

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

In the Matter of )  
 )  
Realignment of the ) RM-11738  
896-901/935-940 MHz Band )  
to Create a Private Enterprise )  
Broadband Allocation )

To: The Commission

**REPLY COMMENTS  
OF THE  
ENTERPRISE WIRELESS ALLIANCE  
AND  
PACIFIC DATAVISION, INC.**

Respectfully submitted,

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July 14, 2015

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## SUMMARY

The Enterprise Wireless Alliance (“EWA”) and Pacific DataVision, Inc. (“PDV”) (EWA and PDV, collectively, “Parties” or “Petitioners”) have proposed a realignment of the 900 MHz band to make available to Critical Infrastructure Industry (“CII”) and other Private Enterprise (“PE”) users broadband capability that would provide the security, reliability, coverage, hardening, and features such as priority access these users have long described as essential to support the fundamental objectives of those organizations. The proposal was responsive, in part, to repeated requests, in particular from the CII community, for access to broadband spectrum that could be employed to meet its specialized requirements, requirements that are not always satisfied on commercial networks. EWA/PDV agree with parties that argue the Federal Communications Commission (“FCC” or “Commission”) should allocate greenfield spectrum for PE/CII broadband use. However, absent any indication that such an allocation is forthcoming,<sup>1</sup> the Petitioners instead have proposed to create this option in already allocated 900 MHz spectrum that, for the most part, was acquired from the FCC in competitive bidding or purchased from incumbents in the secondary market. This approach is consistent with the Commission’s historical position that given finite spectrum resources, it is incumbent upon all licensees, including commercial entities such as PDV, to pursue more efficient use of the spectrum for which they are authorized by investigating and investing in more advanced technologies. The public interest dictates this commitment from all Commission licensees.

Of course, any restructuring or realignment of a band is dependent on an FCC determination that: (1) realignment will not cause harmful interference to the protected operations

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<sup>1</sup> In their June 29, 2015 Comments, the Sensus Partners and Advisors Network acknowledge that “For years, certain CII entities have sought an industry-wide broadband allocation.” Comments at 5.

of other licensees; and (2) any licensee whose system is touched in the process will be provided with fully comparable facilities as that term has been defined and interpreted in numerous FCC proceedings.

In an effort to provide greater clarity and certainty about their proposal, the Petitioners submitted an ex parte filing in which they set out proposed rules for realigning the Part 90 900 MHz band. The recent Comments on that submission focus on several key areas:

- 1) The sufficiency of the broadband technical rules for preventing interference to systems operating adjacent to the proposed broadband allocation at 898-901/937-940 MHz and the appropriateness of the standard for asserting harmful interference claims on a system-specific basis should a problem arise;
- 2) The comparable facilities rights of incumbents operating in the proposed broadband allocation at 898-901/937-940 MHz;
- 3) Certain mechanics of the realignment process itself;
- 4) The obligations associated with each Private Enterprise Broadband (“PEBB”) license; and
- 5) The allocation of 240 900 MHz channels to the PEBB license.

Some of the concerns in the Comments reflect misunderstandings about the PEBB proposal and/or the rules, rather than a substantive disagreement. Those should be relatively easy to resolve.<sup>2</sup> Some that relate to the realignment process itself, such as the timing of notification and negotiation and the selection of realignment managers, present useful input and have prompted the Petitioners to support modifications to the proposed rules, as discussed below. Others, in particular those related to the potential for interference and the right to interference

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<sup>2</sup> For example, American Petroleum Institute (“API”) questioned why §90.1415(a)(4) states that an entity that enters into a broadband system contract with a PEBB licensee would not be subject to the Priority Access obligations of §90.1415(b). The intent was to clarify that CII or PE entities that enter into such contracts to use this spectrum to satisfy their own private, internal, broadband requirements are not themselves required to offer Priority Access to other entities.

protection, are of paramount concern to incumbents in and adjacent to the 900 MHz band and to EWA/PDV as well. Those are addressed in these Reply Comments and should be examined carefully by the Commission in a Notice of Proposed Rulemaking that develops a complete record on all these critical areas.

EWA represents many PE entities, including a number of 900 MHz licensees. It supports this proposal because it will bring next generation technology options to the PE user community on terms that are consistent with their unique requirements and may be implemented while providing incumbents with fully comparable facilities and without causing increased interference. PDV sees an opportunity to put its 900 MHz spectrum to better, more efficient use by making it available to PE/CII entities pursuant to mutually acceptable contractual arrangements, including financial terms that satisfy both parties. It proposes to be a partner with PE/CII entities that see a need for broadband capabilities beyond those offered on commercial systems, an undertaking that will be successful only if PDV is reasonable in its terms and responsive to these entities and their requirements.

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The Enterprise Wireless Alliance (“EWA”) and Pacific DataVision, Inc. (“PDV”) (collectively, “Parties” or “Petitioners”), pursuant to Federal Communications Commission (“FCC” or “Commission”) Rule Section 1.405,<sup>3</sup> respectfully submit their Reply Comments in the most recent phase of the above-entitled proceeding.<sup>4</sup> The Public Notice sought comment on the Parties’ supplement to their Petition for Rulemaking to realign the Part 90 900 MHz band and create a private enterprise broadband allocation.<sup>5</sup> The Petition proposed that the band be realigned to create a 3/3 MHz broadband segment (898-901/937-940 MHz) to be assigned in each MTA to a Private Enterprise Broadband (“PEBB”) licensee, while retaining a 2/2 MHz segment for continued narrowband Private Land Mobile Radio (“PLMR”) operations. On May 3, 2015, the

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<sup>3</sup> For purposes of clarity, existing FCC rules will be shown as “Section XXX” while the Proposed Rules will be identified as “§XXX.”

<sup>4</sup> Wireless Telecommunications Bureau Seeks Comment on Supplement to Enterprise Wireless Alliance and Pacific DataVision, Inc. Petition for Rulemaking Regarding Realignment of 900 MHz Spectrum, *Public Notice*, RM-11738, DA 15-579 (rel. May 13, 2015) (“Public Notice”).

<sup>5</sup> Petition for Rulemaking of the Enterprise Wireless Alliance and Pacific DataVision, Inc., filed Nov. 17, 2014 (“Petition”).

Petitioners made an *ex parte* submission in which they presented proposed rules that would govern the band realignment and subsequent operations on this spectrum.<sup>6</sup> Comments on the Proposed Rules were filed on June 29, 2015.

EWA/PDV appreciate the serious consideration that most commenting parties gave to the Proposed Rules. Band realignments, of necessity, involve some disruption of the operations of incumbents whose equipment would need to be modified to operate on different frequencies. Realignments should not be and are not undertaken lightly by the Commission or incumbents, even if the result – in this instance a Private Enterprise Broadband allocation – is one these same users have described repeatedly as essential to support their day-to-day business activities and operational missions into the future.<sup>7</sup> The Petitioners remain committed to working with all interested parties and the FCC to ensure that a PEBB allocation can be implemented without causing interference to the protected operations of incumbents adjacent to that allocation and while providing incumbents whose frequencies must be realigned with fully comparable facilities.

## **I. BACKGROUND**

It is important to consider the Proposal and the Proposed Rules in the context of the history and current status of the 900 MHz band. This 5/5 MHz allocation, from the outset, has been subdivided equally between spectrum available for commercial Specialized Mobile Radio (“SMR”) and for Business/Industrial/Land Transportation (“B/ILT”) entities that comprise the PE/CII user community. B/ILT channels are recommended by independent frequency coordinators on a first-come, first-served basis in accordance with FCC-defined co-channel separation criteria and then licensed by the FCC on a frequency- and site-specific basis. SMR channels initially were licensed

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<sup>6</sup> Realignment of the 896-901/935-940 MHz Band to Create a Private Enterprise Broadband Allocation, RM-11738, Proposed Rules, filed May 3, 2015 (“Proposed Rules”).

