DI G I C O M

The Newsletter of MAXPAK, The Midlands Packet User Group

DC74 **Sept / Oct 2004**

Node/BBS News
Correct 2nd October 2004

GB7MAX /BLOX Node
The BBS, now using WinFBB continues to perform satisfactorily.
Direct Telnet access to the BBS on Port 4001 remains available. The XRouter Node continues to work well. Telnet access to the BLOX node on Port 2323 is still very much available and is working well.
Contact Chris, G0CNG, sysop, for further information or access password authorisation.

GB7PMB
GB7PMB is currently active on 144.950 MHz, 70.3375 MHz and 432.675 MHz (attended only).
Direct Telnet access to the BBS on Port 4001 is now available. Telnet access to the SALOP node on Port 2323 is also available and is working well.
Contact Tony, G7BUG or Chris, G0CNG, for further information or access password authorisation

GB7WV NODES
All nodes and the UI digipeater are working OK

DY NODES
These nodes are working OK

Any feedback should be sent to Chris G0CNG@GB7MAX

In This Issue

2004-2005 MEMBER'S MEETINGS

Monthly Member's Meetings continue to be held at The **Sir Robert Peel Public House**, located on the main A4124 Bell Lane adjacent to the Lichfield Road / Broad Lane Junction and traffic lights (opposite the old Tildesley Ford Garage).
A to Z Reference: Square 7G, Page 25.

The next meetings, all at the Sir Robert Peel at 20.00 hrs in the Lounge Bar are:

Wednesday 6th October 04
Wednesday 3rd November 04
Wednesday 1st December 04 (Christmas Social)

We hope you may be able to pay us a visit at one of these meetings. You will be most welcome!

CHAIRMAN'S JOTTINGS

Greetings all after a very wet and indifferent Summer. Firstly please accept my sincere apologies for the lateness of issue of DC74. This has been due to both holidays and also my having to prepare for a big OFSTED Inspection at work in two weeks time, leaving little spare time for radio related things.

Nothing much to report over the Summer. During mid August, our main GB7WV Node system at Mander Centre in Wolverhampton survived a lightning strike unscathed. This same strike set off the Mander Centre fire alarms causing the whole of the Mander Shopping Centre in the centre of Wolverhampton to be evacuated! Thank goodness that the antenna set up on the roof is well bonded to a superb earthing system provided by other commercial users who also share antenna space on the roof. The same storm passed over Kidderminster 30 minutes earlier and caused considerable damage to some of G8PZT's KIDDER TNC's and also took out her Cable modem too. To Paula's credit she was fully back on air by a week later.

Sunday 5th September saw Maxpak attending the annual Telford Radio Rally held at the RAF Museum in Cosford. The day was blessed with blue skies and hot sunshine and was a great success. Thousands attended on such a good day.

During October Half Term week, I am planning to upgrade the GB7MAX/BLOX computer from its present 350 MHz machine, now nearly 6 years old to my own 1GHz machine, which I am upgrading this month to a brand new state of the art system with a flat screen TFT monitor. Hopefully this should speed things up at busy times when the present machine flags somewhat under the load.

I also intend to close down the APRS Port on the BLOX node and replace it with a brand new TCPIP 9K6 User Access Port on the 2m band. I intend to open up this new port on 144.825 MHz. Watch this space for further developments.

Meanwhile our monthly natter-night social meetings continue on the first Wednesday of each month at the Sir Robert Peel Public House in Bloxwich, to which you all are cordially invited.

We are hoping once again to have a Christmas Social during the December Meeting; more details closer to the date.

73's to you all.

Chris G0CNG Chairman and Sysop GB7MAX.

www.maxpakgb.org.uk

Minutes of the UK Amateur Packet Radio Conference 2004 (Held in Worcester on Saturday 15th May)

Part 3 - Items 4-7 (Talks)

Item 4 - Presentation: - Amateur Radio Messaging and Paging System
Speaker: Paula G8PZT (on behalf of Phil Cadman, G4JCP)

Paula explained that the presentation was being given on behalf of Phil Cadman G4JCP who couldn't attend the conference, but whose ideas on what is a new packet radio system closely resembled a project she had been working on for the last 3 years.

Amateur Radio Messaging and Paging System (ARMAPS) is a proposed protocol about how AX25-compatible data can be passed efficiently over radio links so as to support both new and existing packet applications. Being merely ideas at this stage, no software or hardware exists, although a development board is in preparation.

