The Johnson Space Center Amateur Radio Club has set up a telephone computer bulletin board (BBS). The purpose of the BBS is to provide a source of current Space Shuttle mission Keplerian Elements.

There are a limited number of BBS files available for downloading. Among the current files are:
- Current and old element sets for the mission in progress
- Current mission information
- Shuttle Amateur Radio Experiment (SAREX) information
- Recent Space Shuttle Mission Schedules and Manifests
- Astronaut/Cosmonaut Ham List
- Current JSC Amateur Radio Club Newsletter

We ask that no files be uploaded to the BBS. The telephone number is (713) 244-5625. Our modem can handle all bauds up to and including 9600 baud. The parameters are N-8-1.

The BBS is currently running in ProComm HOST mode, so the logon is very simple and downloading is easy. After logging in, you will see the Welcome Screen describing the BBS. Also, the Welcome Screen contains the current and latest element set number (e.g., JSC008) loaded on the BBS. Check it against your last set so you won't waste your time duplicating a set you already have. Press ENTER to bring up the second page containing the current Space Shuttle Keplerian Element Set. If you have a file capture or screen capture function in your communications software, then you should use it for this page. That way, you won't have to go through the file download process if all you wanted was the latest element set. If you have any comments for the Club or BBS sysop, leave a message and we will respond.

[The AMSAT News Service would like to thank Dale Martin (KG5U), KG5U @ KA5KTH.#setx.tx.usa.na, Secretary of the Johnson Space Center ARC Houston, Texas (W5RRR)]

*** Connect Request

This column is where you can get in touch with other packeteers who may have similar needs or interests. If you have a question about packet radio, or are looking for a particular type of unusual hardware or software, this may be the place for you. Send your requests to TAPR at any of the usual addresses. Also, please help your fellow Amateurs by responding to requests that you know the answer to.

Request:

I have a question for the SAREX gurus. Today at about 12:25 UTC I made a contact with SAREX on packet; I connected to W5RRR-1,

got an acknowledge of the connection, got my QSO number, but did not received **any** disconnection frame.

My question is, does the QSO count or not? I assume yes, but I may be wrong (hope not!). Was nice to see the connection with just 25W into a dual-band omni and **lots** of traffic!
Luca Bertagnolio IK2OVV
(berta@dsi.unimi.it)

Response:

Your "connect" to W5RRR-1 counts as a QSO, even though you may not have copied a "disconnect" packet. Congratulations.

To obtain a QSL, send your report or QSL to ARRL EAD, STS-59 QSL, 225 Main Street, Newington, CT 06111, USA. Include the following information in your QSL or report: STS-59, date, time in UTC, frequency and mode (FM voice or packet). In addition, you must also include an SASE (or sufficient IRCs) using a large, business-sized envelope if you wish to receive a card. The Orange Park Amateur Radio Club in Florida has generously volunteered to manage the cards for this mission.
Bob Inderbitzen, NQ1R
Assistant to the Manager
ARRL Educational Activities

BBS-SIG

Dave Wolf, WO5H

At its March Board of Directors meeting, TAPR agreed to create two Special Interest Groups (SIG) to help exchange information among packet radio users. One SIG is devoted to networking matters (NET-SIG). The other — BBS-SIG — will provide a forum in which to address many of the issues of interest to BBS sysops.

The BBS-SIG held its first meeting on Saturday evening, March 5, 1994, in conjunction with the TAPR annual meeting. Here is the roster of hams attending that inaugural session:

WO5H	WB7TLS
KI6QE	N7MRP
K5DI	K6IYK
AL7PB	KD6DG
NR7P	N0LEU
KL7EV	K0HYD
AA5DF	AA8Y
W6VHU	N7LEM
K0PFX	W9AZW
F6CNB	WD5IVD

What did we accomplish?

It would be great to report that we solved all of the problems associated with BBS operation and created world peace during our late-night meeting. If only it were that easy... Come to think of it, world peace just might be slightly easier to accomplish than getting two sysops to agree on universal 'TO' and '@' fields!

More realistically, the primary purpose of the initial meeting was to determine if it were possible for a group of sysops to sit and talk about those things that created problems for each of them **without** it turning into a finger-pointing and flaming session. We proved that approximately 20 people can more-or-less do this.

There have been many great ideas generated on a sporadic basis throughout the country (in fact, throughout the world) which consider certain facets of BBS and packet networking operation as it pertains to BBS operation. Most regrettably, some of these good ideas either don't make it out of their immediate areas or are squashed by those who resent adopting a procedure or 'standard' that comes from somewhere else. The 'not invented here' syndrome is alive and well in the world of packet, much to everyone's detriment. Regionalism and nationalism may serve useful purposes in politics and economics. They run counter to the spirit of cooperation that is supposed to be one of the cornerstones of Amateur Radio's foundation, and only hamper progress. One of the primary purposes of the TAPR BBS-SIG will be to consider ideas that arise regionally or from motivated individuals, and determine if they make sense for packet BBS operation as a whole. The advantage that a national committee/group/forum such as BBS SIG has is that it is free from regionalism by its very nature. It may be able to accomplish what regional groups have not been able to by virtue of it being associated with an international organization (TAPR).

We decided that the BBSSIG should consider these issues:
- hierarchical addressing
- education of users to get the most from the local bulletin boards
- education of sysops to get the most from their software
- establishing a library of case studies so we're all not constantly 'reinventing the wheel' when we set up or upgrade a BBS

Some of the issues that are of interest and concern to the community of sysops are shared by the networking folks. Many BBS sysops also operate networks (or is that the other way around?), so it's no surprise that there is some overlap. The BBS-SIG and TAPR's NET-SIG will work together to make sure that we're not duplicating efforts or working at crossed purposes.

The BBS-SIG will provide input to the ARRL Digital Committee on issues of significance to BBS sysops, and it will be active in the creation of guidelines for sysops for more efficient BBS operation.

BBS-SIG Meetings

The second meeting was held at the Dayton HamVention, and a report appears elsewhere in this issue. The BBS-SIG will meet again at the ARRL Digital Communications Conference (August 19-21) in Bloomington, Minnesota (near Minneapolis/St. Paul International Airport). The BBS-SIG will meet in St. Louis at next year's TAPR Annual Meeting (approximately 11 months away!).

Mail List

A BBSSIG Internet mail list has been set up to provide a forum for the exchange of information about packet radio bulletin board systems and the issues surrounding their operation. News, hints & kinks, case studies, and such are welcome parts that we hope will become an important resource for those participating in the forum. Details on how to join the BBS-SIG and other TAPR-sponsored mail lists may be found elsewhere in this issue of *PSR* or details may be obtained from the TAPR office.

If you do not have Internet access, you will be pleased to learn that items of general interest will be reposted from the BBS-SIG Internet forum to the packet network. Look for bulletins addressed to BBSSIG@TAPR on your local packet BBS. It is possible, if volunteers step forward to do so, that such bulletins may also be reposted in other places that

hams gather, such as the Hamnet forum of CompuServe, GEnie, Prodigy, America OnLine, etc. If you should take it upon yourself to repost any of the TAPR forum bulletins to other communications systems, please include the messages in their entirety (which means including the line containing the TAPR-assigned BID). This will reduce the likelihood of dupes being generated in the packet world, which many folks find annoying. Also, please keep your postings constructive, refrain from using profanity, and do not use the forum to promote commercial activity. Please stay focused on issues relating to packet BBS operation.

The mailing list is maintained at the TAPR internet system. On the Internet, messages should be addressed to bbssig@tapr.org.

