

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

In the matter of	)	
	)	
Wireless Operations in the 3650-3700 MHz Band	)	ET Docket No. 04-151
	)	
Rules for Wireless Broadband Services in the 3650-3700 MHz Band	)	WT Docket No. 05-96
	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	ET Docket No. 02-380
	)	
Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band	)	ET Docket No. 98-237
	)	

**PETITION FOR RECONSIDERATION OF MOTOROLA, INC.**

Motorola, Inc. (“Motorola”) respectfully submits this petition for limited reconsideration of the FCC’s *Report and Order* in the above-captioned proceedings.<sup>1</sup> As an initial matter, Motorola commends the Commission for the tremendous progress made in permitting mobile operations in the 3650-3700 MHz (“3650 MHz”) band, and Motorola is pleased by the agency’s decision to adopt many proposals that Motorola supported.

Notwithstanding, Motorola urges the FCC to reconsider its decision to license the entire band on a non-exclusive basis and require that all future 3650 MHz spectrum licensees implement contention based protocols.<sup>2</sup> For the reasons described below, wide-scale deployment

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<sup>1</sup> See *Wireless Operations in the 3650-3700 MHz Band*, Report and Order and Memorandum Opinion and Order, ET Docket No. 04-151, FCC 05-56, Mar. 16, 2005 (“*Report and Order*”).

<sup>2</sup> See *Report and Order* at ¶¶ 55-58.

of contention-based protocols as required by the 3650 MHz *Report and Order* is fraught with both technical and administrative difficulties. Some revisions to the new rules are necessary.

To enable the rapid and successful deployment of broadband wireless services, the Commission should issue exclusive licenses. The 50 MHz band should be allocated in two 25 MHz blocks, and the adjacent licensees should be required to incorporate measures to control interference between licensees.<sup>3</sup> Since these licenses would be auctioned, Motorola also requests that the rules be placed in Part 27 with like Wireless Communications Services and that the license areas be based on recent population information to accurately reflect market sizes.

Exclusive licensed allocations would provide certainty of spectrum access for licensees and provide a valuable degree of harmonization with spectrum allocations in other countries. Exclusive allocations will allow Wireless Internet Service Providers (“WISPs”) and other service

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<sup>3</sup> To ensure compatibility between two adjacent licensed areas a field strength limit between 47 and 55 dB $\mu$ V/m should be employed at the boundaries. See Table entitled “Field Strength Limits for Selected Wireless Services” in Comments of WCA, NIA and CTN at 43, Sept. 8, 2003, *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, WT Docket No. 03-66.

Motorola believes that a level within this range will enable compatibility between licensed regions without unduly constraining equipment design. See *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, ¶ 106 (2004) (use of “boundary signal strength will ... facilitate coordination between co-channel licensees in adjacent areas” and “is a tried and true mechanism for managing and limiting co-channel interference as well as defining rights, obligations and expectations of all licensees in the band”). The two licensees of adjacent spectrum in the same area also may need to coordinate to ensure compatibility through including, for example, guard bands.

providers to rapidly deploy broadband services at 3650 MHz supporting mobile, transportable or fixed backhaul applications with a certain Quality of Service (“QoS”).<sup>4</sup>

Under the approach promulgated in the *Report and Order*, the Commission would issue an unlimited number of nationwide non-exclusive licenses. Each licensee will be authorized to operate on a shared basis with other licensees throughout the entire 50 MHz band, subject to restrictions in geographic areas currently used by Federal Government and Fixed Satellite Service stations.

To facilitate spectrum sharing, new fixed and mobile stations will be required to use “contention-based” protocols<sup>5</sup> that are to be defined by industry. Should interference issues arise, all licensees “are expected to cooperate and resolve th[e] problem by mutually satisfactory arrangements.”<sup>6</sup>

The FCC implemented a peak power limit of 25 Watts per 25 MHz bandwidth for fixed stations,<sup>7</sup> and a 1 Watt maximum peak EIRP over a 25 MHz bandwidth for mobile operations.<sup>8</sup>

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<sup>4</sup> The provision of a mobile/transportable broadband service will be on a limited basis due to requirements to share with incumbents as depicted in Appendix G of the *3650 MHz Allocation Order* and Appendix F of the *Report and Order*. See *Amendment of the Commission’s Rules With Regard to the 3650-3700 MHz Government Transfer Band; The 4.9 GHz Band Transferred from Federal Government Use*, First Report and Order and Second Notice of Proposed Rule Making, ET Docket No. 98-237, WT Docket No. 00-32, 15 FCC Rcd 20488 (2000) (“*3650 MHz Allocation Order*”), App. G; see also *Report and Order*, App. F.

<sup>5</sup> See *Report and Order* at ¶ 58.

<sup>6</sup> See new Rule Section 90.1319. See generally *Report and Order*, App. A.

