

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of )  
 )  
Service Rules for Advanced Wireless Services ) WT Docket No. 07-195  
in the 2155-2175 MHz Band )

**REPLY COMMENTS OF VERIZON WIRELESS**

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## TABLE OF CONTENTS

	<b>Page</b>
I. INTRODUCTION AND SUMMARY .....	1
II. THERE IS AGREEMENT THAT AWS-3 PRESENTS A SIGNIFICANT INTERFERENCE RISK TO EXISTING LICENSEES .....	2
III. THE POTENTIAL FOR BASE-TO-BASE INTERFERENCE WOULD SEVERELY IMPACT AWS-3 LICENSEES.....	7
IV. THE POTENTIAL FOR MOBILE-TO-MOBILE INTERFERENCE WOULD RESTRICT THE PROVISION OF MOBILE SERVICE BY LICENSEES IN ADJACENT BANDS .....	10
V. SPRINT NEXTEL’S PROPOSAL TO APPLY THE COMMISSION’S BRS RULES TO AWS-3 SHOULD BE REJECTED .....	13
VI. CONCLUSION.....	17

APPENDIX “Interference Analysis of BRS/EBS Rules Applied to AWS-3.”  
A technical analysis by V-COMM Telecommunications Engineering.

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**I. INTRODUCTION AND SUMMARY**

Verizon Wireless respectfully submits these reply comments in response to the Commission’s Notice of Proposed Rulemaking to establish rules for the 2155-2175 MHz (“AWS-3”) band.<sup>1</sup> As we noted in our previously submitted comments to the *Notice*,<sup>2</sup> certain uses of the AWS-3 spectrum, i.e., the use of the band for mobile transmissions, could result in significant harmful interference to licensees in adjacent bands. As a result, Verizon Wireless proposed that the Commission either prohibit mobile transmissions or, at a minimum, establish strict technical rules for mobile use of the AWS-3 band to ensure adequate protection to incumbent licensees. As discussed *infra*, the record of this proceeding supports that recommendation.

We note that if the Commission were to explicitly prohibit mobile transmissions in the AWS-3 spectrum, it would not forestall the development of important and useful applications in the band. The band could still be used to support a variety of fixed

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<sup>1</sup> *In the Matter of Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band*, WT Docket No. 07-195, Notice of Proposed Rulemaking (“*Notice*”), FCC 07-164 (rel. Sep. 19, 2007).

<sup>2</sup> *See* Comments of Verizon Wireless, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*Verizon Wireless Comments*”).

wireless applications,<sup>3</sup> and could also be used for air-ground services without the same risks of harmful interference.<sup>4</sup> Moreover, it would provide an opportunity for both current and future licensees to acquire additional “downlink” spectrum to use in conjunction with other paired spectrum licenses. CTIA has previously noted the potential value of such asymmetrical spectrum pairing arrangements in promoting the development of advanced wireless services.<sup>5</sup> In response to the instant proceeding, AirCell, Intel, Motorola, and T-Mobile all supported the concept of using AWS-3 spectrum in conjunction with other licensed spectrum.<sup>6</sup>

## **II. THERE IS AGREEMENT THAT AWS-3 PRESENTS A SIGNIFICANT INTERFERENCE RISK TO EXISTING LICENSEES.**

The *Notice* acknowledges the significant interference challenges associated with operating both base and mobile transmitters in the AWS-3 spectrum.<sup>7</sup> The potential interference scenarios that could result include: (1) a base station transmitter interfering with another operator’s mobile receiver (“BS-MS”); (2) a mobile transmitter interfering with another operator’s base station receiver (“MS-BS”); (3) a base station transmitter interfering with another operator’s base station receiver (“BS-BS”); and (4) a mobile transmitter interfering with another operator’s mobile receiver (“MS-MS”). The first two

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<sup>3</sup> *Id* at 15.

<sup>4</sup> *See generally* Comments of AirCell LLC, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*AirCell Comments*”).

<sup>5</sup> *See* Comments of the Cellular Telecommunications & Internet Association, ET Docket No. 00-258 (filed Apr. 14, 2003) at 6.

