

November 21, 2011

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 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 November 17, 2011, representatives of Philips Healthcare ("Philips") and GE Healthcare ("GE") participated in a teleconference call with staff from the Commission's Office of Engineering and Technology to discuss the operation and architecture envisioned for Medical Body Area Networks ("MBANs"). Attending the call on behalf of Philips were Delroy Smith, Dong Wang, and David Siddall (counsel); for GE were Neal Seidl, David Davenport, and Ari Fitzgerald (counsel); and for the FCC were Rashmi Doshi, Mark Settle, Geraldine Matise, Jamison Prime, Brian Butler and Steve Jones. A diagram of an example MBAN configuration was emailed to the FCC participants to assist in the discussion and is included in this letter.

The purpose of the discussion was to address questions raised by the FCC staff about the proposed operation and architecture of MBANS. The questions fell into four broad categories: (a) devices, (b) communication, (c) functions, and (d) architecture.

DEVICES

1. **MBAN Devices. What devices comprise an MBAN?** A Medical Body Area Network (MBAN) consists of one Master Transmitter and one or more Slave Transmitters that transmit under the control of the Master.
2. **Relationship of MBAN devices. Which devices have a Master Transmitter? Which have a Slave Transmitter? How do these functions relate to body sensors, Hubs and the Control Point?** The Master Transmitter is instantiated in a "Hub" device such as a bedside monitor or portable medical telemetry device, while Slave Transmitters are instantiated in body-worn sensors or actuator devices. A Hub also may have its own hardwired sensors in addition to controlling wireless sensors. Slave devices only transmit in the 2360-2390 MHz band while they maintain communications with a Master that controls their transmissions. The Master, in turn, only enables 2360-2390 MHz transmissions (both of its slaves' and its own) while it continues to receive an enabling control message from the Control Point over the healthcare facility's Local Area Network ("LAN"). The Hub may also act as a bridge relaying data between its Slaves and other devices or applications on the healthcare facility's LAN. Thus, the Hub will

communicate in the 2.3 GHz MBAN frequencies with its Slaves but also may use other spectrum (*e.g.*, WMTS, WiFi, WiMax, etc.) or media (*e.g.*, wired Ethernet).

3. **“Keys” and “Beacons”. Are ‘Keys’ and “Beacons” references to specific physical MBAN devices or do these terms describe data that is communicated electronically by other network components (*e.g.*, an information packet or application)?**

“Beacons” (hereinafter also referred to as “Control Messages”) and “Keys” are data messages containing specific information needed by the MBAN devices to use any channel within the 2360-2390 MHz band. “Key” in the MBAN context refers to an application-specific data message generated by the MBANS coordinator that will enable use of specific frequencies within such band once coordinated. A key will be provided by the MBANS coordinator to a coordinated healthcare facility to program its Control Point. The Control Point will continually generate Control Messages to convey the currently-authorized frequencies to the Master Transmitters over the healthcare facility’s LAN.¹ Failure by an MBAN Master to continually receive these enabling Control Messages would cause that Master and all of its Slaves to cease transmitting within the 2360-2390 MHz range unless and until the reception of enabling Control Messages is re-established.²

4. **Role of Master Transmitter. What information is conveyed by a Master Transmitter? How does this differ from the functions performed by a Key or Beacon (Control Message)?** The Master Transmitter manages operation of the specific MBAN and conveys the coordinated MBAN frequency information derived from the Control Message to each Slave Transmitter in its MBAN (possibly with other network management information).³ Such information will be communicated from Master to Slave Transmitters via data messages exchanged upon network formation to permit the Slave Transmitters to initiate transmissions, and periodically thereafter to ensure continued frequency compliance.

The frequency of operation for a specific MBAN is determined and controlled by that MBAN’s Master Transmitter (Hub). The MBAN Master Transmitter uses application-specific information received in Control Messages that are generated by the Control Point in accordance with the electronic key.

5. **Role of “Beacon”. Does the Beacon (Control Message) reside in the Control Point or is it separate? Does the Beacon originate at the Control Point or with the Coordinator? Is the Beacon a unique communication link to each Hub (suggesting multiple Beacons)? Or is there only one Beacon communicating with multiple Hubs?** *See answer to question 3., above.* The Control Message is used to convey

¹ The Control Messages distributed within the healthcare facility may use formats different than the key generated by the MBANS coordinator (*i.e.*, a subset of information). Also note that a healthcare facility may be coordinated as a single location or as multiple locations (each with its own Control Point and LAN) to allow adequate MBAN use while fully protecting the primary spectrum user. This may be necessary, for example, on a multi-building healthcare campus or to separate high building floors from low floors that are blocked from view.

² Upon loss of Control Messages, the MBAN Master could default itself and its slaves to spectrum outside of the 2360-2390 MHz.

