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In This Issue...

President's Corner

Has much changed since 1985?

We are about to find ourselves in the 10th anniversary of the TNC-2 introduction next year. Amazing that it has only been ten years since the TNC-2, but have we come all that far? In 1985, packet was just gaining its stride to becoming the fastest growing Amateur mode ever. Digipeating was the main mode of semi-networking and BBSs were pretty much the main local resource. Talk of 9600 baud operation and debates on various networking strategies had already begun and were continuing.

I think we can agree that Packet Radio consists of two main technical elements: Radios (RF) and Computers (Digital). I'll ignore the time, money, and manpower part of the equation in this discussion, but they do play a key part of what happens. Since 1985, the increase in Digital Technology has mirrored the consumer explosion. We were once paying $1500 for XT computers and now we get something a gazillion times faster for almost half the price. The problem has been that the RF side has not moved as fast. Various packet radio resources can be attributed to the increase in computer power. Look at the numerous, almost too many, BBSs, DX Clusters, Network Nodes, and all the others local resources. However, our success with computing power is still weighed down by our lack of RF capability.

Those that have been able to go faster than 1200 baud, have been the few that understood how the radios and modems worked individually and together. In addition, they have had the necessary expertise and equipment to make them work correctly. Many times I have read articles on why we need to work on Layer 1 (the physical, or RF layer) issues, but the critical mass of people required in a local area with the necessary expertise is hard to find, and even harder to get working together on a common project. The successful networks and digital groups have been those that have been successful with pulling this critical cross-section together to work on radio technology.

Ten years from the introduction of the TNC-2, we find ourselves doing much the same thing, but only a **lot more of it**. Typically, a digital operator is on VHF/UHF operating with an older voice radio with a TNC operating at 1200 baud. This probably represents more than 90% of the digital community. HF communications has not been stuck in the same rut that VHF/UHF operations has. A lot has been done in modem and software development to improve the performance of HF digital

communications. Some of this can be contributed to the fact that many HF digital operators are willing to pay more for the increased performance, but this is not the entire reason. To get an idea on the type of increase in performance of HF digital operations, just read some of the papers in this year's ARRL Digital Communications Conference.

So, what is going to happen in our future if we cannot get things working better than they are now, while continuing to watch the number of digital operators increase. If we continue to operate as we have been, then we will probably be at deadlock eventually, if not already in many metropolitan areas. This impending overcrowding of the digital channels we use has caused some of the current availability of equipment. Several possible answers are now beginning to appear with the introduction of various manufacturer's radios that allow faster than 1200 baud operations. Although early reports seem to indicate that much still needs to be done on some of these radios to make them work correctly, they are a beginning to providing wider equipment selection. However, many of the Amateur radios available don't work well in environments where many local resources are found to be residing (i.e. buildings with lots of RF floating about). The other limiting factor with these radios are cost. It is hard to justify one of these data-ready radios at the current price. For the price, you can go much faster; plus most of us don't need all the bells and whistles present for just a data radio (which is a normal voice radio with additional functionality). The problem with going faster for the dollar with non-off-the-shelf equipment is again the need in having local expertise that can do it.

Cost and flexibility is the key to the radio problem. The unknown factor in the future is the current emphasis in radio technology now occurring with regards to PCS (Personal Communications Devices) and other wireless technologies. Much, much, much money is being spent on wireless communication technology. Just look at the amount of money dropped on less than a Megahertz of spectrum this summer: $600,000,000. Amateur radio at some point has to be able to take advantage of this technology for what we want to do — that of having a low-cost, flexible, data-only radio. Amateurs have not been successful in inventing radio technology, but we have been successful, in the past, of taking existing technology and transferring it to our needs.

The other solution to better channel performance, is making modems that work on our current voice radios. I have heard many say, "I have a 14.4Kbps modem; why can't we just do this over radios." Whole papers can be written on why this has problems. Basically, telephone and radios are enough different to cause several problems with this concept. Most folks don't understand that to have 14.4Kbps work over the phone requires a rather complex modulation scheme that establishes multiple bits per baud. This works well in the known and stable telephone system, but the radio environment presents many factors which do not allow these current standards to work very well. However, the cost of DSP technology is going to continue to drop and at some point someone will introduce a less than $200 modem that allows approximately 2400baud at N-bit per baud to allow something around 9600bps over our current voice radios. Another answer to the task at hand.

Article submission deadlines for upcoming issues:

Winter 1995	December 15, 1994
Spring 1995	March 15, 1995
Summer 1995	June 15, 1995
Fall 1995	September 15, 1995

Submission Guidelines

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

If you have an idea for an article you would like to see, or you, or someone you know, is doing something that would interest digital communicators, please contact the editor so that your work can be shared with the Amateur community.

***PSR* Editorial Address:**
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The problem with any new work or project is finding folks capable of transferring the technology into the Amateur market. Who can predict the future, but we have to begin serious work on getting operating speeds above 1200 baud to take advantage of the many things that Amateurs want to do. As someone pointed out to me the other day, folks don't want to spend money to go faster until there is some reason. For many, 1200 baud still does what they want. 1200 baud AX.25 operations will not go away for a long time. This is based on the number of TNCs that have been sold and are still operational. For many more, the lack of faster speeds in easy-to-use form has definitely slowed packet growth and is, I believe, one reason for the turnover in packet 'movers and shakers' in the last five years.

Development will continue in this area, but what form will it eventually take? Who can tell? We will all just have to wait and see. Someone will develop something that will transform what we are doing now. There are too many Amateurs ready to purchase something at the right price for someone or some manufacturer not to do something eventually. It is just a matter of time.

— Greg Jones, WD5IVD

TAPR DCD Mod. in the MFJ 1270C TNC

TAPR member, Bruce Spacer, WB8VCM, reported that the TAPR XR2211 DCD modification might not be compatible with the new MFJ 1270C TNC. Bruce was kind enough to send his TNC to Lyle Johnson, WA7GXD, for Lyle to look into the situation. Lyle reports that the 1270C has the same 2211 modem system that is used in the MFJ1278, so the XR2211 DCD mod. isn't sufficiently useful to warrant its installation.

Kooling off the AEA PK-96

Mel Whitten, K0PFX
whitten@chestcp.attmail.com

The new PK-96 ventless case gives one the impression that this little jewel is not related to its toaster cousin PK-88. Yes, it does run "kooler," however as can be seen from the PK-96 power requirements, 400 ma has to be dissipated somewhere. And, that somewhere is in its NMOS 8530 (Zilog's SCC, a 40pin DIP) and 7805 (TO220) regulator. I measured the 8530 case temperature at 55° C. and the 7805 at 75° C. These are well within limits, but they contribute to nearly all the heat generated by the PK-96. All other ICs are low power CMOS.

If heat is a concern, especially if you "stack" your gear, then you may want to consider replacing the 8530 with a CMOS version also made by Zilog. The part number is Z85C300PSC and is available from many distributors (Newark Electronics has them). Like air conditioning, koolness doesn't come cheap. The part costs approximately $15.00 in single quantities (a Newark price) but may be found for less from other sources. In contrast, the NMOS part is less than one third the cost.

Unfortunately, this little mod. is not for the faint-of-heart. The 8530 is a 40 pin through-hole device and not in an IC socket. However, I recommend using an IC socket for the CMOS replacement. If you do not have experience and the proper desoldering equipment, do not attempt to remove the 8530.

Power consumption with the 85C30 is around 100ma, depending on how many LEDs are on. The PK-96 now runs cool as a cucumber. If you run your gear 24 hrs-a-day and your ambient shack temperature may rise, (loss of your air conditioning!) then this mod. will help avoid a heat related failure.

By the way, the "reset" switch on the rear of the PK-96 is a nice addition. Pushing it with power-on, however does not reset or "cold-start" the processor. To reset, power-down the unit, hold the button in, power it back up and release the button. All LEDs, except XMT will remain on until the PK-96 autobaud routine is performed. 'AEA did a nice job on the manual, however this information was apparently overlooked.

AX.25 Version 2.2

The ARRL Future Systems Committee met in Minneapolis at the Digital Communications Conference and among the various issues that were discussed was the LAPA protocol document. This is the extensive document that Bill Beech, NJ7P and Doug Nielsen, N7LEM, have been working on for the last two years. In summary, the committee recognized the huge amount of effort that had been put into this document by its authors and wished to extend its grateful admiration to them. This was no small task! To avoid confusion in the community, the committee has suggested that the title of the document should be *AX.25 Level Two Version 2.2*. The committee has requested some additional work be done before publication of a review document. The ARRL will undertake to duplicate and send copies to the known implementers for comment and feedback. The comment period will close sometime in March 1995. After the review period, the comments will be evaluated. The document will then be edited as a result of the comments and submitted to the Future Systems Committee for approval.

TAPR 1995 Annual Meeting — March 3rd, 4th, & 5th, in St. Louis, Mo.

Hosted by MoAmPS (Missouri Amateur Packet Society)

Join some of the brightest and most enthusiastic of today's packet developers/users, with a weekend full of Packet Radio and Digital Communications talks, presentations, SIG meetings, and **two** special Sunday Workshops. In addition, an advanced DSP symposium is planned for Friday for software developers of DSP systems.

This year's annual meeting will be the first held outside of Arizona and presents a unique opportunity for those unable to travel to Tucson to attend meetings.

The annual meeting informally begins Friday afternoon with the opening of the hospitality suite and continues later that evening with dinner. Dinner is always low-key and provides a great opportunity for those who arrive Friday to discuss and chat about projects before the rest of the weekend begins. Friday evening, after dinner, a meeting of the NETSIG will be held. The TAPR Board of Directors meeting will be held Friday morning. Those needing time at the board meeting, contact Greg Jones, WD5IVD.

An advanced DSP symposium will be held Friday, March 3rd starting at 3pm or 4pm, through dinner (which will be provided), and concluding sometime that evening. The purpose of the Friday symposium is to bring developers of DSP technology together to discuss future directions and technology. This is for those working with DSP technology currently, and not a session for introductory topics. If you would like more information on the symposium, contact TAPR.

The annual meeting formally begins Saturday morning with presentations and papers, as well as discussion on other projects of interest throughout the day. Issues concerning packet networking and BBS operation are also anticipated. Lunch will be up to the participant, but facilities at the College will be available to cater individual tastes. Dinner will be held after the Saturday afternoon session and will include a prize drawing. After dinner, Special Interest Groups will meet and discuss issues.

On Sunday, two workshops will be held. One will focus on Error Correction Techniques, by Phil Karn, KA9Q, while the second will focus on development of software/hardware for the TAPR/AMSAT DSP-93, by Bob Stricklin, N5BRG, and Frank Perkins, WB5IPM.

These are exciting times for digital communications and TAPR. This year's meeting should be a super-charging event for everyone who can attend!

Call for Papers

Papers are welcome from everyone. Although there is limited time during the weekend, all attempts will be made to allow those present to talk. Deadline for submission of papers is Monday, February 7th, 1995. Contact the TAPR office to request an author's information package.