Your chairperson of the BBS-SIG is Dave Wolf, WO5H. My Internet e-mail address is dwolf@tcet.unt.edu
CompuServe: 73427,2246
Packet:
WO5H@WO5H.#DFW.TX.USA.NOAM
My phone is (817) 295-6222
My fax is (817) 295-6232

The most important part of this article is about people. The biggest mistake a BBS sysop can make is to NOT participate with other sysops and packet folks in a meaningful way. If you find information on the forum that saves you some time or frustration, pass it along to a fellow sysop who doesn't have the privilege of accessing the Internet. Help enlighten your BBS users. Remain open minded to the ideas of others. Step forward if you have the time and desire to take a key role in any of the activities of the BBS-SIG.

Phase 3D - A Satellite For All Amateurs

[Edited from a paper distributed to delegates at the IARU, Region 1 Conference in September 1993, and published by AMSAT-UK in Oscar News No. 103.]

This paper is intended to provide information on the Phase 3D satellite program to Members and Delegates at the IARU Tri-Annual Conference 1993, and for subsequent transmission by delegates to their own members and National Societies. The paper shows the potential for Amateur Radio. It is requested that this be given widest publicity to promote help with donations for design, building and launch, which at this date is at a critical stage. Donations would help solve some of the problems.

Phase 3D is the next major satellite construction effort that various AMSAT groups around the world are undertaking. It is believed to be the most challenging project the Amateur Radio community has ever attempted; it is one that requires the combined efforts of an international team of satellite building organizations.

A little explanation of what is meant by Phase 3D is in order. Phase 3 refers to the class of Amateur satellites built to relay broad bands of Amateur frequencies in real time from high elliptical orbits to provide world-wide coverage. The "Phase 1" group of Amateur satellites is typified by OSCARs 1 and 2, carrying only beacons and designed to last only a few weeks. Later spacecraft such as OSCARs 6, 7 and 8, are examples of P2 satellites. While built to last for a period of a year or more, a distinguishing characteristic of these satellites is their relatively low orbit, which affords limited

access time and restricted coverage potential.

The Phase 3 program was initiated during the 1970s to alleviate these limitations. The first Phase 3 spacecraft (Phase 3A) was, unfortunately, lost in an Ariane launch failure in 1980. Thereupon, two more Phase 3 satellites were constructed and successfullly launched, also on Ariane vehicles. The first of these; Phase 3B, which became OSCAR-10, is still supporting Amateur communication. However, due to a failure in its on-board computer brought about by radiation damage, OSCAR-10 is no longer able to be maintained in the proper orientation to afford optimum service. The third Phase 3 satellite, Phase 3C, became OSCAR-13 following its successful launch in 1988. It is still functioning perfectly after about four years in orbit. However its life is now known to be limited. Because of obscure interactions between the spacecraft, the earth, the moon, and the sun, OSCAR-13 is slowly de-orbiting. Studies by professionals, using sophisticated main-frame computers, predict that the satellite will re-enter the atmosphere about four years from now.

Therefore, if Amateur Radio is to continue to have the benefit of a high altitude world-wide coverage satellite, this fourth in the Phase 3 series, Phase 3D, must be built and launched. Fortunately, the expected demise of OSCAR-13 coincides with the scheduled launch of Phase-3D. However, Phase-3D will be much more than a mere replacement for currently operating satellites. Through a combination of higher power transmitters and higher gain antennas, which unlike OSCARs 10 and 13, will point earthward during the entire orbit, Phase 3D will offer greatly improved signal strengths on its downlinks and

require much lower power levels on its uplinks. Thus, Phase 3D is being designed specifically to bring satellite operation to within the reach of many more Amateurs all over the world.

Nor are wide geographical coverage and high signal strengths the only attributes offered by Phase 3D. The satellite is to contain receivers and transmitters on all bands, authorized by ITU for the Amateur Satellite Service, from 18 MHz to 14 GHz. This will continue Amateur Radio's climb through the electromagnetic spectrum, begun at 200 meters in the early 1900's. It should, therefore, be instrumental in preserving our assignments in the valuable microwave bands for future generations of Amateurs, while providing satellite access for "average" radio Amateurs of today.

Specific design features being incorporated into Phase 3D and its orbital parameters will bring about this wider use of Amateur satellites. In addition to substantially reducing ground station requirements, Phase 3D is specifically designed to assist the continued use of Amateur Radio toward higher frequencies. This is important if we are to retain the use of these bands, which in the next century may turn out to be some of the most valuable assignments we enjoy and hold.

As commercial and government agencies have already discovered, satellites can make the upper reaches of the spectrum very useful for communication between widely scattered points on the earth. The time may not be too far off when Amateurs will be using the GHz bands to talk to radio Amateurs on space stations. Phase 3D gives the incentive needed to make more use of these valuable frequencies.

Comparisons of Transmitter Power and Antenna Gain

|	Txmt. P/O	Ant. Gain	E/Rad Pwr	RatioWatts/dB
Oscar 13				
145 MHz	50	5.5	180	
435 MHz	50	9.5	450	
2.4 GHz	1	9.0	8	
Phase 3D				
145 MHz	300	11.1	3860	12.9
435 MHz	300	15.3	10,170	13.6
2.4 GHz	160	19.5	14,260	32.5
10.5 GHz	80	25.0	25,300	N/A
24 GHz	?	?	?	N/A

Amateur Radio satellites over the last twenty years have utilized communications transponders. A transponder receives signals on one band of frequencies and transmits amplified replicas on another band of frequencies. Although this is a concept similar to that used in terrestrial repeaters, repeaters generally consist of a complete receiver and transmitter pair. Transponders, on the other hand, convert the received signals to an intermediate frequency (IF) which is amplified and then converted to another frequency for re-transmission. Amateur satellite transponders have transmit/receive bandwidths ranging from 20 to 800 KHz. For example, the Mode-B transponders on both OSCARs 10 and 13 are approximately 140 KHz in width, By using transponders, many QSOs can take place through a satellite simultaneously, rather than just one, as in the case of repeaters.

Instead of dedicated transponders, which limit flexibility, Phase 3D employs an equipment architecture in which the satellite's communication package consists of a series of receiver front-ends and mixer/power amplifiers, all linked together through an IF-bus controller unit. This enables the output of any receiver to be connected to any of the mixer/power amplifiers, all under computer control. Thus, uplinks and downlinks can be configured on any bands for which hardware exists on the satellite,

This is important since no one can be sure what bands will be most viable for uplinks and downlinks even in five years time, and Phase 3D is being designed for a 10 to 15 year life. It has been noted that Phase 3D will permit greater use by less-capable Amateur stations than do the current OSCARs. P3D orbital parameters have been designed to increase coverage and make the satellite more intuitively easy for all of us to understand and use.

