

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Review of the Commission’s Rules Governing the 896-901/935-940 MHz Band	)	WT Docket No. 17-200
	)	
Realignment of the 896-901/935-940 MHz Band to Create a Private Enterprise Broadband Allocation	)	RM-11738 (Terminated)
	)	
Amendment of the Commission’s Rules to Allow for Specialized Mobile Radio Services Over 900 MHz	)	RM-11755 (Terminated)
Business/Industrial/Land Transportation Frequencies	)	

**Comments of Motorola Solutions, Inc.**

Motorola Solutions, Inc. (“Motorola Solutions”) hereby submits these comments in response to the Commission’s Notice of Inquiry (“NOI”) in the above-captioned proceeding.<sup>1</sup> As discussed below, Motorola Solutions supports this inquiry to adopt new rules that improve the efficient use of the 896-901/935-940 MHz (“900 MHz”) band in ways that best meet the needs of private land mobile radio (“PLMR”) users. In so doing, the Commission must remain mindful to preserve the rights of incumbent narrowband systems and enable such networks to operate without increased potential for interference.

**I. BACKGROUND**

The 900 MHz band is comprised of 399 channel pairs<sup>2</sup> that are based on a standardized narrowband channel bandwidth of 12.5 kHz.<sup>3</sup> The available channels are divided nearly evenly

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<sup>1</sup> *Review of the Commission’s Rules Governing the 896-901/935-940 MHz Band*, WT Docket No. 17-200, *Notice of Inquiry*, 32 FCC Rcd 6421 (2017) (“NOI”).

<sup>2</sup> 47 C.F.R. § 90.613.

between the Specialized Mobile Radio (“SMR”) pool (200 channel pairs) and the Business/Industrial/Land Transportation (“B/ILT”) pool (199 channel pairs).<sup>4</sup> Channels allotted to the two service pools are interleaved throughout the band, which inhibits licensees from aggregating the necessary number of contiguous channels to create broadband channels.

In large measure, the instant inquiry was initiated by a Petition for Rulemaking filed jointly by the Enterprise Wireless Alliance (“EWA”) and Pacific DataVision (“PDV”) to create a new Private Enterprise Broadband (“PEBB”) allocation within the 900 MHz.<sup>5</sup> The stated goal of that Petition is to facilitate the reconfiguration of the 900 MHz band in a manner that would enable PEBB licensees to deploy wireless broadband systems dedicated to meeting the needs of the Critical Infrastructure Industries (“CII”) and the B/ILT user communities.<sup>6</sup>

The Petition proposed that the Commission create the PEBB allocation using 240 contiguous channel pairs located in the upper 3 MHz of the 900 MHz band (*i.e.*, 898-901/937-940 MHz).<sup>7</sup> The remaining spectrum (896-898/935-937 MHz) would remain available for both site-based and geographic-area narrowband operations.<sup>8</sup> A PEBB licensee would be permitted to negotiate with non-affiliated incumbent licensees operating in the PEBB allocation to relocate the incumbents to comparable facilities in the narrowband portion of the band or to otherwise

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<sup>3</sup> 47 C.F.R. § 90.209.

<sup>4</sup> 47 C.F.R. § 90.617.

<sup>5</sup> Petition for Rulemaking of the Enterprise Wireless Alliance and Pacific DataVision, Inc., RM-11738, filed Nov. 17, 2014 (“Petition”).

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

<sup>7</sup> *Id.* at 14.

<sup>8</sup> *Id.* at 15.

accommodate their communications needs.<sup>9</sup> An incumbent would not be obligated to relocate if acceptable replacement frequencies are not available.<sup>10</sup> All costs associated with relocation would be paid by the PEBB licensee.<sup>11</sup>

To be clear, the NOI is a broader inquiry into the rules applicable to the 900 MHz band and is not solely focused on EWA/PDV Petition. The NOI instead seeks comment on the broader question of whether the public interest would be served by making changes to the existing 900 MHz service rules and poses a series of questions on concepts and proposals related to: 1) increasing operational flexibility in the band while retaining the existing band configuration,<sup>12</sup> or 2) reconfiguring the band in order to create opportunities for broadband service.<sup>13</sup>

## **II. COMMENTS.**

Motorola Solutions agrees that the time is ripe to engage in a broad review of the 900 MHz service rules and urges the Commission to seek changes that improve the efficient use of the spectrum while preserving the original intent of the allocation to provide communications solutions tailored for private land mobile users. The fundamental regulatory framework for the band was conceived and designed over 30 years ago and it is appropriate to consider how newer technologies can better the meet the needs of the private land mobile community.

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<sup>9</sup> *Id.* at 15-16.

<sup>10</sup> *Id.*

<sup>11</sup> *Id.*

<sup>12</sup> NOI at ¶ 19.

<sup>13</sup> *Id.* at ¶ 26.

While the proceeding is intended to be a broader inquiry, the principle proposals on the table are found within EWA/PDV's Petition to reconfigure the band to create a broadband channel in the upper 3 MHz of the band. It is appropriate to give this proposal priority consideration as PDV is the predominant licensee in the 900 MHz band. In many areas of the country, PDV holds the over-whelming majority (if not all) of the available SMR channels as well as some of the B/ILT channels. Through the size of its spectrum holdings in the band, PDV is uniquely able to influence the near-term and future use of the band. As such, their vision for how the band should be best utilized should be afforded strong consideration.

