

# PropNET: A Proposal for an APRS-based Propagation-Research Tool

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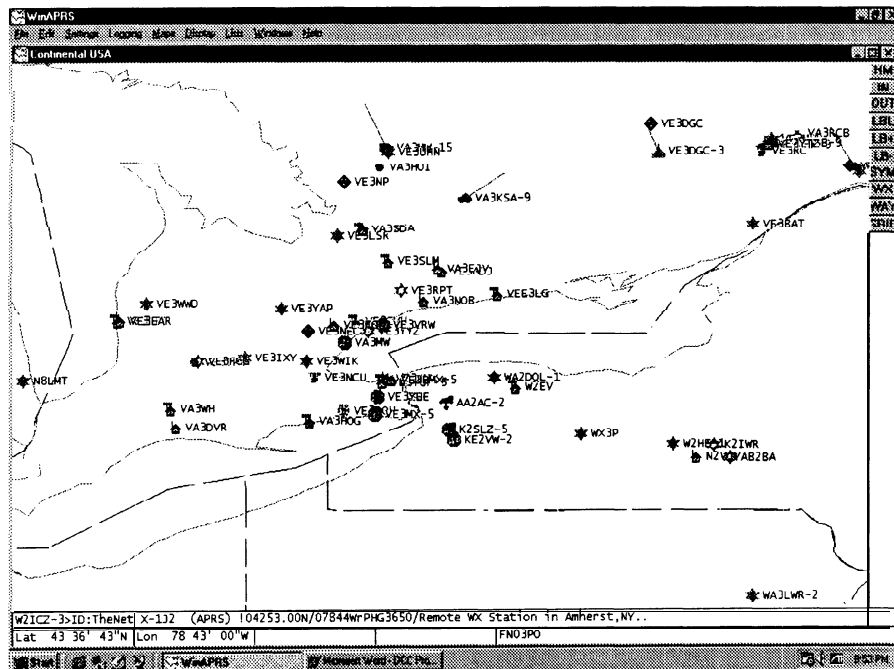
When does the band open? Over what paths did the opening occur? Was it open to more than one location at the same time? Wouldn't it be nice to have been alerted to the opening, while it was in-progress? Wouldn't it be nice to "log the opening", and "re-play" it at a future time? With a minimal investment in equipment and software, you may be able to answer these questions for yourself!

## Introduction

Automatic Position Reporting System (APRS <sup>1</sup>) protocol utilizes unconnected AX.25 packets from Terminal Node Controllers (TNC's) to beacon data. To date, APRS is used effectively to broadcast data such as weather information from data-ready weather stations and, when attached to a Global Positioning System (GPS), mobile stations may be tracked – in real time – on maps displayed on computer screens. Even balloons can be equipped with similar electronics, making their tracking easy.

<sup>1</sup> APRS is a trademark registered by Bob Bruninga WB4APR, WinAPRS and MacAPRS is a trademark registered by Keith Sproul WU2Z

Yet, the fact of the matter is that a vast majority of APRS stations are home or fixed in location. This is clearly evident in the screen-shot shown on this page. Only 4 moving-station icons appear



on this shot of 144.39-MHz APRS activity in Western New York and Southern Ontario, Canada. The rest of the station-icons belong to home and remote-stationary weather stations. Unless one lives in Southern California, it

is doubtful that anyone would ever see much movement from those stations<sup>2</sup>. For the most part, watching an APRS screen can be akin to watching your antennas oxidize. Until now.

<sup>2</sup> A witticism that was plagiarized from Keith Sproul, WU2Z himself

## Enter – Project: PropNET

One of the features that APRS includes is the ability to trace the path that a received-packet took, in its' journey<sup>3</sup>. The process is quite simple. One uses the mouse to select an icon that has appeared on your screen. You then press the “t”-key<sup>4</sup>. The computer then “t”races the path, for your eyes to behold. The screen-shot on the right is an example of invoking the “t”race function, tracing the packet-path between WA3LWR-2 and W2EV. Note that there is no direct path between these two stations, as the packet “hopped” through other TNC’s in order to be received.

