Competitive Carriers Association
Rural • Regional • Nationwide®

Competitive Carriers Association
805 15th Street NW, Suite 401
Washington, DC 20005
Office: (202) 449 -9866 • Fax: (866) 436 -1080

EX PARTE VIA ECFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269
Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions, Docket No. 12-268

Dear Ms. Dortch:

Competitive Carriers Association ("CCA") submits this letter to highlight the broad international consensus on the qualitative differences between high- and low-frequency spectrum for mobile broadband deployment and the competitive importance of aggregation limits in the upcoming incentive auction. Spectrum below 1 GHz has unique propagation characteristics that make it ideal for building advanced mobile networks both in vast, often geographically challenging rural areas and in densely populated urban and suburban areas. The significant deployment cost savings associated with the use of sub-1 GHz spectrum has been recognized across the globe. Abroad, as in the U.S., authorities and analysts have recommended that policymakers and regulators employ aggregation limits to address the qualitative distinctions between high- and low-frequency spectrum to ensure competition in the mobile marketplace. Some of the regulatory authorities adopting spectrum-aggregation limits include the United Kingdom, Germany, Spain, Australia, Canada, Ireland, France, Sweden, Denmark, Spain, Iceland, the Czech Republic, South Korea, Portugal, Norway, Greece, the Netherlands, Peru, Switzerland, Argentina, Columbia, Brazil, Chile, Mexico, Singapore, and Thailand. As explained below, most of these authorities have expressly applied spectrum aggregation limits to below 1 GHz bands.[1] Indeed, the Federal Communications Commission ("Commission") itself has recognized that "providers whose spectrum assets include spectrum below 1 GHz may possess certain competitive advantages for providing robust coverage when compared to licensees whose portfolio is exclusively comprised of higher frequency spectrum."[2] In the upcoming

[1] *See Appendix A.*

[2] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*. WT Docket No. 11-186, Sixteenth Report, 28 FCC Rcd 3700, 3796, ¶ 135 (2013) ("16th Mobile Competition Report"); *see also Applications of AT&T Inc., Cellco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC, and Grain Spectrum II, LLC for Consent to Assign and Lease AWS-1 and Lower 700 MHz Licenses*. WT Docket No. 13-56, Memorandum Opinion and Order, DA 13-1854 at ¶¶ 39-41 (rel. Sept. 3, 2013) (considering the competitive effects of transactions involving spectrum below 1 GHz). Additionally, the Commission's Report points out that nearly seven times the number of people in rural areas (400,000) have no mobile wireless coverage as opposed to those in non-rural areas (58,000) as of October 2012, and that 1.3 million people in rural areas have no mobile broadband access. 16th Mobile Competition Report at 3940-45, ¶¶ 389, 392. The Report goes on to note that the two largest service providers combined hold more than half of the rural MHz-POPs in both the 700 MHz and Cellular bands in the U.S. *Id*. at 3952-53, ¶ 401.

incentive auction, the Commission should ensure that all carriers have a fair opportunity to compete against the nation's two dominant incumbents currently in possession of the vast majority of sub-1 GHz spectrum. In this letter, CCA highlights findings from the World Bank, the Organization for Economic Co-operation and Development ("OECD"), the International Telecommunication Union ("ITU"), and the communications regulatory authorities of the U.K. and the Netherlands, among others, to help emphasize the importance of the incentive auction to competitiveness in the U.S. mobile marketplace and to reinforce the international consensus behind pro-competitive, spectrum-aggregation limits for the low-band spectrum essential to achieve in-building service, rural coverage, and mobile broadband competition.[3]

Lower Frequency Spectrum has Superior Propagation Characteristics for Reaching Vast Rural Areas

