

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

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| In the Matter of |) | |
| |) | |
| Amendment of Part 27 of the |) | WT Docket No. 07-293 |
| Commission's Rules to Govern the |) | |
| Operation of Wireless Communications |) | |
| Services in the 2.3 GHz Band |) | |
| |) | |
| Establishment of Rules and Policies for the |) | IB Docket No. 95-91 |
| Digital Audio Radio Satellite Service in the |) | Gen. Docket No. 90-357 |
| 2310-2360 MHz Frequency Band |) | RM No. 8610 |
| |) | |

REPLY COMMENTS OF SIRIUS SATELLITE RADIO INC.

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EXECUTIVE SUMMARY

In its comments in the instant proceeding and in prior filings in this docket, Sirius Satellite Radio Inc. (“Sirius”) has demonstrated that the proposals advanced by the WCS licensees to change the Part 27 rules would, if adopted, cause significant harm to satellite radio listeners. The WCS Coalition Comments present no new evidence to change that conclusion. Thus, the Commission should deny the WCS Coalition’s request to interfere with satellite radio links and should instead adopt the proposals of Sirius and XM.

The WCS Coalition expresses alarm that the current rules and the proposals of the satellite radio licensees would effectively prohibit the WCS licensees from providing mobile service in the 2.3 GHz band and achieving what it claims is the “highest and best use” of the spectrum. But Congress said otherwise, and made minimizing interference—not maximizing profits—the Commission’s primary allocation policy goal. As such, the Commission recognized and should continue to maintain that mobile services of the type proposed by the WCS Coalition are unsuitable for the 2.3 GHz spectrum because of the close proximity of the WCS allocation to the satellite radio allocation.

Nothing has changed in the 11 years since the agency reached that conclusion. And none of the comments supporting WCS offer new evidence. Indeed, the WCS Coalition’s technical showings are hardly technical and show only that widespread deployment of 2 Watt WiMAX mobile units would result in unacceptable levels of interference to satellite radio. As Sirius’s Comments demonstrate, it is more clear than ever that the rule changes advocated by the WCS Coalition would create crippling levels of interference to satellite radio. The WCS Coalition’s reliance on mitigation from terrestrial repeater coverage and probabilistic factors is founded on incorrect analysis of

the licensees' repeater networks and plainly incorrect assumptions about path loss and real-world interference scenarios: it cannot serve as the basis for the drastic rule changes supported by the WCS licensees. Moreover, the WCS Coalition's proposal to allow unrestricted 2000 watts average power base stations and its claims of interference to WCS transmitters from satellite radio terrestrial repeaters are similarly unsupported.

In addition to rejecting the proposals of the WCS Coalition, the Commission should also act to adopt Sirius' ground-level emission limits, grandfather existing satellite radio repeaters, implement a reasonable licensing system for satellite radio terrestrial repeaters and WCS base stations, and adopt the other rules advanced by Sirius and XM. Furthermore, the Commission should confirm the permissibility of terrestrial repeaters outside of the footprint of satellite radio satellites.

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ATTACHMENT: Technical Appendix

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REPLY COMMENTS OF SIRIUS SATELLITE RADIO INC.

Sirius Satellite Radio Inc. (“Sirius”) hereby replies to the comments submitted in response to the Federal Communications Commission (“FCC” or “Commission”) Notice of Proposed Rulemaking in the above-captioned proceeding.¹ Sirius responds primarily to the comments submitted by the WCS Coalition² and others that would have the Commission ignore interference to millions of satellite radio subscribers so that licensees in the 2.3 GHz Wireless Communications Service (“WCS”) can hope to achieve unwarranted returns on their minimal investments in providing service to the public. Consistent with its decisions made over 10 years ago, the Commission must maintain the course to ensure that satellite radio reception is fully protected from potential interference from mobile WCS transmitters.

¹ *Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, WT Docket No. 07-293, IB Docket No. 95-91, Notice of Proposed Rulemaking and Further Notice of Proposed Rulemaking, 22 FCC Rcd 22123 (2007) (“Notice”).

² Comments of the WCS Coalition, WT Docket No. 07-293, IB Docket No. 95-91, (filed Feb. 14, 2008) (“WCS Coalition Comments”).

I. INTRODUCTION

Sirius and XM Radio, Inc. (“XM”) established in their previously filed comments in this proceeding that the WCS Coalition’s proposals to change the Part 27 rules would cause significant, crippling, interference to millions of existing satellite radio subscribers. The WCS Coalition provides little in the way of experimental data or analysis to dispute these findings. Instead, it makes much of the fact that the current rules will prohibit 2.3 GHz WCS licensees from operating mobile WiMAX systems, but that is an appropriate consequence of the limitations inherent in this band because of the potential impact of such a system to satellite radio consumers.