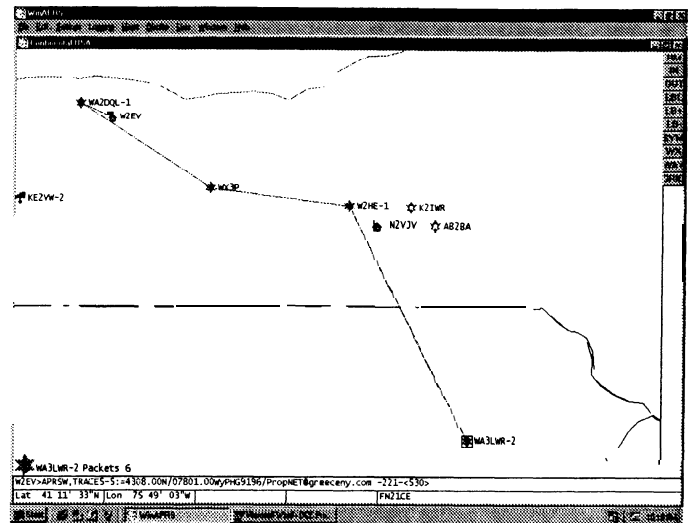
The facts imply that a vast majority of stations are home or fixed in location (yawn). So why not begin APRS operation on a band that is known for long-distance anomalous propagation, optimizing TNC configurations for channelized beacon-type operation with minimum channel-loading? Thus was borne PropNET.

I decided to immerse myself in the world of APRS, to learn the subtleties of the program, to see if there were any other features that could be pressed to PropNET use. Indeed, there were. APRS has the ability to display icons for stations only if they were received *directly* (without being digipeated). The program may also be setup to run in the background, and provide the receiving station with an audio alert if a new, DX station were to be received. Another very powerful function of the APRS system is its ability to log all of the activity on the channel, and play it back at a later time!

The push for PropNET was on. There were still several “management” or “non-technical” issues to be resolved. First, determining which band to

<sup>3</sup> The “Trace Command” works properly only if all TNC’s in the path are configured to take advantage of this function. On the 2-meter band, less than half of the operators have configured their stations to do so as of the date of this publication.

<sup>4</sup> This is a command specific to the Windows version of the software, with which I am most familiar



put it on. Another would be to determine the frequency of operation in the band. An equally close third issue is how to configure the TNC’s to properly load the channel if/when the band was to open.

## A Thumbnail Sketch of the Network

There are three proposed “classes” of PropNET stations: Hub, Peer and Client. Hub-class stations are the equivalent of “Wide-Area Trace Digipeaters” in the APRS world. They are digipeaters placed at altitude (building top, mountaintop, etc.), with high power (100+ watts – the more, the better – really!) and good “ears”. Hub’s are given “channel priority” and beacon frequently (every S-minutes or less). Peer-class stations are “almost everyone else”. They are stations, which are attached to computers running a version of APRS software, patiently awaiting a band opening to report. They are given “lower channel priority” than Hub stations.

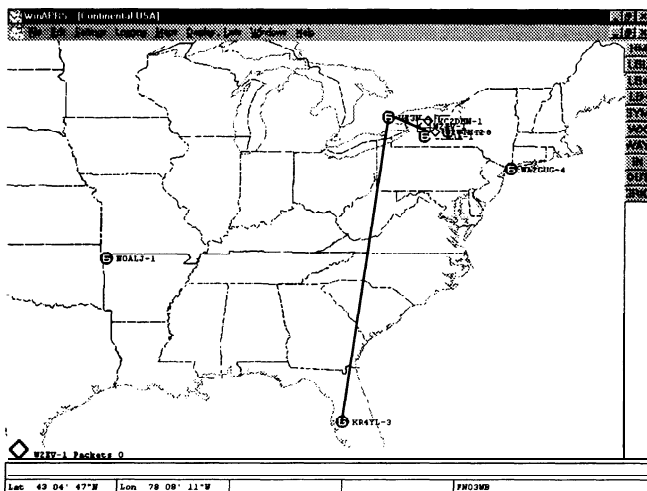
As of the time of this writing, only one TNC manufacturer makes TNC’s that are capable of processing PropNET-tracable packet frames: Kantronics’. Therefore, in order to participate, fully, in PropNET, it is important that you use one of their TNC’s (with ROM version 8.3 or above).

