

Staff and Members,

After 3 months we have received and followed-up on replies to our as-directed communication with the ARRL regarding PAVE PAWS mitigation issues.

The Board will be discussing the meaning and impact of the ARRL response at the upcoming Board meeting February 8th in Sacramento.

All communication to-date are presented in order below.

Jim Aspinwall, VP-NARCC

Original Email/Letter to Ed Hare per Norm Lucas and Jim Aspinwall:

14 November 2013

Ed Hare (W1RFI)
ARRL Laboratory Manager
Newington, CT

RE: UHF Repeater Pave Paws Mitigation - Northern California
UHF Repeater Coordination under NARCC Policies and Guidelines

Dear Mr. Hare:

We, the undersigned, are the President and Vice President of the Northern Amateur Relay Council of California (NARCC), the recognized repeater coordinating body for Northern California. Our Organization has been incorporated since 1987.

We are writing to request advice and assistance with UHF repeater coordination technical issues in light of PAVE PAWS issues highlighted in recent circumstances.

At a recent Board of Directors Meeting, a member questioned his denial of UHF repeater coordination by NARCC's UHF coordinator, based on the potential of excess signal to the PAVE PAWS system at Beale AFB. We have had other inquiries about signal reductions wherein our coordinator is citing higher allowable signal level than have been indicated in letters from the FCC. Our coordinator advises that he was a signal level value given in confidence by an un-named DoD or Air Force representative during a tour of the facility years ago. None of the signal levels were brought forward or discussed.

Since the PAVE PAWS issue was raised in Northern California several years ago, a number of UHF repeaters have gone off the air, or drastically reduced power, relocated, changed antennas, etc. To our knowledge, no UHF repeater operator has recently received a subsequent notice from the FCC/DoD to reduce or further mitigate their power output, due to signal level or interference issues with PAVE PAWS.

This leaves NARCC in a position where we, plus or minus our coordinator's unique knowledge, have no consistent ability to provide UHF repeater owners with valid technical reasons why their applications for coordination have been denied due to real or potential PAVE PAWS issues (which is admittedly

also a policy and procedure issues) nor can we trust that any information used is accurate relative to DoD/FCC indications.

With only an off-the-record privately-held 'number', rather than in the possession the NARCC-proper, we need to be able to serve our community more reliably. We would like to be able to provide a reasonable set of guidelines to our community, especially to avoid misleading system trustees and causing mitigation directions from the FCC.

Please investigate and advise us if there is any recent study that has been conducted by the DoD regarding PAVE PAWS interference by amateur repeaters in Northern California. If there is such a study with new specs in place, how can NARCC be made aware of those new figures so that we can apply good science and technical processes?

If providing a specific "maximum signal" number to our organization (if not also the public is not possible), we'd like to be able to provide some form of pre-calculated guidelines using even an obfuscated signal level or "safety margin". Such a margin could perhaps indicate a calculated coverage plot placing -100 to -90 dBm at Beale AFB is off-limits, -110 to -100 dBm is cautious, -120 to -110 dBm is plausible, below -120 dBm is acceptable. Still, with no guarantee the DoD and FCC might not contact the responsible licensee under some condition, but at least remove the initial risk of excessive levels.

If that is not feasible, instead, we need some sort of an arrangement whereby there is a written, documented process for determining unacceptable interference levels by amateur operations at the Pave Paws site. This alternative arrangement might include bringing your office into the process as an intermediary between NARCC and the DOD, for purposes of calculating potential interference to the Pave Paws operation. Presently, the current figure is entrusted to one individual only, where it should probably be with the NARCC organization, in written, identifiable form.

Please advise.

Respectfully,
Norm Lucas, Jim Aspinwall

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28 January 2014 REPLY from ARRL / DAN HENDERSON

Gentlemen:

I have your letter to Ed Hare dated November 14, 2013. First, let me assure you that ARRL shares your concerns about the difficult situation that we are in with respect to the interference problems noted by the Department of Defense (DoD) affecting the PAVE PAWS radar (PPR) system operating in the 70-cm band at Beale Air Force Base. It is a complex issue with respect to the radars at both Beale and Cape Cod Air Force bases and we anticipate that in the future the same issues that exist in those locations will exist elsewhere as well.

