

# Squelch Tales

A Publication of The San Diego Repeater Association, Inc.  
January / February 2015

## *Ahead in Squelch Tales*

The SANDRA **November 2014 membership meeting** featured Andre Hansen, K6AH, presenting the local development of a Broadband Hamnet. This amateur radio data network, operating on batteries and small solar cells, is a robust data network that could be an ideal emergency communication network.

**A hitch in time.** June 30, 2015 will be 86,401 seconds long instead of the normal 86,400 seconds. We discuss the leap second.

**Announcements:** The San Diego Amateur Radio Council (SANDARC) is seeking nominations for Chairman, Vice Chairman, Secretary and Treasurer. The next SANDRA Board Meeting will be held April 2, 2015.

**Errata, mistakes, updates and shorts** to previous issues of *Squelch Tales* are included as *SQ* receives input from the members and officers of SANDRA.

## November 2014 Membership Meeting

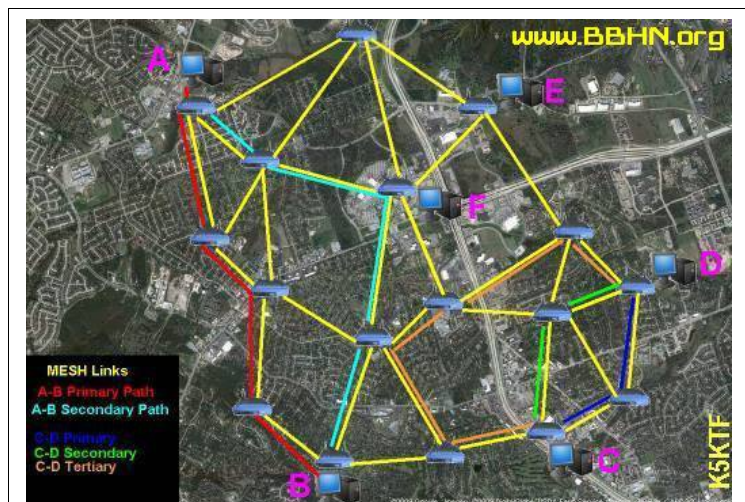
Andre Hansen, K6AH

### **Broadband Hamnet – a self configuring, high speed, RF data net.**

The SANDRA November 2014 membership meeting featured Andre Hansen, K6AH, speaking about the local development of a Broadband Hamnet. The system is designed as a high speed, self discovering, self configuring, fault tolerant, wireless computer network that uses modified off-the-shelf microwave wireless routers, operating within amateur radio allocated frequencies, to carry amateur data traffic. The hardware is easily adaptable to run off of batteries and small solar cells which makes it ideal for handling data traffic in an emergency, especially in Southern California where earthquakes and fires can compromise both the electrical supply and the communications infrastructure. Because the network is structured as multiple interconnected nodes it is referred to as a mesh network.

This digital concept, which originated in Austin, TX, is rapidly spreading, with the US, Canada, Australia and European Continent making up the bulk of activity with additional activity in South America and Africa. The San Diego County effort is being developed by a group of hams who comprise the San Diego Mesh Working Group (SDMWG) and along with Orange County hams are particularly active with seven clubs signed up to host nodes at repeater sites. The Palomar Club will install a node consisting of two sector antennas running on 2.4 and 5.8 GHz at their Mt. Palomar repeater site.

(Continued on page 3)



Typical MESH topology, not that nodes can be reach via multiple paths – BBHN.org.

## **A Hiccup in Time (or at least a leap second)**

The International Rotation Service has announced that on June 30, 2015 at 23:59:59 an additional second will be inserted into Coordinated Universal Time (UTC) so that time will progress as: 23:59:59, 23 59:60, 00:00:00, 00:00:01, etc. making June 30, 2015 one second longer than every other day of the year. The change is necessary to align UTC or civil time to the rotation of the earth. Due to some wobble on it's axis, the rotation of the earth is not as stable as our ability to keep accurate time using atomic clocks. Time is normally kept as TAI (Time Atomic International) using more than 400 atomic clocks distributed around the world corrected for relativistic effects and averaged. UTC is based on TAI but periodically adjusted in whole seconds when the difference between solar time and UTC becomes more than a half second. UTC is the time that is distributed through time servers and by the GPS constellation to the public.