This paper has addressed some of the issues associated with the design and construction of Phase 3D. No less a challenge is finance. Even with volunteer labor, it is estimated that it will cost about £3.25 Million. The Phase 3D satellite will benefit ALL Amateurs, especially packeteers.
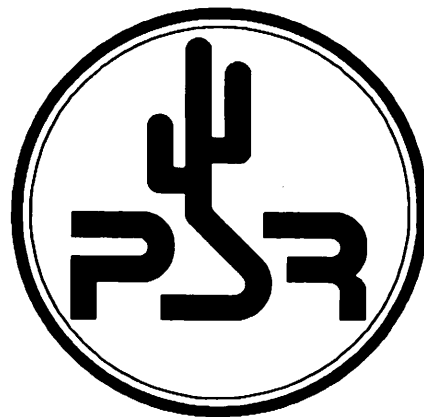
A Proposal for a Standard Digital Radio Interface

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Introduction

Just about everyone who has ever used packet radio has had to deal with what should be a simple task: that of properly connecting radios and terminal node controllers (TNCs) together. Unfortunately, many people have learned that it is not very simple. Not only do the proper signal connections need to be determined between each radio and TNC but the correct audio levels must be set in order for the system to work well. This problem is compounded for persons with multiple TNCs or multiple radios. Every time a radio or TNC is changed, the system must be readjusted for proper receive and transmit audio levels, as well as proper delay times to accommodate the key-up time of the transmitter. These problems are exacerbated by the existence of differing connectors for different models of radios and TNCs. All of this can be attributed to the fact that the interface between the equipment uses analog signals despite the fact that packet radio is a mode of digital communications. For operation at speeds greater than 1200 bits per second (bps) most radios do not even provide a connector for the appropriate signals. Operators of digipeaters or remote sites are burdened with the task of hauling around extra test equipment and adjusting radios on-site instead of performing these adjustments in a convenient location such as a laboratory or home station. Emergency operation is difficult because it is almost impossible to properly connect various pieces of equipment together easily in the field unless the exact configuration is known beforehand.

In this article, a proposal for a digital radio (DR) interface is developed. This interface is designed to support all current packet modulation methods and speeds and any which can be reasonably anticipated for future use. It provides "plug and play" operation between any digital radio and TNC (from here onward the term TNC refers to a TNC or any other device, such as computer or packet switch, which processes the data being communicated). It can be easily incorporated into most existing equipment, and it allows the use of a single radio in multiple packet modes without changing cables or making any adjustments.

Requirements

The requirements of the interface are as follows:
- connect any DR to any TNC;
- be transparent to the data stream;
- operate over a wide range of speeds;
- operate with both synchronous and asynchronous modulation modes;
- operate in both full- and half-duplex modes as well as in transmit- and receive-only systems;
- provide good immunity to electromagnetic interference (EMI);
- be tolerant of variations in the equipment: not require any adjustments when equipment is changed;
- operate over cable distances from zero to at least 10 meters;
- be usable for all existing digital communications modes and for all anticipated modes in the future;
- operate at all existing speeds and at all reasonable future speeds, at least up to 2 Mbps;
- have a single standardized connector so that connection is "plug and play;"
- sense when cable is disconnected or when the DR is powered down;
- make use of existing standards, where possible; and
- allow easy migration from the current system.

Development of the Interface

In a digital communications system, the digital information is communicated by representing the information as an analog signal. For the interface, the simplest representation should be used for the information being sent: this is a serial bit stream. To do this, it is necessary to move the "modem" out of the TNC and into the DR. This change has a benefit of making the dual use (voice and data) of the radio easier to accomplish. A front panel switch could easily select between voice and one or more data modes; for example, a 2-meter radio might be built to support voice, 1200 bps packet, and 9600 bps packet.

Many standards have been developed for use in data communications. Some standards which are related to the needs of this interface are EIA/TIA-232, EIA/TIA-422, EIA/TIA-423, CCITT V.10, V.11, and EIA/TIA-449. There appears to be no standard which provides the necessary functionality; however, some standards can be incorporated into the interface.

Examination of the information which must be communicated across the interface yields the required signals. The fundamental information which must be conveyed across this interface is receive data and transmit data. Auxiliary information is necessary to indicate where each data bit is, when the data is valid, and when the data can be sent and received.

To accommodate both synchronous and asynchronous systems at varying speeds, a synchronous interface is used. The receive and transmit clock signals originate at the digital radio and are independent of each other.

To send data from the DR to the TNC, the following items are necessary:

- Receive Data: the data from the DR to the TNC.
- Receive Clock: a clocking signal for the receive data, originating at the DR.
- Receive Data Valid (RDV): a signal originating at the DR which indicates that the receive data signal is valid (similar to carrier detect).

To send data from the TNC to the DR, the following items are necessary:

- Transmit Data: the data from the TNC to the DR.
- Transmit Clock: a clocking signal for the transmit data, originating at the DR.
- Request To Send (RTS): a signal from the TNC to the DR indicating that data transmission is requested.
- Clear To Send (CTS): a signal from the DR to the TNC indicating that data transmission may proceed.

One other signal is necessary to convey the DR status to the TNC:

- DR Ready (DRR): a signal from the DR to the TNC indicating that it is powered up and capable of reception and/or transmission of data.

The Interface Proposal

The signals listed above will be sent using a combination of EIA/TIA-422 (differential) and EIA/TIA-423 (single-ended) signal levels. The two data signals and two clock signals, because of the potentially high speed will use differential signaling, which provides for speeds of up to 10 Mbps. These signals will use eight wires of the interface. The status signals will use single-ended signaling because high speed is not necessary. These signals will use four signal lines and two ground lines (one in each direction, per EIA/TIA-423 specifications). To ensure proper operation under fault conditions (either unit is powered down or the cable is not connected) "fail safe" line receivers must be used for the four status signals (RDV, RTS, CTS, and DRR).

Much of the delay necessary at the beginning of the transmission is due to internal delays in the transmitter. This delay is made the responsibility of the DR rather than the TNC. When CTS becomes active, data can be sent immediately; after the last bit of data has been sent, RTS may become inactive. Additional delay may be added in the TNC (as is done currently).

The physical connector selected is a high-density 15-pin D-series connector. This connector is small enough to be used on mobile and portable equipment and yet is reasonably rugged, reliable, and inexpensive. The male connector (plug) is used on the TNC and the female connector (socket) is used on the DR. Although the same type of connector is popular for computer displays, the opposite sex connector is used on the computer so that confusion should not occur. Cables will act as "extension cords," that is, they pass all pins straight through from the connector on one end to the other end. The shell of the connector must be used for the shield connection if a shield exists on the cable; if no shield exists, the shells must be connected by a wire in the cable. All DRs and TNCs must have metallic connector shells so that shielded cables can be used effectively.

Alternative Interconnections

Although the interface is specifically designed to connect a DR to a TNC, it can be used to connect two DRs or two TNCs together, or it can be used in a transmit- or receive-only system. To connect two DRs together, there needs to be an adapter which contains a FIFO large enough to accommodate the largest packet at the maximum speed differential between the systems. To connect two TNCs together, there needs to be an adapter which generates appropriate clock signals. The receive and transmit signals are independent of each other so they can be running at different speeds, or can be going to different DRs. Use in a transmit- or receive-only system is also possible (a protocol other than AX.25 will be necessary in this case).

Incorporation Into New and Existing Equipment

This interface can be incorporated into new radio designs by including the "modem" with the radio and providing a method for switching modes (e.g.: voice, 1200 bps data, 9600 bps data). Most TNC designs can be updated quite easily to incorporate the interface without eliminating any current features.

Most existing systems can be easily modified to use the new standard. It appears that the PackeTen, DataEngine, PI, PI2 and PackeTwin cards, and the Kantronics DataEngine modems require very little modification as the appropriate signals are available to easily add the interface; the only significant change is that with the new interface, the modem is physically housed with the DR, not the TNC. In general, any modem which performs clock recovery can be easily modified for use with this interface. Any TNC which provides the "modem disconnect header" can have the interface added to it by using that connector.

A smooth transition from the current system to using the new interface can be made by providing adapter kits for common modems and TNCs so that current equipment will not be obsoleted.