³ The Master Transmitter likely will perform a range of additional management functions unrelated to spectrum use.

authorized frequencies from the healthcare facility's Control Point to each Master Transmitter. The Control Message is logically broadcast (not hub-specific), although the healthcare facility LAN transport mechanism may be unicast, multicast or broadcast.

6. **Certification. What devices have to be certified under Part 95 MBAN rules? Which functions have to be included for compliance testing?** Master and Slave Transmitters logically would be subject to equipment authorization under Part 2 of the FCC's Rules for use in Part 95 MBANS. Compliance testing would address (1) the functions used to limit access to the 2360-2390 MHz frequencies subject to coordination and (2) the function to cease transmission in the 2360-2390 MHz band upon failure by the Master to receive Control Messages from the Control Point or upon failure by the Slaves to maintain communications with the Master that controls their transmissions.

A Control Point would need to be provided by the applicant and a test key obtained from the MBANS coordinator for purpose of certification testing.⁴

COMMUNICATION

1. **Use of 2.3 GHz. Which links use 2.3 GHz?** The 2360-2400 MHz spectrum is used for data communication between the Master and Slaves within an MBAN.
2. **Control Function. Is the Control Point part of the coordination function or part of the MBAN? If there is only one Control Point, how does it control multiple MBANs (e.g., Sensors and Hubs) within the health care facility?** There is one Control Point per coordinated location. The Control Point is not part of an MBAN. The Control Point generates the Control Message to convey authorized frequency information to each MBAN Master Transmitter in accordance with a Key provided from the MBAN coordinator.⁵
3. **Links and Applications. What type of communication link or application (e.g., RF (specify band), hardwire (specify type), Internet Protocol (IP)) could be used for:**
 - a. **Control Point to Coordinator** -- Any type of communication (email, telephone, facsimile, postal mail, etc.) may be used for semi-automatic Key delivery by the MBANS coordinator. A secure Internet connection (the requirements for which will be defined by the MBANS coordinator and equipment manufacturers) will be used for fully-automatic Key delivery.
 - b. **Control Point to Hub** -- Healthcare facility LAN that typically employs multiple technologies, such as Ethernet, Wi-Fi, WMTS, etc. This link is used to distribute the Control Message to Master Transmitters.
 - c. **Hub to Monitoring Station** -- Transmission of information will utilize the healthcare facility LAN. (Also *See answer to question 3.b., above*)

⁴ For testing purposes the Control Point could be simulated in software.

⁵ A healthcare facility occasionally may be coordinated as multiple locations, each with its own control point, such as where different buildings or areas of a single building differ in exposure to the AMT facility being protected.

4. Direction of Hub-to-Control Point Communication. **Is communication between the Hub and Control Point 1-way or 2-way?** The Control Point generates and distributes the Control Message in one direction, from the Control Point to the Master Transmitter (Hub), using the existing healthcare facility infrastructure as described above.⁶
5. Direction of Hub-to-Sensor Communication. **Is communication between the Hub and the Monitoring Station 1-way or 2-way?** The physiological information flow typically is one-way, from Sensor to Hub to Monitoring Station. While the transport of physiological information is one way, the underlying MBAN and LAN transports likely involve two-way communications.

FUNCTIONS

1. Information Conveyed by Key. **What information is conveyed by a Key?** The key, which originates with the MBANS coordinator, defines the spectrum within the 2360-2390 MHz band that is coordinated and any conditions of use.⁷
2. Information Conveyed by Beacon. **What information is conveyed by a Beacon (Control Message)?** The Control Message, transmitted by the Control Point to all Master Transmitters, defines the coordinated frequencies for the specific location on which the Masters and their associated Slaves may transmit.
3. Frequencies Enabled by Hub. **Is a Hub to Control Point communication link needed for an MBAN to operate at 2360-2390 MHz? For 2390-2400 MHz? For 2360-2400 MHz?** Receipt of the Control Messages by the Master is necessary for transmission to be made anywhere within the 2360-2390 MHz band by the Master or its associated Slaves. Slave devices are able to transmit in the 2360-2390 MHz band only while they maintain communication with a Master that itself is receiving the required Control Messages from the Control Point. An MBAN device, Master or Slave, does not require Control Messages or any other Control Point interaction to operate anywhere in the 2390-2400 MHz band.
4. Control of Multiple Sensors. **Can a Hub control sensors on more than one person?** Yes, if two or more patients are in close enough proximity to the Hub, a single Master (Hub) could control multiple sensors on multiple patients. Systems may or may not be designed to do this.
5. Hub-to-Hub communication. **Can Hubs communicate with each other?** Yes, Hubs could be designed to communicate with each other using authorized frequencies. This would be a manufacturer design choice, and hub-to-hub communication alternatively

⁶ While the Control Message information flow is one-way, the underlying LAN transport may involve two-way communications.

⁷ Likely to be also included in the key is information unrelated to FCC regulatory purposes, such as unique healthcare facility identification and vendor identification.

