
-
WB4APR

Updated 25 Nov 08 because the New-N paradigm was adopted 20 Nov 08 at the final plenary of the Cavtat-IARU-Region 1 conference based on the proposal of the norwegian NRLL (paper C5-33, one worldwide aprs-standard). The paper C5_09 of the Danish Radio Society (european-aprs-standard) has been withdrawn by the EDR.

Updated 3 July 2006

Updated 21 Sept 2006

The APRS network in Europe in many areas is unreliable due to the same lack of consistent user settings and network digipeater settings that had evolved in the USA forcing us to finally implement the New-N Paradigm and get consistency and traceability throughtout the network.

See the map on www.aprs.org/newN/NewEU-map.GIF

The following history of APRS paths is important to understand:

RELAY was simple digipeating but NO dupe checking
WIDE was simple digipeating but NO dupe checking*
TRACE simple digipeating but with call substitution & no dupe ck*
WIDEn-N was N flooding with DUPE-CHECKING, but no traceability
TRACEn-N was N TRACEing with DUPE-CHECKING and with TRACEABILITY.

For Optimum operation, APRS networks need n-N Hopping, Dupe Checking and path Traceing.

To eliminate huge numbers of dupes, the first step is to eliminate RELAY, and WIDE and TRACE paths. Next we needed to get n-N hopping and Traceing at the same time. Since 90% of all users were already using WIDEn-N, and since it is extremely difficult to get tens of thousands of users to change their habbits, it was clear that there was only once answer. That is, to move WIDEn-N support over to the Traceable parameter and eliminate TRACEn-N.

Doing it this way, had no impact on the users at all. And only the digipeaters had to change. And the change could be done one-at-a-time with no impact on users. Slowly the system would become one universal standard "WIDEn-N" everywhere and fully Traceable at the same time.

Since we had to change the parameters at ALL the digis to get rid

of RELAY, WIDE and TRACE anyway, it was just as easy to implement number 2 above. Once we put WIDEn-N into the fully-traceable UITRACE function, then there was no need for the "TRACEn-N" any longer. So this then left UIFLOOD unused. So we put the STATE or LOCAL or REGIONAL alias of SSn-N in its place so that the "untraceable" UIFLOOD parameter would still be useful without adding QRM out of the area. In Europe these regions are based on a combination of two iso-standards, ISO 3166-1 country code and ISO 3166-2 subdivision code.

The New-N paradigm in the USA achieved a two to four-fold reduction in dupes and QRM in some regions that had been heavily using the old RELAY and WIDE parameters. This improvement was striking!

NOTE: Admittedly, most European digipeaters evolved after the USA, and so many of them did not have the bad DUPE problem of the old RELAY, WIDE and TRACE because they used more software based TNC's and digipeaters that used the better dupe-checking algorithms that had evolved at that point. But still, there simply is no reason any longer to support all of these original legacy paths. Lets SIMPLIFY APRS! Everything is obsolete except:

WIDEn-N with full dupe-checking and Traceability.

On 20 November 2008, Europe finally decided it was easier to change the digis to Traceable WIDEn-N than to try to convince all the users to change their PATHS to TRACEn-N. At this point, there is no longer any New-EU-Paradigm, as it is now a global New-N Paradigm.

BACKGROUND DATA: To assess the situation a 24 hour snapshot of 94,000 packets was taken in Europe on 17 March 2006 (did not include data from the UK). The data showed the following percentages of those using paths of WIDEn-N or TRACEn-N. It turns out, this was only about half of all paths! The rest were using the obsolete paths of RELAY and WIDE and TRACE! Here were the numbers using WIDEn-N.

WIDE7-7	18%	TRACE7-7	9%
WIDE6-6	2%	TRACE6-6	3%
WIDE5-5	10%	TRACE5-5	4%
WIDE4-4	5%	TRACE4-4	1%
WIDE3-3	36%	TRACE3-3	5%
WIDE2-2	12%	TRACE2-2	1%
WIDE1-1	2%	TRACE1-1	0%
Using both WIDEn-N & TRACEn-N!			5%

The numbers for the UK were similar but they showed a 4:1 preference for using the TRACEn-N system so that they have packet traceability.