Summary

The interface proposal presented here will solve the problem of connecting digital radios and terminal node controller or computer equipment together. It provides a simple, inexpensive, versatile, and easy-to-use solution. It is applicable to all current packet radio systems, as well as other digital systems and it does not prevent future improvements to packet radio systems, either in the modulation and coding techniques, or in the protocols. While the exact specifications remain to be finished and tested through implementation, much existing technology is being used and no problems are anticipated. The author welcomes suggestions for the improvement of this interface and is interested in hearing from a few persons who are willing to design and test interfaces for various modems and TNCs.

New TAPR Members

Please welcome TAPR's newest members:

W5OF	Jack Alexander
N0RIK	Paul Anderson
LA7QM	Arvid Andreassen
N4IDU	Joe Apfl
N6OXX	Geoff Avery
EA7HBZ	Jose Baena
KB4JLM	Ed Bagwell
K9RY	Raymond Baker
KD4WLI	Dan Beach
W9YGI	Norman Beigh
WB9SGP	Steve Belter
KB4MKW	Lloyd Benoit
N2NAE	William Berkefeld
KC5AEX	David Berry
VE4WC	Claude Bisson
—	Guy Black
—	Michael Blair
KB1XF	Felix Blais
WB6LPG	William Bliss
W2SAM	Richard Booth
KR4CN	David Boyle
KD5QD	Bob Buford
—	Brian Burda
—	Michael Burke
W2TQF	Tom Cantine
VE4CSN	Colin Carson
—	Ken Caruso
F1PPK	Phillippe Cassette
KF4DQ	Fred Castello
WB5PKJ	Lon Cecil
VE6LKC	Lawrence Chen
W3ZMN	Conrad Clark
VO1EE	John Clarke
W2EHW	Murray Cohen
W0CSA	Donald Coleman
WR9W	Gordon Conley
KF4ZZ	Justin Converse
AA5Z	James Cooke
VE3BSB	Bruce Crampton
N2SPI	Richard Crow
VE6RTU	Rob Danberger
KD4FBN	Tom Davis
ZL2UCX	Steve Davis
N0MRA	Bob DeWald
SV2QP	Sakis Dictapanidis
N5SD	Stephen Draper
K5YDD	Burgin Dunn
KB4ES	Paul Eakin
N0NMT	Eric Eaton
N8ANA	Curtis Erickson
—	Vernon Eubanks

N8LLA	Earl Fernelius
N6IIW	Richard Fish
K6IYK	James Fortney
WA8HHH	Bayard Fox
N3LPE	Daniel Friese
KF7JZ	Phil Fritz
N4IOZ	Tom Gallagher
KR4JQ	Martin Gary
N7MFY	Richard Goodin
W4QBU	Curtis Goodson
—	Willard Grattinger
N4UJU	John Greiff
N7ZKL	Thomas Griffin, III
KC6VKV	Richard Grove
—	Paul Hammer, Jr.
KC6OVX	R. E. Hanson
N8MOK	Alfred Harmon
N4DHG	Karl Hassler
KA1ZZR	Bill Hays, II
W4AT	Chuck Hennessey
NJ7D	Richard Henry
KC4WGU	James Hensley
9Y4HM	Maurice Hernandez
KC4CH	Tom Hill
VE1HD	Clarence Humber
N6UNI	Steve Jenkins
W2WVC	Robert Johnson
WB0SOK	Ron Jones
W6ICX	Donald Jones
W2HAP	Irvin Kanthack
WA4PGS	Robert Kates
WA9QJR	Frank Kavenik
KB6JTI	Ray Kelley
N0WDI	Edward Kimble
KI7AD	Dave Kinzer
W7QJQ	Sid Knox
AA0HL	Marvin Krause
N8ANR	Henry Kucharski
N4PLY	John Kuklinski
KI7KO	Hiroyuki Kurita
—	Peter LaCount
KD6KSJ	Bill Leak
W7HSK	Lloyd Lewis
VE3SJV	John Lindsay
W9AZW	John Lindstrom
KE7TT	Richard Lions
AC4CX	Don Lloyd
AA7JC	Ken Lotts
WB9BPS	Thomas Luck
W4MPQ	Bob Luman
WD5IFS	Ray Mack
—	Gordon MacKean
KA8MYK	James MacMillan

WI5H	Mike Maner
N8FXF	Clifford Manley
KC4HKO	Tom Manning
N7VMV	Esko Mannisto
NR7P	Steven Martin
EB2DJB	Rafa Martinez
KD9SG	Harold Mathis
KB7PNQ	Guy Matzinger
KE2SC	Skip Mawson
VK5GU	Terry McCarthy
—	Clark McClure
W9DJN	James McKelvy
W6THD	Art McLaughlin
LA3SG	Kjell Midtseter
KK2L	William Miller
DL6SEU	Mr. Shannon Miller
KB7WDL	Mike Mitchell
K3WMH	Bob Montgomery
KD4DOL	Mike Moody
AI7FW	Patrick Moore
N3RIV	Dennis Moran
N1NPZ	Steve Morley
K5DUZ	Ronald Morrison
W7QFW	Joel Mozer
W7QFW	Joel Mozer
W5BLJ	Jerry Mozer
KB5CDX	Brett Mueller
KK6JQ	Dana Myers
KK6JQ	Dana Myers
WR1Q	Marc Nordquest
K6BYQ	Vic Olsen
JH2QQD	Hiroyuki Oomori
AA5ZQ	Bill Osborne
N3CSY	Fred Osborne
WB9OEP	Steve Park
ʼUD	Ted Parker
K8UZK	Roger Parnow
AD4OR	Mike Peacock
IK2IZG	Enrico Pecis
KR4EB	Doug Peoples
—	Thomas Ploski
—	Gordon Powell
KB7ZPJ	Bruce Powell
K0HYD	Dale Puckett
N7UBZ	Terry Purdy
N4YXS	John Rauch
N8SQT	Bob Recny
N2SZK	Tom Reed
KB6UYP	David Reichard
KM6CK	Joseph Resca
KM4EM	Lt. Charles Richard
EA5CV	Maxi Aguado Rico
WD5EWA	Stan Rife

N3LEL	Dwayne Rosko
WA4FSA	Cyrus Rowe
WA6UTQ	Larry Ruegseger
KA4PKB	Robert Schafer
KA4PKB	Robert Schafer
AA2L	Ed Schalow
KD5LV	Richard Schultz
N7WNC	Ethan Schumacker
—	Chris Scott
KA5Q	Ken Seals
N3PPK	Jeff Seymour
N3NXC	David Shultz
KB7UCY	Helmut Silge
KD4WSI	George Silver
N7XBM	Sean Skinner
N5VGC	Presley Smith
WA4YPV	Robert Smith
WA6RLT	Mel Smith
KD6SOJ	Tom Smith
—	Ben Smith
WB6RPZ	Gregory Snow
—	Robert Souter
WB8VCM	Bruce Spacer
KD4BEE	Donald Sparks
VA3SP	Michael Spenuk
WA2OLP	Larry Stanecker
—	Mike Stefiniw
N3OXM	Erich Stocker
K6AZW	Leighton Stumpe
N8ULD	David Swanson
JF3EGT	Munemi Takami
AA7OG	Bob Teller
N7UKR	Lynnwood Thompson
WG0B	Doug Thompson
KA8WLA	David Thornton
WA4SLT	Stanley Trayler
N7NGC	Paul Tremblay
WD8CXB	David Troike
WB2SHR	Stanley Trout
KA7OEI	Clinton Turner
N2JV	John Vandermosten
WB8ZRL	Thomas Vavra
WB7AOW	David Wagner
VE1ALQ	Darrell Ward
AB6YN	H. P. Ward
NQ3N	Bob Ward
A1ASB	Ray Wear
WB3EUC	Franklin Wells
N0ZUS	Terry Whitsel
KA4EEF	Col. Harvey Whitter
KB2JE	Walter Windish
K2LJH	Sidney Wolin
KK4ND	W. E. (Rick) Wright

NET-SIG at Dayton

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AG9V@N8ACV.#DAY.OH.USA

Nearly 40 hams attended the NET-SIG meeting held on Saturday, April 30, in "beautiful, warm, and sunny" Dayton, Ohio.

