

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

In the matter of)	
)	
Unlicensed Operation in the Band 3650 – 3700 MHz)	ET Docket No. 04-151
)	
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
)	

COMMENTS OF MOTOROLA, INC.

Motorola, Inc. (“Motorola”) respectfully submits these comments in response to the FCC’s *Notice of Proposed Rule Making* (“*NPRM*”) in the above-captioned proceeding.¹ In this proceeding, the Commission is proposing rule changes to allow unlicensed devices to operate in either all, or portions of, the 3650-3700 MHz (“3650 MHz”) band under flexible technical limitations while relying on smart/cognitive features to prevent interference to incumbent services.

As a result of Congressional direction, the 3650 MHz band has been reallocated from Federal Government use and is now available for non-Government fixed and mobile terrestrial services (FS and MS) on a co-primary basis with grandfathered Fixed Satellite Service earth stations and Federal Government radiolocation operations.² For the past four years, the FCC and

¹ *In the Matter of Unlicensed Operation in the Band 3650 - 3700 MHz*, Notice of Proposed Rule Making, ET Docket No. 04-151, FCC 04-100 (April 23, 2004) (“*NPRM*”).

² *See, e.g., 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*”).

the wireless industry have struggled to identify the best use of this potentially valuable 50 MHz block. Unable to identify suitable paired spectrum that would elevate the utility of this spectrum for wide area, advanced wireless services using frequency division duplex (“FDD”) technologies,³ the *NPRM* reflects the Commission’s tentative conclusion that “permitting unlicensed operation in the 3650 MHz band would foster the introduction of new and advanced services to the American public, especially in rural areas, and will result in a more efficient use of spectrum.”⁴ To this end, the *NPRM* offers a series of proposals that would allow for the use of relatively high-powered unlicensed devices that would rely on advanced, smart radio techniques to prevent interference to grandfathered incumbents.

Fundamentally, Motorola does not concur that designating the 3650 MHz band primarily for unlicensed uses will maximize the efficient utilization of that band. In the first instance, the 3650 MHz band is unlikely to supplant the existing Part 15 frequency bands near 2.4 GHz and 5 GHz as a preferred home for product development because it offers neither vastly improved propagation characteristics nor sufficient bandwidth to offset the manufacturing economies of scale derived from international standards and allocations already in place for 2.4 and 5 GHz devices. The FCC proposes to entice unlicensed product development in the 3650 MHz band by offering higher operating powers, as high as 25 watts EIRP for fixed unlicensed transmitters.⁵ Such a proposal has the potential to be victimized by its own success – the limited bandwidth

³ See, e.g., *The 4.9 GHz Band Transferred from Federal Government Use*, WT Docket No 00-32, *Second Report and Order and Further Notice of Proposed Rulemaking*, FCC 02-47 (rel. February 27, 2002).

⁴ *NPRM* at ¶ 2.

⁵ *Id.* at ¶ 43.

available in the band could quickly be impacted by multiple “high powered” unlicensed broadband transmitters operating in the same area.

Motorola supports use of the 3650 MHz band on a licensed basis where wireless internet service providers (“WISPs”) or other service providers can access the band to provide broadband services for mobile, transportable or fixed backhaul services.⁶ Provision of this spectrum on a licensed basis will provide certainty of spectrum access for licensees and provide partial harmonization with many other regions of the world where this band is allocated on a licensed basis.⁷

Motorola believes that the Commission should forego employing the “commons model” of spectrum usage in this band. In comments filed last year in response to the FCC Staff’s Spectrum Policy Task Force Report, Motorola explained that additional spectrum should be allocated for future wide-area mobile services to meet the increasing demand for broadband mobile wireless services and that high speed, wide area services are difficult to provide using short-range unlicensed systems.⁸ Therefore, spectrum for such applications must be provided on an exclusive use basis.⁹ Motorola also recited the following technical and economic

⁶ The provision of mobile/transportable broadband services would likely be provided on a limited basis given the requirements to protect incumbents in the band. As shown in the map included in Appendix G of the *3650 MHz Allocation Order*, the coordination zones surrounding incumbent earth stations occupy a great portion of the eastern United States.

⁷ Licensing of frequencies in the immediate vicinity of 3.6 GHz is occurring around the world. For example, Europe has implemented licensed base services in this band in 10 countries per ERC/REC 12-8. China has already completed 2 rounds of licensing and is working on another. See http://www.globalsources.com/am/article_id/9000000050240/page/showarticle?action=GetArticle. Finally, Brazil completed its auction of 3.5 GHz licenses in 2003. See <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr112825e.html>.

⁸ Comments of Motorola, Inc., ET Docket No. 02-135, submitted January 27, 2003, at 20. See also, A White Paper on Future Federal Communications Commission Spectrum Policy, Motorola Inc., ET Docket No. 02-135, submitted August 30, 2002.