<sup>6</sup> *AirCell Comments* at 6; *see also* Comments of Intel Corporation, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*Intel Comments*”) at 1; *see also* Comments of Motorola, Inc., WT Docket No. 07-195 (filed Dec. 14, 2007) (“*Motorola Comments*”) at 2; *see also* Comments of T-Mobile USA, Inc., WT Docket No. 07-195 (filed Dec. 14, 2007) (“*T-Mobile Comments*”) at 4.

<sup>7</sup> *Notice* at ¶¶ 11-23.

interference scenarios commonly occur when deploying mobile systems, and are effectively resolved through various mitigation techniques (e.g., collocation of base stations). The last two interference scenarios, however, are much more challenging, and would make it difficult to accommodate frequency division duplex (“FDD”) and time division duplex (“TDD”) systems within the same or adjacent spectrum.<sup>8</sup>

As a result of these challenges, we noted in our comments that two of the arrangements being considered in the *Notice* – i.e., the “Uplink/Downlink” (“UD”) and “Structured Uplink/Downlink” (“SUD”) approaches – would result in substantial interference to incumbent AWS licensees, including Verizon Wireless.<sup>9</sup> Thus, we urged the Commission to adopt rules that would ensure that such harmful interference does not occur and that any use of the AWS-3 spectrum would not undermine the benefits to the public from the provision of service on spectrum that has already been licensed.

There is broad agreement on the need to protect incumbent licensees.<sup>10</sup> T-Mobile, also an incumbent AWS licensee, states that the interference problems arising from incompatible uses of the AWS-3 spectrum are “insurmountable” absent strong measures to protect adjacent licensees.<sup>11</sup> It notes that operation of TDD systems in the

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<sup>8</sup> FDD systems use different frequencies to transmit and receive, while TDD systems use the same frequencies for both transmission and reception but vary the time in which the available spectrum is used for each function.

<sup>9</sup> *Verizon Wireless Comments* at 13-15.

<sup>10</sup> *T-Mobile Comments* at 1; *Motorola Comments* at 1; *see also* Comments of CTIA – The Wireless Association, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*CTIA Comments*”) at 3; *see also* Joint Comments of TDS Corporation and United States Cellular Corporation, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*TDS/U.S. Cellular Comments*”) at 2; *see also* Comments of TerreStar Networks Inc., WT Docket No. 07-195 (filed Dec. 14, 2007) (“*TerreStar Comments*”) at 1; *see also* Comments of New ICO Satellite Services G.P., WT Docket No. 07-195 (filed Dec. 14, 2007) (“*New ICO Comments*”) at 2-3.

<sup>11</sup> *T-Mobile Comments* at 1.

AWS-3 band would cause substantial harm to their planned deployment of FDD systems in the adjacent AWS-1 band. These harms range from loss of capacity and coverage to the inability to initiate or receive communications.<sup>12</sup>

CTIA shares these concerns, noting that existing AWS licensees “have invested billions of dollars in spectrum, network deployment, and operations and maintenance to deliver high-quality, next-generation mobile wireless services to consumers.”<sup>13</sup> It states that mobile transmissions in the AWS-3 band, as would be permitted under the UD and SUD approaches, would likely cause harmful interference to the planned systems of incumbent AWS licensees “with a resulting loss of coverage or capacity.”<sup>14</sup> CTIA notes that the potential for interference from operations within the AWS-3 block is similar to the interference issues raised in the *H Block Proceeding*,<sup>15</sup> but emphasizes that the ability to mitigate such interference is more challenging in the AWS-3 block because there is no guard band to separate the frequency bands used for transmission from those used for reception.<sup>16</sup> CTIA urges the Commission to make interference protection of adjacent licensees a priority.<sup>17</sup>

Motorola agrees with CTIA that mobile transmission in the AWS-3 spectrum would present interference problems similar to those predicted to occur between H Block

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<sup>12</sup> *Id* at 6.

<sup>13</sup> *CTIA Comments* at 3.

<sup>14</sup> *Id* at 6.

<sup>15</sup> *In the Matter of Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands (WT Docket No. 04-356)*, Notice of Proposed Rulemaking, 19 FCC Rcd 19263 (2004)(“*H Block Proceeding*”).

<sup>16</sup> *CTIA Comments* at 4-5.

