

# DIGICOM

The Newsletter of MAXPAK,  
The Midlands AX25 Packet Radio  
User Group

June / July 2009



## DC93

### In This Issue

Forthcoming Members Meetings	1
Chairman's Jottings.	2
Node / BBS Info	3
WHAT IS APRS? Article by Iain G7III To accompany his talk On 1 <sup>st</sup> June 2009	4
MaxPak Lan	12
MaxPak Who's Who	13

### Forthcoming Members Meetings

Monthly Member's Meetings to be held at the pub  
"One Man and his Dog", Turnberry Road,  
Bloxwich WS3 3UB, just around the corner from  
the old qth, off the A34 ([MAP](#))

All meetings commence about 19.45 hrs in the  
Lounge Bar.

**1<sup>st</sup> June APRS Demo**  
**(Note – See article)**

**6<sup>th</sup> July Natter Evening**

**3<sup>rd</sup> August Natter Evening**

We hope you may be able to pay us a visit to one of  
our meetings.

## **CHAIRMAN'S JOTTINGS**

Greetings all and welcome to this edition of Digicom. Please read the article elsewhere about the presentation being given by our new member, Iain G7III about APRS at our June Meeting on Monday evening 1<sup>st</sup> June. Please do come along to support Iain if you are able.

An interesting problem cropped up recently with my 23cms link from GB7MAX to GB7WAL. Since opening the link earlier this year, the antenna was located in my loft. I have recently had work done on my roof involving replacing some sections of tiles and worn out roofing felt with the breathable synthetic "felt". When the tiles in front of the 23cms antenna were replaced, the link to GB7WAL virtually died. After lots of head scratching, I discovered that the new tiles fitted contain graphite! Hence the tiles were acting as a pretty effective RF screen at 23cms.

The only satisfactory solution was to move the antenna outside and it is now mounted on my main mast under the 2m/70cms User Ports Collinear where it is once again working well. Something to consider if any of you have re roofing work done and use antennas inside the loft.

Nothing much else to report at present.  
Wishing you all 73 until the next issue.

Chris G0CNG  
MaxPak Chairman and Sysop GB7MAX.

[www.maxpak.org.uk](http://www.maxpak.org.uk)

# Node/BBS News

Correct 1<sup>st</sup> June 2009

## GB7MAX /BLOX Node (Bloxwich)

The BBS/Node, using WinFBB/ XROUTER continues to perform satisfactorily. Direct Telnet access to the BBS on Port 4001 and to the BLOX node on Port 2323 is available.

Contact Chris, G0CNG, sysop, for further information or access password authorisation.

Current R.F. user access to both BLOX and GB7MAX is as follows:

**2m 144.9375 MHz 1K2**  
**70cm 432.675 MHz 1K2**

## GB7WAL (Walsall)

This BBS continues to perform satisfactorily. User ports as follows:

**2m 144.850 1K2**  
**2m 144.975 9K6**  
**70cm 432.650 1K2**

## DUDLEY GB7DN (XROUTER) NODE (Dudley)

Sited at the QTH of our Secretary, G4GSB in Dudley. User access is as follows:

**2 m 144.850 MHz 1k2**  
**2 m 144.975 MHz 9k6**  
**70 cm 432.675 MHz 1k2**

## GB7PMB and SALOP G7BUG-8 NODE (Newport, Shropshire)

Sited at the QTH of Tony, G7BUG.

Good signal reports have been received around Newport and Wellington areas.

Direct Telnet access available, contact G0CNG.

