



Amateur Radio and VoIP

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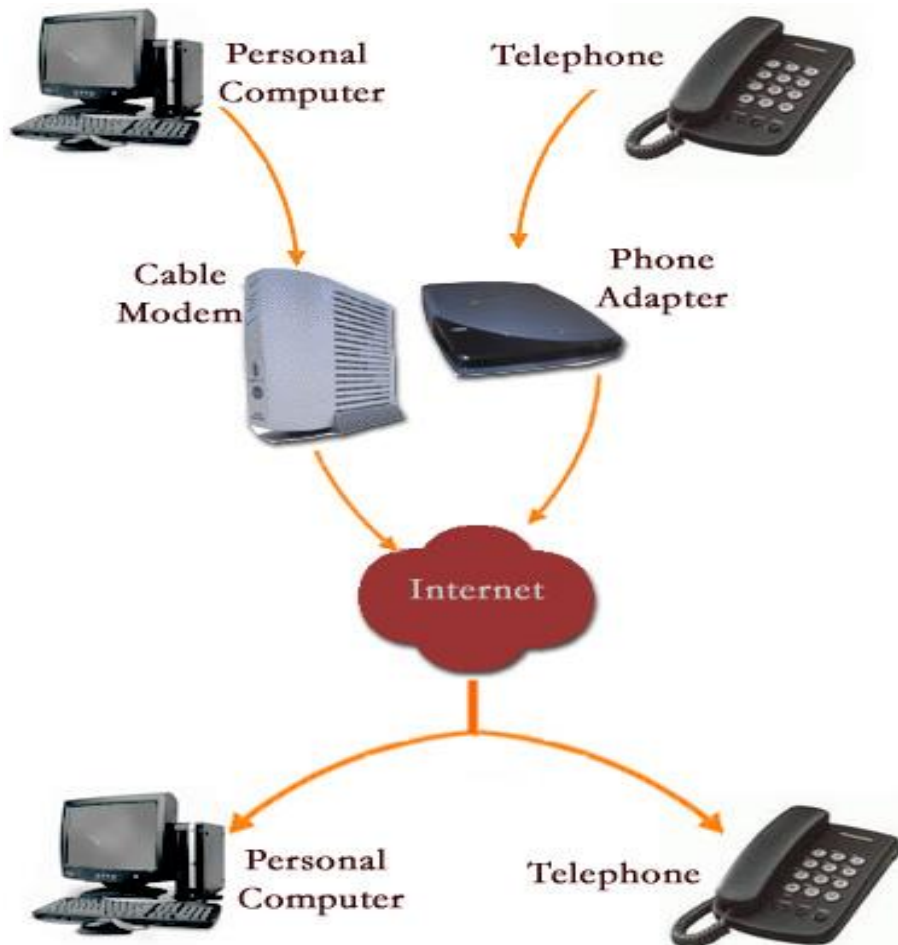
What Is VoIP?



- VoIP is an acronym for **Voice over Internet Protocol**
 - Allows users to send voice over the internet in data form
 - Data is converted back to voice at the user's receiving end
- **First Public Use-A program called Internet Phone**
 - Became available in the mid-1990s
 - Idea was to use the mic and speaker on your PC to make calls to any computer in the world for free
 - As long as you know the IP of the user, type it in and establish a connection



Today's Uses – Telephony



- VoIP converges traditional telephone with Internet to provide cost effective phone service
- Comcast offers a similar service but uses a Local Area Network or LAN versus the Internet.