<sup>17</sup> *Id* at 6.

mobile transmitters and Broadband PCS handsets.<sup>18</sup> Using the same test procedures established for H Block testing, Motorola performed interference tests on current AWS-1 handset receivers to determine the potential interference from AWS-3 mobile transmitters. It concluded that there is a significant potential for interference to occur, and noted that the Commission would need to establish technical rules that are significantly more restrictive than those typically applied to the use of commercial spectrum to ensure that harmful interference is not caused to adjacent bands.<sup>19</sup>

Incumbent AWS-1 licensees are not the only licensees concerned about the risks of harmful interference from AWS-3 mobile operations.<sup>20</sup> TerreStar, for example, notes that its plan to build and operate a broadband communications system using spectrum allocated to the Mobile Satellite Service (“MSS”) could be undermined by interference from the AWS-3 band. In conjunction with its deployment of an “ancillary terrestrial component” (“ATC”) to its MSS offering, TerreStar intends to use the 2180-2200 MHz band for base station transmissions and mobile reception. It concludes that using the nearby AWS-3 band for mobile transmissions “poses a high risk of mobile-to-mobile and base-to-base interference,” and notes that the 5 MHz separation between the AWS-3 band

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<sup>18</sup> *Motorola Comments* at 3.

<sup>19</sup> In conducting its analysis, Motorola assumed that harmful interference occurs when an AWS-1 call is dropped. *Motorola Comments* at Appendix. As Verizon Wireless explained in its Comments, this is an extreme measure of interference to a mobile call. Since call quality is degraded long before the call is dropped, previous H Block testing performed by CTIA and Motorola observed increases in frame error rates as a more accurate determinant of harmful interference. Based on the H Block test data, impairments to call quality occur about 8 dB before a call is dropped. Consequently, while we agree with Motorola that significant interference would occur from the operation of mobile devices in the AWS-3 spectrum, we believe that any power and OOB limits designed to avoid harmful interference must be more stringent than those identified by Motorola.

<sup>20</sup> See generally *TerreStar Comments* and *New ICO Comments*.

and the MSS band is insufficient to provide adequate protection.<sup>21</sup> TerreStar notes that the Commission reached a similar conclusion in assessing the potential for interference between MSS/ATC and PCS mobiles, and as a result, established strict out-of-band emissions (“OOBE”) limits on MSS/ATC mobile transmitters even though a 10 MHz guard band separated the bands used for MSS/ATC and PCS.<sup>22</sup>

Even those commenters proposing greater flexibility in the use of the AWS-3 spectrum do not deny the potential for interference and the need to provide adequate protection to incumbent licensees. Sprint Nextel, for example, notes the importance of protecting adjacent and co-channel licensees against harmful interference and proposes rules that it believes will accomplish that objective,<sup>23</sup> while emphasizing that “no new rules or restrictions need to apply to any existing or prospective adjacent-channel licensees,” and that new AWS-3 licensees should “bear the sole and exclusive responsibility” to resolve interference problems.<sup>24</sup> In support of its proposal, Sprint Nextel references two technical reports – one prepared by the WiMAX Forum and the other prepared by the Radio Sector of the International Telecommunications Union (“ITU-R”) – that it believes demonstrate that “standard interference-abatement measures” could be applied in the AWS-3 band that would allow FDD and TDD systems to coexist without causing interference and without the need for stringent rules.

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<sup>21</sup> *TerreStar Comments* at 2-3.

<sup>22</sup> *Id* at fn 6.

<sup>23</sup> *See* Comments of Sprint Nextel Corporation, WT Docket No. 07-195 (filed Dec. 14, 2007) (“*Sprint Nextel Comments*”) at 3-13.

<sup>24</sup> *Id* at ii.

While we agree with Sprint Nextel that incumbent licensees should be protected against harmful interference and that new AWS-3 licensees should bear the sole and exclusive responsibility of implementing interference mitigation techniques (if mitigation is possible), we disagree that the reports prepared by the WiMAX Forum and the ITU-R support Sprint Nextel's proposal for minimal restrictions on the use of the AWS-3 band. As discussed *infra*, we believe those reports clearly demonstrate the significant MS-MS and BS-BS interference that would occur between FDD and TDD systems operating in the same or adjacent spectrum. Indeed, the WiMAX Forum Report describes such interference as "potentially crippling,"<sup>25</sup> while the ITU-R Report concludes that attempting to accommodate both FDD and TDD in the same or adjacent spectrum would result in severe interference problems that could negatively affect the coverage and capacity of a mobile network.<sup>26</sup> Both reports conclude that there is a high risk of MS-MS and BS-BS interference, and that this interference is unilateral, resulting in little incentive for cooperation among the parties involved.