The focus of ARMAPS is on one-to-one QSOs, rather accessing BBSs, DX Clusters, ARPS, etc. The problem with packet QSOs is the need for acknowledgements. The AX25 protocol can handle unconnected message packets, but UI frames are not acknowledged, so you don't know whether they've got through or not. It doesn't matter with APRS; packets are continually transmitted at regular intervals. But a single message needs an acknowledgement.

Paula explained the thinking that packet needs not just one protocol but a whole suite of related protocols, each protocol being optimised for a specific task or radio channel. Similarly, the protocols should be made available for several micro-controller, modem and memory configurations, so the hardware too can be designed and optimised for a given application. Both hard and software should be as simple as possible, so long as the efficiency of the system is not impaired, nor its potential for expansion compromised. Moreover, unlike APRS for example, the system should not be owned or controlled by any one person or group; it should be completely open for anyone to develop.

The specific novelty of ARMAPS is the introduction of messaging and paging to amateur packet radio. In both cases, messaging and paging would use numbered but unconnected packets - messaging would employ packets which are directed to a single recipient who acknowledges each

packet, and paging would use packets which are not acknowledged and so may be directed to any number of possible recipients.

The proposal also considers how to reduce considerably the problem of packet collisions during data transmission over radio links. The ARMAPS protocol would avoid collisions by two methods: Firstly by not having a "free for all", and secondly, where a free for all is unavoidable, having very low channel occupancy, say less than 10%. ARMAPS would achieve this by using a protocol whereby one station would actively control the flow of packets on a channel, in the same way as on voice nets, where the net controller decides who can speak at any one time.

To allow new stations to be able to join in, and to let stations already in the net signal their departure to the net controller, the example of emergency services could be adopted, whereby a full-duplex base station indicates to other mobiles when a mobile is transmitting (the pip-pip-pip sound).

Concentrating firstly on paging packets, Paula outlined the transmission protocol whereby these packets would be sent from one to seven times. Packets would be transmitted in the sequence they are received from the application, and each packet would only be transmitted when the previous packet has been transmitted the designated number of times. She ventured that we should look at adding FEC to paging packets to make them more resilient.

Paging packets would normally have relatively few data bytes to minimise packet loss and assist those hardware applications that might have small amounts of RAM. Moreover, as paging receivers may well have battery savers, paging transmitters should always transmit two seconds of unmodulated carrier before transmitting data.

The system software does not explicitly acknowledge paging packets, however the applications programs that use them can acknowledge them. Paging packets can be used for any purpose and they can be fast, because with no waiting for acknowledgements, they can (potentially) be sent one after another with no gaps.

Paula turned next to the basics of messaging packets. Like paging packets, messaging packets would also be sent from one to seven times. And again, there would be only one packet outstanding at any time. If an acknowledgement weren't received within a pre-set time, the packet would be sent again. There should be no need for wasteful Receive-Ready packets as in AX25, since the loss of a packet should be very much the exception.

Full-duplex point-to-point links might have more than one packet outstanding, perhaps two or three, as one packet could be transmitted while an acknowledgement for the previous packet was being received.

Not waiting for the corresponding acknowledgement would mean that there need be no gaps between transmitted packets. Transmitters on full-duplex links would not cut carrier between packets. They would only cut carrier when there had been no packet traffic for 30 seconds or more.

Paula then went on to describe the proposed packet format. Like AX25, the packets envisaged under the ARMAPS system would be delimited by the usual HDLC flags and will use bit stuffing and NRZI coding. The first byte after the opening flag would be a packet type identifier. Chips like the 85C30 can be instructed to look for a specific address or group of addresses and would only respond to packets with those addresses. The first address byte of an AX25 packet always has the LSB clear, so if we always set the LSB in the ARMAPS packet type byte, then ARMAPS TNCs can distinguish between the two protocols. Hence we can have a TNC that can handle both AX25 and ARMAPS packets.

All ARMAPS paging packets would have the top bit set. And paging packets that begin binary 1111xxxx, would be reserved for internal system use. Paging packets with a type code of 0x80 to 0xEF would be user-definable. If the top bit of the packet type byte were clear - 0x00 to 0x7F - then it would be defining a messaging packet. All codes are user definable.