R.F. user access as follows:

**2m 144.950 1K2**

*This month's edition of Digicom has been sent slightly earlier to include the following article on APRS.*

*Iain, G7III will be doing a small demonstration and talk on Monday 1<sup>st</sup> June 2009.*

*The following was taken from a power point presentation that accompanies the Talk.*

## **APRS: An Introduction**

**Iain Young, G7III**

[g7iii@g7iii.net](mailto:g7iii@g7iii.net)

### **What Is APRS?**

#### **APRS has been called:**

- “a real-time local tactical communications system”
- “geo-location tool for amateur radio”
- Some big words there, but what do they mean, and what can we use it for?
- But first, let's discuss the differences and similarities between AX.25 and APRS

#### **APRS and AX.25 Similarities and Differences**

- APRS is a subset of AX.25
- It uses the UI (Un-numbered Information) Frame
- APRS uses the TOCALL to identify what software you are running.  
(See <http://aprs.org/tocalls.txt> for the full list)
- A TOCALL of “APRS” can be used for generic purposes/software
- Some software (UIVIEW) combines the TOCALL and the PATH into one, calling it the PATH

#### **What Is It Good For?**

- Showing the location of stations, and objects
- Showing the range and coverage of stations
- Showing WX data at your location
- Chatting
- You can send and receive messages via APRS
- Propagation Monitoring
- It is very obvious when there is a 2 metre lift on
- It is also possible to determine the direction of the lift
- Sending “Bulletins” of important events/updates

*Pretty boring so far huh?*

## **Objects and Their Power**

- Can be placed on the map by any station
- Can be updated by any station
- Can have any name, but must adhere to AX.25 callsign standards
- Have a Date/Time associated with them, so:
  - You know when an object was at a particular location
  - You can track an object's progress “Advanced” APRS Uses
- Club Meetings / Special Events / Rallies etc can all be placed on the map as an object
- Can advertise where a club meets, and what the programme is that week.
- Eliminate the problem of when a Rally Talk-In station goes off air!
- Repeaters, AX.25 Nodes, TCP/IP Nodes, DX Cluster Nodes etc, can all be placed on the Map with additional info added, such as: Frequencies, Access policies, Operational Status

## **Further “Advanced” APRS Uses - Satellite Tracking**

Place an object on the map showing a particular satellite's longitude/latitude, with information such as:

- AOS (Acquisition of Signal) and LOS (Loss of Signal) times
- Frequency, Doppler shift, Range, at the station sending the object [should be close enough For most local RF stations]
- Operational Status (maybe from the spacecraft telemetry)
- Send “Bulletins” showing the next AOS and LOS times up to x minutes out Satellite (and Remote Digi) Telemetry
- Send temperature, battery charge, current drain, operational status etc “over the air”, so a Remote digi can be monitored from a nice warm sofa (or pub!)
- Severe” Weather Events, Eg:
  - Lightning within x miles of a lightning object. Could well be useful for advanced warning If anyone is considering antenna work, or just wants to disconnect for safety reasons.

## **Even More “Advanced” APRS Uses**

- Direction Finding / Fox Hunting Events
- Reduce the “accuracy” (see the APRS protocol for details) of the position report, (or don't Even send one!), and have folks looking to see which stations can hear the fox by means of Their coverage area

## **“Tactical” APRS Uses**

Some RAYNET groups have found APRS useful at a tactical level.

For example: Imagine Scouts 2/3 day Hike event:

- Checkpoints could be added to the map
- Checkpoints could add or update each team as an object as they pass through their Checkpoint
- SAR (Search and Rescue) vehicles could beacon their location, and add/update a team once They have been found and/or dropped off back on the correct route!
- NETCON/OPSCON would have a tactical overview of all teams, checkpoints, and Personnel

## **Digipeaters and Digipeating**

- As in AX.25, APRS Frames can be relayed through digipeaters
- As APRS is AX.25, this is achieved in exactly the same way, by sending the frame via digi1, digi2, digi3 etc
- Like AX.25 limited 8 hops, due to limitations in the AX.25 protocol
- Like AX.25, APRS has Aliases

## **Aliases**

- What is an alias?
- Just like a callsign that a station responds too
- It is just a label, i.e. a collection of letters and numbers
- BUT it must comply with AX.25 FROMCALL and TOCALL limitations

