

February 6, 2014

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: ET Docket No. 08-59, *Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks*

Dear Ms. Dortch:

On January 14, 2014, representatives of GE Healthcare (“GE”), Philips Healthcare (“Philips”), the Aerospace and Flight Test Radio Coordinating Council (“AFTRCC”) (collectively, the “Joint Parties”) and the American Society for Healthcare Engineering (“ASHE”) met with staff of the Federal Communication Commission’s (“FCC” or “Commission”) Office of Engineering and Technology (“OET”) to discuss pending petitions for reconsideration of the Commission’s Medical Body Area Networks (“MBAN”) rules.¹

During the meeting, OET staff requested an additional written submission addressing five proposals for changes to the Commission’s MBAN rules outlined or implicated in the petitions for reconsideration filed in this proceeding.² As requested, further information on these proposals is provided below:

1. MBAN use of the 2360-2390 MHz band should be limited to hospitals or other establishments that offer beds for use beyond a 24-hour period.

The definition of “health care facility” contained in Section 95.1203 extends permissible locations where MBANs devices can be operated on a secondary basis in the 2360-2390 MHz band to “institutions and organizations regularly engaged in providing medical services through clinics, public health facilities, and similar establishments, including government entities and agencies.”³ The Joint Parties stated that this definition should be narrowed because the monitoring needs of establishments that do not offer beds for a 24-hour period can be fully met using the less-restricted 2390-2400 MHz band and, as explained below, use of the 2360-2390

¹ See Letter from Ari Q. Fitzgerald, Counsel to GE Healthcare, David R. Siddall, Counsel to Philips, William K. Keane, Counsel to AFTRCC, and Lawrence J. Movshin, Counsel to ASHE, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 08-59 (filed Jan. 16, 2014).

² See *id.*; see also Joint Petition for Reconsideration of GE Healthcare, Philips, and AFTRCC, ET Docket No. 08-59 (filed Oct. 11, 2012); Petition for Reconsideration of ASHE, ET Docket No. 08-59 (filed Oct. 10, 2012).

³ 47 C.F.R. § 95.1203.

MHz band by such smaller and less technologically resourced establishments would create needless additional interference risks and burdens.

The Joint Parties explained that the upper unrestricted 2390-2400 MHz portion of the MBAN spectrum allocation is sufficient to meet the MBAN wireless monitoring needs of clinics, public health facilities, and other offices that are used less often than hospitals for critical care because such establishments are smaller in size and have fewer patients who need monitoring.⁴ Both Philips and GE Healthcare have concluded that patient monitoring at such smaller facilities can be fully accommodated exclusively using the 2390-2400 MHz band and there is no evidence in the record indicating otherwise. Under the relevant IEEE standard for MBAN devices, namely 802.15.6, MBAN devices can support approximately 18 patients in a typical office setting using the 10 MHz of the upper band even before frequency re-use methods are applied.⁵ The assertion by SmartEdgeNet that health care providers would be denied the benefits of MBAN under the Joint Parties' proposal "simply because they [do not] offer patient stays of 24 or more hours"⁶ is unsupported and, the Joint Parties believe, untrue.

Use of the 2360-2390 MHz band by such smaller establishments not only is unnecessary, but would significantly increase opportunities for harmful interference to primary aeronautical mobile telemetry ("AMT") operations in the band and create a major coordination burden.⁷ Additionally, such use would likely complicate efforts to resolve instances of harmful interference should any occur, given the lack of on-site IT and radio spectrum expertise at doctors' offices and clinics not offering in-patient service (beds for 24-hour medical care).⁸

For these reasons, the Joint Parties urged the Commission to narrow the definition of "healthcare facility" to include only "a hospital or other establishment that offers beds for use beyond a 24-hour period in rendering medical treatment, including government hospitals such as Veterans Administration hospitals." These and other establishments will be able to deploy MBAN devices without coordination in the upper 10 MHz.

⁴ See Letter from David R. Siddall, Counsel to Philips, Ari Q. Fitzgerald, Counsel to GE Healthcare, and William K. Keane, Counsel to AFTRCC, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 08-59 (filed Jan. 31, 2013) ("Joint Parties Letter").

⁵ See *id.*

⁶ See Letter from Randall B. Lowe, Attorney for SmartEdgeNet, LLC, to Marlene Dortch, Secretary, FCC, ET Docket No. 08-59 (filed Dec. 20, 2012) at 3.

⁷ See Joint Parties Letter.

⁸ See *id.*

2. Registration should be required for all MBAN devices capable of operating in the 2360-2400 MHz band.

Consistent with its Petition for Reconsideration, ASHE argued that there would be significant value (and minimal burden on MBANs licensees) associated with requiring registration by those hospitals or other facilities eligible to utilize the 2360-2390 MHz band of any MBAN devices that are capable of operating in that band, even if, upon initial installation, the 2360-2390 MHz band will not be used. ASHE explained that a registration process would not be burdensome or costly for those who have purchased these more sophisticated MBAN products, but will provide the MBAN frequency coordinator, the hospital, the equipment vendor and the installer with important information as to the location of those systems that may, at some point in the future, be using the more heavily regulated 2360-2390 MHz band.⁹ For clarification, ASHE anticipates that the particular qualifying MBAN system as a whole would be registered, and not each individual component of such system. If such rules are adopted, ASHE believes that the system level of registration should be clearly defined such that eligible hospitals and vendors understand what to expect.