To allow for very long callsigns, such as those used when you operate abroad, the source and destination address fields of ARMAPS packets would be of variable length, up to twelve characters long. Characters would be 7-bit plain ASCII, and the 8th bit would be zero. For paging use, the destination callsign could be any word, and paging receivers could be instructed to only respond to that word. This would allow paging users to share a channel.

The SSID would be a hexadecimal character 0 to 9, and A to F. The MSB would be set so as to identify the end of the callsign. The other three bits are unused at present. The network entry and exit addresses could be used for digipeating, or they could be the node callsigns of the entry and exit points to a network. If we use the Internet as a means of routing packets around the country, these fields could contain dotted quad IP addresses without the dots. The exit address could be specified by the originator for manual routing, or inserted later by the network software.

ARMAPS' control bytes are not yet finalised. They might hold things like packet numbers, and distinguish data packets from acknowledgement packets. The data field could be zero up to 256 bytes. This will usually be 7-bit ASCII, delimited by ASCII control characters, but some packets would need to carry pure binary so the packet's control bytes will identify binary packets and give the length of the binary payload. Finally, the frame check sequence will use the usual AX25 CRC, over all the bytes between the opening and closing flags.

Paula turned next to the hardware side of ARMAPS. On the messaging side, the hardware could be based on industry-standard 8032 micro-controller devices. An Am85C30 could handle much of the packet formatting, generation and checking. The amount and type of memory required would be flexible so as to accommodate both simple and more complex applications. On the paging side, much simpler hardware will be more appropriate (on cost, size and power requirement grounds), with the Microchip PIC family of micro-controllers, already widely used by amateur radio and electronics enthusiasts, being ideal candidates.

Concerning baud rate of transmission, the preferred option is 1200 or 2400, making it easy to interface any rig or handheld with minimal effort. For 1200 bauds, the FX614 modem chip was suggested, and for 1200/2400bd, the FX469. Samples of each were available for any interested parties.

Paula indicated that it is envisaged that the software for this project will be 'free software', licensed under the GNU General Public Licence. Once the basic protocols have been implemented in software and released under the GNU GPL, individual amateurs will be able easily to add their own specific software modules to provide whatever additional functions they require. As an aid to developing the software side of ARMAPS, Paula mentioned the Small Devices C Compiler (SDCC), which is primarily aimed at the 8032 and related processors. It's free, being released under the GNU GPL, it runs under both Win32 and Linux, and a shiny new version has just been released. It's a proper C compiler that comes with an associated assembler and linker.

Finally, Paula referred to the following, as being sources of further information:

http://www.armaps.org
G4JCP@GB7PZT.#24.gbr.eu
The May edition of “Practical Wireless”

During the ensuing question and answer session, delegates felt that the flag bytes should be readable by AX25, to enable co-existence on joint ARMAPS/AX25 frequencies. Ideally the ARMAPS protocol would be included inside AX25. Paula was encouraged to consider having these ideas presented to the Data Conference in the USA.

Item 5 - Presentation: - Wireless LAN basics for Amateurs
Speaker: Anthony M1FDE (Chelmsford Amateur Radio Society)

Anthony's presentation aimed to show the conference how amateur radio can create a wireless LAN (local area network) particularly on the 2.4GHz amateur frequency, mirroring the more professional applications of this phenomenon.

Illustrating his talk with many graphics, Anthony began by explaining how radio is used as an alternative to wired networks, linking computer systems. He outlined the various "architectures" or ways in which these networks are constructed.

The "peer to peer" approach simply links computers via one-to-one links, whereas access points (to which a cluster of computers are linked) are common. Radio can link computers to access points, or access points to each other, or both. Radio can be used to enable portable computer users to remain in touch with an established network. The preferred network structure is a "mesh" where multiple links are made between computers and access points.

Devices which use wireless to link to (or provide links within) a network were illustrated, including PMCIA cards, USB and PCI devices, personal mobile devices such as WLAN enabled PDAs and WLAN VOIP phones.

Anthony continued his introduction by outlining the protocols currently in use and their associated frequencies and speeds of operation. 802.11 is for 1 & 2Mbps traffic, 802.11b is for 2.4GHz 5.5 & 11Mb/s traffic, 802.11a is for 5GHz 54Mb/s traffic, and 802.11g is for 2.4GHz at 22-54Mb/s. The term Wi-Fi (Wireless Fidelity) is used to describe generically the use of radio for computer networking.