A number of international bodies have examined the significance of the superior propagation qualities of spectrum below 1 GHz both for coverage of large areas and for in-building penetration. Attached as Appendix B is an excerpt from a study published by the World Bank in 2012, *Maximizing Mobile*, which seeks to provide best practices for policy makers, regulators and investors to support international development of the mobile sector.[4] As part of its overall assessment of mobile deployment, the World Bank observes that low-frequency bands offer distinct advantages for the deployment of mobile broadband in both rural and urban areas. First, the World Bank notes that sub-1 GHz bands allow for "wider coverage from fewer radio base stations," which is an important consideration for rural area deployments.[5] Second, and critically for urban areas, the World Bank states that low-frequency spectrum offers "higher powers to support building penetration."[6]

The World Bank is not the only global economic growth and development institution tracking the value of low-frequency spectrum to mobile development in rural areas. For example, OECD has commented on the "especially attractive" qualities of the "digital dividend" spectrum, and noted that low-band spectrum "provides an optimal balance between distance coverage and transmission capacity, making it particularly suitable for rural and remote areas."[7] Similarly, François Rancy, the Director of the ITU's Radiocommunication Bureau ("ITU-R"), which coordinates the international use of radio spectrum, has explained that spectrum below 1 GHz is particularly suited for mobile broadband because of its ability to support mobile services over large

[3] While this letter primarily addresses aggregation limits applied to spectrum below 1 GHz acquired though auctions, CCA continues to believe that limitations are also necessary on licenses for this spectrum obtained through secondary market transactions. CCA has previously advocated for revisions to the Commission's spectrum screen to account for a carrier's holdings below 1 GHz, and remains committed to that position. In light of the upcoming incentive auction, however, this letter focuses on the implications of acquiring such low-band spectrum through primary market transactions.

[4] The World Bank, International Bank for Reconstruction and Development, "Information and Communications for Development 2012: Maximizing Mobile" (2012), 105, *available at* http://bit.ly/1bAR5de (last accessed Aug. 15, 2013) ("*Maximizing Mobile*").

[5] *Id.*

[6] *Id.*

[7] OECD, "Laying the Foundation for the Internet Economy: Access to the Internet via a High-Speed Infrastructure," OECD Digital Economy Paper No. 201 (2012), 28, *available at* http://dx.doi.org/10.1787/5k95z9cvmnr6-en (last accessed Aug. 16, 2013).

distances with fewer cell sites than high-frequency spectrum.[8] Additionally, in 2010, the Dutch Ministry of Economic Affairs commissioned a study to examine the value of sub-1 GHz spectrum. The study determined that the coverage area of a cell in a rural area using high-frequency spectrum is between 50-60 percent less than coverage using low-frequency spectrum, while in urban or suburban areas, high-frequency spectrum offers a coverage area that is 83-96 percent smaller than a comparable low-frequency spectrum network.[9] As the authors of the Dutch study noted, the significantly smaller range of high-frequency spectrum has implications for deployment in rural, suburban, and urban areas.[10]

Lower Frequency Spectrum has Superior In-Building Penetration Characteristics

Every three to four years the ITU-R holds a World Radiocommunication Conference ("WRC") to review and revise international agreements regarding the use of radio-frequency spectrum. Part of the agenda for the next WRC, scheduled for 2015, is a review of results of technical studies on the use of low-frequency bands by mobile networks.[11] As their starting point, these technical studies rely on the assumption that "where cost considerations warrant the installation of fewer base stations, such as in rural and/or sparsely populated areas, bands below 1 GHz are generally suitable for implementing mobile systems."[12] The ITU-R has also recognized that economies, especially those of developing countries and those with largely rural populations, need cost effective mobile broadband, and this need can best be met using "the propagation characteristics of frequency bands below 1 GHz" that require the construction of fewer cell sites.[13]

In addition to offering the advantage of requiring fewer cell sites for deployment in rural areas, low-frequency spectrum also provides superior coverage inside buildings in urban and suburban areas, where the majority of consumers access mobile broadband.[14] When Ofcom

---

[8] François Rancy, "Armonización espectro para banda ancha móvil en bandas sub 1 GHz" (Oct. 24, 2012), slide 2 (translation), *available at* http://bit.ly/1dbqmFN (last accessed Aug. 9, 2013); *see also* François Rancy, "Armonización de las bandas del Dividendo Digital" (June 12, 2012), slide 2 (translation), *available at* http://slidesha.re/128FyPi (last accessed Aug. 9, 2013).

