

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Amendment of the Commission's Rules to)	
Provide Spectrum for the Operation of Medical)	ET Docket No. 08-59
Body Area Networks)	
)	
)	
To: The Commission)	

**REPLY COMMENTS OF
THE BOEING COMPANY**

Audrey L. Allison
Director, Frequency Management Services
The Boeing Company
1200 Wilson Boulevard
Arlington, VA 22209
(703) 465-3215

Bruce A. Olcott
Joshua T. Guyan
Squire, Sanders & Dempsey L.L.P.
1201 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 626-6615

Its Attorneys

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SUMMARY

The Commission should not establish a secondary allocation for Medical Body Area Networks (“MBANs”) in the 2360-2390 MHz band. The parties in this proceeding have demonstrated that MBANs would cause harmful interference to Aeronautical Mobile Telemetry (“AMT”), a recognized safety-of-life service, which operates on a primary basis in the band. Conceding that harmful interference would result, the MBAN proponents have offered to provide minimal exclusion zones around AMT receive antennas, but have not addressed protection of the mobile AMT base vehicles described in Boeing’s comments, which are critical to safe, effective and efficient flight testing. Mobile AMT base stations can be transported anywhere in the United States and would necessitate new or temporary exclusion zones within a matter of days.

The comments of the MBAN proponents reveal that, although they may be willing to initially accept a secondary allocation subject to strict interference protection measures, later they may use their safety-of-life status to argue for co-primary status or claim that MBANs are not commercially viable without easing the interference protection restrictions. This would likely occur after repeated evidence of harmful interference caused to primary AMT operations.

If, however, the Commission decides to create a secondary allocation for MBANs in the 2360-2390 MHz band, certain strict conditions that might avoid harmful interference to AMT operations would have to be met. First, the Commission would have to adopt line-of-sight exclusion zones for MBAN devices around AMT receive antennas. Second, the Commission would have to mandate the use of built-in electronic key and beacon signal enforcement mechanisms by MBANs to enforce the exclusion

zones. Third, MBAN manufacturers and operators must control the aggregate interference from all MBAN devices in each community. Fourth, the Commission would have to protect new and mobile AMT receive antennas with exclusion zones and ensure that all healthcare facilities employing MBAN devices are capable of limiting all operations to the 2390-2400 MHz band within a matter of days.

Further, due to the MBAN proponents' plans to operate thousands of MBANs at up to 20 mW in the 2390-2400 MHz band, the Commission would have to significantly restrict the out-of-band emissions into the 2360-2390 MHz band. Finally, in order to ensure the efficacy of these restrictions, MBAN devices would have to be authorized only on an individually licensed basis. In fact, the wireless broadband service individual licensing regime would be analogous and appropriate for MBANs.

These conditions are highly interdependent and the Commission would have to impose all of them in order to make them effective in reducing harmful interference to AMT flight test safety. The decision more in keeping with sound spectrum management policy and the public interest, however, would be to preserve the 2360-2400 MHz band for critically important AMT flight test operations by identifying alternate spectrum for the safe, effective and unencumbered operation of MBAN devices.

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**REPLY COMMENTS OF
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The Boeing Company (“Boeing”), by its attorneys and pursuant to Section 1.415 of the Commission’s Rules, 47 C.F.R. § 1.415, hereby submits the following reply comments in the above referenced proceeding regarding a secondary allocation for Medical Body Area Networks (“MBANs”) in the 2360-2390 MHz band.¹ The comments of Boeing, the Aerospace and Flight Test Radio Coordinating Council (“AFTRCC”) and others demonstrate the significant interference concerns and risks of establishing a secondary allocation for a safety service such as MBANs in the same radio frequency band as Aeronautical Mobile Telemetry (“AMT”), a recognized safety-of-life service. In keeping with sound spectrum management policy and in furtherance of the public interest, the Commission should therefore not create an allocation for MBANs in the 2360-2390 MHz band used by AMT on a primary basis.

If the Commission does establish a secondary allocation in the AMT band for MBANs, however, it must require line-of-sight exclusion zones, a built-in electronic key

¹ See *Amendment of the Commission’s Rules to Provide Spectrum for the Operation of Medical Body Area Networks*, ET Docket No. 08-59, Notice of Proposed Rulemaking, 24 FCC Rcd 9589, FCC 09-57 (rel. June 29, 2009) (“MBAN NPRM”).

and beacon signal access system for MBAN devices, such as the one described by Philips Healthcare Systems (“Philips”), control of aggregate interference in each community and the protection of existing and new fixed and mobile AMT sites. Further, it must strictly limit out-of-band emissions (“OOBE”) into the 2360-2390 MHz band and require individual licensing of healthcare facilities. The adoption of such requirements may be sufficient to avoid harmful interference to the primary AMT service.

