How to connect an IRLP node

Simply key up on the node frequency and dial the 4-digit node number

To Disconnect dial 73

Craig Davidson
K1BDX
K1bdx@amsat.org
How does an IRLP node talk to another node?

Ispeaker and Imike are software programs that come (for free) with the standard IRLP Linux operating system.

**Imike** takes your voice from the mic input on the sound card and digitizes it into UDP voice packets and sends them out over the internet to any IP address and port number that you choose whenever pin 11 on the parallel printer port is shorted to ground.

**Ispeaker** listens for UDP voice packets from the internet on any port you choose and turns them back into analog and puts that audio out the speaker jack on the sound card. When valid UDP packets are received pin 3 on the parallel printer port goes high.
How does an IRLP reflector work?

No sound card required on reflector computer. It connects to Internet via high bandwidth connection with a static IP and simply repeats all received VoIP digital voice packets to all other connected nodes. Bandwidth needed is approx 50 kbps per connection.
IRLP reflector

All connected nodes are listening to the reflector computer and also sending a short heartbeat signal every 8 seconds.
IRLP reflector

When no one is keyed up then no voice packets are flowing on the internet

Everyone is listening

Only heartbeat signals every 8 seconds.
IRLP reflector
When a node keys up…

Signal being received from node

Internet
IRLP reflector

…then voice packets are copied and repeated to all other nodes by the reflector computer
IRLP reflector

When that node unkeys…

IRLP Reflector Computer

Signal being Repeated by reflector computer

Internet

Signal being Repeated by reflector computer

Internet

146.46 MHz
Simplex

146.94 MHz
Repeater

146.44 MHz
Simplex

147.58 MHz
Simplex
IRLP reflector

… Then the reflector stops repeating voice packets

Everyone is listening
IRLP reflector

When another different node keys up…

146.46 MHz
Simplex

146.94 MHz
Repeater

146.44 MHz
Simplex

147.58 MHz
Simplex

Signal being received from node

Internet

IRLP Reflector
Computer

Craig Davidson
K1BDX
k1bdx@amsat.org
IRLP reflector

… then voice packets are copied and repeated to all other nodes.
IRLP reflector

When that second node unkeys…

146.94 MHz
Repeater

146.46 MHz
Simplex

Signal being
Repeated by
reflector
computer

Signal being
Repeated by
reflector
computer

Signal being
Repeated by
reflector
computer

When that second node unkeys…

Craig Davidson
K1BDX

K1bdx@amsat.org
IRLP reflector

Then once again… no voice packets are flowing on the internet

Only heartbeat signals every 8 seconds

Everyone is listening
IRLP Interface Card

- Sound Card
  - Speaker
  - Microphone
- Parallel Printer Port
  - Pins 10, 12, 13, 15
  - Pin 3
  - Pin 11
- IRLP Interface Board
  - DTMF decode chip
  - Pin 8
  - Pin 2
  - Pin 7
- Power

Connections:
- Speaker to Mic
- Speaker to Microphone
- Mic to Speaker
- PTT to Squelch
IRLP connect/disconnect process

• **Always Listening**
  - DTMF program always monitors COS and DTMF on parallel port from RF mobile station
  - Call Listener program monitors TCP port 15425 for connect request from other node

• **Calling**
  - Once detected DTMF sequence passed to the call script
  - Server is asked for latest IP of node being called
  - Irlp_call is started, and a TCP connection is made to the called node on port 15425
  - Remote node starts irlp_answer in response to TCP call on port 15425
  - PGP security performs a dual challenge to ensure calling node is an IRLP node
  - Irlp_call and irlp_answer start speak freely software on UDP ports 2074 and 2075

**During the Call**
- Irlp_call and irlp_answer send keep-alives in the background. If keep-alive fails, the connection drops (every 15 sec)

• **Disconnect**
  - Disconnecting node uses TCP info channel (port 15425) to send disconnect message.
  - Unexpected drop in the TCP connection prompts reset of IRLP node
  - If the timeout elapses, disconnect is sent
What happens during connection

Step 1

After you dial a node number on your touchtone pad, your node contacts the IRLP system server for the IP address of other node.

