

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20054

In the Matter of	)	
	)	
Motorola, Inc. Request for Interpretation	)	WT Docket No. 10-74
or Waiver of Section 90.267 Regarding	)	
450-470 MHz Band Low Power Operations	)	

**REPLY COMMENTS OF MOTOROLA, INC.**

Motorola Inc. (“Motorola”) respectfully submits these replies to comments filed in response to its request for waiver of Section 90.267.<sup>1</sup> As further discussed below, Motorola believes that the public interest is served by grant of the proposed blanket waiver under certain conditions that can be monitored through the application and coordination process.

**I. INTRODUCTION AND BACKGROUND**

Motorola filed a request for the Commission to clarify that the standard 5 MHz separation requirement between paired base and mobile transmit frequencies in the 450-470 MHz band under Section 90.173(i)<sup>2</sup> of the Commission’s Rules does not apply to low power operations authorized under Section 90.267.<sup>3</sup> In the alternative, Motorola requested that the Commission grant a blanket waiver of those standard separation provisions for all such low power systems. The Commission issued a Public Notice<sup>4</sup> on March 19, 2010, seeking comments on Motorola’s request. The Association of Public-Safety Communications Officials-International, Inc. (“APCO”) and the Enterprise Wireless Alliance (“EWA”) filed timely comments to the staff’s

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<sup>1</sup> Motorola Inc. Request for Declaratory Ruling or, in the Alternative, Waiver of the Commission’s Rules, WT Docket No. 10-74 (filed Mar. 4, 2010).

<sup>2</sup> 47 C.F.R. § 90.173(i).

<sup>3</sup> 47 C.F.R. § 90.267.

<sup>4</sup> Wireless Telecommunications Bureau Seeks Comment on Motorola, Inc. Request for Interpretation or Waiver of Section 90.267 of the Commission's Rules Regarding 450-470 MHz Band Low Power Operations, WT Docket No. 10-74, Public Notice (rel. March 29, 2010).

public notice. An unsigned pleading, attributed to Scott Adams in the Commission's Electronic Comment Filing System, was filed after the comment period deadline.

EWA supports Motorola's aim to make more effective use of the spectrum available to Part 90 licensees and agrees that a regulatory solution should exist to address situations where intermodulation interference can be predicted to occur, but expressed concerns of possible interference issues in certain situations.<sup>5</sup> EWA suggests that the Commission consider limiting non-standard frequency pair assignments to situations where intermodulation interference problems arise under normal separations and where radio transmissions can be contained within facilities with little or no "leakage" to the outside. EWA thus "encourages Motorola to define in greater detail the factual circumstances in which it expects the need for non-standard low power channel pairing to arise."<sup>6</sup> Similarly, while APCO states that it generally opposes blanket waivers such as the one Motorola proposes, it "would not object to case-by-case waivers . . . where good cause is shown, and where there is no risk of interference to public safety operations or disruption of frequency coordination procedures."<sup>7</sup>

The concerns of APCO and EWA boil down to interference that would be potentially created by non-standard frequency pair operation on the low power pool channels. Motorola takes these issues very seriously and believes that, on a whole, the proposed solution resolves more interference concerns than it raises. Motorola believes that there is no inherent advantage to repeaters operating on non-standard frequency pairs other than protection from intermodulation interference. Therefore, the devices will not create a new market that

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<sup>5</sup> Comments of the Enterprise Wireless Association, WT Docket No. 10-74, at 2 (filed April 19, 2010).

<sup>6</sup> *Id.* at 3-4.

<sup>7</sup> Comments of APCO, WT Docket No. 10-74, at 2 (filed April 19, 2010).

supercedes standard operation and will not become the rule, rather than the exception. Still, Motorola believes that there are numerous instances where licensees would benefit from deploying repeaters with spacing beyond 5 MHz to warrant the blanket waiver.

**II. GRANT OF THE WAIVER WILL NOT CAUSE INTERFERENCE TO OPERATIONS IN THE 450-470 MHZ BAND**

As an initial matter, Motorola concedes that waiver of the Commission's rules is appropriate for the relief sought here and therefore withdraws that portion of its request that seeks a declaratory ruling that the provisions of Section 90.173(i) do not apply to frequencies available under Section 90.267 of the rules. In these reply comments, Motorola hopes to dispel any concerns of interference to support its contention that grant of the waiver would not undermine the intent of Section 90.173(i). As explained below, by adopting simple, common-sense conditions, the Commission can ensure that devices operating pursuant to the blanket waiver will not cause an increase in harmful interference.

