

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

In the Matter of	)	
	)	
Service Rules for the 698-746, 747-762 and 777-792 MHz Bands	)	WT Docket No. 06-150
	)	
Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems	)	CC Docket No. 94-102
	)	
Section 68.4(a) of the Commission’s Rules Governing Hearing Aid-Compatible Telephones	)	WT Docket No. 01-309
	)	

**COMMENTS**

NextWave Broadband Inc. (“NextWave”) submits these comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) Notice of Proposed Rulemaking contemplating changes to the Part 27 service rules governing wireless licenses in the 698-746 MHz band (the “Lower 700 MHz Band”) and the 746-764 and 776-794 MHz bands (the “Upper 700 MHz Band”) (collectively, the “700 MHz Band”).<sup>1</sup>

The 700 MHz Band is fertile ground for valuable IP-based wireless services that consumers demand, particularly next-generation mobile broadband services based upon the WiMAX standard. However, the service rules for the 700 MHz Band, particularly the geographic service areas (“GSAs”) assigned to vacant 700 MHz spectrum, the amount of bandwidth per license, and the band plan, are not optimal for next-generation services and must be revisited in order to permit “more effective use of this spectrum to better meet the needs of today’s consumers.”<sup>2</sup>

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<sup>1</sup> *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Notice of Proposed Rulemaking, FCC 06-114 (rel. August 10, 2006) (“*NPRM*”).

<sup>2</sup> *NPRM* at ¶ 25.

NextWave is developing next-generation mobile broadband and wireless multimedia products, technologies and services, based on the IEEE 802.16e WiMAX standard. NextWave intends to market these products to network infrastructure and device manufacturers and network operators worldwide. In addition, NextWave plans to partner with service providers to build and operate 802.16e WiMAX-compliant networks that operate on NextWave's licensed spectrum and utilize network and device equipment that incorporates NextWave's products and technologies.<sup>3</sup> To facilitate the deployment of network solutions it is now developing, NextWave is in the process of accumulating spectrum across the United States. NextWave may pursue adding 700 MHz spectrum to its spectrum portfolio if the 700 MHz service rules, band plan, channel bandwidths and GSAs for the licenses are revised to permit next-generation services.

**I. IN ORDER TO MAXIMIZE SPECTRUM ACCESS OPPORTUNITIES FOR NEW COMPETITIVE ENTRANTS AND ENSURE SERVICE TO RURAL AND UNDERSERVED AREAS, NEXTWAVE URGES THE COMMISSION TO LICENSE UNASSIGNED 700 MHZ SPECTRUM ON A CMA AND EA BASIS.**

The Commission can and should promote its statutory and broadband policy objectives by licensing unassigned Lower and Upper 700 MHz Band spectrum ("Unassigned 700 MHz Spectrum") using smaller GSAs. Specifically, instead of offering Unassigned 700 MHz Spectrum in just six Economic Area Grouping ("EAG") licenses nationwide, NextWave urges the Commission to configure this spectrum using Cellular Market Area ("CMA") and Economic Area ("EA") licenses. Offering 734 CMA licenses and 176 EA licenses will create the greatest opportunity and flexibility for new entrants and niche providers to acquire spectrum and provide

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<sup>3</sup> NextWave's enhanced network solutions, combined with its wireless multimedia software products, will offer wireless service providers, cable operators, multimedia content distributors and Internet service providers an unparalleled platform to provide advanced wireless broadband services to their customers. In addition, through its subsidiary, PacketVideo, NextWave is the world's largest independent provider of embedded multimedia software for mobile phones.

next-generation IP-based services to both urban and rural areas, will enhance broadband competition, and will further the President's broadband goals.

**A. The Rationale For Using Large Geographic Service Areas To License The 700 MHz Band Plan Is No Longer Valid.**

When the Commission adopted the service rules for the 700 MHz Band years ago, it was focused on issuing 700 MHz licenses that could be easily consolidated into a nationwide footprint that would enable competition with national Commercial Mobile Radio Service ("CMRS") carriers.<sup>4</sup> Accordingly, other than a single CMA channel block in the Lower 700 MHz Band, all other 700 MHz Band spectrum was configured into six EAG licenses.<sup>5</sup> As the Commission notes in the *NPRM*, subscription to mobile telephone service has increased by approximately 50 percent since the 700 MHz Band service rules were first issued.<sup>6</sup> The Commission's latest data further suggests that competition in the CMRS sector is more robust than ever.<sup>7</sup> Allocating more spectrum for CMRS competition is clearly unnecessary.