[9] PA Consulting Group for Ministerie van Economische Zaken (Netherlands Ministry of Economic Affairs), "Study on Comparability of Frequency Bands in Different Business Models" (Sept. 17, 2010), 22, *available at* http://bit.ly/1dbqGEH (last accessed Aug. 9, 2013) ("*Dutch Frequency Band Study*").

[10] *See id.* at 21-22.

[11] *See* ITU, "World Radiocommunication Conference 2015 (WRC-15)—Agenda and Relevant Resolutions" (2012), 2, *available at* http://www.itu.int/dms_pub/itu-r/oth/12/01/R12010000014A01PDFE.pdf (last accessed Aug. 9, 2013) ("*WRC 2015 Agenda*").

[12] *Id.* at 63. The proposal also affirms that bands below 1 GHz are especially important in "developing countries and countries with large areas where economic solutions for low population density areas are necessary." *Id.*

[13] *Id.* at 64; *see also* ITU, "Spectrum for IMT," at 1, *available at* http://bit.ly/1bARnAI (last accessed Aug. 9, 2013) (noting that low-frequency spectrum is ideal for the needs of developing countries "due to the ability to serve larger rural areas from a single cell site" compared to the exponentially larger number of cell sites required for deploying a network using high-frequency spectrum).

[14] *See* Ofcom, "Second Consultation on Assessment of Future Mobile Competition and Proposals for the Award of 800 MHz and 2.6 GHz Spectrum and Related Issues—Annex 6: Revised Competition Assessment" (Feb. 17, 2012), at 50, *available at* http://bit.ly/1bARDzL (last accessed Aug. 9, 2013) ("*Ofcom Annex 6*"). As noted by Ofcom, a study from 2010 found that 72 percent of mobile broadband subscribers in Europe, and 79 percent of U.S. mobile broadband subscribers, use mobile broadband service mostly, or solely, at home or

considered the ability of high-frequency spectrum to penetrate buildings, it found a higher degradation in quality of coverage in high-frequency bands "deep in buildings or in other hard to serve locations" than for low-frequency bands.[15] Based on this distinction between high- and low-frequency spectrum, Ofcom recognized that even if a carrier could provide "sufficiently good quality coverage to act as a credible national wholesaler," if that carrier does not hold below-1 GHz spectrum "it may be a weaker competitor in particular service or customer segments than a wholesaler with sub 1 GHz."[16] Similarly, in proposing rules for the upcoming auction of 700 MHz spectrum in Canada, Industry Canada observed that in addition to its suitability for rural deployments, the 700 MHz spectrum is well suited for "high capacity applications in high density urban areas."[17] This point being, while low-band spectrum is well-suited to address capacity constraints, low-band spectrum is even more important to achieve ubiquitous coverage in both rural and urban markets.

Lower Frequency Spectrum Results in Significant Deployment Cost Savings

International authorities have recognized that the ability to deploy fewer cell sites to achieve coverage, whether macro cells or small cells, enables those carriers deploying low-frequency spectrum to benefit from significant cost savings. Although the World Bank finds that multiple bands are technologically suitable for deploying LTE technology, it concludes that deployment in "the lower bands (such as 700 and 800 megahertz, or MHz) can be more cost-effective" than higher-spectrum deployments because of lower capital expenditures by carriers.[18] Similarly, the Dutch study concluded that because "operators with sub-1 GHz spectrum require fewer base stations and supporting passive infrastructure elements in order to achieve their desired network coverage," they benefit from lower rollout costs.[19] A 2012 report issued in anticipation of an auction of 800 MHz and 2.6 GHz spectrum by the U.K. communications regulator Ofcom came to the same conclusion, finding that although the coverage challenges posed by mid-frequency spectrum can be partially addressed through the use of small cells, these solutions pose challenges of their own in locations with poor coverage.[20] Ofcom found that carriers seeking to serve rural areas where small cell solutions are not an option might find it "a significant competitive advantage to hold[] lower