## **Examples of APRS Aliases:**

- WIDE, WIDE1, WIDE2, WIDE3
- TRACE1, TRACE2, TRACE3, TRACE4, TRACE5
- TRACE6, TRACE7

## **What Is So Special About the Aliases WIDEn-N & TRACEn-N**

- Nothing. Absolutely Nothing
- They are just aliases like any other alias
- However, APRS uses these two aliases for specific digipeating purposes
- The number before the dash is used to say how many times the packet will be digipeated (hop count)
- The numbers after the dash are actually SSIDs, and indicate how many hops the packet has left to travel before it is dropped (Time-To-Live)

## **Other (Obsolete) APRS Aliases**

Documented here for reference only

### **Do NOT use them**

- WIDE with no number.
- RELAY. Use WIDE1-1 instead, or set n-N to the number of hops required. RELAY got digied and digied and digied and digied for ever...
- Digis should “alias” RELAY to WIDE1-1, thus treating it the same

## **UITRACE and UIFLOOD**

- These two parameters control digipeating behaviour
- UIFLOOD will digipeat a packet, and reduce the -N by one, e.g.:
- Received Packet: G7III>APRS, WIDE3-3...
- Retransmitted Packet: G7III>APRS, WIDE3-2...
- Second Hop Retransmitted Packet: G7III>APRS, WIDE3-1...

- UITRACE will do the same, but add the digipeater's callsign the packet path, e.g.:
- Received Packet: G7III>APRS,WIDE3-3...
- Retransmitted Packet: G7III>APRS,WIDE3-2,DIGI1...
- Second Hop Retransmitted Packet: G7III>APRS,WIDE3-1,DIGI1,DIGI2... NewN-n Paradigm
- Sets UITRACE to WIDE3, WIDE2, WIDE1
- Limits hop count to 3
- Pure N-n rewrites packets with hop counts greater than 3, and re-transmits them as WIDE3, Or WIDE2-1 or however the digi has been configured
- Deployed in the US in response to channel congestion

## **Original UK Settings**

- Sets UITRACE to TRACE
- This means that TRACE1 thru TRACE7 is digied
- Digi stations often set UIFLOOD to WIDE
- This meant that sending a packet via TRACEn-N would show the entire path that it took to Get to you
- While a packet sent via WIDEn-N would the same number of hops, but not record the path Taken.

## **The Situation in Europe**

- Some countries used the Newn-N paradigm as deployed in the US
- Some countries used the UK's TRACEn-N model
- Others used the older pure WIDE (no number), RELAY, or some combination
- In November 2008, IARU Region 1 met at Cavtat, and recommended that Newn-N was Deployed Europe Wide

## **UK Opposition**

There was much opposition to this in the UK, for many reasons.

Some of the reasons were:

- Limited to 3 hops. This is not appropriate for most areas of the UK. It is too short.
- Packets longer than 3 hops would be rewritten, overriding the intent of the sender of the Packet

## **The Compromise**

In “typical” British style, a compromise was suggested:

We adopt WIDEn-N (up to 7 hops) as UITRACE

- This means that any packet sent to WIDEn-N would be traceable
- We do not drop or re-write packets with a hop count >7
- We can still send packets to a maximum of 7 hops, rather than pure WIDEn-N's limit of 3 Hops
- We adopt TRACEn-N (up to 7 hops) as UIFLOOD
- This means any packet sent to TRACEn-N will be digipeated, but not traceable

## **The Compromise Continued**

- Digis “alias” RELAY to WIDE1-1, so packets get RELAYed, but we don't have the Bouncing duplicate packet issue

## **The Compromise: The Implications**

The compromise settings give us:

- Compatibility with the rest of the world
- The ability to keep our longer paths
- Ironically, TRACE is no longer guaranteed to be traceable in the UK, while WIDE is!!
- Some software can only handle one alias in the UITRACE field.
- Other software can handle multiple UITRACE and UIFLOOD aliases

*(G7III suggests adding both WIDE and TRACE to UITRACE if you are running a digi and your digi software allows!!!)*

## **So What Packet Paths Should I Use?**

- Direct packets (no digi) should be sent simply to AP\*
- (where AP\* means the correct TOCALL listed at <http://aprs.org/tocalls.txt>)
- Use WIDEn-N for packets you wish to be digi'd
- Packets you want to be digi'd should be sent to AP\* (again see list above),

## **Via WIDEn-N where:**

n-N must be between 1 and 7 that achieves what you want, and no more.

