

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of: )  
 ) RM No. \_\_\_\_\_  
Preventing Interference in Public )  
Safety Frequencies By Requiring H )  
Mask and Mutual Aid for Digital )  
Technologies )  
 )

**PETITION FOR RULEMAKING**

Harris Corporation (Harris), pursuant to 47 C.F.R. §1.41, respectfully seeks that the Federal Communications Commission’s (Commission) take specific actions that, due to recent activity, are necessary to protect public safety first responders from interference that will jeopardize critical communications, and that will enhance realization of interoperability on the designated mutual aid channels in the VHF, UHF and 800 MHz spectrum. Specifically, Harris requests the Commission initiate a rulemaking to:

- 1) Require, on a technology-neutral basis, digitally-modulated signals be certified under the H-Mask for use in public safety spectrum.
- 2) Pending final resolution of this rulemaking, prohibit any digital technology not meeting the H-Mask emissions requirements from operating in public safety spectrum.
- 3) Adopt equipment certification “technical” mandates for operation on the mutual aid channels designated in §90.203(i) and §90.203(j)(1)<sup>1</sup>.

**I. Mask H is Used by Manufacturers in Public Safety Spectrum to Avoid Interference to First Responders.**

Commission rules currently permit type certification with different masks. Mask B is used for systems that contain audio filtering. This mask is referenced to the emissions

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<sup>1</sup> 47 C.F.R. §90.203(i) and 47 C.F.R. §90.203(j)(1)

<sup>2</sup> See 47 C.F.R. § 90.210(b).

<sup>3</sup> See 47 C.F.R. § 90.210(h).

<sup>4</sup> OpenSky™ 4-slot TDMA, NPSPAC, FCC ID Nos. BV8MBS800A075, BV8P-801T, and BV8M803M.

<sup>5</sup> See Letter from Jose M. Martin, Executive Vice President & Chief Operating Officer, PowerTrunk, Inc.

bandwidth of the signal and is not applied to digitally modulated signals.<sup>2</sup> Mask H is used for systems that do not contain audio filtering.<sup>3</sup> This mask is independent of emissions bandwidth and is used for digitally modulated signals. Under emissions Mask B, waveforms emit considerable amounts of energy in the two adjacent channels 12.5 kHz away from the channel center. It is widely accepted in the public safety community that the use of Mask B when selecting applicable masks for equipment employing digital modulation would result in unacceptable levels of interference to incumbent public safety systems. The interference potential in a typical scenario is illustrated in the table below. The table shows the difference in Adjacent Channel Power (ACP) for different TDMA technologies. ACP is typically defined as the ratio of the average power in the adjacent frequency channel to the average power in the transmitted frequency channel. In this case the adjacent channel is assumed to be a typical P25 receiver.

System	ACP (measured in a 6 kHz bandwidth at a 12.5 kHz offset)
“low power TETRA” 4-slot TDMA system compliant to the B mask	-22 dBc
4-slot TDMA system <sup>4</sup> compliant to the H mask	-46 dBc

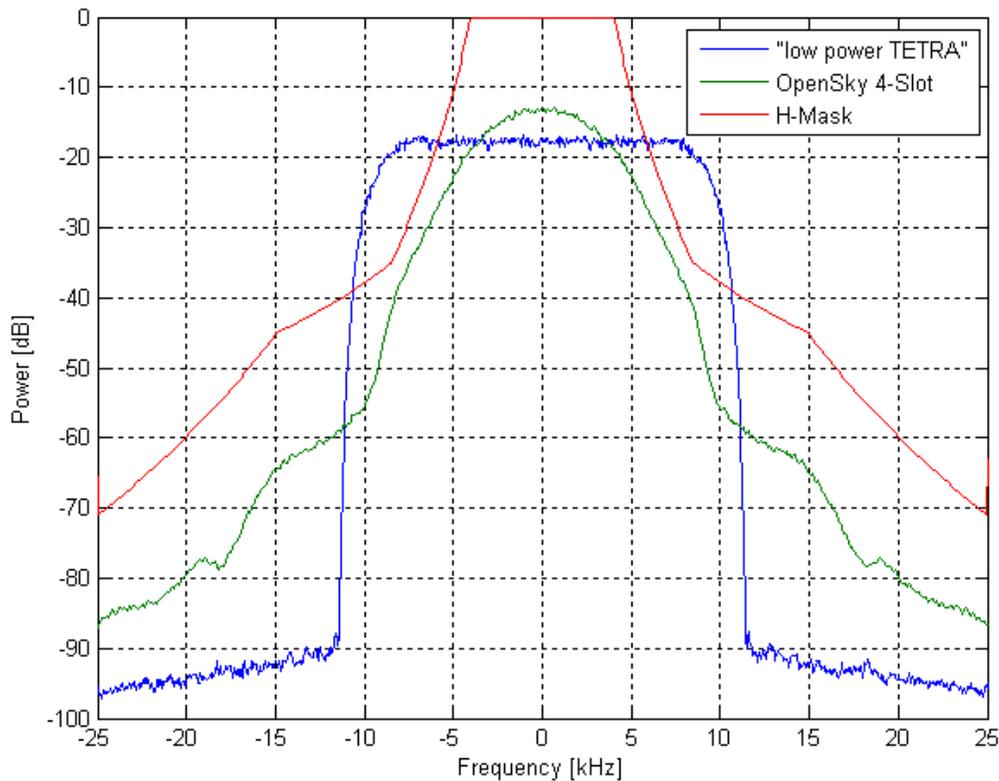
The spectrum emission plots associated with the systems referenced in the table immediately above are shown overlaid on the H mask in the following figure.