Meeting Place and Hotel

The TAPR Annual Meeting presentations, meetings, and workshops, will be held at the St. Louis Community College at Florissant Valley. Lodging and the hospitality suite will be at the Henry VIII Hotel and Conference Center, 4690 North Lindberg Blvd, St. Louis (Bridgeton), MO, 63044, Phone: 800-325-1588, 800-392-1660 (in MO. only), 314 731-3040, or FAX 314 731-4210. Rooms rates are $58 for single or double or $68 will get you a "suite" for single or double. The hotel has a coffee shop and nice restaurant, with another restaurant/bar next to it (in same parking lot). It is approximately 4 miles west of St. Louis Lambert Airport with shuttle service and approximately 10 miles (all freeway) from the college. A block of 50 rooms will be held until February 4th, at which time those rooms will be released for general booking. If you are planning to stay at the hotel, it is highly recommended that you book your room prior to February 4th, 1994.

FCC 800-Number

FCC establishes 800 number at Gettysburg licensing division as implementation of new customer service standards begins

Declaring that "Customer service has taken on new meaning at the FCC," Chairman Reed E. Hundt has submitted to the White House the FCC's plan for new, improved customer service standards.

Submission of the plan is in response to an Executive Order of the President which requires that, in order to carry out the principles of the National Performance Review, the Federal Government must be customer-driven and provide the public with "the highest quality of service delivered to customers by private organizations providing a comparable or analogous service." Each agency is required to submit to the White House its individual plan for review.

As part of its overall plan, the FCC initiated a pilot program using customers of the Private Land Mobile Radio Services. It held a series of focus groups with external customers and then asked

the employees of the Division to develop customer service standards, using the information from the focus groups. The Division then developed a brochure on customer service standards, including increased emphasis on response to telephone inquiries. It also identified the need for an 800 number for calling the licensing division.

Effective immediately, all public inquiries to the FCC's Gettysburg, PA, Licensing Division, Customer Assistance Branch, can be placed by calling 800-322-1117. Hours of operation are weekdays from 8 AM to 4:30 PM, eastern time. On the Commission's 24-hour automated information system, callers dealing with interference complaints, form requests, availability of records, Amateur radio call sign assignments, Marine radio licensing information, fee information and processing times may access recorded information.

Within the next 18 months, customer service standards will be developed for other areas of Commission operations to ensure that FCC customers receive the highest quality of service possible. As these new standards become available, the FCC will inform its customers.

For more information contact Kay Hillegas at (717) 337-1215 ext. 103.

1995 TAPR Annual Meeting

Registration

Preregistration (before Feb 17th)	$15.00 *	$25.00 w/ Dinner**
Late Registration or at door	$20.00 *	$30.00 w/ Dinner **

*Annual Meeting Registration includes: a copy of the TAPR 1995 Proceedings and dinner Friday night (pizza out). Saturday lunch is not included in registration. Lunch will be up to the participant, but facilities at the College will be available to cater to individual tastes.

**TAPR Dinner Saturday evening (limited space) includes a speaker (to be determined) and prize drawing!

Friday DSP Symposium

Preregistration (before Feb 17th)	$10.00
Late Registration or at door	$15.00

Symposium attendees receive dinner (pizza during the symposium)

Sunday Half-day Workshops (8:30am - 12noon)

#1 - Error Correction Techniques, Phil Karn, KA9Q

Preregistration (before Feb 17th)	$10.00
Late Registration or at door	$15.00

Workshop attendees receive a set workshop materials.

#2 - Developing Software/Hardware for TAPR/AMSAT DSP-93, Bob Stricklin, N5BRG and Frank Perkins, WB5IPM.

Preregistration (before Feb 17th)	$10.00
Late Registration or at door	$15.00

Workshop attendees receive a set of workshop materials.

13th ARRL Digital Communications Conference

Compiled by Greg Jones, WD5IVD

The 13th ARRL Digital Communications Conference was held in Bloomington, Minn, on August 19-21, 1994, hosted by the TwinsLAN ARC. The conference was attended by approximately 150 and was one of the best in the last few years. Amateurs from twenty states and seven nations were present. A change was made in the organization of the overall conference, which resulted in three strands running through the entire conference. This presented some problems due to the overlap of several topics, but was one of the few negatives comments that were heard during the weekend. This format did allow for the numerous special interests to have time during the conference to discuss issues. The conference seems to have moved more to specialization and away from generalization as was the presentation format in the early conferences.

Due to the number of sessions, each of the moderators was asked to write up a short overview of what happened during their session or forum. The following information is a compilation of those writeups as well as a brief review of each of the technical paper sessions.

Technical Papers

Automatic Packet Reporting System

The paper (7 pages) discusses APRS (Automatic Packet Reporting System) and details several applications for APRS.

MacAPRS: Mac Automatic Packet Reporting System

The paper (13 pages) discusses APRS and the Macintosh implementation of it. Contains more detailed information on the system and has pictures of several items.

Packet, GPRS,APRS, and the future

The paper (2 pages) discusses GPS (Global Positioning System) and how GPS is used in packet radio.

G-TOR: The Protocol

The paper (31 pages) details G-TOR. Includes: overview, technical details, speed transition diagram, SDL Diagrams, Huffman Decoding Tree, and C program routines.

GMON-a G-TOR Monitoring Program for PC computers

The paper (6 pages) describes a method for monitoring G-TOR communications.

A Theoretical Evaluation of the G-TOR Protocol Hybrid ARQ Protocol

The paper (6 pages) discusses the advantages of using a hybrid ARQ protocol through theoretical evaluation.

A Preview of HF Packet Radio Modem Protocol Performance

The paper (4 pages) discusses protocol performance testing that was conducted at NTIA/ITS. AX.25, AMTOR, PACTOR, SITOR, CLOVER II, and Baudot were tested in a simulator and the results shown in the paper.

How Amateur Radio Operators can Emulate an HF ALE Radio

The paper (3 pages) how Automatic Link Establishment (ALE) can be used and some of the future potential for emulating an ALE radio using only typical Amateur equipment.

FSK Modem with Scalable Baud Rate

The paper (7 pages) discusses the design of a scalable baud rate modem. Paper includes schematics.

Designing Rural Telecom Systems for Developing Countries

Formation of the BBS SIG

The paper (3 pages) describes the formation of the TAPR BBS Special Interest Group and future goals.

Broadcast, UI, and Un-connected Protocols - The Future of Amateur Radio

The paper (4 pages) overviews user applications and the relevance of connected protocols and suggests formats for unconnected systems.

On Fractal Compress of Images for Narrowband Channels and Storage

The paper (5 pages) comments on several new classes of compression techniques based on fractals.

Fast CLEP Algorithm and Implementation for Speech Compression

The paper (13 pages) describes a fast algorithm and implementation of code excited linear predictive (CLEP) speech coding for use over low-bit rate systems. An excellent technical paper.

Wavelet Compression of Images for Narrowband through Band Limited Channels

The paper (10 pages) studies compression scheme using wavelets for image transmission through band limited channels.

Papers that were not presented, but are in the proceedings include: A Proposal for a Standard Digital Radio Interface by Jeffrey Austen, K9JA. Computer Networks in Africa: From Utopian Discourse to Working Reality by Iain Cook. ROSE X.25 Packet Switch Status Update by Thomas Moulton, W2VY. A Primer on Reliability as Applied to Amateur Radio Packet Networks by Tom McDermott, N5EG.

Forums

Developments in DSP for the Amateur

The following topics were discussed: About five in the group had done or were considering doing some work with the TI DSK board. We discussed the use of this board and possible locations for obtaining the DSK which included TI distributors. TI has also introduced a new DSK which is based on the TMS320C50 and it is selling for about $100. Software to run on the DSK is available on Internet, ti.com. It was also noted that an Amateur has built a memory board to add to the DSK.

There was a limited discussion about working with sound cards for the PC. The problem here seems to be availability of detailed information to change the function of these cards. The interfaces are not easily adaptable to Amateur radio for functions required to control your radio. The DSP-93 being developed by TAPR was briefly reviewed. The DSP-93 has all the required hardware and software to work in many Amateur applications. All of the information required to do additional software development is also being supplied with the unit. A detailed discussion of implementing filters with DSP systems ensued when Timewave presented information on the subject. Timewave has developed filters for the Amateur market using hardware they build. Filter design and implementation are key advantages to DSP. Also discussed was a recent article in QEX, the experimenters magazine from the ARRL, about Pactor. Code to implement Pactor and Amtor on a DSP based system was developed by HB9JNX and others. This code is available on internet at ftp.cs.buffalo.edu. Of those in attendance, over half of the group was actually active in development of Amateur related DSP projects. Of these about half were working with TI based processors in the DSP-93 or DSK unit and most of the rest are working with the Analog Devices units. One man was working with Burr Brown products.

The forum was a good opportunity to exchange ideas in an open, friendly environment. As the application of DSP products continues to grow in Amateur radio, I feel we will see more of these type of gatherings with more and more substance in each one.

TCP/IP - What's next?

"TCP/IP is obsolete and dying" — The same statement had been heard over 12 years ago in the commercial world from the soothe sayers that saw OSI winning the protocol wars. Now look at it today. Broad-based commercial support in the popular network operating system (Netware, LANMan, etc.) and still going strong as the life blood of the Internet. No, TCP/IP is far from dead. It is emerging as the preferred way to interconnect computing platforms of different architectures and is the "on-ramp" to the Internet.

The "Information Super Highway" (Infobahn) and its relation to the public Internet was discussed. It was thought that the two would be interconnected, but the Infobahn would operate more like the commercial business model, charging for services and access.

There was a concern that the current DOS programming environment overly constrained the growth of NOS and thus TCP/IP use in the Amateur community. The Intel 64K segment architecture and DOS 640K barrier proved to have serious limitations when adding new functions to NOS. Phil Karn, KA9Q, pointed out that you do not have to implement every new server application and Internet toy that comes along in NOS! NOS on DOS is best deployed as a TCP/IP router and doing things specific to Amateur use like AX.25, NETROM, and BBS forwarding. Network alternatives such as a NOS front-end on ethernet or PPP to a Windows or Linux box should not be overlooked.

It was pointed out that the next version of Windows (tm) would likely include TCP/IP as part of the operating system. This would go a long way toward providing a future common programming model (Winsock) for both Amateur and commercial use that can overcome the 640K barrier. The opportunity to adapt Amateur applications (BBS, Converse/Mail servers, gateways,...) while exploiting the Internet tools for Windows like MOSAIC, WS_FTP, Gopher, and Archie, is both a challenging and an exciting concept. Many of these tools are also available on other OS platforms (Linux, Unix, Mac, and OS-2), all interconnected with TCP/IP, ham radio digital networks, and the Internet.

TCP/IP was seen by some as spectrum pollution and a channel hog. It was pointed out by Phil Karn, KA9Q, and others that this was not the case as NOS TCP/IP implements very sophisticated back-off algorithms and by default is probably the most polite channel user around. The multi-level protocol nature of TCP/IP provides tuning parameters at each level that can be set to maximize throughput while reducing channel congestion. Phil noted that many of the problems associated with TCP/IP are actually due to defects in link layer protocols (AX.25 and NETROM).

