

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

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| In the matter of                             | ) |           |
|  | ) |           |
| Service Rules for Advanced Wireless Services | ) | WT 07-195 |
| in the in the 2155-21755 MHz Band            | ) |           |
|  | ) |           |

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**COMMENTS OF FREE PRESS, MEDIA ACCESS PROJECT, NEW AMERICA  
FOUNDATION, AND PUBLIC KNOWLEDGE**

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## **Summary**

The Commission can best serve the public interest and promote broadband delivery through assigning the AWS-3 band through a scoring auction. This auction should be based on three public interest criteria: adoption of openness principles, technical and economic feasibility, and rapid broadband build-out and acceptable data rates.

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**COMMENTS OF FREE PRESS, MEDIA ACCESS PROJECT, NEW AMERICA  
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Free Press, Media Access Project, New America Foundation, and Public Knowledge (“Commenters”) submit these comments in response to the Notice in the above docketed proceeding. Commenters applaud the Federal Communications Commission for launching this proceeding with the aim to make “further progress toward providing all Americans with universal, affordable access to broadband technology”<sup>1</sup> at a time when the nation continues to fall farther behind our global competitors in terms of broadband choice, deployment, and adoption.<sup>2</sup>

Commenters have been actively engaged in spectrum proceedings before the Commission. To foster greater access to advanced services, we have consistently urged the Commission to adopt policies that would promote competition—among broadband network providers, content providers, applications providers, and device manufacturers. Competition will promote broadband access, which promotes consumer choice and technological and economic innovation, as well as civic participation and engagement made possible through internet technologies.

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<sup>1</sup> Notice of Proposed Rulemaking, Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, WT 07-195, 22 FCC Rcd. 17,035, ¶4 rel. Sept. 19, 2007 (“AWS-3 Notice”).

Commenters here reiterate openness principles that should guide Commission policy. We then provide an analysis of the technical possibilities and constraints in this band. In light of the principles and the technical constraints, we propose that the Commission assign licenses in the band based on three factors; first, an applicant's willingness to adhere to the proposed openness principles; second, the Commission's consideration of the technical feasibility and economic practicality of the applicant's plan; and third, the applicant's foreseeable contribution to increasing broadband access. Although we retain our preference for and commitment to unlicensed allocations, the technical characteristics of this band lead us to conclude that a licensed approach, subject to openness conditions, would likely better serve the public interest.

#### **I. The Commission Should Act To Promote Increased Broadband Access and Broadband Competition**

The Commission should act in this proceeding promote its broadband policy goals of increasing access and openness.<sup>3</sup> The United States is falling behind in broadband penetration, adoption, speeds, and value. Broadband service is unavailable to roughly 10% households.<sup>4</sup> Over 50% of households do not subscribe to broadband. An OECD study places the US 15th among 30 OECD member nations in broadband adoption; a broader ITU study places the US at 16th.<sup>5</sup> The trends lines are all negative; we are falling

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<sup>2</sup> See, e.g., S. Derek Turner, *Broadband Reality Check II*, Free Press, Consumers Union, and Consumer Federation of America, August 2006, available at <http://www.freepress.net/docs/bbrc2-final.pdf>.

<sup>3</sup> Cf. Federal Communications Commission, Policy Statement, Aug. 5, 2005, p. 3, [http://fjallfoss.fcc.gov/edocs\\_public/attachmatch/FCC-05-151A1.pdf](http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf) (adopting policies to promote the interconnected nature of the internet and promote broadband deployment).

<sup>4</sup> *Broadband Deployment is Extensive throughout the United States, but it is Difficult to Assess the Extent of Deployment Gaps in Rural Areas*, Government Accountability Office, Report to Congressional Committees, GAO-06- 426, May 2006.