After an initial — and very interesting — trip around the room to let everyone describe their network status and problems, the discussion moved away from the four specific NETSIG goals and into a more general discussion of packet networking. Some of the provocative ideas put forward were:

1) Can we **really** build a nation-wide RF network in the forsee-able future? The concensus was that we probably can't, at least not until we have geostationary satellites.

2) As network builders, what are our goals? Vic, K1LT, raised this issue and hopefully he'll be expanding on it in another message. The point is that the network we build has to be based on what we want to do, and that's never been well articulated.

3) How do we get user involvement? First the BBS, and now PacketCluster, could be considered "killer apps." for packet. But is there another killer app. lurking that will make packet networking **really** take off? It's clear from the discussion that services like "converse" will lure users into exploring — and loading — the network. Several folks thought that the Internet gateways may be it. Jay, WB8TKL, called for a challenge to provide gateway access on every local network.

4) Following on from that point, the group agreed that training — both on using the network, and using the applications — is critical.

5) And, many felt that the gateways would play a critical role in linking our networks.

Lots of other issues came up, but these were the major ones (at least, they were the ones that showed up in the notes!).

Let's keep this discussion going, via the NET-SIG mailing list. What do **you** think about these issues?

On the administrative front, the following hams volunteered to work on the four NETSIG goals:

1) The Networking Guide — John, AG9V, Vic, K1LT, and Gary, K8LT.

2) The Network People Database — John, N2VQJ and Michael, N3IDI

3) Internetworking and input to the 219 Committee — NO ONE!!! Let's have some volunteers!!!

4) Packet/Internet Gateways — Barry, K2MF and Jay, N4GAA

The next meeting of NET-SIG will be at the ARRL Digital Communications Conference in Minnesota during August. I probably won't be able to make it, so I'm looking for a volunteer to serve as facilitator for the meeting. Let me know if you're interested.

Finally, thanks to Jay, N4GAA for serving as secretary for the meeting, and to Greg, WD5IVD and all the TAPR folks for putting it together.

Report of TAPR BBS-SIG Meeting at Dayton Hamvention

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Over 40 people participated in the Dayton meeting of the TAPR BBS Special Interest Group. Those who attended ranged in experience from the just plain curious to the very dedicated. People started gathering prior to the 6:30 pm published meeting time and were eager to begin discussion. One of the co-developers of the hierarchical address method used by packet BBS software, Dave Toth, participated. A member of the ARRL Digital Committee, Bo McLean, also attended. Their input was greatly appreciated by all.

One of the purposes of the meeting was to provide an opportunity for a free discussion of ideas. While a bit chaotic, this unstructured exchange was useful. It permited sysops to hear, first-hand, what issues were important to sysops in other regions of the country. At Dayton, we were fortunate to have input from Amateurs in Canada and Great Britain, as well as from most parts of the US.

Before discussion got too far along, an exercise was conducted in which the active BBS sysops were asked to list the five most important concerns they had as sysops. This helped to define some issues which needed to be discussed in more detail in order for those participating to feel their time at the meeting was well spent.

Message content was the most frequently mentioned concern to sysops. Fear over losing one's

license for being tied to a message whose content violated Part 97 was the number one issue with those attending. Also mentioned very frequently were accountability (a close cousin to fear of losing one's license), the desire for the identification of a series of standard "@" fields, and the growing amount of what was termed "junk mail" which might be displacing P-type messages on the busier parts of the forwarding network.

Overall, the top-five list exercise and the open discussion indicated that the issues on the mind of most sysops are content-related. Only later in the meeting, with a little steering in that direction, did the focus turn to how TAPR and the BBS-SIG might first concentrate on making the mechanics of BBS operation more efficient. While the BBS-SIG can't directly impact message content, it is important that participating sysops be given plenty of time to share what they're thinking about. Only at a national gathering such as this would sysops have a chance to find out what sysops across the country are thinking about.

Sysops from all over generally agreed that what started out as a means to send personal messages to individuals has increasingly become a forum for the promotion of ideas and "for sale" messages. Many stated that they were somewhat disillusioned over this metamorphosis. It was further agreed that there probably isn't enough awareness among users that the systems to forward messages have physical limits. It will be worth a try for the sysops to better educate users on this, starting on a one-to-one basis. Sysops of urban boards were especially concerned that the networks for forwarding were going to grind to a halt. No one wanted to inhibit the growth of packet radio, overly restrict users,

turn being a sysop into a full-time profession, or go broke, keeping up with increasing traffic amounts.

Eventually, discussion turned to how the TAPR BBS-SIG could begin to help improve the efficiency of BBS operation. Several of the points made during the Packet Forum presentation on the BBS-SIG were among those mentioned during our meeting:

• operational issues (rather than content) are good starting points;

• all of the problems associated with message forwarding can't be solved at once;

• a library of hints collected and maintained by TAPR would be very helpful. This library could be available as an on-line service and published as a pamphlet or book;

• BBS software writers should be made to feel comfortable to participate in the SIG. It could be a good opportunity for constructive exchange. We depend upon each other (sysops and software writers) to keep doing what we are doing in our hobby. We won't learn anything new and continue to have fun if we don't communicate with each other;

• an (inter)national organization, such as TAPR, is well-suited to transcend regional tendencies to reject ideas not invented locally;

Several resolutions were made. One was that the group that met was to reaffirm the use of the two-letter continental designators until the matter could be studied in depth. The group also resolved that TAPR study and issue a list of most-frequently-used 'TO' and '@' fields. Yet another resolution by the group was for TAPR to recommend a common flood bulletin structure.

A meeting by a smaller group of sysops took place on Saturday

evening while the NET-SIG meeting was held. This smaller group reviewed the discussions of the previous evening. It was agreed that a "Request For Comment" be prepared and issued. Incorporated into this RFC would be solicitation of input for a proposed set of setup tips for the most popular BBS software in use today. More information on this will be published on the BBS-SIG Internet forum as it is prepared. It is expected that the collection of setup tips will be completed in time for the ARRL Digital Conference being held in Minneapolis during August.

The next in-person meeting of the TAPR BBS-SIG will be held at the ARRL Digital Conference. As always, you are encouraged to use the Internet forum established by TAPR to exchange ideas and request help from other sysops.

Dayton, 1994

Greg Jones, WD5IVD

Dayton this year for TAPR was great. Mel Whitten, K0PFX, Dave Wolf, WO5H, Dorothy Jones, KA5DWR, John Bennett, N4XI, John Ackerman, AG9V, Fred Treasure, KE5CI, Bob Stricklin, N5BRG, Shelton McAnelly, KD5SL, and Adam Tate, AB5PO, made working the booth a lot of fun. If I missed anyone, thanks for helping. We were short-handed a number of times, but were able to keep the booth manned with Dorothy and two others most of the time. Attendance at Dayton seemed to be about the same (37K?) but the weather was awful! It rained the entire weekend and then got cold and rainy on Sunday (snow flurries were predicted!). This was good and bad. It kept the flea market folks inside looking at the exhibit stuff, but then made the indoor convention areas so crowded that it would take literally

forever to move from booth to booth.