<sup>7</sup> See, e.g., Comments of the Utilities Telecom Council – NBP Public Notice #6, GN Docket No. 09-47, filed Oct. 23, 2009 at 9-11; see also Reply Comments of the American Petroleum Institute, GN Docket No. 12-354, filed Apr. 5, 2013 at 2.

in a similar process but, in 1995, the FCC conducted geographic auctions of the SMR spectrum and awarded licenses for operation throughout Major Trading Areas (“MTAs”). While any entity was free to buy the spectrum it needed in these auctions, and at least one utility was successful in doing so in a major market, the great majority of MTA licenses were purchased by Sprint Corporation (“Sprint”) (then, Nextel Communications, Inc.) either directly from the FCC with the monies going to the Federal Treasury or from other auction winners in the secondary market. This spectrum, along with Sprint’s 800 MHz spectrum holdings, was deployed in its advanced dispatch-centric iDEN network that ultimately served more than 20 million subscribers, including many B/ILT entities. When the FCC modified its rules to permit the conversion of 900 MHz B/ILT spectrum from private internal to commercial use, Sprint also bought a significant number of channels from B/ILT licensees in certain market areas and converted them to commercial status to increase the capacity of the iDEN network.

This 900 MHz Sprint spectrum that has been acquired by PDV represents the great majority of the spectrum proposed for the PEBB allocation. Its conversion to a contiguous broadband allocation does not constitute a reduction of the spectrum available for B/ILT licensees, since they have no access to it today, whether auctioned MTA spectrum or purchased B/ILT frequencies converted to commercial status. The issue is whether the public interest, more specifically the interest of the B/ILT user community, would be better served by adopting rule changes that would enable it to be deployed for PE/CII broadband use, the logical next step for spectrum whose use historically has evolved to permit the deployment of more efficient, state-of-the-art technology.

## II. ISSUES

### A. Interference

The concern about potential interference from a broadband allocation to adjacent narrowband PLMR and FlexNet™<sup>8</sup> operations dominates the Comments. These concerns focus on two distinct, but related, areas:

- 1) Will the proposed power/antenna height limits in §90.635(c)<sup>9</sup> and the emission mask in §90.1419, including the aggressive filtering needed to achieve that mask, in conjunction with the internal guard band in an LTE channel, provide interference protection that is equal or superior to the protection afforded to incumbents today under the current Part 90 technical rules; and
- 2) Will the proposed Interference Protection Rights in §90.1421 ensure that PLMR incumbents in the 900 MHz band continue to enjoy protected operations, at a minimum within their 40 dBμV/m contours post-realignment and will they impose an obligation for prompt and effective resolution of the problem by the PEBB licensee should interference nonetheless occur?

Some parties take the position that it is not possible to provide adequate protection without at least a 1 MHz guard band between broadband and narrowband operations.<sup>10</sup> Some object to the

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<sup>8</sup> As described by Sensus USA Inc. (“Sensus”) in its June 29, 2015 Comments, its FlexNet™ systems are used for advanced metering infrastructure and smart grid applications and often operate on narrowband PCS (“NPCS”) 901/940 MHz spectrum licensed to Sensus, spectrum that is immediately adjacent to the proposed PEBB allocation. Comments at 2.

<sup>9</sup> Harris Corporation (“Harris”) has suggested that the 900 MHz broadband rules should include a provision limiting power flux density (“PFD”) to a prescribed level such as was adopted in Section 90.542(b) for Part 90 700 MHz broadband. Comments at 14. PDV agrees that a PFD standard should be considered in the Notice of Proposed Rulemaking.

<sup>10</sup> *See, e.g.*, Comments of Harris and Lower Colorado River Authority (“LCRA”). These two parties also argue that interference protection is particularly critical because public safety entities sometimes share use of 900 MHz B/ILT systems pursuant to Section 90.179(h). The Petitioners agree that protecting B/ILT systems from interference is essential, but not because there may be some public safety usage on some systems. B/ILT entities are entitled to interference-free operations in their own right and for their own operations, many of which also involve safety of life and property. If public safety entities elect to conduct certain operations on 900 MHz channels pursuant to sharing arrangements with eligible B/ILT entities rather than using their own ample VHF, UHF, 700 MHz and 800 MHz spectrum, their rights are no greater or less than those of all 900 MHz B/ILT incumbents.

Petition on the basis that any increase in the current noise floor is impermissible.<sup>11</sup> Some essentially argue that the FCC does not have sufficient expertise in PLMR narrowband and LTE broadband operations to make a reasoned assessment of the potential for interference between them.<sup>12</sup> A number of parties object to the -88 dBm and -85 dBm signal strength thresholds imported from Section 90.672 as inadequate for an interference protection right standard.<sup>13</sup>

#### 1. Guard Band

The Petitioners are confident that an objective assessment of the Proposed Rules will confirm that incumbents on both sides of the PEBB allocation will not see any reduction in their current interference protection rights and that the presence of an external guard band is not needed to assure this result.<sup>14</sup> The Parties recognize those instances in which the Commission has established a guard band between narrowband and broadband operations.<sup>15</sup> If that were the only means to allow narrowband and broadband technologies to exist in proximity, then a guard band should be established, since each meets an important communications requirement.

But guard bands should be a last resort, not the first. Guard bands represent spectrum that is not being used to address a communications need in a world where spectrum is increasingly scarce, particularly below 1 GHz. Technological advances such as improved filtering techniques,

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<sup>11</sup> See Comments of Sensus and LCRA.

<sup>12</sup> See, e.g., Comments of Sensus and PECO Energy Company (“PECO”).

<sup>13</sup> See, e.g., Comments of Utilities Telecom Council (“UTC”), LCRA, and Salt River Project Agricultural Improvement and Power District (“SRP”).

<sup>14</sup> The Association of American Railroads (“AAR”) filed brief comments indicating concern regarding potential interference to Advanced Train Control System (“ATCS”) operations conducted by railroads, including on channel 897/936.9875 MHz, which is immediately adjacent to the proposed PEBB allocation. The Petitioners would happily work with AAR to address whatever specific concerns it has, but they have had difficulty locating any details about where ATCS systems are located or their operating parameters. If AAR could share that information, EWA/PDV believes constructive discussions certainly would follow.

<sup>15</sup> Harris is not entirely correct that the Commission rejected a band reconfiguration without guard band protection at 800 MHz. Harris Comments at 5. The FCC authorized broadband usage in the 813.5-824/858.5-869 MHz Enhanced SMR (“ESMR”) band in the Southeastern United States, where Sprint Corporation and Southern Communications Services, Inc. d/b/a SouthernLINC Wireless both hold ESMR licenses, and in the 817-824/862-869 MHz band in the rest of the United States. It did not limit operations to a particular broadband technology. Because the FCC did not adopt a guard band in the Southeastern U.S., licensees in the 858-858.5 MHz band, which include a variety of public safety and PE licensees, will continue to operate in a narrowband segment of the 800 MHz band that is immediately adjacent to an allocation authorized for broadband use.

in conjunction with extensive real-world experience with LTE and other broadband technologies, support a determination that external guard bands are a luxury, not a necessity, as long as sufficiently rigorous out-of-band-emission (“OOBE”) standards and other technical provisions provide adequate interference protection. Indeed, PLMR applicants have shown no hesitation in acquiring spectrum in the 800 MHz Guard Band immediately adjacent to Sprint’s ESMR allocation at 817-824/862-869 MHz, an allocation whose OOBE limit is no more rigorous than that in the Proposed Rules.<sup>16</sup> Guard bands must be used when needed. They should not be an automatic appendage to every broadband allocation that is proximate to narrowband operations when appropriate technical requirements will produce the necessary and perhaps superior interference protection.