<sup>7</sup> See *Report and Order* at ¶ 50.

<sup>8</sup> See *id.* at ¶ 52.

These power levels will allow communications over areas of several miles in point-to-point applications and up to several thousand feet in typical mobile applications.

These power levels, which were instituted to allow broader coverage, coupled with the requirement that new licensees implement a contention-based protocol, create troubling technical and administrative issues. For the reasons outlined below, the Commission should reconsider its non-exclusive licensing approach coupled with requiring use of a contention-based protocol in the 3650 MHz band.

Contention-based protocols require RF transceivers to listen before transmitting so they transmit only when the channel is clear. Where the transmitting device can communicate over long distances, it is often very difficult to determine whether a channel is truly clear, *i.e.*, whether the transmitting device will be interfered with or interfere with other unrelated communications. Where the transmitting device intends to transmit over a long distance, not only is there greater probability that multiple users also will be attempting to access the spectrum at that same time, but there also is reduced throughput because more users must remain silent for longer periods of time to avoid interference.

Contention-based protocols work best in small areas. Indeed, Wi-Fi technology, which implements a contention-based protocol, works well because it enables wireless connectivity in areas the size of a large conference room.<sup>9</sup> And, since Wi-Fi networks are usually non-overlapping and under the control of a single user, interference issues can be easily identified and

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<sup>9</sup> In addition, 2.4 GHz Wi-Fi devices have access to nearly twice the spectrum than is available at 3650 MHz. And, even the CS/CSMA contention-based protocol that is implemented in the 802.11 standards (at 2.4 GHz and elsewhere) results in interference between two operators in the same geographical space.

addressed. In contrast, 3650 MHz operations, pursuant to the *Report and Order*, would operate over much larger areas and be used by many unaffiliated users in both urban and rural areas. As a result, interference issues will be difficult to identify and remedy. Therefore, implementing the requirement that licensees “cooperate” and “resolve” interference “by mutually satisfactory arrangements” will be more easily said than done, particularly in dense urban areas.

Also, wireless devices that implement contention-based protocols to control access to spectrum must address the hidden node problem. The hidden node problem occurs when a signal that reaches a “hidden” receiver near to a sensing transceiver is drowned out by the transceiver’s transmissions because the transceiver does not sense the nearby signal due to local terrain. Because of the hidden node problem, devices that support short-range wireless applications often build in 20 to 30 dB of margin; however, the longer range communications allowed at 3650 MHz would present serious design challenges.<sup>10</sup>

These issues would make it very difficult to deploy any services that require a specific QoS in the 3650 MHz band. They also would rule out the use of viable “non-hotspot” broadband service using well-established standards such as 802.11 (“Wi-Fi”) and 802.16 (“Wi-MAX”).

There is also a timing issue. The FCC is relying on industry to develop flexible and efficient methods of complying with the contention-based protocols,<sup>11</sup> but the agency has not explained how it will determine compliance with the industry-developed protocol. Such development efforts will take time, and given the problems described above, the effort will need

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<sup>10</sup> See Comments of Motorola, Inc., *Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies*, ET Docket No. 03-108, May 3, 2004, at 9-14.

<sup>11</sup> See *Report and Order* at ¶ 49.

to address a number of novel issues; in particular, the difficulties of implementing a listen before talk mechanism over long distances and the hidden node problem.<sup>12</sup>

In conclusion, the Commission should reconsider its decisions to issue unlimited non-exclusive licenses and require contention-based protocols in the 3650 MHz band. The FCC should instead issue exclusive licenses because, given the long-range communications that are permitted by the *Report and Order*, the use of a contention-based protocol among multiple unaffiliated users will not allow rapid deployment at 3650 MHz nor offer the most efficient use of the spectrum, particularly in dense urban areas. Motorola requests that the spectrum be licensed in two 25 MHz blocks with license areas based on recent population information to accurately reflect market size. The combination of exclusive licensed use along with flexible technical standards and secondary market leasing provisions will offer the most efficient and rapid deployment of wireless broadband services across the U.S. using this new band.

Respectfully submitted,

/s/ Steve B. Sharkey  
Steve B. Sharkey  
Director, Spectrum and Standards Strategy

/s/ Robert D. Kubik  
Robert D. Kubik  
Manager, Spectrum and Regulatory Policy

Motorola, Inc.  
1350 I Street, N.W.  
Washington, D.C. 20005  
(202) 371-6900

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<sup>12</sup> If the contention-based protocol (and non-exclusive licensing) requirements are upheld, the FCC must decide how it will determine compliance with the protocol. The FCC also should change the phrase “contention protocol” to “contention mechanism.” The term “protocol” is often interpreted to be a specific approach/technology, and Motorola respectfully submits that the Commission does not want to be technology specific.