<sup>5</sup> Organization for Economic Cooperation and Development (OECD), *OECD Broadband Statistics to December 2006*, <http://www.oecd.org/sti/ict/broadband>; [http://www.itu.int/ITU-D/ict/statistics/at\\_glance/top20\\_broad\\_2005.html](http://www.itu.int/ITU-D/ict/statistics/at_glance/top20_broad_2005.html).

behind faster, as our growth rate from 2005 to 2006 is 20<sup>th</sup> in world.<sup>6</sup> Our speeds are far behind those available in countries like Japan and France, where connections of 30 to 100 Mbps in both directions are affordable.<sup>7</sup> In the US, these speeds are generally unavailable. Most US connections are less than 2.5 Mbps.<sup>8</sup> High-prices are often cited as a reason why US households do not subscribe.<sup>9</sup> Other countries provide far greater value for the price, providing far faster connections for more affordable prices.

These figures point to deeper issues. Because high-speed internet supports economic development, consumer choice, opportunities for small businesses, healthcare, education, and workplace productivity, the nation's "broadband problem" results in foregone benefits to citizens and harms our global competitive in the industries of the 21st Century.<sup>10</sup> Studies indicate that universal broadband would result in \$500 billion/year and 1.2 million new jobs added to the economic.<sup>11</sup>

The FCC has acted and, by Congress's command, must continue to act to address this broadband problem. The 1996 Telecommunications Act requires the FCC to

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<sup>6</sup> Organization for Economic Cooperation and Development, "OECD Broadband Statistics to December 2006", <http://www.oecd.org/sti/ict/broadband>.

<sup>7</sup> "Neuf Offers 50 Mbps in Paris for 30 EUR per month," MuniWireless, 7 March 2007, <http://www.muniwireless.com/article/articleview/5771/1/2/>; Grant Gross, "U.S. customers pay considerably more than the Japanese for bandwidth," IDG, 4 April 2007, [http://www.infoworld.com/archives/emailPrint.jsp?R=printThis&A=/article/07/04/04/HNjapbroadband\\_1.html](http://www.infoworld.com/archives/emailPrint.jsp?R=printThis&A=/article/07/04/04/HNjapbroadband_1.html).

<sup>8</sup> "High-Speed Services for Internet Access as of June 30, 2006," Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission.

<sup>9</sup> Extrapolated from "High-Speed Services for Internet Access as of June 30, 2006," Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission.; calculated assuming one line per household, based on July 1 2006 Census household estimates; S. Derek Turner, *Broadband Reality Check II*, Free Press, Consumers Union, and Consumer Federation of America, August 2006, available at <http://www.freepress.net/docs/bbrc2-final.pdf>.

<sup>10</sup> The Telecommunications Industry Association, "The Economic and Social Benefits of Broadband Deployment," October 2003.

<sup>11</sup> Robert W. Crandall and Charles L. Jackson, "The \$500 Billion Opportunity: The Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access," Criterion Economics, July 2001; Robert W. Crandall, Charles L. Jackson, and Hal J. Singer, "The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy," Criterion Economics, September 2000.

“encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans.”<sup>12</sup> And Congress has dictated that the FCC must promote services placing choice in the hands of consumers, not network gatekeepers. The Act specifies explicitly that the policy of the United States is “to encourage the development of technologies which maximize user control over what information is received by individuals, families, and schools who use the Internet and other interactive computer services.”<sup>13</sup> Commenters have consistently argued that increased competition is central to spurring greater broadband access. As a result, we have advocated for openness principles that we advocate for in this proceeding, as detailed below.

## **II. Our Technical Analysis Finds That the Band Can Support Various Models**

The AWS-3 band has certain technical capabilities outlined in the attached technical assessment by the Columbia Telecommunications Corp. (“CTC”). CTC found that AWS-3 spectrum can effectively perform, with certain limitations, in both an unlicensed scenario and in a licensed scenario embracing open service and open network rules (or what the assessment calls a “base-station/coordinated” scenario).

