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

In the matter of Amendment of the Commission's Part 90 Rules in the 904-909.75 and 919.75-928 MHz bands	WT Docket No. 06-49

COMMENTS OF MOTOROLA, INC.

Motorola, Inc. ("Motorola") respectfully submits these comments. Motorola urges the Commission to maintain the carefully balanced framework it adopted for operations in the 902-928 MHz band that allows the public to continue to realize the significant economic and societal benefits from devices operating under Part 15 of the FCC rules, while also accommodating licensed use of the band. The Commission should also ensure that changes in the rules do not adversely impact uses in adjacent bands, i.e. the 896-901 MHz land mobile band which supports iDEN technology[1].

I. MOTOROLA'S INTEREST IN THIS PROCEEDING

Motorola products that utilize the 902-928 MHz band include wireless broadband Canopy™ radios as well as land mobile MOTOtalk™ (Direct Talk[SM]) and DTR Series™ radios[2]. These are described below.

- The Canopy system provides high quality broadband service in the 902-928 MHz bands via a 6.0 Mbps signaling rate with a line-of-sight range of more than 40 miles

[1] *See* http://idenphones.motorola.com/iden/common/what_is_iden.jsp

[2] *See* http://www.motorola.com/dtr

and is particularly suited to delivery of broadband services in rural areas.[3] To date, more than 70,000 Canopy 900 MHz modules have been deployed. The Canopy 900 MHz system is used in the following applications:

Education – As an example, one school district in North Carolina deployed Canopy 900 MHz modules to enable more than 1,200 students to have broadband access for research and distance learning.

Residential Broadband Access – In low population density areas, Canopy 900 MHz modules provide cost effective broadband access in areas where DSL or other wire-based alternatives cannot be cost justified. Canopy 900 MHz modules are part of the USDA Rural Utility Services (RUS) program.

Non-Line-of-Sight Applications – In geographic areas where higher frequency wireless broadband cannot be deployed due to foliage obstructions, Canopy 900 MHz modules provide non-line of sight coverage up to 4 miles without requiring changes to the landscape.

- MOTOtalk™ (also call Direct Talk℠ in the Sprint-Nextel service brand) is a push-to-talk feature implemented in our iDEN radios which creates a temporary virtual network with other MOTOtalk™ capable units within 2 miles. This service keeps users connected if the regular network is down, the signal is weak or the users are in out-of-coverage areas. It allows them to transfer manually to a simplex two-way radio-to-radio communication mode and is also useful for private or group communications for non-mission critical government use, construction teams, utilities, outdoor sports enthusiasts or groups that travel outside of Nextel coverage. As of May 1, 2006 MOTOtalk™ is in the following iDEN handsets approved by the FCC: i315, i325, i580, i740, and i870.[4]

[3] *See* http://www.motorola.com/canopy.

[4] *See* http://nextelonline.nextel.com/assets/pdfs/en/about/directtalk_fact_sheet.pdf

- DTR Series™ provides similar capabilities to MOTOtalk™ for on-site communications in hospitality, retail and manufacturing environments but on a stand-alone, non-integrated device. A typical deployment in an on-site application encompasses anywhere from five to hundreds of devices.

II. THE COMMISSION SHOULD RETAIN THE SAFE HARBOR RULE THAT PART 15 DEVICES OPERATING WITH CERTAIN TECHNICAL PARAMTERS WILL NOT BE CONSIDERED TO BE CAUSING HARMFUL INTERFERENCE

The safe harbor provisions provide much-needed certainty essential to the sharing of the 902 – 928 MHz band. Part 15 use of 902 – 928 MHz has progressed remarkably since the Commission implemented the safe harbor provisions. In 1995, the Commission counted more than 4 million Part 15 devices operating in the 902-928 MHz band.[5] Today, that number is in the tens if not hundreds of millions.[6] These rules represent a balancing of the equities reached in a rule making conducted well in advance of the auction of multilateration licenses. As such, the safe harbor provisions have facilitated the development of a wide variety of Part 15 devices. These include cordless telephones, RFID devices, utility load management and remote meter reading devices, telemetry and security devices such as alarm devices, vehicle tracking systems, traffic control systems, home security systems, medical devices, wireless speakers, intercom devices, wireless keypads and mouse controllers, baby monitors, video cameras, and network devices that provide wireless high-speed data and Internet-type services.

---

[5] Automatic Vehicle Monitoring Systems, 10 FCC Rcd 4695 at ¶ 30 (1995) ("*LMS Report and Order")*.