### **III. THE POTENTIAL FOR BASE-TO-BASE INTERFERENCE WOULD SEVERELY IMPACT AWS-3 LICENSEES.**

As already noted, the most severe interference scenarios that would arise from the use of the AWS-3 band for mobile transmissions are the interference that would occur between base stations, i.e., BS-BS interference, and between mobile devices, i.e., MS-MS interference. Verizon Wireless focused its previous comments on the MS-MS

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<sup>25</sup> See WiMAX Forum, *Service Recommendations to Support Technology Neutral Allocations, FDD/TDD Coexistence*, (Apr. 10, 2007) ("WiMAX Forum Report") at 21.

<sup>26</sup> See International Telecommunications Union – Radio Sector, *Coexistence between IMT-2000 time division duplex and frequency division duplex terrestrial radio interface technologies*

interference scenario, because of its significant potential impact on existing AWS-1 licensees. However, the risk of harmful interference to AWS-3 base stations is also significant.

The ITU-R Report concludes that base stations would need to be separated by large distances (as much as 10 km) in order to avoid harmful interference.<sup>27</sup> This requirement would be difficult to achieve in many cases, even if operators had a mutual interest in cooperating (which they would not, given the asymmetrical interference situation). However, despite its reliance on geographical separation as the principle mechanism for resolving BS-BS interference, the ITU-R Report also notes that collocation (or near collocation) of base stations is a common practice and, in fact, necessary to address BS-MS and MS-BS interference problems that are also prevalent.<sup>28</sup>

The report states:

“Collocation of multiple operators on the same tower or building is a common practice that will become more prevalent in future systems as the number of operators increases and more cell density is required for greater coverage and capacity. Because of deployment constraints, site acquisition difficulties, and other logistical and engineering issues, it is highly likely that TDD and FDD sites would be co-sited (i.e., collocated).”<sup>29</sup>

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*around 2600 MHz operating in adjacent bands and in the same geographical area” (“ITU-R Report”).* Report ITU-R M.2030 (2003) at 2-3.

<sup>27</sup> *Id* at 29-33.

<sup>28</sup> The BS-MS and MS-BS interference problems referenced here are commonly referred to as a “near-far” interference problem where the base station and mobile device that are attempting to communicate with one another are relatively far apart and the interfering transmitter (either base station or mobile) is relatively close – resulting in harmful interference into either the base station or mobile receiver. To prevent these problems from occurring, operators frequently locate their base stations within close proximity so that the relative distance between the mobile and the desired and interfering base stations is small.

<sup>29</sup> *ITU-R Report* at 33.

So, while the ITU-R Report acknowledges the necessity of locating base stations near to one another to avoid some types of interference, it also concludes that doing so would worsen interference between FDD and TDD base stations. The WiMAX Forum Report reaches the same conclusion – noting that collocation efforts designed to alleviate interference between base stations and mobile devices will exacerbate the BS-BS and MS-MS interference scenarios which would be unavoidable if FDD and TDD systems were to coexist in the same or adjacent spectrum.<sup>30</sup> Others filing comments with the Commission agree.<sup>31</sup>

The ITU-R Report states that there are other actions that can be taken to mitigate BS-BS interference besides geographical separation of base stations. However, it warns that all “are associated with some kind of cost or other difficulties.”<sup>32</sup> It notes that the interfering base stations (e.g., AWS-1) could be operated at lower power, but that would result in substantial reductions in coverage and flexibility of deployment, or a substantial increase in costs for more base stations, or both. And, given the unilateral nature of the problem, there would be no incentive for the operator of an interfering base station to take such action. It notes that the operator experiencing interference at its base stations could employ higher transmitter power in its mobile devices, but that would exacerbate the potential for MS-MS interference (described *infra*). Finally, while it states that appropriate guard bands could be used to separate disparate FDD and TDD systems, it also concedes that “even a guardband of 5 MHz or 10 MHz will not remove the

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<sup>30</sup> *WiMAX Forum Report* at 3.

<sup>31</sup> *TerreStar Comments* at 3-4.