## 2. Noise Floor

Several parties including Sensus expressed concern that introducing a PEBB allocation will cause a rise in their current noise floor, either from broadband operations themselves, from a larger number of LMR systems in the 2/2 narrowband segment post-realignment, or from both. There is an implication, and in Sensus’ case a specific claim, that licensees are entitled to rely on the noise floor as it exists at some moment in time, even if the existing rules would permit more intensive use of the spectrum on which they operate.

It may be that licensees in the Part 90 900 MHz band and in the adjacent NPCS band have enjoyed unusually low noise levels to date.<sup>17</sup> (The attached Exhibit A addresses the technical arguments presented by Sensus, including the Noise Floor Measurement Data in its Exhibit 2.)

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<sup>16</sup> The emission mask for the ESMR allocation is Band Class 26 which is  $55+10 \log (P)$ .

<sup>17</sup> It is not clear why this would be the case with 900 MHz narrowband, as all B/ILT and SMR channels have been fully licensed in major urban areas for decades. Sensus noted that Sprint iDEN network made intensive use of its channels. Sensus Comments at 19. The Petitioners assume that the frequencies licensed to PLMR entities are used intensively as well, at least in and around major markets. It is not clear why the realignment proposed by the Petitioners would have a meaningful impact on the noise floor in markets where the band is heavily used already. Outside those areas, there has been limited deployment of 900 MHz B/ILT systems during the past 30 years.

More intensive use of the 900 MHz band presumably will increase those noise levels, but as long as the realignment proposed by the Petitioners does not produce a greater impact than permitted under the existing rules, that result is consistent with the FCC's regulations and its policies. Spectrum is to be used as intensively as the technical rules adopted by the Commission permit, since those rules define what the FCC considers an acceptable operating environment. Moreover, those rules should operate to enable the introduction of advanced and efficient uses of licensed spectrum, as long as they continue to mandate at least equivalent interference protection to adjacent licensees as the rules in place when those adjacent allocations were authorized.

Sensus may have made the business decision (which, like all such decisions, carries a corresponding business risk) not to design its systems in the NPCS spectrum to tolerate a noise floor that would be permissible based on PLMR systems operating throughout the adjacent Part 900 MHz band in conformance with the long-standing narrowband rules. Instead, it may have elected to rely on a spectrum environment that presumed: (1) Sprint's iDEN network would be the predominant neighbor in perpetuity; and (2) as Sensus states without explanation or corroboration, narrowband PLMR systems would be compelled to "take extra measures to limit OOB in order to minimize intra-system interference and optimize commercial use of this limited spectrum."<sup>18</sup> This was a surprising choice if even some of the Sensus systems require "real time data with no interruption" as asserted in its Comments.<sup>19</sup>

Having made that decision, it cannot bootstrap that choice into justification for a claim that **"FlexNet™ users have a reliance interest in the continued use of their licensed frequencies...operating with the noise floor the same as it has been for the last ten years."**<sup>20</sup>

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<sup>18</sup> *Id.* at 21 (emphasis added).

<sup>19</sup> *Id.* at iii.

<sup>20</sup> *Id.* at iv.

The claim is startling in its audacity and incorrect as a matter of law.<sup>21</sup> FlexNet™ users have the same right as all other licensees on exclusive channels: the right to protection from interference based on the technical rules adopted by the FCC for the service in question.<sup>22</sup> To conclude otherwise would give licensees the power to veto virtually all subsequent allocations or rule changes involving spectrum in any proximity to their own, perhaps even additional licensees in existing allocations, as additional or modified uses and users almost inevitably contribute to the noise floor in an area, even if operating in full compliance with FCC regulations. It would allow this veto even if the Commission had determined that the resulting noise levels were tolerable.

Sensus argues that the FCC cannot allow rule changes absent a demonstration that no harmful interference will result. But that is not the issue here. The proposed PEBB allocation will have no greater impact on operations in the NPCS spectrum used by Sensus' customers than would narrowband PLMR systems operating under the current rules. The Sensus systems, because of the assumption made in their system design, already are susceptible to "harmful interference" under the current rules, whether they have experienced it or not. PDV has begun and expects to continue to deploy digital high-site trunked systems in certain markets pending action on the Petition. Contrary to Sensus, it has not identified any need to adopt additional OOB limitations to avoid intra-system interference and has designed its systems in conformance with the existing rules.

Having disregarded those rules in its system designs, Sensus effectively is seeking a retroactive rule change. It wants greater protection from adjacent 900 MHz operations than is

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<sup>21</sup> The only citation offered by Sensus in support of its reliance argument is to a 1996 case involving the FCC's eleventh hour reversal of a decision not to require any payment for a paging license awarded under the Pioneer's Preference program. *Mobile Communications Corporation of America v. FCC*, 77 F3d 1399 (1996). The prospective licensee argued that it had relied on the FCC's previous assurances that no payment would be required, and that it therefore had not had an opportunity to explain why the payment should not be required. The Court remanded it to the FCC for further consideration.

<sup>22</sup> Sensus also is incorrect in its assertion that incumbent systems always are entitled to interference protection, as long as they operate in compliance with FCC rules. The FCC made it clear in Section 90.672 that even public safety systems must demonstrate an appropriate level of interference-rejection capability before they can claim protection.

provided under the technical regulations that were in place when it acquired its spectrum. Acceding to that demand would, in Sensus' words, "have a chilling effect on applicants wanting to secure exclusive-use spectrum at auction"<sup>23</sup> since they could not be certain that the licensee(s) of an earlier allocation would not demand interference protection greater than that specified in the rules.

To be clear, the Petitioners have no desire to adversely impact operations in the adjacent NPCS band. They will continue to seek engagement with Sensus in technical discussions that hopefully will allow systems in both bands to operate as may be reasonably anticipated. The Petitioners are confident that the PEBB allocation can coexist compatibly with FlexNet™ systems at noise floor levels consistent with what is permitted today from FCC-compliant operations in the adjacent narrowband spectrum – in most cases even given Sensus' highly interference-susceptible design configurations. The same is true for PLMR licensees in the 2/2 MHz narrowband PLMR segment. Out of an abundance of caution, the Commission may wish to impose on PEBB licensees a notification obligation vis-à-vis licensees in adjacent bands similar to that required of 800 MHz ESMR licensees that deploy broadband technology on their spectrum.<sup>24</sup> It might also be appropriate to require PEBB licensees to maintain a database of deployed facilities with technical information comparable to the data associated with site-based licenses.

### 3. LTE/PLMR Expertise

It should not be necessary to refute the contention that LTE interference modeling is in a nascent stage<sup>25</sup> and, by implication, that the FCC lacks sufficient expertise to make a considered

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<sup>23</sup> Sensus Comments at 19.

<sup>24</sup> See Letter from David L. Furth, Associate Bureau Chief, Public Safety and Homeland Security Bureau and Joel D. Taubenblatt, Acting Deputy Chief, Wireless Telecommunications Bureau to Lawrence R. Krevor, Vice President-Spectrum and James B. Goldstein, Director, Spectrum Reconfiguration Sprint Nextel Corporation, WT Docket No. 02-55, DA 08-1074 (May 6, 2008).

<sup>25</sup> Sensus Comments at n. 15.

assessment regarding the sufficiency of the proposed rules in protecting against interference. LTE technology is deployed extensively throughout the world, including in the United States. The Proposed Rules are based on off-the-shelf LTE technology – infrastructure, subscriber devices, and filters – that can be purchased today. Petitioners are confident that the highly competent staff of the FCC’s Office of Engineering and Technology and the agency’s other technical experts are amply qualified to subject the technical aspects of this proposal to rigorous evaluation in the context of a Notice of Proposed Rulemaking, just as they have in any number of similar matters over many decades.