I. THE COMMISSION SHOULD NOT AUTHORIZE MBANS IN THE 2360-2390 MHZ BAND DUE TO THE HARMFUL INTERFERENCE TO AMT OPERATIONS THAT WOULD RESULT

The Commission should not establish a secondary allocation for MBANs in the 2360-2390 MHz band because of the harmful interference to safety-of-life AMT signals that have been identified by parties in this proceeding. Further, in proposing exclusion zones to limit harmful interference, no MBAN proponents have addressed the fact that aircraft manufacturers, including Boeing, use mobile AMT base vehicles to supplement fixed AMT sites. Finally, as demonstrated by the comments of several parties, the request of the MBAN proponents for a secondary allocation under strict interference protection conditions is likely to be the first step in the process. Once it becomes evident that operations of MBANs in the 2360-2390 MHz band have to be significantly constrained to protect primary AMT networks, MBAN proponents may use their status as a safety-of-life service to claim the need to elevate their allocation to co-primary status and abate the interference protection restrictions that are needed to ensure safe and effective flight test operations. The Commission has faced similar problems in other spectrum bands where safety-of-life services have been permitted to operate on a secondary basis. The lesson of those experiences is clear – the public interest would be

far better served by identifying from the start a spectrum band that can be made available for MBAN devices without resulting in harmful interference to another, critically important, safety-of-life service.

A. The Parties Have Demonstrated That MBANs Would Cause Harmful Interference to a Recognized Safety-of-Life Primary Service

Boeing, AFTRCC, the Telecommunications Industry Association (“TIA”) and others have raised important public interest concerns regarding the proposal for an MBAN allocation in the 2360-2390 MHz band. Boeing’s comments explained the importance of efficient and effective flight testing to meet delivery dates and retain its global competitiveness as one of the leading U.S. exporters, which is important for the U.S. economy and its recovery. Boeing and AFTRCC also cited the Commission’s recognition that AMT flight testing is a safety-of-life service and provided examples of situations where flight tests require that aircraft be pushed to their operational limits and be closely monitored to avoid life-threatening accidents.² AFTRCC cited an example where a new model business jet had to be stressed during flight testing to identify an oscillation malfunction while still ensuring the safety of the flight crew.³ Effective telemetry monitoring allowed the test to occur safely. Boeing also provided detailed descriptions of flight tests that put the flight crew at controlled risk and required robust and uninterrupted telemetry transmissions.⁴

² See Comments of The Boeing Company, ET Docket No. 08-59 at 3-8 (filed Oct. 5, 2009) (“Boeing Comments”) and Comments of Aerospace and Flight Test Radio Coordinating Council, ET Docket No. 08-59 at 3-7 (filed Oct. 5, 2009) (“AFTRCC Comments”).

³ See AFTRCC Comments at 4.

⁴ See Boeing Comments at 22-26.

In its comments TIA urged the Commission to consider carefully the significant risk of harmful interference to AMT operations in the 2360-2395 MHz band.⁵ Those interference risks were discussed at length in the Boeing and AFTRCC comments. On the other hand, the MBAN proponents have offered flawed interference analyses due to their lack of a full understanding of AMT flight testing. For example, Boeing informed the Commission that AMT receivers are designed to track aircraft up to 200 miles away sometimes at speeds of more than 1,300 mph, necessitating sensitive high gain antennas and noise-limited (not interference limited) conditions.⁶ An increase in the noise floor due to MBAN operations would reduce the available flight test range that, at such high speeds, is essential for effective flight testing.

AFTRCC raised the fact that the GEHC Monte Carlo interference analysis incorrectly assumes that flight tests involve aircraft flying in circles around ground stations.⁷ The Boeing comments clarify this misperception, describing the use of flight test “racetracks,” which usually must be 400 miles in length to permit sufficient monitoring of aircraft frame, flight systems and other control systems.⁸ AFTRCC further demonstrated that, if GEHC were to use the correct $C/(I+N)$ interference ratio, its analysis would show that AMT signals would be subject to a staggering 20 percent

⁵ See Comments of the Telecommunications Industry Association, ET Docket No. 08-59 at 2 (filed Oct. 5, 2009) (“TIA Comments”).

⁶ See Boeing Comments at 13-17 (discussing GEHC’s incorrect claim that AMT operations currently tolerate significant noise in the band).

⁷ See AFTRCC Comments at 8-9.

⁸ See Boeing Comments at 13-15.

outage rate.⁹ It is clear that MBANs would cause harmful interference to AMT operations in the 2360-2390 MHz band, a fact that both GEHC and the Commission appear to concede. The Commission therefore should not attempt to employ complex and questionable spectrum sharing regimes, such as exclusion zones, that would have doubtful efficacy in forcing two highly mobile safety-of-life services to operate in the same spectrum band. Instead, the public interest would be best served by identifying alternate spectrum where MBANs can operate in an unencumbered manner, without harming another critically important safety-of-life service.

