THE WORLD BELOW 400 GHz

The Periodical Newsletter of the
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WAIKATO VHF GROUP EXECUTIVE

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General Meeting September 2023

The General Meeting of the Waikato VHF Group will be held on

Sunday, 24th September 2023, 1:30pm

at the Silver Fern Farms Event Centre, (aka Te Aroha Events Centre),
44 Stanley Ave, Te Aroha
Our program will be normal business then a talk by Warren Harris – ZL2AJ on
SOTA (Summits on the Air), APRS (Automatic Packet Reporting System) and Ham Cram.
A sub renewal/joining form can be found HERE.

Repeaters/Beacons

The Waikato VHF Group owns and operates one beacon plus repeaters across six sites covering the Waikato, Thames Valley and Western Bay of Plenty area, with our 'WaiPlenty 2m repeater network' accounting for twelve individual licenses. Each of our radio licences is available for annual sponsorship, see https://www.zl1is.info/sites.html for a list of repeaters, links and beacon currently available for sponsorship. If you'd like to sponsor one (or more) of these, please contact our Secretary (ZL1GWP) or Treasurer (ZL1TAT).

Annual radio license fees are usually our largest single expenditure item, occasionally exceeded by major repairs/maintenance as occurred for Te Weraiti in 2022 and Waihi North in 2018. Funding for all Waikato VHF Group operations depends primarily on membership subscriptions, supported by income derived from trading table sales.

Delivery of Waikato VHF Group newsletter

Commencing with this issue, our quarterly newsletter is being **delivered via email only**. It is therefore important for us to have your up to date email address. To confirm or update your details in our records, simply send an email to branch.81@nzart.org.nz with your callsign in the subject line, and if there's been an address change, place those details in the message body please?

Constitution review

The original Incorporated Societies Act 1908 (yes, 115 year old Act) is being replaced by the **Incorporated Societies Act 2022** which comes into effect in October this year. All 24,000 incorporated Societies in NZ will be required to re-register under this new Act, with the re-registration period running from October 2023 through to April 2026. The Waikato VHF Group's June 2021 Constitution largely complies with this new Act, however we'll need to add a dispute resolution procedure along with several other minor changes.

NZART's Constitution has been reviewed by their lawyers, with the resulting documents published on their web site at https://www.nzart.org.nz/nzart/constitution/draft-constitution Club members should look over these and bring any feedback to our next meeting for us to provide feedback to Council **before September 30th 2023**.

The new 2022 Act in full (all 134 pages) can be found on the Government's web site at https://www.legislation.govt.nz/act/public/2022/0012/latest/LMS100809.html Section 26 of this new Act sets out what needs to be included in a society's constitution, with new requirements introduced for membership, governance, general meetings, amendment procedures, dispute resolution procedures, name, purposes and winding up.

Were you caught in the Electrolytic Capacitor Plague?

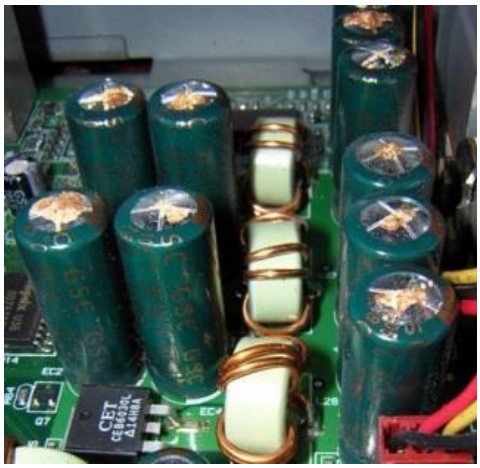
Thanks to Rodney ZL1TFX for the heads-up on this article.

The capacitor plague manifested itself in a higher than-expected failure rate of non-solid aluminium electrolytic capacitors between 1999 and 2007. It is thought that, in 2001, a scientist working in Japan's Rubycon Corporation stole a mis-copied formula for capacitor's electrolyte, and took the faulty formula to the Luminous Town Electric company in China. In that same year, the scientist's staff left China, stealing again the miscopied formula and moving to Taiwan, where they started their own company, producing capacitors and propagating even further this faulty formula for capacitor electrolytes.