#### 4. Interference Protection Rights

There apparently is confusion as to whether the post-realignment interference protection rights set out in §90.1421(a)(2) would be available only to incumbents that had been relocated from frequencies above 937 MHz to the 2/2 MHz narrowband segment or to all 900 MHz narrowband licensees. That is an easy matter to clarify: all 900 MHz licensees may avail themselves of that provision if they believe they are experiencing interference from a PEBB facility. It does not matter whether their system has been realigned. Additionally, after discussion with incumbents and equipment manufacturers, the Petitioners recommend revising the interference protection rights thresholds in that provision, standards that were imported purposely from Section 90.672. Protection from interference within a licensee’s 40 dB $\mu$ V/m contour is a foundational Part 90 900 MHz right. Should interference be experienced within that contour, as it sometimes is in a congested wireless world where even the most perfect technical rules do not always produce a perfect outcome, the interferer should bear full responsibility for correcting the problem. The Petitioners therefore propose that §90.1421(a)(2) be modified to require a median desired signal strength of -98 dBm for mobiles in subsection (i) and -95 dBm for portables under subsection (ii).

EWA/PDV recognize that some incumbents have described their systems as operating satisfactorily with signal levels as low as -119 dBm.<sup>26</sup> They will be free to maintain their current configuration. However, in what the Petitioners contend is the unlikely event that a PEBB deployment arguably causes interference to radios operating in fringe areas within or outside the 40 dB $\mu$ V/m of a system that relies on less robust infrastructure deployment, they will not trigger the proposed interference protection right.

#### 5. Fixed Endpoints

A question was raised in the Comments regarding the need to provide for what the Petitioners call “fixed endpoints” for broadband operations. EWA/PDV agree that such devices should be expressly identified in the technical rules, as many of the anticipated PE/CII broadband applications are likely to involve low-power endpoints operating from fixed locations. Therefore, the Petitioners recommend that §90.635(c)(4) be modified to add “and fixed endpoints” after “(hand-held devices).”

#### **B. Comparable Facilities**

The original Petition and each subsequent filing by EWA/PDV has reaffirmed that no incumbent operating on frequencies above 937 MHz will be realigned to frequencies below 937 MHz unless the PEBB licensee can provide fully comparable facilities and pay the associated costs. This is a fundamental precept in any band restructuring, the details of which are described accurately by the Utilities Telecom Council.<sup>27</sup>

Sensus erroneously states that the PEBB licensee would “confiscate” auctioned MTA licenses above 937 MHz held by other licensees, since the Proposed Rules “do not give these licensees the right to negotiate in, object to, or hold out from, the confiscation of their licenses,”

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<sup>26</sup> See Comments of SRP.

<sup>27</sup> UTC Comments at 7.

although it concedes that they provide for realignment of such systems to spectrum below 937 MHz. This description ignores §90.1407(b)(2)(i), which specifically provides that MTA licensees above 937 MHz can choose to contribute their spectrum rights to the PEBB license pursuant to a negotiated agreement with the PEBB licensee or to negotiate a realignment agreement. Sensus also claims that §90.1413(c)(ii) would give the PEBB licensee the right to give realigned MTA licensees site-based rather than geographic authorizations. That too is incorrect. A realigned MTA licensee would receive a fully comparable MTA authorization below 937 MHz.

M2M Spectrum Networks, LLC argues that PDV does not have the spectrum needed to provide all incumbents with comparable facilities. The Petitioners have addressed this issue previously and have explained that it is not possible to quantify precisely the amount of replacement spectrum needed at this stage of the proceeding. However, PDV believes the ULS database corroborates that PDV's spectrum holdings are adequate to realign all incumbent licensees in the vast majority of MTAs in which PDV would be designated as the PEBB licensee under the proposed rules. Of course, realignment is but one way to achieve a 3/3 broadband allocation and likely will be supplemented with both license acquisitions by the PEBB and contributions from incumbent licensees. That subject undoubtedly will be examined in detail in a Notice of Proposed Rulemaking.

Although the comparable facilities standard has been used and has proven effective in a number of other bands, the language in §90.1413(c)(1)(ii), which was imported wholesale from Section 90.699 governing 800 MHz rebanding, may require clarification. It states:

To meet the comparable facilities requirement, the incumbent licensee shall be provided with facilities that provide equivalent channel capacity. For purposes of this paragraph (c)(1)(i), "channel capacity" shall mean the same number of channels with the same bandwidth that is currently available to the licensee.

However, it goes on to state the following:

If a different channel configuration is used by the realigned system, such channel configuration shall have the same overall capacity as the original configuration used by the incumbent licensee.

It is not clear to Petitioners what situation that sentence was intended to address; to the best of their knowledge it was never raised in an 800 MHz rebanding project; and it is not necessary for purposes of the Petition. Incumbents will be entitled to replacement 12.5 kHz channels on a 1:1 basis and that sentence should be deleted from the Proposed Rules.

Some parties have suggested that systems with frequencies below 937 MHz should be entitled to comparable facilities as well if they experience interference due to band realignment.<sup>28</sup> The Petitioners respectfully disagree. If there are isolated instances of post-realignment interference, the affected licensee will be able to avail itself of the Interference Protection Rights provision. If PEBB facilities are the source of interference, there are any number of actions the PEBB licensee might take to resolve the problem such as reducing power, modifying the antenna pattern, changing frequencies or changing sites. It also is possible that the optimal solution would entail some alteration of the incumbent's system at the expense of the PEBB licensee, but that would be determined on a case-by-case basis.

Parties also argued that the PEBB licensee should be responsible in perpetuity for increased operating costs attributable to band realignment.<sup>29</sup> In this instance, as in others, the Petitioners have mirrored the approach adopted by the FCC for 800 MHz rebanding projects. Section 90.699(d)(4) details the increased operating costs for which reimbursement can be claimed, but specifies that the obligation ends five years after relocation has been completed. This provision applies to public safety as well as private systems, including those operated by CII

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<sup>28</sup> See, e.g., Comments of Nextera Energy, Inc. and UTC.

<sup>29</sup> See, e.g., Comments of UTC and SRP.

entities. The FCC thought that balance was reasonable in the context of 800 MHz rebanding. It is not obvious why the Commission would deem it appropriate to strike a different balance and provide greater potential remuneration in this instance.

**C. Realignment Process**

**1. Notification and Negotiation Issues**

The Proposed Rules include a detailed process for identifying and issuing PEBB licensees in each MTA (§90.1405), for administering the realignment process (§90.1407), and for negotiating agreements between the PEBB licensee and incumbents with channels above 937.000 MHz (§90.1409). UTC and other parties raised concerns that some of these steps were too accelerated and might disadvantage incumbents that may not track FCC activities closely or that are not as familiar with the realignment process.

The Petitioners are confident that UTC, API, AAR and other representatives of B/ILT incumbents will keep their members fully informed with regard to the realignment process. Nonetheless, the objective is to establish a smooth, workable process with which all parties are comfortable. If more time is needed, EWA/PDV have no objection, for example, to extending the proposed 30-day deadlines to 60 or even 90 days. It also would agree to the two-year mandatory negotiation period used by the FCC in certain microwave bands rather than the proposed bifurcated process with one year for voluntary and one year for mandatory negotiations.<sup>30</sup> As long as the time periods are reasonable and consistent with those utilized in other band reconfigurations, the Petitioners would not object to different provisions.

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<sup>30</sup> Contrary to the preferences of some incumbents, it is not viable to leave a band restructuring to secondary market transactions with no obligation on incumbents to negotiate in good faith and no mechanism for involuntary realignment should no agreement be reached. *See* Comments of Ad Hoc Refiners Group. PDV has already entered into both frequency exchange and spectrum purchase agreements with a number of 900 MHz incumbents and will continue to pursue voluntary arrangements. In the end, however, if there is a public interest in creating a Private Enterprise broadband option, that option should not be thwarted by the unwillingness of any single incumbent to participate.