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<sup>2</sup> See 47 C.F.R. § 90.210(b).

<sup>3</sup> See 47 C.F.R. § 90.210(h).

<sup>4</sup> OpenSky™ 4-slot TDMA, NPSPAC, FCC ID Nos. BV8MBS800A075, BV8P-801T, and BV8M803M.



The 24 dB decrease in interference protection, in the very realistic scenario presented, must be considered unacceptable.

In fact, due to long-accepted interference concerns, Mask B is not commonly the emissions mask used for digital technologies in public safety frequencies. Accordingly, public safety equipment manufacturers have not utilized the “audio low-pass filter” proviso of Mask B in the case of digitally modulated equipment. The fear is that use of the “audio low-pass filter” proviso could lead to the creation of interference, as illustrated above in most if not all Land Mobile Radio frequency bands similar to the situation created in the 800 MHz spectrum, which resulted in 800 MHz “Reconfiguration.”

As is evident, allowance of any Mask B technology operating in or in the vicinity of public safety spectrum will have significant impact upon incumbent public safety systems.

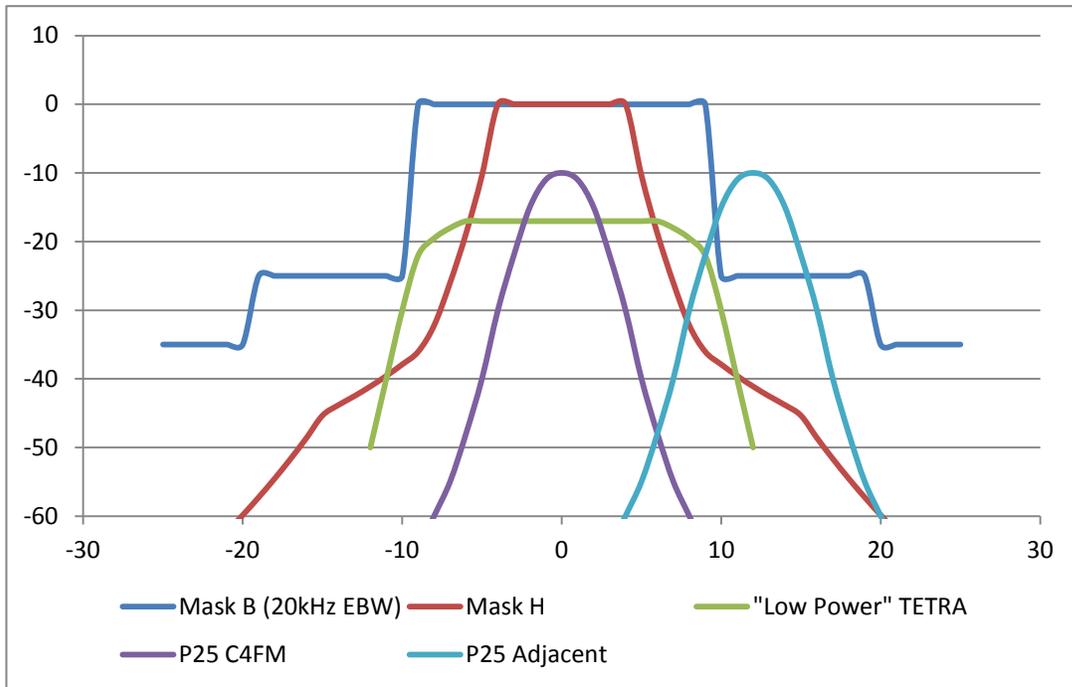
## **II. Need for Rulemaking Mandating Use of Mask H.**