---

work). *See id.* (citing Analysys Mason, "Fixed-Mobile Substitution: A Reversal of Fortune for Fixed Operators" (Dec. 10, 2010), *available at* http://bit.ly/14bXWES (last accessed Aug. 29, 2013).

[15] Ofcom, "Second Consultation on Assessment of Future Mobile Competition and Proposals for the Award of 800 MHz and 2.6 GHz Spectrum and Related Issues" (Jan. 12, 2012), 36, *available at* http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/summary/combined-award-2.pdf (last accessed Aug. 9, 2013) ("*Ofcom Second Consultation*").

[16] *Id.*

[17] Industry Canada, "Policy and Technical Framework, Mobile Broadband Services (MBS)—700 MHz Band; Broadband Radio Services (BRS)—2500 MHz Band" (Mar. 20, 2012), 25, *available at* http://bit.ly/14POsCq (last accessed Aug. 13, 2013) ("*Canadian 700 MHz Band Plan*").

[18] *Maximizing Mobile at* 105. A presentation by World Bank technical consultant Jan van Rees confirms that "a lower frequency band results in a much more cost efficient network roll-out in rural areas," because of the significantly fewer number of base stations that are needed for bands below 1 GHz. Jan van Rees, "Technology Neutral Spectrum Social Benefits," Presentation at the UMTS Forum, slide 5, *available at* http://bit.ly/14DngTd (last accessed Aug. 9, 2013) ("*Technology Neutral Spectrum Social Benefits*").

[19] *Dutch Frequency Band Study* at 8; *see also id.* at 15 ("Overall, the sub-1 GHz spectrum bands are best suited for coverage, and offer a lower cost option for operators to achieve that coverage.").

[20] *See Ofcom Second Consultation* at 36.

frequency spectrum."[21] The ITU-R's Director Rancy has noted that the "very attractive propagation characteristics" of low-frequency spectrum create a "unique opportunity to bridge the digital divide by providing broadband mobile coverage to sparsely populated areas at a much lower cost [than] at higher frequencies."[22]

Economics is a major consideration when using high or low frequency spectrum. The difference in deployment costs between high- and low-frequency spectrum can be dramatic. The Dutch authority for instance found that the relative cost of deploying a network using 1800 MHz spectrum would be over 8 times higher than using 800 MHz spectrum, as a result of the number of base stations needed to achieve commercially satisfactory coverage, while using 2600 MHz spectrum would increase costs to more than fifteen times that needed for a carrier holding low-frequency spectrum.[23] The study concludes that it is "*most unlikely* to be cost effective to roll out a national network with supra 1 GHz spectrum in contrast with operators that have access to sub 1 GHz."[24] Likewise, a study conducted by The Global Mobile Suppliers Association ("GSA") found that the combined operating and capital expenditures for low-frequency spectrum are 60 percent lower than for high-frequency spectrum.[25]

Mobile broadband providers are well aware of the advantages offered by low-frequency spectrum, and as Ofcom wrote as part of its 2012 consultation, "[e]vidence from international markets shows that sub-1 GHz is more valuable than higher frequency spectrum [as a result]."[26] To highlight the premium placed on low-frequency spectrum, both Ofcom and the Dutch Ministry of Economic Affairs conducted benchmark comparisons of prices for high- and low-frequency licenses sold at recent spectrum auctions, reproduced at Appendix D.[27] Ofcom found, that, in general, below 1 GHz spectrum brought radically higher prices at auction than 1800 MHz, 2.6 GHz, or 2.6 GHz spectrum blocks.[28] The Dutch authority looked specifically at the 2010 German "mega-auction" of 800 MHz, 1800 MHz, 2100 MHz, and 2.5 GHz spectrum, and found that carriers paid seven times more for low-frequency spectrum than for higher bands, and the winning bidders for low-frequency spectrum paid almost 20 times more per MHz compared to the price paid for 2600 MHz spectrum.[29] These higher prices are direct result of the superior propagation characteristics and the deployment efficiencies.