The mis-copied electrolyte composition formula caused corrosion accompanied by gas generation, often rupturing the case of the capacitor from build-up of internal pressure. The improperly formulated electrolyte was mostly used in the so-called ecap series of "non-solid aluminium" capacitors with "low equivalent series resistance (ESR)", "low impedance", or "high ripple current" prevalent in power supply construction.

When examining a failed electronic device, failed capacitors can often be recognized by visible symptoms such as:

- Bulging of the capacitor itself or the vent on top of the capacitor. The vent is frequently in the form of a cross scribed on the top of the capacitor's can.
- Visible crusty rust-like brown or red dried electrolyte deposits (see photo right).
- Capacitor casing sitting crooked on the circuit board, due to the bottom rubber plug being pushed out.
- Signs of leaked electrolyte (not to be confused with thick elastic glue sometimes used to secure the capacitors against shock).
- Observing-two short wires where the capacitor used to be, plus possibly burn marks and surrounding components covered with waxy slime.



Failed aluminium electrolytic capacitors with open vents in the top of the can, and visible dried electrolyte residue (reddish-brown colour)

This proved to be an expensive problem for industry, with Dell spending some US$420 million replacing motherboards outright and on the logistics of determining whether a system was in need of replacement.

Further reading:

https://en.wikipedia.org/wiki/Capacitor_plague

Aluminium Electrolytic Capacitors - General technical information:
https://www.tdk-electronics.tdk.com/download/185386/e724fb43668a157bc547c65b0cff75f8/pdf-generaltechnicalinformation.pdf

Capacitor Types Explained: electrolytic, ceramic, tantalum, plastic film (8½ minute You Tube Video):
https://www.youtube.com/watch?v=e3W0kdLodXo

Emergency preparedness

Amateur radio has long been a backstop for communications when all else fails. Recent fires on the island of Maui in Hawaii have again demonstrated the vulnerability of everyday communications infrastructure we rely on. Maui wildfires affected phones, internet, and cell-phone services. VERY limited cell-phone contact was established with Lahaina or its ham operators due to burned fibre lines and few hams in the area. Unlike much of New Zealand where fibre is reticulated underground, a lot of Hawaii's fibre reticulation is via overhead cables strung along poles, making it especially vulnerable. Underground communication circuits on the other hand can be vulnerable to earthquake and land slip.

Cell sites failed after normal electricity supply was disrupted by downed power lines and their back-up batteries ran down, taking down both cell-phone service and internet for those relying on wireless internet. Cell sites can have as little as 8 hours battery backup following loss of normal mains power. Larger network stations and telephone exchanges often have a standby generator capable of keeping the station operational for maybe a week. That gives network operators an opportunity to transport a generator or additional fuel to the site to extend operation, provided the site remains accessible and otherwise undamaged. Wildfires are a particular danger, as they frequently destroy antenna's and their feed systems, sometimes the equipment shelter and its contents too!

Have you ever asked how long your amateur radio station could remain operational after losing mains power? Fully charged hand-held and mobile radios provide a buffer, but then what? If relying on an amateur repeater, how long will that last? Within the WaiPlenty 2m repeater network, both Maungakawa ('5575) and Te Uku ('5675) have standby generators to power those commercial sites. Te Weraiti ('695) and Waihi North ('5475) have approximately 36 hours of (VHF Group owned) battery backup, which will be reduced by higher than normal traffic on the network. National System repeater sites operated by the Waikato VHF Group have comparable levels of backup power. Both the WaiPlenty network and National System have direct inter-site radio links, so apart from IRLP access, are not dependent on the internet for inter-site communication like many of the digital networks are.

SPONSORSHIP OF RADIO LICENCES 2023

Licences costing **$50 each** are invoiced annually to the Waikato VHF Group Inc.

Would you like to assist by sponsoring one or more of our fourteen radio licences?