## 2. Realignment Management/Mediation

Several parties, including UTC and SRP, object to having the PEBB licensee in each MTA select a single “realignment manager” that would be responsible for conducting the replacement frequency analysis for all incumbents in that MTA. The Petitioners had proposed that approach because it seemed the most efficient way of preventing the mutually exclusive assignment of frequencies to more than a single incumbent in an area. Since all replacement assignments will be governed by the co-channel protection criteria in Section 90.621, just as all 900 MHz channel assignments are today, and as there are no rules governing narrowband adjacent channel assignments, it was assumed that this would be a relatively mechanical process.

Nonetheless, since these objections have been voiced, the Petitioners believe that a different approach could be equally viable. Several frequency coordinators are signatories to a Memorandum of Agreement (“MOA”) governing coordination of Sprint-vacated spectrum at 800 MHz. The MOA sets up a process that prevents the submission of mutually exclusive applications to the FCC by establishing a queuing process for frequency assignments and an information exchange among the participating coordinators. A similar arrangement could be used here so that incumbents could choose among all coordinators with the desire and the ability to adhere to the agreed upon coordination standards.

It is important to recall that the FCC has authorized the realignment of multiple bands without mandating that a third party oversee the process or mediate disputes.<sup>31</sup> In that regard, the recent 800 MHz rebanding process, including charging the 800 MHz Transition Administrator, LLC with responsibility for mediation, was a deviation from the Commission’s standard practice and designed to address very specific policy considerations. Typically responsibility for mediating disputes remains with the FCC. The Petitioners proposed that API, UTC, and EWA

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<sup>31</sup> See, e.g., Sections 101.69 and 101.85.

act as a rotating roster of mediators instead to relieve the Commission of that responsibility. However, API has expressly rejected that role<sup>32</sup> and Harris has questioned the arrangement.<sup>33</sup>

Given the relatively small number of 900 MHz incumbent systems that will require realignment by comparison with other bands, and the even smaller number of large, complex systems that are most likely to present realignment challenges, it may be best to follow the normal practice and assume that the Commission will mediate any realignment disputes. Alternatively, if the FCC wants that task handled by a neutral third party, the Petitioners would not object.

#### **D. PEBB Regulatory Obligations**

The Proposed Rules set out service obligations on the part of every PEBB licensee in §90.1415. These include an obligation to provide “priority access” to CII entities in accordance with subsection (b). That obligation attaches to the PEBB license irrespective of assignment or transfer pursuant to §90.1405. Priority access is defined in §90.1415(b)(2)(3), but some parties have suggested that a clearer definition is needed.<sup>34</sup> The Petitioners welcome suggestions as to language that better captures the operational significance of having this superior right to network access.

API has recommended that PEBB licenses be subject to a 10-year buildout requirement.<sup>35</sup> The Proposed Rules did not include a specific construction obligation for two reasons. First, all of the spectrum that will be included in a PEBB license already has satisfied a construction deadline: either the coverage requirement applicable to geographic MTA licenses or the construction requirement applicable to site-based B/ILT channels. Second, the Petition proposes that broadband facilities will be built in response to RFPs or other types of solicitations from PE/CII entities that want access to broadband custom solutions. This is unlike the typical CMRS

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<sup>32</sup> API Comments at 5.

<sup>33</sup> Harris Comments at 9.

<sup>34</sup> *See, e.g.*, Comments of UTC.

<sup>35</sup> API Comments at 4.

network deployed to meet consumer broadband demand. Nonetheless, the Petitioners agree, even in this instance, that ensuring the productive and efficient use of spectrum dictates that PEBB licensees have a build-out requirement. API's suggestion of a substantial service showing on an MTA-by-MTA basis at the end of 10 years is reasonable.

#### **E. 240-Channel PEBB Allocation**

PDV's 900 MHz spectrum holdings are available in the FCC's Universal Licensing System database and also were provided as Schedules I and II to the Petitioner's January 27, 2015 Reply Comments at the earlier stage of this proceeding. The Parties explained in that filing that PDV holds an average of 240 channels in the top 20 markets in the country and greater and lesser amounts outside those markets, areas where 900 MHz B/ILT channels typically remain plentiful. In fact, there are markets where it would be impossible for the PEBB to hold more than the 200 SMR channels as none of the B/ILT channels are licensed and, therefore, none are even potentially available for purchase from an incumbent by a commercial licensee.

Assuming the Commission determines that the public interest supports creation of the PEBB allocation, it also will need to consider how to ensure that PDV and other PEBB licensees are not "unjustly enriched" in markets where they do not already hold 240 900 MHz channels. The FCC has addressed this issue in several ways in other band repurposings. One consideration in this instance presumably will be the fact that the PEBB licensee must assume all costs associated with realignment in an MTA. The Petitioners expect this element of the Petition to generate significant discussion in the Notice of Proposed Rulemaking.

### **III. CONCLUSION**

The Petition and the responsive comments present an unusual situation for the FCC. On the one hand, it will require the normal balancing act of encouraging spectrum efficiency while promoting increased investment and innovation versus the obligation to protect the legitimate

interests of incumbents. It is unusual in that the primary intended beneficiaries of the new technology in some cases are the incumbents.

The Petitioners appreciate that those incumbents also must balance interests. They first must be assured that the proposed realignment will not cause harmful interference post-realignment and that there are appropriate protections in place should they experience a problem. They then must weigh the prospective benefits, not only to their own companies but to the PE/CII community as a whole, in having access to broadband capabilities designed to their rigorous specifications. What this means is that the Petitioners and any PEBB licensees which this proceeding may authorize will depend for the success of this endeavor on satisfying incumbents that the proposed build-to-suit model is a viable option for addressing their current and future broadband needs. Thus, in a way not always present in rebanding proceedings, the ultimate success of the proposal depends equally on the satisfaction of both sides.

# Technical Response to Sensus Comments

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# Section I

Rebuttal of  
Real Wireless Report:  
Co-existence Between  
Proposed PEBB LTE systems  
and  
Existing Sensus FlexNet™ systems  
in the  
900MHz Band

# Summary of PDV Rebuttal Comments

- PDV has reviewed the Sensus/Real Wireless (S/RW) comments regarding PDV's co-existence modeling and analysis
- S/RW agree with PDV's model construct and analysis methodology but disagree with the parameter values assumed by PDV
- PDV submits that for reliable communication systems that require robust links, operating at an effective noise floor equal to thermal noise floor (-170 dBm/Hz) is unrealistic
- PDV believes that Sensus, in its designs, routinely deploys systems higher than the stated -170dBm/Hz effective noise floor and leverages other techniques (space, time, and cell-overlap diversity) to operate at or about a -160 dBm/Hz effective noise floor to accommodate interference above thermal noise<sup>1</sup>
- In these rebuttal comments, PDV justifies the parameters used in its methodology and shows that its model reflects no interference to Sensus systems deploying links with fade margins to meet their QoS/SLAs
- Finally, PDV notes that the test conditions (e.g., measurement resolution bandwidth) for specifying emission limits have not been selected by PDV, as asserted by S/RW, but rather exist in the rules and guidelines that the FCC OET has stipulated to measure emissions<sup>2</sup>

1: PDV calculated the Sensus Effective Noise Floor using methods outlined in the Sensus White Paper 300: Developing a Framework of System Performance Prior to Purchasing and Deploying Assets

2: FCC OET - Laboratory Division MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS / 10.17.14

# Introduction and Scope

- S/RW identified 10 parameters in the uplink (UL) and 6 parameters in the downlink (DL) that they stated have been miscalculated in the PDV model and analysis.
- Three of the issue cases were the same for both UL/DL.