### **Consider:**

- How far your packet will go.
- If you are on the south coast, is someone in Aberdeen really going to be able to work your Local 70cms repeater?
- Both n and N should be the same value when you transmit the packet.
- Let the digi do the reductions. Don't try and be clever here, it just causes confusion!

## **What are HF Gates, IGATES, and Sat Gates?**

- Relay data to/from HF, The Internet, and the APRS satellite fleet respectively
- The term is also sometimes used to indicate a station that receives on HF (or satellite) and Retransmits on 144.800 (or the APRS satellite frequency of 145.825)
- Not a digi, however digi functionality is often integrated to the software or device Anyway, leading to what you could call “Hybrids”

## **HF Gates**

- HF Gates relay packets from HF (usually 10.147) to the internet (or VHF)
- Debatable value of general HF to VHF relaying.

## **When relaying HF to VHF, Consider:**

- Relevance: Is a station in the Ukraine really of interest or use to the local VHF APRS Community?
- Will they even see it on their maps, or will it be just another AX.25 packet on the channel?

## **Hop Count:**

- Consider how far afield a station would be useful to the enlarged VHF APRS community?
- Consider restricting to POSIT (Position) packets, known travelling folks, and messages To/from people within your VHF RF range.
- Do **NOT** do general relay from VHF to HF. You will clog the 300 baud channel. It is one Quarter of the bandwidth of VHF, and covers a much wider area!

## **IGATES**

IGATES relay packets to/from the Internet.

Perfectly acceptable to relay all packets from RF to the internet

But if relaying packets from the internet to RF, consider:

- Licensing requirements
- Interest and relevance to your local RF Area.
- Is it worth sending a packet about a station in Kirkwall if you are in Land's End?
- Will anyone in the area be interested?
- Hop counts: Again, if you are in Land's end, and send a internet object with a WIDE7-7 Packet, are folks 7 hops away really going to be interested?

*I would personally suggest a maximum of 1 or 2 hops, dependent on your local circumstances.*

## **Sat Gates**

Relay packets to/from the APRS Satellite Fleet to the internet

- Currently ISS, and PCSAT if it's in sunlight, sometimes AO-51 (check schedule).
- GO-32 if it is still with us
- More small APRS satellites being built could also digi to/from the local VHF Channel,

But:

- Consider Range. Do your local users really want to see a station in Spain that 5 minutes later they can't work because ISS has moved?

So if you do this, limit to local stations to you. And only Space to 144.800, don't spam ISS with your local 144.800 traffic. You only have a 5-10 minute window at best. **Anyway;**

- This can be achieved by using filters, and an extra IGATE/digi server instance
- See <http://aprs.org/astars.html> for more ideas and details

## **So what are the differences between the different “Gates”?**

Pretty arbitrary, and folks do use the terms interchangeably sometimes, but a rule of thumb:

- It's a <something>gate if it sends to/from the internet
- It's a digi if it implements the digipeating algorithms, and relays on RF
- It can do both on the same box, at the same time.
- (and yes, a HFGATE doesn't fit these rules as its first use was a HF->VHF relay)

## **APRS Software**

- Available for multiple operating systems and devices
- Comes in many flavours:
- GUI software such as AGWTracker, UI-View, and Xastir
- Dedicated TNC Firmware (TMD7x0, TinyTrak2, Tracker2 etc)
- Dedicated Digi/IGATE/HFGate/SatGate software such as
- JavAPRSSrvr, aprs4r, digi-ned, aprsdigi etc
- Don't discount the Linux AX.25 command line tools, they can be very powerful for  
Generating packets, especially objects