Today's Uses – Webcasting/Video Streaming



- Commercial radio stations, TV stations both commercial and community access, and personal broadcasters use streaming, which is a form of VoIP, to deliver audio content





Today's Uses – Ham Radio



- Amateur operators can communicate using VoIP networks that link radio systems worldwide – these are some of the most popular modes

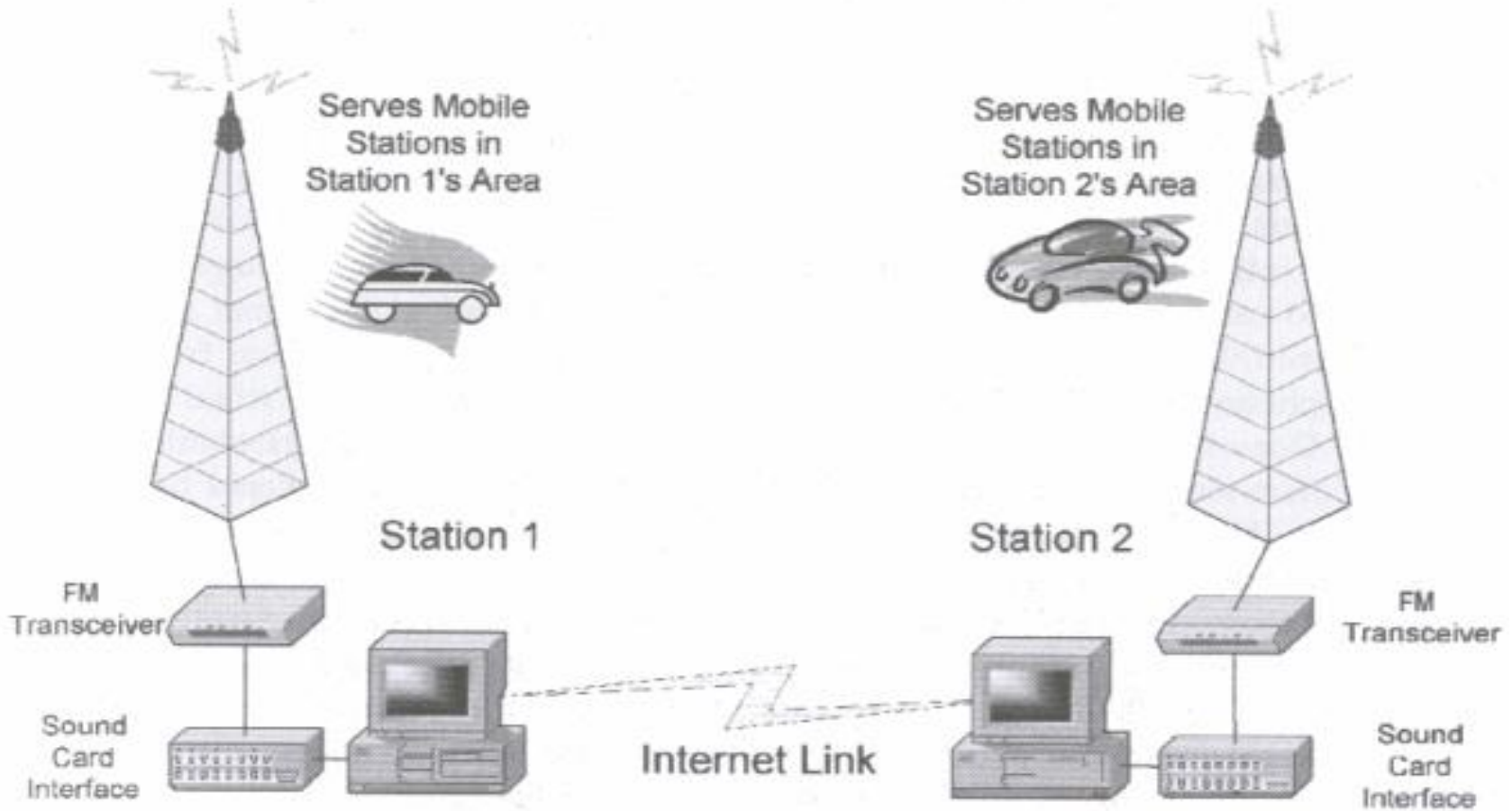


EchoLink



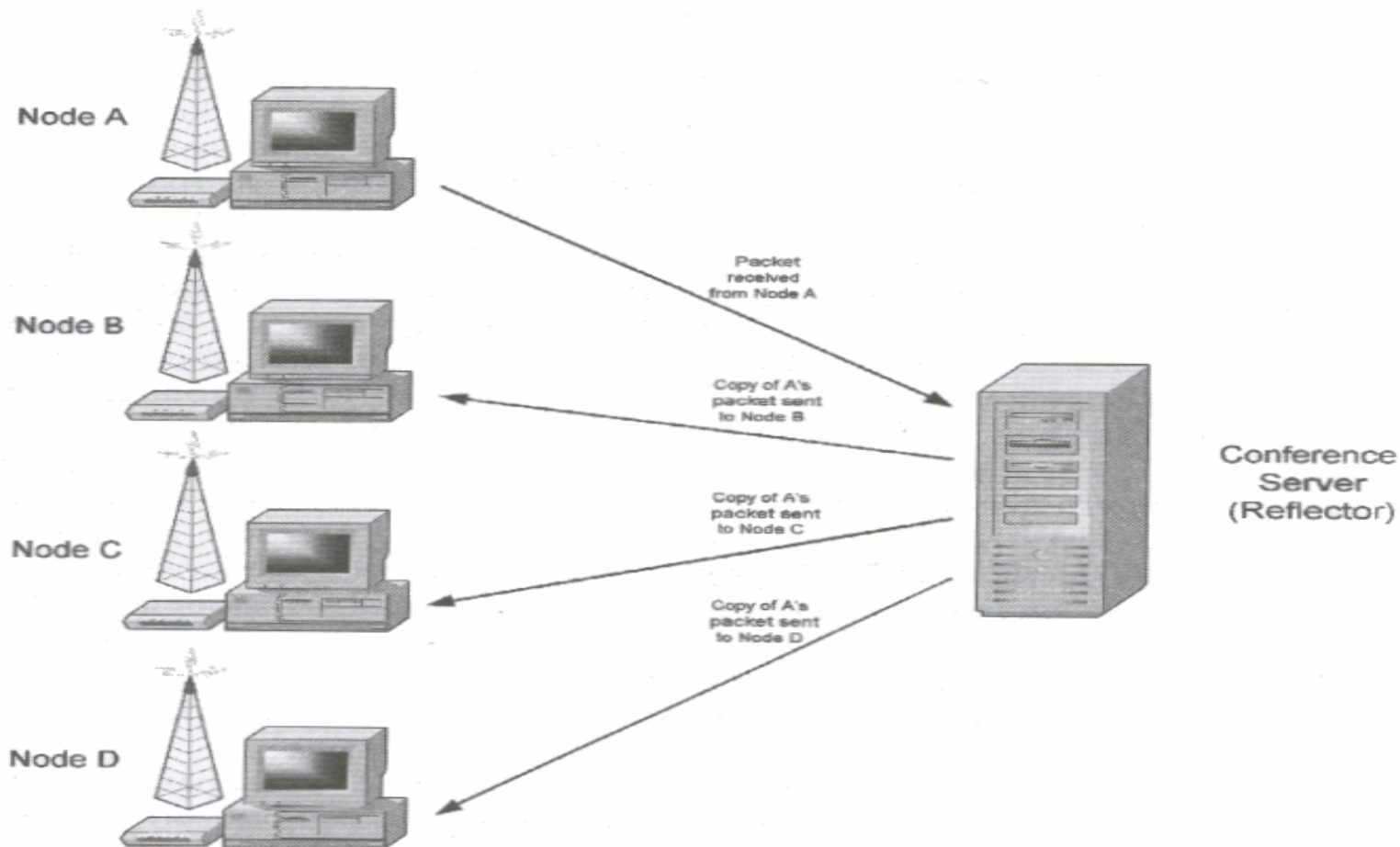


VoIP & Amateur Radio – Station to Station Overview