During the same time period since issuance of the 700 MHz Band service rules, however, the development and growth of personal wireless broadband IP-based services, including hotspot Internet access services, using WiMAX, WiFi and/or other access technologies, has outstripped spectrum availability. These services can effectively be offered on a localized basis, such as

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<sup>4</sup> See *Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)*, Report and Order, 17 FCC Rcd 1022, 1058-61 (2002) ("*Lower 700 MHz Band Order*"); *Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules*, First Report and Order, 15 FCC Rcd 476 at ¶¶ 56-57 (2000) ("*Upper 700 MHz Band Order*").

<sup>5</sup> The Commission also was concerned that auctioning a large number of licenses could take longer and jeopardize its ability to meet then-applicable statutory obligations to complete the Upper 700 MHz Band auction by September 30, 2000. Those statutory mandates for auctioning spectrum no longer apply.

<sup>6</sup> *NPRM* at ¶ 1.

<sup>7</sup> According to the 11<sup>th</sup> CMRS Competition Report, "98 percent of the total U.S. population lives in counties with access to three or more different operators offering mobile telephone service, slightly higher than in the previous year, and up from 88 percent in 2000, the first year for which these statistics were kept." *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual*

home/business broadband Internet access and IP-based video applications, wireless personal area networks (“WPANs”), wireless local area networks (“WLANs”), and wireless metropolitan area networks (“WMANs”).<sup>8</sup> The current 700 MHz EAG licenses are too large for entities seeking to provide these and other IP-based services using time division duplex (“TDD”) systems on a localized or regional basis, and as explained below, few other spectrum options exist.

**B. Licensing 700 MHz Spectrum Using Smaller Geographic Service Areas Will Encourage Rural Deployments And Will Create More Opportunities For Local, Regional And Niche Service Providers.**

The Commission inquired in the *NPRM* whether the size of 700 MHz service areas should be smaller in order to “enhance access to spectrum in rural areas.”<sup>9</sup> As the Commission’s own experience in auctioning spectrum demonstrates, the answer to this question is undeniably “yes,” and will also foster opportunity for local, regional and niche providers of IP-based services. In the recently concluded Advanced Wireless Services (“AWS”) auction, for example, more than 97 entities bid for and won the 734 CMA licenses. In the aggregate, these entities appear to represent a diverse range of service providers who are focused on providing service to local, rural and underserved areas; 55 of these entities qualified as small businesses or very small businesses. Similarly, in the initial auction of Lower 700 MHz Band (Auction No. 44), CMA licenses were acquired by 101 entities. In contrast, the AWS REAG licenses, of which there are

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*Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Eleventh Report, FCC 06-142 at ¶ 2 (rel. September 29, 2006).

<sup>8</sup> As the Wireless Broadband Access Task Force observed, these applications include: “Wi-Fi hot spots (*e.g.*, stores, airports); community networks; en route, mobile applications (*e.g.*, on trains and ferries); public safety applications (*e.g.*, integrating police in the field with their departments, enabling quicker communications of emergency information); surveillance applications (*e.g.*, ensuring building security, securing military bases, improving transportation monitoring, preventing theft in shopping centers); personalized mobile access to music and video entertainment; and educational applications (*e.g.*, creating a “wireless campus” that connects students with school networks).” *Connected & On the Go Broadband Goes Wireless Report by the Wireless Broadband Access Task Force*, Report, GN Docket No. 04-163, 2005 FCC LEXIS 1488 at 4-5 (rel. Feb. 2005) (“*Broadband Access Task Force Report*”).

<sup>9</sup> *NPRM* at ¶ 28.

just six (CONUS) nationwide, were acquired primarily by a handful of large, national and regional wireless carriers. If the Commission retains just six 700 MHz licenses nationwide, it can expect a similar result, which is not beneficial for competition, service to rural areas, or IP-based service offerings made on a localized basis. Clearly, if the Commission wishes to encourage new competitive entrants to acquire 700 MHz spectrum to provide next-generation wireless broadband services to both urban and rural areas, granting a larger number of smaller-sized 700 MHz licenses will achieve this goal.

The Commission also acknowledged the benefits of licensing 700 MHz spectrum on a CMA basis when it observed that licensing “over these small geographic areas balances the playing field such that small and rural providers will have an opportunity to participate in the auction and the provision of spectrum-based services.”<sup>10</sup> As the Commission more recently acknowledged in the AWS proceeding,

[CMAs] allow entities to mix and match rural and urban areas according to their business plans and that, by being smaller, these types of geographic service areas provide entry opportunities for smaller carriers, new entrants, and rural telephone companies. Additionally, with respect to larger carriers, [] aggregation at auction of smaller spectrum licenses and blocks may provide bidders with greater flexibility to implement their business plans as compared with a more traditional approach of defining an optimal size.”<sup>11</sup>

Increasing the number of licenses available in the 700 MHz Band also will further the statutory objectives underlying the Commission’s competitive bidding policies and other public interest objectives. As the Commission observed in adopting a CMA licensing scheme for the Lower 700 MHz Band C Block channel, licensing on a CMA basis “promotes opportunities for a wide variety of applicants, including small and rural wireless providers,” which the Commission

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<sup>10</sup> *Lower 700 MHz Band Order*, 17 FCC Rcd 1022, 1061 (citing 47 U.S.C. § 309(j)(3)(B)).