<sup>32</sup> *ITU-R Report* at 44-45.

problem.”<sup>33</sup> As Verizon Wireless has previously noted, there is not sufficient spectrum available in the AWS-3 band to provide an adequate guard band while also allowing the use of the band for mobile transmissions.<sup>34</sup>

The WiMAX Forum Report asserts that the most significant interference scenarios between TDD systems can be eliminated by time synchronizing the base stations of adjacent channel TDD systems.<sup>35</sup> However, this is only effective if all systems use a common transmit/receive timing structure, which would limit the flexibility of TDD systems to dynamically allocate available bandwidth. Moreover, it would not be an effective solution for interference between FDD and TDD systems, since FDD systems cannot be time synchronized.

#### **IV. THE POTENTIAL FOR MOBILE-TO-MOBILE INTERFERENCE WOULD RESTRICT THE PROVISION OF MOBILE SERVICE BY LICENSEES IN ADJACENT BANDS.**

As the Notice acknowledges<sup>36</sup> and numerous parties have stated in various FCC proceedings,<sup>37</sup> there is a significant risk of interference whenever two or more mobile devices physically close to one another transmit and receive in the same or adjacent frequency bands. The record in this proceeding supports that assessment.<sup>38</sup>

The WiMAX Forum Report does not provide a detailed analysis of the MS-MS interference problem. However, while it claims that the problem will only continue while

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<sup>33</sup> *Id* at 3.

<sup>34</sup> *Verizon Wireless Comments* at 8-12.

<sup>35</sup> *WiMAX Forum Report* at 22-23.

<sup>36</sup> *Notice* at 15.

<sup>37</sup> *Verizon Wireless Comments* at 5.

<sup>38</sup> *See, e.g., T-Mobile Comments* at 3-4; *Motorola Comments* at 3-7; *CTIA Comments* at 4-6.

FDD and TDD mobile devices are in close proximity and that it believes the number of users affected will be minimal, it also acknowledges that if mobile devices are operated close enough to one another there is nothing that can be done to mitigate the problem.<sup>39</sup>

The ITU-R Report provides a more detailed assessment of the MS-MS problem. Unlike the interference between base stations, the report concludes, MS-MS interference will not have a substantial impact on system capacity when averaged over the entire system and using uniform user densities (emphasis added).<sup>40</sup> However, it acknowledges that it is not realistic to assume that mobile users will be distributed uniformly over a given service area.<sup>41</sup> Non-uniform distributions would likely result in higher interference probabilities and, unlike the uniform distribution case, could have a negative impact on overall system capacity. The report, therefore, recommends further studies to assess the impact of non-uniform user densities on the potential for MS-MS interference.

Importantly, the ITU-R Report concludes that, even assuming a uniform distribution of users, the impact on any individual mobile user (as opposed to the average system impact) would likely be severe.<sup>42</sup> As a result, the presence of MS-MS interference could have a detrimental effect on the level of service provided to wireless customers.

Based on a Monte Carlo simulation, the ITU-R report concludes that the probability of MS-MS interference is significant even where there is 5 MHz or 10 MHz

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<sup>39</sup> *WiMAX Forum Report* at 21.

<sup>40</sup> *ITU-R Report* at 3.

<sup>41</sup> *Id* at 3 and 45.

<sup>42</sup> *Ibid.*

separation between interfering systems.<sup>43</sup> For example, in one interference scenario, the report concludes that the probability of interference between mobile devices separated by 5 MHz would be 73% if the devices are one meter apart, 54% if the devices are three meters apart, and 18% if the devices are ten meters apart.<sup>44</sup> Even with a 10 MHz carrier separation, the ITU-R analysis concludes that the probability of interference would be 54%, 34%, and 8% for separation distances of one meter, three meters, and ten meters, respectively.<sup>45</sup> The ITU-R Report also notes that such occurrences of interference are likely to be commonplace:

“It is not difficult to imagine common scenarios where small distances between mobiles combined with medium to high powers and medium to large distances to serving BS will cause dramatic increases in noise floor (up to 20-25 dB increase) which the BS cannot compensate. Two mobiles on a bus or a train connected to outdoor micro or macro BSs will likely qualify. The extra interference will often be more than enough to make the victim MS lose the connection.”<sup>46</sup>

Verizon Wireless agrees. We noted in our comments that there are a variety of circumstances in which multiple wireless customers will want to use their mobile devices when in close proximity to one another.<sup>47</sup> Moreover, the potential for MS-MS interference will increase as the number of mobile users and mobile applications continues to grow and as the mobile services market expands to include more applications that involve “machine to machine” communications and not just communications between people. In such an environment, it will not be possible to either

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<sup>43</sup> *Id* at 39-42.

