By Paul Cassel, VE3SY

From Ether to Ethernet

The merging of wired networks with radio has resulted in a more flexible, reliable and portable radio system. Make DX contacts and enhance your emergency communications with a hand-held radio.

It was the last night in December of 2002. Stations in many different time zones were being worked from North America, while amateurs worldwide were bringing in the New Year. Tony, VK3JED, in Melbourne, Australia was celebrating on the air at 6 o'clock in the morning (my time). As midnight approached in India, Sam, VU2SBB, was busy talking to North America, followed by South Africa; then Belgium and the UK. It was a thrill to talk to the world from home on a hand-held radio. Yes, talk to the world with a battery-powered VHF/UHF FM transceiver!

Amateur Radio has seen many technological changes in the last 85 years. First, the shift from spark to CW in the '20s; next, AM in the early '30s; followed by SSB in the '50s. In the '60s, when hams started to convert discarded taxi and police radios to 2 meters, VHF-FM became the rage, with repeaters following.

Change does not occur without controversy. "Spark Forever!" was heard in the '20s as crystal control and CW ushered in the then-new wireless technology. When AM first appeared, "brass pounders" felt their frequencies were being pirated by the new "upstart." Now that Internet linking of VHF/UHF Amateur Radio repeaters is becoming popular, change is again occurring, but not without controversy.

Early experiments linking FM repeaters using the Internet with Voice Over IP (VoIP) were, for the most part, unsuccessful and none (*iPhone* was one example) ever became popular. Then, in 1998, a ham in Vancouver, Canada designed a better, more reliable way to do that and it has rapidly embraced a worldwide following.

Dave Cameron, VE7LTD, of Vancouver, British Columbia began experimenting with what he called the Internet Radio Linking Project or simply IRLP. Dave and Michael Illingby, VE7TFD, of Vernon, British Columbia, became frustrated with the unreliable operation of *Windows*-based *iPhone,* VoIP software. At that time, all *Windows*-based Amateur Radio linking software used voice control (VOX) and it wasn't secure from non-amateur access.

Dave designed and developed the new IRLP system using *Linux*, resulting in an ultra-stable operating platform for the new software. It now has an installed base that is approaching 1000 active nodes and is worldwide in scope. With the release of Version 3.0 hardware and greatly enhanced software, IRLP continues to grow rapidly. (When the author first ordered IRLP interface hardware in February 2001, there were only 63 nodes.)

What is Voice Over IP?

Telephone system companies and network infrastructure suppliers, such as Lucent and Nortel, have started promoting Voice Over Internet Protocol (VoIP). The telephone companies recognized that VoIP was an efficient way to merge their telephone voice and data traffic using the TCP/IP protocol. With an IP-based network, the telephone audio is sampled, compressed and wrapped into data packets that can be routed, bridged and switched alongside other data packets flowing through private networks and the Internet. With the great advances in computer soundcard-based software applications, it was just a matter of time before reliable VoIP applications would be generally available.

IRLP is not the only VoIP application making its way into Amateur Radio. Systems such as EchoLink, eQSO and Yaesu Wires II allow computer-to-computer or computer-to-radio links. IRLP continues to build on a philosophy that insists that a radio be at each end of an IRLP contact. Having said that, there is a need for PC-radio based networks that the other technologies provide.

Using IRLP

The technology allows amateurs within range of a repeater or simplex station, equipped with an IRLP interface, to easily link a local repeater to one or more IRLP-equipped stations around the world. The local user simply requires a radio with DTMF capability and local access information.

The local linking station is termed a *node*. It's a good idea to contact the station operator before trying to use that station, as some nodes require a pre-access code, similar to a phone patch access. One should also support the local club or organization providing the IRLP link. Refer to the list of active nodes at **status.irlp.net** to find a node close to your location.

The default access requires dialing the destination node number. Within a second or two, the called node will identify in plain voice with its call sign and location. If the target node is connected, you will receive a recording telling you what node or reflector the repeater is connected to. Optionally, if the target node has enabled its Call Waiting feature, a form of voice enabled call display will announce that a call has been attempted from your node number.

Multiple repeaters can be linked utilizing one of over a dozen multi-channel

What is a Reflector?

A reflector is nothing more than a robust PC accessing a large amount of bandwidth and used for a node connector or a bridge. These machines allow many nodes to be linked together in the form of a round table or a conference bridge. Only one node can talk at a time, although all connected nodes receive a copy of the received audio. No "doubling" is possible on an IRLP system, as the first packet to arrive "wins" and all other IP packets are ignored until the initial station drops the PTT circuit. The main reflectors have a primary channel and nine sub-channels, each with enough capacity for a large number of simultaneous connections. The main international calling channel reflector is 9200 in Indianapolis, Indiana. See **status.irlp.net** for a full listing of available reflectors.