The AWS-3 band, as the Commission knows, has several technical limitations. First, the available bandwidth is limited, as the band consists of only 20 MHz. Second, uses at the edges of the AWS-3 band are limited by the band’s proximity to AWS-1 and AWS-2 bands. Third, the propagation characteristics of the AWS-3 band limit its ability to penetrate buildings and other obstructions, compared to bands in lower frequencies.

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<sup>12</sup> 47 U.S.C. § 157

<sup>13</sup> 47 U.S.C. § 230(b)(3).

The AWS-3 band could be used for unlicensed uses, but is likely most suited for short-range networking of technologies such as Bluetooth and RFID, rather than WiFi-like technologies. On its own, the band could likely not support the same speeds and uses supported by the unlicensed spectrum in the 2.4 GHz band used for WiFi and other technologies. The AWS-3 band has only 25% the bandwidth of the 2.4 GHz unlicensed band. Further, the edges of the AWS-3 bandwidth are further limited by proximity to the AWS-1 and AWS-2 and the AWS-3 band could not support WiFi technologies without WiFi making some accommodations, such as using narrower channels, not using multiple channels, and attenuating power at the band's edges. As a result, short-range networking technologies are probably most suited for an unlicensed AWS-3 band. This could relieve some of the congestion in the 2.4 GHz band, as short-range networking devices could migrate to the AWS-3 band. Nonetheless, unlicensed uses enable innovation and creativity that cannot easily be predicted, so an unlicensed assignment could lead to unforeseen technologies and advances.

Second, coordinated uses are technically feasible. With coordinated operation, a licensee could use a base-station arrangement to serve users over several kilometers and deliver speeds up to a few hundred Kbps, which are comparable to the speeds available with existing 3G technologies such as 1xEV-DO or HSDPA. The band's utility would be comparable to networks in existing PCS spectrum or of any single AWS-1 licensee. Coordinated uses could also include offering shared roaming space to multiple carriers. Finally, a licensee could operate an open platform, providing capacity and network operations to competing operators and offered devices.

This band necessitates higher capital costs than 3G services operating over greater bandwidth, as more sophisticated technology would be necessary for similar performance. As a result, with only the AWS-3 band, a licensee would need considerable investment to compete with 3G incumbents, though perhaps with less of a cost disadvantage in rural areas. A company with access to other bands to supplement the AWS-3 band could be at less of a technical disadvantage.

### **III. The FCC Should Adopt a Scoring Auction Based on Public Interest Factors**

The Commission should adopt a scoring auction weighing three public interest factors. The Commission asks whether it should adopt a scoring auction and how a scoring auction should be implemented.<sup>14</sup> A scoring auction would rate auction bids not just on price but also based on a host of “performance dimensions” such as likely coverage commitments.<sup>15</sup> The Commission should score the auction based on three factors that we discuss in the next section: proposed openness principles; technical feasibility and economic practicality; and contribution to broadband delivery. The Commission should weigh, we argue, these factors in scoring the auction, without a dollar-amount component. The Commission must maximize the public interest, not auction revenues,<sup>16</sup> and weighing these three factors would better serve the public interest than merely a price auction. An auction solely on price can impose huge debt burdens on new entrants, disfavor business models requiring steady growth rather than immediate cash flow, and thereby foreclose innovative uses.<sup>17</sup> It could also permit wireline incumbents to bid ways to block entry or buy spectrum to warehouse it, such as

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<sup>14</sup> AWS-3 Notice at ¶126.

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

<sup>16</sup> 47 USC §§309(j)(7)(A)-(B).

SpectrumCo's apparent strategy. Since the FCC must generally ensure the "recovery for the public of a portion of the value of the public spectrum resource made available for commercial use and avoidance of unjust enrichment,"<sup>18</sup> the Commission should require a spectrum fee of 5% of gross revenues.