B. No Party Addressed the Fact That Exclusion Zones Would Not Protect the Use by Aircraft Manufacturers of Mobile AMT Base Vehicles

The proponents of MBANs recognize the need for complex measures, such as exclusion zones, to reduce harmful interference to AMT operations. Those MBAN advocates, however, have not addressed the fact that Boeing and others use mobile AMT base vehicles to supplement their fixed AMT sites. In fact, Boeing's comments noted that GEHC was under the misimpression that AMT receive antennas exist only at fixed locations.¹⁰

Boeing provided extensive detail regarding its current and planned use of mobile AMT base vehicles, which enhance the flexibility and responsiveness of Boeing's flight test operations and are moved anywhere in the United States often on short notice.¹¹

⁹ See AFTRCC Comments at 8-9.

¹⁰ See Boeing Comments at 31 (*citing* Ex Parte of GE Healthcare, ET Docket No. 08-59 at 12 (filed Mar. 4, 2009)).

¹¹ See Boeing Comments at 9-13.

Boeing currently operates seven mobile AMT base vehicles that allow it to conduct flight testing in favorable weather conditions and respond to other flight testing variables in order to meet strict aircraft delivery deadlines. In its comments, Philips claims that existing and new AMT sites would be protected with exclusion zones, but it did not address the ability of MBAN operators to promptly adjust to new exclusion zones to accommodate mobile AMT base vehicles, the effective use of which can necessitate the creation of new or modified exclusion zones often within a matter of days.¹² Because of the widespread use of mobile AMT base vehicles, and the lack of an adequate means to implement timely exclusion zones for these operations, the Commission should recognize that the use of exclusion zones to reduce harmful interference to AMT networks is not practical. Instead, alternate spectrum should be identified for MBAN operations.

C. The Comments Reveal that, Regardless of the Rules that the Commission May Adopt in This Proceeding, MBAN Proponents May Subsequently Seek a Primary Allocation or Reduced Interference Protection Requirements

The history of Commission spectrum allocation policy abounds with situations where proponents of new services accept secondary allocations or strict technical or geographic restrictions, only later to announce that they need to elevate their allocation status or ease restrictions designed to protect incumbent services from harmful interference. GEHC has argued throughout this proceeding that a secondary MBAN allocation can be created without causing harmful interference to primary AMT operations in the band. GEHC offered that MBANs would be limited to 1 mW power and protect AMT receive antennas with exclusion zones (albeit so small as to be

¹² See Comments of Philips Healthcare Systems, ET Docket No. 08-59 at A-7 (filed Oct. 5, 2009) (“Philips Comments”).

ineffective). In its comments Philips also offers that MBANs could be designed with an electronic key and beacon signal enforcement mechanism to enforce the exclusion zones.

The comments of GEHC and Philips, as well as others, however, reveal that their short term optimism may later be replaced by a demand for co-primary or what would amount to super-primary status in response to repeated evidence of harmful interference to AMT networks, or because the technical restrictions that are adopted severely impair the commercial viability of MBANs. Evidence of this shift is already in the record. Both GEHC and Philips have now argued for increased power levels in the 2390-2400 MHz band, which as discussed below, could result in harmful OOB into the upper portion of the 2360-2390 MHz AMT band. AdvaMed has argued for grandfathering existing MBANs when new AMT flight test exclusion zones are established. In the most revealing proposal to date, AT&T argues that MBANs should be permitted to operate without restrictions on geographic usage (i.e., no exclusion zones), outdoor usage, voice service usage, or interconnection to the public switched telephone network.¹³ AT&T currently appears to be acting as a stalking horse for a position that other MBAN proponents may embrace in the future – a primary allocation for MBANs without adequate interference protection for AMT flight testing.

If the Commission were to accommodate such requests, it would result in such harmful interference as to risk the lives of flight test crews or force primary AMT services from the band. Therefore, the Commission should not allow the camel to get its nose under the tent by establishing a secondary allocation for MBANs in the 2360-2390 MHz band. If the Commission does permit some form of MBAN operations in the 2360-

¹³ See Comments of AT&T Inc., ET Docket No. 08-59 (filed Oct. 5, 2009) (“AT&T Comments”).

2390 MHz band, however, it must be adequately assured that MBANs can offer a commercially viable product under the restrictions discussed below. Further, if it is eventually accepted by all parties that MBANs cannot operate on a commercially viable basis pursuant to the requisite restrictions discussed below, MBANs must be migrated out of the 2360-2390 MHz spectrum band.

