

Links Across the Yukon

Canadian Amateurs Provide a Special Style of Northern Exposure

By Richard Fisher, KI6SN



On the Yukon's Pilot Mountain, a long line to a helicopter overhead is used to lift a green "comshell" – a 28-foot tall fiberglass enclosure that houses batteries and radios in the bottom portion and antennas inside the top, providing an ideal location for mounting the solar panels. The unit's dark color helps absorb heat from the sun, which, along with the flexing of the fiberglass in the wind, assists in clearing ice and frost buildup over the winter. (All photos courtesy of YARA)

In the radio days of Sergeant Preston of the Yukon it was sometimes the duty of this intrepid Royal Canadian Mounted Policeman to mush his sled dogs – led by the faithful Yukon King – in a desperate attempt to "get word" to Whitehorse or Dawson City that bad guys were on the loose.

Communication in the vast Yukon Territory of Northern Canada was a tremendous challenge at the time of that popular 1950s radio drama. It still is.

Since 1976, though, Canadian radio amateurs have been building a VHF network that would have made Sergeant Preston's life a whole lot easier. Today, a system of 15 linked repeaters and four non-linked local machines under the operation of the Yukon Amateur Radio Association is vital to a population scattered across almost 200,000 square miles.

The diversity of the region's terrain provides a canvas for some of the most breathtaking repeater sites in the world.

In a recent interview, YARA President Scott Williamson, VY1SW, underscored the multi-level value of the organization's communications system and provided a snapshot of how careful planning, cooperation and tremendously hard work have

resulted in a far reaching system that provides a link to areas where none other exists.

WRO: How critical is the YARA repeater network in providing communications in a region as massive as the Yukon?

VY1SW: The Yukon covers 483,450 square kilometers – about 187,000 square miles – and has a total population of only 34,000 people. As such, there is not much (need) for (broad) cellular coverage – only within the major communities. And satellite phone coverage is spotty at best. Too far north.

WRO: About how many people use the system? In what remote and urban locations?

VY1SW: The Yukon Amateur Radio Association has about 35 members who regularly use the network. In the summer months we have many traveling tourists who use the system to get directions, ask for assistance or access Echolink and IRLP repeaters.

All the major communities south of, and including, Dawson City have coverage – about 90 percent of the population. There



A wind-powered generator - which sees duty in summer months on Pilot Mountain – is covered in snow and ice in winter. At 6,620 feet elevation, the generator is in action from about early June to the beginning of September.



At 7,650 feet, Mount Deceoli, with its knife-edge ridge, is the highest elevation site in the YARA network. It's located on the western edge of the Kluane Mountain Range and experiences severe winds and ice. "The first 'standard' comshell was shredded by flying ice in the first winter," wrote VY1SW. "The second 'beefed up' comshell disappeared from the mountain about two weeks after installation following a severe wind storm. The current installation is a small square metal building anchored with 30+ guy wires and has survived about 18 years now." The site "provides excellent coverage including our longest UHF link (a 2-watt transmitter providing a 200km link!"

is coverage on most of the major highways except the Dempster Highway, which heads north from Dawson City.

WRO: What approximate square mileage does the network cover?

VY1SW: It's hard to tell exactly due to the remoteness and the ruggedness of the terrain. I would expect that the entire network covers around 200,000 square kilometers – 77,000 square miles. Most of the repeaters are located on mountaintops that are significantly higher than the surrounding area.

WRO: Are there any specific incidents in which the network proved to be critical in getting information passed? Emergencies?

VY1SW: We have been involved with several emergencies and have been asked by the local government EMO (Emergency Measures Organization) and the local Search and Rescue to provide communications assistance.

One example was during a bad fire burning close to one of the main microwave towers that carries all the land line communications out of the territory. A couple of our members were onsite at the fire command post providing relay and programming assistance to both Yukon and British Columbia Forestry workers.