As has been discussed in past issues of *Squelch Tales*, in 1967 the definition of the SI second became the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium (caesium) 133 atom. TAI is the number of SI seconds since 00:00:00 January 1, 1961. UTC defines days as 86,400 TAI seconds, 60 seconds per minute and 60 minutes per hour. UTC is defined as TAI minus the number of accumulated leap seconds (currently there are 25 leap seconds but soon to be 26 at the end of June). Besides TAI and UTC there are two other important time scales in use, UT1 and GPS. GPS time is the time kept by the GPS constellation which is equal to TAI – 19 seconds, and is not corrected with Leap Seconds. UT1 is Mean Solar Time and is corrected weekly to keep within 0.1 seconds of the solar day. UT1 is equal to TAI minus Leap Seconds + DUT1, which is the weekly correction. UT1 is the closest thing to the now obsolete GMT which was time distributed prior to 1960. The number of time scales does not stop here but the additional scales are less pervasive.

There have been 25 previous Leap Seconds, the last one applied in June 2012, all of which have passed without a much attention. This year, however, there have been dire predictions of massive failure all around the world reminiscent of the millennium bug at the end of the century. The doom sayers are predicting that because of the World Wide Web and the number of computers linked together around the world, that they will all become confused causing a mammoth crash and society as a whole will come to a stop. The problem here may well be the World Wide Web, but not its use to distribute UTC but the ease of distribution of rumor and conspiracy theories. Computers get out of sync with time servers every day, Network Time Protocol (NTP) is anything but totally consistent and time servers crash and go off line. It may be true that some time sensitive programs (dovecot comes to mind) may lose their way and stop functioning, however, time sensitive programs do that frequently anyway – they usually just need to be restarted.

It is also interesting that the predictions of dire consequences arise just as a discussion of the elimination of Leap Seconds is approaching. The concept of Leap Seconds is not universally accepted, many groups think that the Leap Second should be abandoned because they place undue strain on managing anything that requires very accurate timing such as high speed computer clusters and nearly all satellite and space operations. This has been an ongoing argument since the adoption of Leap Seconds and continues unabated. The tide has been slowly shifting against the Leap Second and it will likely disappear in the next few years. People will have to learn to deal with the day creeping out of sync with the sun by a second every three years or so. -{SQ}-

**Broadband Hamnet** – continued from page1.

The SDMWG is inviting all clubs to install nodes at repeater sites to create as robust a network as is possible. The initial goal of the mesh network is to provide an integrated emergency network allowing the forwarding of message traffic as email or other digital forms and which doesn't require verbal transcription, reentry or re-transcription of messages. The system would greatly enhance the efficiency of message handling and consequently the speed and capacity of message handling under emergency conditions.

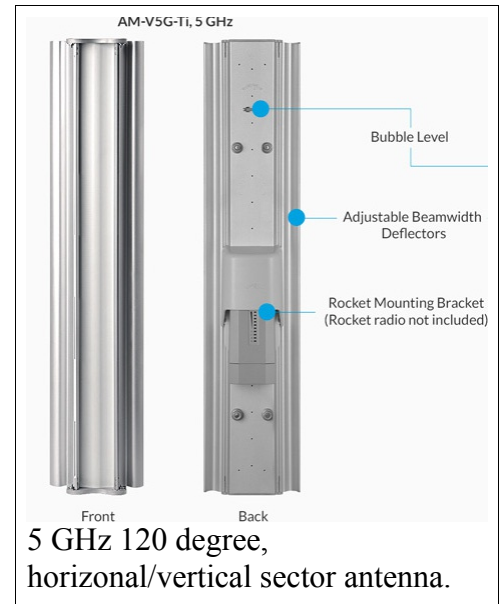
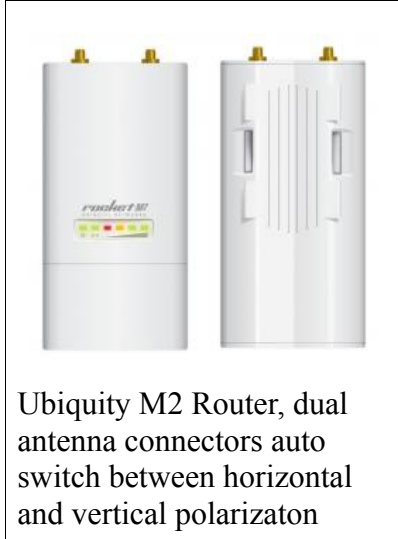
The nets are built by repurposing Wireless Internet Service Provider (WISP) routers, originally intended to deliver wide area internet wifi access in sparsely populated areas, to operate as an amateur radio data network. This is possible because some amateur allocations at 900 MHz, 2.4 GHz, 3.4 GHz and 5.8 GHz overlap frequencies used for wireless internet access. Hams have a great deal of flexibility in the way they develop and operate equipment in their allocations which gives the ability to easily repurpose these devices for ham radio use. Currently, the preferred equipment is the Ubiquity series of WISP routers and antennas which operate at power levels between 200 mw and 600 mw into antennas with a sector width of 120 degrees. Software has been developed to support 900 MHz, 2.4 GHz, and 5.8 GHz with 3.4 GHz available shortly. These networks are TCP/IP networks, passing IP packets just as is done over the internet. The mesh is capable of passing internet traffic, however, since most internet traffic is encrypted and hams are not allowed to encrypt transmissions, it would be a serious violation of a licensee's privileges to pass encrypted traffic and may engender some large fines (\$10,000/day). A typical node length can be anything up to 25 miles and potentially longer depending on the terrain that is traversed. The typical data that is passed is in the form of email, Voice Over Internet Protocol (VOIP), image, and potentially any other unencrypted data application. There is interest in an application that would directly transmit ICS 213 message forms between nodes.

