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WILLIAM K. KEANE
DIRECT DIAL: 202.776.5243
PERSONAL FAX: 202.478.2160
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June 9, 2009

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW.
Washington DC 20554

Re: ET Docket No. 08-59
Ex Parte Statement

Dear Ms. Dortch:

Recently, Philips Healthcare Systems ("Philips") and Advanced Medical Technology Association ("AdvaMed") filed ex parte presentations in this proceeding. These filings merit a response in order to set the record straight.[1] Aerospace and Flight Test Radio Coordinating Council ("AFTRCC"), whose members include incumbent, primary users of the band 2360-2390 MHz, hereby presents that response.

Notably, the Philips filing envisions a very different utilization of medical body area network sensors ("MBANS" aka body sensor networks or "BSNs") than that espoused by GE Healthcare ("GEH"), the initial proponent of a secondary allocation in the 2.3 GHz band. May 18 ex parte at page 8. The Philips presentation focuses on scenarios where a "patient's family [can] identify a failing patient," such that "appropriate radio technology [can] allow sensors to reliably and inexpensively relay their information so that clinicians can respond in a timely fashion." *Id.* In other words, Phillips envisions use of MBANS devices outside of hospitals, i.e. in patients' homes and workplaces.

This proposal would expand the distribution of MBANS to the ubiquitous deployment scenario initially proposed in this proceeding. It is to be contrasted with the current GEH proposal which purports to limit MBANS to hospitals and healthcare facilities. AFTRCC has previously demonstrated that even the use proposed by GEH presents a real and serious interference threat; the much more pervasive and dispersed use suggested by Philips increases that risk by several orders of magnitude without offering any suggestions as to how flight testing applications would be protected from harmful interference.

[1] Ex parte submission by Philips dated May 18; ex parte submission by AdvaMed dated May 7.

AdvaMed, in its ex parte, claims that "MBANS devices can use advanced cognitive techniques, including dynamic frequency selection ("DFS") and spread spectrum or other adaptive methods, both to prevent interference to other users and to avoid interference from other users." May 7 ex parte at 2. Indeed, in an earlier ex parte (that of April 7), AdvaMed claims that, as a result of such techniques, there are a "large number of such devices ... successfully operating in the 5 GHz U-NII spectrum while protecting [government radar]." Id. at 2.

However, cognitive radio/DFS techniques only work within a relatively narrow range of ideal circumstances. They are not a panacea for spectrum sharing. Regarding the matter at hand, these techniques will not work for the protection of flight test telemetry for the reasons stated previously by AFTRCC and addressed further in the attached Engineering Statement. In brief, because telemetry signals from aircraft hundreds of miles distant are extremely weak, flight test operators are required to use very high gain, large dish-type antennas. The low cost, low gain, omni antennas that would be employed by small, portable (even disposable) MBANS devices would simply be incapable of detecting such a weak telemetry signal. Thus, the co-channel MBANS transmitters, even were they equipped with cognitive radio/DFS techniques, would not detect the primary signals and, when within line of sight of the flight test telemetry receivers, will cause harmful interference.

AdvaMed's sweeping conclusions betray another weakness, i.e. a failure to grasp the consequences of interference to flight test telemetry. As AFTRCC has pointed out and the Commission has repeatedly recognized, aeronautical telemetry is a safety-of-life application. Any interruption in the telemetry can put at risk the pilot and persons on the ground. Moreover, even without injury to person or property, a single instance of interference can cost the manufacturer and the taxpayer (in the case of government programs) hundreds of thousands, even millions, of dollars. Thus, facile comparisons to radio local area networks ("RLANs"), or to wireless medical telemetry service (WMTS) co-existence with utility meter readers (as has also been mentioned), entirely miss the point.

AdvaMed also argues that "the AFTRCC tests . . . did not use signals representative of the proposed MBANS signals." May 7 ex parte at p. 3. For example, it questions the use of Nordic chips in the tests conducted for AFTRCC by the Johns Hopkins University Applied Physics Laboratory. Ex parte of May 7, 2009.

This challenge is puzzling. GEH itself has repeatedly referenced Nordic Semiconductor nRF2401 and nRF24L01 chips as leading examples of the technology it would employ -- the exact chips used in the Johns Hopkins University tests. Indeed, GEH criticized earlier test data submitted by AFTRCC for <u>not</u> utilizing the Nordic devices.[2] AdvaMed is silent on this. Other arguments made by the commenter are rebutted in the attached Engineering Statement.

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[2] Nordic Semiconductor has filed comments in this proceeding touting use of its technology for MBANS. Letter filed January 28, 2009.

A copy of this letter is submitted for inclusion in the docket in accordance with Commission Rules.

Respectfully submitted,

William K. Keane

Counsel for Aerospace and Flight Test Radio Coordinating Council

cc: The Honorable Michael J. Copps
The Honorable Jonathan S. Adelstein
The Honorable Robert M. McDowell
Paul Murray
Renee Crittendon
Angela Giancarlo
Julius Knapp
Bruce Romano
Ira Keltz
Ronald Repasi
Geraldine Matise
Alan Stillwell
Jamison Prime
Mark Settle
Gary Thayer

Engineering Statement

Lack of Impact of Modulation Techniques on the Aggregate Effects of Interference from Body Area Network devices to Aeronautical Mobile Telemetry

Dr. Daniel G. Jablonski, P.E.

Johns Hopkins University
Applied Physics Laboratory
Laurel, MD 20723

9 June 09

This Engineering Statement has been prepared in order to address certain statements made by Advanced Medical Technology Association ("AdvaMed") concerning the proposed body sensor network (aka "MBANS") devices.