## **So what software can do what?**

Not all software can do all functions, so use the right tool for the right job

- For user interaction, use AGWTracker, UI-View, or Xastir
- JavAPRSSrvr can function as a digi, an [I|HF|SAT]GATE, or a combination and link to D Star, as well as store packets in a database
- Aprs4r can act as a digi, and an [I|HF|SAT]GATE, or a combination and can send out Objects at pre determined periods
- Digned is a pure digipeater, as is aprsdigi
- The Linux command beacon can be used to send POSIT packets, Objects, or Bulletins, Although you will often need to combine it with scripts

## **Licensing Considerations**

A few notes on licensing issues:

### **Digipeating:**

- Needs a NoV to your licence (see Clause 14)
- Must be frequency cleared for 144.8 (part of the NoV process)
- IGATING:
- RF to Internet: no issues
- Internet to RF: NoV required, but you get it with the digipeating (packet node) NoV
- APRS Trackers (Transmit Only Devices) are considered as beacons

## **Further Information**

- <http://aprs.org> - A wealth of info here, if US centric, but think concepts, not specifics
- <http://www.apritch.myby.co.uk> - Andy Pritchard's UK APRS Site
- <http://aprs.org/tocalls.txt> - A list of the TOCALLS you should use in your APRS packets.
- <http://groups.yahoo.com/group/APRSUK/> - UK APRS group at yahoo
- G7III is available via email at [g7iii@g7iii.net](mailto:g7iii@g7iii.net)

## **APRS Protocol Links**

- The APRS protocol is at: <http://info.aprs.net/index.php?title=Protocol>
- But also check out the addendum's at:
- <http://aprs.org/aprs11.html> (version 1.1)
- <http://aprs.org/aprs12.html> (version 1.2)
- Read the protocol to see exactly what types of packets you can send

## **Software Links**

- GUI Software:
- <http://www.agwtracker.com/>
- <http://www.ui-view.org/>
- <http://www.xastir.org/>
- Command Line (mainly Linux) Software:
- JavAPRSSrvr has its own Yahoo group at <http://groups.yahoo.com/group/javaprssrvr/>
- Aprs4r is at <http://www.aprs4r.org>
- Digined is at <http://digined.pe1mew.nl/>