The WCS Coalition’s comments are fraught with inconsistencies and inaccuracies. For example, the WCS Coalition asks for increased transmitter power while simultaneously claiming that WCS licensees will not need it. The WCS Coalition also claims that satellite radio repeater signals will cause interference blanketing WCS mobile receivers without supplying any technical documentation on such receivers’ performance—yet simultaneously seeks to deploy mobile service only where such allegedly harmful interference exists. The WCS Coalition predicts no significant interference to satellite radio subscribers in urban areas because it mistakenly assumes nearly twice the number of repeaters Sirius has actually deployed and then erroneously overstates the actual operating power of many Sirius repeaters. It narrows its investigation to hypothetical circumstances far from “real world” use cases and contradicts recent filings by prominent WCS Coalition members in the pending rulemaking for AWS-3 and AWS-1 services near 2155 MHz.³ The WCS Coalition also

³ *Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band*, Notice of Proposed Rulemaking, 22 FCC Rcd 17035 (2007).

presents a path loss model that is some 12 dB higher than published propagation studies and Sirius test data—yet never acknowledges that even under its own flawed formula, WCS mobiles would mute satellite radios almost 40 meters away, far greater than the 4 to 13 feet muting radius WCS it claims that it measured.

In these comments and the attached technical appendix, Sirius provides full rebuttal to each of these technical points raised by the WCS Coalition. In short, the Commission must reject the proposals of the WCS Coalition as unworkable and unsupported by the record. Instead, the Commission should adopt the proposals of Sirius and XM, which would limit the permissible power of WCS mobile devices, grandfathering existing terrestrial repeaters deployed by satellite radio operators, establishing ground-level emission limits for fixed facilities to provide bi-directional protection to adjacent band receivers, and allow for the operation of terrestrial repeaters outside of the footprint of the satellite. These rules will protect more than 17 million consumer radios and ensure that satellite radio remains a viable and valuable consumer service while providing WCS licensees a viable model to provide commercial services that are consistent with the original 2.3 GHz band plan.

II. USE OF THE WCS SPECTRUM MUST BE COMPATIBLE WITH ADJACENT BAND SATELLITE SERVICE, AS THE COMMISSION RULED A DECADE AGO

The WCS Coalition's arguments are founded on the false premise that WCS licensees are entitled to deploy mobile WiMAX, regardless of the impact to more than over 17 million subscriber receivers in the immediately-adjacent satellite radio band. In support, the WCS Coalition invents, then relies upon, the purported principle that all

spectrum, including the 2.3 GHz WCS band, “be put to its highest and best use.”⁴

According to the WCS Coalition, the highest and best use of their licensed frequencies is the provision of advanced mobile wireless broadband services, including WiMAX, which necessitates the relaxation of out-of-band emission (OOBE) limits for WCS subscriber devices by 55 dB and increasing the maximum transmitter output power by as much 10 dB.⁵

As shown below, the WCS Coalition’s claims have no footing in policy or precedent.

A. The FCC’s Allocation Authority Is Centered Upon Minimizing Interference, Not Guaranteeing Licensees The Ability To Pursue A Particular Business Model

The WCS Coalition, and other supporting commenters,⁶ argue that the Commission’s goals in this proceeding are simple: the 2.3 GHz WCS spectrum should be put to the highest and best use which, according to the WCS Coalition, is mobile broadband services provided using WiMAX technology. The WCS Coalition and Motorola and the WiMAX Forum place great weight on the fact that that the 2.3 GHz band has been identified internationally for WiMAX implementation and this proceeding was expressly crafted to “assur[e]” that outcome.⁷ It seems clear that the WCS licensees are hoping that relaxing the Part 27 technical restrictions will make the 2.3 GHz WCS

⁴ WCS Coalition Comments at 1-2.

⁵ *Id.* at 10.

⁶ See Comments of the WiMAX Forum, WT Dkt. No. 07-293, IB Dkt. No. 95-91 (filed Feb. 14, 2008) (“WiMAX Forum Comments”); Comments of Motorola, Inc., WT Dkt. No. 07-293, IB Dkt. No. 95-91 (filed Feb. 14, 2008).

⁷ WCS Coalition Comments at 1.

band – which they acquired for an exceedingly small investment⁸ – as useful and valuable as other commercial mobile spectrum bands such as the AWS-1 band in the 1.7/2.1 GHz band.⁹ The FCC should not be persuaded by the WCS Coalition’s dreams.

First, the WCS Coalition does not cite, nor could it, any basis for its fanciful policy regarding spectrum allocations, a core FCC responsibility.¹⁰ Rather, Congress directed different goals in Section 303 of the Communications Act itself, stressing the agency’s duty to:

Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein; [and]
Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this chapter.¹¹

So while WCS licensees might prefer technical limits be determined by maximizing licensee profits, an approach which no doubt explains why the WCS Coalition downplayed interference to adjacent-band satellite radio, the Communications Act requires that interference concerns be prioritized.

⁸ The 30 MHz of spectrum that comprises the 2.3 GHz WCS band was auctioned for a total of \$13.6 million, which corresponds to a spectrum valuation of 0.0015 \$/MHz/pop. See Comments of Sirius Satellite Radio Inc., WT Dkt. No. 07-293, IB Dkt. No. 95-91 at 12 n.31, 14 (filed Feb. 14, 2008) (“Sirius Comments”).