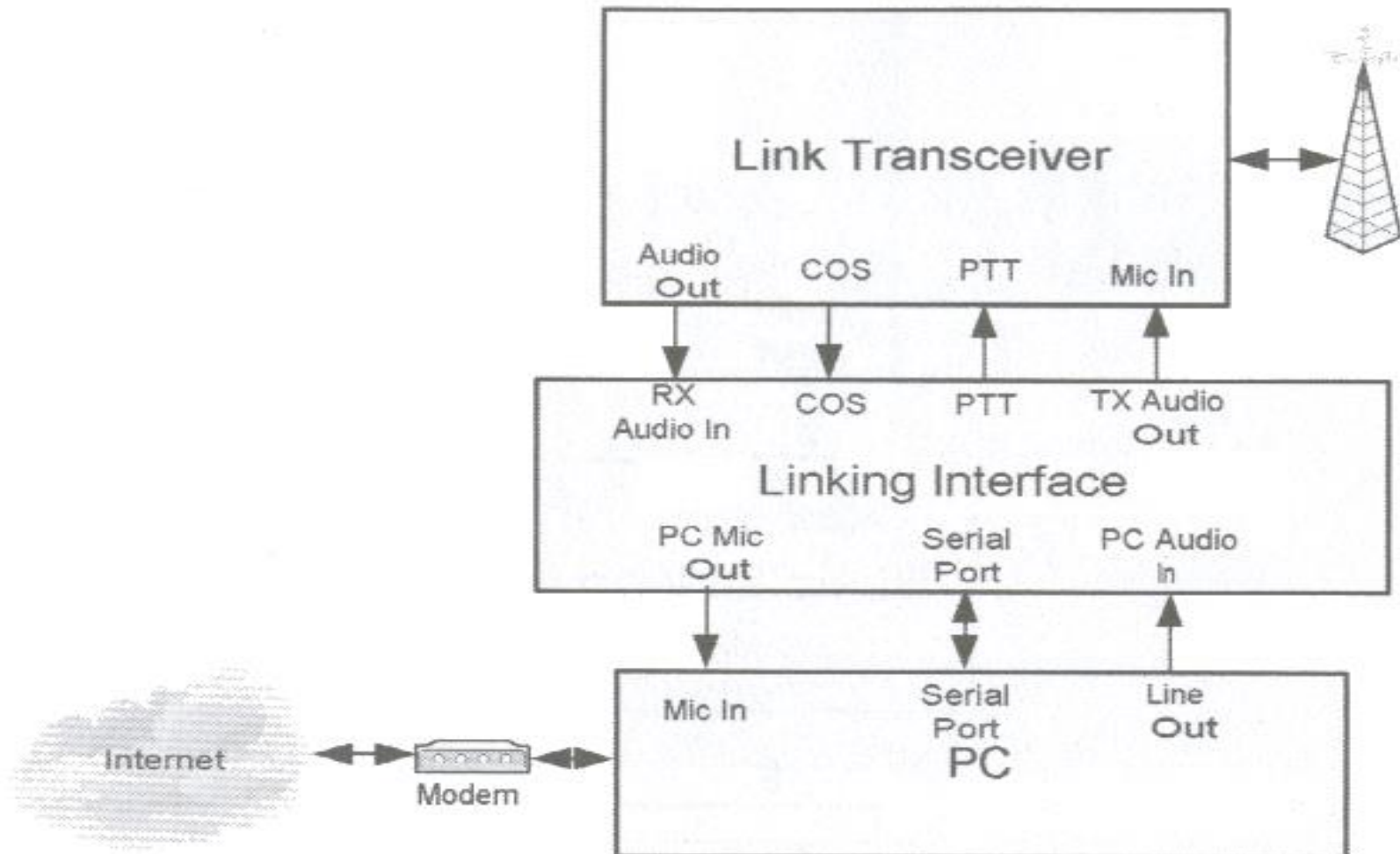


VoIP & Amateur Radio – Conference (Reflector) Overview



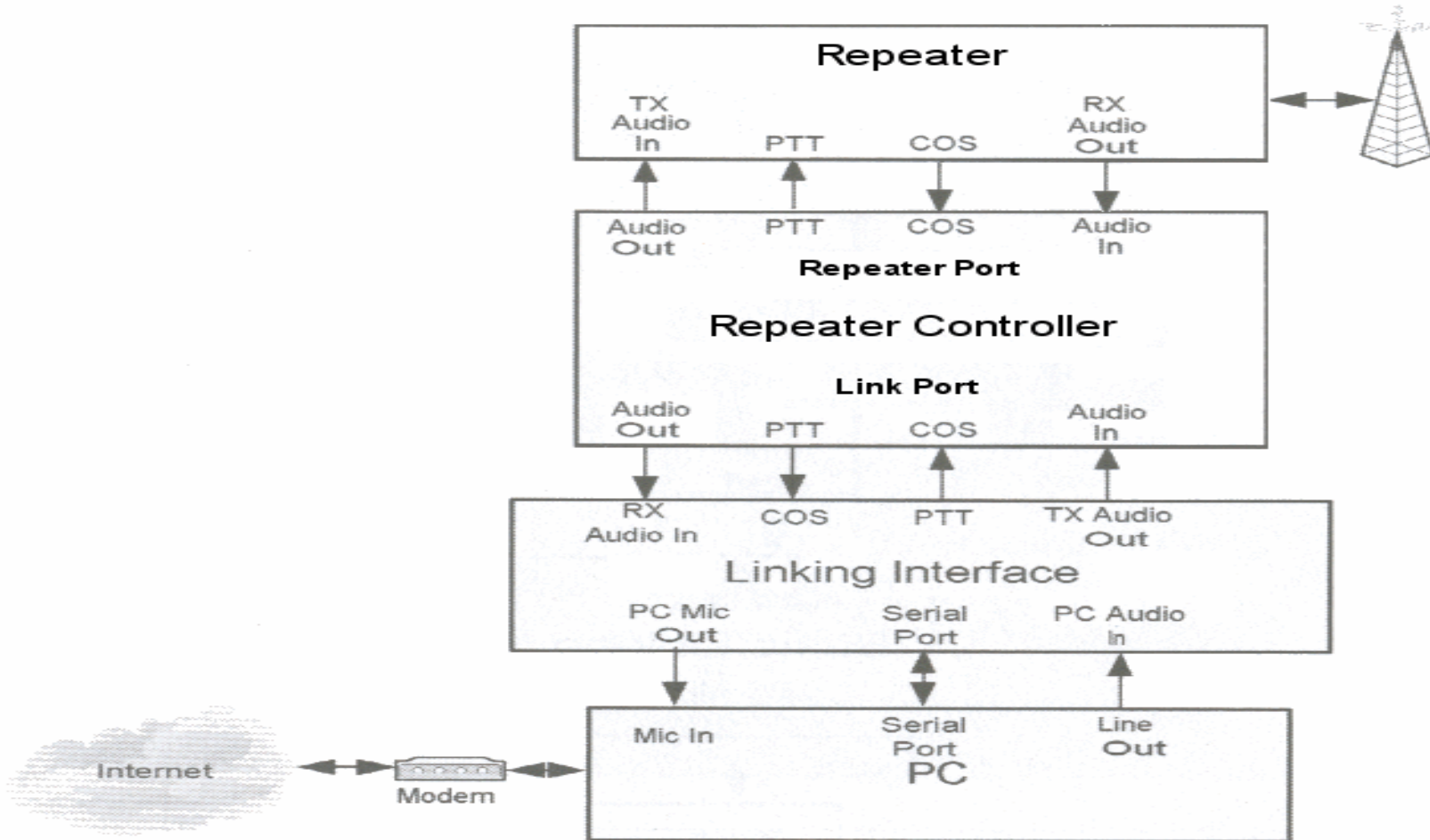


VoIP & Amateur Radio – Simplex RF Link Overview





VoIP & Amateur Radio – Linked Repeater Overview





IRLP



- IRLP is an acronym for **I**nternet **R**adio **L**inking **P**roject
- Developed by Dave Cameron, VE7LTD from Vancouver, Canada



Pictured:
Dave, VE7LTD founder of IRLP with Dave,
K9DC owner of the Indiana Reflector 9200



