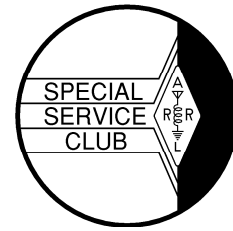




SIGNAL



de NINC

November 2006 Volume 15 Number 11

This Month's Meeting

The program for the November meeting was not set as of the newsletter printing.

Road Cleanup will be Sunday November 19th.

Last Month's Meeting

Last month's regular meeting program was a QSL card sort for the W1 QSL Bureau. This is the ninth time we have sorted cards for the W1 QSL Bureau starting back in 1998.



Courtesy KD1SM

Above Dennis K1LGQ with Bruce K1BG on the right and Wolf KA1VOU on the left sorting into the pigeonhole box Stan KD1LE built.



Courtesy W1JMM

The pigeonhole box lets one or two people sort cards from each side without moving as our traditional letters on a table does. The only tradeoff is the letters run in reverse order on one side.

We are currently building five more boxes for our use next time we sort. We will also offer them to other clubs that sort for the bureau.

Pizza and drinks were served after the sort was completed. We sorted approximately 20,000 cards in one and one half hours finishing by nine o'clock.

As a last thought we invited the Montachusett Amateur Radio Association (MARA) to participate in our card sort. Several MARA members were able to attend. Next year plan to give advance notice to all the area clubs.



Courtesy KD1SM

Stan KD1LE and Fred WA1TNY on left sorting our traditional way based on letters laid out on four tables.



Courtesy KD1SM

There was a good selection of pizza for the sorters after we finished.

Attendees at the September meeting: Dale AB1GA, Walter K1CMF, Leo K1LK, Wolf KA1VOU, Phil KB1JKL, Peter KB1LZH, Stan KD1LE, Ralph KD1SM, Les N1SV, Joel W1JMM, Peter W1LLB, Dick KB1MBR, James W1TRC, Bob AB1CV, Bruce K1BG, Bill Wrocklage K1IE, Dennis K1LGQ, Callie Cornell K1ZAK, Larry KB1ESR, Bob KB1JZU, Gordon N1MGO, Les N1SV, Bill Leger N1UZ, Peter N1ZRG, Peter W1LLB, and Fred Courtemarche WA1TNY.

Mr. Beverages Antenna

This is an email written in response to a question on the 600 Meter reflector. The 600 Meter band is 500 KHz give or take and is experimental at this stage with only a limited number of stations being authorized to operate there. Bob thought other might have questions about receiving antennas for the low bands.--ed

Hello,

I thought I would send you a reply directly to your question about the "Beverage" antenna. The "Beverage" antenna is named after one of the three men that developed it for reception of transatlantic VLF signals in the 1930's. If my office wasn't in the process of moving to the basement for home repairs, I could dig out the original paper. I believe the other two men were named Rice and Kellogg. The antenna is a "traveling wave" antenna. That means it is terminated at one end. The antenna is used unterminated as a bidirectional antenna and people refer to this as an unterminated Beverage, but it is not the original design. Although the antenna is a horizontal wire connected to ground at each end it is a vertically polarized antenna. Think of it as a high impedance transmission line terminated at one end in a resistor and connected to the receiver at the other end usually through a matching transformer and transmission line. The horizontal wire is one conductor of the parallel wire line and the ground is the other conductor of the line. A vertically polarized radio wave coming in at a low grazing angle to the earth induces a voltage in the wire as it travels along parallel to the wire. (The antenna responds to only low angle vertical signals.) This is because the radio wave is tipped as it travels along the ground because of the losses in the ground under the wave. The tipping of the wave is like the wave is dragging it's feet behind it as it travels along the ground. The tipping of the wave results in the normally vertical electric vector to now have a small component parallel to the wire. This small electric vector parallel to the wire induces the current into the transmission line. As the wave travels along the wire it keeps adding to the current flowing in the wire because the velocity of the two waves (that in the air and that in the wire of the Beverage antenna) are nearly the same. So the longer the antenna the bigger the received signal at least for antennas up to several wavelengths. As I said the two velocities of propagation are "nearly" equal, but not exactly so the phase of the two signals starts to shift as the antenna gets longer and there is a limit electrically if not by the space available to how long you can build an effective Beverage antenna.