⁹ In 2006, the AWS-1 auction raised over \$13.6 billion, which corresponds to a spectrum valuation of approximately 0.54 \$/MHz/pop. Therefore, if the WCS Coalition can convince the Commission to relax the technical restrictions that allowed them to acquire spectrum so cheaply, they can conceivably inflate the value of their spectrum to that of the AWS-1 spectrum. If successful, the WCS licensees can boast about an astounding increase of spectrum valuation of nearly 36,000%.

¹⁰ 47 U.S.C. § 303(a-e) (2006).

¹¹ *Id.*, § 303(e-f).

As Sirius demonstrated in its Comments, and as amplified below, the WCS Coalition's proposal could cripple reception for existing and future satellite radio customers.¹² Certain deployments may not work in 2.3 GHz WCS, but not all spectrum is created equal. And though the WCS Coalition prefers to forget this fact today, its members (and member predecessors) certainly understood it when they bid, and won so inexpensively, their the 2.3 GHz licenses.¹³

Second, the WCS Coalition claims that rules that do not permit WCS licensees to utilize 2.3 GHz spectrum to provide mobile WiMAX are "unworkable from the WCS perspective"¹⁴ and would "sound the death knell" for wireless broadband in the band.¹⁵ Not so: the WCS Coalition appears to conflate the term "wireless broadband" and "mobile wireless broadband" throughout its pleading.¹⁶ It should be relatively easy to deploy fixed and broadcast networks¹⁷ in the 2.3 GHz WCS band as some licensees have

¹² See Sirius Comments at 11-24.

¹³ As noted in previous comments, the 1997 auctions of WCS licenses generated a total of \$13.6 million in net bids nationwide for a total of 30 MHz whereas the auction of 25 MHz of adjacent band satellite radio licenses the very same month generated over \$173 million in net bids. See Letter From Patrick Donnelly, General Counsel, Sirius Satellite Radio Inc. and James Blitz, Regulatory Counsel, XM Satellite Radio Inc. to Marlene Dortch, Secretary, FCC, IB Docket No. 95-91 and GEN Docket No. 90-357 at 4-5 (filed Sep. 19, 2007) ("September 2007 Ex Parte").

¹⁴ WCS Coalition Comments at 30.

¹⁵ *Id.* at 2.

¹⁶ See *e.g.*, *id.* at 1-3.

¹⁷ Sirius notes that use of IEEE 802.16 technologies, commonly referred to as WiMAX, does not necessarily imply the provision of wide area mobile services in direct competition to commercial mobile services offered in the 800 MHz cellular, broadband PCS, and AWS frequency bands. WiMAX platforms can be used for other applications in the 2.3 GHz WCS band such as fixed broadband access, backhaul, and broadcast-like distribution of video. Such applications are more compatible with adjacent band satellite services and can be implemented today with little or even no changes to the existing rules.

pursued without any complaint of harmful interference to satellite radio. DigitalBridge Communications offers BridgeMAXX service, which uses 2.3 GHz spectrum to provide fast, portable, affordable wireless Internet service in rural towns in Idaho, Indiana, Montana, and Virginia.¹⁸ Additionally, AT&T provides fixed wireless broadband service using 2.3 GHz spectrum in Pahrump, Nevada.¹⁹ These operations are demonstrating that fixed wireless broadband is a compatible use of the WCS spectrum; such use is fully consistent with the FCC's original concerns on the use of WCS spectrum, which were reflected in the auction prices paid for WCS licenses.²⁰ Further, WCS licensees can still utilize the 2.3 GHz band for mobile WCS devices that comply with the Commission's rules.²¹

The WCS Coalition's paranoia that the satellite radio licensees have some implicit intent to destroy the viability of WCS operations is flatly wrong. Satellite radio licensees are not focused on mobile broadband and thus have no competitive incentive to disrupt the introduction of additional CMRS in the WCS band. Rather, Sirius' concerns are driven solely by technical compatibility and a workable and efficient licensing system for its terrestrial repeaters.

¹⁸ See <http://www.digitalbridgecommunications.com/SupportCenter/FAQs/tabid/77/Default.aspx#8> (last visited Mar. 6, 2008).

¹⁹ See Press Release, AT&T Announces Availability of Fixed Wireless High Speed Internet Access in Pahrump (Nov. 16, 2006), <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=23161> (last visited Mar. 6, 2008).

²⁰ To be clear, Sirius does not oppose wireless broadband services to the extent that they comply with the current rules and do not harmfully interfere with reception by satellite radio subscribers. What Sirius does oppose is the relaxation of the rules to allow for wide area, high density mobile services that were never intended to be provided in this band.

²¹ See 47 C.F.R. § 27.53(a)(9) (2007).

Finally, the NPRM says the Commission would “*consider* changes to the rules governing WCS licensees.”²² This is a far cry from an assurance. Nor is the language from the 1997 WCS Orders that the WCS Coalition touts: “[b]ecause we are unable to determine the specific operating parameters of a WCS service until the service is actually implemented, we found it appropriate to adopt limits that take into account any possible system configuration.”²³ The WCS Coalition claims this shows the current WCS technical restrictions were based on a “worst case” analysis that would almost certainly be modified in the future. But the meaning of this statement is exactly the opposite: the FCC said that because WCS operations were undefined, the Part 27 services rules and technical limitations would cover *any* possible deployment, including mobile broadband operations. Nothing in the Notice or prior Part 27 rulemaking relieves the WCS Coalition of the burden of persuasion for its Part 27 proposal.