<sup>11</sup> *Service Rules for Advanced Wireless Services In the 1.7 GHz and 2.1 GHz Bands*, Order on Reconsideration, 20 FCC Rcd 14058, 14066 (2005).

found to be “consistent with our congressional mandate to promote ‘economic opportunity and competition’ and to disseminate licenses ‘among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.’”<sup>12</sup> Increasing the number of licenses available also will facilitate wide-scale deployments of WiMAX and other TDD-based broadband wireless technologies by multiple providers, enhancing intramodal and intermodal competition in the provision of wireless IP-based services, and bringing the country one step closer to meeting the President’s goal of making affordable broadband available to all Americans by the end of 2007.<sup>13</sup>

**II. MORE SPECTRUM FOR FDD-BASED SERVICES IS NOT NEEDED; THE COMMISSION SHOULD REAPPORTION UNASSIGNED 700 MHZ SPECTRUM TO CREATE LARGER, UNPAIRED BLOCKS THAT WILL ACCOMMODATE TDD-BASED SERVICES.**

Five years ago, the Commission designed the 700 MHz band plan to facilitate CMRS competition on a national basis, using frequency division duplexing (“FDD”) technologies. Because FDD technologies require paired spectrum, Unassigned 700 MHz Spectrum is predominantly banded in this manner. Since the 700 MHz service rules were first adopted, however, the Commission has made available significant amounts of paired spectrum to meet that demand. For example, the Commission made available 242 PCS paired-channel licenses in Auction No. 58, as well as more than 1,000 paired channel licenses, spanning 90 MHz, in the recently-concluded AWS auction.

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<sup>12</sup> *Lower 700 MHz Band Order*, 17 FCC Rcd 1022, 1061. As the Commission further observed, “Licensing a portion of the Lower 700 MHz Band over these small geographic areas balances the playing field such that small and rural providers will have an opportunity to participate in the auction and the provision of spectrum-based services. We believe that a combination of large and small geographic service areas best accomplishes these various statutory objectives.” *Id.*

<sup>13</sup> See *President Outlines Path for Lasting Prosperity in Wednesday Speech Remarks by the President at the Newspaper Association of America Annual Convention*, Omni Shoreham Hotel, Washington, D.C., Office of the Press Secretary (April 21, 2004).

Although the Commission has provided FDD proponents with abundant spectrum access opportunities, it has not fully addressed the needs of TDD operators. The Commission indicated in the AWS service rules proceeding that “we will make every effort to provide spectrum opportunities for TDD systems in future allocation and spectrum proceedings,”<sup>14</sup> but the fact remains that there are limited options for TDD deployments. In the AWS auction, for example, the Commission created paired channels specifically to accommodate FDD systems, but did so at the expense of TDD proponents, who effectively are barred from that band.

Moreover, the exhaustion of unlicensed spectrum capacity in the 2.4 GHz unlicensed band and the unattractive propagation characteristics associated with the 5 GHz unlicensed bands have created an acute need for spectrum below 3 GHz that can be used to provide broadband Internet access and other advanced broadband IP-based services. The 3.6 GHz band, which was touted as being a new home for broadband IP-based services, requires further development and implementation of contention based protocols into 802.11, 802.16 and other standards, and in all events will be challenged to meet the quality-of-service requirements for multimedia applications and VoIP services due to the contention-based scheme.<sup>15</sup>

**A. NextWave Urges The Commission To License Remaining Unassigned 700 MHz Spectrum In Unpaired Blocks Of 6-15 MHz.**

Given that the Commission has provided ample spectrum access opportunities for traditional FDD-based CMRS systems, and given the need for more spectrum below 3 GHz for broadband services, the Commission should revise the 700 MHz Band to address the shortage of spectrum license configurations that are necessary to development of TDD, IP-based applications

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<sup>14</sup> *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, 18 FCC Rcd 25162, 25179 (2003).