Now as I have said, the signal is traveling along the wire towards the receive end. If the antenna (transmission line) is matched at the receive end the wave traveling along the line is terminated in the receiver load. If the radio wave is traveling in the direction from the receiver end to the terminated end of the Beverage antenna it will induce a current flowing towards the termination. If the transmission line (antenna) is terminated all the energy is dissipated in the termination resistor and none gets to the receive end of the antenna. This is how the antenna has a directional pattern. If the termination is not perfect (and it never is) the amount of the wave reflected off the termination resistor (SWR) determines the front to back ratio. So if you remove the termination resistor all the energy is reflected off the open circuit and the antenna is bi directional. You could also short the antenna at the end and get the same results. It should be obvious that a radio wave traveling at right angles to the wire will not induce a voltage in the antenna because the wave and wire do not have a parallel component. In order for the radio wave to couple energy into the antenna they need to have a parallel component. Parallel to the wire the coupling is maximum and at 90 degrees to the wire it is zero. In between it has a pattern like any other directional antenna. There is some voltage induced in the vertical sections of wire at the ends of the antenna so keeping the height low is an advantage in improving the front to side ratio of the antenna. Some people try sloping the ends to reduce the effect but height is height so the front to side is never perfect either. But since it does not respond to high angle signals and has a good front to back, and front to side ratio the Beverage is a good low noise receiving antenna, since it doesn't pick up noise from undesired directions. But as you may have guessed from the description it is not a very efficient antenna. The coupling to the wave is low meaning it receives a small part of the energy in the passing wave. This means the received levels on the Beverage are low but this can be made up with a pre amp if necessary. But, and this is the "biggie", the ratio of signal to noise will be much better. It is a good receiving antenna in one direction. To be effective it has to point towards the desired signal. Its feature may also be its disadvantage. That and its size. It needs to be at least half a wave length and longer is better up to several wavelengths (Shorter wires work but the signal levels get low and the pattern gets poorer.) There are other low noise receiving antennas that are smaller. See the literature. There is a lot of information available in the amateur literature. Try the ARRL antenna book or the Low Band DXing book by ON4UN as a start if you are interested. On the lower ham bands and LF and MF bands, receiving antennas are the thing that can make or break things but a Beverage for 500 kHz can get very long!

I hope this has helped you a bit. Good luck 73
Bob W1XP

Board Meeting

The newsletter had to go to press prior to this month's board meeting.

Treasurers Report

Income for October was \$15 from member dues, \$29.27 from bank interest, and \$10 from PowerPole connector sales. We also received a donation of \$0.23 from road cleanup findings. Expenses were \$15.60 for newsletter postage, \$56.96 for pizza for the October meeting, and \$199.99 for books for the meeting raffle leaving a net expense of \$218.05 for the month.

Current balances:

General fund	\$3867.32
Community fund	\$2136.83

As of 7 November we have 59 members who are current with their dues and 3 renewals outstanding. Please check the member roster that is circulated at the monthly meeting if you do not remember your renewal date. Your membership date also appears on your newsletter mailing label.

If your ARRL membership renewal is coming up, leave your renewal with me at a Club meeting and the Club will pay the postage. As a Special Service Club, the ARRL lets us retain a small portion of the dues that we forward to them.

Ralph KD1SM

Swap Shop

If you have items for trade or sale that may be of interest to members contact the newsletter editor for listings.

PSLIST

Date	Location	Event	Contact	Tel/Email
Nov 11	Lowell MA	Lowell Youth Soccer Tourn	Ron KB1KRG	781-752-5885 kb1krq@arrl.net
Nov 12	Lowell MA	Lowell Youth Soccer Tourn.	Ron KB1KRG	781-752-5885 kb1krq@arrl.net

NVARC Club Net

The club net meets on the 442.900 repeater. Recent participants include Dave N1MNX, Bob W1XP, Bob AB1CV, Joel W1JMM, John KK1X, Larry KB1ESR, Skip K1NKR, Gary K1YTS, Ralph KD1SM, Stan KD1LE, Les N1SV, Richard KB1MBR, Ken K1JKR, Erik W1ZBT, Den KD2S and Peter KB1LZH.

Recent discussions were meeting programs and construction of the QSL sorting boxes.

The net is a good place to bring information for the club and questions or discussions. The net meets at 8:00 PM Monday evenings on the 442.900 N1MNX repeater.

Adopt-A-Highway

The next road cleanup is Sunday November 19th.

