

Worldwide Repeaters?

by Gary Pearce KN4AQ

The two worlds of Amateur Radio are coming closer together, and it's the Internet that's bridging the gap.

The Old World:

Worldwide high frequency communications using cw and SSB.

The New World:

Local VHF/UHF FM and repeaters.

The Future:

Worldwide communications using VHF/UHF FM and repeaters, linked by the IRLP - the Internet Radio Linking Project.

And the future is already here in three SERA cities. Hams in Atlanta GA, Greenville SC and Raleigh NC are enjoying worldwide contacts with the clarity and convenience of their local FM repeaters. IRLP linked repeaters are in dozens of other cities worldwide. One could be coming to a town near you.

Using it:

If you don't have an IRLP linked repeater in your town, this might be a little hard to imagine. But picture yourself driving along on your morning commute. You pick up the mic, announce your callsign, and you get a reply from a ham in Sydney,

Australia, as he is heading home for the day. You didn't have to battle a pile-up to make the contact, and you feel no pressure to complete it in just a few seconds. You're on your local repeater, and he's on his local repeater. You're both full-quieting, with signals as clear as someone would be just on the other side of town, instead of the other side of the world. As your conversation progresses, you might be asking if traffic there is frequently interrupted by herds of kangaroo jumping across the freeway, and he might be asking if you've seen one too many Crocodile Dundee movies.

Later, you're just monitoring. The repeater that used to sit idle hour after hour is now alive with traffic all day (and maybe all night) long. Hams are talking from the northeast, the midwest, California, Hawaii, the Caribbean, all over Canada and the UK. They are having ordinary ham conversations. That is, they are saying nothing, or something. They talk about the weather, their radios, traffic. The IRLP network itself is a frequent subject of discussion, and it seems like there's always someone new coming on for their first conversation,

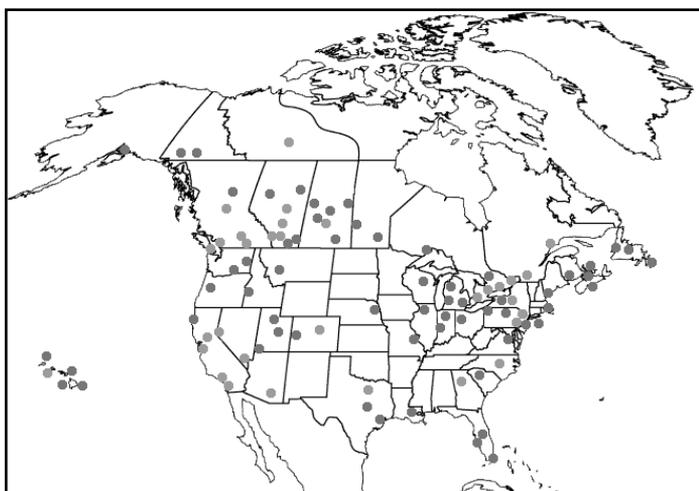
often after having listened for days or weeks. And now and then you hear one of those rare contacts where hams in different parts of the world actually talk about cultures and customs, geography, climate - things people expect hams to talk about, but we hardly ever do.

The only thing you're asked to do that's different from making a local repeater contact is

leave more space between transmissions, and hold your mic button down for a second or so before you talk. The technology behind the IRLP is second-generation. This was tried before in the mid 90's and it didn't work very well. This time, it works pretty well, but there are some short delays in getting keying and audio through the system. Of course, asking hams to leave a pause



For more information on IRLP, visit their web site:
www.irlp.net



This map shows repeaters across North America that are linked to IRLP. SERA cities covered include Atlanta GA, Raleigh NC and Greenville SC. There are more linked repeaters in Australia, the Caribbean and the UK.

and wait before speaking is like asking them to be clean and squench the fribbage prack. The words make no sense, and are promptly forgotten. But we had to mention it for the record.

The result of not pausing is that the first bit of whatever someone says is just not repeated. It's not usually a big problem, but there are a lot of missed callsigns. And it can be hard to break into an ongoing IRLP contact. There is also a unique new form of "doubling" when two hams try talking at the same time. When you key up, your local repeater begins sending data packets over the Internet to a server that then distributes the packets to all the other repeaters that are currently on the system. If two repeaters send packets, the first one to get packets to the server wins completely. There's no heterodyning, and audio is not mixed. But if the double goes on for a minute or so, Internet delays can cause the packets from that first repeater to be interrupted, giving packets from the second repeater a chance to capture the server. So for all the people listening, the voices may blip back and forth as long as the two hams continue to double.

There are a few other problems unique to an Internet based linking system. The Internet is not a totally

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reliable delivery system for audio, so sometimes it just takes too long for what you said to make it to the server. The result is a silent hole for a half second or maybe a little longer. Noisy signals seem a bit more irritating when propagated around the world, so they ask you to use the system only when you have a pretty good chance of being full-quieting into your local machine.

And it's hard to diagnose the source of a problem with a signal that just isn't making it. Is it his local repeater? Your local repeater? The Internet? Hard to say... so the hams will say it over and over. Yep, no doubt about it, this is ham radio.