That said, Motorola Solutions has consistently stated since the filing of the Petition that in considering whether to enable broadband service in the 900 MHz band, "the rights of incumbent licensees must be preserved."<sup>14</sup> Motorola Solutions further amplified on that overarching view by stating:<sup>15</sup>

[t]he key to the successful implementation of the EWA/PDV broadband concept is to ensure that the rights of incumbent narrowband licensees are fully protected. This means that narrowband licensees should not be subject to diminished performance, coverage, or capacity in order to accommodate new broadband deployment. Further, all incumbent costs for any frequency relocation or system modification should be fully funded by the PEBB licensee. This obligation should include responsibility for full life-cycle equipment replacement costs and any additional costs for maintenance and infrastructure – including new transmitting sites – that may be needed to ensure that the narrowband incumbents are made whole.

During the course of this proceeding, Motorola Solutions will pay particular attention to the potential interference scenarios introduced by allowing broadband and narrowband networks to coexist in close spectral proximity in a narrow (5 x 5 megahertz) bandwidth. It is in no one's

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<sup>14</sup> MSI January 12, 2015 comments at 3.

<sup>15</sup> MSI June 29, 2015 Further Comments at 2.

interest, particularly PDV's, to realign the band in a manner that re-creates the interference scenarios that occurred in the 800 MHz band and which led to the costly and disruptive band reconfiguration process. For this reason, Motorola Solutions previously objected to the initial proposal to characterize degradation to harmful interference to an incumbent system only if the protected receiver had a desired median signal strength of -88 dBm (mobiles) or -85 dBm (portable handhelds).<sup>16</sup> Noting that its 900 MHz products are designed to provide reliable service with signals much lower than -88/-85 dBm, Motorola Solutions urged the Commission to consider protection standards below -88/-85 dBm.<sup>17</sup> In response, EWA/PDV increased the level of protection afforded incumbent under its proposal to a median signal strength of -98 dBm for mobiles and -95 dBm for portables.<sup>18</sup> That concession is appreciated and appropriate – technical service rules should be designed to ensure that incidents of interference are rare.

If the 900 MHz band is to be home to both narrowband and broadband systems, the industry should be comfortable that potential interference caused by out-of-band emissions (OOBE) and intermodulation is confined to minimum levels. OOBE enters receivers on other channels and sums with the thermal noise floor of the receiver. Since the interference is due to noise that is on-channel to receiver, there is nothing that can be done at the receiver to mitigate interference due to OOBE. Filter performance of the broadband transmitter is therefore critical to minimize interference from OOBE.<sup>19</sup>

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<sup>16</sup> *Id.*

<sup>17</sup> *Id.*

<sup>18</sup> Reply Comments of the Enterprise Wireless Alliance and Pacific Datavision, Inc., July 14, 2015, at 10.

<sup>19</sup> Not to be ignored is OOBE from the broadband handset which, under certain operating conditions such as maximum transmit power with all resource blocks active, could present close-

Motorola Solutions is also investigating the impact of receiver intermodulation (“IM”) on incumbent narrowband systems. Historically, IM was thought of as individual carriers at particular frequencies intermodulating such that the products would fall on particular, unfortunate frequencies. Broadband signals change this considerably for a couple of reasons. First, it is not possible to avoid IM through judicious frequency selection since broadband signals can occupy much or all of a band. Further, the IM products produced by broadband signals are themselves broadband and can span the whole receive band.

For the most part, interference due to IM may be mitigated by improving the characteristics of the receiver itself, but there are practical limits. Experience gained through the cellular/public safety interference problems of the 800 MHz band indicated that increasing the IM rejection (“IMR”) specification of the narrowband receiver to 80 dB, utilizing an automatic RF attenuator in the receiver front-end, and reducing preselector bandwidth to the minimum necessary to cover the LMR band eliminated a very high percentage of IM interference cases. However, most incumbent narrowband receivers do not achieve that level (*i.e.*, 80 dB) of IMR. Further, the 800 MHz experience is not directly applicable to 900 MHz due to the lack of sizeable guard bands separating narrowband from broadband networks in the proposed 900 MHz plan.<sup>20</sup>

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in OOB that is only 20 dB or so below the main channel power spectral density level. Such levels give rise to interference concerns with LMR base receivers.

<sup>20</sup> As the Commission is aware, the 800 MHz band plan provides a 1 MHz wide guard band (816-817/861-862 MHz) and a 1 MHz wide transition band (815-816/861-862 MHz) to serve to segregate LTE broadband networks from traditional LMR networks. That amount of separation will not be available in a reconfigured 900 MHz band.

The Commission will need to consider addressing other operating parameters to continue providing a reasonable environment for LMR networks, for example Power on Ground (“POG”), OOB, IMR and guardbands.

### **III. CONCLUSION.**

Motorola Solutions is a strong supporter of innovations that improve communications options for private land mobile users. We therefore support further investigations into how the rules for the 900 MHz can be enhanced to best meet the needs of private land mobile radio users. We look forward to helping the Commission find the optimal solutions that improve the efficient use of the 900 MHz band without undermining the performance of incumbent networks.

Respectfully Submitted,

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