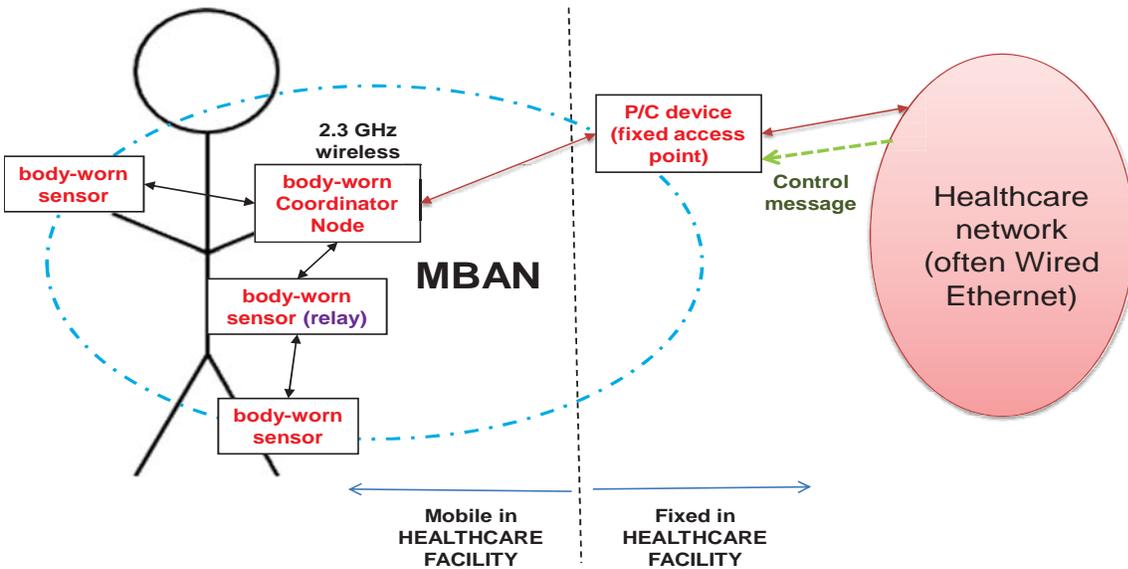
3. Either the P/C or one of the body-worn devices in an MBAN should be allowed to act as the Coordinator Node.

Philips and GE Healthcare explained that in some instances, it may not be desirable for the device with LAN connectivity and which transmits the control message to be the same device that acts as the body-worn Coordinator Node.¹⁰ For example, a fixed non-body-worn access point with physical wired LAN connection could act as the P/C receiving control messages from the LAN while at the same time being a spoke node in the MBAN star topology receiving medical data from body-worn sensors (which are also spoke nodes) via the Coordinator Node. Philips and GE Healthcare argued that there is no justification for inhibiting such an architecture, which is a natural and commonly-envisioned scenario in hospitals, and an MBAN device capable of performing this alternative Coordinator Node role can be tested and certified for MBAN compliance. Hospitals constantly are subject to cost pressures and demand the most cost effective infrastructure. Offering this flexibility in MBAN equipment would, in some circumstances, help keep monitoring costs as low as possible.

⁹ ASHE also noted that requiring registration of all full-band MBAN equipment will allow stakeholders to collaborate in the selection and use of frequencies in order to minimize the potential for harmful interference.

¹⁰ “Coordinator Node” is the term used in IEEE 802.15.6 for the node responsible for coordinating the MAC function (e.g., assigning TDMA slots to other nodes) and being the main routing hub for communication with all other nodes in the MBAN star topology. In previous filings, the Joint Parties have used this term and “hub” synonymously.

Example: Body-Worn Coordinator Node



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Philips and GE Healthcare noted that the only purpose of the current restrictions is to prevent outdoor operation within the 2360-2390 MHz sub-band being shared with AMT and therefore emphasized that under all circumstances there should be no limitation on communication between and among MBAN devices in the unrestricted 2390-2400 MHz band. MBAN devices operating within the unrestricted 2390-2400 MHz band should be distinguished from those operating within the shared 2360-2390 MHz band with regard to permitted communication among and between devices. The current MBAN rules unnecessarily and without justification restrict communication in the upper unrestricted band, treating the devices operating in that band as if they were sharing spectrum with AMT, which they are not.¹¹ Multiple and no P/C configurations should be allowed for MBAN operation in the upper 2390-2400 MHz band, and connections between and among devices should be freely permitted.

¹¹ See Joint Petition for Reconsideration at 6.