AdvaMed argues that "the AFTRCC tests submitted in the record did not account for cognitive and spread spectrum techniques and did not use signals representative of the proposed MBANS signals." May 7 ex parte at p. 3. As the attached ex parte letter points out, APL utilized the Nordic technology because that is the technology GE Healthcare itself has repeatedly referenced.

Beyond this, it should be noted that the IEEE has a working group, 802.15 Task Group 6, that is debating what standards should be adopted for implementation of body area networks (BANs).[3] Technical proposals, of which there are many,[4] span the gamut of possible technologies, including frequency shift keying, phase shift keying, ultra wideband, narrowband, direct sequence spread spectrum, and frequency-hopping techniques. The proposed implementation of BSNs using the Nordic chips is perfectly adequate for representing the aggregate interference effects of body area networks on flight test operations, independent of which of the many techniques under consideration by Task Group 6 might eventually be used. The AFTRCC filings have discussed this in detail.[5] Co-channel interference to flight testing depends on the aggregate interference that lies within the bandwidth of an AMT receive channel, and not what modulation technique individual devices may use when contributing to this interference. Indeed, AFTRCC has shown in laboratory testing that a CW signal containing the same energy as a modulated signal has identical interference effects to an AMT receiver when the total energy in each of these signals lies within the receive bandwidth of the AMT receiver.

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[3] The IEEE 802.15 working group, specifically task group 6, is attempting to set standards for body area networks. However, there is little evidence of consensus within this group regarding how to implement such networks in terms of power levels, bandwidth, modulation techniques; how to achieve compliance with specific absorption rate (SAR) requirements; or what should be the details of the medium access control (MAC) and the physical layer (PHY) specifications,

[4] These documents are found at http://www.ieee802.org/15/.

[5] Test Report: Measurements of Co-channel Interference to Aeronautical Mobile Telemetry Systems from Devices Using Nordic Semiconductor Transceiver Chips, filed in Docket 08-59 on 23 February 2009.

Certainly, spread spectrum techniques can be used to spread an individual signal across many flight test channels. However, for an ensemble of signals, this is a zero-sum game, as it makes no difference whether the interference to a flight test receiver is due to a strong signal from a single emitter, or weak signals from each of several emitters.

Furthermore, some of the frequency hopping techniques proposed in Task Group 6 will exacerbate interference effects by causing frame synchronization to be lost in an AMT channel, after which the interfering signal hops to another frequency and causes a second aircraft to lose its telemetry channel. This effect, in which a short term drop out causes a long duration loss of telemetry, and which can lead to the loss of an entire flight test operation, is also discussed in detail in earlier AFTRCC filings.[6]

It is also noteworthy that a number of the documents presented to Task Group 6 propose "narrow-band implementations" of a few hundred kHz per body area network channel.[7] These proposals are consistent with the 250 kbps implementation urged by AFTRCC as a practical compromise between spectrum use and battery life.

Document IEEE 802.15-09-0160-00-0006, for example, defines 300 kHz channels as being a "narrowband" implementation of a medical body area network.[8] The document then goes on to explain in detail that this "narrowband" implementation meets in-hospital requirements that are essentially identical to those proposed by GEH, while at the same time providing adequate battery efficiency.

Document IEEE 802.15 -09-0342 not only proposes a 250 kbps data rate, but specifically identifies the Nordic nRF24L01 chip as being the most appropriate chip available for use for body area network applications.[9]

Thus, the AFTRCC choice of 250 kbps (which, at 1 bit per Hz efficiency, is ideal for the 250 - 300 kHz channel requirement) is directly supported by the Nordic chips. This implementation is also entirely consistent with the "narrowband" implementation defined above and proposed to the 802.15 working group, and it lowers the overall MBANS spectrum requirement <u>by a factor of four</u>, while still providing adequate battery life for the intended application.

AdvaMed's criticism of the APL tests as having failed to account for cognitive radio techniques are no more germane. AFTRCC has repeatedly shown that, however labeled, the medical telemetry approach to avoiding interference to flight testing is flawed due to the inability of MBANs devices to detect AMT signals. MBANS devices will utilize low cost, low-gain, omni-directional antennas. This leaves the medical telemetry devices 40 dB short -- 40 dB being the gain of an AMT receive antenna -- of being able to detect an AMT signal in order to drive the dynamic frequency selection ("DFS") process. Thus, even if DFS approaches are applicable to

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[6] See, for example, section 3 of the engineering statement enclosed with AFTRCC's filing in Docket 08-59 dated 28 July 2008.
[7] Also at http://www.ieee802.org/15/.
[8] Ibid.
[9] Ibid.

other bands, they are unusable for effective sharing with flight testing in the 2360-2390 MHz band.

In conclusion, AdvaMed's criticisms of AFTRCC's use of the nRF24L01 device serves only to highlight the immaturity of the proposed medical body area network concept. The 802.15 standards setting process for these networks is still in its infancy, and the only experimental data submitted to this docket is that provided by AFTRCC. Indeed, if the AdvaMed criticisms are taken at face value, the logical conclusion is that until the 802.15 group completes its work and issues a standard, issuance of an NPRM would be premature and unproductive.

I have read and am familiar with the attached letter being filed on behalf of the Aerospace and Flight Test Radio Coordinating Council. The statements made herein and in the letter are true and correct to the best of my knowledge and belief.

My qualifications to offer this Statement are a matter of record with the Commission.

Daniel G. Jablonski

Daniel G. Jablonski
June 8, 2009