II. IF THE COMMISSION DECIDES TO AUTHORIZE THE OPERATION OF MBANS IN THE 2360-2390 MHZ BAND, STRICT RESTRICTIONS WOULD BE NECESSARY, INCLUDING LINE-OF-SIGHT EXCLUSION ZONES AND A BUILT-IN ELECTRONIC KEY AND BEACON SIGNAL ENFORCEMENT MECHANISM

Although the Commission cannot establish a secondary allocation for MBANs in the 2360-2390 MHz band as proposed in the MBAN NPRM without causing harmful interference to safety-of-life AMT services, it can impose specific requirements that might be sufficient to avoid harmful interference. Boeing outlines these requirements in the discussion below. In providing this information, Boeing emphasizes that any secondary spectrum allocation created for MBANs in the 2360-2390 MHz band would be far from optimal. The best solution to serve the public interest would be to identify alternate spectrum for the safe, effective and unencumbered operation of MBAN devices. Further, Boeing stresses that the conditions discussed below are highly interdependent – the Commission must impose all the conditions discussed below in order to make them effective in reducing harmful interference to AMT flight test safety.

- First, the Commission must adopt line-of-sight exclusion zones for MBAN devices around AMT receive antennas.
- Second, the Commission must mandate the use of built-in electronic key and beacon signal enforcement mechanisms to ensure that errant MBAN devices do not inadvertently stray into exclusion zones.

- Third, MBAN manufacturers and operators must be required to control the aggregate interference from all MBAN devices in each community (including MBAN devices at different healthcare facilities) in order to ensure that aggregate emissions do not exceed the levels upon which the exclusion zones are based.
- Fourth, the Commission must require all healthcare facilities employing MBAN systems to be capable of limiting their operations to the 2390-2400 MHz band on a few days notice in the event that new or temporary AMT flight test exclusion zones are established by AFTRCC, one of its members, or a federal user of the AMT spectrum allocation.
- Fifth, the Commission should impose strict OOB limits on MBANs in the 2390-2400 MHz band to address the harmful interference that would be generated into the upper portion of the 2360-2390 MHz band by the intensive usage of the 2390-2400 MHz band for potentially high-power MBAN devices.
- Sixth, in order to ensure the efficacy of the above-listed requirements and also to ensure that their importance is adequately understood and acknowledged by the medical community, MBAN devices, if permitted in the 2360-2400 MHz band, must be authorized only on an individually licensed basis.

Each of these critical restrictions is discussed in turn below.

A. If the Commission Decides to Authorize the Operation of MBANs in the 2360-2390 MHz Band, it Should Impose Line-of-Sight Exclusion Zones Around AMT Receive Antennas

If the Commission creates a secondary allocation for MBANs in the 2360-2390 MHz band, nearly all parties addressing the issue agree that exclusion zones would be necessary to protect AMT operations from harmful interference. The most comprehensive examination of this issue to date has been the AFTRCC analysis and Johns Hopkins tests (including additional AFTRCC field tests, the results of which are being provided to the Commission by AFTRCC today), which demonstrate that the Commission should require effective exclusion zones encompassing the area within line-

of-sight of AMT receive antennas.¹⁴ The AFTRCC analysis, unlike the analyses of GEHC and Philips, accounts for worst-case conditions. This is crucial because the exclusion zones must be designed to protect a recognized safety-of-life service.

Philips argues for 11.5 km exclusion zones around AMT receive antenna sites.¹⁵ The Philips exclusion zone AMT interference analysis, however, contains erroneous and unsubstantiated assumptions that result in artificially small exclusion zones and require further scrutiny by the Commission. For example, Philips uses an interference to noise ratio (I/N) of -3 dB for hypothetical MBANs sharing with AMT in the 2360-2390 MHz band.¹⁶ The -3 dB value is from ITU-R M.1459 and applies to a sharing regime between co-primary services. This means that the aggregate interference is 50 percent of the noise power. This is unacceptable for a secondary service and therefore would not be the appropriate interference standard for co-frequency operations of secondary MBAN devices and primary AMT. The appropriate I/N value should be at least -6 dB, which would limit aggregate interference to 25 percent of the noise power and would alone double the size of the necessary exclusion zones.

Philips also erroneously uses a 5 MHz bandwidth AMT signal in its interference analysis when, in fact, AMT flight test signals frequently operate with a 20 MHz bandwidth.¹⁷ There are two implications of this error. First, the fact that AMT transmissions occur over 20 MHz of the 30 MHz in the 2360-2390 MHz band (and not 5

¹⁴ See AFTRCC Comments at 13-15. The exclusion zone would have to extend to line-of-sight at least in the direction of the flight test.

¹⁵ See Philips Comments at A-7-A-8.

¹⁶ See Philips Comments at E-12.

¹⁷ See Philips Comments at E-8.