Is this Ham Radio?

Or is it? Some hams are saying it is not. Since it's not *radio* that's linking the repeaters, IRLP is not true ham radio.

But it is! While Junior and Sis have been able to connect a microphone to their computer and chat worldwide on various instant messengers for the past couple of years (ask them how, if you're not too embarrassed), that has not generated much interest in the ham community. But use similar technology to connect some repeaters together, and the interest soars. Jim Price WW4M said that the first time he heard a California ham coming through the repeater he had just connected to IRLP, the hair on the back of his neck stood up.

"Have you heard that repeater that links to Australia?" is a common question on the other repeaters in town, and at club meetings. The local hams can't remember the initials, maybe, but IRLP has hams paying attention.

What helps makes it ham radio is that ham radio is the only way into and out of IRLP. You can't get in through the Internet (though you can listen to streaming audio from some of the repeaters that are connected). The Internet is just the linking path. The user connection is strictly ham radio. It sounds like ham radio. It feels like ham radio.

But ham radio with a difference. One code-free Tech said, "Now I don't have to learn code and upgrade!" She will be disappointed when her access to worldwide

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IRLP - A User's Perspective

by Mark Gibson, N4MQU

I was half-way listening one night to the Johnston Amateur Radio Society's (JARS) rag-chew net on 147.27 and heard Byron King K4NGJ, one of the control operators of the Cary Repeater Association, talking about linking the repeaters to the internet and talking to a station in Australia. At first I wasn't too impressed. I can talk to Australia on HF. After the second and third time I heard K4NGJ talk about this, I decided to listen. I tuned in 146.775 in Raleigh and immediately heard Colorado, Florida, and Canada. After listening to see what procedure was being used to make contact I threw out my call sign and location. My first contact was with a station from Canada. It was great.

I checked the web site (www.irlp.net) to find out where the available IRLP-capable repeaters were located and found out that Atlanta, GA had more than one. A friend who inspired me to get my start in amateur radio, Andy Clegg W4JE, lives near Atlanta and I wanted to make contact with him via the IRLP. It turned out that the owner of one of the Atlanta repeaters, Chuck Link W4CML, worked on the same floor as Andy. After finding out that they did not have a DTMF tone pad between them, I made contact with K4NGJ and asked if he could link up Raleigh and Atlanta. After K4NGJ punched in a few buttons I called for W4JE and presto we were in contact on two meters via IRLP.

Not long after that, I had a scheduled trip to the Atlanta area, and I found out one of our local UHF repeaters was available for "Direct Connect" link. After arriving at my destination in Atlanta, W4JE asked for the two control operators of the 440 repeater. Once the proper contact was made, I acquired the microphone and made an introduction and requested the node 427 be linked. After the link was established, Dan Musten KD4RAA immediately responded to my call, followed by K4NGJ. It was really a thrill for me to talk from a city outside of my home territory to a repeater at my home location.

After talking to K4NGJ, I requested that I be able to talk to my wife, KD4JMJ, on the two-meter node because my wife did not have a 440 transmitter. The node in Raleigh was on Reflector 2 and had to be turned off so the node in Atlanta could connect. After a few more magic buttons were pushed I was on the link between the 440 repeater in Atlanta and the 2 meter repeater in Raleigh. Since it was about 15 minutes before my wife was scheduled to get off of work, I chatted with a few more hams from the area, and finally to my wife. After telling her that I arrived safely with our daughter and exchanging a few pleasantries, I communicated with other members of the JARS club. I know I could have used my friends' telephone to call Linda, but the point is I could use my amateur radio to get the job done.

It was my pleasure to meet W4CML in person the next day. I found out that the sole purpose of his repeater was for connecting to others via IRLP.

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communications fizzles 30 miles outside of town. IRLP may be everywhere someday, but not today. Today you get small pools of coverage, mostly in urban areas.

Other comparisons with HF are inevitable. IRLP is unaffected by propagation - the band is always open. It's usually not noisy. And at least so far, it's not dominated by nets and conversations that seem to have started 20 years ago and continue, day after day, among the same groups of people who "own" a frequency on one band or another.

But HF does cover everywhere, at one time or another. On HF, it's your equipment and the other guy's, and you're doing it by yourselves (with a boost from nature). It's immensely satisfying when signals are strong, and challenging when they're not. So IRLP is not an HF replacement. It's something new. And maybe a code-free Tech will get a taste of worldwide communication and decide it's time to upgrade after all.

Repeaters, and Point-to-Point

The operation we've described so far is only one of two IRLP modes. In this mode, many repeaters are linked together through a single server called a **Reflector**. Everybody talks to and listens to everybody else. There are actually a half-dozen of these Reflectors, and the control operators or sometimes the users of

member repeaters can use touch-tones to connect the repeater to one or another of the Reflectors and leave it there for hours or days. And as described above, Reflector operation can be exciting. But as Penn McClatchey K4PM, President of the Atlanta Radio Club says, "A Reflector generally takes over a repeater. I think they are inappropriate for a high traffic machine like our 146.82 machine." A repeater on a Reflector becomes a spigot for the world to pour into town, but the repeater is no longer available for local contacts, since those local contacts are tying up repeaters around the world.