The GOOD news: Clearly WIDEn-N was favored *and* about half of the users were being considerate and keeping their QRM down with 3-3 and 2-2 packets. Also this showed that simplifying the network to only use WIDEn-N could be done with little impact to existing users. And simply swapping the WIDEn-N support over to the UITRACE parameter would allow all WIDEn-N paths to be traceable just like we did in the USA.

The BAD news: The biggest LOAD, however, was caused by the huge numbers of 7-7 and 5-5 packets and packets with BOTH WIDEn-N and TRACEn-N in the same packet! For each of these additional hops, the number of QRM copies can triple! And for only a few 7-7 users, they can cause QRM over much of the continent.

Our final suggestion for the New-EU Paradigm was:

- 1) The best path for fixed stations is WIDEn-N (small N, 2 or less)
- 2) The best path for Mobiles is WIDE1-1,WIDEn-N (Small N, 2 or less)
- 3) Educate users to use routine N no larger than their ALOHA area
- 4) Change the digis (swap TRACEn-N and WIDEn-N) so Wn-N is traceable.

IGATE RULES: IGates are also big contributors to the health of the APRS network. They should set their path to their local area only (usually one hop, WIDE1-1) and should not flood their area with unwanted QRM.

New-N Paradigm DIGIPEATER RULES:

- 1) In saturated areas, TRAP large values of N-N by setting call-substitution aliases of WIDE7-7, 6-6, 5-5, etc. These will digi once and then stop further routing.
- 2) Home stations should *not* be digipeaters UNLESS:
 - a) Station is high and is -not- covered by a BIG digi. They should support WIDEn-N, and regional SSn-N.
 - b) -or- Station is needed for a fill-in digi for nearby mobiles who cannot be heard by the big digi. Support ***only*** the WIDE1-1 alias.
- 3) For NETWORK reliability, All digipeaters should:
 - a) Put their PHGxxxx in their position comment
 - b) Put "Wn, SSSSn" in the beacon to show users proper settings
 - c) The SSn shows what regional SSSSn-N they support
 - d) Use the DIGI symbol with "S" overlay to show it is new-N Paradigm.
 - d) -or- use the "1" overlay for WIDE1-1 ONLY home digis.
- 4) Move WIDEn-N support to the UITRACE parameter so that all WIDEn-N traffic is traceable.

- 5) Support for WIDE, TRACE or TRACEn-N should be eliminated immediately to force users to reset their settings. Providing an ongoing crutch for a period will only delay the problem.
- 6) With time, WIDEn-N will become fully traceable as DIGI owners move WIDEn-N support over to the UITRACE parameter.
- 7) Digipeaters should not beacon beyond 2 hops. Use the proportional pathing algorithm for DIGI beacons. That is, set for a local (direct, no hops) beacon rate of 10 minutes. If possible, then also a one-hop beacon once every 30 minutes. Then a 2-hop beacon once an hour.

TRACKERS: All future mobile GPS tracker designs should consider the Proportional-Pathing algorithm that sends 1 minute updates local-direct, every 2nd minute via one hop, every 4th minute via 2 hops and optionally every 8th minute via 3 hops. See www.aprs.org/newN/ProportionalPathing.txt

TIPS:

- Be sure all digis transmit their PHGxxxx and "Wn, SSSn" data
- Use the UI-PHG add-on to see the range and coverage of all digipeaters and stations in your area
- Use UI-ALOHA add-on to see the ALOHA range for your UIVIEW station. It analyses traffic heard by your station to compute that area that is a 100% saturated 1200 baud APRS channel. Keep your N hops within that area.

By simplifying the network to only WIDEn-N and WIDE1-1, WIDEn-N guidance and telling users to limit their N's to the minimum needed in their area, then a vast improvement in reliability and throughput can be achieved in the European System.

For more in-depth understanding, please review the details in the web page:

www.aprs.org/fix14439.html

Good luck!
Spread the word.

de Wb4APR, Bob