MHz) means that frequency-hopping MBANs would have less spectrum in which to “hop” to avoid interference from AMT operations. Second, and of greater concern, a 20 MHz bandwidth AMT signal is more susceptible to in-band interference than a 5 MHz bandwidth AMT signal. This is in part because a greater number of MBANs would be operating within the AMT signal, resulting in a higher level of noise and degradation of the AMT link. Philips’ assumption of a 5 MHz bandwidth AMT signal underestimates the increase that would occur in the noise floor, and therefore again results in artificially small exclusion zones.

Further, in its AMT interference analysis Philips assumes 10 dB of attenuation would be provided by the physical structure of healthcare facilities.¹⁸ Philips provides no justification or reasoning for this assumption and should be required to do so. Granted, some healthcare facility structures may provide 10 dB or more of attenuation to MBAN signals. Other portions of the same buildings, however, may provide little or no attenuation, particularly near windows of patient rooms. Given the fact that this proceeding is examining the potential co-frequency operation of two recognized safety-of-life services, worst case conditions must be considered in assessing the prerequisites for the creation of a secondary allocation. Consistent with this approach, no attenuation should be attributed to healthcare facility structures and the Philips analysis should be discounted accordingly.

The Commission should instead acknowledge the accuracy and importance of the John Hopkins analysis, which demonstrates that only line-of-sight exclusion zones could be effective to minimize harmful interference to AMT receive antennas.

¹⁸ See Philips Comments at E-12.

B. If the Commission Decides to Authorize the Operation of MBANs in the 2360-2390 MHz Band, it Should Require a Built-in Electronic Key and Beacon Signal Enforcement Mechanism

One of the shortcomings of exclusion zones is they would not be enforceable because patient movement and the location of MBAN transmissions could not be adequately controlled.¹⁹ For these reasons, AT&T asserted that “patients with remote MBAN systems could inevitably travel within a exclusion zone” and it “would be impossible to enforce an exclusion zone in these situations.”²⁰ TIA also questioned how exclusion zones could be enforced.²¹ Finally, AFTRCC stated in its comments that exclusion zones would be impractical and unenforceable unless there is a “technological, fail-safe function built-in such that the devices could not radiate in an established, new, or temporary exclusion zone....”²²

The Philips comments raised the potential for such a technological solution. Philips proposed that all MBANs operate by default in the 2390-2400 MHz band.²³ The devices would only be permitted to operate in the 2360-2390 MHz band if they first check for an electronic authentication key from their healthcare facility or coordinator.²⁴ The key would only be provided to hospitals not located within an exclusion zone.²⁵

¹⁹ See Boeing Comments at 33-35.

²⁰ See AT&T Comments at 5.

²¹ See TIA Comments at 4.

²² AFTRCC Comments at 16.

²³ See Philips Comments at A-6-A-7.

²⁴ See Philips Comments at A-6-A-7.

²⁵ See Philips Comments at A-7.

Further, to protect against unintentional movement of MBANs outside of healthcare facilities, MBANs would only be able to operate if they received a beacon signal from the coordinator.²⁶ Boeing would be willing to explore such enforcement mechanisms for exclusion zones if the additional provisions discussed in the following sections are imposed to protect AMT systems.

The Commission should require that, in order to receive an equipment certification, MBANs be hard-coded to operate in the 2360-2390 MHz band only when they confirm an electronic key from a healthcare facility or coordinator, which would only be available to facilities that are not located in exclusion zones. The Commission should also require that MBANs be designed to cease transmissions in the 2360-2390 MHz band if they do not regularly receive a beacon signal from their healthcare facility or other controller. The beacon signal must be designed such that it can only be received by MBANs within the applicable healthcare facility. The Commission must require that all healthcare facilities employing MBAN devices be capable of receiving updated electronic keys on a regular and continuing basis to ensure protection of any new fixed or mobile AMT operations within a matter of days. Absent such requirements, the imposition by the Commission of MBAN exclusion zones – regardless of their size – would be illusory in providing interference protection to safety-of-life AMT operations.

C. MBAN Operations, If Permitted, Should be Controlled on a Community-Wide Basis to Account for Aggregate Interference

Although the parties have disputed the likelihood and extent of the harmful interference that would occur to primary AMT signals from a *single* MBAN device,

²⁶ See Philips Comments at C-1.

inevitably the simultaneous operation of thousands of MBAN devices would result in an aggregate increase in the noise floor in the band. If such aggregate noise levels are not controlled on a community-wide basis, harmful interference to AMT flight test communications would result.