Thanks to the following members for their participation in the October cleanup Ralph KD1SM, Bob W1XP, Stan KD1LE, Larry KB1ESR, Jim AA1PO, and Dave N1MNX. We picked up 15 bags of trash.

We meet at the Nashua River common on 119 at 9:00 AM the Sunday morning after the regular club meeting.

Contest, DXpeditions and Special Events

The information for a DXpedition can be quite detailed and may include bands, dates, number of stations, and times of day they plan to work certain continents so I can not list it all here. But if a country or prefix is of interest you can get more information at www.425dxn.org.

Contests 2006

Nov
18-20 ARRL November Sweepstakes Phone
25-26 CQ WW DX Contest CW

Dec
1-3 ARRL 160 Meter Contest
9-10 ARRL 10 Meter Contest

2007
January
1 Straight Key Night
6-7 ARRL RTTY Round-Up

20-21 ARRL January VHF Sweepstakes
CQWW 160 CW last full weekend

February
CQWW RTTY WPX 2nd full weekend
17-18 ARRL International DX Contest CW
CQWW 160 SSB last full weekend

March
3-4 ARRL International DX Contest Phone

May
CQWW WPX CW last full weekend

June
9-11 ARRL June VHF QSO Party
23-24 ARRL Field Day

July
CQWW VHF 3rd full weekend

September
CQWW RTTY DX 4th full weekend

DXpeditions

Call	Location	Until
TF/IW5DCE	Iceland	December
YI9KT	Iraq	January 07
OX3PG	Greenland	June 07
TU2/F5LDY	Ivory Coast	31 August 07
T68G	Afghanistan	March 2007
9V1CW	Singapore	2008

See www.425dxn.org for more listings

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ARRL Letter

LEAGUE SEEKS FCC'S WRC-07 SUPPORT FOR 150-KHZ 60-METER AMATEUR ALLOCATION

The ARRL wants the FCC to throw its support behind a Draft Proposal seeking to have World Radiocommunication Conference 2007 (WRC-07) delegates consider a worldwide, secondary Amateur Radio allocation from 5260 kHz to 5410 kHz. The ARRL included the request in comments <http://www.arrl.org/announce/regulatory/WRC07/WRC-07-Comments-10-27-06.pdf> it filed October 27 in IB Docket 04-286, "Recommendations approved by the Advisory Committee for the 2007 World Radiocommunication Conference." WRC-07 Agenda Item 1.13 will review allocations to all services between 4 and 10 MHz. The League told the FCC that a contiguous band of frequencies in the range of 5 MHz is an important goal of the amateur community -- domestically and internationally.

"There are times when the propagation at 5 MHz bridges a significant gap between the Maximum Usable Frequency (MUF) when the MUF is below 7 MHz, but the Lowest Usable Frequency (LUF) is above the next lower Amateur Radio allocation at around 3.8 MHz," the League said, citing the Draft Proposal. "For reliable communications, an Amateur allocation in the vicinity of 5 MHz is the solution."

Originating with ARRL, the Draft Proposal from Informal Working Group 4 (IWG-4) follows up on disaster relief-related changes to Article 25 of the international Radio Regulations made at WRC-03.

"The amateur services provide emergency communications on a local, national and international basis as an adjunct to normal communications, and in many cases provide the first information about disasters and serve as the only communications link when communications infrastructures are destroyed," the IWG-4 Draft Proposal background information notes.

Several countries -- including the US, Canada, Finland, Iceland, Norway and the UK -- already have permitted Amateur Radio operation on spectrum between 5250 and 5450 kHz, the ARRL said, citing the Draft Proposal. "It notes that there is a successful history of amateur secondary use of bands in which incumbent primary users are present," the ARRL said, mentioning 30 meters as one example. The ARRL said the five 60-meter channels have been in regular use by US radio amateurs since 2003 "without any instances of interference reported by primary users."

The League took issue with remarks contained in the ITU Conference Preparatory Meeting (CPM) draft report with respect to Agenda Item 1.13 that suggest otherwise. Among "disadvantages," the Draft CPM Report asserts, an allocation such as the League suggests "would increase congestion and potential interference to fixed and mobile services at 5 MHz." It argues that compatibility between amateur and fixed service systems in the vicinity of 5 MHz "has not been shown" and a decision to create an Amateur Service allocation there "could seriously affect reliable 24 hours [sic] communication capabilities of the fixed and mobile services." The Draft CPM Report also takes note of the advantages to the Amateur Service of such an allocation.