---

[21] *Ofcom Annex 6* at 51.

[22] François Rancy, "Speech at Ancom International Conference on Radio Spectrum Strategies," Bucharest, Romania (May 12, 2011), *available at* http://bit.ly/15KOjMC (last accessed Aug. 9, 2013); *see also* François Rancy, "Speech at Spectrum 20/20 Event," Ottowa, Canada (May 3, 2011), *available at* http://bit.ly/143bZQs (last accessed Aug. 9, 2013).

[23] *Dutch Frequency Band Study* at 23.

[24] *Id.* at 1-2 (emphasis added) ("Lack of access to sub 1 GHz spectrum will result in a material competitive disadvantage to a mobile operator with national mass market ambitions.").

[25] *See Technology Neutral Spectrum Social Benefits* at slide 6, citing GSA Information Paper UMTS 900 (Jan. 28, 2009).

[26] *Ofcom Annex 6* at 53.

[27] *Ofcom Annex 6* at 53; *Dutch Frequency Band Study* at 24.

[28] *See Ofcom Annex 6 at 53.*

[29] *See Dutch Frequency Band Study* at 24. The amount paid for the 800 MHz spectrum represented over 80 percent of the total amount collected in the auction, despite representing only sixteen percent of the total spectrum auctioned. *See* ITU, "Exploring the Value and Economic Evaluation of Spectrum" (Apr. 2012), 24, *available at* http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_SpectrumValue.pdf (last accessed Aug. 13, 2013).

Superior Propagation and Cost Savings are Internationally Recognized; Used as Basis for Implementing Aggregation Limits

Unsurprisingly, given the wide agreement on the value of low-frequency spectrum for building out mobile broadband networks, a broad international consensus has emerged that imposing reasonable limits on spectrum aggregation promotes competition.[30] As mentioned above, Appendix A compiles a partial listing of the many countries around the globe that have determined that spectrum aggregation limits are a critical tool to ensure that dominant players do not usurp control of spectrum resources critical to competition. While cautioning against aggregation limits that are overly stringent, the World Bank has recommended that as part of their best practices, regulators affirmatively "[l]imit spectrum hoarding that could distort competitive conditions in the market."[31] The World Bank has noted in particular the dangers of foreclosure by powerful players in the mobile marketplace, and advises regulators to ensure that spectrum allocation be performed efficiently so that operators use their spectrum allocations "to provide services" and not to "distort the market or impede other providers from entering the market."[32] To meet this standard, the World Bank recommends designing auctions to include spectrum aggregation limits coupled with "monitor[ing] the market needs and competitive conditions as they evolve."[33] In assessing the rules for its auction of sub-1 GHz spectrum, the Dutch Ministry of Economic Affairs similarly concluded that the economic advantages offered by access to low-frequency spectrum was sufficiently great to justify an aggregation limit that would not harm incumbents, but would allow a new entrant to raise sufficient funds from investors to enter the national marketplace.[34] Significantly, several countries including Canada and the U.K. that in the past either eliminated spectrum aggregation limits or relied on other means to provide competition in the mobile marketplace have change their positions, likely in light of changing markets, and recently decided to impose limits for below 1 GHz spectrum auctions, citing the need to ensure that new entrants are able to acquire this valuable spectrum resource.[35]

---

[30] *See* Organization for Economic Co-operation and Development (OECD), "OECD Communications Outlook 2013," Table 2-13 (Spectrum Tendering Processes), *available at* http://www.oecd.org/sti/broadband/2-13.pdf (last accessed Aug. 13, 2013).