[6] For example, Itron alone reports having sold five million automatic meter reading units from 1990 – 1995 and some eighteen million additional units from 1996 – 2002 . Itron Ex Parte, RM-10403, at 3, (June 4, 2003).

III. PROPOSALS FOR INCREASED M-LMS OPERATIONS WILL RESULT IN ADDITIONAL INTERFERENCE TO CURRENT USERS

In adopting the original M-LMS regulations, the Commission explained how the limitations on M-LMS would help to ensure co-existence with other users of the band. Thus, the Commission noted that "[m]ultilateration LMS systems are designed to locate vehicles or other objects by measuring the difference in time of arrival, or difference in phase, of signals transmitted from a unit to a number of fixed points, or from a number of fixed points to the unit to be located. Such systems generally use spread-spectrum technology to locate vehicles throughout a wide geographic area. Multilateration technology is used, for example, by trucking companies to track individual vehicles, by municipalities to pinpoint the location of their buses, and by private entrepreneurs developing subscriber-based services for recovery of stolen vehicles."[7]

The Commission also established limitations on LMS system interconnection with the public switched network and set forth a number of technical requirements intended to ensure successful coexistence of all the services authorized to operate in the band.[8] Altogether, these limitations represented the balance needed to implement M-LMS systems, to minimize the risk of out-of-band interference and, at the same time, maintain the band for the use of others on a

---

[7] *LMS Report and Order*, 10 FCC Rcd at 4697-98, 4703, ¶ 14.

[8] *See* Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, *Order on Reconsideration*, PR Docket No. 93-61, 11 FCC Rcd 16905 (1996) ("*Order on Reconsideration*"); *see also LMS Further Notice*, 12 FCC Rcd at 13942. Specifically, the *Order on Reconsideration* resolved issues regarding incumbent LMS licensees that were afforded grandfathered status. These issues involved interference testing, accommodation of secondary uses in the 902-928 MHz band, emission masks, frequency tolerance, type acceptance and site relocation with respect to grandfathered licenses, as well as extension of the construction deadline applicable to grandfathered licensees. The *LMS Further Notice* clarified issues such as interconnection limitations, operational parameters for non-multilateration systems, treatment of other users of the 902-928 MHz band, the structure of the spectrum allocation plan, geographic service areas, and the licensing of wideband forward links.

Part 15 basis. However, the proposed changes to these rules will upset this careful balance and will lead to interference to unlicensed operations in the 902-928 MHz band and may lead to interference to adjacent band licensed operations.

A. The Commission's Proposals May Result in Unacceptable Interference to Licensed Systems

One area of concern is the potential for out-of-band emissions of M-LMS operations to cause unacceptable interference to iDEN base station receivers operating in the 896-901 MHz band. If the deployment model for M-LMS stations changes in a manner that encourages the widespread use of the M-LMS spectrum for other applications involving base stations operating in the M-LMS spectrum, there will then be the potential for interference into base station receivers at 896 – 901 MHz. Currently, with M-LMS operations authorized as mobiles at 904 – 909.750 MHz, there is little concern with such interference. That would change, however, if base stations were allowed to operate in the 904 – 909.750 MHz M-LMS sub-band with out-of-band emission levels as currently found in Part 90.[9]

B. The Commissions Proposals Will Result in Unacceptable Interference to Unlicensed Systems

In the *LMS Report and Order*, the Commission recognized the important contribution to the public provided by Part 15 technologies and amateur radio operators. The Commission then sought to develop a band plan that would maximize the ability of these services to coexist with

[9] The sensitivity of iDEN base stations is -124.5 dBm, with a 25 kHz channel and 12 dB of antenna gain (including line losses). The equivalent power density at the input to the antenna for a 1 dB degradation in sensitivity is -142.4 dBm/25 kHz. It is difficult to assess if the ubiquitous M-LMS base stations which could be operating in the 904-928 MHz band would be able to co-exist with iDEN operation without a better understanding of the modulation/coding and filtering that will be developed by systems operating in this band, but even with isolation of 90 dB between a M-LMS transmitter and the iDEN base station, the radiated power density into the 896-901 MHz band from the M-LMS transmitter will have to be below -52.4 dBm/25 kHz (or -36.4 dBm/MHz) to meet the 1 dB degradation level.