B. WCS Licensees at 2.3 GHz Have Always Known They Are Required to Protect Adjacent Satellite Radio Space-to-Earth Links

According to the WCS Coalition, relaxing the Part 27 technical limits is in the public interest because *mobile* wireless broadband is infeasible under the current rules. This is not breaking news—it was adopted as part of the original reallocation of the WCS service over a decade ago. As Sirius explained in its Comments, the FCC was aware that allocating adjacent satellite and terrestrial services carries the potential for severe interference.²⁴ The Commission also understood that the 2.3 GHz band was the sole U.S.

²² Notice at 22124 (¶ 3) (emphasis added).

²³ WCS Coalition Comments at 8 (citing *Amendment of the Commission’s Rules to Establish Part 27*, Memorandum Opinion and Order, 12 FCC Rcd 3977, 3991 (1997) (“WCS MO&O”))

²⁴ See Sirius Comments at 12-13.

allocation for satellite radio, whereas the mobile services had significant spectrum throughout many frequency bands. Specifically, the Commission stated:

We also recognize that the 2320-2345 MHz frequency band is the only spectrum specifically available for provision of Satellite DARS in the United States. Accordingly, if Satellite DARS in this spectrum is subject to excessive interference, the service will not be successful and the American public will not benefit from the service. In contrast, [terrestrial mobile service] can be provided in other spectrum currently available for use by services including cellular and PCS.²⁵

So the Commission decided that sensitive satellite radio links obliged limits on 2.3 GHz WCS terrestrial operations to “protect...satellite DARS licensees from interference from WCS operations.”²⁶

As Sirius has previously documented (and the WCS Coalition has not denied), WCS auction participants and their successors were aware of these restrictions when they acquired WCS spectrum. In particular, the FCC specifically stated that these restrictions could “make mobile operations in the WCS spectrum technologically infeasible.”²⁷ WCS licensees were warned “to carefully consider whether their anticipated uses and business plans can be successfully implemented under the additional technical and operational restrictions necessary to qualify for the lesser out-of-band emission limit.”²⁸ The FCC

²⁵ *WCS MO&O* at 3992 (¶ 27). Sirius notes that the disparity of spectrum availability between satellite radio and terrestrial mobile service has become even more pronounced since the 1997 WCS/Satellite Radio allocations.

²⁶ *Amendment of the Commission’s Rules to Establish Part 27*, Report and Order, 12 FCC Rcd 10785, 10787 (¶ 3) (1997) (“WCS Report and Order”).

²⁷ *See id.*

²⁸ *See WCS MO&O* at 3979 (¶ 5) (1997) (warning potential WCS bidders that “wide area, full mobility systems and services such as those being provided or anticipated in the cellular and PCS bands are likely to be of questionable feasibility.”).

even acknowledged that the limitations placed on WCS operations could cause certain financial constraints.²⁹

Overlooking this history, the WiMAX Forum claims that the international identification of this band for WiMAX systems justifies relaxation of the WCS technical rules.³⁰ It does not. Decisions by other sovereigns, or a non-binding “identification” by the ITU, do not trump the Communications Act’s directive that the FCC minimize harmful interference. Further, the circumstances abroad are entirely not relevant as only North America uses 2.3 GHz for satellite radio whereas other countries can license 2.3 GHz WiMAX without fear of interfering with satellite downlinks. Indeed, the WRC Resolution relied upon by the WiMAX Forum undercuts its argument: that resolution noted that, “due to differing requirements, not all administrations may need all of the IMT bands identified at this Conference, or, due to the usage by and investment in existing services, may not be able to implement IMT in all of those bands” and “that the identification of several bands for IMT allows administrations to choose the best band or parts of bands for their circumstances.”³¹

Satellite radio licensees built and deployed a system in reliance on rules established by the Commission and in place for over ten years. With these rules as guidelines, satellite radio licensees deployed systems that currently provide a valuable

²⁹ WCS Report and Order at 10857 (¶ 138) (cautioning that the Part 27 regulations for 2.3 GHz licensees could have “significant cost or service implications for WCS.”).

³⁰ See WiMAX Forum Comments at 6.

³¹ WRC-07 Provisional Final Acts, Resolution 223. Elsewhere, the Resolution emphasizes “that flexibility must be afforded to administrations: to determine, at a national level, how much spectrum to make available for IMT from within the identified bands.”

service to an installed base that cumulatively exceeds 17 million subscribers – subscribers that, in the aggregate, have invested hundreds of millions of dollars in satellite radio equipment.³² The investment-backed expectations should not be decimated by rule changes intended to accommodate the newest in a string of business models proposed for WCS spectrum.