TCP/IP-ready TNCs and digital radios were discussed. It was felt that the KISS mode operation of TNCs left a lot of room for improvement in terms of both ease

of use and hardware support. Someone suggested that TNCs need to be more TCP/IP aware and implement most of the protocol stack with a terminal console/control interface to the host (ala Data Engine). Phil Karn, KA9Q, mentioned that it may be time to consider replacing the AX.25 link layer with more effective Forward Error Correcting (FEC) protocols such as those being developed by Qualcomm and others for cellular radio digital packet use.

The need for a common messaging paradigm (addressing, store, routing, and format) for mail, news, bulletins, and forwarding was discussed. The richer programming and Internet-ready model provided by TCP/IP-based systems was seen as the tool that would lead the way toward consolidation of messaging systems in the future. The easier to use graphical development tools that are now available in powerful multitasking operating environments (Linux, Win 4.0, Unix, and OS-2) will enable a lot of previously untapped talents to be contributed toward developing applications that can be shared by all.

ARRL Committee Updates: "Future Modes"

Paul Rinaldo, W4RI, opened the forum explaining the environment we find ourselves in today with the FCC. He went to some detail to explain what the FCC reorganization was and how he thought it would affect us (lower priority, longer delays in processing changes, etc.) He stated that the FCC consensus was that their priority should be to identify new technology and techniques that would promote increased population of the UHF and Microwave Bands. Spread Spectrum was one of the areas mentioned.

Tod Olson, K0TO, presented the 219MHz Committee's general plan to the audience. The primary discussion was about those who want to use the band at baud rates less than 56KB, and concerns that the "Repeater Coordinators" in the Country aren't really Spectrum Managers in many areas and may not be the best people to coordinate the digital activities. I spoke to both of these issues saying that the 56KB requirement was good planning since frequencies occupied by lower speed operations are very difficult to displace (it is a guideline not a regulation), and that everyone should write to their ARRL Director about their spectrum management vs. coordination concerns since the Board is actively investigating this issue.

Digital Data (Voice and Image) Transmission Method Developments

The presentation was started by talking about the Internet Multicast Backbone (mbone) and the audio and video conferencing tools that use it (vat, nv, wb). These tools use compression techniques at rates that, although fairly high, are not beyond reach of Amateurs: 13-64 kb/s for voice and 128 kb/s (average) for medium-scan video (several frames per second). Software that implements them runs on standard workstations and is readily available over the net. So wouldn't we like to see something like this come to Amateur radio? One place this could be done is the new 219-220 MHz band. Its "virgin" nature and the need to control transmitters make it an ideal choice for a high speed Amateur multicasting service that could carry, among other things, selected multicasts from the Internet MBONE (e.g., NASA Select during shuttle missions). Lots of discussions ensued about various coding schemes for both voice and video, and a lively time was had by all.

High-Speed (above 1200 baud) data transfer Methods and networking techniques

The High-Speed Data Transfer forum at the DCC started with a discussion of some of the new hardware — both RF and digital — that's becoming available for high(er) speed packet radio. The group was then treated to an impromptu presentation from Dewayne Hendricks, WA8DZP, on the current status of spread spectrum systems being used in Part 15 (unlicensed) service. Since these devices operate in or near our bands, they offer a lot of potential for megabit-plus, relatively short range links. After the break, the group resumed in an informal roundtable devoted to shoving fast data through slow radios.

HF Data Transmission Methods - An overview of current modes and what's coming next

Technical discussions were about evenly split between modem design issues (DSP in particular) and protocol issues. Two general approaches to HF DSP modem design were discussed - matched filter and delay line discriminator. Noise reduction techniques were reviewed with special emphasis on DSP noise reduction delay. LMS adaptive noise reduction techniques appeared more suitable for use with HF modems than FFT bin clipping because of the lower process delay. Protocol discussions included AMTOR, PACTOR, G-TOR and a light discussion of PACTOR 2. Also some discussion on 300 bps packet. A survey of forum attendees showed broad capabilities and interests in running everything from RTTY through G-TOR and on to 300 bps packet.

TAPR SIG Meetings (NETSIG/BBSSIG)

The NetSIG forum at the ARRL Computer Networking Conference in Minneapolis focused on how to gather and disseminate information about networking people and activities. We agreed that a database of both networks, and network builders, would be a good idea. It was agreed that we should start first by contacting area packet coordinators (where they exist) as an information resource, and build from there. There was discussion — but no real consensus — on how much, and what type, of data we should be looking for. The general feeling was that we should try to include information about individual networks but not (at least for now) individual nodes. The data should include contact information so that the primary builders/maintainers of each network segment are known. The hope is that a national network map can emerge from this effort, as well as a national database of network builders.

Volunteers are currently designing the database format and we hope to start gathering information in the next few weeks. In the meantime, we'd be happy to get names and e-mail addresses of network builders, so we can contact them directly when the info. requests are ready. You can send that information to jra@ag9v.ampr.org if you'd like.

The forum also had a lively discussion about why we're building networks, and what we want to do with them. As usual, no definitive answers emerged, but lots of folks had a chance to think about what draws us to this task.

A Low Cost DSP Modem for HF Digital Experimentation

This presentation touched on several reasons why HF digital offers unique opportunities for technical innovation and offered a low cost DSP-based solution. The presentation included a number of interesting topics such as: HF propagation, its variability and how these factors set the stage for special considerations in modem design, i.e. good dynamic range and carefully designed filters. The presentation included a discussion of methods to increase dynamic range, criteria for demodulation, and detection using matched filters. The design of the linear phase, finite impulse response (FIR) filters for a typical HF modem was shown. This presentation showed that cost is no longer a factor for doing advanced digital experimentation using DSP - it has become a matter of applying classical DSP theory. A number of interesting technical points were discussed afterwards amongst attendees that indicated the high level of enthusiasm that exists for DSP technology. Although the meeting was the last one after a long busy day, it was well-received and well attended.

If You Couldn't Make It

1994 Conference Proceedings are available from the ARRL for $12. (203) 666-1541. Past Proceedings of the Digital Conference are available from TAPR.

Video tapes of the paper presentations are available. The complete set is $60. There are three tapes, which can also be bought individually. For more information contact Paul Ramey, WG0G, 16266 Finland Ave, Rosemount, MN, 55068.

The TwinsLAN folks did an outstanding job and have set a fine trend for future DCCs.

Next year's Digital Communications Conference will be co-hosted by TAPR and TPRS (Texas Packet Radio Society) in Sept. 1995, in the Dallas/Ft. Worth area.

The ARRL National DCC as I saw it...

Dave Wolf, WO5H)

The two most prevalent topics that struck me at the DCC were HF digital and DSP. A minor thread that was reflected (and is a perpetual topic of discussion among ham digital enthusiasts) was "we've got this great technology at our disposal, let's find something useful to do with it." APRS is one of the applications for packet that addresses this.

Some of the discussions at the Futures Committee and among several of the hams during the weekend should be talked up. The only areas in Amateur radio where you don't find plug-and-play the order of the day are in digital communications and satellites (with healthy overlap between the two). If ham radio is to continue as an outlet for technological experimentation, the rules and regulations must encourage this. If we are not allowed opportunity to experiment (and occassionally screw up in the process!), the kind of work that engineers do in their 'off hours' in their ham hobbies will evaporate completely. All of the marvelous talent working on hardware and software for Amateur use will be dedicated to commercial endeavors. If one attends hamfests and sidewalk sales, it is easy to come to the conclusion that ALL hams are appliance operators who crammed enough technical knowledge to pass their tests. While this might be true for many in the ranks, it isn't true for everyone. We've always had our share of operators and tinkerers. As a group, we must encourage our representative organizations and our regulators to continue to allow great latitude in the rules for experimentation.

Impact of Part 97 Changes on HF Digital Modes

Johan Forrer, KC7WW

How does the new proposed amendment to Part 97 accommodate future developments in the digital modes for HF?

The digital community has been asked for input on the proposed amendments to Part 97. These changes deal with automated and semi-automated operations. My views are that of both a user and an experimenter.

There effectively are two basic types of digital modes of operation: keyboard-to-keyboard (one-to-one) operations including Aplink semi-automatic, and the AX.25 packet networking/BBS (many-to-one) groups. These two modes require totally different needs.

Lets look at AX.25 packet first: in this instance there are several stations sharing a common "channel". Even if the channel is not occupied, this does not mean that the channel is free for use by keyboard-to-keyboard or semi-automatic operation. Present and future protocols that manage the flow of traffic require this — it is also anticipated that a great deal of these operations would fall in the "automatic" category. The main challenge here is to deal with the nature of HF propagation especially skip conditions and the "hidden transmitter." It makes sense to give these traffic nets a fair chance of success by allocation of sub-bands for this type of operation. I also wish to point out that the present state of these operations are in great need for technical innovations — increasing their efficiency, making them more robust and giving them added throughput capability — more about this later.

The other type of operation, i.e. keyboard-to-keyboard and Aplink traffic handling, all require synchronous links. They are unforgiving when it comes to sharing frequency. Besides issues of operating courtesy, the nature of HF propagation often adds to the confusion caused by interfering stations. How often have I not heard several stations calling CQ on nearly the same frequency, but realizing that I can hear several of them, but they often can't hear each other. Add to this the confusion added by skip stations activating Aplink stations in semi-automatic mode and one can understand the degree of unhappiness expressed by those just wishing to have a peaceful keyboard-to-keyboard QSO. Will the proposed amendment to Part 97 allowing semi-automatic operations in the "real-time" sub-band be effective here? I have doubts. Skip conditions will still be there and so will the problems caused by poor operator judgement. Will a 500 Hz bandwidth limitation, as it stands in the proposal, have the desired effect? I am not convinced either. QRM on one's operating frequency is just as undesired whether it is 100 Hz or 800 Hz wide. I suspect that the intention was to "channelize" Aplinks in 500 Hz slots and thus limiting bandwidth of such semi-automatic operations. This way it is intended that others can "avoid" those frequencies. I am not sure that it is realized that most of the commercial equipment manufactured for the ham radio market as used by semi-automatic operations, even with the best of intentions, emits in excess of 500 Hz bandwidth. To illustrate this point further, take a simple example — two stations, each using the same TNC-type transmit a "clean" 170 Hz shift, 100 baud FSK signal, one at a 100W output level, the other at 1KW. Do they occupy the same bandwidth? What happens when there is a QSO in progress 500 Hz away where signals are marginal? In the given example, the 100W signal probably will be tolerable, however, the power in the sidelobes of the high power signal will probably wipe out the weak signals in the adjacent channel. Does this sound familiar? I hope that this example illustrates that

Table 1.

	Baud	BPS	'Shift'	B.W.	Modulation scheme
1.	100	100	170	370	noncoherent binary FSK
2.	100	100	200	400	
3.	200	200	200	600	
4.	300	300	200	800	
1a.	100	100	N.A.	200	DPSK
2a.	-	-	-	-	
3a.	200	200	N.A.	400	DPSK
4a.	300	300	N.A.	600	DPSK
5.	100	300	85	800	8-ary noncoherent FSK
6.	100	400	85	455	4 parallel PSK tones
7.	100	800	85	560	4 parallel QAM tones
8.	100	700	85	710	7 parallel PSK tones

output power plays just an important role. The 500 Hz proposal needs to specify whether that is measured at the -3dB or -60dB levels in order to be effective.