IRLP Background



- Started in November of 1997 as an attempt to use the internet to link radio systems across Canada
- The first full time link that was established ran from Vancouver, BC to Saint John, NB
- IRLP's motto is "Keeping the Radio in Amateur Radio" by only allowing RF links



IRLP Node Breakdown



→ Uses 4 digit node numbers to identify each IRLP station or reflector

- 1000 to 2999 = Canada
- 3000 to 3999 = Western USA
- 4000 to 4999 = Eastern USA
- 5000 to 5999 = England & USA
- 6000 to 6999 = Australia & New Zealand
- 7000 to 7999 = USA & Territories
- 8000 to 8999 = Sweden, Mexico, Japan & Others
- 9000 to 9999 = Reflectors

The above is *typical* assignments for each regional area.
See <http://status.irlp.net> for a listing of all IRLP nodes.



EchoLink



- EchoLink is another very popular VoIP linking option
- Developed by Jonathan Taylor, K1RFD
- Based on the original iLINK software by Graeme Barnes, M0CSH



Pictured:
Jonathan, K1RFD founder of the
EchoLink software



EchoLink General Info



- ➔ Allows amateurs to communicate using VoIP via Windows/Apple based software or cell phone app
- ➔ Users can operate via one of four methods:
 - Personal Computer
 - Cell Phone App
 - Simplex RF Link
 - Linked Repeater



EchoLink



IRLP and EchoLink Differences



- IRLP is an RF only system.
- EchoLink permits direct PC access.
- IRLP uses PGP for authentication.
- IRLP nodes owners have to contact installation team to receive their PGP keys.
- EchoLink uses validation against online databases, with some applicants being hand validated.
- EchoLink uses encrypted password login.
- Technical differences have resulted in significant cultural differences.



Echolink Software Updated



News and Tips

https://secure.echolink.org/news.htm

Support and FAQs
Help Files
Call CQ!
News and Tips
Vanity Node Numbers
Conference Servers
Routers and Firewalls
Current Logins
Link Status

Notices

16 March 2021: After a 14-year hiatus, we are pleased to announce that EchoLink for Windows version 2.1 is now available. Please see the [Download page](#) to download. The changelog is shown below.

Latest Features

Current Version: 2.1.109

2.1.109 (March 18, 2021)

- Fixes an issue that could prevent stations calling CQ from being able to connect to each other.

2.1.108 (March 16, 2021)

- Updated main window look, with dockable menu bar and selectable visual styles
- New ["Call CQ" feature](#) (also to be rolled out on Mobile app editions), including DTMF code to activate
- Automatic Proxy selection option
- Migrated to 16-bit audio, to match all modern sound cards. This is a significant change to the audio chain that should result in noticeably better SNR and audio quality.
- Better sizing/rendering on Windows "large font" and/or high DPI settings
- Fixed bug with mislabeled audio devices on Audio tab
- Added Recent QSOs folder to Explorer View
- Explorer View is now the default
- Added Search Results folder for a "find all" Search function
- Improved inbound/outbound Firewall Tests
- Clearer labeling of available COM ports in drop-downs for Sysop configuration
- Added Signalink (VOX) as a third interface option in Setup Wizards
- Option to enable a continuous subaudible tone to keep VOX-driven devices keyed consistently throughout each transmission.
- Smarter handling of connection message protocol to improve connect reliability after IP change
- Removed support for, and mentions of, dial-up networking
- Option to show timestamps for each message in text-chat window
- Fix for not muting conference audio during playing of Welcome message to newly-connected peer.
- Removed "Auto-select mic input" PTT option. (This was only available on Windows XP and below.)
- Revised Help file.
- Added "Reset to Defaults" button on Setup->Timings tab; adjusted numerical validation ranges.
- Extended maximum length of Name field to 18 characters.

2.0.908 (May 22, 2007)

- Fixed problems with displaying Asian characters in Chat window and Station List.
- Fixed intermittent page-refresh problem with Web remote control feature (in Sysop mode).