<sup>15</sup> Also, the 3650 MHz band sets low power limits for base station and end user equipment, so it is not optimal for rural areas, and urban areas where indoor coverage from an outdoor base station is desired.

and services. The most efficient and commercially successful broadband Internet access air interface standards are predominantly based on TDD (WiFi, WiMax, etc.). As the Broadband Task Force recommended when it discussed optimal band configurations for broadband services, as opposed to mobile telephony, the Commission should “assign spectrum that would allow potential licensees to acquire . . . unpaired spectrum for the deployment of technologies such as time division duplex (TDD), which do not require paired bands.”<sup>16</sup>

In light of the foregoing, NextWave proposes reconfiguring the Unassigned 700 MHz Spectrum into unpaired CMA and EA licenses having significantly larger bandwidth than is allowed in the current 700 MHz band plan. Specifically, NextWave proposes reconfiguring the Lower 700 MHz A and B channel blocks into two unpaired contiguous 12 MHz channels, and reconfiguring the Upper 700 MHz C and D channel blocks into two unpaired contiguous 15 MHz licenses, as outlined in the tables in Attachment I.

**B. Utilizing Unpaired Licenses With Greater Bandwidth Will Allow TDD Systems To Provide Advanced Broadband Services With Unmatched Spectral Efficiency.**

TDD technology is a particularly efficient method for providing advanced broadband IP-based services. As the Broadband Task Force noted, broadband services typically require more spectrum for downstream transmissions than upstream transmissions, and are thus better suited to using larger unpaired blocks than symmetrical paired blocks.<sup>17</sup> In contrast, FDD systems utilize one paired channel for upstream and an identical channel for downstream, even though the upstream requirements typically can be met using a fraction of the bandwidth allotted. The

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Many aspects of the 3.6 GHz rules have been challenged by various parties seeking to transform this band into a licensed regime that would substantially reduce opportunities to access this band.

<sup>16</sup> *Broadband Access Task Force Report* at 63.

<sup>17</sup> As the Wireless Broadband Access Task Force noted, “[b]roadband services differ from traditional mobile telephony services in that they often involve a high volume of downstream traffic – the result of

inefficiency of FDD technology results in wasted and unused spectrum. The current generation of TDD systems are typically IP-based which results in high spectral efficiency when carrying IP-based traffic such as web pages, VoIP and streaming media.

Advancements in TDD technology – notably WiMax, but also to some extent WiFi, TD-CDMA, TD-SCDMA, WiBro, etc. – have made TDD systems even more efficient through the use of adaptive modulation, adaptive antenna systems and multiple-input, multiple-output (“MIMO”) enhancements, while also fully supporting high-speed mobility. Current standards also support multiple channel bandwidths, which increases the peak throughputs possible from each base station transmitter and end user device, while reducing the overhead percentages and capital expenditures (in terms of dollars/Mbps).

Assigning wider contiguous bandwidths to Unassigned 700 MHz Spectrum will provide better economies of scale for the operator, and will allow new entrants to better match the economics of larger incumbents. Specifically, although many current TDD systems can be implemented in hardware capable of operating within multiple, non-contiguous bandwidths under software control, a system that can focus on one or two wide bands (as opposed to multiple smaller bands) eliminates the redundancies in the transmission of some overhead and signaling information and the fixed TDD-turn around time. In this manner, wider channel bandwidths offer the ability to create more capacity with a fixed amount of capital.

Assigning unpaired spectrum in large blocks is more spectrum- and capital-efficient for TDD systems than paired allocations, due to elimination of redundant overhead messaging and TDD turnaround guard time, and owing to the fact that new technology allows end user devices and base stations to simultaneously utilize bandwidths of up to 10 MHz in one radio, with

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consumers/users downloading large music and video files, as well as graphics-rich content – and a lower volume of upstream traffic.” *Broadband Access Task Force Report* at 63.

additional spectrum able to be utilized for capacity expansion and frequency reuse planning. Unpaired spectrum also is well suited for multicast services, such as Qualcomm's MediaFLO service, that do not require a return path to the base station. In all events, operators seeking paired spectrum to deploy FDD systems can bid on multiple blocks in the Upper and/or Lower 700 MHz Bands to create an FDD channel pairing if an FDD configuration is desired.

### **III. CONCLUSION.**

The 700 MHz Band holds great promise for IP-based broadband wireless services, particularly next-generation services using the WiMAX standard, but the service rules, GSAs, channel bandwidth and band plan, originally conceived for nationwide CMRS service, are not optimal for next-generation broadband services utilizing TDD technology. Given that CMRS competition is more robust than ever, and FDD proponents have abundant spectrum opportunities, the Commission should amend the 700 MHz rules to maximize the band for broadband IP-based services using TDD technology. There is an acute need for TDD spectrum, particularly below 3 GHz, that can be used to provide advanced broadband IP-based services. Accordingly, NextWave urges the Commission to assign the Unlicensed 700 MHz Spectrum according to CMAs and EAs, and reband the spectrum to provide for larger unpaired channel blocks of 6-15 MHz.

Respectfully submitted,

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## ATTACHMENT I

### NextWave's Proposed Band Plans For Unassigned 700 MHz Spectrum