That brings me to my main concern: what about the future? I would hope that there is agreement that with the development of DSP applications, we are about to see significant technological advances. Besides the affects that it will have on future radios, the digital modes will most certainly experience marvelous technological advances. This includes possibilities for more robust bandwidth-efficient modulation schemes, better modems and protocols for both real-time operations and high speed networking.

How does the proposed amendments to Part 97 affect the future of these developments? For sake of argument, I have put together a few possibilities in Table 1. I do not guarantee that all is feasible or accurate — please use your own judgement. Cases 1-4 are what we presently have — existing equipment. Cases 1a-4a shows the spectral efficiency achievable by using PSK instead of FSK. Case 5 is something along the lines of the ALE format, just for interest sake. In cases 6-11, my assumptions are as follows: maximum baudrate ~100 baud, minimum separation ~85 Hz, parallel tones along the lines of MIL-STD-188. The four tone system for cases 6 and 7 is along the lines of the CLOVER II system and could possibly be implemented on something like a DSP sound card or the TAPR DSP-93, however, I suspect that 8-11 may require multiple DSP's.

I do wish to point out that we can achieve a lot with a 1000 Hz bandwidth channel, that is within the present Part 97 framework. I hope that it could be shown that 1200 bps, perhaps even 2400 bps would be possible under favorable conditions. This would be a wonderful achievement for Amateur radio. On the other hand, I do wish to express grave concerns for excessive power usage on such extended bandwidth modes. This would be contrary to all the efforts to develop spectrally-efficient high-speed digital modes. This obviously need careful further planning.

In Summary

The separation of the one-to-one vs. the many-to-one types of operations, into different sub-bands makes a lot of sense.

The 500 Hz recommendation should be phrased to include how that bandwidth is measured, i.e. -60dB levels may be workable. Perhaps bandwidth and output power should be the norm. This needs some further thought.

I respectfully request that the 300 baud / 1000Hz shift, as presently contained in Part 97, be retained for future explorations, even if that restricts this to the "automated" sub-bands.

I also strongly suggest that the HF digital group get involved with the VHF movement to improve and overhaul the existing AX.25 networking protocol. In this regard, HF has some special considerations.

I appreciate your time and the opportunity to voice my opinions and for considering this plea.

St. Louis TCP/IP Packet Network Update

John Wilson, N0TYZ

Presently, in St. Louis, Missouri we are working on setting up a 9600 Baud TCP/IP Gateway to the Internet. St. Louis packet users formerly entered the Internet via a private LAN connection that routed packets via California and then to Chicago, Illinois where they finally entered the Internet.

Working with Washington University's Amateur Radio Club, W0QEV, the Missouri Amateur Packet Society (MoAmPS), and local St. Louis and western Illinois radio clubs, we are providing an IP Gateway Network that will route packets to regional nodes. These regional nodes will be on another backbone frequency, (yet to be determined), along with the Gateway node which is centrally located at the WUARC site. To cover the greater St Louis area, the Gateway node will have links initially to two existing Gracilis PackeTens. Future plans call for a higher speed links and additional Gracilis switches. We hope to have the St. Louis Gateway up and running by the end of the year.

Renew Your Membership!

TAPR sends out renewal reminders quarterly, but to find out when your membership will expire, check your mailing label. Your membership is very important.

SIG Updates

Greg Jones, WD5IVD

The TAPR Special Interest Groups have been active, but still are in a critical mode. Lots of communications and other types of information flow have taken place. Many on both lists have commented on the lack of focus on either SIG mailing list. As of right now, both SIGs have been wildly more successful than I had hoped for. My goal for both groups was to provide open discussion, but I knew that few final agreements would be derived from diverse backgrounds and interests. What has happened is that more people have seen what others are thinking and doing. For either group to get meaningful things accomplished will depend on small sub-groups or individuals within the SIGs working in a common direction and participating in building something useful. This might be a recommendation, a booklet of information, or whatever. The idea for these projects will have to come from individuals within the SIGs. If you see something worth doing, then start on it and try to get some help and then get feedback from the SIG or SIG chair. I do not expect either current SIG chairs to be able to have enough time to set direction for everyone. Their job is to help channel and organize the groups to positive outcomes and to help individuals/groups with project ideas as a method of feedback.

The BBS-SIG and NET-SIG still each have one chair heading the forefronts. Each SIG needs additional assistant chairs to help organize projects and do things. The BBS-SIG is working on two recommendations, one printed in this issue of the *PSR*. In addition, a BBS Sysop/User guide to operations is in the works. All three of these things have been started by individuals with a concept that only needed a little feedback and a lot of encouragement.

Three new SIGs will be forming this year. An HF-SIG will be formed to provide a focus point on HF digital issues. A DSP-SIG will begin to concentrate on DSP software development and issues. It is estimated that much of the first activity will center on DSP-93 software development. And finally, a DSP-93 SIG to help support DSP-93 builder and hardware issues.

Introducing the TAPR HF-SIG

Johan Forrer, KC7WW

Objectives for the HF-SIG

The purpose of the HF-SIG is to serve as a forum for those involved in experimenting, and developing digital applications for HF.

Background

HF offers unique challenges and rewarding opportunities for Amateur radio - it allows for both short and long distance digital communications without the involvement of specialized terrestrial or space-based equipment such as repeaters, or satellite transponders. It allows for one-to-one (keyboard to keyboard) as well as many-to-one (networking), modes of operation. These are quite different in philosophy and functional needs.

The Amateur bands have seen a dramatic increase in diversity in technology as well as increased activity in the use of digital modes. This is due mostly to the availability of TNCs and application of personal computers. Basic technology, however, has not changed much since the 60s and is in great need for innovation to meet future challenges.

Development of future technology for HF digital requires experimentation with several topics on communications such as:

1. Bandwidth-efficient modulation schemes, i.e. for increased robustness, speed, and useability. These include various forms of m-ary FSK, m-ary PSK, or QAM using single or multiple carriers. However, other technologies such as spread-spectrum communications also need to be explored.
2. Application of coding theory for error detection and correction for increased reliability. This will require the use of block and/or convolutional codes.
3. Protocols to suit new proposed modulation and coding schemes. Various forms of ARQ and FEC are possible. The possibilities for half and full duplex modes need to be explored.

In addition, development platforms for such experimental work will most certainly receive attention.

4. Programmable DSP platforms. Hardware, and software for application development.
5. Host-based software. Typically this include low-level I/O, CUA/SAA compliant user-interface development, but also a user-contributed software repository for commonly-used algorithms such as frame synchronization, channel equalization, scrambler polynomials, fast CRC calculations, various error-detection/correction algorithms such as Golay (24,12), Reed-Solomon, and trellis/Viterbi codes for example.

Getting involved

We require talents representing a wide range of topics such as mathematics (coding theory, signals and transforms), software engineering (algorithm development, real-time OS, low-level I/O, host OS), electrical engineering (analog, digital and RF), digital signal processing (theoretical, hardware and software), etc. However, there also is a simialr need for technical writers, beta testers, and project management.

It is unlikely that this type of experimental work will be using any existing TNC hardware. A general-purpose programmable DSP platform, such as the TAPR DSP-93, a DSP-based sound card, or equivalent would be required as well as a fairly fast 386/486 or equivalent host computer for high-level software development.

Besides development efforts, there will be ongoing on-the-air testing to establish how well theoretical ideas are working in practice. It is envisaged that there would be rapid evolution of modulation and protocol development and thus the need for fully programmable hardware.

This introductory note is probably incomplete, however, it presents some perspective and direction for the HFSIG. I would appreciate further suggestions and feedback.

Subscribing

To subscribe to this mailing list send a message to 'listserv@tapr.org' with the following line in the body of the message:

```
subscribe list full_name
```

Example:

```
subscribe hfsig Joe Amateur
```

Here We Go

I thought it would be of interest to provide further outlines of some ideas and get the discussion and interaction started. Please be so kind and take a few moments to study the summary given below.

1). HF Comms at the physical layer

Regardless of whether you are to apply results to networking or real-time keyboard operations, I believe that our efforts should first address issues surrounding the physical layer.

2). Choosing the modulation scheme

Which modulation scheme would be appropriate. HF demands a robust modulation scheme to address:

2.1 Flat fading
2.2 Selective fading
2.3 ISI due to multiplath
2.4 Unique noise characteristics - probably peculiar to each band
2.5 Bandwidth limitations

Experience on Amateur projects has shown that 100 baud, i.e., 10 ms signaling elements (bauds) may be taken as a rough upper bound. FSK has been the main modulation method — in its non-coherent form, it is easy to implement, easy to tune, and has proven to be reasonably robust. It would be possible to implement m-ary FSK to "stack" several bits to a baud and thus increase throughput, however, it can be shown that for the given throughput, it will use a lot of additional bandwidth. The best we probably can do with FSK would be to implement a form of m-MSK.

As an alternative, I would, however, like to suggest the use of some form of phase shift keyed modulation. The justification is that bandwidth may be used conservatively by using n-parallel, complex-modulated carriers. The parallelism provides both throughput, and when conditions are poor, redundancy fallback. It would be possible, I believe, to initially develop a single channel using readily available hardware. Extension to multiple channels would follow, however, may require further research work into optimal pulse shape.

3) Evaluation of Modulation

It is good engineering practice to first test these ideas by simulation. This requires computer simulation and modeling.

The second phase would be to test the computer model with some real data. For this purpose, we need an HF channel simulator. In its simplest form, this could be a number of "gold standard" recordings off the air and made available as .WAV files that could be played through a sound card or applied directly in a simulated environment. Such standards should also be used to test and compare incremental development efforts.

4) On-the-air testing

It is essential that throughout early development, experience be gained from actual on-the-air testing. We will require a simple protocol to experiment with. There are several options that we can use here.

5) Protocol development

This will follow as soon as the we have a working modulation scheme. This probably will include either block or convolutional coding, compression etc. However, it probably will require an extensive development cycle similar to the modulation scheme.

Proposed Recommendation for Hierarchical Addressing Protocol

Dave Wolf, WO5H
Greg Jones, WD5IVD
Roy Engehausen, AA4RE
Hank Oredson, W0RLI

Date: August 30th, 1994

Comment Period on Table Changes: September 1st, 1994 through January 31st, 1995

Send Comments to: Dave Wolf, WO5H, TAPR BBS-SIG Chair
Packet: wo5h@wo5h.#dfw.tx.usa.noam
Internet: dwolf@tcet.unt.edu
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Introduction

The TAPR BBS Special Interest Group recommends the adoption of the x.3.4 hierarchical address protocol.

After discussion of previous articles on hierarchical addressing standards [1, 2] and taking into account international issues of regional/state name sizes, the TAPR BBS Special Interest Group recommends the adoption of the x.3.4 standard on an international basis. 'x' is defined as 2-, 3-, or 4-letter region names as defined by the country.

Examples of x.3.4:
@WA6GVD.CA.USA.NOAM
@EA2CMO.EAZ.ESP.EURO
@F5JGK.FAQI.FRA.EURO

Regional identifiers may be duplicated in different countries (i.e. AK, Alaska, USA, could be used in another country as a regional identifier); however, Country and Continental identifiers **should not** be used as regional names.