We also understand your desire to provide some predictive

interference-avoidance data to applicants for new and modified 70 cm repeaters in Northern California based on calculations that you would like to conduct. Interference avoidance is, after all, precisely what repeater coordinators are supposed to do, based on predictive data and calculations. Unfortunately, the information that you are asking for regarding the radars' susceptibility is not available. Furthermore, it is unfortunately not within the purview of a regional repeater coordinator to unilaterally engineer in new or modified repeaters in this unique RF environment. Here is why:

1. As everyone knows, Government radiolocation is primary in this band and Amateur Radio is secondary. We do not get to dictate the uses made by the primary allocation holder, nor do we get to second-guess the Air Force in this context. What signal levels are tolerable to the radar from the secondary user is non-negotiable.

2. When we first heard of these issues in 2007, the Air Force was urging FCC to preclude all Amateur Radio operation in the 70 cm band within a 150-mile radius of the Beale Pave Paws radar. Changing this mindset took a lot of effort in Washington to fix.

3. Discussions with the Air Force resulted in a series of meetings among this office, the ARRL Lab, and Air Force representatives. ARRL devoted considerable time to learning as much as possible about the operation of the radar, but very little is subject to public disclosure due to national security classification of much of the characteristics of the system. Nevertheless, we have confirmed reliably that the claims of interference made by the Air Force were real and based on solid data and good engineering practice. The basic situation is that, on a given channel, a signal a few dB above the noise floor will limit the ability of the radar system to detect smaller objects in space (the basic function of the radar). A signal a few dB more will limit the sensitivity on that channel even more. At some undetermined point, the channel becomes essentially unusable, which has the overall impact of reducing the sensitivity of the system, which is an unacceptable result. The level of interference with which the radar can "tolerate" isn't negotiable. It is protected from any harmful interference from secondary users - and they get to determine what is needed for them to complete their primary usage.

4. A process was established among ARRL representatives; staff of the US Air Force Space Command; civilian contractors from the Department of Defense; and operators of the radar sites. Periodically, DoD engineering contractors monitor potential interference sources and identify individual contributors. The process they used was to determine specific signal strengths that cannot be disclosed for national security reasons. Actual measurements are taken on various frequencies using calibrated antennas and receivers at the PPR site.

Signal levels are measured both at the top of the radar antenna, and at the input of the radar receivers. The Air Force's concerns about interference are based on actual measurements, so factors involved in the repeater's operation such as tower shielding, antenna patterns and the like have been fully taken into account in their determinations. Under the circumstances, predictive calculations done by the Amateur community, including NARCC, would not be determinative.

5. After the frequencies of any sources of actual interference are determined by DoD, specific repeaters on those frequencies are identified. ARRL assists in this process. ARRL provides DoD representatives with updated databases of callsigns and frequencies to prevent misidentification.

6. The instances of actual interference that have been noted have been addressed cooperatively in general. We understand that the last periodic monitoring event by DoD contractors revealed an acceptable level of stability in the RF environment. That does not, however, mean that the Amateur community should be proposing to modify existing repeaters or to add new ones in this band in northern California. While the Amateurs may want new repeaters or usage, that desire is always secondary to the tasking and mission of the primary user.

7. Because the Pave Paws radar system upgrades and the re-tasking of its mission resulted in increased sensitivity of the radar, interference that was previously tolerable is now unacceptable. This is a determination that the radio service with the primary allocation in the band is entitled to make. As secondary users of this spectrum, Amateurs must fully accept the responsibility to resolve any harmful interference caused to the primary user, and given the nature of this radar facility, we are not entitled to have the information that would allow the development of "a written, documented process for determining unacceptable interference levels by amateur operations at the Pave Paws site" as you request.

8. DoD has indicated to us that there may be other Amateur sources of interference identified in the future in addition to FM voice repeaters. While testing is not continual at Beale by the DoD, it is a regularly scheduled, ongoing event. This situation is therefore very sensitive, and we have no intention of jeopardizing all Amateur Radio activity in this band in northern California and elsewhere, having spent a lot of effort over the past seven years minimizing (reasonably successfully under the circumstances) limiting the impact on the entire Amateur community from these Federal government priority uses of the band.