If the Commission chooses not to adopt a scoring auction, it should avoid auctioning altogether and not accept mutually exclusive applications. Congress has not relieved the FCC "of the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and licensing proceedings."<sup>19</sup> Here, the Commission could adopt strict threshold qualifications and service regulations, such as the three public interest requirements proposed herein, to limit potential bidders. The bidders may likely be limited, through such qualifications and regulations, to only one viable candidate. (The FCC should insist on a 5% spectrum fee in this case as well.) If there is more than one viable candidate under these qualifications and regulations, the Commission can then auction, perhaps with a scoring auction including price, a spectrum fee, and other factors.

As the Commission suggests, if it assigns licenses in the band by a scoring auction based on performance commitments, it must "enforce performance commitments, ensure sincere bidding," and safeguard the auction's integrity.<sup>20</sup> The Commission should adopt considerable substantial service requirements with mid-license performance

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<sup>17</sup> See AWS-3 Notice, at n. 181 (citing PISC Aug. 28, 2007 *M2Z Ex Parte*, at 7); see also n. 180 (listing applicants offering 5% in fees).

<sup>18</sup> See 47 U.S.C. § 309j(3)(C).

<sup>19</sup> See 47 U.S.C. § 309j(6)(E).

<sup>20</sup> AWS-3 Notice, at ¶126.

requirements, and a keep-what-you-use condition.<sup>21</sup> It should also eliminate renewal expectancy and permit competing applications if the applicant misses any of its commitments by renewal.

To best serve the public interest, the Commission should assign AWS-3 licenses to an entity that will best use the band to promote access to advanced telecommunications. The Commission should score three criteria: first, an applicant's willingness to adhere to the proposed openness principles; second, the Commission's consideration of the technical feasibility and economic practicality of the applicant's plan; and third, the applicant's foreseeable contribution to increasing broadband access.

**A. The Commission Should Insist on Openness Principles to Ensure Increased Broadband Access**

The Commission should insist, first, on four openness principles that ensure competitive markets in broadband provision. Broadband delivery entails services that do not have gatekeepers controlling the applications, services, content, and devices. To increase access to open broadband networks, the Commission should adopt openness rules that promote competition in the provision of broadband network access, applications, and devices. Filing in both the *700 Mhz Proceeding*<sup>22</sup> and the *M2Z Networks Proceeding*,<sup>23</sup> Commenters have consistently argued for ways to ensure a “third pipe” to the home through wireless offerings. A third pipe should serve as an independent competitor to wireline incumbents, who generally own the incumbent companies providing wireless service (such as Verizon controlling Verizon Wireless,

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<sup>21</sup> AWS-3 Notice, at ¶111.

<sup>22</sup> See, e.g., *Ex Parte* Comments of Public Interest Spectrum Coalition, filed April 5, 2007; Comments of Public Interest Spectrum Coalition, filed May 23, 2007; *Ex Parte* Reply Comments of Public Interest Spectrum Coalition, filed July 6, 2007, In the Matter of Service Rules for the 698-746, 747-762, and 777-792 MHz Bands, WT Dkt Nos. 06-150 et al.

Comcast controlling SpectrumCo, and AT&T controlling AT&T Wireless). These incumbents have not used their spectral assets to provide internet service that competes with the two main pipes (DSL and cable), but rather have provided merely complimentary wireless services.<sup>24</sup> Through strategic behavior, warehousing, and blocking competitors at auctions, incumbents have foreclosed competition from wireless network provision.<sup>25</sup> Likely because of uncompetitive markets, the incumbents who control wireline and wireless broadband have also been able to stifle competition among providers of broadband internet service, applications (such as VOIP and others), and content.<sup>26</sup>

Whether or not the spectrum available in this band could support a third pipe without being incorporated with other spectral assets, the Commission should adopt rules that maximize the likelihood of the band supporting network competition, as well as competition in among providers of service, applications, and content. One option for effecting such openness and competition would be unlicensed uses. Generally, Commenters' first-preference is for unlicensed uses. In this case, however, based on the technical attributes of this band, unlicensed uses may not be the most effective use. Though the nature of unlicensed uses are extremely difficult to predict, CTC's technical assessment suggests that unlicensed uses likely will not support WiFi-like or other broadband-like technologies. So unlicensed uses in this band currently seem unlikely to

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<sup>23</sup> See, e.g., *Ex Parte* Written Comments of the Public Interest Spectrum Coalition, In the Matter of M2Z Networks, Inc., WT Dkt Nos. 07-16 et al.; filed Aug. 28, 2007.