Until recently, manufacturers generally have interpreted Part 90 rules to preclude use of Mask B in public safety frequencies due to the obvious and inevitable interference facing first responders should Mask B be applied in public safety frequencies. To be specific, digital technology meeting the more stringent Mask H emissions requirements is almost universally utilized in public safety frequencies used by first responders and others protecting life, health, and property.

However, there have been recent attempts to utilize digital equipment only certified to Mask B on public safety channels.<sup>5</sup> These products meet the Mask B emissions standard, but fail that of Mask H. The graphic below demonstrates this fact and clearly shows the inevitable interference that will result if digital equipment only meeting Mask B are utilized in or near public safety frequencies where other technologies, compliant with Mask H operate.

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<sup>5</sup> See Letter from Jose M. Martin, Executive Vice President & Chief Operating Officer, PowerTrunk, Inc. to Marlene Dortch, Secretary, FCC, WT Docket No. 11-69 (June 8, 2011).



Those espousing the suitability of using digitally modulated equipment that only comply with Mask B assert: “Rule 90.210 does not make any distinction between digital modulated and analog modulated signals in regard to the qualification of any given transmitter equipped with an audio low pass filter. Hence, a digital transmitter equipped with an audio low pass filter implemented in the digital domain qualifies for being certified under Mask B for NPSPAC spectrum.”<sup>6</sup> Claims that digitally modulated equipment can take advantage of the audio low pass filter proviso in §90.210,<sup>7</sup> are inaccurate from a technical standpoint and upon understanding what an audio low pass filter is designed to do. What the proponents refer to as “Primary Audio Filter” ( $\alpha=0.2$  square raised cosine filter), i.e., audio low pass filter, is in fact a spectral shaping filter, as

<sup>6</sup> Ex Parte Notice, PowerTrunk, WT Docket No. 11-69, ET Docket No. 09-234 (Mar. 23, 2012) (PowerTrunk Ex Parte) at 5.

<sup>7</sup> See *id.*

it works on an already-modulated signal. It is inserted after the ACELP vocoder and is not an audio filter in the spirit of Mask B. This filter is used to modify the final transmit spectrum to meet Mask B and adjacent channel power requirements. However, it does not limit audio in any form, and therefore does not meet the function of an audio low pass filter, as it will not affect the bandwidth, sound, or quality of de-vocoded audio in any manner.

Further, in a digital system such as TETRA, all information is transmitted in an identical manner (including digital data, control information, and digitized voice). The “Secondary Audio Filter” is only applied to the voice before the vocoder, and is not applied to any other digital data. P25 and existing TDMA technologies certified to Mask H operate in a similar manner, but the data rates (e.g. 9.6/19.2 kbps) and spectral shaping filters are optimized specifically to meet the requirements of the H mask. If other digital systems were allowed to use the B Mask, they could operate at significantly extended ranges, or the data rate could be increased to match TETRA’s. However, this would cause the same unacceptable interference as TETRA and “low-power” TETRA.

Even if such claims in this regard that the presence of the “Secondary Audio” Filter meets the Mask B requirements, use of such a filter is not relevant to technologies employing digital voice coding and digital modulation techniques. In fact, the use of such an audio filter inserted before the vocoder in no way impacts the emissions of digital waveforms. Further, when the digitally modulated equipment claimed to be acceptable despite only complying with Mask B is not transmitting voice, it continues to transmit a forward channel that is “Data Only.” In this frequent circumstance, such equipment

offers no true audio filtering, secondary or otherwise, and the intended emissions from the equipment are identical to those experienced when the station is transmitting digitally-coded voice.

Due to the significant and dangerous divergence between practical, safe application of Part 90 rules in public safety frequencies and the interpretation of such Rules by those asserting compliance with Mask B only for digitally modulated equipment and the increasing likelihood such equipment will begin widespread implementation in public safety spectrum, the Commission faces an alarming choice:

- 1) Forbear from action and allow Mask B technologies in public safety frequencies and resulting interference to public safety communications; or
- 2) Conform its rules to common industry practice and require digitally-modulated signals be certified under the H-Mask for use in public safety spectrum.