III. THE WCS COALITION’S TECHNICAL SHOWINGS ARE INSUFFICIENT TO WARRANT THE SUBSTANTIAL RELAXATION OF THE EXISTING WCS RULES SOUGHT BY THE WCS COALITION

The WCS Coalition attempts to paint its proposals as conciliatory and purports to demonstrate that adopting the WCS Coalition’s proposals will result in an imperfect but reasonable operational environment for all parties. Indeed, the WCS Coalition goes out of its way to present its rule proposals as a “reasonable middle ground”³³ that is “hardly optimal”³⁴ for the WCS licensees. However, when the WCS Coalition’s proposals are fully analyzed it is clear that they are unsupportable. Instead, when placed under scrutiny using the laws of physics, it is shown that the WCS licensees’ approach would result in significant interference to satellite radio subscribers as reflected in the experimental data already submitted by the satellite radio operators. Based on the record in this docket, the Commission should reject the rules proposed by the WCS Coalition.

³² Because millions of receivers are already in consumers’ hands, the WCS Coalition’s arguments regarding the addition of filtering to satellite radios are ridiculous. Though the WCS Coalition objects to adding filters to their own, undeveloped, undeployed devices, they believe that Sirius and XM should somehow retrofit existing consumer devices, an undertaking which would be a great expense and is entirely unnecessary under the current rules. *See* WCS Coalition Comments at 11-12 n.24.

³³ *Id.* at 26.

³⁴ *Id.* at 11.

A. The WCS Coalition's Proposed Mobile Devices Undoubtedly Would Interfere with Satellite Radio

Given the Commission's well-founded fear of interference from WCS to satellite radio, the WCS Coalition's request to relax WCS technical standards requires compelling, certifiable, and replicable data that shows that the proposed WCS operations will not result in harmful interference into the adjacent satellite radio spectrum. The WCS Coalition has not met this burden. Crucially, it supplied little or no actual data to support its proposal. Indeed, the WCS Coalition's sparse technical analysis is riddled with incorrect assumptions and contradicted by filings of its own members in the AWS-3 proceeding.

As Sirius and XM demonstrated in their comments, mobile WCS devices would render satellite radio receivers inoperable at unacceptable distances.³⁵ Sirius presented substantial experimental data, certified by both a Sirius representative and a third-party engineering organization, that demonstrated that a mobile WCS transmitter operating at 250 milliwatt (mW) would cause overload interference that would mute a satellite radio receiver at distances between 18 and 34 meters even with high satellite radio signal link margins, depending upon the spectrum block in which the device operated.³⁶ These interference distances would be amplified in multiples for subscribers that are experiencing normal local fading conditions that would reduce the link margin for the already weak satellite signals. These test results—and the additional studies more fully

³⁵ Sirius Comments at 23; Comments of XM Radio Inc., WT Docket No. 07-293, IB Docket No. 95-91, Exhibit C at 9 (filed Feb. 14, 2008) (“XM Comments”).

³⁶ Sirius Comments at 23.

described below—confirm the FCC’s original assumption that mobile WCS and satellite radio services in adjacent bands are not compatible uses of the spectrum.

These interference distances (the zone around a WCS mobile transmitter where a satellite radio subscriber receivers are prone to muting) are only slightly smaller when the satellite radio receiver is in an area covered by strong terrestrial repeater signals. For example, Exhibit C shows that a Sirius receiver operating in an area with -75 dBm terrestrial coverage experiences muting from a 250 mW WCS transceiver operating in the A block at approximately 15 meters. If the WCS equipment is operating in the B block or C block, the muting distances increases to approximately 18 to nearly 23 meters respectively.³⁷ Moreover, a terrestrial signal strong enough to mitigate this interference even this small amount is only experienced in a minute fraction of the one percent of the U.S. land mass that is covered by any terrestrial signal.³⁸

The WCS Coalition, on the other hand, claims that their “preliminary field testing” indicates that “no muting could be induced in the tested SDARS receivers when those receivers were served by SDARS terrestrial repeaters,” and that “[w]hen the testing was repeated in an area where SDARS only has satellite coverage, muting could only be induced at 250 mW at distances of 4 to 13 feet.”³⁹ Unlike Sirius and XM, however, the WCS Coalition provides no supporting documents that describe the experiments, including which victim receiver was tested, what controls were implemented, how the interference conditions creating muting of the satellite radio receivers were defined, the

³⁷ Exhibit C at 5-6.

³⁸ See Exhibit A, Appendix A; Sirius Comments at 8.

³⁹ WCS Coalition Comments at 18.

block in which the WCS transmitter was operating, the duty cycle of the device, or any other details. The absence of this information is not an isolated case in the WCS Coalition's filing. Indeed, several WCS Coalition claims are not backed by citations, facts or experimental data.⁴⁰

There is no excuse for the WCS licensees to not include full test reports with exhaustive data with their filings. The Commission time and again requested such data and analysis in its *Notice*.⁴¹ The Wireless Communications Association received FCC experimental authority on the same day as Sirius,⁴² weeks before comments were due. And WCS licensees actually have an advantage over the satellite radio operators because they are able to purchase commercially a variety of satellite radio receivers and test their susceptibility to any type of operational conditions they wish. Satellite radio operators do not have that luxury – no 2.3 GHz mobile WiMAX subscriber equipment is available in the market.