<sup>24</sup> See, e.g., PISC Comments, May 23, 2007, at 6-15 (and sources therein).

<sup>25</sup> See *id.* at 6-15; 30-34.

<sup>26</sup> See, e.g., *id.* at 6-7; Tim Wu, *Wireless Network Neutrality*, Feb. 2007, available at [http://www.newamerica.net/files/WorkingPaper17\\_WirelessNetNeutrality\\_Wu.pdf](http://www.newamerica.net/files/WorkingPaper17_WirelessNetNeutrality_Wu.pdf).

inject considerable competition in network provision. As a result, Commenters would favor a licensed approach subject to openness mandates.

Under a licensed approach, the Commission should judge applicants on their willingness to adopt four openness mandates proposed by Commenters, as well as by certain industry commenters.<sup>27</sup>

1. Open applications (or network neutrality) requirements, such as those adopted in the *AT&T/Bell South Merger Order*, should ensure no discrimination against content or applications.<sup>28</sup>
2. Open-devices rules, such as those adopted in the seminal *Carterfone* decision and by this Commission regarding the “C Block” in the 700 MHz Order,<sup>29</sup> should apply to this band.
3. Open service rules, which ensure that a third party service provider can acquire wireless service on a wholesale basis, at commercially reasonable rates, terms and conditions, should apply.
4. Open network rules, ensuring that third parties like Internet service providers can interconnect at any technically feasible point in the licensee’s network.

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<sup>27</sup> See, e.g., Google Ex Parte Filing, Service Rules for the 690-746, 747-762, and 777-792 MHz Bands, WC Dkt Nos. 06-150 et al., July 9, 2007; PISC filings cited in notes 22-23. The language in the text tracks Google’s language. In the previous proceeding regarding this band, we argued that proposals were in the public interest to the extent they conformed to these principles, but were not to the extent they did not—for example, with deviations from network neutrality through content-filtering and from open devices. *Ex Parte* Written Comments of the Public Interest Spectrum Coalition, In the Matter of M2Z Networks, Inc., WT Dkt Nos. 07-16 et al.; filed Aug. 28, 2007 at 6-7.

<sup>28</sup> 22 FCC Rcd at 5814-15.

<sup>29</sup> See *Carterfone*, 13 FCC 2d 420 (1968).

Adopting these mandates would best serve the public interest because the mandates could ensure the entry of, and a level field for, many competing network providers, service providers, applications providers, and device manufacturers.<sup>30</sup>

**B. Technical Feasibility and Economic Practicality of the Applicant's Plan**

Next, the Commission should evaluate and score a proposal's technical and economic practicality.

Technically, the Commission should evaluate the applicant's plans to ensure that the applicant's promised speeds, build-out timetable, and services are technically feasible. CTC's assessment suggests that an AWS-3 licensee can offer 3G services through an open platform service. Previous applicants for this band have promised national broadband service. The Commission should ensure such technical promises are likely accurate.

This technical analysis should help determine the *geographic and bandwidth size* of licenses in the band plan.<sup>31</sup> If an applicant can use the entire 20 MHz nationally to provide a feasible broadband service, as some applicants have previously claimed, the Commission should accept such a national 20MHz license, subject to the openness principles. If the Commission does not accept the technical feasibility of a national 20MHz operation, the Commission should adopt a band plan with a mix of regional and local licenses, subject to the openness principles. Smaller licenses would enable new entrants, local entrants, experimentation with business plans to meet local needs, and likely easier access to capital to build out in remote areas.