One may participate in PropNET even without a Kantronics TNC. Doing so classifies you as a

<sup>5</sup> Kantronics and KPC are trademarks of Kantronics Corp.

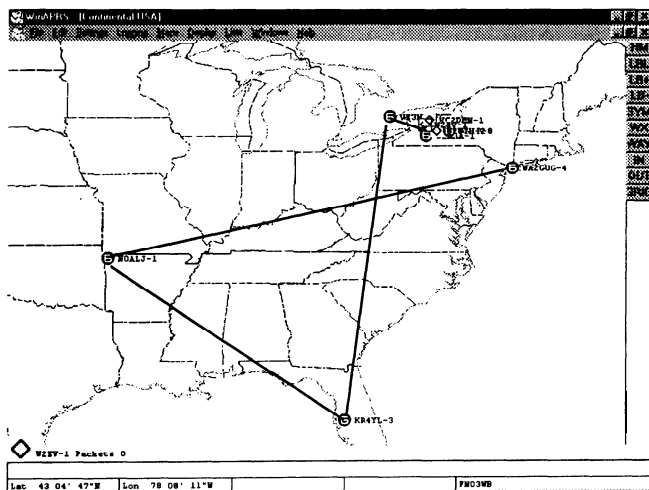


The band just opened! Three Hubs have just popped on your screen. Using your mouse, you point-and-click on KR4YL<sup>8</sup>, press the “t”-key and the following trace appears on your computer screen:



It looks like the band just opened between central florida and Southern Ontario; the packet came from KR4YL through VE3NCU, who digipeated it to W2EV!

Hey, look at the Hub on Long Island, New York. That’s too far to be groundwave, I wonder how we’re hearing it. Point-and-click on WA2GUG’s Hub, press the “t”-trace key, and you get this interesting path-map:



<sup>8</sup> KR4YL and VE3NCU, although active on APRS, are not active on PropNET – yet. :o) W2UTH is used for illustration only.

WOW! What a thought provoking graphic. Under normal circumstances, a station in Ontario, Canada would be aware only of the opening to Florida. The station in Florida would know of the opening to Ontario, Canada and to Northwest Arkansas. The station in Arkansas would know of the opening to Florida and Long Island. Yet, each would be oblivious to the anomalous propagation being experienced in the others’ domain!

The potential power of PropNET is enormous! Couple this with the ability to “log” openings to disk and play them back on demand, and one’s mind boggles (ok.. .so maybe I’m overstating a bit, but it’s easy to get excited about this concept, don’t you agree?).

### Is PropNET for you?

Are you a pioneer? Can you work collaboratively with other enthusiasts, being flexible as to how your station is configured – and willing to make changes for the good of the network as a whole, as need dictates? PropNET may, indeed, be just what the doctor ordered.

The scope of this article was intended to outline a vision for this new experimental service. There are many technical and political issues yet to resolve. To stay up-to-date on the technical issues of PropNET, visit the website<sup>9</sup>. As this is going to press, I’ve gotten communication from Greg Jones – WD5IVD (of TAPR fame), who has agreed to host a PropNET listserve on the TAPR website, to keep us “pioneers” speaking with one voice.

Does PropNET work? No one can say one way or the other – yet. As of press time, only three stations are known to exist, but excitement is building. It is our intent to continue to build the network over the Fall and Winter, so that we can boast a “critical mass” of 6-meter PropNET stations by the time that the 1999 summer Es season kicks into high gear. Join-in as we attempt to make a little history of our own!

<sup>9</sup> <http://www.greeceney.com/propnet>