LMS systems.[10] Even though the proposals by the FCC reduce the power levels allowed in the band, the removal of the requirements that M-LMS operations not cause unacceptable levels of interference (Section 90.353(d)) to Part 15 devices would likely fuel great degradation of unlicensed use of the band. As M-LMS is allowed to proliferate and provide new types of services, the increased density of M-LMS devices and increased duty cycle that would be seen by eliminating current limits, such as interconnection, will dramatically increase the interference levels experienced by Part 15 devices and undermine the continued viability of Part 15 operations in the band. The reduced power levels contemplated by the Commission are not sufficient to overcome the deleterious effects of significantly increasing the density and operating characteristics of M-LMS systems. Technical studies to assess accurately the actual impact are difficult to perform with-out a clear understanding of all of the technical parameters such as the number of deployed sites, the actual locations, the spacing between sites, and the level of channel occupancy. All these parameters need to be identified and used in a credible technical study to determine the impact which the proposed rule changes will have on the probability that the underlying protection requirements currently provided under Section 90.353(d) will still be met.

A glimpse of the type of deployment and interference that could be expected is found in the RM-10407 docket as filed by Progeny.[11] They present an analysis that assumes that the M-LMS Systems will be ubiquitously deployed outdoors, at relativly high altitudes (on roof tops) with directional antennas (16 dBi). According to the Progeny information, mobiles would be deployed indoors with modest antenna gain (2.2 dBi). Two primary cases of interference to

---

[10] *LMS Report and Order*, 10 FCC Rcd at 4714, ¶ 34.

[11] Progeny LMS, LLC, Ex Parte Presentation, RM-10403, While Paper at 2-4. (Oct. 10, 2002).

devices using the same frequency will arise. The first will result from an outdoor-to-outdoor scenario and the second is an indoor-to-indoor case.

In the first case the M-LMS is expected to have a deployment of 5.2 base stations per square mile in an urban environment. Such a high density deployment (even at the lower powers proposed by the FCC) will effectively interfere with any outdoor Part 15 devices deployed in the same general region. This raises particular concerns for Part 15 devices that provide broadband access such as Motorola's Broadband Canopy system. The M-LMS systems ubiquitous deployment would render the outdoor Part 15 deployments unusable in the same general region.

In the second case where a M-LMS mobile transmitter of 2.9 W radiated power is operating indoors, the scenario is one in which interference to a Part 15 mobile device (such as a MOTOtalk™ radio) would be at such a level that it would not permit operation. This is due to the limited isolation between the two devices and their proximity.[12]

The intensive Part 15 use of 902- 928 MHz includes far more than just the Motorola Canopy and MOTOtalk™ systems, however. Schlumberger has noted some 10 million points of presence in unlicensed bands in May 2003.[13] Intermec also addressed the Progeny white paper and concluded that it was not an accurate depiction of interference attributable to M-LMS

[12] At 904 MHz the free space loss at a separation of 50 feet is 55 dB, a 10 mW EIRP part 15 transmitter would present an on-channel signal of -43 dBm to the M-LMS mobile (since the M-LMS mobile has a receive gain of 2.2 dBi and line loss of 0.2 dB), the on-channel power received would be 61 dB above the receiver threshold of -105 dBm used in the link budget shown by Progeny and will block the use of the channel by M-LMS mobiles. Since the M-LMS transmitter is of higher radiated power than the Part 15 devices it is also expected that the interference to an on-channel Part 15 transmitter will also be well above the receiver threshold and would effectively block the use of frequencies by the Part 15 device.

[13] SchlumbergerSema Inc., Ex Parte Presentation, RM-10403, at 8 (Oct. 16, 2003). *See also* SchlumbergerSema Inc., Comments, RM-10403 (May 15, 2002).

operations that would likely ensue from the changes Progeny sought.[14] Itron noted the extensive use being made of the band for automatic meter reading and explained that it had shipped more than 20 million such devices.[15] Finally, Waverider has explained how wireless internet service providers are using the band, especially for the provision of service to small towns in rural America.[16] Waverider also has raised concerns with Progeny's analysis.

Conclusion

For the foregoing reasons, the Commission should not permit expanded use of the M-LMS band. Doing so will undermine the continued viability of Part 15 operations in the band by destroying the carefully crafted balance previously achieved by the Commission and will result in a significant increase in interference to existing users and systems. The Commission must not undermine the economic and societal benefits that Part 15 operations in this band are providing to the American people, including broadband service to rural areas.

Respectfully submitted,

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

/s/ Robert D. Kubik
Robert D. Kubik
Director, Telecom Relations Global

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

May 30, 2006

[14] Intermec Ex Parte Comments, RM-10403, at 2-6 (Mar. 20, 2003).

[15] Comments of Itron, Inc., on Progeny White Paper, RM-10403, at 2 (Jan 10, 2003).

[16] WaveRider Communications, Inc., Ex Parte Comments, RM-10403, at 4-7 (Mar. 7, 2003).