



VIA ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

November 4, 2004

Re: WT Docket No. 03-103
Written Ex Parte Presentation

Dear Ms. Dortch:

Motorola would like to emphasize the need for the Commission to address the potential for systems operating in the Air-Ground Telecommunications (ATG) Service to cause interference to services operating on adjacent spectrum as it considers revised rules for air-ground use of the 849-851 MHz and 894-896 MHz bands.¹

In its comments to this proceeding Motorola supported updating the current ATG service rules to allow more efficient and beneficial use of this spectrum. Motorola noted however that, as currently configured and used, this spectrum largely serves as a guard band between commercial cellular operations and public safety and private wireless systems and that the Commission should carefully consider the potential interference impact resulting from modified use of this band.² In recent filings, the Association of Public-Safety Communications Officials Internationals, Inc. (APCO), Nextel, Inc. ("Nextel") and the CTIA – The Wireless AssociationTM ("CTIA") also raised concerns and note that the record in this proceeding contains little information on the potential for systems operating under revised ATG rules to interfere with adjacent channel operations.³

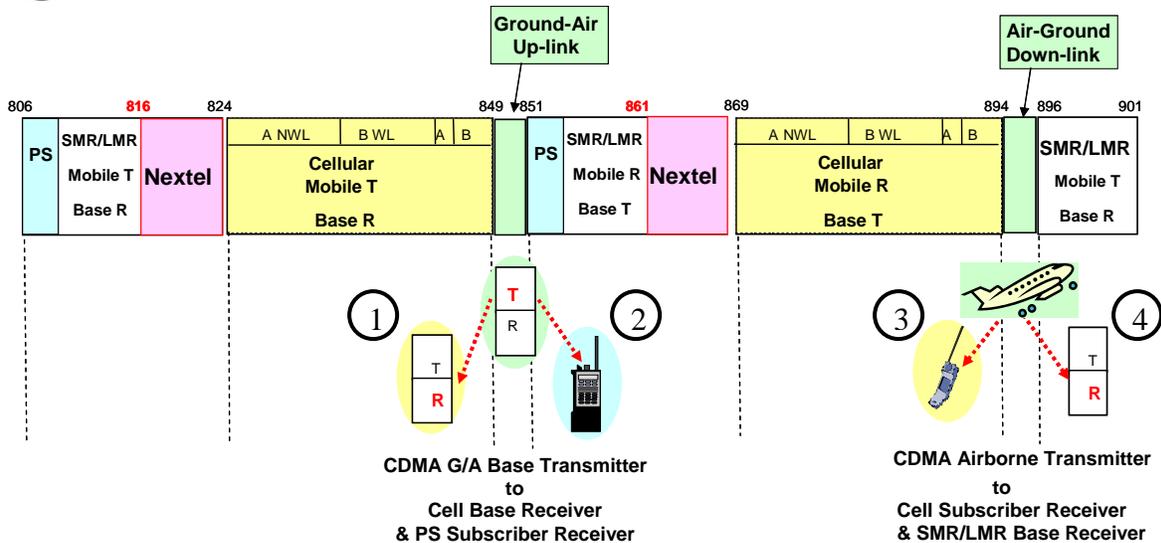
As shown in the figure below, the ATG spectrum under consideration is bordered by the Cellular Radio Service, 800 MHz spectrum that will be home to the public safety NPSPAC channels once the band is reconfigured under the rules adopted by the Commission in WT Docket 02-55,⁴ and by private radio and specialized mobile radio systems in the 900 MHz band.

¹ Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services, Biennial Regulatory Review – Amendment of Parts 1, 22, and 90 of the Commission's Rules, WT Docket No. 03-103, *Notice of Proposed Rulemaking*, 18 FCC Rcd 8380 (2003).

² See, Comments of Motorola, Inc., WT Docket No. 03-103 (filed Sept. 23, 2003) ("While increased use of the band does not necessarily mean that a greater potential for interference exists, before adopting any changes in the air-ground rules that greatly affect the density of use as well as the types of applications, the FCC must fully consider the potential impact to adjacent allocations and avoid creating any new interference scenarios similar to those being experienced in the 806/824/851-869 MHz band.").

³ See, Letter from Robert M. Gurss, APCO, to the Honorable Michael Powell dated October 12, 2004, letter from Trey Hanbury, Nextel, to Marlene H. Dortch dated September 29, 2004 and letter from Christopher Guttman-McCabe, CTIA, to Marlene H. Dortch dated October 20, 2004.

⁴ See, In the Matter of, *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Released August 6, 2004, FCC 04-168.