## Uplink

1. UE Antenna Gain and Body Loss
2. LTE UE power backoff
3. Effect of UE power control on OOBE
4. NB-BTS Cable Loss
5. No. of simultaneously transmitting PDV devices
6. Environmental noise margin Duplicate in DL
7. Base Station antenna radiation pattern and gain
8. Base Station antenna height
9. Propagation model Duplicate in DL
10. Maximum attenuation due to antenna pattern Duplicate in DL

# Introduction and Scope

- Downlink
  1. eNodeB antenna gain and losses
  2. Environmental noise margin Duplicate in UL
  3. FlexNet Endpoint antenna gain and cable loss
  4. Base Station antenna height
  5. Propagation model Duplicate in UL
  6. Maximum attenuation due to antenna pattern Duplicate in UL
- In the following we:
  - provide an explanation of and justification for the contested values
  - demonstrate the validity of the parameters
- Note: eNode B implies LTE BTS and NB-BTS implies Narrowband BTS

# UL 1 UE Antenna Gain and Body Loss

- S/RW Claim - PDV has over-estimated the value for body loss:
  - PDV used the FCC accepted UE antenna gain and head/body loss for a composite gain of -10 dBi <sup>1</sup>
  - Head/body loss is an accepted line item in commercial link budgets as well as in interference and co-existence analysis
  - ETSI/3GPP have regularly used head/body loss in their analysis<sup>2</sup>
  - Note that no other losses are assumed such as vehicle and in-building penetration, hence PDV has been conservative in loss estimation

• <sup>1</sup>FCC 12-151 Para 142

<sup>2</sup>3GPP TR 36.844 V13.2.0 (2015-03); ETSI TR 143 030 V9.0.0 (2010-02); 3GPP TR 36.824 V11.0.0 (2012-06);  
3GPP TS 45.050 v. 8.1.0

# UL 2 LTE UE Power Backoff

- S/RW Claim - LTE UE Power Backoff is an “irrelevant statistic”:
  - UE power backoff from the maximum will result in lower power transmissions and will directly reduce interference potential in the uplink
  - PDV uses a finding by the CSMAC simulations that 98.3% of UEs in an LTE cell by design backed-off 9 dB or more. This is designed to conserve battery power and promote timely handoff. Advanced techniques such as CoMP and eICIC are likely to maintain or even further reduce UE transmit powers
  - PDV models assume a full buffer and hence a constantly transmitting UE with no duty cycle

# UL 3 Effect of UE Power Control on OOB

- S/RW Claim - No reference is cited for relationship between reduction in fundamental power and OOB:
  - 1 dB reduction in OOB for 1 dB reduction in fundamental power has been consistently recognized by standards bodies and industry experts <sup>1,2</sup>
  - Regarding OOB caused by spurious emissions or linearized PAs, it is expected that reduction in OOB would be more than 1 dB for 1 dB reduction in fundamental power, as these are dominated by transmit intermodulation (IM) components with non-linear power relationship to the fundamental power

<sup>1</sup> CEPT ECC Report: Lab measurement results of 800 MHz band LTE UE unwanted emissions, Doc. SE21(13)29

<sup>2</sup> Nokia Corporation, "LTE band 28 UE emissions to DTT frequencies"

# UL 4 NB-BTS Cable Loss

- S/RW Claim - Cable loss is a “UE feeder loss”:
  - BTS cable loss is the loss attributed to the RF cable connecting the antenna to the transceiver in the BTS and therefore is a valid loss contribution
  - Cable loss applies to both the receive and the transmit path in the BTS, and hence figures in both models: PEBB-UE to NB-BTS and PEBB-BTS to NB-UE
  - PDV has assumed 4 dB value for this parameter for both Sensus and PEBB (LTE) BTS
  - These are standard values, taller sites will only increase this cable loss

# UL 5 No. of Simultaneously Transmitting UEs

- S/RW Claim - PDV did not include the effect of multiple UEs active and simultaneously transmitting in eNodeB sector:
  - A sector can handle many active UEs
  - For a 3 MHz channel, number of UEs transmitting per sub-frame is 1, as calculated below
  - Only the UEs allocated within one TTI (sub-frame) are considered to be transmitting simultaneously
  - The typical number of Resource Block allocations within a TTI, and hence number of UEs per TTI, depends on cell load
  - 3GPP TR 36.942 (Section 12.1.2) defines a framework to calculate typical number of UEs per TTI per sector and corroborates PDV's calculation of single UE transmitting per TTI in a 3MHz channel

# UL 6 and DL 2 Environmental Noise Margin

S/RW Claim - Low confidence in the PDV-attributed level of environmental noise:

- S/RW has misinterpreted the dearth of measurement studies *in the specific band* to imply a low confidence in the stated environmental noise measure
- There is no evidence that Sensus' empirical noise floor measurements were obtained using standardized methodology and instruments and acceptable collection procedures for environmental noise characterization as defined by such standard bodies as IEEE, URSI, CEPT, and WMO etc.
- There is ample best-practices evidence in the industry of accounting for environmental noise **by incorporating fade margins**, typically 10-12 dB, in the design of reliable wireless communication links
- Sensus utilizes a number of enhancements in their link budget to overcome fading and noise above the thermal noise, but has not shared their actual link budget calculations to allow PDV to assess the interference mitigated in the Sensus RF design
- Based on PDV's information and belief, Sensus designs its systems to overcome the interference noise margin

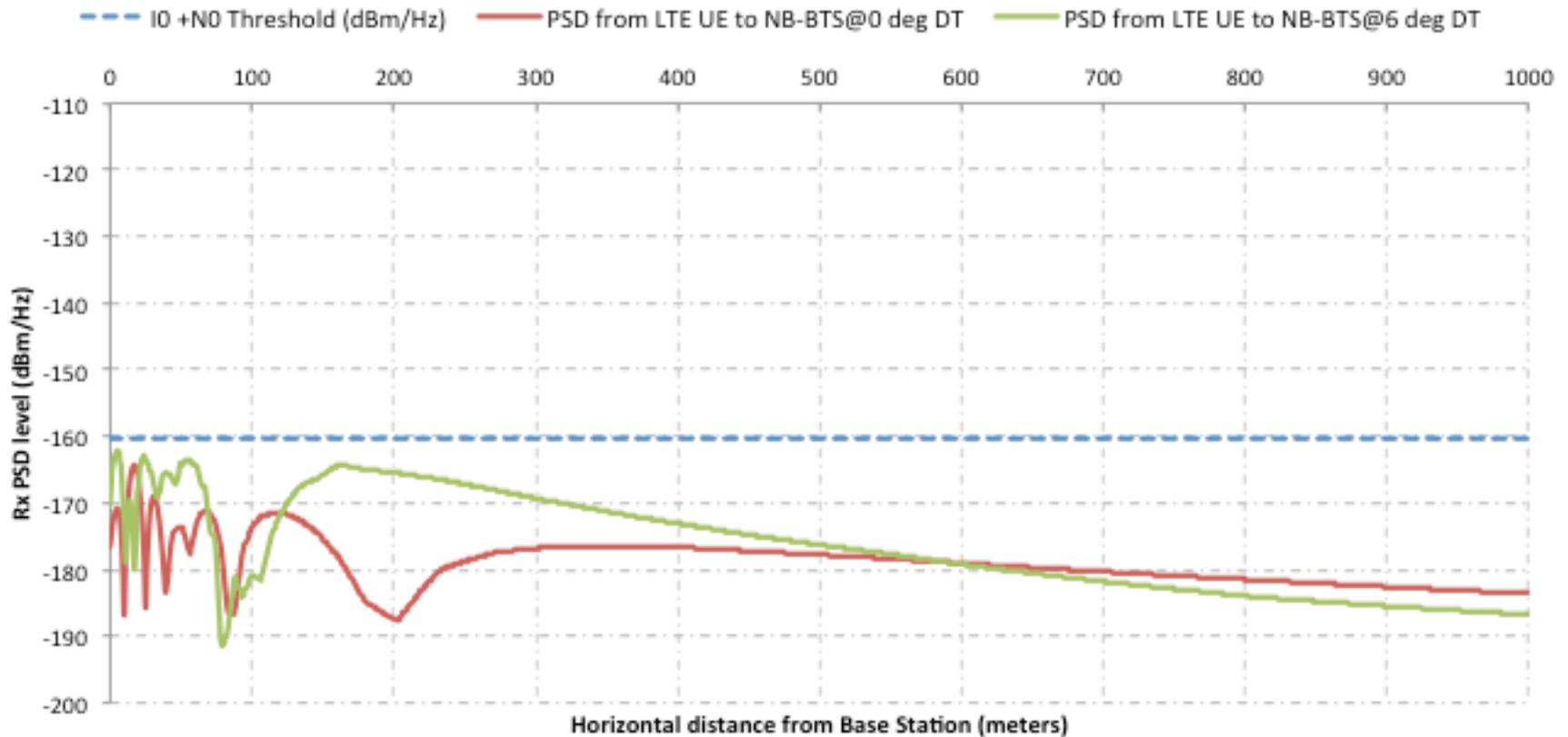
# UL 7 Base Station Antenna Pattern and Gain