We also had manned the Government JEOCC (Joint Emergency Operations

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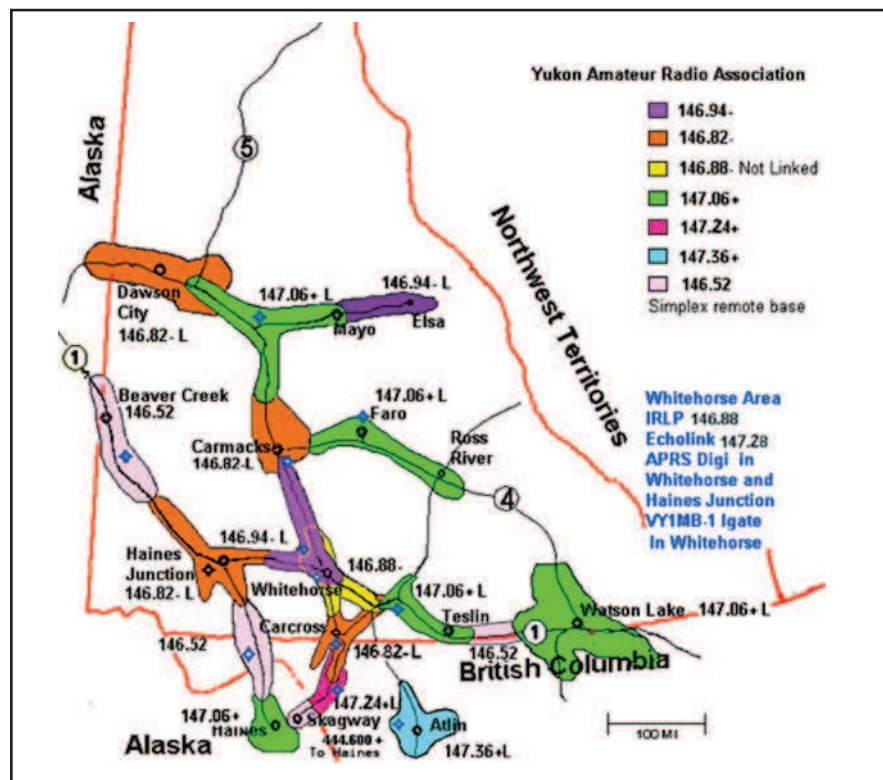
Command and Control) radio room. Our network was the only system capable of communication between the front line fire personal and the commanders in Whitehorse.

WRO: What is the system's primary use? Nets? Emergency communications? Rag chewing?

VYISW: It sees various uses – primarily rag chewing and emergency communications.

WRO: How was the network developed and over what period of time? Is it still growing?

VYISW: The first repeater was installed on a local mountain known as



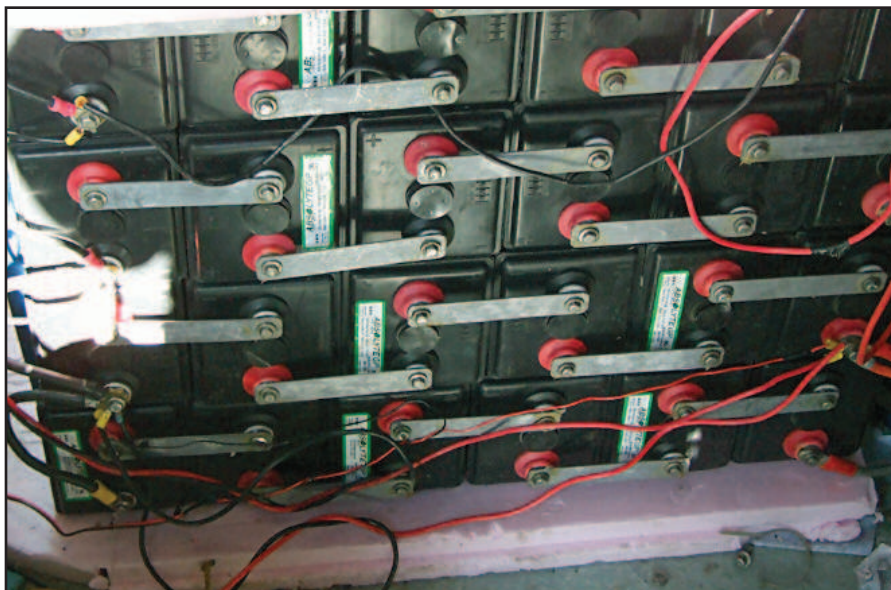
Yukon Amateur Radio Association Linked Repeater System

VA7ATN – Atlin Mountain – 147.34+
VY1RCM – Chilkat (Haines Rd) – 146.52 simplex remote base
VY1RMD – Dawson Lookout – 146.82-
VY1RFH – Ferry Hill (Steward Crossing) – 147.06+
VY1RBT – Galena Hill (Keno) – 146.94-
VY1RHP – Hayes Peak (Johnsons Crossing) – 147.06+
Miners Ridge (White Pass Summit) – 146.52 simplex remote base
VY1RHH – Horsecamp Hill (Beaver Creek) – 146.52 simplex remote base
VY1RMM – Montana Mountain (Carcross) – 146.82-
VY1RMB – Mt. Berdoe (Carmacks) – 146.82-
VY1RHJ – Mt. Deceoli (Haines Junction) – 146.82-
VE7RFT – Mt. Panacea (Bennett Lake) – 147.24+
VY1RPT – Pilot Mountain (Whitehorse) – 146.94-
VY1RRH – Rose Hill (Faro) – 147.06+
VY1RM – (Whitehorse) – 147.18+