The Friday Packet Forum, moderated by Bob Neben, K9BL, saw a number of TAPR members making presentations. I presented the opening talk on Packet Radio for the Beginner. The TAPR/AMSAT DSP-93 Project was presented by Bob Stricklin, N5BRG. Dave Wolf, WO5H, discussed current happenings in the TAPR BBS-SIG. Mel Whitten, K0PFX, made a presentation on Interfacing weather data to packet, followed by John Bennett, N4XI, speaking on weather station interfaces. John Ackerman, AG9V, made a presentation on the

TAPR Network SIG and its current direction and efforts. Dewayne Hendricks, WA8DZP, discussed current FCC regulatory issues and the impact they might have on digital communications in the future. I hope I didn't miss anyone, but the forum as usual was well attended for the whole time. Another good job this year, Bob.

Friday was again the best day for sales. Seems like everyone shows up with money in hand! TrakBox sales were brisk, but we still came home with a few remaining units. The new publications were really going fast and folks seemed generally hungry for materials other than kits. NOSIntro by Ian

Wade sold well and we still have a few copies at the office left to sell. New membership was up. We had 92 new members, 44 renewals, 2 new Canada, 5 Canada renewals, 3 new foreign, 3 foreign renewals. That is a total of 97 new members — WELCOME! and a lot of the renewals were from before 1993. With the Dayton effort this brings us up over 400+ new members since January 1st. WOW! If we can continue to recruit new members, we will make this year's goal of 2000+ members.

The Friday and Saturday night SIG meetings were a success although the room we had at the Radisson was almost as bad as the

Board Of Directors Meeting Minutes, 4 March 1994

Gary Hauge, N4CHV TAPR Secretary

[Edited for publication.]

The Annual Meeting of the TAPR Board of Directors was held in Tucson, AZ. on March 4th, 1994. The meeting convened at 8am.

Board Members in attendance were:
Greg Jones, WD5IVD	Jim Neely, WA5LHS
Keith Justice, KF7TP	Gary Hauge, N4CHV
Mel Whitten, K0PFX	John Koster, W9DDD
Ron Bates, AG7H	

Not Present:
Jack Davis, WA4EJR	Bob Hansen, N2GDE

Others Present:
Jerry Crawford, K7UPJ	Bob Nielsen, W6SWE

1. Reports
A. The Secretary's report was read by Gary Hauge:
- Report on the TAPR booth at the Orlando Hamcation, it went better than expected.

B. The Financial report was read by Jim Neely:
- Jim noted that the office move dug deeply into the cash reserves.

C. President's Report:
- Greg Jones gave a report on the office move and the new equipment that will support the new facility.
- Bob Hansen received praise for his continued efforts to improve the *PSR*.
- Plans for Dayton, more supplies and support anticipated.

2. New Board Members
The following new Board members were welcomed:
Mel Whitten, K0PFX	John Koster, W9DDD
Ron Bates, AG7H	

and best wishes to the departing board members, Bob Nielsen, W6SWE Jerry Crawford, K7UPJ.

3. Election of Officers.
President - Greg Jones, WD5IVD *
Vice President - Keith Justice, KF7TP
Secretary - Gary Hauge, N4CHV *
Treasurer - Jim Neely, WA5LHS *
* re-elected

4. New Business.
A. Greg Jones presented the budget for 1994 which was approved by the Board.

B. Bob Strickland, N5BRG, gave an excellent presentation on the status of the DSP board along with working models and a video tape. Efforts will continue and no further action was taken by the Board.

C. Greg Eubank, KL7EV, gave a presentation on his ideas for a national TAPR land line BBS. No immediate action was taken by the Board.

D. Carl Bergstedt, K9VXW, gave a report on the German 23 cm board and the possibility of TAPR selling that item here in the U.S. A motion was made and approved, to study the costs involved in support of the 23 cm board.

weather. The room was hot and stuffy both nights. Friday night the air conditioner was broken and on Saturday night they had it fixed, but turned on the heat since it was supposed to be down to 34 degrees that night — couldn't win. We made do, but we definitely will want to fix this for next year. I will be working with John Ackerman, Bob Neben, and Robert (of the national packet round table) next year to think about ways we can organize the Friday and Saturday night activities. We have access to space at the Roadway Inn or we might be looking for some place else. We still have a few months to get everything lined up. The Saturday evening meal at McNasty's was well attended, but a number of folks believe that a change here is due. If you have an opinion one way or the other please let us know at the office. I think we will look at having a packet forum Friday night along with the BBS-SIG, and include more packet talks or something. Then on Saturday we will look at a possible change in dinner locations which will allow us to hold the NET-SIG and different general discussion groups. I would like to still have a place at the Radisson since it is easy for the group to get to and it also allows a common place for people to stay up past midnight to chat. So, will have to think carefully about this. The NET-SIG meeting on Saturday had folks up past midnight talking technical issues.

I think we can consider Dayton another success this year based on membership activity, sales, and continued membership growth. If you didn't make it this year, you should plan to come next year. Dayton is a lot of fun and TAPR plans to do more packet activities next year. Till then!

73, Greg

E. Lyle Johnson gave a report on the AMSAT Phase 3D effort, and the fact that the entire downlink has been turned over to the U.S. team speaks well for itself. Lyle will head up the effort and requested the financial support of TAPR.

A motion was made that TAPR hold a fund raising drive later this year and from that drive a minimum of $6,000 be donated to the project - approved by the Board.

F. Dave Wolf presented several ideas on TAPR growth and how to improve our standing within the Amateur community. A few of his ideas were as follows.
- Increase advertising in Amateur publications.
- Contact equipment manufacturers and request a TAPR membership card be included along with merchandise they sell.
- Accept advertisements in *PSR*.
A motion was made to accept Dave's suggestions - approved by the Board.

G. Greg Jones presented his ideas on TAPR expansion which included:
- Host one of the ARRL Digital Communication Conferences.
- Establish a coordinating committee for the annual meetings.
- Host annual meetings every other year in Tucson. The idea being that every other year we hold the meeting in a different area of the country to permit TAPR members to attend who would not normally

be able to, as well as to increase TAPR's visibility throughout the Amateur community.

A motion was made to host next year's annual meeting in St Louis, MO — the motion was passed.

Greg mentioned the passing of Andy Freeborn, N0CCZ. Andy was a loyal supporter of TAPR and his presence will be missed by all who know him and those who knew of his support within the Amateur radio community. In his honor, a moment of silence was dedicated. A motion was made to accept donations to the American Cancer Society in Andy's name — approved.

5. Goals for 1994
The Board agreed to work toward the following goals in 1994:
- Increase membership.
- Provide a forum or BBS-SIG.
- Improve control over spending.
- Provide closure on current products.
- Further National issues. TAPR will take a stand and provide leadership on Digital issues.
- TAPR will set long range goals and follow through with them.
- Establish goals for 9600 baud and above operation.

The 1994 Annual Board meeting was adjourned at 5pm.

Digital Communications via Phase 3 D

Lyle Johnson, WA7GXD
Internet: wa7gxd@amsat.org

I am sure you have all heard about AMSAT's Phase 3D spacecraft project. You already know it is a cooperative, international effort. You already know it will be in a high-altitude elliptical orbit. You know it will have 3-axis stabilization, more powerful transmitters than ever, better antennas, cover more bands, etc.

What you probably don't know is that there is now a very good chance that there will be a pair of digital communications systems on board!

That's right, a pair of them!

RUDAK-E

The Munich, Germany-based RUDAK group has always planned on having an experimental digital communications system on Phase 3D. This system is now being unofficially referred to as RUDAK-E (the E is for experimental).

