

The Repeater Rag

Volume 36 Number 4



**NEWSLETTER OF
THE DENVER RADIO LEAGUE**
*A CLUB DEVOTED TO
QUALITY AMATEUR RADIO*

Published in Centennial, Colorado

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DRL BOARD MEMBERS

Curtis Willoughby, KAØVBA, President

Day Meyer, NØPUF, Vice President

Mike Manes, W5VSI, Secretary

George Brady, KCØYHA, Treasurer

Mel Minnick, KØMEL, Member at Large

Tim Armagost, WBØTUB, Repeater Trustee

REPEATER LOCATIONS:

146.88Ø..... Warren Mountain

146.64Ø.....Centennial Cone

449.6ØØ..... Warren Mountain

145.Ø5Ø Digi Warren Mountain

Repeater Identifier: WAØKBT

DRL website: www.denverradioleague.org

or www.eoss.org/drl

*The Denver Radio League is open to all licensed
amateur radio operators. Repeater usage is
limited to properly licensed hams.*

MEMBERSHIP DUES AND RENEWALS

~ Please make checks (\$15) payable only to

Denver Radio League or DRL ~

Remit to: George Brady, KCØYHA

6166 S. Forest Ct.

Centennial, Colorado 80121

For information, contact George at 303-773-6244

MEMBERSHIP MEETING

REMINDER

NOVEMBER 20, 2012

7:00 TO 9:00 P.M.

BEMIS PUBLIC LIBRARY

6014 South Datura Street

Littleton, Colorado 80120-3636

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New officers

At the board meeting held on September 28th, the following officers were elected from the board you elected at the August meeting:

President: Curtis, Willoughby, KAØVBA

Vice President: Dan Meyer, NØPUF

Secretary: Mike Manes, W5VSI

Treasurer: George Brady, KCØYHA

The other two board members you elected are:

At large: Tim Armagost, WBØTUB

At large: Mel Minnick, KØMEL

The other major piece of business was:

Tim Armagost, WBØTUB was selected as our new Trustee, replacing George Stoll, WAØKBT, who resigned earlier this year. A great big Thank You is offered to Tim for taking on this important responsibility, and also to George, who has done this job well for many years.

Tim and others he recruited have already repaired a major repeater failure, and are continuing to repair the failed receiver board which they replaced from the spare repeater. Thank you, again Tim and your recruits

The November meeting is scheduled for Tuesday, November 20th at the Bemis Library. We will have an interesting program, so don't miss it. I appreciate your support as we finish out 2012, and move into 2013. If you want to contact me to compliment, volunteer for a job such as program chairman, or whatever else members say, my phone number is 303 424-7373.

73,

D. Curtis Willoughby—KA ØVBA

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A report!

This past month the Denver Radio League experienced a failure at the Lockheed/Martin Warren Mountain site and both 146.88 and 446.600 we not responding. It took several days to get a work party assembled but finally, on a Sunday morning, a team of three (Mike Manes, W5VSI, Mike Pappas, WØCN, and Tim Armagost, WBØTUB) made it to Warren mountain with a spare VHF repeater and a truck full of trouble shooting equipment.

We discovered the 88 machine was able to transmit but it's receiver was deaf as a post! After some trouble-shooting we found the receiver in the repeater was not working. We then took the receive board out of the spare repeater and swapped the bad board with the good board. Mike P broke out his service monitor and retuned the 'ICOM' (Motorola speak for "Integrated Circuit Oscillator Module") and \*bingo\*, the 88 machine came back to life!

We then turned our attention to the 449.600 UHF repeater...we discovered that the repeater itself was working, but the NØTI controller was not. Since we do not have a spare controller for the UHF machine we removed the controller for possible repair, but the repeater is no longer on the air. With some recently located controller schematics it is hoped that we can get the 449.600 machine running in the near future.

Currently, the spare VHF repeater is in the process of getting repaired and the UHF repeater is off the air awaiting a controller.

Stay tuned!

In other business, we have received a complete UHF spare repeater and a VHF repeater frame and enough parts to put together a complete repeater. Documentation was also found for all the MastrII machines and the old controllers from NØTI. The 'new controller' hook-up guys met and have a plan in place to get the new controllers wired and installed – it may be such that the new controller will be ready before the old 449.600 controller is repaired and if so, we will install whichever one is most ready.

A few years ago the DRL asked who would like to learn about the repeaters and get on the maintenance team – this is the first failure we have had since that list was put together, so nothing has been done *with* the list. I will

get it back together and send off a note to all and see if we can get that going. I apologize for the delay!