Since test aircraft can fly in the vicinity of many healthcare facilities during a flight test, a controller would need to know how many MBAN devices are operating in the 2360-2390 MHz band in the community in order to control aggregate interference to AMT operations. The greater the number of MBANs, the greater the potential interference to the AMT flight test operations in areas where MBANs are restricted. The necessity of the built-in electronic key and beacon access control system described above further necessitates that the Commission require community-wide control of MBANs. The community controller would need to work closely with AFTRCC and its members in order to ensure that aggregate interference limits are maintained.

In raising the possibility of community-wide control of MBAN devices, Boeing is not suggesting that it advocates the adoption of a coordination regime between primary AMT licensees and secondary MBANs operators. As Boeing explained in its comments, such an approach would nullify the primary status that safety-of-life AMT operations must retain.²⁷ Instead, the community control mechanism advocated by Boeing would involve intra-service coordination between different medical facilities within a community in order to ensure that no one healthcare facility, or the aggregate operations of all medical facilities in a single community, exceeds the aggregate emissions limits upon which the exclusion zones are based.

²⁷ See Boeing Comments at 37-40.

The measures that the medical community employs to accomplish these requirements – both in terms of day-to-day administration and equitable distribution of emission allowances (i.e., how many devices each healthcare facility could use at any one time) likely could be left to MBAN manufacturers and licensees to ascertain.²⁸ The Commission, however, must ensure that the community-wide aggregate interference restrictions that are adopted are carefully crafted and closely adhered-to in order to ensure that potentially ubiquitous use of MBAN devices outside of exclusion zones do not raise the noise floor sufficiently to cause harmful interference to AMT flight test systems within their areas of operation.

D. The Commission Should Protect Future and Mobile AMT Flight Test Sites with New and Modified Exclusion Zones

Boeing argued in its comments that the proposed exclusion zones did not take into account new and temporary AMT flight test sites necessary for the mobile telemetry units used by Boeing.²⁹ The Commission should protect future AMT flight test sites with exclusion zones even if MBANs are already operating in the area. Philips accepted this fact and stated, “[i]f a hospital has deployed MBAN devices and later a new AMT site is established so that the hospital now is within an exclusion zone, the hospital would be informed through the coordinator and subject to the same restrictions as if it always had been within an AMT exclusion zone.”³⁰

²⁸ The costs of this intra-service coordination process should be borne by the medical community since they would be the beneficiaries of this new secondary spectrum allocation.

²⁹ See Boeing Comments at 31-33.

³⁰ Philips Comments at A-7.

The Commission should take Philips at its word and require that functioning MBANs in the line-of-sight area move to the 2390-2400 MHz band or shut down when a new AMT flight test exclusion zone is established. This would sometimes need to occur within a matter of days and MBAN manufacturers and licensees must show a willingness and ability to put in place an electronic and automated system to meet that requirement. Philips stated in its comments that a typical mid-sized hospital may have 1,600 MBAN devices in operation at any time.³¹ Therefore, MBAN manufacturers and operators should demonstrate that they can simultaneously operate 1,600 MBAN devices in the same location using only the 2390-2400 MHz band while meeting the OOB limits as discussed below.

Barring such a demonstration, the Commission would inevitably be faced with a situation where a future fixed or mobile AMT flight test site is established, necessitating a new exclusion zone in an area where a healthcare facility operating MBANs is located. If the potentially thousands of MBANs in the new exclusion zone cannot all be operated in the 2390-2400 MHz band, either an MBANs prioritization scheme must be developed, or all of the MBANs would have to be shut down, potentially endangering patient safety.

Alternatively, the Commission would be forced to restrict the operations of the primary service in the band to protect a secondary service. This is the lesson of the Wireless Medical Telemetry Service (“WMTS”) where the Commission was forced to protect an allocation with no legal protection to the detriment of primary services.³² The

³¹ Phillips Comments at A-13.

³² See Boeing Comments at 6-7 and AFTRCC Comments at 18.

Commission later decided it had to allocate spectrum to WMTS for its use on a primary basis.

In fact, AdvaMed advocates grandfathering existing MBAN sites when establishing new AMT exclusion zones.³³ This would turn the primary AMT status and secondary MBAN status on its head. It also raises the suspicion, as discussed in detail above, that the proponents of MBANs are not really seeking a secondary allocation at all.

Most important, the need to protect new and temporary AMT flight test areas with additional or modified exclusion zones in the future further underscores the fallacy of attempting to force two safety-of-life services to employ complex and questionable interference mitigation measures in order to operate in the same spectrum. If such an approach is adopted by the Commission, it must be expressly stated that all operations of MBAN devices within the 2360-2390 MHz band in any community of the country must be moved to the 2390-2400 MHz band on a few days notice in order to accommodate new or modified flight test operational areas designated by AFTRCC, any of its members, or a federal government user of AMT flight test spectrum.