The mesh is self configuring, with each node discovering (or being told) where every other node is located and what paths are available to reach it. A path cost is assigned to each path between any two nodes based on signal quality and bandwidth. The cost for a connection between any two nodes is selected to be the lowest cost which provides the most efficient transport. Path costs are continually being evaluated so the most efficient path will always be selected. The applications (email, VOIP, etc) are typically hosted on small computers attached to the router. A Raspberry Pi is an outstanding selection for this application because it is small, consumes very little power and can be powered by a small battery/solar cells unit. Local access to the Raspberry Pi can be via local ethernet connection or another mesh node. Each node advertises what services (applications) it has available to all other nodes which can be viewed on an administration screen.

Mesh nodes are powered by two key pieces of software that are available on the Broadband Hamnet web site, <http://www.broadband-hamnet.org>. The first piece of software is firmware that needs to be loaded into the mesh router to configure it for amateur use. The second piece of piece of software is Optimized Link State Routing (OLSR) which provides the optimized routing between nodes. The firmware configures the hardware for interoperability with the MESH network and allows for some editing of the network parameters. Generally, the router is configured with kamakazi 7.09 to run in ad-hoc mode on channel 1 with encryption disabled, speed automatic, wireless and ethernet ports not bridged (remember these routers are Linux computers in their own rite and can be configured to do a lot of things), the SSID set for the MESH network, and the LAN and WAN ports configured. OLSR does the hard work of accessing routes through the network and passing traffic in as efficient a path as possible. OLSR offers screens that give basic information about the network of connected nodes, the services that are offered at each node and the connection paths to each node.

Broadband-hamnet combines newer data technologies with ham radio to provide an efficient  
(please see next page)

communication network using low power nodes that can easily be operated from battery or battery/solar systems to be independent of the wired infrastructure. The network offers advantages to emergency communication and opportunities to the ham community for experimentation and development -{SQ}-



### San Diego Section ARES Meetings

From Section Emergency Coordinator Bruce Krypton, KG6IYN:

The ARES Team Meets the second Saturday of each month at 0800 Hours (local), in the Schatzel Center Nobel Room, on the Scripps La Jolla Hospital Campus, in San Diego.

### Planned General Agenda:

- Opening greetings, housekeeping and general introductions
- Current Section Report (Section Manager)
- General Announcements (Section Emergency Coordinator, Asst. Section Emergency Coordinator)
- Weekly Drill Report (Training Coordinator)
- Monthly Agenda and Topics
- Club Reports and any activity announcements
- Final comments and general meeting close

There will be a light breakfast provided (donations to offset out of pocket costs are greatly appreciated), and parking fee (normally 4.00) is waived for attendees.

ARES offers training in equipment operation, message handling, ARES procedures with frequent emergency drills. Contact Bruce Krypton at [KG6IYN@arrl.net](mailto:KG6IYN@arrl.net).