<sup>44</sup> *Id* at 40.

<sup>45</sup> *Ibid*.

<sup>46</sup> *Id* at 42.

<sup>47</sup> *Verizon Wireless Comments* at Attachment A.

determine or control the locations from which consumers will want to operate mobile devices, and it will not be acceptable to limit in any way the proliferation of such devices. Attempts to apply such limitations to the AWS spectrum will substantially limit the usefulness of that spectrum and make it difficult for AWS licensees to provide mobile services that are comparable in quality to those provided by licensees in other bands.

**V. SPRINT NEXTEL'S PROPOSAL TO APPLY THE COMMISSION'S BRS RULES TO AWS-3 SHOULD BE REJECTED.**

While it does not dispute the obvious evidence that significant harmful interference could come from certain uses of the AWS-3 spectrum, Sprint Nextel contends that the Commission could effectively mitigate this interference by establishing technical rules that align with rules recently adopted for the Broadband Radio Service ("BRS").<sup>48</sup> This claim is without merit and should be rejected.

Sprint Nextel proposes that the Commission apply both power limits and OOB limits to AWS-3 mobile devices that are comparable to those that apply for BRS. Specifically, it proposes that AWS-3 mobiles be limited to a power of 2 watts EIRP and an OOB of  $43 + 10 \log P$  watts at the channel edge and  $55 + 10 \log P$  watts at 5.5 MHz from the channel edge and beyond.<sup>49</sup>

The rules proposed by Sprint Nextel would not provide adequate protection to AWS licensees. Importantly, the proposed power limit of 2 watts EIRP and OOB limit of  $43 + 10 \log P$  watts are typical limits applied to commercial wireless services where there is no significant risk of harmful interference, and they are far more permissive than

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<sup>48</sup> *Sprint Nextel Comments* at 5.

<sup>49</sup> *Id.* at 8-9.

rules that the Commission has applied (or has proposed to be applied) to other spectrum bands where the potential for harmful interference is less severe than it is here. For example, as already noted, the Commission adopted a more stringent OOB rule for MSS/ATC to protect PCS receivers, i.e.,  $70 + 10 \log P$  watts.<sup>50</sup> Similarly, in the *H Block Proceeding*, the Commission concluded that an OOB limit of at least -66 dBm/MHz into the PCS mobile receive band would be needed to protect PCS mobile devices at a separation distance of one meter.<sup>51</sup> This corresponds to an OOB of  $96 + 10 \log P$  watts, a limit that is 53 dB more stringent than that which Sprint Nextel proposes be applied to mobile transmitters operating in the AWS-3 spectrum.

Importantly, these more stringent OOB limits were deemed necessary even though there is 10 MHz of guard band separating the MSS/ATC and H Block spectrum from the PCS band. There is no guard band separating the AWS-3 spectrum from the AWS-1 and AWS-2 bands that would be at risk of interference. If anything, the lack of guard band here argues for more stringent rules than those either already applied to the MSS/ATC spectrum or being proposed by the Commission for the H Block.

A more analogous situation to the AWS-3 interference case, due to the lack of any guard band, is the potential for interference between Wireless Communications Service (“WCS”) and Satellite Digital Audio Radio Service (“SDARS”) licensees in the 2.3 GHz band. In establishing its rules for WCS, the Commission recognized the significant potential for interference between mobile WCS devices and SDARS receivers. As a result, it established a strict OOB limit that requires power from any mobile WCS

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<sup>50</sup> *Notice* at 54.

<sup>51</sup> *H Block Proceeding* at ¶ 91.

device to be reduced by  $110 + 10 \log P$  outside its licensed band.<sup>52</sup> This OOB limit is more stringent than the one that Verizon Wireless proposed for AWS-3 mobile transmissions in its earlier comments.