Two methods of wireless modulation were outlined. DSSS (Direct Sequence Spread Spectrum) was one method used. Based on PSK or QPSK (phase modulation), it uses a higher-rate chipping code to widen spectrum, but uses more than the necessary bandwidth. Its advantage is that it provides immunity from narrowband interferers. The second method, OFDM (Orthogonal Frequency Division Multiplex) uses multiple modulated carriers and uses all available bandwidth. The more technical aspects of 1mbps and 5.5mbps CCK modulation were illustrated, from input data to final transmission

Anthony explained that the wireless traffic in a WLAN channel needs to be arbitrated or coordinated. DCF (Distributed coordination function) operates by sensing collisions and backing off, as well as having a contention-resolution phase (as with RTS/CTS), seizing the air around both stations before sending traffic. PCF (Point coordination function) requires access points to manage timeslots. Moreover, the headers of packets are transmitted in common 1Mbps format, after which the modulation is switched for the payload. By these methods, data rates are auto-negotiated and can remain adaptive.

The range of hardware and software compliant with these standards is wide and is an invitation to amateurs to take advantage of the facility for amateur application - using distributed networks, access points connected by fixed links, with routed, bridged or "mesh" architectures.

Anthony then went on to talk about security within the WLAN. WEP ("wired equivalent privacy") is common but easily broken. It prevents accidental access but won't stop serious attack. It requires a shared secret key, but it would be difficult to control its distribution. Also used is 802.11i WPA (AES encryption).

Because amateur radio cannot exchange coded information, the issue of security is a problem. Encryption is not permitted, although the hashing out of password is acceptable. However MAC address filtering is a useful "closed door", despite the fact that addresses can be "sniffed" and cloned.

Moving on to transmit power, Anthony provided various examples. The maximum permitted is 20dBm (100mW), with typical usage being 18dBm (60mW), but with some stations operating as low as 30mW. For receive sensitivity, about 90dBm was suggested, with 80dBm being allowed by the 802.11 specifications. 55dB between transmit and receive was required (on different channels) and a separation of dipoles in the order of 10m was recommended.

Anthony illustrated the various 802.11 Channels, of which 6 fall within the amateur bands, namely:

Ch	Frequency
1	2412MHz
2	2417MHz
3	2422MHz
4	2427MHz
5	2432MHz
6	2437MHz

The range of Wi-Fi was outlined, with the greatest distance (ca. 100m) being achievable when using 1mbps transmissions. The range decreases with the speed of transmission, dropping to around 20m at 54mbps.

The features and benefits of various antennas and boosters were presented - collinear dipoles, biquads, dishes, disk Yagis, slotted waveguides and chip antennas. The access point hardware Linksys WET-11 (802.11b - 11Mb/s, Interface: 10baseT) was recommended.

Anthony finished by pointing delegates in the direction of G8OTA, as a person with expertise in this area, along with the website www.wlan.org.uk, from where details of a mailing list can be obtained.

Further contacts and links were as follows:

Antennas

http://www.trevormarshall.com
http://www.poynting.co.za/tech_training/diskyagi.shtml

Anthony Martin M1FDE

http://homepage.ntlworld.com/mtn/
http://www.m1fde.org.uk
Email: m1fde@g0mwt.org.uk

Book

"802.11 Wireless Networks" - Matthew S. Gast - O'reilly

Standards

http://www.wi-fi.org
http://www.ieee802.org
http://standards.ieee.org/getieee802/

During the question and answer session, Anthony was asked about the need for CW ID (required if operating unattended) and site clearance (not required). He was less clear on the need for an NoV.

Mention was also made of G0GON in Exmouth who has an interest in this area.

The need to disassemble some WLAN cards to gain access to a hot-wiring point for an external antenna was mentioned, as not all cards have external antenna points.

Item 6 - Presentation: - XARPM (Packet mailbox for Linux)
Speakers: Ian, G6VEY and Colin G1IXV (Sysops of GB7YFS)

XARPM is the acronym for Linux Amateur Radio Packet Mailbox, a joint project between Ian, G6VEY and Stuart, G0LGS, with Colin, G1IXV as a beta tester. The presentation was to show delegates the main features of this software, and was mainly comprised of pictures illustrating the GUI of the program, with accompanying explanations.