The proposed allocation is "well within the scope of existing resolutions from WRC-03," the League said. It reiterated that amateur use of the five current 60-meter channels "has not resulted in any apparent compromise in the use of the band" on the part of primary Fixed and Mobile services. "To the contrary, that use has demonstrated compatibility with primary users over a reasonable period of time," the ARRL said.

The ARRL's request in its IB Docket 04-286 comments is unrelated to the League's October 10 Petition for Rule Making (PRM) <<http://www.arrl.org/announce/regulatory/5MHz/5-MHz-Improvement-Petition-09-2006.pdf>>, in which the ARRL asked the FCC to expand operating privileges on 60 meters and to swap one existing channel for a new one.

While the National Telecommunications and Information Administration (NTIA) has indicated it's okay with the ARRL's October 10 petition request, it also said it could not support a request for a 50 kHz-wide domestic secondary allocation. The NTIA oversees spectrum allocated to federal government users, which includes the present 60 meter allocation.

Both the FCC and the NTIA provide input toward positions the US delegation ultimately will take on various WRC-07 issues. Should WRC-07 delegates eventually consider and agree to the international allocation at 5 MHz that ARRL proposes, it still would be up to the FCC -- in conjunction with the NTIA -- whether to authorize such a band for US radio amateurs.

DUELING DXPEDITIONS? TWO GROUPS SET TO DESCEND ON RARE LAKSHADWEEP ISLANDS

The second most-wanted DXCC entity, Lakshadweep Islands (VU7) may host two separate DXpeditions during December. A team sponsored by the Amateur Radio Society of India (ARSI) -- the International Amateur Radio Union (IARU) member-society for India -- will operate as VU7LD <<http://arsi.info/vu7/index.html>>. A second group, under the auspices of the National Institute for Amateur Radio (NIAR), has announced plans to operate as VU7RG <<http://www.vu7.in/>>, in honor of the late Indian Prime Minister Rajiv Gandhi, VU2RG. While the two DXpeditions would have multiple stations on the air simultaneously on various HF bands and modes for at least the first part of December, the Web sites for the respective DXpeditions do not mention the other's planned operation. The Daily DX and QST "How's DX?" Editor Bernie McClenny, W3UR, has cautioned that the two highly competitive organizations carefully coordinate their on-air activities to avoid chaos.

"It is possible that up to six or more stations between the two teams may operate at the same time on the same band and mode," McClenny pointed out in the October 26 edition of The Daily DX <<http://www.dailydx.com>>. He said both teams are aware of concerns within the DX community and on the part of potential DXpedition sponsors regarding the possibility for confusion caused by overlapping operating frequencies that could decrease the efficiency of the operations as well as opportunities to get into the VU7LD and VU7RG logs.

"With this in mind, it will be important for some kind of frequency management (ie, to assign strict frequency slots for all modes and bands to all operation sites of both groups)," McClenny advised. "This will ensure well-regulated and trouble free operations." He says members of the two groups need to work out an agreement before their DXpeditions begin. The NIAR says all of its VU7RG sites "will work closely together to avoid multiple stations in the air using overlapping frequencies."

ARSI's VU7LD DXpedition will run from December 1 until December 30, while NIAR's VU7RG DXpedition is set for December 1 until December 10. A three-day hamfest and conference will kick off the NIAR DXpedition. Earlier NIAR announcements had set the event for the January 15-25, 2007, time frame, but ARSI's announcement that it would mount its own VU7 DXpedition reportedly drove NIAR to re-schedule.

Questions remain as to whether the Indian government has authorized NIAR's VU7RG DXpedition, but event organizers called these "rumors," and assured that the VU7 licenses "are getting processed in a

regular way." Earlier this year, the NIAR organized and sponsored a successful DXpedition and hamfest-conference in the Andaman Islands (VU4).

Fifty or more hams from India and elsewhere -- including a number of well-known DXers -- are said to have signed on to fill the VU7RG operating positions. Approximately two dozen radio amateurs from India will handle VU7LD operations on CW, SSB and digital modes.

Part of the Laccadive Islands, Lakshadweep -- the smallest union territory of India -- is located in the Arabian Sea some 200 to 300 km off the southwestern coast of India. The territory marks its 50th anniversary this year. The VU7LD team will operate from Kavaratti Island, while the VU7RG DXpedition will take place from sites on Agatti, Bangaram and Kadmat islands.