## **San Diego Amateur Radio Council**

### **SANDARC**

The San Diego Amateur Radio Council, Inc. (SANDARC) is a countywide organization comprised of Amateur Radio Clubs from all parts of San Diego County. SANDARC provides Amateur Radio license examinations at different locations throughout the County and sponsors special classes for those who wish to obtain a license with testing immediately following the class. The organization also assists local clubs with annual events and activities that all member and non-member clubs can attend. More information can be found at [www.sandarc.org](http://www.sandarc.org).

The SANDARC Executive Board elections will be held on April 30<sup>th</sup>, 2015. Nominations are being accepted to fill the Chairman, Vice Chairman, Secretary, and Treasurer positions for two year terms.

If you wish to run for any of these board positions, please contact any of the Nominating Committee members below before the nomination deadline of March 26th, 2015. Thank you.

Mike Hightower, KF6SJ

[mike@hightower.com](mailto:mike@hightower.com)

858-382-4041

Bill Honaker, N9LZ

[N9lz@arrl.net](mailto:N9lz@arrl.net)

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Larry Plummer, AE6AV

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Home: 619-460-1107

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### **SANDRA Board of Directors Meeting**

**April 2, 2015 - 7:00 pm**

**County Education Center**

**6401 Linda Vista Road**

**Room 301**

**Sand Diego, CA 92111**

**All members are welcome and encouraged to attend**

This is an outstanding way to become involved with SANDRA - attend a BOD meeting and volunteer to help the club achieve it's goals. Contribute input to the organization so that SANDRA meets the needs and expectations of the San Diego amateur radio community. Amateur radio clubs function because of people who donate their time to keep the clubs and the club equipment operating. SANDRA and other amateur radio organizations need new volunteers to assist and keep the organizations functioning.

**SANDRA wants you - please attend.**

**San Diego Repeater Association, Inc.**

Board of Directors Meeting Minutes  
 October 2, 2014 (Thursday) 7:00 PM  
 San Diego County Office of Education  
 6401 Linda Vista Road, Room 301  
 San Diego, CA 92111

Director	Present	Excused
President Barbie Flinn, WA6URS	X	
Vice President Stogie Panger, AJ6AX	X	
Treasurer Ken Decker, WA6OSB	X	
Secretary Alex Groza, WB6DTR	X	
Membership Chair Bob Boehme, W2IRI	X	
Meeting Chair Ben Concepcion, N6VVY		X
MAL-1 Year Bayard Rehkopf, K6GAO	X	
MAL-2 Year Chuck Wood, WD6APP	X	
MAL-3 Year David Andreoli, KI6VIA	X	
Past President John Austin, K6RLV	X	

**Call to Order:** The meeting convened at 7:00 PM, President Barbie Flinn presiding.

**Members in attendance:** Attendance Roster attached. (Eleven attendees)

**Approval of Minutes:** Approval of Meeting Minutes from July 2014 Board Meeting and September 2014 Membership Meeting, by unanimous consent.

**Board Reports / Presentations / Comments: Treasurer:**

July, August and September 2014 Treasurer Reports were submitted in advance via email. Reports were filed with the Secretary. Discussion took place regarding Otay phone bill. Treasurer to analyze utility rate increases for Otay site, and report back to the Board

**Membership Chair:** 211 members. WA6OSB discussed ways to acknowledge new and renewing members via SANDRA Internet website or email

**Committee Reports:**

**Technical Committee:** The Otay UHF Yaesu repeater is working well. Bayard stated Laguna 220 MHz. repeater signal strength is down. K6RLV will schedule a Laguna site inspection / maintenance trip. Bayard inquired about Hi-Pass clean-up. K6RLV referred him to Craig Williams. An Otay clean-up trip is also needed. K6RLV will program an RLC-1 controller for the Sharp Hospital repeater. WA6URS requested Tech Committee members conduct an inspection / maintenance trip to Laguna prior to winter.

**SANDARC:** WD6APP and W2IRI spoke about the SANDARC convention. Approximately 644 attendees. SANDARC made a profit from this convention. The Convention Chairman (Mike Maston, N6OPH) will make a presentation to SANDARC clubs at their October meeting.

**New Business:**

- WA6URS closed the nominations for 2015 SANDRA Board / Officers per policy. KI6VIA stated there were no challengers to any of the open positions. Current Board will remain, with MAL positions rotating per policy (K6GAO to MAL-3 position). 2015 Election Committee was disbanded.