In a recent discussion with John Maxwell, WØVG, he mentioned that Rocky Mountain Ham Radio is working on an internet link along the front range and as we chatted it became very interesting very quickly. I asked John if he would put together something for the newsletter describing the link (in the 3.3 Ghz ham band) and you will find that article in this issue as well.

73 es CU on the air!

Tim, WBØTUB

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RM Ham Digital Network

With the advent of all of the new digital technologies out there, hams are having to rely on the internet more and more for their communications backhaul. Many clubs are moving their linking channels off of radio links and onto Voice Over IP technology or VoIP. This technology is opening up the world by allowing hams to put repeaters wherever there is access to an internet connection. Over the last 15 years, VoIP based technologies have been creeping into amateur radio and have firmly taken hold with systems like IRLP, D-STAR, All Star, and MotoTRBO radio systems, just to name a few.

Rocky Mountain Ham Radio (RMHR) has repeater sites all along the Front Range and has been linking them via IRLP on commercial internet for years. Due to the cost and reliability factors of Commercial Internet, RMHR has been looking for a ham radio spectrum based transport method for their IP needs, which have been steadily growing for the last 10 years.

Along comes Ubiquiti Networks who is a commercial manufacturer that produces radio equipment in the 900MHz, 2.4GHz, 3.4-3.8MHz, 5.2-5.8GHz and 10GHz point-to-point and point-to-multipoint IP radio equipment. This cost-effective radio equipment can be purchased for export in 3.3-3.5GHz frequency range and works perfectly in the ham radio band (which we are the primary licensees on.) This spectrum is basically untouched by commercial equipment, unlike the 900 MHz, 2.4 GHz and 5.8GHz bands which are nearly unusable for this purpose due to commercial uses.

With this technology, RMHR has deployed a Proof of Concept radio link system from Firestone, CO to Lee Hill in Boulder (22 miles), and a second shot 13 miles to

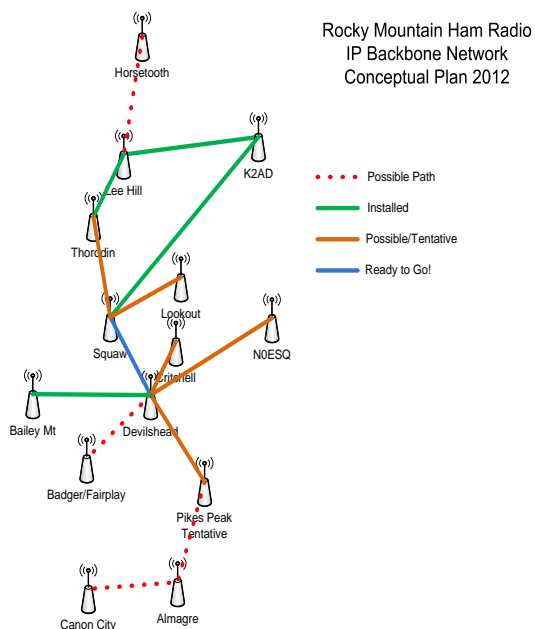
Thorodin Mountain in Gilpin County as well as a 42 mile shot from Firestone to Squaw Mountain. These links are all up and operational and have been carrying traffic for the MotoTRBO, IRLP and BPQ packet systems since March, 2012. The network management tools are impressive for this equipment too. Ubiquiti provides a full network management server that allows the user to constantly monitor the signal strength and alarms on any radio connected to the network on any browser as well as an application for iDevices as well as Android OS.

Our long term plan for the network is to feed IP from Horsetooth Mountain in Fort Collins to Almagre Mountain in Colorado Springs via this network to bypass the need for commercial internet in these locations. We are working to create a private CO-OP IP network for the amateur community along the front range and we will provide direction to other clubs wishing to tie into this network to further the cause.

To start, there will be several "Points of Presence" where we will tie into the commercial internet so that we are not creating a giant island, but an interconnected freeway system that ties to the world.

As you can imagine, the construction and operation of this network is not without cost, but the costs associated with this deployment are significantly less than what you would expect if you were to purchase internet from a commercial carrier.

The network diagram as the test network was built and overlaid with plan:



This network has the possibility of growing quite large, and adding many sites to it. The only issue we have is capitalization of the network. To start, RMHR's immediate needs are all we are looking to cover but would entertain any additional sites added to the network if the requesting club were to defray their equipment costs to ride the network as well as their portion of the ongoing operating expenses.

For more information see the Rocky Mountain Ham Radio website at <http://www.rmham.org>.

John Maxwell, WØVG

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**Field Day 2012**



Join us during the DRL Fun Net, every Wednesday evening,,  
7:30 p.m. local time, on 146.88!!