⁹ *Id.*

considerations as to why frequencies below 6 GHz are needed for future wide-area mobile services:

- *Transmit power is proportional to the data rate:* Thus broadband services are more readily accommodated at lower frequencies.
- *Infrastructure cost is inversely proportional to cell size:* Large cells are less costly and more economically viable than small cells.
- *Path loss is frequency dependent:* Larger cell sizes are possible at lower frequencies.
- *Propagation becomes line of sight at very high frequencies:* Signals lose the ability to penetrate or travel around objects at high frequencies, and this effect becomes significant above 6 GHz.
- *Doppler effects increase with frequency and vehicle speed:* Lower frequencies minimize Doppler effects, which is a significant factor for vehicular users.

As the 3650 MHz band falls well within this upper limit, the FCC should first exhaust its analysis to determine whether and how the band can best be utilized for advanced wireless services and fixed backhaul services on an exclusive licensed basis.¹⁰ Otherwise, allowing for high-powered unlicensed use of the 3650 MHz band via the subject *NPRM* will eliminate the opportunity to establish licensed services.

¹⁰ Motorola recognizes that the 3650 MHz band is presently allocated for fixed and mobile (base station) services and that the FCC previously rejected Motorola's request that the allocation specifically support mobile devices including nomadic or temporary fixed transmitters. See *3650 MHz Allocation Order* at ¶ 18. In so doing, the Commission's stated concern was the ability of mobile transmitters to protect grandfathered Fixed Satellite Service earth stations. *Id* at ¶ 17. We note that in the subject *NPRM*, the Commission is considering adopting rules that would allow for "non-fixed" unlicensed transmitters to operate with up to 1 watt EIRP and have proposed a variety of techniques and protocols to ensure non-operation within the protected zones of the grandfathered earth stations. *NPRM* at ¶¶ 48-54. To the extent that such techniques are successful at preventing interference caused by unlicensed "non-fixed" transmitting devices, they should be equally useful for licensed mobile transmitters. Motorola therefore urges the FCC to remove the limitation on mobile transmitter use that currently resides in the domestic table of allocations.

Earlier this year, Motorola expressed this same concern to the National Telecommunications and Information Administration (“NTIA”) arguing that “amending Part 15 to allow unlicensed operation in this band would be premature at this time.”¹¹ Motorola explained that the FCC has yet to establish service rules for licensed uses of the 3650 MHz band and that without full understanding of the protection requirements for future uses it is difficult, if not impossible, to fully determine operational requirements for unlicensed devices.¹² To that end, Motorola stressed that “due to the dynamic nature of mobile operations, there is no readily apparent technological solution that would enable unlicensed secondary use without causing harmful interference to licensed [mobile] services” thus implying that unfettered unlicensed deployment would preclude licensed mobile use of the band.¹³ Motorola ultimately recommended that instead of pursuing rules for unlicensed operation of the 3650 MHz band, “the Commission should instead focus on developing the licensing and service rules so that new licensed fixed and mobile services can be deployed” in the 3650 MHz band.¹⁴

Motorola thus believes that the FCC should defer consideration of unlicensed use of the 3650 MHz band until it is satisfied that no viable opportunities exist to utilize the band for mobile uses. With the recent allocation of some 230 MHz of additional spectrum in the 5.8 GHz band and other spectrum opportunities for unlicensed uses currently under consideration,¹⁵ the

¹¹ Comments Of Motorola, Inc., NTIA Docket No. 040116021-4021-01, February 27, 2004, at 4.

¹² *Id.*

¹³ *Id.* at 3.

¹⁴ *Id.* at 4.

¹⁵ *See, e.g., Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, Notice of Proposed Rule Making, rel. May 25, 2004.

market for unlicensed broadband devices will not be negatively affected by any delay in the availability of this spectrum.

While pairing the 3650 MHz band with a suitable symmetrical block would be the ideal solution as it would allow for the establishment of service rules similar to that used for the Broadband PCS service, Motorola believes that the potential exists to utilize the band for wide-area mobile broadband services using some form of time division duplex (“TDD”) technology. To minimize coexistence issues between multiple TDD licensees in the same area, the FCC could license the band as a 50 MHz block. Service areas could be relatively small to provide for a more robust competitive environment and assist in the provision of services to rural markets. Likewise, licensees would be able to take advantage of the FCC’s secondary markets leasing provisions to respond to unique spectrum opportunities on a market-by-market basis.

Alternatively, the FCC could establish three licensed blocks of, for example, two 20 MHz blocks separated by a 10 MHz block to provide at least two potential service providers in any geographic area. While further study is needed to determine the detailed coordination requirements to enable the coexistence of multiple licensees operating unsynchronized TDD systems in adjacent bands in the same market, Motorola’s preliminary analysis indicates that factors such as site location selection and a 10 MHz guard band can provide adequate isolation to enable co-existence. The guard band can be used for point-to-point backhaul operations where careful site engineering would be applied on a case-by-case basis to avoid interference to the TDD operations.

Regardless of the band plan chosen, the key point is that deploying licensed services in the 3650 MHz band will not preclude the opportunity to utilize the band for mobile services. The combination of flexible technical standards and secondary market leasing provisions will

provide licensees with the opportunity to better respond to changing market conditions and future technological advances. Motorola therefore urges the FCC to reconsider its proposal to convert the 3650 MHz band into an unlicensed band and instead issue licenses for flexible advanced wireless services.

Respectfully submitted,

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