4. Limited communication between two body-worn devices within the same MBAN should be allowed.

Philips and GE Healthcare also argued that limited communication between two body-worn devices within the same MBAN should be allowed to ensure the utmost possible reliability, given that they must operate at the extremely low power of 1 milliWatt (“1mW”) EIRP or less in the 2360-2390 MHz band shared on a secondary basis with AMT. Under some foreseeable circumstances this low power can complicate the necessary communication function of these devices and impair reception of their signal by the Coordinator Node. Philips and GE Healthcare noted that the MBAN architecture designers in the IEEE 802.15.6 standards drafting group developed an architecture that permits one body-worn device to be activated autonomously to relay data from another device on the same patient when the nearby device fails to communicate with their shared Coordinator Node. For example, when a sleeping patient rolls onto her stomach, the signal of one or more MBAN devices located on her stomach may no longer have the signal strength to reach its associated Coordinator Node. In this situation an MBAN device located on her side could be alerted and start relaying signals from the impaired body-worn device on her stomach to their shared Coordinator Node, so that monitoring could continue uninterrupted. Philips and GE Healthcare stated that we are approaching a tipping point in technology innovation with active development of many types of body worn sensors that, to be effective, must be small in size and highly integrated, which equates to very low transmit power. An example of this type of sensor is the wireless contact lens sensor to support glucose monitoring that was announced recently by Google.¹²

The current MBAN rules prohibit one body-worn device from communicating with another body-worn device. To ensure the continuous monitoring needed, the Joint Parties respectfully requested that the MBAN rules be amended to allow one MBAN body-worn device to communicate with another MBAN body-worn device on the same patient in order to permit the relay of data to the body-worn devices’ shared Coordinator Node. Permitting the relay of data to the original body-worn device’s Coordinator Node would make these devices more robust at the low permitted power levels and accommodate the need envisioned and provided for by the drafters of the IEEE MBAN standard.

The Commission’s MBAN rules also prohibit communication between two P/Cs. The Joint Parties noted that in some situations P/C to P/C communication may be needed to avoid MBAN-to-MBAN interference and that the IEEE 802.15.6 standard provides the architecture to allow this type of communication. Such communication is desirable and, indeed, the Commission has for the same reason allowed it in a comparable rule governing Medical

¹² See *Google Unveils Smart Contact Lens to Monitor Glucose*, Brian Womack, Bloomberg, <http://www.bloomberg.com/news/2014-01-17/google-unveils-smart-contact-lens-project-to-monitor-glucose.html> (last viewed Feb. 4, 2014).

Microprocessor Networks (“MMNs”).¹³ Thus, the Joint Parties urged the Commission to revise its MBAN rules to prohibit P/Cs from receiving their control message from another P/C (or Coordinator Node or body-worn MBAN device), but not preclude P/C to P/C communication altogether.

With regard to device-to-device and P/C-to-device communication generally, the Joint Parties recognized the Commission’s stated objective to not allow broader mesh networks in the 2360-2390 MHz shared spectrum that might, without controls, extend beyond the facility to prohibited outdoor areas. However, the Joint Parties pointed out that limiting body-worn device-to-device communications to two such devices (i.e., the Coordinator Node plus one potential relay sensor) as discussed above, and prohibiting a P/C from forwarding its control information to another P/C, would fully achieve the Commission’s objectives in preventing *ad hoc* mesh networks while allowing MBAN devices to attain the communications reliability envisaged by its designers, as evidenced by the IEEE standard.

The Joint Parties emphasized that in all events body-worn MBAN devices, including the Coordinator Node, and all body-worn sensors/relays, will be configured to communicate with only one P/C, either directly or indirectly. This, together with the prohibition on relay of the control message from one P/C to another P/C, the Joint Parties agreed, is essential to ensuring that there are no mesh networks and should be reflected in the Commission’s MBAN rules.

5. Hospital or equipment vendors should be required to certify to the MBAN coordinator that testing of the relevant 2360-2390 MHz MBAN equipment was conducted in situ and confirmed that the equipment does not operate outdoors.

During the January 14, 2014 meeting, AFTRCC observed that, while all concerned had labored hard to fashion appropriate rules which would ensure that primary users do not suffer harmful interference from new secondary MBAN users, the prohibition on outdoor MBAN operation in 2360-2390 MHz -- a key element to the MBAN rules -- lacked any validation/enforcement requirement. AFTRCC advised that it and ASHE had discussed the issue, and reached agreement on a way to address the matter. In particular, the Joint Parties and ASHE urge the Commission to clarify that it expects the MBAN coordinator to require a certification from the hospital or its vendor that, upon completion of installation, the components of the MBAN system will have been tested to demonstrate that it will, in fact, comply with FCC requirements upon being moved outdoors, *i.e.* either shut down or, in the alternative, operate only on 2390-2400 MHz frequencies. The Joint Parties and ASHE also noted that they do not

¹³ See 47 C.F.R. § 95.1209(f) (providing that “a MedRadio programmer/control transmitter of an MMN may communicate with the MedRadio programmer/control transmitter of another MMN to coordinate transmissions so as to avoid interference between the two MMNs.”).

contemplate that the MBAN coordinator would be obliged to independently verify the accuracy of such certifications.

Pursuant to Section 1.1206 of the Commission's rules, an electronic copy of this letter is being filed for inclusion in the above-referenced docket.

Respectfully submitted,

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