III. IF THE COMMISSION AUTHORIZES MBAN OPERATIONS IN THE 2390-2400 MHZ BAND, IT SHOULD STRICTLY LIMIT OUT OF BAND EMISSIONS

The comments of Philips and GEHC significantly heighten the concern regarding potentially heavy use of the 2390-2400 MHz band by MBANs and the resulting OOB into the 2360-2390 MHz AMT flight test band. Both Philips and GEHC argue that MBANs should be permitted to operate at a higher power level (e.g., 20 mW) in the

³³ See Comments of AdvaMed, ET Docket No. 08-59 at 9 (filed Oct. 6, 2009).

2390-2400 MHz band, potentially resulting in higher OOB. ³⁴ Further, the interference mitigation measures discussed in the previous sections of these comments – exclusion zones and built-in access control systems for MBANs – rely heavily on the use of the 2390-2400 MHz band within exclusion zones and whenever an MBAN is outside of a hospital. This heightened reliance on the 2390-2400 MHz band necessitates the adoption of measures to ensure that OOB from MBAN operations in the 2390-2400 MHz band do not cause harmful interference to AMT missions using the upper portions of the 2360-2390 MHz band. ³⁵

The MBAN operations envisioned by Philips and GEHC include potentially thousands of MBANs operating at 20 mW in the 2390-2400 MHz band immediately adjacent to the 2360-2390 MHz band in situations, such as within exclusion zones, where it has been established that MBANs would cause harmful interference to AMT flight test communications within the same band.

As demonstrated in studies provided to the Commission by Boeing, Textron, and AFTRCC, the 2360-2390 MHz band relies on noise limited (not interference limited) conditions. ³⁶ Boeing’s measurements under noisy urban conditions in the Seattle area showed a noise floor of only -148 dBm (at 30 Hz). ³⁷ This demonstrates that the 2360-

³⁴ See Philips Comments at A-6 and Comments of GE Healthcare, ET Docket No. 08-59 at 28 (filed Oct. 5, 2009) (“GEHC Comments”).

³⁵ The potential for OOB interference aggregation from thousands of MBANs potentially operating at 20 mW in a community further necessitates the community-wide MBANs intra-service coordination and control measures discussed above.

³⁶ See Boeing Comments at 16; Textron, Inc., S Band Noise Floor Measurements and Signal Survey, ET Docket No. 08-59 (filed Oct. 5, 2009); and AFTRCC Comments at 12.

³⁷ See Boeing Comments at 16 and Exhibit.

2390 MHz band is currently free of significant OOB from adjacent bands. MBANs operating in the 2390-2400 MHz band should therefore be required to limit their OOB such that the aggregate emissions are below the noise floor in the entire 2360-2390 MHz band in order to protect adequately AMT receivers that are operating close to the band edge. Such restrictions may require additional filters on the MBAN devices or a guard band within the 2390-2400 MHz spectrum. Such precautions are necessary, however, in order to ensure that proposed secondary operations of MBAN devices in the 2390-2400 MHz band do not make the upper portion of the 2360-2390 MHz band unusable as a primary allocation for flight test networks.

IV. IF THE COMMISSION AUTHORIZES MBAN OPERATIONS, IT SHOULD REQUIRE INDIVIDUAL LICENSING OF MBAN FACILITIES

In the MBAN NPRM, the Commission requested comment on the appropriate licensing approach for secondary MBANs in the 2360-2400 MHz band.³⁸ Several commenters, including Boeing and AFTRCC, argued for individual licensing of MBAN facilities if an MBAN allocation is established in the 2360-2400 MHz band.³⁹ Other parties, including Philips and the American Society for Healthcare Engineering (“ASHE”) argued in favor of a license-by-rule regime for MBAN devices.⁴⁰

The Commission should refrain from adopting any allocation for MBANs in the 2360-2390 MHz band. If a spectrum allocation is adopted, however, the most

³⁸ See MBANs NPRM, 24 FCC Rcd at 9600-9601, ¶¶ 35-36.

³⁹ See Boeing Comments at 40-44 and AFTRCC Comments at 23.

⁴⁰ See Philips Comments at A-14 and Comments of the American Society for Healthcare Engineering of the American Hospital Association, ET Docket No 08-59 at 3-4 (filed Oct. 5, 2009) (“ASHE Comments”).

appropriate licensing regime would be individual licensing of healthcare facilities in conjunction with the electronic key, beacon signal access system and other restrictions discussed above. Such an approach would be similar to the licensing regime adopted for the wireless broadband service (“WBS”).