RUDAK-E will be designed for high speed digital data experiments as well as low-power, narrow-bandwidth experiments. One goal, for example, is to try and design a digital communications system where a person could take a low-power SSB radio into the field and perform digital communications through the satellite using omnidirectional antennas.

RUDAK-E should present an interesting opportunity to explore new approaches to digital communications with no "shackles" to existing systems.

The advantages of this kind of design freedom are apparent. The primary disadvantage is that, for most of us, RUDAK-E will not be a service we use — it will be a vehicle for experimentation.

RUDAK-U

I was in Marburg, Germany, in Februrary for a Phase 3D meeting. During the course of various discussions, we all agreed that it would be a good idea to add a second digital payload to the satellite.

This payload is tentatively called RUDAK-U (Paul Barrow suggests we call it COMDEX instead). U stands for user — this system is designed to be a communications service provider. It is intended to be open access for today's digital Amateur as well as for tomorrow's.

I will proceed to describe this project in general terms. The terms have to be general, because there are still a myriad of details to be worked out, and because the availability of funds (or lack of them) may significantly alter the final configuration of this system.

Spectrum

RUDAK-U will share with RUDAK-E about 40% of the satellite's transponder bandwidth. For most bands, this means about 150 kHz of downlink and 200 kHz of uplink. For 2 meters, it will be much, much less.

Phase 3D has a transponder matrix switch to pipe various receivers into various transmitters. We may be able to tap into this matrix, giving us a high degree of flexibility.

In any event, it appears that we will have uplinks on 23 cm (1270 MHz band). We hope to have uplinks on 70 cm (438 MHZ band) as well as on other bands. We also hope to have downlinks on 70 cm as well as on S-band (2.4 GHz). Two-meters, if available, will probably be limited to one or two channels.

Data Rates

Currently, we are looking at 9600 bps as a baseline. This would be standard Amateur 9600 bps practice, using FSK modems and FM radios much like the present UoSATs and KITSATs. These would probably be done using conventional hardware modem designs. This allows a lot of people to be able to use RUDAK-U very soon after launch without having to reconfigure their stations for yet another incompatible mode! But then, if you have a DSP-93 modem, maybe that's not such a hassle.

However, we are also looking carefully at incorporating DSP-based modems in the satellite. This will give us operational flexibility. This satellite is expected to provide service from 1996-2006. We expect that most Amateurs will be capable of running far more sophisticated digital links over this time period. We certainly hope so — but then we never thought most packet activity would be at 1200 bps AFSK/FM in 1994 when we first started doing this sort of thing in 1981!

We also hope to be able to include at least one fast (say 56 kbps) managed channel for ground-based information servers. More on this below.

Channels

We want to use the spectrum available. There will likely be uplink channels available at any given time - perhaps as many as 12. Downlinks will come and go, but there could be several operational at any given time.

Digital System Architecture

The current thinking is to have a pair of V53s (80C186-like processors) running near 16 MHz with 16 megabytes of error-correcting memory attached to each one. There will be 16 DMA

channels and up to a total of 16 channels of serial data through the DMA system.

The two processors would share information via a dual-ported RAM area or a bidirectional FIFO buffer.

The processors would tie into the other high-speed experiments (RUDAK-E, SCOPE camera) via a CAN-bus controller, possibly an Intel 82527. We are also hoping to put a CAN-bus controller as a secondary link into the spacecraft's primary computer (1802-based IHU) so we can exchange data with the spacecraft.

The processors would then tie into a set of modem boards. These modems would be both hardware (default) as well as DSP-based. Since the DSPs won't have error-correcting memeory, we'll have to test them and reload them from time to time. This should be transparent to the user — a given modem would be down for a few milliseconds at most.

Finally, this system is autonomous within the Phase 3D spacecraft. The primary computer will allow us to operate, or disallow our operation. It will probably select the frequency bands we use for uplink and downlink. The rest is up to us.

Modems

The modems on the satellite will be different than most current Amateur satellites use. We are accustomed to providing audio to an RF modulator, and getting audio from an IF demodulator.

On this satellite, we will have to generate the transmit signals at an IF frequency near 10 MHz and demodulate from a low-level IF signal in the same frequency range. We thus have control of the type and number of uplinks and downlinks and can manage them.

AO-21's RUDAK-2 system uses this type of scheme, and they have shared details of their implementation with us.

We are currently investigating the use of direct digital synthesis (DDS) techniques to add flexibility to this concept.

Possible Operational Scenario

This system will not be a primarily store-and-forward file system like the current UoSATs, MicroSats and KITSATs. Since Phase 3D will see so much of the earth at a given time, it is better used as a real-time communications resource.

One possibility is to have 3 or 4 ground stations that act as file servers. They would have access to the high-speed link (56 kbps?). You would check into the satellite at 9600 bps and ask for a file. If the file is onboard, it will be immediately downloaded to you.

If it isn't onboard, it will be requested from the ground server, which will then uplink it to the satelite for buffering and downloading to you.

As a user, you'd probably never notice the difference. What you would see is that you asked for a file and almost immediately received it.

Or, you may want to use a digital voice or digital "SSTV" or some other "multimedia" communications station. Given time to organize it all, such real-time non-text uses of digital commuications should become commonplace with this system. After all, we are looking at the 21st century here!

The Players

This system design and implementation is being supported by a number of groups. Presently AMSAT-DL, AMSAT-NA,

BekTek, Surrey Satellite Technology (SSTL) and TAPR have committed money or people.

The primary team consists of Lyle Johnson (Project Manager), Chuck Green, Peter Guelzow, Harold Price, and Jeff Ward.

The Pitch

Of course, there's always a pitch at the end of this kind of article.

The disclaimers are that this project may fail, we may lack the money to make it happen, the launch could slip, etc. Also, the eventual system may bear little resemblance to the one outlined here!

Nonetheless, we need your help to make this happen.

The AMSAT organizations need to hear from you that you support this effort aboard Phase 3D. TAPR needs to hear from you that you support this effort. TAPR has pledged $6,000 (10% of the estimated $60,000 needed to make this a reality) and, frankly, TAPR doesn't have the money. So, in addition to sending in well-wishes, please send money to TAPR and mark the donation for the RUDAK-U project.

Please send me your thoughts on this system. I probably won't reply to you, but I will read what's sent to me.

13th Annual

ARRL

Digital Communications Conference

August 19 - 21, 1994
Bloomington, Minn.

The TwinsLAN ARC will sponsor the 1994 (13th annual) ARRL Digital Communications Conference August 19-21 at the Thunderbird Hotel and Conference Center in Bloomington, Minnesota, U.S.A.

The objective of the Conference is to create a forum for radio amateurs and experts in digital communications, networking, and related technologies to meet, publish their work, and present new ideas and techniques for discussion. Presenters and attendees will have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications.

Conference Location

•Thunderbird Hotel
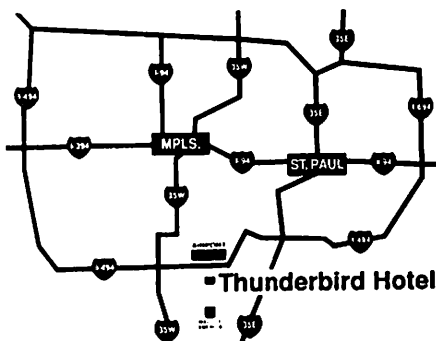
Call For Papers

Anyone interested in digital communications is invited to submit a paper for publication in the Conference Proceedings. Presentation at the Conference is not required for publication. Papers are due by June 20 and should be submitted to Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111 U.S.A. or via Internet at lweinber@arrl.org.