WaiPlenty Repeater Network

Te Uku

'5675 2m Repeater	145.675 MHz	2023 sponsorship available
Inter-site Link facing Te Weraiti	43x.xxx MHz	2023 sponsorship available
Inter-site Link facing Maungakawa	43x.xxx MHz	2023 sponsorship available
IRLP access Link facing Hamilton	43x.xxx MHz	2023 sponsorship available
IRLP access Link facing Te Uku	43x.xxx MHz	2023 sponsorship available

Te Weraiti

'695 2m Repeater	146.950 MHz	thankyou ZL1GWP
Inter-site Link facing Te Uku	43x.xxx MHz	thankyou ZL1TLQ
Inter-site Link facing Waihi North	43x.xxx MHz	thankyou ZL1TLQ

Maungakawa

'5575 2m Repeater	145.575 MHz	thankyou ZL1AOX
Inter-site Link facing Te Uku	43x.xxx MHz	thankyou ZL1AOX

Waihi North

'5475 2m Repeater	145.475 MHz	thankyou ZL1KL
Inter-site Link facing Te Weraiti	43x.xxx MHz	2023 sponsorship available

ZL1VHW Beacons

Hamilton 2m	144.260 MHz	Off air
Kaimai (Takaurunga) 12cm	2400.260 MHz	2023 sponsorship available

Payment can be made online to the Waikato VHF Group, Westpac account, No. 03 1555 0091289-00 . When paying, please enter your name/callsign and what the payment is for.

Sponsorship of the Licence fee for any repeater, beacon or fixed link does not convey any right of Trusteeship, Ownership or Control of the equipment.

Your reward is having your callsign listed above, plus on our web site at https://www.zl1is.info/sites.html

One NZ and the SpaceX announcement John ZL2HD

One NZ (formerly Vodafone NZ) has announced that our normal mobile phone will be able to send and receive text messages using SpaceX's satellite from late 2024. No new phone, 100% coverage.

Details on the costs and what plans are supported are still to come, but as amazing and far fetched as this whole thing sounds, it seems to be achievable and real. How?

One NZ joins a small group of cellular operators around the globe to make this announcement, others include T Mobile in the US, Salt is Switzerland and KDDI in Japan. SpaceX has said they have been approached by over 50 operators asking for the service but are expecting to only sign agreements with a small number (5 I think was the number mentioned).

NZ telco 2Degrees is also making progress on this service, with Lynk, a LEO satellite operator.

SpaceX is part of Elon Musk's empire, since he brought into this worldwide, low earth orbit satellite broadband company. It is well funded and has been very successful and is growing super-fast. The huge number of satellites with a relatively small footprint can communicate with low power and low latency, and even achieve good frequency reuse. It is nothing like Iridium, or INMARSAT, and really is more like cell towers in space.

But the current satellites won't be providing the cell phone functions One NZ are talking about. SpaceX is planning to launch a constellation of Generation 2 satellites that have much larger antennas and will work on the bands the terrestrial operators such as One NZ are licenced for, and only use these frequencies in the area that the ground operator is licenced for. The satellites have large, phased array antennas to deliver the service. If the Gen2 satellites don't get launched in time on the new SpaceX heavy rocket, they have a "plan B "to get smaller Gen2 type satellites on the current rockets, but these are not likely to offer as good a service.

The footprint of a Starlink satellite is around 100km radius, and the downlink is normally located within a slightly larger footprint, although on different frequencies. There are 6 located in New Zealand at Awarua (Southland), Cromwell (Otago), Hinds (Canterbury), Puwera (Northland) Te Hana (Northland) and Clevedon (Auckland). There is a large amount of satellite to satellite communications, so coverage is not limited to just where the ground stations are.

The exciting part of the Gen2 constellation is more than the new bands support (for mobile coverage). The new satellites will also use optical (laser) communications, between satellites, to the ground and to the new, high orbit space based datacentres. These new satellites will provide data caching to the low orbit satellites, and use the low latency laser links to support the growing bandwidths. It is stated that laser links have 40% better speed through the vacuum of space than through fibre optic cables, so by going via the space laser links to the data source, better response times can be achieved. And, of course, much higher capacity is available with optical systems than microwave. Already Starlink is offering cellular backhaul in Japan, so more bandwidth is really needed.

One downside of the optical links is that the satellites will not be able to have anti reflection shields on them, which currently prevent the satellites from ruining visual astronomy. Also the 30,000 number of planned Gen2 satellites will increase the issue. Astro photographers are worried.

While we have heard much about SpaceX and their satellite to phone service, there are other operators in the same business. BlueWalker3 is also in demonstration mode, and 2 Degrees is working with Lynk, and we will see more announcements before we get to use this technology.