It is important to note that there is a distinct and significant difference between **hierarchical addresses** and **flood designators**. Hierarchical address elements are common to all messages types (bulletins, private, and traffic) and are the foundation of the digital forwarding system. Flood designators are used for routing and filtering bulletins. Geographical flood designators are likely based upon hierarchical address elements. It is therefore important that any attempt to establish standards concentrate first on hierarchical address elements. Standards for flood designators can follow.

It is the purpose of this document to generate a changing recommendation that reflects current hierarchical routing. The Reference Tables will be changed as necessary to reflect current configurations within the international BBS network. These tables will need to be changed and updated in order to meet future needs of user and sysops.

Table 1: Continent Identifiers

EURO	Europe
MEDR	Mediterranean
INDI	Indian Ocean including the Indian subcontinent
MDLE	Middle East
SEAS	South-East Asia
ASIA	The Orient
NOAM	North America
CEAM	Central America
CARB	Caribbean
SOAM	South America
AUNZ	Australia/New Zealand
EPAC	Eastern Pacific
NPAC	Northern Pacific
SPAC	Southern Pacific
WPAC	Western Pacific
NAFR	Northern Africa
CAFR	Central Africa
SAFR	Southern Africa
ANTR	Antarctica

Hierarchical Routing Syntax Summary

This summary uses a modified Backus-Naur form to summarize the syntax for hierarchical addressing. [] = optional

TABLE 2: Country Identifiers

ARG	Argentina	SLV	El Salvador	PRK	Korea, North	PRT	Portugal
AUS	Australia	FIN	Finland	KOR	Korea, South	ROM	Romania
AUT	Austria	FRA	France	LBN	Lebanon	SAU	Saudi Arabia
BEL	Belgium	PYF	French Polynesia	LIE	Liechtenstein	SGP	Singapore
BMU	Bermuda	DEU	Germany	LUX	Luxembourg	ZAF	South Africa
BOL	Bolivia	GRC	Greece	MYS	Malaysia	ESP	Spain
BRA	Brazil	GRL	Greenland	MEX	Mexico	SWE	Sweden
BRN	Brunei	GTM	Guatemala	MCO	Monaco	CHE	Switzerland
BGR	Bulgaria	HTI	Haiti	MAR	Morocco	SYR	Syria
CAN	Canada	HND	Honduras	NLD	Netherlands	TWN	Taiwan
CHL	Chile	HKG	Hong Kong	NZL	New Zealand	THA	Thailand
CHN	China	HUN	Hungary	NIC	Nicaragua	TUR	Turkey
COL	Colombia	ISL	Iceland	NOR	Norway	GBR	United Kingdom
CRI	Costa Rica	IND	India	PAK	Pakistan	USA	United States
CUB	Cuba	IDN	Indonesia	PAN	Panama	URY	Uruguay
DNK	Denmark	IRL	Ireland	PRY	Paraguay	SUN	USSR ???
DOM	Dominican Republic	ISR	Israel	PER	Peru	VEN	Venezuela
ECU	Ecuador	ITA	Italy	PHL	Phillipines	YUG	Yugoslavia
EGY	Egypt	JPN	Japan	POL	Poland		

Table 3: Region Identifiers organized by Country Codes.

[Countries not listed had no known region identifiers at the time of publication. Please forward any additional information during the comment period.]

ARG Argentina
BA ??
CF ??

BEL Belgium
HT ??
LG ??
OVN ??
WVL ??

BRA Brazil
RS ??
SP ??

CAN Canada
NF Newfoundland
AB Alberta
BC British Columbia
MB Manitoba
NB New Brunswick
NS Nova Scotia
NW Northwest Territories
ON Ontario
PQ Province du Quebec
SK Saskatchewan
YK Yukon

FRA France
FCEN ??
FRPA ??
FCAL ??
FPDL ??
FMLR ??
FNOR ??
FCOR ??
FPOC ??
FAQI ??

DEU Germany
BY ??

GTM Guatemala
none

ITA Italy
IEMR ??
IFVG ??
ILOM ??
IPIE ??
IPUG ??
ISAR ??
ISIC ??
ITAA ??
IVEN ??
MO ??

PRT Portugal
CTPT ??

ESP Spain
EACA ??
EAH ??
EASE ??
EAHU ??
EAZ ??

SWE Sweden
AC ??

GBR United Kingdom
(need a list of routing numbers by county)

USA United States
AK Alaska
AL Alabama
AR Arkansas
AZ Arizona
CA California
CO Colorado
CT Connecticut
DE Delaware
FL Florida
GA Georgia
HI Hawaii
IA Iowa
ID Idaho
IL Illinois
IN Indiana
KS Kansas
KY Kentucky
LA Louisiana
MA Massachusetts
MD Maryland
ME Maine
MI Michigan
MI Mississippi
MN Minnesota
MO Missouri
MT Montana
NC North Carolina
ND North Dakota
NE Nebraska
NH New Hampshire
NJ New Jersey
NM New Mexico
NV Nevada
NY New York
OH Ohio
OK Oklahoma
OR Oregon
PA Pennsylvania
RI Rhode Island
SC South Carolina
SD South Dakota
TN Tennessee
TX Texas
UT Utah
VA Virginia
VT Vermont
WA Washington
WI Wisconsin
WV West Virginia
WY Wyoming

URY Uruguay
MVD ??

YUG Yugoslavia
SRB ??

@hierarchical_address = bbs.[#octothorpe.][region.]country.continent

bbs = valid callsign as defined by local communications authority

#octothorpe. = #area.[#octothorpe.]

#area = The area as defined by the local region. See Table 4 for list of current area identifiers

region = 2-, 3-, or 4-character region identifier as defined by the country. See Table 3 for list of region identifiers

country = 3-character country identifier as defined by ANSI X.12 and EDIFACT. Published in ISO 3166-1981(E/F). See Table 2 for country identifiers

continent = 4-character continental identifier. See Table 1 for continental identifiers.

Examples:

```
F6CNB.#SETX.TX.USA.NOAM
KB7WE.#WWA.WA.USA.NOAM
OH6RBV.#VAA.FIN.EURO
SK2AT.AC.SWE.EURO
OH6RBG.FIN.EURO
KE7KD.#NONEV.NV.USA.NOAM
WX3K.#NOCAL.CA.USA.NOAM
```

References:

1. Jenkins, Lew (N6VV), Dave Toth (VE3GYQ), and Hank Oredson (W0RLI). International Routing Designators. Proceedings of the ARRL 7th Computer Networking Conference. Columbia Maryland. October 1, 1988. pp. 91-93.

2. Clark, Tom (W3IWI). Some comments on the Hierarchical Continent Address Designator. Proceedings of the ARRL 9th Computer Networking Conference. London, Ontario Canada. September 22, 1990. pp. 278-279.

Table 4: Hierarchical Addressing Area Definitions

This table to be defined during the comment period.

All readers are asked to submit their regional area definitions for inclusion in the table. Be sure to include the region and country. For example:, #DFW.TX.USA Dallas/Ft Worth Texas Area would be an entry in this table.

#EPA.PA.USA	East PA
#WPA.PA.USA	Western PA
#DFW.TX.USA	Dallas/Ft.Worth, TX

RUDAK-U Update

Lyle Johnson, WA7GXD,
for the RUDAK-U team

RUDAK-U is a digital communications system being designed for you! Currently slated to fly aboard the International Phase 3D Satellite (P3D) being built by AMSAT organizations worldwide, RUDAK-U will bring real-time digital communications with global coverage.

Presently, your packet traffic is typically handled on VHF/UHF channels at 1200 bps or 9600 bps data rates. The station you directly communicate with is usually less than 25 miles (40 km) away. Most of your traffic is in the form of electronic mail, bulletins and programs or data files.

You've been conditioned to believe that packet is for non-real-time communications, and you've exploited this limitation. Some of you have tried to use packet for keyboard-to-keyboard QSOs and have had the local "experts" tell you are clogging up important file transfer channels, and that packet isn't intended for such communications.

Existing packet satellites have been optimized to exploit their low earth orbits (LEO) and are, in effect, flying mailboxes.

Well, a new dimension is about to be added to packet communications in particular, and Amateur digital communications in general.

RUDAK - What?

RUDAK-U will be able to see half the world at a time, and from almost any location on the planet you'll have access to almost all the rest of it over a 48-hour period. It will have the file store-and-forward ability you're already accustomed to. We're hoping to augment the spacecraft's memory systems with ground-based mass storage facilities.

But let's look at the real-time opportunities.

RUDAK may have as many as ten (10) communications channels operational at a time. During these times, multiple QSOs can be carried out using multimedia, digital voice, and so forth. At other times, only a few channels will be operating. Some of these channels will likely be "scheduled" to minimize QRM (oops, I meant "collisions").

There is a possibility that there will be a special, bandwidth-efficient 256 kilobit/sec modem aboard the satellite and that RUDAK-U will have the opportunity to connect to it. We're talking serious capability here, like real-time motion video!

Speaking of video, RUDAK-U is expected to be the primary communications path for images from the SCOPE earth-imaging cameras on Phase 3 D. It will also be a source of precise information from the on-board Global Positioning Satellite (GPS) experiment.

Some of the time, RUDAK-U will have only one or two downlinks running, but with sufficient power that a ground station with a low-noise front end and a small beam antenna (perhaps 5 or 6 elements, maybe fewer) will be able to fully utilize. At other times, when more downlinks are on or high-speed links are in use, a better antenna will be required.

As you can see from this brief sketch, RUDAK will have something for everyone in the digital communications community.

RUDAK has something for you!

RUDAK - When?

The design has been worked out at the block level, and detailed circuit design is being completed as this is written.

Engineering prototypes are expected to be built and shaken down in the December 1994 timeframe. Flight hardware construction will begin in January and the flight module will be delivered to the satellite integration facility in Orlando, Florida, in March, 1995.

RUDAK - Some Details

RUDAK will carry two independent computers.

CPU-A will be based on the NEC V53 processor. This processor is a superset of the V40 flying aboard the MicroSats and scheduled to fly on UNAMSAT. The V53 is flying now as part of AO-27. It will have 16 megabytes of error correcting memory, and sixteen (16) DMA-based communications ports.

CPU-B will be based on the Intel i386EX processor. This is a high-end controller and is being investigated for use on future Amateur spacecraft as well. Like CPU-A, this one will have 16 megabytes of memory, with error correction to help protect against the hazards of radiation upsets. It will have fewer communications channels than CPU-A due to limited DMA resources (8 channels).

For comparison, the MicroSats have 256 kilobytes of error-correcting memory (1/64th the amount of either CPU on RUDAK-U) and a total of 8-1/4 megabytes of memory (about 1/2 the amount of either CPU on RUDAK). They have six (6) DMA ports.

The CPUs will be tied together by a high-speed first-in first-out (FIFO) buffer. This will

effectively enable each CPU to have access to much of the other CPU's memory resources.