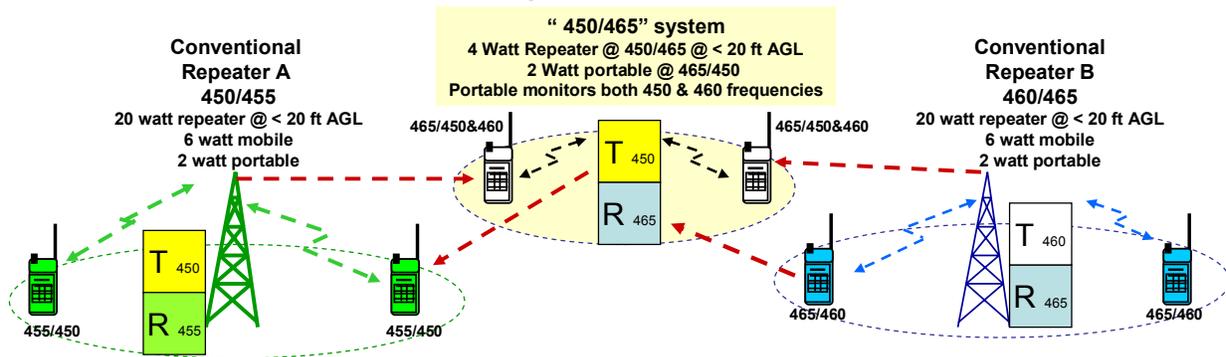
Section 90.267 provides two sets of frequency pairs; the first come from the 450-455 MHz and 455-460 MHz bands and the second comes from the 460-465 MHz and 465-470 MHz bands. Standard low power repeaters operating on the lower set of frequency pairs have their base transmit frequencies in the 450-455 MHz band and their mobile transmit frequencies (*i.e.*, base receive frequencies) in the 455-460 MHz band. This configuration is referred to here as a "450 repeater". Similarly, standard low power repeaters operating on the upper set of frequency pairs have their base transmit frequencies in the 460-465 MHz band and their mobile transmit frequencies (*i.e.*, base receive frequencies) in the 465-470 MHz band. This configuration is referred to here as a "460 repeater".

If granted, Motorola's blanket waiver would authorize a "450/465 repeater" with the base transmit frequencies located in the 450-455 MHz band and the mobile transmit (base receive)

frequencies in the 465-470 MHz band. To be clear, Motorola believes that a condition of the blanket waiver should be that the proposed system maintain the standard orientation of base transmit frequencies on the low side of the pair and mobile transmit frequencies operating on the high side. Maintaining this configuration minimizes potential interference that could occur if bases transmitted on the mobile half of the pair and vice versa.

The following figure shows a 450 repeater, a 460 repeater and a 450/465 repeater operating in the same geographic area. Motorola believes that with additional monitoring requirements imposed on the 450/465 repeater operations, users of the 450 repeater and the 460 repeater will not experience additional interference risks by the authorization of the 450/465 repeater.

### Scenario - "450/465 repeater" system



#### "450/465 Rptr" portable

- Can monitor distant 450/455 Rptr A output directly on 450
  - won't transmit if portable hear distant activity on 450
- Allows it to indirectly monitor subscriber activity on 455

#### Conv 450/455 Rptr A subscriber

- Can monitor "450/465 Rptr" output directly on 450
  - won't transmit if subscriber hears distant activity on 450
- Allows it to indirectly monitor subscriber activity on 465
  - reduces potential interference from Rptr A subscriber to 450/465 portable

450 MHz frequency is coordinated

*\* Assume all subscribers monitor channel before transmitting or have channel activity indicator.*

#### "450/465 Rptr" portable

- Can monitor other "450/465" Rptrs output directly on 450
  - won't transmit if portable hears activity on 450
- Allows it to indirectly monitor subscriber activity on 465

#### Conv 460/465 Rptr B subscriber

- Can monitor 460/465 Rptr B input directly on 460
  - "450/465" portable also scans paired 460 frequency
  - won't transmit if portable hears activity on 460
- Allows it to indirectly monitor subscriber activity on 465
- Could also be programmed to monitor 465 frequency

#### Conventional 460/465 Rptr B subscriber

- Can not monitor "450/465 Rptr" on 450
- When Rptr B subscriber keys it might interfere with nearby "450/465 Rptr" Rcvr on 465. No different than subscribers operating in direct mode on 465 channel.
- Could be reduced by "450/465" portables monitoring 465 channel for subscriber activity.
- "450/465 Rptr" could be moved to another coordinated CH/Rx freq to avoid interference as necessary.

460 MHz frequency is coordinated

Grant of a 450/465 repeater poses no unique operational issues for the 450 repeater. The base transmit frequencies would be coordinated, as typical. Further, subscribers or mobile users on the 450/465 MHz repeater would be able to monitor co-channel activity on their paired 450 MHz frequency before transmitting. This is similar to mobile users of a co-channel 450 repeater transmitting on 455 MHz frequencies and not 465 MHz frequencies. Therefore, the 450 repeater operator is not affected by the authorization of the 450/465 repeater any more than it would be if another 450 repeater using standard paired frequencies were authorized in the same area.

The 460 MHz repeater can be similarly protected by adopting the following conditions to the blanket waiver. First, applicants for a 450/465 repeater should be coordinated for the 460 MHz base transmit frequency. Second, the mobile users of the 450/465 repeater should be required to monitor activity on the base transmit repeater frequency in the 460 MHz band that is normally paired with the 465 MHz mobile transmit frequency used by the 450/465 repeater.<sup>8</sup> This combination of monitoring and coordination should prevent any increase in harmful interference to 460 repeater operation.