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<sup>30</sup> See sources cited in 22-23; see also Columbia Telecommunications Corporation, *An Engineering Assessment of Select Technical Issues Raised in the 700 MHz Proceeding*, May 2007, <http://www.ctcnet.us/700%20band%20issues%20jsh.pdf>.

<sup>31</sup> See, e.g., AWS-3 Notice, at ¶38.

The Commission should also evaluate the economic practicality of the applicant's proposed business plan, especially if the Commission adopts a spectrum fee.

Commenters have already made the case for the economic practicality of an open platforms licensee, based on existing successful business models and apparent pent-up demand.<sup>32</sup> CTC concludes that a new entrant in this band can technically compete with 3G service, though with greater equipment expense. If the entrant need not take on the debt to purchase the spectrum at auction, this greater expense can be managed.<sup>33</sup>

### **C. The Commission Should Judge the Proposal's Foreseeable Contribution to Increasing Broadband Access**

The AWS-3 band can best serve the public interest by helping to promote robust competition in broadband delivery. If an applicant will adhere to the openness mandates and provides a technically and economically feasible plan, then the Commission should choose the applicant that can most quickly and widely expand broadband service.

As a result, the Commission should ensure that the licensees can provide sufficient minimal data rates.<sup>34</sup> The Commission should seek licensees with the highest technically feasible data rates that are economically practical, with an emphasis on those with symmetrical connections.<sup>35</sup>

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<sup>32</sup> See, e.g., *Ex Parte* Reply Comments of Public Interest Spectrum Coalition, In the Matter of Service Rules for the 698-746, 747-762, and 777-792 MHz Bands, WT Dkt Nos. 06-150 et al., filed July 6, 2007, at 5-9.

<sup>33</sup> Further, even if the spectrum were put to auction, a bidder could discount its bid accordingly, resulting in economically practical open platform service. Since the FCC is obligated to maximize public interest benefits and not auction revenue, this outcome is also acceptable. 47 USC §§309(j)(7)(A)-(B).

<sup>34</sup> AWS-3 Notice, at ¶87.

<sup>35</sup> We contest the Commission's apparent acceptance of increasingly asymmetric data flows. Data flows over the internet rely extensively, and increasingly, on uploading capabilities. See, e.g., Matter of the Petition of Free Press et al. for Declaratory Ruling that Degrading an Internet Application Violates the FCC's Internet Policy Statement, RM-\_\_\_\_, WC Docket No. 07-52, Nov. 1, 2007. Moreover, Congress envisioned symmetrical broadband connections. See, e.g., Comments of Consumers Union, Consumer Federation of America, and Free Press, Inquiry Concerning the Deployment of Advanced Telecommunications Capability, GN Docket No. 07-45, filed May 16, 2007.

The Commission should favor licensing the band with *both uplink and downlink capabilities*.<sup>36</sup> Licensing for mere downlink capabilities would, as the Commission acknowledges, “inhibit new entry into his band by potential providers that may not be licensed to use other bands.”<sup>37</sup> The public interest would benefit from new entry.<sup>38</sup>

Finally, the Commission should also adopt strict *build out* requirements, on a *geographic*, not population, basis, and by geography, not “counties” or another proxy.<sup>39</sup> If the Commission finds that a licensee can offer broadband service nationally with a national 20MHz license, the Commission should seek the greatest and most rapid build-out commitments, yet ensure their technical and practical feasibility. The build-out requirements for a national licensee should not be substantially less than those proposed by current applicants.<sup>40</sup>

#### **IV. Conclusion**

To best serve the public interest and promote broadband delivery through assigning the AWS-3 band, the Commission should adopt a scoring auction centered on three public interest criteria: openness, feasibility, and rapid broadband build-out.