The program can be obtained free of charge from www.xarpm.org.uk and is simple to install and configure, particularly for those already familiar with such programs as WinPack and Sally, but also for those familiar with email programs such as Outlook; the interface and functionality of XARPM reflects several aspects of all these.

Beyond the standard functions, XARPM's various servers were alluded to; the address book, the 7Plus server, the module manager, the update manager, the mail editor, etc. Its use of the "Festival" voice/sound server was a point of interest.

The versatility of the program was underlined - including its colour configurability. As well as standard telnet facilities, its monitoring capacity was a strong point, overlaying Linux's own "Listen" facility.

XARPM has users throughout the world, who can make use of its Vconv facility - a converse client, again linked to "Festival", capable of private mode operation.

The program is still in development and the inclusion of password configuration and compressed mail forwarding is planned. However a port to Solaris/UNIX/Windows is not envisaged.

For further information, contact may be made with the author, Ian Haver G6VEY, as follows:

G6vey@gb7yfs.ampr.org
G6VEY@GB7YFS.#26.GBR.EU

Or via the GB7YFS web site - http://www.gb7yfs.org.uk

Item 7 - Presentation: - The current 70cms situation
Speaker: Nick G6AWT (Committee member, Fourpak)

Nick had been asked to report to conference the latest news about the restrictions in force in the 70cms band, given that for several months now no site clearances were being granted to amateur applicants.

Nick reported that the origins of this restriction apparently lay in East Anglia where a major installation was being planned by the MoD on behalf of a third party. This third party had requested there to be no further 70cms activity.

The MoD had asked the RSGB for information about amateur activity in the 70cms band, but this request had been declined on the grounds of data protection. The blanket ban by the MoD on further clearances had followed this refusal.

Geoff Hoon had been asked to justify this UK-wide ban - particularly since existing 70cms activity was being allowed to continue unrestricted - but no answer had been supplied at the time of the conference (a month or so after the question was raised). The possibility of a question in the House was mentioned.

Some PMR users had been affected by this ban - with some being taken off air - and there were some lawsuits against the MoD occurring owing to loss of business.

Nick went on to mention that the support of OfCom could not be enlisted, as the organisation has no control over that part of the spectrum. He also commented on the nature of the organisation, observing how various departments were concerned with policy alone (but were ignorant of RF matters) whereas other departments were engineering only (and found themselves sometimes constrained by the decisions made by RF-ignorant policy makers).

He also outlined the plan to liberalise the 2.0-2.4GHz band and make it a licence exempt section. Telecommunications companies would be free to use up to 40dBW (10,000W) in this band, as they develop 3rd/4th generation mobile technology. The amateur participation in the 2.3GHz area is therefore potentially under threat.

Finally Nick mentioned the plan to bring forward the shutdown of analogue TV broadcasts. Affected users would most likely be given digital-to-analogue converters. Of interest to amateurs is the freeing up of the slots in the existing TV bands, and it was hoped that the RSGB would be asking for a couple of 1MHz slots for amateur usage.

Mike Wager
Minutes Secretary

MAXPAK modems price list for 2004/05

Specially reduced prices
Prices include P & P
Whilst stocks last!!

MAX-01 1200 baud PACKET MODEM
Baycom type modem (3 IC's), PCB, circuit diagram & parts list plus all the components required to populate the PCB.
Price £15.00

Ready built and tested modems available £5.00 extra
PRE DRILLED AND PUNCHED CASE including installation kit etc.
Price £5.00

MAX-02 1200 & 9600 baud MODEM.
Sorry, but we have now sold out of kits.
We still have stocks of the PCB plus full construction manual.
Price £5.00
PRE DRILLED AND PUNCHED CASE including installation kit etc.
Price £7.50

Please add £2.50 P & P per complete order to all above prices.

Payment by Cheque or Postal Order.

Sorry, we do not accept credit/debit cards.

Please send all orders to
Mr C Roberts G0CNG
72 Nairn Road,
Walsall WS3 3XB

The MAX-01 has been tested with, Windows 3.1x, Windows95, Windows98 and Windows ME
The MAX-02 will **NOT** work with Win 3.1x but has been tested with, Windows95, Windows98 and Windows ME

MAXPAK who's who?

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All sales items available from Chris G0CNG, see left.