Local Only (not linked):

VY1IRL – Haeckel Hill (Whitehorse) – 146.88- PL100 IRLP Node 1662
VY1ECH – Mt. Sima (Whitehorse) – 147.28+ Echolink Node 322488
VY1RTM – Transport Mtn (Watson Lake) – 146.82- (link to be completed in 2010 via two new sites at Mount Hazel and McNaughton)
VY1RPM – Haines Junction – 146.88- Echolink Node 322804

Courtesy of VYISW



Due to the limited charge opportunities available on Mount Panacea, four large banks of grid plate batteries have been installed by YARA providing more than 2,400 amp-hours of capacity. Each bank has six 2-volt cells weighing about 90 pounds each – lots of work to haul and install.

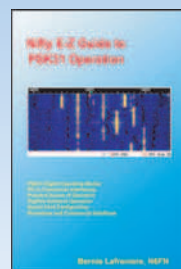


The comshell for Mount Panacea is lifted by a Bell 204 helicpoter.

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Though it requires a 2,300+ foot vertical hike, the Horse Camp Hill repeater site is accessible on foot. It is one of YARA's remote base sites, which are 146.52 FM simplex repeaters linked into the network. There is no local repeating but they receive and transmit into the network. There have been several humorous instances with traveling tourists when they realize that they are talking on 146.52 MHz simplex to someone who is 1,000 km away, VY1SW said.

Haeckel Hill – now the site of our IRLP linked repeater – in 1976. In the mid '80s the linked network of repeaters was started and it has slowly grown since then.

Last year we added the Southern Extension which gives us coverage along the South Klondike Highway down to Skagway, Alaska.

WRO: How is the system maintained and funded? Is it affiliated or tied-in with any other public service agencies?

VY1SW: Most of our sites are in partnership with various other organizations such as the Yukon Marine Distress System – run by YARA and funded by EMO, Department of Fisheries and Oceans, and Yukon Electric – the Yukon Government, Yukon Electric, White Pass & Yukon Railway, Parks Canada, Department of Fisheries and Oceans, Northwestel, Environment Canada, and Discovery Helicopters.

Each site has an agreement with one or more of the organizations mentioned. We have access agreements for several of the sites, but many of them are controlled by



A comshell and wind generator on Montana Mountain are accessible on foot after a 2,200 foot vertical hike. This site was destroyed by a lightning strike several years ago. Since then, YARA is "much better at properly grounding the spike on the top to a network of copper wire laid out on the the top of the mountain."



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A view inside the lower part of the comshell on Atlin Mountain shows gear at the site, which includes several UHF and VHF transmitters, requiring complex multi-coupling and filtering.

YARA – we have done the work and been granted the land access.

Each site and build project is (different), but generally YARA supplies the expertise, manpower and some of the repeater equipment – sourced from years of scavenging, dismantling of other systems, and purchased using various grant applications. The site partners pay for the required helicopter time and some of the equipment.

WRO: From a technical standpoint, what challenges have you overcome?

VY1SW: Technically, we have learned many things. Since the majority of our sites do not have access to AC power, we have had to become experts at setting up equipment that minimizes power consumption, battery and power storage technology, and solar and wind generation capability.

The majority of our sites are also located at the top of mountains in areas that see temperature extremes, high winds, frost and ice, and lots of snow. The accompanying pictures highlight some of these issues.

WRO: How do technicians get to those remarkable repeater sites?

VY1SW: The access to the sites varies from a few drive-ups and some hiking to basic mountaineering and helicopter-only access.

WRO: What lessons have been learned in developing such an ambitious project?

VY1SW: The importance of partnerships has certainly been the key to our success. We have been fortunate enough to have several very talented volunteers capable of all the engineering and tuning that goes into building these sites.

We have been able to leverage those skills to be able to offer something of value to our various site partners. It costs them less to get the sites established and maintained with the partnership with us and we get access to funds and equipment that we would not have otherwise. Everybody wins!

For more information about the Yukon Amateur Radio Association and its linked repeater system, visit: <http://www.yara.ca>



The specially reinforced comshell at the top of Atlin Mountain does not require any guy wiring. All the anchoring is from below with rock anchors and concrete footings. "This was necessary at this site as the mountain drops off quite steeply on three sides of the comshell," VY1SW said. "(You) need to be very careful of footing when stepping out the door as an extra step would take you down a few thousand feet."