The Commission suggested in the MBAN NPRM that the non-exclusive nationwide licensing approach applicable to WBS in the 3650-3700 MHz band might be appropriate for MBANs.⁴¹ Boeing argued in its comments that such a licensing regime would not be adequate.⁴² This was because, before they can transmit, mobile WBS devices are required to positively receive and decode an enabling signal transmitted by a base station so that the mobile station “knows” it is within a reasonable distance of a base station and therefore far from a fixed satellite service (“FSS”) earth station, which they are required to protect.⁴³ Boeing stated that it was unlikely that inexpensive and potentially disposable MBANs could employ that kind of listen-before-talk (“LBT”) capability.⁴⁴

As discussed above, the Philips comments claim that such LBT technology could be built into MBAN devices. Therefore, the WBS licensing regime could potentially be applied to MBANs and is much more analogous and appropriate than a license-by-rule regime.

⁴¹ See MBANs NPRM, 24 FCC Rcd at 9600-9601, ¶ 36.

⁴² See Boeing Comments at 40-42.

⁴³ See *Wireless Operations in the 3650-3700 MHz Band; Rules for Wireless Broadband Services in the 3650-3700 MHz Band*, ET Docket No. 04-151, WT Docket No. 05-96, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd 6502, 6521 ¶ 51 (2005) (“WBS Order”).

⁴⁴ See Boeing Comments at 41.

Licensing-by-rule under Part 95 of the Commission's rules would not be adequate in this situation. ASHE asserts that "licensing and coordination of these very low power systems under Part 90 procedures would be overly cumbersome for health care facilities that do not regularly deal directly with this type of frequency coordination and licensing at the FCC."⁴⁵ The lack of communications sophistication of the medical facilities that are to operate MBANs is not a sufficient justification for a license-by-rule approach. Rather, it is an important reason for the Commission to require individual licensing of healthcare facilities – only through an individual licensing process would the Commission be able to determine whether each and every health care facility that seeks to use MBAN devices are willing and capable of managing the important electronic key and beacon signal access system in a safe, accountable and compliant manner.

The Commission should not permit license-by-rule MBAN operations pursuant to Part 95 of the rules for the same reasons that the Commission did not authorize WBS operations on an unlicensed basis. The Commission determined in the WBS Order that individual licensing should be required because of the need to: 1) protect grandfathered FSS earth station operations in the band, 2) ensure that all systems operating in the band are identified, 3) allow the Commission to obtain contact information should the need arise and 4) allow the Commission and the public to monitor the intensity of spectrum usage in the band.⁴⁶

The same concerns are applicable to MBANs. MBANs must protect primary AMT operations in the band. Medical facilities operating MBANs should be clearly

⁴⁵ ASHE Comments at 3.

⁴⁶ See WBS Order, 20 FCC Rcd at 6511-6512, ¶¶ 25, 29

identified to ensure that they are correctly operating the electronic key and beacon signal systems. The Commission must be able to obtain and maintain accurate contact information from MBAN licensees. Finally, the flight test community must be able to monitor the intensity and location of MBAN usage of the band due to the OOB, aggregation and community-wide coordination concerns raised above. The Commission should not authorize MBANs in the 2360-2390 MHz band, but if it does, it should require individual licensing of healthcare facilities.

V. CONCLUSION

The Commission should not establish a secondary allocation for MBANs in the 2360-2390 MHz band. The parties have demonstrated that MBANs would cause harmful interference to AMT, a safety-of-life primary service. The MBAN proponents appear to concede this point. The comments of the parties also reveal that the MBAN proponents may be willing to accept a secondary allocation and agree to interference protection requirements now, only to require co-primary status and eased interference protection restrictions later.

The Commission should avoid such an unfortunate outcome by identifying appropriate spectrum for MBANs outside the 2360-2390 MHz band, rather than trying to force two highly mobile safety-of-life services to employ complex and questionable interference mitigation measures to attempt to operate in the same spectrum. History has shown that such measures ultimately do not serve the public interest, necessitating the allocation of alternate spectrum for the secondary service to operate without causing harmful interference to primary services.

If, however, the Commission does establish a secondary allocation for MBANs in the 2360-2390 MHz band, it would have to be coupled with strict interference protection measures, including line-of-sight exclusion zones around AMT receive antennas, an electronic key and beacon signal enforcement mechanism, protection of new and mobile AMT receive antennas with additional or modified exclusion zones, control over the aggregate interference from all MBAN devices in each community, strict OOB limits for the 2390-2400 MHz band and individual licensing for operators of MBANs. Absent such requirements, the operation of MBANs in the 2360-2400 MHz band would result in harmful interference to critically-important, primary AMT operations.

Respectfully submitted,

THE BOEING COMPANY

By:



Audrey L. Allison
Director, Frequency Management Services
The Boeing Company
1200 Wilson Boulevard
Arlington, VA 22209
(703) 465-3215

Bruce A. Olcott
Joshua T. Guyan
Squire, Sanders & Dempsey L.L.P.
1201 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
(202) 626-6615

Its Attorneys

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