ARISS "CONTINGENCY NETWORK" IMPRESSES NASA

When Russian flight controllers encountered difficulties during a recent International Space Station cargo rocket docking, NASA called on a special -- although little-known -- Amateur Radio team to stand by if needed. Amateur Radio on the International Space Station (ARISS) Ops Team "ISS Ham Contingency Network" volunteers around the world immediately swung into action. Within 15 minutes of receiving the call from Johnson Space Center, Kenneth Ransom, N5VHO, reported the ISS Ham Contingency Network was ready to provide any necessary communication support.

"The ARISS teamwork was very effective," ARISS Secretary-Treasurer Rosalie White, K1STO said. "Its members learned a great deal, and they impressed NASA with how quickly the system was brought up."

During the October 26 Progress docking, NASA says, Russian flight controllers were unable to confirm whether an automated antenna on the rocket had retracted as commanded. If still extended, the antenna could have interfered with the final latching of the supply ship to the ISS. To avoid disturbing the softly docked cargo ship and to aid the crew with docking maneuvers, the ISS orientation was allowed to drift freely.

During free-drift mode, however, the Tracking and Data Relay Satellite System (TDRSS) -- which handles communication between the crew and Mission Control in Houston -- can be lost. That's because the station's solar arrays may not directly face the sun, causing a drop in onboard power.

Awakened at 2 AM, ARISS Australian team member Tony Hutchison, VK5ZAI, put out a blind call on VHF to the ISS crew, although no answer was needed at that point. Others available to cover later passes included Gerald Klatzko, ZS6BTD, in South Africa; Gaston Bertels, ON4WF, at ON4ISS in Belgium; Dick Flagg, AH6NM, and Nancy Rocheleau, WH6PN, at Sacred Hearts Academy in Honolulu; and Frank Bauer, KA3HDO, and Mark Steiner, K3MS, at the Goddard Space Flight Center's WA3NAN. Each of these Earth stations has a track record of being able to sustain reliable communication with the ISS.

The call-up marked the first time that NASA had asked for such Amateur Radio assistance since the initial crew came aboard the ISS in November 2000. Ransom says that by remaining available to ensure solid communication while Mission Control staff dealt with the docking issue, the ISS Ham Contingency Network provided Mission Control with an additional layer of security.

Once the antenna retraction problem was resolved, the contingency network stood down, but NASA's request and the ensuing ham radio activity did serve as a valuable drill, ARISS said.

NASA says Expedition 14 Commander Mike Lopez-Alegria, KE5GTK, and flight engineers Mikhail Tyurin, RZ3FT, and Thomas Reiter, DF4TR, opened the hatch to the supply ship October 27 to unload supplies.

FCC "OMNIBUS" REPORT AND ORDER CONTAINS PLUSES, MINUSES AND ERRORS

The FCC's recent Report and Order (R&O) in WT Docket 04-140 seems to offer something for just about every sector of the Amateur Radio community, but it's not without shortcomings. Most appear to be unintended consequences stemming from the FCC's arguably too-generous allocation of 75 meter phone spectrum to Amateur Extra class licensees. The FCC indicated it was only doing what the ham radio community said it wanted.

"Indeed, a number of commenters argue that the NPRM (Notice of Proposed Rule Making) proposal to increase the amount of spectrum permitted for voice communications would still not meet the demand for voice communication in the HF bands, particularly in the 80 meter band," the FCC said in the R&O, released October 10. Several radio amateurs filing comments justified extending the phone allocation further into the CW band, the FCC continued, citing their arguments that the CW band is "grossly under-used and represents a huge waste in spectrum."

Once the new rules go into effect, the 75 meter phone band will span 3800 to 4000 kHz for Generals, 3700 to 4000 kHz for Advanced class licensees (ARRL had requested 3750 to 4000 kHz), and 3600 to 4000 kHz for Amateur Extras (ARRL had requested 3725 to 4000 kHz). Far more modest phone expansions were the rule for 40 and 15 meters, the other affected bands.

But the ample 75 meter Amateur Extra class phone allocation not only effectively reduces the amount of 80-meter spectrum available for CW, RTTY and data, it actually eliminates Advanced and General class access on any mode to certain segments where they now have privileges. Sensitive to fallout from the "incentive licensing" debacle of the late 1960s, the FCC in the past has indicated it wouldn't let that kind of thing happen again.