What is IP address of node xxxx?

IRLP System Server

Internet

146.46 MHz Simplex

Parallel Printer Port for PTT & COS
Sound Card Mic & Speaker

147.58 MHz Simplex

Parallel Printer Port for PTT & COS
Sound Card Mic & Speaker

Craig Davidson
K1BDX
K1bdx@amsat.org
What happens during connection

Step 2

146.46 MHz Simplex

Parallel Printer Port for PTT & COS

Sound Card Mic & Speaker

Your node then sends a connect request to the other node’s IP address on port 15425

147.58 MHz Simplex

Parallel Printer Port for PTT & COS

Sound Card Mic & Speaker

Internet

Craig Davidson
K1BDX
K1bdx@amsat.org
What happens during connection

Step 3

146.46 MHz Simplex

147.58 MHz Simplex

Parallel Printer Port for PTT & COS

Sound Card Mic & Speaker

Parallel Printer Port for PTT & COS

Sound Card Mic & Speaker

The other challenges you for your PGP encryption key on port 15425

Internet

Craig Davidson

K1BDX

K1bdx@amsat.org
What happens during connection

Step 4

Ispeaker and Imike are then started in each node and voice communications can begin
What happens during connection

Step 5

After the connection begins both your node and the other node send update messages to the IRLP system server web page
Where to get the software

Download Linux Centos 4

Download for free and make your own ISO boot disk
http://mirror.irlp.net/iso/IRLP_CD_7.08.iso
http://irlp.net/new-install/IRLP_OS_Installation_COS44.pdf

Boot from CD ROM on old windows computer

Erase all old software and partitions on old computer
Log into Centos 4 computer and download IRLP software
/root/get-irlp-files
If this is not a new install then you must have an IRLP backup file
in the TMP folder

Experimental nodes are free but If you want a registered node with a
node number you must first buy an interface card ($123) before you
install with /root/get-irlp-files You can order here: http://irlp.net/orderform.html

Craig Davidson K1BDX K1bdx@amsat.org
Speak Freely software developed by John Walker in 1995 and released to the Public domain:

http://www.fourmilab.ch/speakfree/eol/

David Cameron in Vancouver Canada modified the source code:

Ispeaker keys transmitter via pin 3 of the parallel printer port when packets received. Imike looks for pin 11 shorted to ground to begin sending VIOP packets

General information for IRLP

http://irlp.net

Status page for all nodes and reflectors:

http://status.irlp.net

After the node is installed:

http://irlp.net/new-install/Ver3_Wiring.pdf
http://irlp.net/new-install/afterinstallv2.pdf
Required Computer Hardware

Old cheap (or free) computers seem to work better than new ones

300 MHz processor is fine

128 megabytes of RAM is fine

Parallel port and Ethernet interface required

Serial port is not used

only a 2 Gigabyte hard drive is required.

Hard to find one that small these days.

Centos 4 can’t seem to run on a drive bigger than 120 gig

Consider a 2 gig solid state hard drive for $25

VIA computers (Canadian Company)

Lots of good deals on Ebay
Craig’s Opinions
(He seems to have a lot of ‘em!)

An idle node is a wasted node

Find a reflector channel you like and hang out there.
  Disconnect only if local conversation (or node to node connection) is desired
  When finished go back to reflector
  You won’t know what’s happening on the reflector unless you are connected

No Channel Surfing – This isn’t your TV remote control

If you connect to a reflector then stay there a while
Make sure you listen for AT LEAST 60 SECONDS before talking
Do not interrupt ongoing conversations. Wait, Listen, then join in.
Advanced Topics

Repeaters as nodes
Mobile nodes
Echoirlp
Remote Admin Web page
Personal web page
Experimental nodes and reflectors
GPS / APRS reporting node location
Remote commanding with Icom C-IV port
The End