From this perch high above Atlanta, the W4DOC 146.82 repeater is too busy to be a full-time Reflector machine. You'll find it available for Point-to-Point linking anytime.



Dan Musten KD4RAA and Jim Price WW4M pose before the computers and radios that link the NC4SU 146.775 repeater in Raleigh to the world via IRLP.

In Atlanta, Penn is preparing to make one of the club's quieter UHF repeaters a Reflector connection. But in Raleigh NC, Dan Musten KD4RAA and Jim Price WW4M are doing it the other way around. They've taken a quiet 2 meter machine on 146.775 and made it the talk of the town by connecting full-time to one of the Reflectors. Raleigh has plenty of local repeater capacity, and the 775 machine was

rarely used. Dan said "A Reflector is a good way to bring life to a lifeless repeater."

The alternative to a Reflector is point-to-point linking, or what IRLP calls **Direct Connect** (sorry, Nextel). In fact, most of the nearly 200 repeaters set up for IRLP choose *not* to attach to a Reflector. Instead, they are available for direct connection to and from any of the other system repeaters. A user on one of those repeaters won't hear worldwide chat all day every day, but when he or she wants to talk to someone in Honolulu or Perth, they just hit some touch-tones and they are instantly connected. Once again, the operation is just like hams talking on their local repeaters.

You don't have to have globe-girdling ambition for IRLP, though. Dan Musten was originally attracted to joining IRLP because he wanted to

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Worldwide Repeaters ...concludes

link several repeaters together that were just out of RF range in North and South Carolina. He'll be adding Direct Connect to his UHF repeater in Raleigh, and the other repeaters he's been trying to link up. The Reflector connection he made available on VHF was just icing on the cake.

Lee Barnett N4GLB operates a UHF machine in Greenville SC, the only other SERA city currently on the network. His 444.725 machine is also on Direct Connect. Lee and Penn both report moderate activity in that mode - a few contacts a day. Lee says that there are several repeater users who dial up friends routinely.

Behind the curtain.

The IRLP is the creation of Dave Cameron VE7LTD, of Vancouver, British Columbia. Frustrated by the limitations of the first Internet repeater link plan based on Windows and I-Phone, Dave developed new hardware and Linux based software, and adapted a freeware voice-over-IP program called Speak Freely. IRLP is hosted on several servers located across North America.

At the local repeater end, you need a computer running Red Hat Linux, an IRLP interface card, a full-time Internet connection (DSL and cable work fine, and you don't need a fixed IP address), and a way to get the audio to and from the computer and the repeater. The Atlanta club uses a UHF link. In Raleigh, a VHF radio on the repeater's channel does the job. You could put the computer right at the repeater if you have an Internet connection there.

The interface card processes the audio, provides keying to the

link/repeater, and detects signals from the repeater to feed to the server. VOX is not used - there is real push-to-talk keying controlled by software. For more details on IRLP technology, visit their web page at www.irlp.net.

Penn McClatchey says it isn't all that hard to get things working, if you're familiar with Linux. He said it was more trouble getting the link



Dave Cameron VE7LTD supplies this small interface card and the software that operates in a Linux-based computer. You supply the rest. They'll help get you up and running on Linux, but a local guru is a good idea.

radios working than getting the IRLP computer on-line. "Being ham radio," he says, "there is always fiddling. If it were a commercial application, I probably could've left it alone after a few hours. I am logged into my IRLP machine right now via SSH from work, and you'll sometimes catch me fiddling with the configuration to this day!"

Dan Musten found it a bit more daunting. He turned to Jim Price for

the Linux end of things. The radio work was more familiar - just getting audio levels and PTT timing set right. Dan and Jim were particularly impressed that after they got their computer on line, Dave Cameron loaded and configured the IRLP software remotely from Canada. And Dave doesn't miss anything from that distance - he noticed that they were not using the specified genuine SoundBlaster audio interface.

Where to from here?

IRLP can be a high-reliability system. The weak link most system operators report is their local Internet connection. The Linux computer platform is much more stable than Windows and runs for months without crashing. The Internet itself is designed to be "adaptive" in routing signals around hardware failures. Dan Musten notes that by using a VHF link radio that makes the IRLP system "just another repeater user," he can move the IRLP to any other local repeater that can accommodate the need for zero hang-time (either through CTCSS that drops instantly, or a real zero hang-time repeater drop). None of the SERA member repeaters report any specialized use for emergencies or events yet, but they see it coming.

IRLP is experiencing explosive growth, adding new repeaters as fast as Dave and his assistants can supply the hardware and get them configured - more than a dozen a month. Undoubtedly there will be continued technical innovation, but the basics are in place for a system that works. And growth potential is unlimited. When a Reflector becomes too busy, they can add another one.

And since we're on the downward slope of the current sunspot cycle, it looks like it's just in time. ■

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