In the runup to the April 2000 license restructuring, the FCC assured that any pending changes would not take away any incumbent licensee's privileges, and it carefully avoided doing so in its restructuring R&O. In applauding the ARRL's "refarming" proposal in this docket's NPRM, the FCC pointed out that "as proposed, no licensees would lose any spectrum privileges." Nonetheless that's just what happened:

Generals lose 150 kHz of CW/data spectrum on 80 meters but gain 50 kHz of phone spectrum on 75. They also lose 25 kHz of CW/data spectrum on 40 meters but gain 50 kHz of phone privileges on that band. Factoring in another 25 kHz of phone spectrum on 15 meters that's an overall gain of 125 kHz of phone spectrum offset by an overall loss of 175 kHz of CW/data spectrum -- or a net loss of 50 kHz in spectrum privileges.

Advanced licensees also lose 150 kHz of CW/data spectrum on 80 meters but gain 75 kHz of phone spectrum on 75. They also lose 25 kHz of CW/data spectrum on 40 meters but gain 25 kHz of phone spectrum there. That's an overall loss of 175 kHz of CW/data spectrum offset by an overall gain of 100 kHz of phone spectrum (25 kHz less than Generals). The net loss in Advanced privileges works out to 75 kHz (25 kHz greater than Generals).

The new rules are "nothing but net" for Novice and Tech Plus (Technician with Element 1 credit) licensees. These licensees take home a whopping 250 kHz of additional CW spectrum (CW/data on 10 meters).

The R&O contains several apparent mistakes, too. For example, in §97.301(d) the 80 meter row should read 3.525-3.600 MHz for all three ITU regions. In

§97.305(c), the frequencies in the first line for 40 meters should read 7.000-7.100 MHz. The FCC will fix these errors when the "official" R&O text appears in the Federal Register later this fall.

Other corrections may prove more troublesome. Creating a humongous 75 meter phone band for Extras effectively, but apparently inadvertently, deleted the only 80 meter segment where automatically controlled digital stations may operate -- 3620 to 3635 kHz. The new rules no longer permit RTTY and data there, however.

In addition, the FCC accommodated the inclusion of images in data transmissions by defining a range of image emission types as "data" and limiting them to 500 Hz bandwidth in the RTTY/data subbands. Unfortunately, it did so in a way that also limits J2D emissions -- data sent by modulating an SSB transmitter -- to 500 Hz bandwidth.

AMSAT'S PROJECT EAGLE SATELLITE SHIFTS DIRECTION

AMSAT-NA has announced it's revamping the design of its high-Earth orbit (HEO) Project Eagle satellite, currently in the development stages <<http://www.amsat.org/amsat-new/eagle/>>. The next generation satellite will take maximum advantage of software-defined transponder (SDX) technology to offer a broader range of easily accessible Amateur Radio payloads. The AMSAT Board of Directors okayed the Eagle upgrade plans during the 2006 AMSAT-NA Space Symposium and Annual Meeting held October 6-8 in San Francisco. Eagle Project Manager Jim Sanford, WB4GCS, outlined the changes at his Space Symposium forum October 7.

"The structure which we have been presenting for several years is not going to meet our mission needs," Sanford explained. "We have moved on to a later structure."

Under the new plan, Sanford says, Eagle's communications payloads will include a mode U/V linear transponder for SSB, CW and other modes. A second SSB/CW transponder will uplink on L band (1.2 GHz) and downlink on S1 band (2.4 GHz). Both would be usable over 75 percent of the satellite's orbit by an AO-13 or AO-40-capable ground station, AMSAT says.

Something new to Amateur Radio satellites is a planned low-rate text messaging system similar to cellular telephone SMS. Sanford said the text-messaging capability may prove valuable for providing emergency and disaster communication. It will operate in mode U/V and also will be available to

modest ground stations over 75 percent of Eagle's orbit.

Eagle will also carry an advanced communications payload (ACP). The ACP will accommodate voice communication using an S2 band (3.4 GHz) uplink and a C band (5.8 GHz) downlink via a single 60 cm dish on the ground. As an alternative -- for stations in those parts of the world where 3.4 GHz is unavailable -- Eagle will provide an additional L band uplink.

The ACP also will offer high data rate communication including the possibility of full-motion compressed video in S2/C mode. The same mode also could support an Internet link. Ground-station antennas for Eagle may even pass muster in neighborhoods governed by private deed covenants, conditions and restrictions (CC&Rs), Sanford suggested.