This technology-neutral proposal to accept the latter option represents the best opportunity to serve the public interest and the integrity of public safety communications. To refrain from rulemaking in this regard will not further the public interest, as forbearance will speed deployment of technologies that will inevitably cause interference in public safety frequencies.

### **III. Enhancement of the Commission's Rules Regarding Public Safety Mutual Aid Frequencies is Needed.**

Due to the planned deployment of some digital devices as described above, it appears that measures beyond codification of interference-protecting common manufacturer practices is required. As the Commission knows, "Equipment certificated after February 16, 1988 and marketed for public safety operation in the 806–809/851–854 MHz bands must have the capability to be programmed for operation on the mutual aid channels as designated

in §90.617(a)(1) of the rules;”<sup>8</sup> and “Applications for certification received on or after January 1, 2005, for mobile and portable transmitters designed to transmit voice on public safety frequencies in the 150–174 MHz band will be granted only if the mobile/portable equipment is capable of operating on the nationwide public safety interoperability calling channel in the 150–174 MHz band. (See §90.20(c), (d) of this part.) Applications for certification received on or after January 1, 2005, for mobile and portable transmitters designed to transmit voice on public safety frequencies in the 450–470 MHz band will be granted only if the mobile/portable equipment is capable of operating on the nationwide public safety interoperability calling channel in the 450–470 MHz band. (See §90.20(c), (d) of this part.)”<sup>9</sup> The reason for these Commission requirements speaks to the need to enable interoperability among public safety entities on the designated mutual aid channels. The problem with the current mandates is the fact the requirements can arguably be satisfied provided the equipment is capable of tuning to the specified frequencies regardless of what form of modulation is used in the equipment. As part of the 700 MHz Public Safety rulemaking the Commission recognized only requiring equipment have that capability of operating on certain designated channels for certification was in sufficient. The Commission adopted supplementary technical requirements mandated the use of a certain modulation scheme on the designated interoperability channels regardless of what modulation scheme is employed in the other portions of the 700 MHz public safety narrowband spectrum.

Recently, some digital devices, such as “low-power” TETRA and TETRA technologies, which have the capability to tune to the frequencies designated in §90.617(a)(1) have

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<sup>8</sup> 47 C.F.R. §90.203(i).

<sup>9</sup> §90.203(j)(1)

received equipment certification even though the modulation scheme employed on such channel was totally non-compatible with the common modulation scheme employed by all other certified equipment for operation on the frequencies designated in §90.617(a)(1). Given the fact that equipments have received certification despite the fact they do not possess compatible unit to unit communications capability on the frequencies designated in §90.617(a)(1), which is totally contrary to the Commission’s espoused policy to do everything possible to achieve interoperability through the use of the designated mutual aid channels, it is now time for the Commission to adopt appropriate modulation “technical” standards for operation on the mutual aid channels.

Given the widespread acceptance of narrowband analog modulation<sup>10</sup> by licensees and the Regional Planning Committees for operation on the channels designated in §90.617(a)(1), and in light of the pending Narrowband deadline for operation in the Commission spectrum below 512 MHz, the Commission should adopt modulation “technical” standards, as the Commission did when it required certain modulation technical standards for operation on the 700 MHz narrowband public safety designated interoperability channels,<sup>11</sup> requiring narrowband analog FM modulation<sup>12</sup> for equipment certification, which such modulation standard will supplement the “programming or tuning” capability requirements of §90.203(i) and §90.203(j)(1).

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<sup>10</sup> 12.5 kHz analog FM.

<sup>11</sup> 47 C.F.R. §90.548

<sup>12</sup> 11K0F3E in accordance with ANSI/TIA-603-D (2010), Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

**IV. An Immediate Freeze on Certification of Any Non-H Mask-Conforming Digital Technologies and on Certification of any Equipment not Having Compatible Emission Designators for Operation on Mutual Aid Channels is Warranted.**

Harris looks forward to the Commission's deliberate rulemaking process on these vital matters.<sup>13</sup> However, the threat of introducing interference-causing digital technologies not meeting the H Mask standards is imminent, and the public interest is best served by temporarily prohibiting operation in public safety frequencies of digitally modulated technologies not certified under the H-Mask until this matter is finally resolved. Were there no intent to immediately infuse such technologies into public safety frequencies, this temporary freeze would not be needed.