In short, the WCS Coalition's analytical support for its proposals is unsupported by actual test data, fraught with errors, and clearly contradicted by actual field data presented by Sirius and XM. The WCS licensees, not the satellite radio operators, bear the burden of demonstrating that relaxation of Part 27 standards will not harm satellite radio. Because the WCS licensees fail to provide data or otherwise support their rule

⁴⁰ The Coalition also contradicts itself: elsewhere in its filing the Coalition calculates that muting would occur where the path loss to the victim satellite radio is less than 87 dBm, which translates to 38 meters, not the few meters predicted elsewhere in the filing.

⁴¹ See Notice at 22132-133 (¶¶ 23, 25, 36) (noting that comments submitted in response to this Notice should include “technical analysis” or “technical studies”).

⁴² See OET File No. 0611-EX-ST-2007 (Jan. 23, 2008).

changes, the FCC should reject the WCS Coalition's proposal and adopt the changes requested by Sirius and XM.

B. Relaxation of the Emissions Mask for WCS Mobile and Portable Devices Would Result In Significant Additional Interference to Satellite Radio Subscribers And Other Services

As Sirius and XM already have demonstrated, relaxing the spectral mask for out-of-band emissions as proposed by the WCS Coalition would engender significant additional interference to satellite receivers. Previously, Sirius and XM explained that, given the required margin to overcome shadowing, fading, and multipath interference, the accepted metric for out-of-band emissions by terrestrial transmitters adjacent to satellite services is that the OOB should result in no more than a 1 dB rise in the satellite link noise floor at the maximum interference coordination distance.⁴³ Sirius incorporated that metric into its system design, and reiterates its recommendation that any relaxation of Part 27 WCS OOB standards conform to that ceiling. To their credit, the WCS Coalition accepted the 1 dB metric.⁴⁴

Last year, Sirius and XM analyzed the effect on satellite radio of relaxing the allowed OOB for WCS, which concluded that the change proposed by the WCS Coalition (from $110 + 10 \log(p)$ to $55 + 10 \log(p)$) would raise the noise floor excessively for satellite receivers within 860 meters of the WCS emitter.⁴⁵ Put differently, a single WCS transmitter operating with the OOB limits the WCS Coalition seeks would

⁴³ See Sirius Comments at 20-21; XM Comments at 31-32.

⁴⁴ See "Compatibility of Services Using WiMAX Technology With Satellite Services in the 2.3 – 2.7 GHz and 3.3 – 3.8 GHz Bands," WiMAX Forum, Section 4 (2007). The WCS Coalition admits that this is a "typical industry value for noise floor protection." WCS Coalition Comments at 13.

⁴⁵ September 2007 Ex Parte, Annex 1 at 2.

unacceptably degrade the satellite radio link margin, thus dramatically increasing the probability of interference, over an area of 2.7 square kilometers. This study assumed the noise floor in the satellite radio spectrum was -111 dBm.⁴⁶

Further measurements undertaken in the course of testing in support of its initial comments measured the noise floor in the satellite radio spectrum at -113 dBm, 2 dB lower than originally assumed. Applying this more recent, and rigorously verified measurement—which was reviewed and attested to by a third-party engineer—to any revision of Section 27.53(a) of the rules shows that there is even less opportunity for relaxation than suggested last year.

Were the FCC to adopt the WCS Coalition’s plea for 55 dB additional spurious and unnecessary emissions, satellite radio receivers would be subject to massive levels of overload interference. The mobile WiMAX service that the WCS licensees seek to deploy is a consumer device capable of operating with up to 2 watts under their proposal. The WCS licensees’ business plan and their core reason for seeking Part 27 changes is to deploy millions of mobile devices in the 2.3 GHz band. Put differently, the transceiver type at issue—fixed and mobile stations operating at 2 watts or lower—essentially encompasses all of the subscriber equipment that a licensee would seek to deploy in a WCS mobile WiMAX system.⁴⁷ And, in addition to out-of-band interference, 2 million mobile WiMAX units transmitting up to 2 watts in the adjacent band would generate enormous added overload interference to satellite radio receivers.

⁴⁶ *Id.*

⁴⁷ The WCS Coalition’s claim that its proposal to relax the out-of-band-emissions only for a “limited class of subscriber equipment” operating at “low power levels” is entirely disingenuous. WCS Coalition Comments at 10. If the WCS Coalition is successful in its attempts, mobile transmitters meeting these parameters will be the predominant mode of transmitters in the 2.3 GHz band, by far.

As shown above, Sirius' field testing indicates that a *single* WiMAX mobile device operating at 250 mW would mute a satellite radio receiver at distances between 17.7 and 38 meters, depending upon the block in which the WCS device is operating, which translates into a zone of interference ranging between 984 square meters and 4,534 square meters where satellite radio reception would be rendered inoperable.⁴⁸

Apparently not content with muting satellite radio once, the WCS Coalition's out of band rule would give WCS the chance to mute it twice.