9. The ARRL Lab has developed Longley-Rice propagation plots for each repeater that has been identified by DoD as an interference

contributor. These plots permitted certain identification of measured repeaters to insure that they were in fact the correct source of the identified interference. The DoD testing engineers also have been recording repeater identifications on-the-air to further ensure proper identification of transmission sources. We have determined, to the best of our ability to do so, that the DoD engineers are acting in every respect in good faith and are not engaged in overregulation. This has again been corroborated by reliable sources.

10. The Air Force consultants used their measurements and the observed effect of different repeaters on the PPR system to develop a table showing the amount of power that would be needed for each repeater. ARRL has carefully checked the signal reduction requirements against its own calculations, the frequencies involved and the known call signs and locations of nearby repeaters on the frequencies measured. We continue to work with the Air Force as necessary on specific questions of identification with each round of measurements done by the engineering contractors. When it is determined that a repeater causing harmful interference has been correctly identified, ARRL is contacting that repeater operator and providing them with the requirements the Air Force has put on the table.

11. In this context, the most that NARCC can do to assist repeater owners who wish to modify an existing repeater, would be to measure the field strength of the existing facility in the azimuths toward the radar facility, and to determine by calculations that the modified facility does not increase the field strength in those same azimuths. Variations in transmitter power, use of directional antennas, and terrain shielding provide some methods of creating no net change in the field strengths toward the radar.

12. Any effort to "second guess" the Air Force or the DoD contractors is doomed to failure and endangers the access of the Amateur Radio community to this band in the future, not only in Northern California but everywhere in the United States. The FCC is engaged in making sure that required interference mitigation is effectuated and maintained by Amateur repeater owners. They accept DoD's allegations of interference and, in the case of any specific shutdown requests, will themselves re-evaluate the interference claims of DoD. FCC's obligation is to protect the primary allocation holder, as is the Amateur community.

I am sorry that this is not one of those cases where the expertise of repeater coordinating entities can be brought to the table on a case-by-case basis to maximize Amateur access to a secondary allocation, but unfortunately it simply is not. If you have a specific proposal for the Air Force to change the procedures used to date that does not involve asking for information that is not available to the public, we will be pleased to provide it to our Air Force contacts and to FCC.

73,

Dan Henderson, N1ND

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28 January 2014: Follow-up questions to Dan Henderson

From: Jim Aspinwall [jim.nolpc@gmail.com]
Sent: Tuesday, January 28, 2014 2:17 PM
To: Craigie, Kay, N3KN; Imlay, Chris, W3KD; Sumner, Dave, K1ZZ; Tiemstra, James, (Vice Dir, Pacific); Vallio, Bob (Dir, PC); Hare, Ed W1RFI; Henderson, Dan N1ND; Norm Lucas
Subject: re: Beale PAVE PAWS Issues raised in letter to Ed Hare

Dan, et al,

[apologies to those who may be getting multiple replies, Yahoo or ARRL.org seems to have issues with some of the ARRL.ORG<<http://ARRL.ORG>> addressing from Yahoo.]

Thank you for the response. We owe this and related responses to the rest of our Board and members and will have to present what we know at the next Board meeting Feb 8th. We are of course well aware of our standing in this situation, and respectful of appropriate confidentiality. Our interest is of course in being as pro-active as possible, maintaining a positive and cooperative posture and performance with the FCC and DoD.

Follow-on questions:

Q1. We believe there is/was an offer to submit system data to Ed for evaluation should we need to resolve specific system questions. Is that assistance available to us or our members?

Q2. Part 97 retains a requirement for operators of systems within 150 miles of Beale to notify local FCC engineering office and the frequency coordinator of Beale. What are the current methods and contact points to fulfill that obligation?

