The World Below 400 GHz

The Periodical Newsletter of the
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NZART
BRANCH 81

November 2008 Issue

WAIKATO VHF GROUP EXECUTIVE

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General Meeting November 2008

A General meeting of the group has been arranged for
Sunday, 30th November, 2008 at 1.30pm.
at the Te Puke Amateur Radio Club Rooms, State Highway 2, Te Puke.

The meeting will be a "Show and Tell" event.We invite you to bring along a piece of Amateur equipment/apparatus or software etc., that you have built or substantially modified and explain its operation to those present. Please advise the Secretary at:- zl1gwp@nzart.org.nz if you plan to participate

D-STAR

D-STAR (Digital Smart Technology for Amateur Radio) protocols are opening up new possibilities for Radio Amateurs. D-STAR brings digital systems to the amateur bands to create entirely new radio systems and services, just as high speed digital networks led to brand new ways to communicate.

What is D-STAR?

D-STAR (Digital Smart Technology for Amateur Radio) is an exciting new form of Amateur Radio that compliments other parts of the hobby including VHF, HF operation, Contesting and Satellite communications,etc. Utilising digital communication and the Internet, D-Star allows you to communicate worldwide with other operators who are connected to D-Star repeaters.

An Overview

D-STAR, a standard published in 2001, is the result of years of research funded by the Japanese government and administered by the JARL to investigate digital technologies for amateur radio. D-Star is an open protocol – published by the JARL, it is available to be implemented by anyone. Whilst Icom is the only company to date that manufactures D-STAR compatible radios , any equipment or software that supports the D-STAR protocol will work in a D-STAR system.

In a D-STAR system, the air link portion of the protocol applies to signals travelling directly between radios or between radios via a repeater. D-STAR radios can talk directly to each other without any intermediate equipment or through a repeater using D-STAR voice or data transceivers.

The gateway portion of the protocol applies to the digital interface between D-STAR repeaters. D-STAR also specifies how a voice signal is converted to and from the stream of digital data. The D-STAR codec is known as AMBE (Advanced Multiband Excitation) and the voice signal is transmitted in the D-STAR system at 3600 bits/second (3.6kbps)

D-Star Digital Voice and Digital Data

The D-STAR system supports two types of digital data streams. The Digital Voice (DV) stream used for example on 430-440 MHz contains both digitised voice (3600 bps including error correction) and digital data (1200 bps). Using a DV radio is like having both a packet link and FM voice operating simultaneously. The Digital Data (DD) stream, used only on 1.2 GHz is entirely data with a bit rate of 128k bps. The data connection to a radio that uses DV is via an RS-232 interface or USB 1.0. An Ethernet connection is used for high speed DD D-STAR data. Ordinary terminal emulation software (DV) or a Web browser (DD) will be sufficient for exchanging data.

You can find more on D-STAR on the following websites:-

http://en.wikipedia.org/wiki/D-STAR

http://www.d-staruk.co.uk/

http://www.icomamerica.com/en/products/amateur/dstar/id1/default.aspx

However, don't be confused by 'DSTAR' - this stands for Distribution Systems Testing, Application and Research. The focus of which is engineering issues related to electric power distribution in the US.

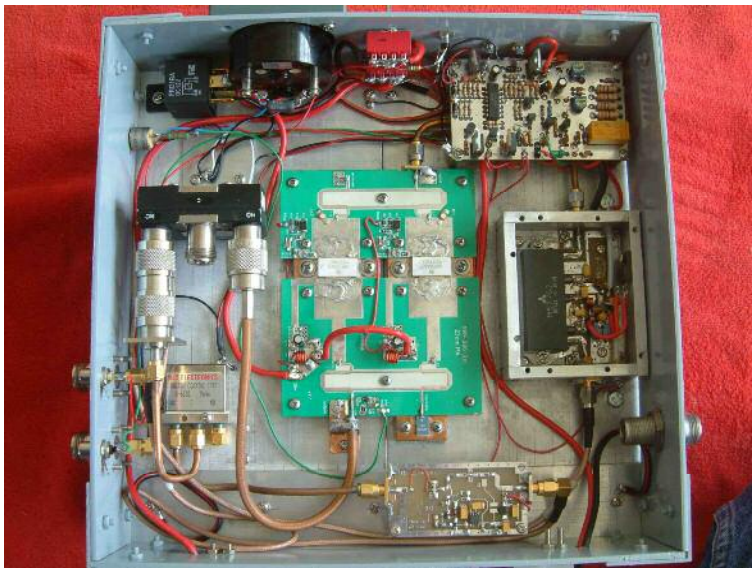
General

Stephen ZL1TPH (a Waikato VHF Group member) has been hard at work in the shack over the last few months. He has spent many, many hours putting together a high performance 23cm station.

Most 23cm stations run from a few mW up to ~ 15 watts. This may be from a standalone transverter, with an optional amplifier module, or an elderly MMT1296, and in some cases a transceiver with 1296 MHz included. The availability of surplus amplifiers and amplifier kits, recently, have allowed many to run higher power than before.

Stephen acquired a W6PQL dual amplifier kit (100+ watts), which he built up and integrated with a Minikits sequencer, Minikits preamp, driver PA, heatsink + cooling. He also had some surplus amplifiers, which he had used, but unfortunately, they have succumbed to excess VSWR.

Stephen uses a Microwave Modules MMT1296 transverter, with a Icom IC202 (which he often advertises for in Break In). An alternative is a Yaesu FT221R, which allows use of FM, and AM.



At the same time, as constructing the electronics, Stephen has built an array of 4 x 30 element Yagis with a gain of ~ 24 dBi. This together with the higher power and preamp allows further distances to be worked.

VHF/UHF/SHF propagation over long distances, over non line of sight paths often uses a mechanism called troposcatter, where signals are scattered from irregularities in the troposphere. This mechanism is always present, but just requires some power (or GOO) as Stephen calls it.

Using a troposcatter calculator (www.bobatkins.com/radio/scatter.html) the scribe found out that signals could possibly be heard in Hamilton, from Stephen's sea level QTH in Orewa. His signals were expected to be 7 to 10 dB above the noise in a SSB bandwidth.

In late October/ early November the scribe set up his modified MMT1296 transverter/ PA and FT290Mk2 outside the garage in a Hamilton suburb . Stephen fired up his equipment and his SSB signals were peaking RS59, with excellent copy. The initial QSO happened to coincide with a "lift" in conditions. We exchanged details, although he needed good "ears" to hear my much weaker SSB signal.
Since that initial QSO, Stephens signals are weaker, as the conditions are "normal" again, but the SSB signals are still copiable at this end. The path from Stephens QTH to Hamilton, has multiple obstructions, due to large moulds of earth and rock in the way.
The calculator indicates that possibly another Microwave band, might be able to carry possibly a CW signal, so some further experimenting is happening.

The scribe has parts for a High Power amplifier, so in the future I might be able to get louder signals towards the North.

The addition of the high performance setup at Orewa has pushed the distance out that Stephen can work to, by perhaps 3 or 4 times. A well equipped and sited station could possibly work Stephen at a much greater distance, while at an intermediate distance, such as Hamilton, the greater Waikato and Bay of Plenty stations could be within range.
Note the path gives weak signals, and SSB/CW is necessary, but FM may be usable dependent on "lift" conditions.

TECHNOLOGY CONVENTION
EASTER 2009
11th & 12th April in Hamilton
Details in next Break-In
and The World Below 400GHz
Email contact: branch.12@nzart.org.nz