The modems for RUDAK will interface to the IF switching matrix on P3D. This means a different kind of interface (similar to that pioneered by RUDAK-II aboard RS-14/AO-21) and the ability to operate on multiple frequency bands along with the analog transponders.

One of the design goals of RUDAK-U is to be compatible with existing packet users. Another goal is to be flexible for future operations. Since we expect P3D to be operational for more than ten years, we don't want people to have to use today's (obsolete) technology.

Each CPU will have a modem module. Each modem module will have the following lineup:

(1) One 1200 bps Manchester uplink/PSK downlink for low speed, lower-power operation.

(2) Two 9600 bps FSK uplink/downlink for "typical" operation. These modems will be switchable to 19.2 kbps and perhaps as fast as 38.4 kbps.

(3) At least two DSP-based modems. These will allow operation at reasonable data rates (we are looking at making them capable of 56 kbps operation) as well as more complex modulation schemes. They will of course be able to provide compatibility with today's satellite standards.

RUDAK - How

RUDAK-U is happening because some volunteers are pouring countless hours of toil and love into it. These volunteers have reduced the dollars required to about $60,000. TAPR [1] has set up a special fund for supporting this project. Please consider making a donation. Consider it an investment in the future of Amateur digital communications [2].

Just so you don't think your money might be spent on a Caribbean Cruise, here is a condensed breakdown of the budget:

Module	Flight	Engineering
CPU-A	590	330
CPU-B	620	310
MEMORYx2	5080	1340
MODEMx2	1760	1140
TOTAL	14890	5600

NOTE: A complete system includes one CPU-A, one CPU-B, two MEMORY and two MODEM.

There will be four engineering units and two flight units.

Parts	$52,180
PCB charges	8,800
Travel, Meetings, Initial Integration	5,500
Parts Discounts	(2,880)
Estimated Total	$63,600

Like the rest of P3D, RUDAK-U is a truly international effort. The main players in the technical team include Lyle Johnson (Project Manager), Peter Guelzow, Chuck Green, Harold Price and Jeff Ward. We are all licensed Amateurs with long experience in volunteer service to Amateur radio, Amateur packet radio and Amateur Satellites.

As you can tell, we're very excited about this project.

Won't you help us make this dream a reality?

[1] TAPR, 8987-309 E. Tanque Verde Road #337, Tucson AZ 85749-9399. Phone: (817) 383-0000. Fax: (817) 566-2544. MC/Visa Accepted.

[2] If you are a U.S. taxpayer itemizing deductions, such donations may be tax-deductible. Consult your tax advisor. Your mileage may vary.

@USBBS: Addressing Packet Bulletins

By Brian Battles, WS1O

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Anyone who has visited the Never Land of written electronic communication knows that the open forum provided by telephone bulletin boards (BBSs), the Internet and other similar media have long offered users exciting, effective means of discussing, debating and announcing diverse opinions, issues and emotions. These environments have traditionally relied on two basic means of controlling the content of messages posted and behavior of those who choose to participate: (1) a "gatekeeper" and (2) peer pressure. The gatekeeper (SysOp) can decide who may post material, what may be posted and if it will be forwarded. Peer pressure provides a vocal, but officially impotent form of obligation to conformity. It does this through friendly advice, admonishment, chastisement, and outright insult. In Amateur packet radio, a third entity wields a measure of control: The FCC determines what is legally acceptable.

Traditional networks, such as the seminal Fidonet, maintain an accepted level of decorum through a voluntary standard of cooperation and a hierarchy of people who have definite levels of enforcement authority. Specific areas, also known as "conferences" or "forums" (or Echoes, in the case of Fidonet), are designated where users may write messages pertaining to that area's usually narrowly defined topic. A volunteer, often selected by conference participants, acts as a moderator. This person's job is to regularly post a set of conference rules and to monitor posted messages. Theoretically, the moderator's presence is to serve as a referee, to inform users of transgressions and to reduce the amount of peer-to-peer bickering over each others' perceived misbehavior. Users who repeatedly violate the rules after sufficient warnings from the moderator are reported to the SysOp of the site where the user logs in to post messages. It's the SysOp's responsibility to counsel, rehabilitate, educate, or bar the user's access to the conference. The SysOp is motivated by the potential consequence of having his BBS excommunicated from the network if he fails to exercise the proper control over his users' behavior.

In the world of Amateur packet radio bulletin boards (PBBSs), however, there are differences that make control and adherence to standards difficult to implement. The spirit of democratic, uncensored participation that offers many advantages to radio Amateurs precludes most SysOps from refusing access to uncooperative users, induces them to make undesirable messages available to all of their local users, and even to forward such messages to other PBBSs in the network. SysOps have been roundly and publicly criticized for refusing to forward bulletins they deemed to be inappropriate, even if only for purely technical reasons. In raging discussions, misinformed or selfish users maintain that a SysOp is obligated to accept and forward their message without question, as long as it doesn't expressly violate any FCC rules. (This is, by the way, entirely untrue. No SysOp is under any obligation to do anything whatsoever with any radio Amateur's messages and the FCC rules state that a PBBS is its SysOp's privately operated radio station, for which the SysOp is permitted — in fact, expected — to monitor and control the material it transmits.)

Educating Users

To turn to a more basic, pragmatic issue, many packet operators have spent many hours discussing the frustration of having these PBBSs, supposedly designed and built for the purpose of carrying person-to-person mail traffic and occasional bulletins of general interest, into electronic "classified ad pages." Notices that carry announcements of items for sale, swap, or wanted, noticeably outnumber other single types of bulletins. Because of its convenience, low cost, and apparent effectiveness, PBBS users inundate the airwaves with a nationwide swapfest day and night. Most messages in this category are individually harmless, but when viewed as a class, are the greatest consumers of computer storage space, message-forwarding time and bandwidth.

Many SysOps and PBBS users complain that all you ever see listed on a PBBS today are screenfuls of SALE@USBBS messages and so on. It's an understandable lament: there's a lot of stuff in there, but most of it is "junk mail" most users never read. For example, a ham in Boston isn't likely to care about a personal computer or hand-held transceiver being sold by an Amateur in Seattle. But there are hundreds, maybe thousands of Amateurs in Washington or perhaps the Pacific Northwest region who will read and respond to such a notice. So why waste the time and bandwidth to send this bulletin ping-ponging

all over the US by addressing it so it's forwarded to @USBBS?

In a sadly ironic way, most packet traffic isn't nearly as efficient as the non-SysOp packet operator believes. Notices of items too insignificant or unwieldy to be easily sold to Amateurs hundreds of miles away are routinely sent out addressed to SALE@USBBS. This is a lazy, or perhaps misunderstood, format that causes thousands of hams in a state like Alabama, for example, to have their local PBBSs spew forth several screens worth of listings for hand-held transceivers, parts, batteries and other such items being offered by hams in Oregon or Alaska, which are likely to be sold by the time they reach most out-of-state PBBSs, anyway.

SysOps: Can You Do It?

Perhaps there needs to be a system implemented by which SysOps would be asked to voluntarily help educate users. Each user could be compelled to read an educational message about the most appropriate way to address bulletins before he'd be given the privilege to post a message intended to be forwarded to other PBBSs. This would require at least two things: (1) The PBBS software would have to support a method of doing so, and (2) The SysOp would have to be willing to invest whatever additional time it might take to grant access to potential users who acknowledge that they've read and understand the proper procedure.

Is it reasonable to suggest that PBBS SysOps route incoming messages addressed to @USBBS to some kind of holding bin, unless they meet certain criteria (e.g., ARL, KEPS, AMSAT, FCC, SYSOP, DX, etc)? For example, do we really need so many SALE, WANTED, HELP, FEST and EXAM bulletins addressed to, and circulated over the airwaves to, @USBBS? Does it offer any real advantage to the user who posts it? Isn't it more efficient, timely and appropriate to post most bulletins to a local, state, or regional circulation? Could PBBS SysOps do this, and would they want to? How much extra time and effort would it take? Can any of this be automated? Will an investment in the time and energy now pay off later with less "junk mail" coming through each PBBS in the near future, if users can be taught to cut down the unnecessary @USBBS traffic? And how much actual improvement would that offer all Amateurs, regarding the possible decrease in traffic transmitted via VHF/UHF backbone and HF forwarding?

This could certainly be implemented in a friendly manner, with errant users gently instructed in a friendly, helpful manner. Each PBBS SysOp could prepare a "boilerplate" text he could use to inform a user whose postings were held or rerouted that would explain what was done, why it was done and how to avoid such faux pas in the future. A standard one-page (one screen?) message from the SysOp could simply inform the user that @USBBS is, by conventional agreement, reserved for messages that, by their inherent nature, lend themselves most advantageously to distribution to the entire nation's Amateurs. It could advise the user that buying, selling, swapping or evaluating almost any Amateur Radio item could be quite effectively accomplished via a local or regional bulletin, and that he should seriously consider if the hams in a distant state will care or be able to take advantage of the information in certain types of messages.

The Alternative

This primarily concerns standard AX.25 PBBS users and SysOps because more advanced software, such as that used for TCP/IP networking, doesn't even involve PBBSs as most hams have come to know them. A TCP/IP user finds his incoming mail neatly stored in his own private mail area on his own computer's disk drive. Bulletins can be forwarded only to TCP/IP operators who specifically request them, by category, from individuals or from stations that act as "gateways" to collect useful messages from local AX.25 PBBSs and mail them directly only to those who want to see them. Ideally, if all U.S. packet stations operated TCP/IP software, rather than just plain, "built-in" AX.25 TNC firmware, the traditional PBBS could be eliminated and Amateur packet radio would function more like the Internet. Each station would be accessible directly by every other station, and each Amateur could choose to "subscribe" to "newsgroups" that encompass particular topics.

Let's hear what you think, as a packet operator, and especially as a PBBS SysOp. Poke holes in these suggestions or offer ideas on how to improve them. Be constructive and thoughtful, and perhaps we'll be able to slowly educate our fellow packet operators so that we can all help each other maintain, expand and speed up the powerful, impressive Amateur packet radio network.

Send your comments to Tucson Amateur Packet Radio (TAPR), 8987-309 E Tanque Verde Rd #337, Tucson, AZ 85749-9399; tel 817-383-0000;
Internet psr@tapr.org.

Proposal: A High Speed Multicast-capable Packet System for the 219 Mhz Band

Jeff King WB8WKA
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Packet: wb8wka@detroit.ampr.org
Date: 9/4/94

On August 19-21, 1994, I had the pleasure of attending the ARRL Digital Networking conference in St. Paul Minnesota. One of the committee meetings that I attended was a joint session of the ARRL Futures and 219Mhz committees. One of the goals of the 219Mhz committee was to occupy the band once we obtain it. Phil Karn, KA9Q, proposed that the band, in part, be used for multicasting. What I propose here (and there also) is a system that will be multicast capable (when the protocol issues are ironed out) and be put to immediate use today.

One of the problems with packet is that it is half duplex. Even at medium speeds, such as 9600 bps, you are lucky if you can utilize half the channel capacity with our current system. While you certainly could operate full duplex, this would preclude others use of the channel due to the full occupancy of both of the channels (RX and TX).