- S/RW Claim - Model used the wrong antenna pattern for NB-BTS:
  - PDV used an antenna from a list of commonly used antennas provided by Sensus with a downtilt of 0 degree: BCD-87010-EDIN-1-25
  - It should be noted that only the vertical antenna pattern is relevant to this exercise, which has been obtained from the manufacturer's website
  - It should be further noted that if only the vertical pattern is changed keeping the maximum gain the same, the peak interference points will remain unchanged; only the low points will be slightly elevated due to an incorrect pattern
  - Finally, using the antenna preferred by S/RW<sup>1</sup> the peak interference levels remains approximately the same, only this peak effect is observed at larger distances from the base station

<sup>1</sup> BCD-87010-6-25 (6 degrees downtilt) which is the same manufacturer/model antenna that we have used except for the downtilt

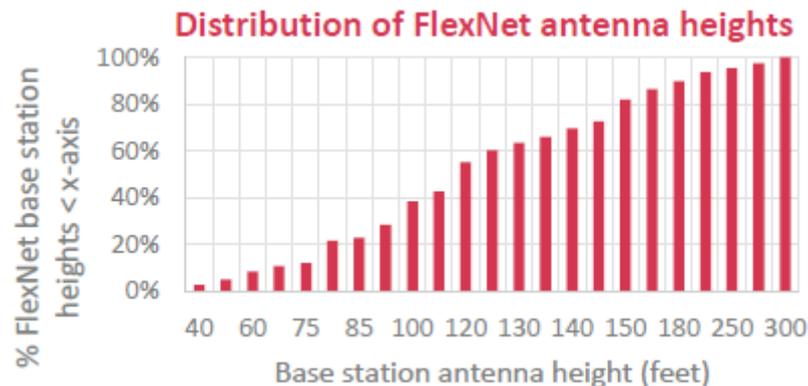
# UL 7 - Downtilt Comparison

## LTE UE OOB E at NB-BTS - 0 and 6 deg Downtilt



# UL 8 Base Station Antenna Height

- S/RW Claim - Model overestimated Sensus system antenna heights:
  - S/RW analysis included the bar chart (below) but used an almost worst case of 60' for its analysis
  - Consistent with FCC practice, PDV has selected a closer to average 148' for purposes of its analysis; neither the best case nor the worst case used by Sensus



# UL 9 and DL 5 Propagation Model

- S/RW Claim – WI-LOS model is not a valid path loss model for this analysis:
  - S/RW did not clearly propose an alternative “acceptable” model
  - The WI-LOS model is the appropriate model, as opposed to either a WI-NLOS or a Free-Space model
  - WI-NLOS is conservative in estimating interference
  - Free-Space over-estimates interference by ignoring ground/building clutter
  - WI-LOS reverts to a free space model from 0 to 20m from the base station
  - If the alternative suggestion is to use the Free Space model even beyond 20m, PDV does not agree as ground-clutter plays a role in propagation except in extreme wide-open rural spaces
  - Consistent with FCC practice, PDV has used probabilistic objectives rather than extreme conditions

## Attenuation Due to Antenna Pattern

- S/RW Claim - In real-world deployments, antenna patterns see a reduction of nulls:
  - If only the vertical pattern is changed and the maximum gain remains the same, the peak interference points will remain unchanged; only the low points will be slightly elevated due to the effect described by S/RW
  - The impact of this attribute on interference modeling is inconsequential

# DL 1 eNodeB Antenna Pattern

- S/RW Claim - Model underestimated vertical beam width for eNode Bs antennas:
  - PDV has assumed an antenna pattern with relevant parameters, including gain, vertical beam width, downtilt, and other attributes that are applicable to LTE deployment in 900 MHz band
  - The antenna proposed by RW for use in modeling for LTE is a 1.1 dBd gain omni antenna and though applicable for narrowband system is not applicable to cellular LTE base station deployments
  - A partial list of applicable LTE antennas from the same manufacturer, Amphenol, with more relevant vertical beam widths of 7-10 degrees and variable tilts as assumed: Model No.: 5880200, 6880200, 5888100, 6876300, 6878300, 6888300.....
  - Finally, it is not clear how assuming a different vertical beam width would result in 18 dB worse interference if RW agrees with the maximum gain of the antenna

# DL 3. FlexNet Endpoint Antenna Gain/Cable Loss

- S/RW Claim – Model underestimate Sensus' endpoint antenna gain:
  - Sensus has not shared with PDV their system link budget parameters that would include the specifications of endpoint antenna gains and connector losses
  - PDV has assumed a -1 dBd or +1.15 dBi antenna gain and a 1.9 dB cable/connector loss based on specifications of endpoints in the band for similar applications, resulting in a total endpoint loss of -0.75 dB
  - PDV believes these assumptions are reasonable given the size and function of Sensus' endpoint

# DL 4 PDV eNodeB Antenna Height

- S/RW Claim – Model used higher than average eNode B antenna heights:
  - PDV's intent is to model a median environment rather than an absolute worst/best case scenario which may be statistically insignificant, following FCC's guidelines on interference thresholds
  - Under these guidelines, an LTE eNodeB height assumption of 30m is reasonable, given the typical LTE deployments currently being rolled out and what it assumes will be the average antenna height of its deployed eNodeB base station sites

# Real Wireless UL Issues - PDV Rebuttal

Parameter	Sensus RW Issue	PDV Comment
1. UE antenna gain and body loss	Body loss does not always protect from interference	Body loss very often reduces interference
2. LTE UE power backoff	LTE UE power backoff is an irrelevant statistic	98% of the time, LTE UE transmits less than 14 dB
3. Effect of UE power control on OOB	OOB is not reduced dB-for-dB with fundamental power	Relevant simulations show at least dB-for-dB reduction
4. NB-BTS cable loss	UE cable loss seems to be mistakenly included	This is BTS cable loss and is relevant to interference
5. No. of simultaneously transmitting PDV devices	Assumed only 1 UE active	Assumed only 1 UE transmitting per sub-frame
6. Environmental noise margin	No measurements to support environmental noise	Sufficient evidence from best practices for design of reliable links
7. Base Station antenna radiation pattern and gain	Used an unrealistic antenna pattern	Used an antenna type provided by Sensus
8. Base Station antenna height	Overestimated antenna height	Used median antenna height rather than low end
9. Propagation model	WI-LOS not applicable	WI_LOS with Free-Space in first 20 m, is applicable
10. Maximum attenuation due to antenna pattern	No consideration for null impacts	Null-filling does not affect the worst case interference scenario