Motorola notes that these recommendations will not eliminate potential interference from nearby portable units operating on a 460 repeater to the base receivers of a 450/465 repeater. Subscriber equipment designed to operate on standard pairing on the 460/465 MHz channels can not monitor base transmit frequencies in the 450 MHz band. Those operating pursuant to the blanket waiver would need to tolerate this interference from nearby subscriber devices operating on 460 MHz repeaters.

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<sup>8</sup> Mobile/portable devices designed to operate on 450/465 repeaters will be able to monitor the repeater output frequencies of relevant 450/455 repeaters and 460/465 repeaters so the obligation to monitor both can be satisfied by the end user.

Motorola believes that these operational features render any potential increase in interference potential from 450/465 repeaters negligible when compared to that of other low power repeaters operating on standard paired frequencies. Motorola notes that licensees would be likely to take advantage of this option in order to resolve interference scenarios and to receive a higher quality of service on the low power pool channels. That said, Motorola appreciates the need to protect public safety communications. While we believe that there are situations where a public safety or government entity would benefit from the deployment of low power repeaters on non-standard frequency pairs, we recommend that the terms of any blanket waiver provided by the Commission not apply to those low power pool frequencies reserved for public safety use.<sup>9</sup> Should the operational requirements of governmental entity require such technology, Motorola recommends that they be required to pursue a specific waiver based on a case-by-case review of the facts involved.

### **III. GRANT OF THE WAIVER WILL SERVE THE PUBLIC INTEREST**

A blanket waiver with the conditions discussed herein will serve the public interest by making available to the public a much-needed new option for enhancing the reliability of low power systems.<sup>10</sup> Motorola has performed extensive market research into various industry segments and found significant demand for a low power repeater or mobile relay device to provide more reliable operation to multiple end users. This device would be limited to

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<sup>9</sup> Specifically, those frequencies available under Section 90.267(g) of the Commission's Rules.

<sup>10</sup> Motorola would consider other conditions that allow enterprise and business organization the opportunity to improve their communications capabilities on the low power pool channels. For example, while most frequencies available under Section 90.267 are already restricted to antennas heights less than 75 feet above ground level, an appropriate HAAT restriction also could be imposed. Limiting the blanket waiver to applications that specify transmitting antennas below a certain HAAT limit, would eliminate mountain-top sites, tall buildings and towers and help ensure that the provide coverage only over limited areas.

operations on the low power pool frequencies available under Section 90.267 of the rules to take advantage of the operational flexibility as well as the protections afforded through the frequency coordination process. Low power products envisioned would be portable and appropriately sized to facilitate ease of installation. The device could be powered from a variety of sources including AC, 12 volt auto, and rechargeable batteries. The device would be frequency agile across the available low power channels, within any constraints imposed to minimize concerns of interference, and easily programmable to allowable channels by dealers or authorized technicians. It would have the ability to serve multiple end users over a single frequency pair while allowing for the deployment of multiple repeaters at the same approximate location. Motorola believes that such a device would address a variety of “business critical” operational scenarios.

Construction sites, for example, require communications over limited areas that are best served by low power systems. However, the critical communication path between supervisors on the ground and the crane operators is a complex radio environment that changes as the building’s construction progresses. Obstructions that didn’t exist at the beginning of the project are introduced and can interfere with communications to the crane operator, making it necessary to adjust the location or operation of the repeater. In addition, the work force at a construction site is constantly evolving as well with different crews from different sub-contractors are called on throughout the project for support. Interoperability becomes a key safety issue if all workers are not able to communicate over the same network.

As another example, the management of events such as concerts, sports activities and conventions require multiple work teams communicating in defined areas that are typically very challenging RF environments. Deploying a single low power portable repeater for these events

limits users to one talk group that can leave gaps in coverage. Deploying multiple repeaters in a confined area increases the potential for intermodulation interference.<sup>11</sup>

The portable repeater being developed by Motorola to serve these and other public interest needs and to overcome intermodulation interference in these environments is well suited for operations on the low power pool channels of Section 90.267. There are sufficient frequencies available and the key technical parameters, namely operating power, are sufficient for effective communications. The limiting factor is the requirement in Section 90.173(i) that both halves of a 450 MHz frequency pairs be separated by 5 MHz. Motorola recognizes the concerns that have been raised that deviating from the 5 MHz separation for the proposed 4W devices could result in new interference scenarios, however, Motorola is confident that the additional safeguards proposed herein—that the 450/465 be coordinated for, and that portable units monitor, the 460 MHz base transmissions in addition to the normal 450 MHz operations—address these concerns and ensure that the risk of interference is not increased. Motorola believes that good cause exists to issue a blanket waiver for eligible Part 90 users in order for applications to use such devices be approved on a routine basis.

Respectfully Submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey

Senior Director

Regulatory and Spectrum Policy

Motorola, Inc.

1455 Pennsylvania Avenue, NW

Suite 900

Washington, DC 20004

TEL: 202.371.6900

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<sup>11</sup> See, *In the matter of Cavalier Operating Co., LLC Request for Waiver of the 5 MHz Separation Requirements of 47 C.F.R. § 90.173(i)*, Order, DA 07-1730, released April 17, 2007 (“Cavalier Waiver Order”).