Verizon Wireless asked V-COMM, a leading provider of integrated network engineering and support services, to assess the impact of Sprint Nextel's proposed rules on adjacent licensees. V-COMM's analysis concludes that the application of those rules would result in significant harmful interference to both AWS-1 and AWS-2 user devices.<sup>53</sup>

In our earlier comments in this proceeding, Verizon Wireless included an analysis performed by V-COMM that concluded that AWS-3 mobile transmitters would have to be limited to a power of 0 dBm (1 mW) to provide adequate protection to AWS-1 mobile receivers at a distance of one meter.<sup>54</sup> V-COMM's more recent analysis concludes that application of the power limit proposed by Sprint Nextel (2 watts EIRP, or 33 dBm) would result in harmful interference when AWS-1 and AWS-3 mobile devices are as far apart as 44 meters (144 feet) and would result in dropped calls for AWS-1 devices at a separation distance of 17.5 meters (57 feet).<sup>55</sup>

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<sup>52</sup> *In the Matter of Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS")*, WT Docket No. 96-228, Report and Order ("*WCS Order*"), FCC 97-50 (rel. Feb. 19, 1997) at ¶ 136.

<sup>53</sup> V-COMM, "*Interference Analysis of BRS/EBS Rules Applied to AWS-3*," Jan. 10, 2008, attached infra as Appendix ("*V-COMM Analysis*").

<sup>54</sup> *Verizon Wireless Comments* at Attachment A.

<sup>55</sup> *V-COMM Analysis* at 3. As previously noted (*see* fn 19 *supra*), Motorola's assumption that harmful interference occurs when a call is dropped is not supported by the earlier industry analysis, which concluded that increases in frame error rates are a better determinant of harmful interference. In any event, the recent analysis by V-COMM concludes that, even using Motorola's much more permissive assumptions, the potential interference from AWS-3 mobile operations would be excessive if Sprint Nextel's proposed rules are adopted.

V-COMM's earlier analysis also concluded that the OOB of AWS-3 mobile transmitters would have to be limited to an OOB of -75 dBm/MHz to avoid harmful interference to AWS-1 mobiles when such devices are operated within one meter of one another.<sup>56</sup> This is equivalent to an attenuation of  $105 + 10 \log P$  watts. V-COMM's recent analysis concludes that application of the OOB rule proposed by Sprint Nextel (i.e., attenuation of  $43 + 10 \log P$  at the channel edge and  $55 + 10 \log P$  at 5.5 MHz from the channel edge and beyond) would result in harmful interference to some AWS-1 devices (i.e., those within 5.5 MHz of the band edge) when AWS-3 mobile devices are as far apart as 1.2 km (approximately three quarters of a mile) and harmful interference to all other AWS-1 devices (i.e., those 5.5 MHz or more away from the band edge) when AWS-3 mobile devices are as far apart as 312 meters (more than 1000 feet).<sup>57</sup> Adjusting for expected signal attenuation due to path obstructions such as trees, buildings, and other structures, AWS-3 devices could still be expected to cause harmful interference to AWS-1 devices when they are within 1,000 feet (for AWS-1 devices operating within 5.5 MHz of the band edge) and within 250 feet (for AWS-1 devices operating at 5.5 MHz from the band edge and beyond).<sup>58</sup>

These are extremely large impact areas, demonstrating that a single interfering AWS-3 device could impact many AWS-1 user devices. Clearly, the application of Sprint Nextel's proposed rules to the AWS-3 band would have a severe and detrimental

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<sup>56</sup> *Verizon Wireless Comments* at Attachment A.

<sup>57</sup> *V-COMM Analysis* at 4.

<sup>58</sup> *Ibid.*

effect on the provision of service in adjacent bands. As a result, we urge the Commission to reject Sprint Nextel's proposal.

## **VI. CONCLUSION**

The record in this proceeding clearly demonstrates the significant harmful interference that could be caused to existing licensees by operation of mobile transmitters in the AWS-3 spectrum. As a result, Verizon Wireless urges the Commission to either prohibit mobile transmissions in the band or, at a minimum, to establish stringent power and OOB rules that will ensure protection of existing licensees. Moreover, the Commission should reject Sprint Nextel's proposal to apply those technical rules that currently apply to the BRS band, as those rules would not provide adequate protection.

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## **Appendix**

### **“Interference Analysis of BRS/EBS Rules Applied to AWS-3”**

Technical analysis performed by V-COMM Telecommunications Engineering  
at the request of Verizon Wireless