

WA8LMF TNC Test CD Results

a.k.a. Battle of the TNCs

Compiled by WB2OSZ, September 2015

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It's not that hard to build something that receives perfect APRS / AX.25 Packet Radio signals. Building something that works well, with all of the less-than-ideal signals out there, takes some effort.

How can we compare how well different TNCs perform under real world conditions?

The de facto standard of measurement is the number of packets decoded from WA8LMF's TNC Test CD obtained from <http://wa8lmf.net/TNCtest/index.htm>.

Many have published the number of packets they have been able to decode from this test. Here they are, all gathered in one place, for your reading pleasure.

WARNING: **Do not take these numbers too seriously.**

There are a few things to keep in mind:

1. These tests were performed by different people, different times, different places, under different conditions.
2. **Most don't mention which track was used. Track 1 is easier.** Track 2 is more difficult but closer to typical real world conditions. Most people are probably using the speaker output. For an explanation, see <https://github.com/wb2osz/direwolf/raw/master/doc/A-Better-APRS-Packet-Demodulator-Part-1-1200-baud.pdf>
3. Some information might be outdated. Newer versions of the same thing might be better.
4. Small differences are not significant. It all depends on the mix of frames in the test. If you took another similar collection another place, another time, the rankings might be a little different. Even under scientifically controlled, repeatable conditions, another 10 packets is only a 1% increase.

Reference	TNC	Unknown Track	Track 1	Track 2
KI4MCW https://sites.google.com/site/ki4mcw/Home/arduino-tnc	Arduino Duemilanove (328p)	871		
	TNC-X	818		
	Argent Data OpenTracker 1+	729		
	AGWPE 2005.127	500		
	Linux PC soundmodem	412		
	Linux PC multimon	130		
http://www.trinityos.com/HAM/CentosDigitalModes/hampacketizing-centos.html#6.softtnc	Soundmodem for Linux			450
N4MSJ http://groups.yahoo.com/group/tnc-x/message/542	KPC-3	986		
	MFJ-1274	883		
	AEA PK90	728		
	Early Beta TT4	920		
4X6IZ http://www.tau.ac.il/~stoledo/Bib/Pubs/QEX-JulAug-2012.pdf	AX25 Java Soundcard Modem		966	964
N1VG http://www.tapr.org/pipermail/aprssi/2007-May/019449.html	Tracker 2	910		
	KPC-3 (non-plus)	967		
	uTNT	970		
	Tracker 2 with TCM3105	991		
	AEA PK-90	728		
	MFJ-1274	883		
Microsat http://microsat.com.pl/product_info.php?products_id=100 http://www.rpc-electronics.com/microsat-wx3in1p2.php	WX3in1 Plus 2.0		960	981
UZ7HO http://www.pe0sat.vgnet.nl/tag/uz7ho/	UZ7HO Sound-Modem 0.83b	1021		
OZ7HVO & OZ1EKD http://www.kissoz.dk/	ARM32M4F TNC platform	994 - 998		
WB2OSZ https://github.com/wb2osz/direwolf/blob/master/doc/A-Better-APRS-Packet-Demodulator-Part-1-1200-baud.pdf	Dire Wolf version 1.2		1011	1004
	Dire Wolf version 1.5		1012	1008
CT1EIZ https://www.facebook.com/aprspo/posts/601800476638754	APRSpro v2.1 (Note 1)		1012	958
	PocketPacket v2.2		964	1
	KPC3 (Flawed methodology)		1043	942
http://vapn.org/design/scs-tracker-dsp-tnc-1200-baud.html	Dire Wolf 1.2		1010	999
	SCS Tracker DSP TNC 1.5s		988	943
DrYerzinia https://hackaday.io/project/2865	BluetoothLE APRS TNC		958	641

/logs				
markqvist http://unsigned.io/the-new-micromodem/	MicroModem		905	
WB2OSZ	KPC-3 plus (notes below)		989	925
	SoundModem by UZ7HO, 0.97b		1027	1022
	AGWPE 415.2013		956	513
http://tarpn.net/t/nino-tnc/n9600a/n9600a_info.html	NinoTNC A2	940		

Note 1: APRSpro uses demodulator from Dire Wolf.

My Test Conditions for Dire Wolf

Using the default demodulator, currently "E+". "Fix bits" option is turned off.

My Test Conditions for KPC-3 plus

Using audio out from headphone jack:

- Track 1 has consistent results across a range of volume settings.
- Track 2 needs much higher volume for good results.

Volume	Track 1	Track 2
20	989	261
40	986	544
60		871
70	987	915
80		913
90		925
100	982	921

Unfortunately, there is not a simple way to know if your radio volume is anywhere near the optimum level.