Marlene H. Dortch, Secretary

November 21, 2011

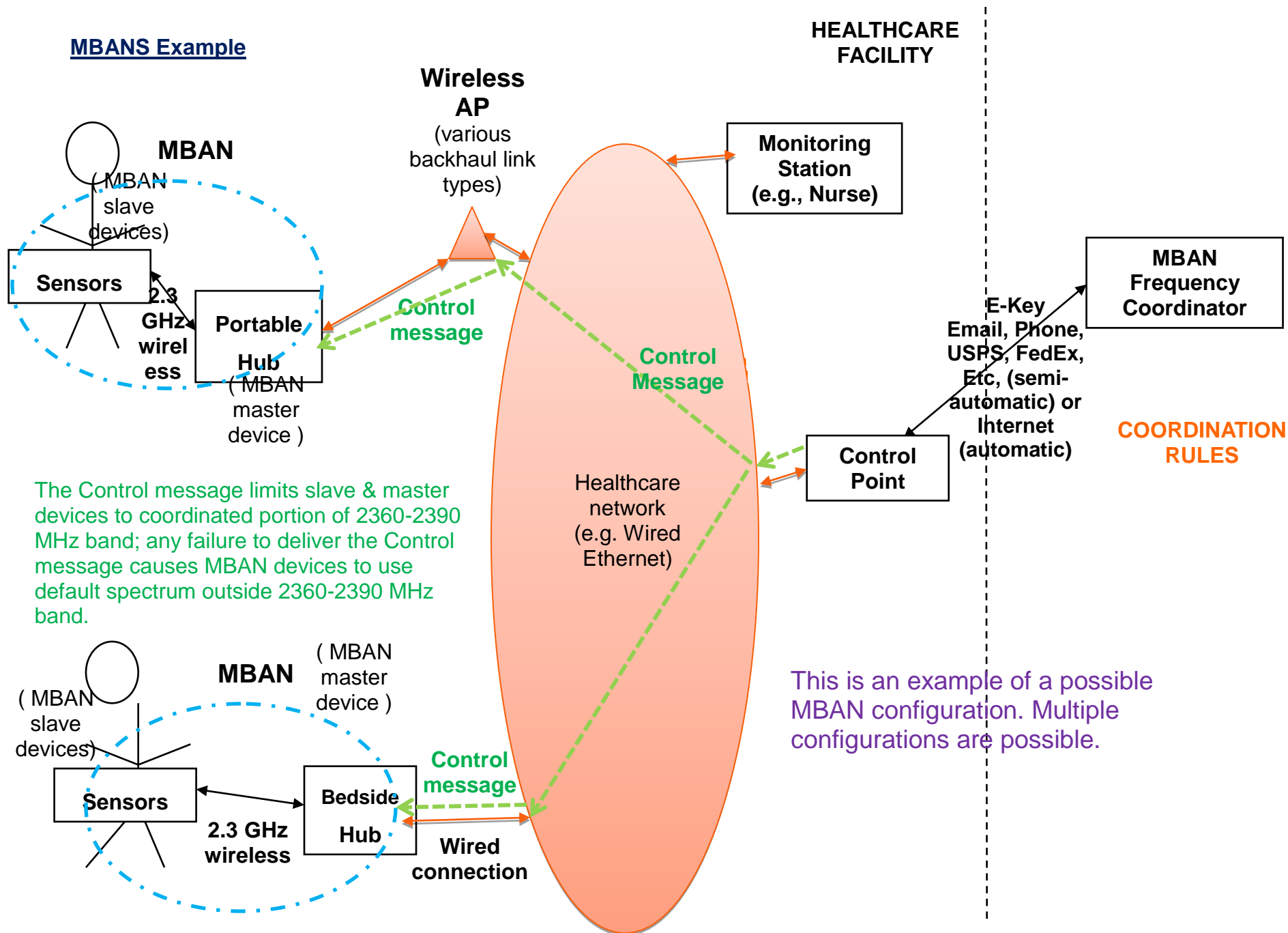
Page 5

may be conducted over the LAN. Nothing should preclude MBAN designs in which a Master in one MBAN also could act as a Slave in another MBAN.

ARCHITECTURE

The figure below illustrates the elements of the MBANS system architecture. Solid lines represent physical connections (wired or wireless). Dotted lines represent information flows.

MBANS Example



Marlene H. Dortch, Secretary

November 21, 2011

Page 7

Pursuant to Section 1.1206 of the Commission's Rules, this letter is being electronically filed in Docket ET 08-59.

Respectfully Submitted,

/s/

David R. Siddall, Esq.
Counsel to Philips Healthcare
DS Law, PLLC
1717 Pennsylvania Ave. NW, Ste 1025
Washington, DC 20006
(202) 559-9065

/s/

Ari Q. Fitzgerald, Esq.
Counsel to GE Healthcare
Hogan Lovells US LLP
555 Thirteenth St. NW
Washington, DC 20004
(202) 637-5600