During a presentation on the ACP, Matt Ettus, N2MJI, said one of the goals of the package is to open up the satellite to a new base of users, not just restrict it to elite satellite operators and sophisticated ground stations. Embracing SDR technology simplifies signal handling, he explained, because going digital is just a matter of transmitting bits up and down.

"The satellite doesn't really care what the bits mean," he said. The satellite "just reflects bits," and most policy-type issues will be handled by ground stations.

The satellite's signal will present one wideband downlink containing multiplexed data. "There will be room for many, many carriers in the passband," Ettus predicted. The mix of users would be apportioned among both low and high-rate modes, depending on overall traffic.

Plans call for electronically steering the satellite's antennas to mitigate the effects of the spacecraft's spin and maximize the spacecraft's accessibility. In a subsequent forum, AMSAT board member and well-known satellite expert Tom Clark, K3IO (ex-W3IWI) discussed some of the mathematics and physics that would permit steering a 37-element S band antenna array on Eagle.

"We would intentionally steer that pattern, so the array is always pointing toward Earth," Clark said, regardless of spin factor. He described a system of interferometers to do the pointing on the basis of "master beacon signals" uplinked from different points on Earth's surface. "It [Eagle] will measure where they are and know where to point the beam," he explained.

In a presentation on applying SDR techniques to satellite transponders, Howard Long, G6LVB, described and demonstrated a prototype SDX board. "This is the holy grail of what we've been trying to do," he told his audience. Long showed how his hand-soldered SDX could be configured to accommodate various signal strengths and types within the same passband and even to easily notch interfering signals quickly and flawlessly.

Sanford concluded his presentation by saying it's time to take the AMSAT board's concrete decisions and plan, schedule and build Eagle. "We're about to start spending some serious money," he said. During a later question-and-answer session, Sanford stressed that reliability of the ultimate Eagle satellite is a key goal. "I want no single-failure mission kills on this satellite," he said.

Project Eagle still needs to raise \$33,500 by December. Eagle could launch by 2010. The whole project will cost some \$600,000.

During the AMSAT-NA annual meeting October 8, President Rick Hambly, W2GPS, expressed his enthusiasm for Project Eagle. "I think it will be the greatest thing we've ever done!" he said. The 2007 AMSAT Symposium and Annual Meeting will take place in Pittsburgh.

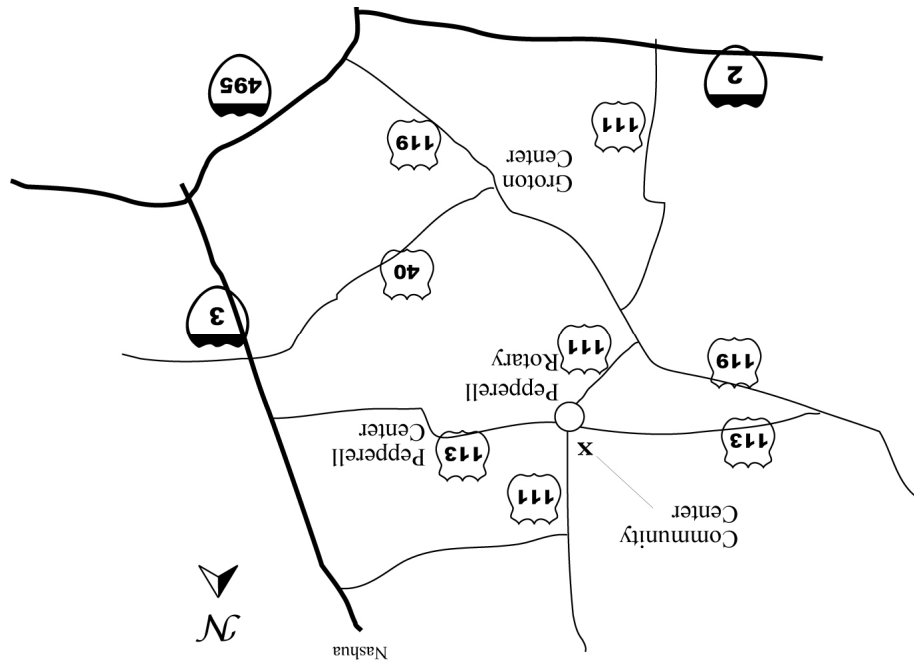


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