# Real Wireless DL Issues - PDV Rebuttal

Parameter	Sensus RW Issue	PDV Comment
1. eNodeB antenna pattern and gain	Vertical beam width has been underestimated	Vertical beam width of 7-10 degrees is standard for LTE deployments
2. Environmental noise margin	No measurements to support environmental noise	Sufficient evidence from best practices for design of reliable links
3. Flexnet endpoint antenna gain and cable loss	Antenna gain underestimated and cable loss overestimated	Composite antenna gain+cable loss of -0.75 dB is reasonable
4. Base Station antenna height	Underestimated LTE BTS antenna height	Antenna height of 30m is certainly median and likely represents a substantial percentage of facilities
5. Propagation model	WI-LOS not applicable	WI_LOS with Free-Space in first 20 m, is applicable
6. Maximum attenuation due to antenna pattern	No consideration for null impacts	Null-filling does not affect the worst case interference scenario

# Specified Emission Limits: ERP or EiRP?

- S/RW questioned whether emission power should be specified as ERP or EiRP
  - Neither. Emission limits or masks have always been defined at the transmitter PA power
  - In PDV's model, the certification process is emulated, i.e. antenna gain and cable losses are applied to the OOBE at the transmitter PA (-55 dBW/30 kHz = -70 dBm/Hz)
  - Using an antenna of 16 dBi gain and 4 dB cable loss, this results in a OOB EiRP of -58 dBm/Hz

# ANNEX I Reply Comments

## LTE user equipment out of band emission measurements

- S/RW Claim – LTE OET UE device certification analysis by RW concluded that the LTE device produced levels of OOBE that would be harmful to the Sensus Flexnet system performance
  - RW analyzed the wrong band class of device
  - Instead of BC26 which uses a  $55+10\log(P)$  mask, RW analyzed CMRS / Part 27 compliant devices which use a  $48+10\log(P)$  mask and is therefore less stringent

# Section II

## S/RW Exhibits

# S/RW Exhibit 2: FlexNet Base Station Noise Floor

- PDV questions the measurements submitted in S/RW Exhibit 2
  - It is unclear if Sensus is referring to “N” ( $kt+NF$  or thermal noise), the effective noise floor (Noise +Interference) or the FlexNet receiver instrument calibrated noise floor.
  - The graph Exhibit 2 - Page 3 is confusing and misleading as two -170dBm references are shown: PDV is unclear as to what the slide was meant to portray
  - PDV reiterates its position that there is ample evidence that there is a significant noise rise above thermal due to environmental interference
  - Noise floor research of such standard bodies as IEEE, URSI, CEPT, WMO etc. using standardized methodology and instruments and acceptable collection procedures for environmental noise characterization have corroborated this position

# Exhibit 3 & 4 : Interference Illustrations

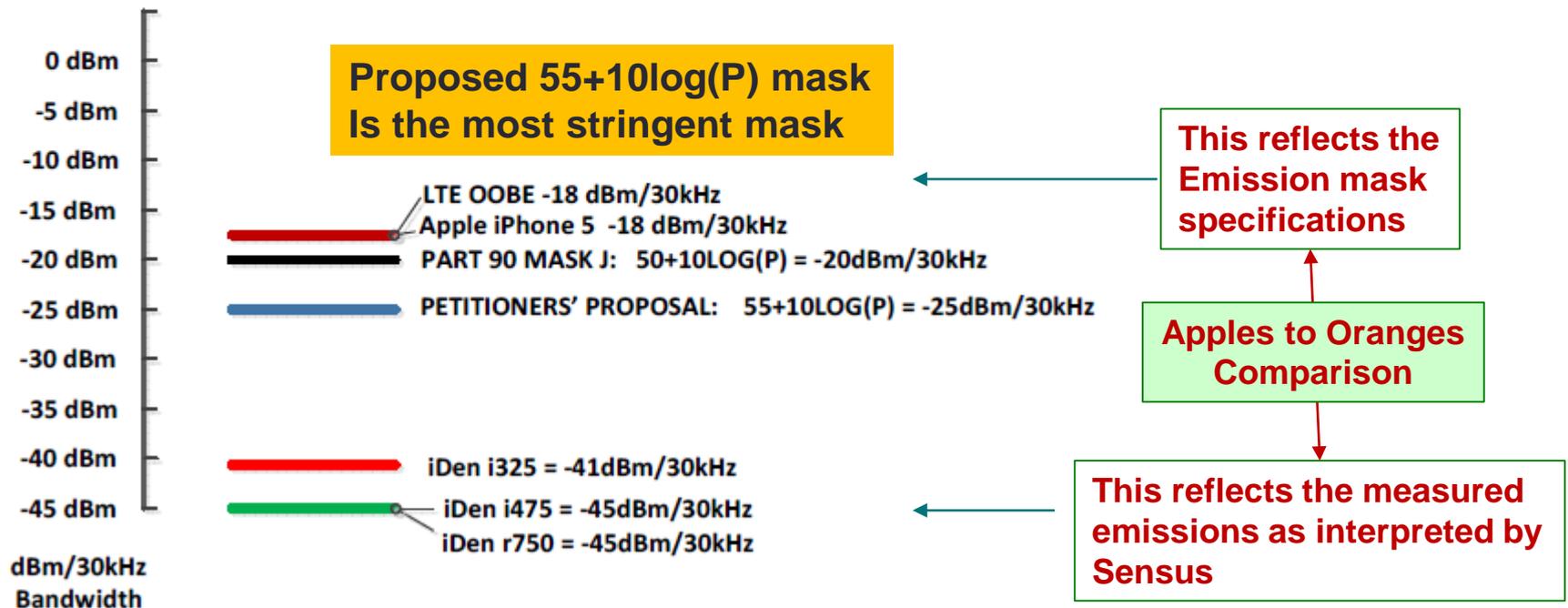
- PDV believes that Exhibits 3 and 4 provide reinforcing examples of the merits of interference resolution procedures
- However, without reference values of the X and Y axis on both charts, it is difficult to relate this occurrence to the results of the PDV interference analysis
- These exhibits highlight the issue of identification of the interfering parties into the Flexnet System as Sensus is operating between 900MHz SMR/B/ILT and Part 15 operators

# Exhibit 5 : Incumbent SMR

- In Exhibit 5, S/RW contends that Nextel required their device suppliers to produce UEs that exceeded the mandated emission mask specifications
- While Sensus offers no support for this supposition, the noise floor that existed when iDEN was a primary user in the band is not relevant; what is relevant is the emission mask adopted by the FCC
- PDV's proposed emission mask is designed to provide Sensus with the interference protection to which it is entitled under the rules applicable to the 900 MHz band in its current narrowband configuration

# Exhibit 6 : OOB E Illustration

## EXHIBIT 6 OOBE COMPARISON REFERENCED TO 30 kHz BANDWIDTH



PDV is unclear as to the intent of this exhibit

## Your submission has been accepted

<b>ECFS Filing Receipt -</b>	
<b>Confirmation number:</b> <b>2015714316903</b>	
Proceeding	
<b>Name</b>	<b>Subject</b>
RM- 11738	Comment Sought on EWA/PDV Rulemaking Petition to Realign 900 MHz Band
<b>Contact Info</b>	
<b>Name of Filer:</b> Enterprise Wireless Alliance and Pacific DataVision, Inc.	
<b>Email Address:</b> mark.crosby@enterprisewireless.org	
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EWA PDV Reply Comments RM- 11738.pdf	361 KB
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