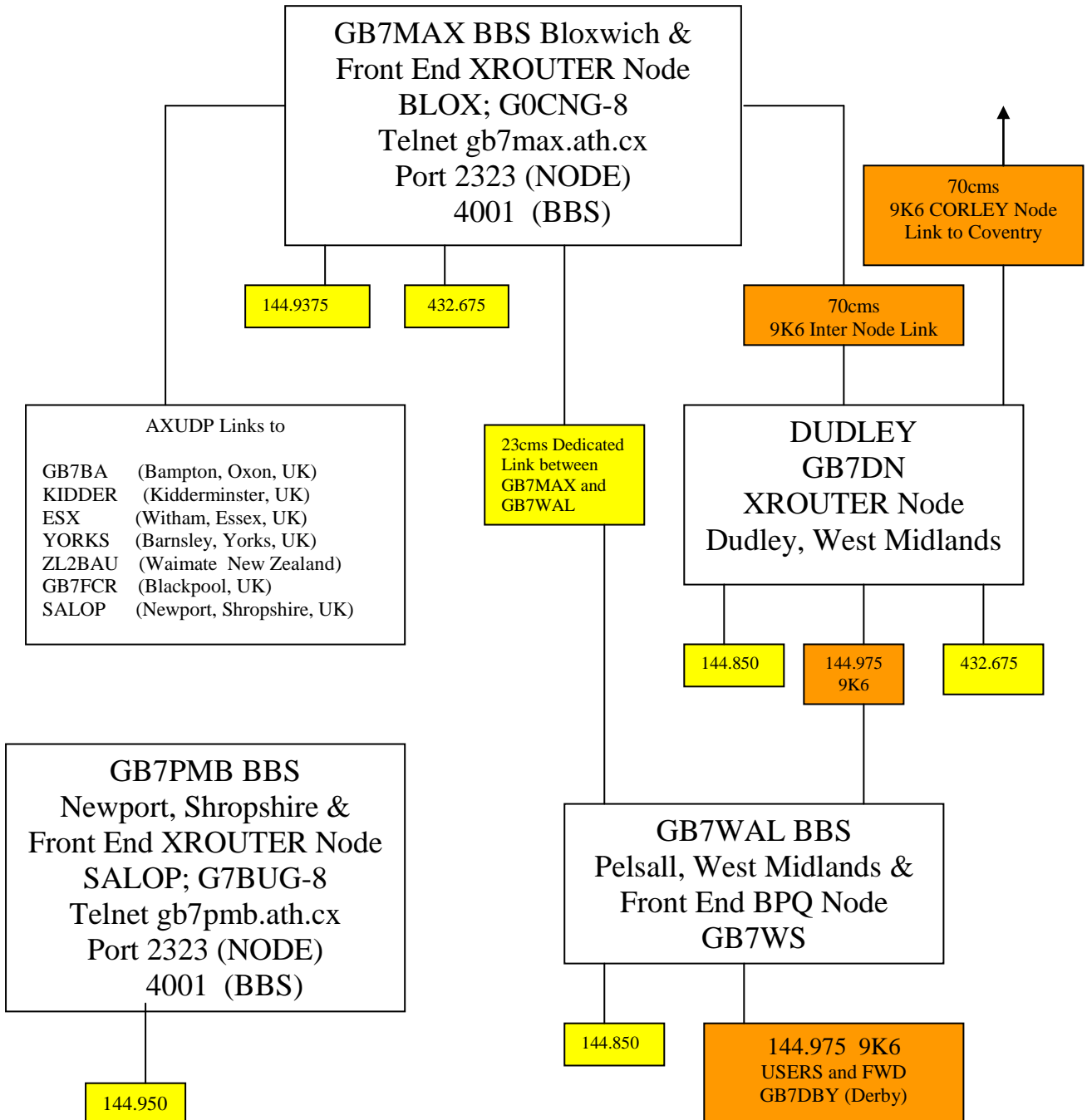
# **Any Questions?**

Contact Iain at [g7iii@g7iii.net](mailto:g7iii@g7iii.net)

See you at the next MAXPAK meeting on June 1st for the demonstrations!

# The MaxPak Local Area AX25 Network - June 2009

1K2 user ports in yellow, 9K6 users ports in brown



## **2009 - 2010 COMMITTEE MEMBERS**

### **Chairman and Membership Secretary**

Chris G0CNG QTHR or @ GB7MAX

[chris.g0cng@nasuwt.net](mailto:chris.g0cng@nasuwt.net)

Tel: 01922 494680

### **Secretary**

Miles G4GSB @ GB7MAX

SysOp GB7DN

[g4gsb@btinternet.com](mailto:g4gsb@btinternet.com)

Tel: 07703 338752

### **Treasurer**

Albert G0KFS @ GB7MAX

<mailto:albertg0kfs@raynet-uk.net>

Tel: 01922 409705

SysOp GB7WAL Dave G7BNK

G7BNK @ GB7WAL

[david.g7bnk@talktalk.net](mailto:david.g7bnk@talktalk.net)

01922 685953

### **Webmaster**

David M0DCM @ GB7MAX

[dave.maydew@btinternet.com](mailto:dave.maydew@btinternet.com)

Tel: 01902 609339

### **Digicom Editor**

Miles G4GSB / Dave M0DCM

Details as above

[www.maxpak.org.uk](http://www.maxpak.org.uk)