Q3. Background: Due to membership change and a death of one trustee, I am responsible for two systems that were on the air pre-mitigation, received mitigation notices and complied - but I have no specific record of before/after conditions. I only have what I know to have been the original designs and installations. One of those systems is being relocated based on site opportunity and physical/dirt shielding from Beale, the other is relocating due to the fire on Mt Diablo that destroyed much equipment which will be displaced and need to rebuild.

I would like to submit the as-built/anticipated rebuild data for those two systems and know mitigation steps before construction is complete and installation takes place. I'm sure I'm not the only one who will have to re-

think their replacement systems.

Q4. If we are left only to 'chance' of mitigation or not - what time period might we anticipate either hearing nothing (no mitigation needed) or receiving mitigation advice? (would it be possible to get an affirmative "no mitigation needed" acknowledgement?)

Again, thank you very much for this response.

We look forward to a follow-on response so that we may prepare presentation to the community. Meanwhile, if Ed can and will consider my pre-/post-mitigation dilemma I can send data anytime.

Respectfully,

Jim Aspinwall, NO1PC
Vice President, NARCC

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28 January PM Reply from Dan Henderson:

Mr. Aspinwall

Nothing has changed from the ARRL's end as far as assisting with modeling to help determine what may or may not work. But it is important to remember, modeling does not guarantee a final "pass" to someone who appears to be able to put up a repeater. The only number that matters in the end is what the Air Force engineering unit - which by the way is a mix of top flight civilians as well as military personnel - determines is needed from measurements during their testing visits.

My recommendation for Q2 is you should contact the FCC office in San Francisco. I don't know the specific contact there but they determine the procedures. As far as the DoD notification, sending the request to me is easily done and I will forward it to the DoD at Peterson AFB where the coordination is handled.

For Q3, the Air Force is not going to do "preemptive" work. The testing unit frankly is stationed at Keesler AFB in Mississippi and works around the globe. The staff at the radar does not have the time to do "can you see if this might work" type requests. Again, going through Ed Hare at the ARRL Lab is the best option to get a "guess-timate" which is just that. The repeater will be tested along with others when the next cycle of testing is done at Beale. By the way, we do not know when the Air Force schedules its testing at the site, and in fact prefer it that way so there can be no question that rogue repeater owners might be tipped off and make temporary changes to try and game the system. The DoD testing and the FCC know that type of planned activity has been discussed among some repeater owners in the affected area and that will not be taken lightly should such behavior be documented.

The answer for Q4 really is reflected in Q3. The DoD testing unit does so on their schedule. If there was to be a sudden increase in problems that causes the radar to be operating at less than expected use, then I would suspect that the radar site reports to Air Force Space Command's frequency coordinator at Peterson AFB in Colorado, and a testing session would be pushed up their schedule. But they don't have a set timetable or schedule. There can't be something along the lines of "well it's been up a couple of months so we are now ok."

Feel free to contact Ed at your convenience.

Dan Henderson, N1ND
ARRL Regulatory Information Manager

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28 January PM response back to Dan Henderson

Dan,

Thank you.

We are smart people and are trying to lead the smart thing for those less experienced, and realize that calculations work in most cases.

Others and myself do understand most of the cumulative processes of what PAVE PAWS is doing (rather brilliant) as some among us have several years in a variety of signal analysis and validation - no one is trying to outsmart anyone, just get to an agreeable premise. There are and will be disclaimers on existing and new action.

As the coordinating body you can see under the circumstances we need to not be the authority for such things we are not allowed, empowered, etc. to speak for. That said we also realize the ARRL can and will not be either, but the ARRL is much closer to the issue than any unsubstantiated "I was told in confidence...". The process must survive the dynamic of Board members and coordinators. Ultimately the licensee of any specific transmitter is their own best advocate.

Thanks again.

/s/ Jim

Ed: expect a set of data points from what I know of the systems I need to reconcile.

73 !

Subsequent to this series of dialog Ed Hare has suggested some information sharing with our technical team to the effect that we may be able to replicate his process for unofficial (non-DOD/non-FCC) mitigation references.

As well, despite the clarity of Mr Henderson's feedback there have been different interpretations and communication with the ARRL not involving those assigned to pursue it, so we need to get everything back on the same page.

===== 10 Feb 2014, de NO1PC - current end of thread =====