Upgrade Notes

If you are upgrading from an earlier release of EchoLink, please note the following:



New England Network (NEN)



- A project that started December 2003
- Merges the power and technology of both IRLP and EchoLink
- Started by New England Hams
 - Brian, K1SOX, West Haven, CT
 - Jed, N1JBC, Johnston, RI
 - Rick, W1RJC, Dartmouth, MA
 - Tony, N1XRS, Dartmouth, MA





New England Network (NEN)



- Links amateurs all over New England
 - Make new friends
 - Keep in touch when driving long distances
 - **Communications for ARES & SKYWARN**





Digital Link Characteristics



- Audio is not decoded and recoded as it passes the gateway.
- Less audio degradation.
- Lower latency.
- Extremely difficult to tell whether originating station is on IRLP or EchoLink.
- IRLP stations must use GSM CODEC for digital link to work.
- Traffic passes directly between IRLP and EchoLink.



AllStar Link



- AllStarLink is a network of Amateur Radio repeaters, remote base stations and hot spots accessible to each other via Voice over Internet Protocol.
- AllStarLink runs on a dedicated computer (including the Raspberry Pi) that you host at your home, radio site or computer center.
- It is based on the open source Asterisk PBX running our app_rpt application.
- App_rpt makes Asterisk a powerful system capable of controlling one or more radios.
- It provides linking of these radio "nodes" to other systems of similar construction anywhere in the world via VoIP.



DMR



- Two major DMR networks – Brandmeister and DMR-MARC
- Ability for voice and data transmissions
- Ability to use wireless hot spot technology to access the networks
- DMR is an open and published international digital radio standard that specifies the 2-slot (channel) TDMA communications.
- DMR is amateur radio's newest digital protocol.
- DMR radios are produced by several manufacturers and they all work on our TRBO system as long as they are Tier II compliant, as most are.



Today's Uses – Ham Radio



- D-STAR is another ham radio system which offers digital voice and data communication.
- It connects repeater sites over microwave links and the Internet and forms a wide area ham radio network.
- The DSTAR system provides a capability and functionality to the ham radio world and increases the efficiency of emergency communications.
- The D-STAR system provides not only digital voice (DV mode) communication but also digital data transmission (DD mode). It can exchange various data files such as graphics, images, etc,
- Multiple repeater links by radio and the Internet provide long distance communication to virtually anywhere



VoIP Usage in Emergency Communications



→ How can IRLP and Echolink Be utilized in Emergency Communications:

- Long haul Liaison at a regional, national or even international level.
- Excellent for VHF/UHF liaison to affected areas at a regional, national or international liaison that can be used as a primary or backup to HF.
- Point to Point communications with repeaters/links in an area that may not otherwise be reachable other than HF.
- Excellent usage as a served agency command net.
- Allows access to Hams that do not have HF privileges that maybe helpful in the event of a communications emergency.
- Ability to utilize Hams across the country or internationally without dependence on propagation to support a net 24 hours a day/7 days per week. Model used by VoIP Hurricane Net



Combination of VoIP Modes for VoIP Hurricane Net



- ➔ In the 2020 Atlantic Hurricane Season, we utilized the VK3JED “Megalink” to bring in Allstar, DMR, Fusion, Wires, Echolink, IRLP and other VoIP Modes into the VoIP Hurricane Net
 - VK3JED Megalink system was attached to IRLP 9219/*WX_TALK* Echolink conference node: 7203 for VoIP Hurricane Net operations
 - Allowed for almost all VoIP modes to interoperate with one another (except for DMR-MARC)
 - Excellent for ease of VoIP communications across all mediums to allow for one large net to save net control and liaison resources
 - Experimented with similar modes via the QuadNet through efforts from Lloyd-KC5FM and Quadnet maintainer - Jeff Bishop-VE6DV in 2018-2019



For More Information



- A summary of links VoIP Amateur Radio modes and the VoIP Hurricane Net is listed below:
- <http://www.irlp.net/>
- <http://status.irlp.net/>
- <https://www.echolink.org/>
- <https://www.allstarlink.org/>
- <http://www.voipwx.net/>
- <https://www.dmr-marc.net/>
- <https://brandmeister.network/>