Accommodations

The conference will be held at the Best Western Thunderbird Hotel and Convention Center, located at 2201 East 78th Street, Interstate I-494 at the 24th Ave. exit, in Bloomington, MN. Free shuttle service to the adjacent Minneapolis/St. Paul International Airport and Mall of America is available.

For information on room reservations, Northwest Airlines ticket discounts, Twin Cities visitor attractions, etc, please contact Cathy Thomas, Mainline Travel, at 1-800-726-6715.

A Family Weekend

Family participation in the Digital Conference weekend is encouraged. The hotel has a large pool for guests. Informal outings are planned to the Minnesota Zoo (admission extra) and the Mall of America, the largest indoor shopping mall in the U.S. Free scheduled shuttle service is also available from the conference center to the Mall. Minnesota is a great place to visit in August. Consider making this weekend an addition to your family vacation plans.

Registration

The conference registration fee is $45 per person, which includes a luncheon buffet, a

copy of the Conference Proceedings published by ARRL (including papers submitted but not presented) and transportation to the Mall of America on Saturday evening. Optional Saturday evening buffet dinner is $20 **additional**. Registration, by check payable to "TwinsLAN Conference," must be received by August 12. Mail your registration to:

ARRL DCC
c/o Paul Ramey WG0G
16266 Finland Ave.
Rosemount, MN 55068
U.S.A.

Schedule of Events

Friday afternoon, August 19
- Registration
- ARRL 219 MHz and Future Modes Committee meetings
- Hospitality Suite
- Informal demonstrations

Saturday, August 20
- Registration
- Technical paper presentations
- Buffet luncheon (included)
- "Birds-of-a-Feather" forums
- Hospitality Suite
- Informal demonstrations
- Buffet dinner (optional at extra cost)
- Evening Technical Showcase
  - TAPR Special Interest Groups
  - ADRS DSP presentation

Sunday morning, August 21
- Hospitality Suite
- Informal demonstrations
- Conference wrap-up

Reference PSR Sets Available

Back issues of PSR are now available in 4-year volumes as follows:

Vol. 1	#1-17	1982-85
Vol. 2	#18-36	1986-1989
Vol. 3	#37-52	1990-1993

Each volume is priced at $20

Also available is NOSIntro by Ian Wade, G3NRW, for $23 ($20 with membership discount; quatities limited).

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Summer 1994

All prices subject to change without notice and are payable in U.S. funds. Members receive 10% off on Kits and Publications. Please allow six to eight weeks for your order to be shipped. For specific information on kits, see Product Description flyer.

Kits / Firmware / Publications

Qty	Item	Unit Price	Total Price	Kit Code	Information
____	TAPR 9600 bps Modem	$ 80.00	____	6	
____	Bit Regenerator	$ 10.00	____	0	used for regenerative repeater operation
____	Clock Option	$ 5.00	____	0	used for regenerative repeater operation
____	Deviation Meter	$ 95.00	____	5	
____	Trak-Box	$ 195.00	____	6	limited kits available, member discount $15
____	METCON-1 Telemetry/Control	$ 85.00	____	1	includes 8 input, 4 output ports
____	4 additional output ports	$ 15.00	____	1	
____	Voltage-to-Frequency module	$ 30.00	____	3	
____	Temperature-to-Freq module	$ 40.00	____	3	
____	A-D Converter	$ 45.00	____	3	
____	Elapsed Time Pulser	$ 35.00	____	3	
____	PK-232 Modem Disconnect	$ 20.00	____	2	simplifies connection of external modems
____	PK232MBX Installation Kit	$ 20.00	____	2	for installation of 9600 modem in PK-232MBX
____	XR2211 DCD Mod.	$ 20.00	____	1	
____	State Machine DCD Mod.	$ 20.00	____	2	
____	State Machine DCD w/Int Clock	$ 25.00	____	2	For KPC2 or other TNC w/o 16X or 32X int clock
____	TNC-2 bare PC Board	$ 40.00	____	4	No parts. Incls schematic, manuals, EPROM code.
____	32K RAM w/ TNC2 update docs	$ 20.00	____	1	
____	TNC-2 1.1.8a w/KISS EPROM	$ 15.00	____	2	includes 1.1.8 Commands booklet
____	TNC-2 WA8DED EPROM	$ 12.00	____	1	8 connect version for ARES/Data standard
____	TNC-1 WA8DED EPROM	$ 12.00	____	1	
____	PK-87 WA8DED EPROM	$ 12.00	____	1	
____	TNC-1 KISS EPROM	$ 12.00	____	1	
____	TNC-2 KISS EPROM	$ 12.00	____	1	
____	1.1.8 Commands Booklet	$ 8.00	____	1	full TNC-2 command set for 1.1.8
____	TAPR's Packet Radio General Info	$ 7.00	____	1	40 page book for the beginner to intermediate
____	TAPR's 94 Annual Proceedings	$ 7.00	____	1	53 pages. Papers from the Annual Meeting
____	PSR Set Vol 1 (#1 - #17 '82 - '85)	$ 20.00	____	5	
____	PSR Set Vol 2 (#18 - #36 '86 - '89)	$ 20.00	____	7	
____	PSR Set Vol 3 (#37 - #52 '90 - '93)	$ 20.00	____	7	
____	NOSIntro, Intro to KA9Q NOS	$ 23.00	____	5	Ian Wade, G3NRW, TCP/IP over Packet Radio
____	TAPR Badge	$ 10.00	____	0	include Name and Call for badge

Sub-Total Kits/Firmware/Publications: _____

____ :Added Total of Kit Codes

Members 10% Discount (Kits & Publications): – _____

(Example: 9600modem w/ BitRegen: 4 + 0 = 4)

_____ :Member # (Place New, if joining)

+ _____ **Sub-Total Disk Purchase** (see reserve)

Sub-Total (Kits - Discount + Disks) _____

Texas Residents add 7.25% tax _____

____ Membership (each year) .... _____

Membership (New or Renwal) _____

$15 per year US and possessions,
$18 Canada/Mexico, $25 elsewhere
(Join and place NEW in above Member #
to receive your 10% member discount!)

For Total Kit Codes between:

1 - 3	4 - 7	8 - 15	16 - 27	28 - 55
Add $2	Add $3⁵⁰	Add $4	Add $5	Add $6

TOTAL Order Amount _____

Kit Codes above 55 or INTERNATIONAL orders
Please call TAPR for Shipping & Handling Amount

Credit Card #_____ Expires: _____ Signature: _____
(Visa/Mastercard Only)

Name: _____ Callsign: _____ City, State: _____

Address: _____ Zip, Country: _____

The Tucson Amateur Packet Radio Corporation is a non-profit, scientific research and development corporation. TAPR is chartered in the State of Arizona for the purpose of designing and developing new systems for packet radio communication in the Amateur Radio Service, and for freely disseminating information required during, and obtained from, such research.

The officers of the Tucson Amateur Packet Radio Corp. are:

Greg Jones, WD5IVD	President
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Jim Neely, WA5LHS	Treasurer

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The Board encourages input from all interested members. If you have an issue you want addressed, or an idea for a project you would like TAPR to sponsor, contact any Board member, or drop a note to the TAPR office.

TAPR is now accessable through the Internet. You may send e-mail messages (no long files, please) to the TAPR office at
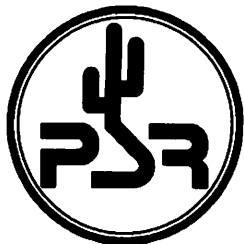
tapr@tapr.org

and to any of the directors at
callsign@tapr.org

substituting their call for "callsign." Also, submittals for *Packet Status Register* may be sent to
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