In addition to the effect on satellite radio, the comments submitted by the Aerospace and Flight Test Radio Coordinating Council ("AFTRCC") show that mobile WiMaX in the 2.3 GHz band could cause significant harmful interference to aeronautical telemetry operations from consumer devices that would be deployed in such a scenario.⁴⁹ Indeed, AFTRCC proposes that the $110 + 10 \log (P)$ OOB limit applicable to emission from WCS operations into satellite radio be applied to the aeronautical telemetry bands as well.⁵⁰ Sirius fully agrees with AFTRCC that the Commission must act to protect all licensees from the unreasonable interference that could be caused by mobile WCS operations.

C. The WCS Coalition Overstates the Impact of Interference Mitigation Factors

The WCS Coalition claims that its initial field testing did not yield results similar to those presented by Sirius and XM. Sirius is unable to respond directly to this story

⁴⁸ The area was calculated using the geometric equation for determining the area of a circle, πr^2 , where r is the radius of the circle.

⁴⁹ Comments of Aerospace and Flight Test Radio Coordinating Council, WT Dkt. No. 07-293, IB Dkt. No. 95-91, at 4-5 (filed Feb. 14, 2008).

⁵⁰ *Id.* at 5.

because, as described above, the WCS Coalition did not provide full documentation about its observed results. Additionally, the WCS Coalition admits that it was using a more restrictive spectral mask for its field testing.⁵¹ Because the satellite radio operators and the WCS Coalition have observed such disparate results, joint-testing conducted by both sets of licensees—possibly with Commission oversight—could help resolve the issues in this proceeding.

Instead of measuring interference in the real world, the WCS Coalition presents a series of red herrings that it claims show that real-world interference will be lower than anticipated by the satellite radio operators. Spinning without substance, the WCS Coalition relies on the availability of terrestrial repeater coverage, incorrect calculations of path loss, probabilistic arguments, transmission duration, power control, and the satellite radio buffer in an attempt to prove its case that mobile WCS devices will not cause harmful interference. Its methodology is basically an admission that WCS mobiles will mute satellite radio receivers at large distances. Finally, using WCS's own unverifiable path loss assumptions and formula, WCS admits that the interference to a satellite radio receiver occurs with an 87 dB path loss, which would require nearly a 38 meter distance separation to avoid interference between the WCS transmitter and the victim satellite radio receiver.⁵²

⁵¹ WCS Coalition Comments at 18-19.

⁵² *Id.* at 13-14.

1. The WCS Coalition Overstates the Impact of Terrestrial Repeater Coverage on Received Interference and the Extent of Terrestrial Repeater Coverage

The WCS Coalition places significant weight on the premise that potential OOB interference with satellite radio subscribers is reduced to minimal levels when a satellite radio subscriber is in an area served by a terrestrial repeater.⁵³ The WCS Coalition suggests that interference in urban areas is thus mitigated because of the vast number of terrestrial repeaters Sirius and XM are authorized to use in certain metropolitan areas and because of the power levels at which those repeaters are authorized to operate.⁵⁴ However, the WCS Coalition overstates both the impact of terrestrial repeater coverage on the interference received by satellite radio and the level of terrestrial repeater coverage available due to inaccurate characterizations of satellite radio service and faulty assumptions regarding the level of coverage provided by terrestrial repeaters.

Though the WCS Coalition claims that it could not mute a satellite radio receiver when that receiver was within terrestrial repeater coverage, Sirius has observed entirely different results.⁵⁵ As detailed in Exhibit C of the attached appendix, Sirius satellite receivers operating in the presence of a relatively strong terrestrial repeater signal of -75 dBm were muted by a 250 mW WCS transmitter at distances varying between 15 and 23 meters depending on the WCS frequency of operation.⁵⁶ Sirius is unable to explain the conflicting analysis presented by the WCS Coalition as their observations were not fully documented.

⁵³ *Id.* at 16-18.

⁵⁴ *See id.*

⁵⁵ *See supra* at III.B.

⁵⁶ Exhibit C at 4-6.

While these results are a slight improvement over the situation where the satellite receiver is receiving a single satellite stream, interference observed at 50-75 feet (approximately 15-23 meters) is not indicative of compatible adjacent services. More importantly, it is important to remember that the service Sirius and XM provide is first and foremost a *satellite* service and it would be a perverse outcome for the Commission to adopt rules in this proceeding that force the satellite providers to deploy more terrestrial repeaters to overcome adjacent band interference. As described in its opening comments, Sirius optimized its satellite service and signal delivery (*i.e.*, modulation) in order to minimize its reliance on terrestrial coverage. While terrestrial repeaters are certainly essential to overcoming satellite coverage challenges within urban canyons or areas of dense foliage, Sirius' investment in satellite coverage has allowed it to restrict the cumulative coverage of its terrestrial repeaters to less than one percent of the contiguous United States. To modify this approach at this stage of development will be a tremendous financial burden on both Sirius and XM while having little impact on the embedded base of 17 million subscriber radios.