Respectfully Submitted

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<sup>36</sup> AWS-3 Notice, at ¶¶14-20.

<sup>37</sup> AWS-3, at ¶21.

<sup>38</sup> Commenters can imagine a situation where downlink-only application would serve the public interest if it helped a competitor (without major DSL and cable holdings) to build a broadband service that could compete with DSL and cable offerings.

<sup>39</sup> *Cf.* AWS-3 Notice, at ¶¶111, 119.

<sup>40</sup> *See, e.g.*, AWS-3 Notice, at ¶¶118, 121.

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## **Appendix: CTC Technical Assessment**



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## **A Brief Technical Assessment of Capabilities of AWS-3 Spectrum Prepared for Free Press December 2007**

This assessment briefly addresses the technical capabilities of the spectrum designated by the FCC as AWS-3 (2155 to 2175 MHz). This assessment was prepared in December 2007 by Columbia Telecommunications Corporation (CTC) for Free Press. Per the request of Free Press, this assessment evaluates the capability of the AWS-3 spectrum band to effectively perform in both an unlicensed scenario and in a coordinated, base-station scenario.

This assessment concludes that the AWS-3 spectrum can effectively perform, with certain limitations, in both an unlicensed scenario and in a base-station/coordinated scenario. The capabilities of this spectrum will be limited by a number of key disadvantages flowing from the following factors:

1. The limited available bandwidth of 20 MHz
2. Proximity to the AWS-1 and AWS-2 bands, which further reduces the usable spectrum by limiting use of the spectrum edges to limit interference
3. The fundamental propagation characteristics of the spectrum at issue, which is less capable than other spectrum for penetration of buildings and other obstructions than spectrum below 1 GHz used by many incumbent wireless providers

## A. Potential of AWS-3 Spectrum for Unlicensed Use

The AWS-3 spectrum holds some promise for unlicensed use, particularly for certain low-power applications and as part of a broader range of unlicensed spectrum bands used in a coordinated fashion through the use of smart radios.

Though it has potential in other areas, it is clear that the AWS-3 band by itself will not be capable of the same speeds and uses as is the existing unlicensed spectrum in the 2.4 GHz band that has so effectively been used for WiFi and many other unlicensed wireless technologies. AWS-3 is limited in capacity relative to the 2.4 GHz unlicensed band--at 20 MHz in size, AWS-3 contains approximately 25 percent of the capacity of the nearly 80 MHz of size in the 2.4 GHz band.

Indeed, AWS-3 has even less than 25 percent of the utility of the 2.4 GHz band with respect to broadband applications, for two primary reasons: first, the spectrum at the edges of the band abuts the AWS-1 and AWS-2 bands, raising the risk of interference--these edges must therefore be avoided or restricted to lower power.

Second, AWS-3 is not conducive to existing, cost-effective, unlicensed broadband technologies, such as WiFi, that have proven so successful and flexible in the 2.4 GHz band. WiFi, for example, requires a channel width that is slightly wider than the entire proposed AWS-3 band. Moreover, the 2.4 GHz WiFi band allows for more advanced versions of WiFi technology, such as 802.11n, that use multiple WiFi channels simultaneously to achieve higher speeds and greater range. In order to operate in AWS-3, the technologies that use WiFi would need to accommodate these requirements in the following ways: 1) using narrower channels (resulting in lower speeds than WiFi), 2) not using multiple channels (and thereby reducing options to avoid interference from other users) unless the channels are much narrower, and 3) engineering systems so that the power level at the edges of the band will not interfere with AWS-1 and AWS-2 (potentially resulting in higher costs and shorter range).