Given the likelihood that revised ATG rules will result in increased use of the band and implementation of wider band technologies than currently employed, the potential for interference to adjacent services is very real and must be addressed by the Commission as it considers rules for this band. There are numerous factors that impact the interference potential between services and the record does not contain sufficient information for Motorola to do a complete analysis of the adjacent-channel interference potential or to address the feasibility for ATG providers to meet the necessary requirements. However, Motorola provides the following information regarding the general protection requirements for, and impact on, the adjacent services under the scenarios depicted above.⁵

1) Ground-Air Uplink interfering with Cellular Base Receivers

Section 22.861(c) of the Commission’s current rules limit the radiated power into the cellular base receivers to -10 dBm/6 kHz ERP or equivalently a level of 14 dBm/MHz EIRP. Absent additional attenuation, such a level would significantly degrade the performance of a cellular system. Additional mitigation measures are required to limit the impact. As an example, if 142 dB of isolation is ensured between a Ground-Air uplink station and a cellular base receiver the interference is limited to a 1 dB increase in system noise level.⁶

2) Ground-Air Uplink interfering with Public Safety Subscriber Receivers

This spectrum will be home to Public Safety NSPTC receivers under the band plan adopted in WT Docket number 02-55. Motorola believes that the interference

⁵ This analysis is done considering a single interference source. Multiple sources would have cumulative effects and the overall impact should be considered.

⁶ An ERP of -10 dBm/6 kHz would raise the noise floor of a cellular base station receiver by 1 dB when 142 dB of isolation is available, assuming a cellular base station with a noise figure of 5 dB a receive gain of 15 dBi and line loss of 2 dB. Isolation includes propagation loss between the transmitter and receiver, amount of antenna discrimination from the Ground-Air transmitter in the direction of the cellular base station or any other loss factors such as additional filtering of the Ground-Air transmitter.



protection levels adopted in that proceeding in the new 47 CFR § 90.672 provide appropriate levels of protection.⁷ Section 90.672 ensures a Carrier to Noise plus Interference (C/(I+N)) ratio of at least 20 dB for most public safety radios in areas where the public safety desired signal strength is equal to or greater than -104 dBm for mobile receivers and -101 dBm for portable receivers. Motorola has not examined how the interference mitigation requirements adopted in the *800 MHz R&O* would need to be modified to take into account the ATG service.

3) **Air-Ground Downlink interfering with Cellular Mobile Receivers**

Section 22.861 of the current FCC rules limits power density from Air-Ground downlinks to -148 dBm on a 6 kHz channel removed by more than one channel from the channel in use at any air-ground base station. It would appear to be reasonable to apply this approach more broadly by generally limiting ATG emissions to a power flux density on the ground. This would provide a maximum power level that could be presented to a victim receiver and it also provides flexibility for the ATG provider because the system may have a number of ways to meet such a requirement via the use of power control and/or antenna patterns. The current power density appears to have minimal impact to Cellular mobile operations.⁸ It is likely that protection levels adopted to protect SMR and LMR base stations, as described below, would provide sufficient protection to cellular mobile handsets.

4) **Air-Ground Downlink interfering with SMR/LMR Base Receivers**

This situation is different than when considering interference into cellular mobile receivers. In this case, because it is unlikely that any additional loss factors over free space loss will be experienced due to the height of the base receiver, it is likely that SMR/LMR base receiver will see the entire power level proposed by the FCC. Furthermore there is a potential that the angle of arrival of the interference could be such that it may experience amplification due to the SMR/LMR receiver antenna gain. In this case, applying the Section 22.861 pfd limit of -148 dBm/6 kHz (equivalent to a power density of -126 dBm/MHz) at the SMR/LMR base station receiver would raise the noise floor and degrade the link by around 0.3 dB.⁹ A pfd limit of -120 dBm/MHz would degrade the link by 1 dB. Using a technology that complies with the emission limit of -13 dBm/100 kHz found in Section 22.917 for cellular systems, the ATG licensee would have to provide an additional 117 dB of isolation to meet a limit of -120 dBm/MHz. This would require 18.8 km (11.7 miles) of separation if free space loss were the only means available for meeting this limit.

⁷ See, In the Matter of, *Improving Public Safety Communications in the 800 MHz Band*, Report and Order (*800 MHz R&O*), Released August 6, 2004, FCC 04-168 at page 223-224.

⁸ A power density on the ground of -148 dBm/6 kHz (or for a 1 MHz measurement bandwidth a power density of -126 dBm/MHz) would raise the noise floor of a cellular mobile receiver by less than 0.1 dB, assuming a noise figure of 7 dB and receive gain of 0 dBi. Under most scenarios the power actually received will be lower due to additional loss factors between the Air-Ground downlink and the mobile receiver. Relaxing the power density by 13 dB would result in 1 dB degradation to the link.

⁹ This assumes a noise figure of 5 dB a receive gain of 7 dBi and line loss of 2 dB. The interference level is highly dependant upon the geometry between the SMR/LMR base receiver and the airborne transmitter.



Much of the protection levels described above are based on current rules developed for narrow-band systems. Meeting these protection levels presents significant challenges to Air-Ground operators implementing wide band technologies and there is not sufficient information on the record to determine how, or if, required levels of protection can be afforded. While it may not be necessary to restrict OOB emissions to the levels described above, because factors like physical separation and antenna characteristics could help ATG operators meet applicable limits at a victim receiver, the Commission should ensure that, whatever protection levels are adopted under revised ATG rules, they should protect adjacent operations and that realistic methods are available to meet the limits.

Motorola does not take any position regarding the various licensing proposals that parties have proposed in this proceeding. It is imperative, however, that any revised rules for the ATG service ensure that the service will be compatible with neighboring services.

Respectfully submitted,

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