There was a reported number of 1043 by someone else. That number is mighty suspicious. What could explain this? Monitor mode looks like this:

```
KD6UZM-15>S3UWTS,WB6JAR-10,N6EX-1*: <UI>:
^-)l v\":r}
```

```
N6QFD-9>GPSLJ,N6EX-5*: <UI>:
$GPRMC,013714,A,3408.6360,N,11812.0716,W,0.0,88.1,231105,13.5,E,D*09
N6EX-3>APJI23,N6EX-4,SOCAL1-1: <UI>:
}W6AHM>APRS,TCPIP,N6EX-
3*:@230135z3350.28N/11818.85W_269/010g010t065r000P000p000h64b10155v6
N6EX-3>APJI23,N6EX-4*,SOCAL1-1: <UI>:
}W6AHM>APRS,TCPIP,N6EX-
3*:@230135z3350.28N/11818.85W_269/010g010t065r000P000p000h64b10155v6
```

Notice how there are two lines per frame. I just counted the lines containing "<UI>".

When using matching for something looking like source>destination, for the first test case, I ended up with 1041. This is wrong. Some information parts, including third party traffic, match this pattern. My 1041 is essentially the same as 1043 reported by someone else.

I believe that person's counting methodology was flawed.

My Test Conditions for SoundModem by UZ7HO

Version 0.97b

All default settings for "AFSK AX.25 1200bd". Bits Recovery = NONE.

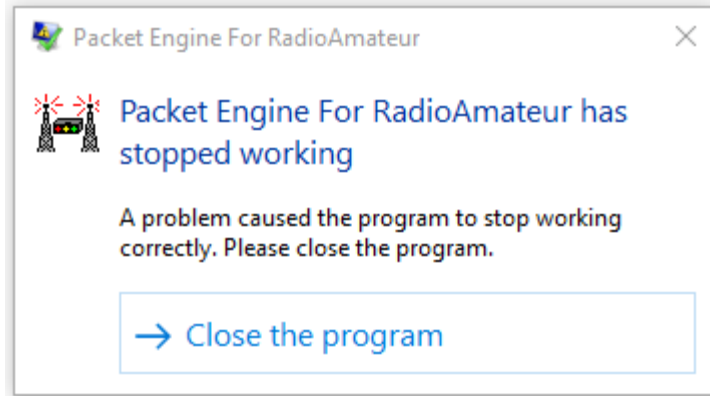
Used a virtual audio cable, skipping the analog audio step. This avoids adding any additional distortion.

My Test Conditions for AGWPE,

Norton anti-virus insisted on removing it.

"Threat type: Insight Network Threat. There are many indications that this file is untrustworthy and therefore not safe."

After configuring Norton to exclude that directory, I was able to start it up. After picking Properties, then New Port, to configure a TNC, I got



The second attempt was successful. Picked soundcard and SinglePort.

Used a virtual audio cable, skipping the analog audio step. Exactly the same way as with UZ7HO.

The logging feature of APRSISCE/32 was used to count number of packets received.

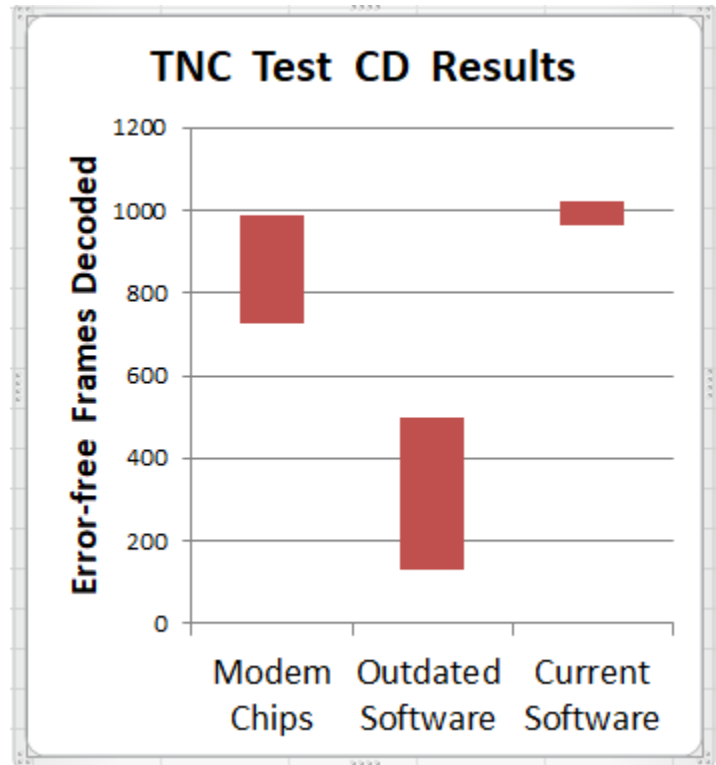
956 for Track 1 is respectable.

Track 2 is a disaster at 513. The earlier report of 500 is close.

Conclusions

If we separate the numbers into 3 groups a very interesting pattern emerges.

- Traditional TNCs with hardware modems.
700's to high 900's
- First generation soundcard modems.
500 and below.
These gave the software approach a bad reputation. You will still find **outdated** articles that insist you **NEED** to buy a hardware TNC for best results.
- Second generation soundcard modems.
Upper part of 900 and over 1000.



A couple decades ago, you needed specialized hardware for the best results.

Those days are gone.

Some of the software TNCs are now leading the pack, leaving the modem chips behind.