Given these limitations, it seems unlikely that AWS-3, if unlicensed, would be used in the same ways as unlicensed spectrum in the 2.4 GHz band. Rather, from a technical standpoint, this spectrum is more suitable to technologies that utilize narrower channels and lower power--or power that is adaptable depending on where it sits within the band. For example--unlicensed AWS-3

could effectively enable very short-range networking (either alone or in combination with other bands) of technologies comparable to Bluetooth, other personal area-networking technologies, and other short-range technologies like RFID. Under this scenario, some existing personal area-networking could migrate to unlicensed AWS-3 and thereby reduce congestion in the 2.4 GHz unlicensed band, freeing up that spectrum for longer-range broadband local area networking, such as WiFi and emerging technologies. These personal area-networking technologies would no longer compete with WiFi in their immediate area for 2.4 GHz spectrum.<sup>41</sup>

Of course, unlicensed AWS-3 spectrum would facilitate and enable innovation and creativity that cannot be predicted in advance—as has been universally acknowledged by engineers, carriers, and policy-makers with respect to the unlicensed 2.4 GHz band. Even with the inherent limitations of AWS-3, an unlicensed designation would begin this enabling process, not only to support current applications, but also to facilitate emergence of the applications of the future.

## **B. Potential of AWS-3 Spectrum for Coordinated and Base-Station Use**

Different possibilities and limitations arise if the AWS-3 spectrum is licensed such that it can be operated in a “coordinated” or base-station format. Coordinated operation enables an operator to serve users over a relatively large distance (up to a few kilometers) with a single set of base-station equipment and potentially to realize the functional benefits of a carrier network. If the network is so engineered, the operator may deliver speeds of up to a few hundred Kbps—comparable to those available with existing 3G technologies such as 1xEV-DO or HSDPA. The spectrum would have operational utility comparable to the networks operating in the existing PCS spectrum or those of any single operator in the AWS-1 spectrum.

Another potential coordinated use of the spectrum is to augment existing broadband wireless services by offering shared roaming space to multiple carriers. In another potential scenario, the licensee could operate an open

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<sup>41</sup> It’s important to note, however, the emergence of other technologies for high-speed personal area networking (such as, for example, ultrawideband networking in frequencies above 3 GHz) that may, in the course of time, provide more capacity and utility for personal area networking than would AWS-3.

platform, providing capacity and network operations to multiple competing service providers connected to the operator's RF network, each of whom could offer devices for use on the network.<sup>42</sup> Such a scenario would provide all the potential technical benefits of open platforms—competition, innovation, efficiency.

This level of technical competition, however, will necessitate higher capital costs than if more spectrum were available, because achieving comparable speed over less spectrum requires more sophisticated technologies, more antennas, more antenna sites, and more backhaul. As a result, AWS-3 may need costly engineering and construction to match 3G speeds operating over the greater bandwidth of PCS licenses. At 20 MHz, the AWS-3 band is approximately half the size of any individual PCS license, on which most broadband wireless technologies currently operate. It is significantly smaller than the bands operated by the 2.5 GHz licensees such as Sprint and Clearwire. AWS-3 is comparable in size to the individual AWS-1 licenses, but most AWS-1 licensees are major carriers that also have holdings in other bands—enabling them to use multiple bands to boost capacity for future broadband wireless products. The AWS-3 licensee will be at a technical disadvantage to these carriers if it does not also hold licenses for other bands to supplement AWS-3.

As a result, the AWS-3 licensee, if a new entrant, would likely have less available capacity and flexibility to offer services than many of the existing commercial providers. The licensee could compete technically—but at considerable expense—particularly in densely populated markets where significantly higher volume of radios and backhaul would be necessary to give individual users comparable speeds. In a rural area, it may be less expensive to technically compete with 3G over AWS-3, because less spectrum is required in the aggregate (since lower user density results in greater net spectrum per user).

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<sup>42</sup> For a detailed technical description of the operations and technical benefits of an open platform wireless network, see Columbia Telecommunications Corporation, "An Engineering Assessment of Select Technical Issues Raised in the 700 MHz Proceeding," May 2007, <http://www.ctcnet.us/700%20band%20issues%20jsh.pdf>.