As noted, Harris believes that the Commission's Clarification Order in the TETRA proceeding precluded "low-power" TETRA, a TETRA derivative digital technology not meeting Mask H, from operation in public safety frequencies.<sup>14</sup> Harris also believed that the obvious, recorded interference concerns and the FCC's input on this matter would preclude any jurisdiction from being able to justify using TETRA, TETRA derivative technology, or any digital technology not meeting Mask H in public safety spectrum.

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<sup>13</sup> While Harris believes that a rulemaking is appropriate for the overall rules' changes needed, it believes that the FCC has previously made clear that "low-power" TETRA and all TETRA technologies are not at this time allowed to operate in public safety frequencies. *See, e.g.,* Ex Parte Notice, Harris Corporation, WT Docket No. 11-69, ET Docket No. 09-234 (Mar. 16, 2012) (demonstrating that the Commission's *Order on Clarification*, WT Docket No. 11-69 and ET Docket No. 09-234, 26 FCC Rcd 13360 (Clarification Order) (rel. Sept. 28, 2011) intended to "ensure that TETRA equipment would not be operated in the vicinity of public safety systems," and that this prohibition applied to all TETRA derivative technologies, including that of PowerTrunk). Harris urges immediate affirmation of this argument to prevent the seeding of interference-causing technologies in public safety spectrum.

<sup>14</sup> *See Order on Clarification*, WT Docket No. 11-69 and ET Docket No. 09-234, 26 FCC Rcd 13360 (rel. Sept. 28, 2011) ("Clarification Order") (stating the Commission's intent to "ensure that TETRA equipment would not be operated in the vicinity of public safety systems.").

These concerns were not heeded in the case of New Jersey Transit (NJT) and applications for Commission authorization to use “low-power” TETRA by NJT in public safety frequencies are expected soon. Therefore, without prompt and decisive Commission action, it is possible that an interference-causing technology will be deployed in public safety frequencies. If NJT is allowed to use “low-power” TETRA in public safety spectrum during the pendency of the rulemaking, other jurisdictions will likely follow suit further enhancing the probability for widespread interference among first responders due to the fact that digital technologies not meeting Mask H are deployed. Furthermore, if the Commission does not take prompt and decisive action to bar digital technologies only complying with Mask B from public safety spectrum, it is likely manufacturers will recertify existing certified digital equipment to Mask B requirements in public safety spectrum further exacerbating the interference potential in public safety spectrum.

Additionally, the Commission’s existing equipment certification rules for operation on the designated mutual aid channels are incomplete. The public interest will not be served by continuing to allow equipments to be certificated for operations in public safety spectrum when such equipments are able to take an advantage of a loophole in the Commission’s Rules that virtually guarantees public safety licensees using such equipments will not be able to interoperate on the designated mutual aid channels as intended by Commission policy. The probability the number of equipments taking advantage of the loophole created by the incomplete certification rules for operation on the mutual aid channels is rapidly rising as digital technologies are increasingly embraced by public safety licensees. The Narrowbanding mandate in the spectrum below 512 MHz continues to accelerate the presence of digital equipments in public safety spectrum

thereby increasing the probability interoperability on the mutual aid channels will not be achieved or be severely negated for many years to come. The Commission should freeze the certification of additional digital equipments for operations in public safety spectrum unless such equipments include compatible modulation schemes for operation on the designated mutual aid channels in the public safety spectrum. Additionally, because public safety's best interests as well as the public interest will be severely harmed unless full and complete measures are implemented to enhance the realization of fulfillment of the Commission's policy to achieve interoperability on the designated mutual aid channels, the Commission should also, until the termination of the anticipated rulemaking, suspend any equipment certifications for operations in public safety spectrum, unless such equipments include modulation schemes compatible for operation on the designated mutual aid channels.

To avoid the potentially devastating outcomes discussed above, the Commission can best serve the public interest by implementing the temporary measures proposed until resolution of the anticipated rulemaking process.

**V. Conclusion.**

For the reasons detailed above, Harris urges the Commission to expeditiously initiate an appropriate rulemaking and to implement appropriate interim actions to minimize any additional harm to public safety operations.

Respectfully submitted,

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April 30, 2012