Statistics on people's usage of the internet show that the majority of the data exchanges are asymmetrical. That is, you receive far more then you send. This factor can be to our advantage, both from a technical as well as economical perspective in Amateur radio tcp/ip.

A system like this is already in use on the Amateur PacSats. There are multiple low speed inputs with one high speed output. I propose a similar system for terrestrial use. With the high speed output on the 219mhz band (and users receiving there) you have greater control over placement of transmitters, which will be a requirement of the 219Mhz band that is a shared band.

The system would consist of one high speed output (128 Kbaud to 256 kbaud) on 219 or 222/223 MHz and multiple medium speed (9600 baud) inputs on different bands, lets say 440 for now (but it just as easily could be 2m 9600 baud). The high speed channel could be based on a GRAPES MSK modem, transmitter only. This would feed an omni-directional antenna. Power output would vary depending on coverage required. The user inputs could be based on TEKK 440 data radios (or DR-1200). Antennas would be shaped coverage (beams or otherwise) directed towards the user area one wished to cover. Initially the user inputs (440 9600bps) could be simplex based, depending on height/coverage, one might want to make them mini repeaters so one could get DCD and eliminate hidden terminals. This has another advantage. Lets say you are running 4 9600 inputs at about 1 watt (User areas: North, East, South, West). You'll need to space them at least 1Mhz apart if you are at the same site and running 1 watt or so. If you run them as repeaters/DDR's (not hard at all at the 1 watt level), you can have them on adjacent channels. (i.e. 441.075/446.075 441.1/446.1 441.125/446.125 441.150/446.150).

On the digital hardware end, life is simple also. The Ottawa 'PI' board would be a perfect fit for this, both from the client (user) and server end. The PI board is a $125 (U.S) board that has two ports on it similar to a DRSI with the exception that one port is DMA based. Meaning, you can run 56Kbaud on XT based machines with ease. Obviously, things work much faster on better class machines. The TEKK radio is in the 100-110 dollar range. A TAPR 9600 baud modem would set you back around $80. The server would be a 386+ class machine with multiple ports.

The real beauty of this plan is its scalability, system economics, and pay as you go feature. Remember, I mentioned it could be done today with existing hardware. A user (client) would initially purchase the 9600 baud equipment. With this, he could communicate with users on his LAN as well as do standard half duplex routing through the server/router. This is what we have today on the 2m 9600 baud as well as 440 9600 baud channels in the Detroit area. However, once the user wanted to upgrade, he would just need to purchase a 219 Mhz receive-only modem/receiver, which could consist of simply a wide-band police scanner or a low-cost Hamtronics receive transverter. Due to multipath concerns, all user stations would need to use beam antennas for the high speed channel (pointed at the server).

System economics is where this really shines also. That is, the system cost (add all the user costs+the server costs) is less then with standard high speed systems. If the server system invests in a higher power/better coverage high speed channel (and remember, there are no hidden terminals due to the fact there is only one transmitter on the server frequency) then the total system cost is reduced. This is due to the fact the users do not need to invest heavily in high antennas/towers to receive the site in addition they only need be concerned about receiving the site at high speed, their transmitting is only done locally with modest (inexpensive) equipment. Initially, the user station would do symmetrical routing (as would the server), that is, out the same port he receives on. (User: route add server.ampr.org 440, Server: route add user.ampr.org 440) When he added his high speed 219 receive port, his routing then would be the same (route add server.ampr.org

440) but the server would return to him on the high speed 219 channel (route add user.ampr.org 219).

Now, how about some of the potential problems? When grabbing stuff from the internet at high speed, there will be plenty of 'holes' on the medium speed channels to get a 'packet in edgewise' due to the fact that most ACKs are quite short. Since the high speed channel is being controlled by a router (it's not a DDR), it will be easy to interleave packets even if it is keyed continuously. User stations will be able to communicate amongst themselves as they do now (on simplex). Since the 440 (2m) radios will be RX and TX, DCD will be maintained reducing collisions. The only potential problem we will have is if a user wishes to send a file to the internet. Then we would run into a problem that the 9600bps channel would be continuously occupied (with ACKs coming back at 56Kbaud on 219). I believe this problem could be solved in software. Obtaining a high speed internet feed could be a problem, but here in the Detroit area we have two well-connected sites (WSU and MERIT) that could feed the multicast server (which is a high site by definition).

OK, so how can we do this now? We can start on a 56kbaud TX channel in the 222/223 range... we may have to be a bit creative, i.e., horizontal polarization, overlay on top of distant repeater outputs, but technically it is very do-able. When (if) we get the 219Mhz band, we move the server down there and up the speed to 128Kbaud. The user would simply need to move his receiver as all his hardware will still be capable of the higher speed (on AT class and above). And of course, our medium speed user channels are already going into place.

Now I've just talked about a system that could be implemented today. Like high speed access to Mosaic (faster than any phone line), WWW, FTP's, Archies, you name it. These are all client/server applications. How about multicasting?

How would you like to receive the entire USENET feed? How about all the AX.25 bulletins? Would you like to watch NASA select (the space shuttle liftoffs) video from you PC screen? Listen to internet talk radio? Have multi-media roundtable's? All this is possible (and much of it already happening) with multicasting. With multicasting you don't acknowledge every transmission and multiple users can receive the same data. This is going to be much of the future both for the internet side as well as the AX.25 side for bulletin/information distribution. And one other possibility of Amateur multicasting, that was mentioned at the DCC is the fact that a SWL (DWL?) will be able to receive most of this information. This would also attract users (SWLs, DWLs) to the hobby.

So folks, what do you think? It won't take a rocket scientist to do this and it can be done today with off the shelf equipment. It will have to be a group effort though, as many things would have to fall into place, but it can happen if you wish it to. Speak up if you think it's a good idea, bad idea, questions, or have some thoughts.. I personally want to get high speed internet access and this seems to be the most economical way I have run across yet. Remember, if you do nothing, nothing will happen. Let's here from you. Comments, questions to semcon@detroit.ampr.org

Reference:

Karn, Phil (KA9Q). (1987). A High Performance, Collision-Free Packet Radio Network. Proceedings of the ARRL 6th Computer Networking Conference, Redondo Beach, Calf, August 29, 1987, pp. 90-94.

Help TAPR Create a Data Base of Regional Packet Organizations

TAPR is generating an accurate list of regional and local packet groups.

Many of the lists we have seen published in the last few years have been woefully out of date. TAPR feels that an accurate listing for regional/local packet groups is necessary to help exchange information and allow TAPR to tell people how to contact their regional/local groups.

We will distribute this information in various future TAPR publications. So, getting this club information correct will help your group as well as TAPR. In addition, we will be adding each of the groups to the *PSR* mailing.

TAPR believes that local and regional groups are essential for educating and supporting local operators. As a national organization, TAPR can provide the necessary glue and information sharing needed to tie all our groups together.

The Board has been busy transforming TAPR from strictly a hardware / software development group, into a more well-rounded membership society which continues to work on technology.

In the future, it is hoped that together, TAPR and the regional packet groups can provide the kind of leadership that digital communications enthusiasts are eagerly looking for.

You can provide information for the data base by mail, FAX, phone, or Internet: tapr@tapr.org. We look forward to your feedback.

P.S. If you have any suggestions on how TAPR can work with your group or others, please feel free to give us a call or send e-mail.

Nominations Sought for TAPR Board of Directors

Tucson Amateur Packet Radio is incorporated in the State of Arizona as a non-profit scientific and educational institution. It is recognized by the IRS as a 501(c)3 tax-exempt organization for these same purposes. TAPR is governed by a 9-member Board of Directors. Each member of the Board serves a three year term. Every year, three positions are up for election.

Board members are expected to attend the annual Board meeting held in conjunction with the annual meeting. They participate in the decision-making process and provide guidance to the officers. They receive no pay and must defray their own expenses to attend meetings. Board members should be prepared to be active in the continuing Board deliberations, which are conducted via the Internet. Active participation in TAPR activities by Board members is important to the furtherance of the objectives of TAPR. The officers of TAPR are elected by the members of the Board at the annual Board of Directors meeting.

The current members of the Board of Directors and the expiration dates of their terms are:

*Ron Bates, AG7H	1995	
*Jack Davis, WA4EJR	1995	
*Jim Neely, WA5LHS	1995	Treasurer
Bob Hansen, N2GDE	1996	
Gary Hauge, N4CHV	1996	Secretary
Keith Justice, KF7TP	1996	Vice President
Greg Jones, WD5IVD	1997	President
John Koster, W9DDD	1997	
Mel Whitten, K0PFX	1997	

Nominations are now open for seats expiring in March 1995 (marked with an asterisk).

To place a person in nomination, please remember that he or she must be a member of TAPR. Confirm that the individual is willing to have their name placed in nomination. Send that person's name (or your own if you wish to nominate yourself) along with your call and their call, telephone numbers, mailing address, and Internet address. The person nominated should submit a short biographical sketch to be published along with the ballot.

Nominations and biographical sketches should be submitted to the TAPR office **no later than December 10th, 1994.**

Ballots will be mailed the end of December directly to the membership and be due on or before February 24th, 1994. Results will be announced on March 1st, 1994.

Responsibilities of a board member include:

1) Attendance at the annual meeting and board meeting each year.

2) Regular participation with the continuous session of the board (currently held over the Internet). Typically this requires a minimum of 2 hours a week, although sometimes much more is required during active board discussions.

3) Participation with TAPR projects as volunteered. Board members, while not required, are involved with various project management, ongoing organization and/or supervision and liaison positions. Active board participation with various projects make many of the most important projects and tasks possible. Board members are expected to take an active part in TAPR in some form.

All nominated members will be placed on the ballot and the highest vote receivers will be placed in the open board positions. If elected, the board meeting is Friday March 3rd, 8am, in St Louis, Mo. A board retreat is scheduled informally for March 2nd, in the afternoon to evening as board members arrive to the hotel. All directors shall serve for a term of three years.

Office Closed for Christmas

The TAPR office will be closed from December 15th through Jan 9th. This means that Dorothy will not be answering the phone during office hours. The TAPR telephone system will contiue to operate, as well as the fax, and the mail will continue to arrive.

Changes in the TAPR Telephone System

We have been listening to the phone system survey (available on the system) and messages left concerning how we can improve the voice system. A majority of the calls indicated that they liked the system, but thought we should work on simplifying the overall range of choices. Based on these suggestions, we have made some changes. All the various informational choices that were available under each category have been consolidated under the Information selection. The other selections now take you right to Dorothy during office hours or into the voice mail system. The system continues to receive numerous calls and these changes should reduce any possible confusion and speed up your selection choice. The Fax back capability has been getting a lot of use. Dave Wolf, WO5H, continues to help with recording the messages heard on the system. We would like to thank Dave for his time in driving up from Burleson, Texas to help with this task.

RUDAK-U

The RUDAK-U project fund raising has been going well. As of this writing we have raised $1,500. We still need another $4,000 in order to complete this fund rasier. We would like to thank all the contributors thus far for their help. If you belong to a local or regional packet group, suggest that the group provide money for this unique digital project. A few $250 donations from digital groups would make our goal of reaching $6000 easy. RUDAK-U has some tremendous future in personal and regional high-speed digital communications, but requires further funding. Talk to your local or regional packet group.