[31] *Maximizing Mobile* at 106. While some countries, including Canada and the U.K., have included build out requirements as part of their auction of sub-1 GHz spectrum, by imposing spectrum aggregation limits, they have recognized that these construction requirements are not, in themselves, sufficient to ensure competition in their wireless marketplaces. *See Canadian 700 MHz Band Plan* at 29; Ofcom, Assessment of Future Mobile Competition and Award of 800 MHz and 2.6 GHz (July 24, 2012), 3-5, *available at* http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/Statement-summary.pdf (last accessed Aug. 29, 2013).

[32] *Maximizing Mobile* at 106.

[33] *Id.* at 107.

[34] *See Dutch Frequency Band Study* at 3. To further protect new entrants, many countries that have included spectrum aggregation limits have also imposed post-auction limits on transfers of spectrum on the secondary market for a set period of time. *See, e.g., Canadian 700 MHz Band Plan* at 30.

[35] *See* Arthur D. Little, "Mobile Broadband, Competition and Spectrum Caps," GSMA (2009), 8-10, *available at* http://bit.ly/17vb9L2 (last accessed Aug. 16, 2013). The vast majority of countries have embraced spectrum limits in major auctions and even the handful of regulatory authorities known to have considered but declined to impose limits in some proceedings have favorably discussed the policy and only rejected limitations based on the limited scope of the auction or other specific conditions peculiar to the auction or local market. In making the determination that no spectrum-aggregation limits were necessary for the recent auction of 2.5/2.6 GHz spectrum in Hong Kong, for example, the regulatory authority noted approvingly that

As Shown in International Contexts, Sub-1 GHz Aggregation Limits Are Needed

The experience of international regulatory bodies and analysts is instructive in the context of the upcoming incentive auction, and shows that deploying high-frequency spectrum is far more costly than deploying low-frequency spectrum, especially in rural areas, while access to sub-1 GHz spectrum provides a considerable competitive advantage in deploying advanced wireless networks. The future competitiveness of the wireless broadband market depends upon the Commission adopting clear, upfront limits on how much low-frequency spectrum any one carrier can acquire. To arrive at a transparent, balanced approach to excessive concentration of spectrum resources prior to the incentive auction, the FCC should take into account the limits imposed on this valuable spectrum by a number of regulatory authorities, and ultimately must ensure that every wireless carrier has a fair opportunity to compete and win in the auction by adopting reasonable aggregation limits.

Sincerely,

/*s*/
Rebecca Murphy Thompson
General Counsel

---

the U.K. government imposed limits for its 800 MHz and 2.6 GHz band auction, as that spectrum would constitute three quarters of all radio spectrum currently in use in the U.K. In contrast, the Hong Kong authority noted (in part) that its auction only involved nine percent of its assigned spectrum, leading to the decision not to impose aggregation limits. *See* Statement of the Communications Authority (Hong Kong), "Assignment of the Available Radio Spectrum in the 2.5/2.6 GHz Band for Wireless Broadband Services" (July 4, 2012), 11-12, *available at* http://bit.ly/17RYsZy (last accessed Aug. 16, 2013). Other countries in developing nations may not yet have imposed spectrum-aggregation limits, but have signaled that they are planning to use limits for future auctions to ensure new entrants in the marketplace. *See, e.g.*, National Telecom Regulatory Authority (Egypt), "Spectrum Regulatory Measures to Promote Wireless Broadband" (Sept. 21-23, 2011), *available at* http://bit.ly/19xVNek (last accessed Aug. 16, 2013) ("In designing the [future] auction, regulator[s] should impose spectrum caps to the bidders in order to increase the competition and to force them to make innovative offerings in the broadband market.").