- WD6APP motion / second by W2IRI for SANDRA to purchase dinner for our meeting guest speaker(s). Discussion took place. Passed by unanimous vote of the Board members present (N6VVY absent).
- WA6URS: November is the Annual Meeting of the members. No election will be held since all offices were unopposed. K6RLV invited Andre Hansen to make a presentation at the November meeting. WD6APP to confirm with Andre.
- WA6URS: Discussed December pot-luck dinner. Discussion took place about prizes.

Grand Prize will be final drawing with all tickets eligible to win Grand Prize. WD6APP motion / second by W2IRI to purchase Kenwood TM-V71a as Grand Prize. Discussion took place. Vote 7 Yes, 1 Abstained, 1 Absent. Motion passed. KI6VIA motion / second by WD6APP to spend \$700.00 for prizes. Motion passed by unanimous vote of the Board members present. WD6APP made a personal donation to SANDRA in the amount of

\$100.00 to go toward the December event expenses. Further discussion to take place at

November Board meeting. WA6OSB will purchase the prizes at HRO. • WA6URS: Requested Tech Committee members conduct maintenance at Hi-Pass, Laguna and Otay. Site maintenance was also discussed earlier in the meeting.

- Miramar Air Show: ARES will be using Otay 449.200 repeater as needed.
- WD6APP: SANDARC will be voting on bylaws updates in November. WD6APP and WB6DTR will represent SANDRA. Each club has one vote for the amendments.

Next Meeting Date: November 6, 2014 – Annual Meeting, Room 306.

Adjournment: The meeting was adjourned at 8:31 PM by Unanimous Consent.

**Errata, Corrections, Amplifications and Shorts:** This sections acknowledges errors and omissions or allows additions to previous *SQ* issues. We rely on feedback from the readers – please write.

### **Repeater Status:**

**Otay UHF 449.200 repeater** – The analog repeater is up and running. When the new repeaters from Yaesu are received, one will be programmed for 449.200 and installed on Otay. It will be run at reduced drive power and amplifier output. The notch cavity that has been place in the transmit feed-line will be removed. A brush maintenance party is being arranged.

No change in any other Otay repeater.

**Lyons** - No changes this past month.

**Sharp Hospital** - The old RLC controller was replaced with a newer RLC-1. The 420 link receiver was 6 KHz off frequency and appeared to be unstable. We should order a new crystal and channel element from International Crystal. The Otay receiver was slow in responding. It is likely that the 420 transmitter is off channel as well.

**Laguna** - No changes this past month. Laguna will receive a new Yaesu DR-1 when it is available.

**Hi-Pass** – No changes since last month.

**Kearney Mesa** - No changes this past month.

Callsign	Location	Input	Output	Callsign	Location	Input	Output
WB6WLV	Mt. Otay	146.040	146.640	WB6WLV	Mt. Laguna	444.500	449.500
WB6WLV	Mt. Otay	222.460	224.060	K6GAO	Hi-Pass	144.680	145.280
WB6WLV	Mt. Otay	444.200	449.200	W6SS	Lyon's Peak	146.865	146.265
WB6WLV	Mt. Otay	1270.300	1282.300	WA6AIL	Sharp Hospital	147.285	147.885
WB6WLV	Mt. Laguna	147.750	147.150	WB6WLV	San Diego	442.320	447.320
WB6WLV	Mt. Laguna	222.600	224.200				

**All SANDRA repeaters use PL 107.2**

**SANDRA NETS**

Sunday 8:00 P.M. Mt. Otay Repeater  
 Wednesday 7:30 P.M. Mt. Laguna Repeater

**GUIDELINES SUMMARY**

SANDRA, Inc. operates their repeaters for service in the San Diego area. The policy of the organization is that the repeaters are available for all licensed amateur radio operators to use so long as applicable rules and regulation are observed, whether members of SANDRA or not.

**SQUELCH TALES**

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The SANDRA membership meets the first Thursday in the Months of March, June, September and December. Meetings start at 7:00 P.M. and are located at the San Diego County Education Center, 6401 Linda Vista Road, San Diego. Board meetings take place on the first Thursday of January, February, April, May, July, October and November. All SANDRA members are encouraged to attend.

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