Donations above $25 will receive a certificate indicating their funding of RUDAK-U, while donations of $250 or more will receive a plaque to let all know of their efforts with this project. All donations are needed, both large and small. You can call the office at (817) 383-0000 or Fax (817) 566-2544 to make your donation by MC/Visa.

Dayton '95 — The Packet Connection

TAPR hopes to host Dayton's biggest and best packet event at next spring's HamVention. Together with the Miami Valley FM Association, a Dayton club with a strong packet radio interest, we plan to have a Friday evening dinner program with speakers, separate break-out sessions, and a prize raffle. Saturday evening will continue with an informal dinner and more forum sessions. We invite all packet groups to join us for these events. Stay tuned for more details. Dayton will continue to be an important activity in which TAPR participates.

DSP-93 Update

The DSP-93 initial kit offering is sold out and we are working on orders for a second run to be done in March. Orders must be placed before December 31st, 1994, price is $430.

There has been so much happening with the beta-testing it is hard to cover it all. As of this writing the following modes have been tested and working on the DSP-93 beta units: 9600baud FSK full-duplex satellite, 9600 baud FSK terrestrial, 1200 baud PSK, 300/1200 baud AFSK, RTTY, AMTOR, PCTOR, Audio Filters, a large assortment of test programs, APT, a Windows and Macintosh interface program, and the list continues to grow.

For international buyers who have something other than 110v 60Hz power, the price of the DSP-93 kit is being reduced to $420 and the 9 volt AC wall transformer will not be included. Please indicate this when ordering. 9 volt AC power will need to be provided by the builder.

The technical support for the first production units and successive kit releases will be conducted on Internet. If you are getting a kit, you need to either find a feed to and from the mail group or find a group to help each other. Plus, there will most likely be a lot of support on the various store-and-forward satellites. The DSP-93 kit is such, that no one individual within TAPR or AMSAT will be able to support the build phase of any kit group. It will be up to previous builders to help those that follow.

TAPR will be forming two new mail groups on DSP this fall. One is named DSP, which will focus on DSP software development and DSP-93 to focus on the DSP-93 kit. Look for information on these later this year. We are still aiming at having kits shipped around the middle of November. To get information on various TAPR lists, send mail to 'listserv@tapr.org' and in the message body include 'help' (no quotes).

AN-93 Kit Update

The AN-93 kit had a setback in August. The new Printed Circuit Board should be finished as of this printing and available for sale. The AN-93 kit provides any PC user with the capability for operating RTTY, AMTOR, and PCTOR with this simple modem-only design. AN-93 is the equivalent of a BayCom, BayPac, or PMP setup, but for HF digital operations. This very simple kit is for those that have wanted to play on HF, but didn't want to pay the money for an expensive multi-mode controller. TAPR will be doing a limited run of 100 AN-93 kits. This is not a beta-test, but a market test to see what the level of interest is in this kit design. The AN-93 comes with a tuning indicator to allow visual tuning and the unit also provides audio output for oscilloscope display.

Introduction of the TAPR HF Special Interest Group.

TAPR is proud to announce the formation of a Special Interest Group focusing on HF Digital Issues. Johan Forrer, KC7WW, will be the Chairperson of this group during its initial formation period. See the HF-SIG introduction in this issue to see the objectives and goals of this group. The TAPR Board looks forward to the future activities of this group.

TAPR.ORG Update (Yet Again)

Things are on the change again with the TAPR.ORG server. We are relocating the Internet server to a more permanent location, which has full Internet access. This change has been brought about by several factors: 1) the need for better access with more reliable service and a long-term location, 2) our current system sysop, Lou Nigro, KW7H, is having to cut his commitment to maintaining the server, 3) the need to cut operational costs for maintaining the system and 4) to provide one location for file-requests, ftp, and mail groups.

The purpose of the initial TAPR.ORG server, which was initiated at the TAPR Board of Directors meeting in 1993, was to prove that Internet access would be a better method of BoD activity than CompuServe, and would provide better information access to the membership. Both goals have been successfully met, as indicated by the BoD and membership activity over the past two years. As the TAPR.ORG service grew, the system we were using had been strained to take the additional load. This appeared in full force when we crashed the mail server of our provider and moved the three mail groups in one night to the TCET.UNT.EDU Internet site.

The new site is currently located at DATAPOINT.COM and will stay there until the node which will eventually house TAPR.ORG is installed. Lee Ziegenhals, N5LYT, has been of tremendous help in this relocation. Lee is providing the current access and is helping with the setup and maintenance of the new system.

The new server is using ListProcessor 6.0. This system supports both mail lists and an e-mail file request system. The server can be reached by using our current "listserv@tapr.org" or "file-request@tapr.org".

The three TAPR mail lists currently supported on TCET.UNT.EDU will have been moved to the TAPR.ORG by the time of this printing. So, to join the SIG mailing lists, you will need to use the new address of "listserv@tapr.org" instead of the tcet.unt.edu address.

Here is a brief set of basic requests:

help
Get the basic help file.

index -all
Get a list of files in all archives.

get <archive> <file>
Get the requested file from the specified archive. Example:
get tapr taprinfo.txt

lists
Get a list of all local mailing lists that are available.

subscribe <list> <your name>
The only way to subscribe to a list. Example:
subscribe tapr-bb Joe Ham

unsubscribe <list>
signoff <list>
Two ways of removing yourself from the specified list. Example:
signoff netsig

information <list>
Get information file about the specified mail list.

which
Get a listing of local mailing lists to which you have subscribed.

User Oriented Requests

You can 'set list mail ack' in which case messages to the list will be echoed back to you, and 'set list mail noack' (the opposite). The default is set to 'mail ack'.
Example:
set netsig mail noack
A 'set list mail postpone' request will not send any messages to the subscriber until he resets it to one of the other options (used to suppress sending e-mail temporarily).
Example:
set netsig mail postpone
A 'set list mail digest' will only send messages at the end of each day as a digest.
Example:
set netsig mail digest
A 'set list' with no arguments returns the current values for all options.
Example:
set netsig
You may hide your identity by issuing a 'set list conceal yes' request.
Example:
set netsig conceal yes

ARRL 14th Digital Communications Conference 1995

TAPR is proud to announce that TAPR and TPRS (Texas Packet Radio Society) will be co-hosting the 1995 ARRL Digital Communications Conference during September, 1995, in Arlington, Texas (near Dallas/Ft. Worth airport). (Most probably the same location used by AMSAT-NA for their 1993 national convention.) This facility allows easy access to the DFW airport and provides lodging at a very reasonable rate. A final date and full information should be available the first of 1995.

A Network Building Opportunity

Carl Bergstedt K9VXW

Last March, at the annual TAPR meeting in Tucson, I presented a project idea to the TAPR board. The plan was to involve TAPR in some way with the introduction of the RF hardware developed by the Karlsruhe Packet Radio Group, that has been so sucessful in the German packet network and in surrounding countries. Wolf-Henning Rech, DF9IC, and other members of the project team have developed 23 cm packet radio hardware that has been used in over 300 nodes in the German PR network.

Their latest development is a 23 cm full-duplex system that is capable of 19.2 Kbps using G3RUH compatible FSK modems. It is now available in Germany as separate transmitter, receiver, and power amplifier kits designed specifically for data service.

With our current lack of spectrum for high speed (greater than 9600) linking in urban and metropolitan areas, 23 cm seemed to be a good choice to use for linking. Small, high gain antennas or dishes allow low power node RF equipment. Relatively inexpensive RF transistors and power amplifier modules make 23 cm RF hardware feasible.

Depending on antennas and elevation, 15 watts can allow node separations in excess of 60 miles. The 2 watt PA could be used in metro areas where node spacings are 30 miles or less.

Abbreviated specifications for the transmitter are in Table 1.

The receiver uses a similar crystal multiplier and is a triple conversion unit with intermediate frequencies of 74.7 MHz, 10.7 MHz, and 455 KHz. It is operated with a frequncy offset of 49 or 59 MHz to work with the interdigital filter / duplexer designed by DF9IC. The abbreviated specifications for the receiver are in Table 2.

The duplexer designed for the full-duplex system is made of a rectangular aluminum section, approximately 60 x 33 mm and is 430mm long. There are 11 solid aluminum rod resonators of varying diameters and lengths that are fastened inside of the rectangular aluminum housing. Eight screw adjustments are used to tune the resonators, and three resonator rods are attached to connectors for the receiver, transmitter, and antenna ports. The duplexer has a passband insertion loss of 1.2 dB. Over 100 dB isolation is attainable at 59 MHz offset, with mimimum isolation of 80 dB at 35 MHz offset, with a maximum insertion loss of 1.6 dB.

TAPR would like to judge the extent of interest in this hardware, prior to making arrangements with the supplier of these kits to import them for sale in the U.S. Exclusive of any import duties, the full-duplex system would cost approximately $500 with a 2 watt PA or $550 with a 15 watt PA. These prices would include an interdigital filter / duplexer designed by DF9IC, tuned up on specified transmitter and receiver frequencies.

Please indicate your interest by completing the coupon below (or similar) and mailing to TAPR.

No commitment on your part is implied, but TAPR would prefer that you reply only if you have a genuine interest. TAPR will proceed if there is significant interest.

1.2 GHz Digital Radio Interest Survey

(Enter quantities desired)

I would be interested in ____ complete rf transmitter, receiver, and 2 watt PA kits and assembled and tuned duplexer(s)

I would be interested in ____ complete rf transmitter, receiver, and 15 watt PA kits and assembled and tuned duplexer(s)

Callsign, for further info only:

Mail to:
Tucson Amateur Packet Radio
8987-309 East Tanque Verde #337
Tucson AZ 85749-9399.

Table 1. Transmitter Specifications

Frequency coverage	1150 to 1350 MHz
Output power	+12dBm min.
Crystal frequency	Ft/128 w/30pf load capacitance 3.5 ppm from 0-60° C
Stabilization	PTC thermistor attached to crystal holder yields < +/- 5KHz from -10° to +50° C
Deviation	2 V p-p yields 5KHz swing
Frequency response	Flat from < 1 Hz to > 20KHz
Usable FSK Data rate	4800 to 19,200 min.
Input impedance	47K in parallel with 1 nf.
Supply voltage	+12 to 15VDC
Supply current	170 ma. typical

Table 2. Receiver Specifications

Frequency range	1100 to 1300 MHz
Supply current	250 ma.
Image rejection	> 40dB
IF Bandwidth	30 KHz
Noise level	3 dB
Sensitivity (BER=1e-6)	-113 dBm

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
Keith Justice, KF7TP	Vice President
Gary Hauge, N4CHV	Secretary
Jim Neely, WA5LHS	Treasurer

TAPR Membership and *PSR* Subscription Mailing Address:

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Date is expiration of term on Board of Directors.
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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

psr@tapr.org

Packet Status Register
Tucson Amateur Packet Radio Corp.
PO Box 51114
Denton, TX 76206-0114

ADDRESS CORRECTION REQUESTED

SECOND CLASS POSTAGE PAID AT DENTON, TX.

Check your address label for membership expiration date. Your renewal is important!