The WCS Coalition provides studies that it commissioned purporting to indicate that Sirius and XM's repeaters blanket certain metropolitan areas in a seamless and ubiquitous manner.⁵⁷ These showings, however, are inaccurate. The WCS Coalition assumes, incorrectly, that Sirius and XM built and operate all authorized terrestrial repeaters and that the companies operate each repeater at the highest power levels

⁵⁷ See WCS Coalition Comments at 17 n.31 & Attachment C.

authorized.⁵⁸ In combination, these erroneous suppositions hugely overstate the extent, and signal strength, of satellite radio repeater coverage.

Sirius and XM went to great lengths to develop systems for determining where terrestrial repeaters should be located and how many repeaters are needed at those locations and have supplied accurate current data on our operating terrestrial repeaters to those operators that have requested such information. In the specific cases analyzed by the WCS Coalition, New York City and Washington, DC, the WCS Coalition predictions appear to be based on STA filings indicating that Sirius is authorized to operate 22 and 12 repeaters, respectively. In fact, Sirius only operates 12 repeaters in New York and 6 repeaters in Washington, DC. Likewise, the companies operate certain repeaters at power levels lower than originally authorized, in order to reduce interference. The WCS Coalition's arguments are even more fraudulent because Sirius and XM have supplied accurate current data on their operating terrestrial repeaters to those operators that have so requested.

In the attached Exhibit A, Sirius provides corrected coverage maps for both New York and Washington, DC to illustrate the following inaccuracies with the WCS Coalition's analysis: 1) terrestrial coverage in those two markets is not ubiquitous and there are areas within these markets that are served solely by satellite transmissions and 2) the average signal level on the ground from terrestrial repeaters is not nearly as high as the WCS Coalition purports. As shown in Exhibit A, the majority of the area within these two markets receive terrestrial signal levels between -75 and -95 dBm. The areas where the terrestrial signal levels exceed -44 dBm (the ground level limit initially

⁵⁸ See *id.* at 17 n.31 (basing analysis on repeater configurations authorized by the Commission in Fall 2007).

proposed by Sirius) or -35 dBm (Sirius' modified proposal for the ground level emission limit) is exceedingly small. Note that these calculations were based on actual measurements.

The data presented in Exhibit A disproves the analysis on repeater coverage presented by the WCS Coalition, which means that the WCS Coalition cannot presume that terrestrial repeater coverage in urban areas is so robust that the potential for WCS interference with their proposed OOB limits can be mitigated.⁵⁹ Moreover, when considering the true level of coverage provided by Sirius and XM's repeaters in urban environments, the interference threat posed by the WCS Coalition's proposed rules takes on a new perspective. In order to overcome the interference from even 250 mW mobile units (one-tenth of the terminal EIRP that the WCS licensees propose), Sirius and XM terrestrial repeaters would have to provide continuous coverage at signal levels greater than -60 dBm.⁶⁰ This level of coverage, even if technically feasible (which it is not), would require many more terrestrial repeaters⁶¹ and would essentially require that Sirius convert its satellite service into a terrestrial service in all urban markets. In the New York market, for example, Sirius would have to increase the number of terrestrial repeaters from the twelve it operates today to 4,850 repeaters operating at 2 kilowatts.⁶²

⁵⁹ See *id.* at 16-18.

⁶⁰ Exhibit C at 8.

⁶¹ Exhibit A at 4.

⁶² *Id.*

2. The WCS Coalition's Path Loss Calculation Is Unsupported by Measured Data and Other Evidence

The WCS Coalition uses an analysis of path loss measurements as a core component of its probability analysis.⁶³ This analysis is contradicted by Sirius' own experimental results and various industry and governmental findings. The WCS Coalition states that it has determined that the path loss between a mobile WCS transmitter and a satellite radio receiver can be calculated using the function $\text{pathloss}(\text{dB})=52+22 \log (D)$, where D is the distance in meters.⁶⁴ Essentially, the WCS Coalition is claiming that the signal generated by its handsets will be significantly attenuated before it reaches the input of the satellite radio receiver.

The WCS Coalition's path loss assumptions do not correspond with prevailing industry analysis or Sirius' measured data. As detailed in Exhibit B of the attached appendix, the WCS Coalition's proposed equation overestimates the path loss by an average of 12 dB. For example, the NTIA released a study in 2007 on propagation path loss assumptions for mobile-to-mobile devices in close proximity and estimates a 50 dB path loss at 3 meters for frequencies near 2.3 GHz.⁶⁵ Other technical analyses of path loss between mobile devices show similar results.⁶⁶ Sirius' measured data was consistent with the findings in these sources.⁶⁷ Also, the analyses and measured data are consistent

⁶³ WCS Coalition Comments, Attachment B at 6.

⁶⁴ *Id.*, Attachment B at 12.

⁶⁵ ITS, NTIA Report TR-07-449, Propagation Loss Prediction Considerations for Close-In Distances and Low-Antenna Height Applications, Nicholas DeMinco (July 2007), available at <http://www.its.blrdoc.gov/pub/ntia-rpt/07-449/> (last visited March 17, 2008).

⁶⁶ See Exhibit B at 8-9.

⁶⁷ See Exhibit B at 9.

with the comments submitted by Motorola and Verizon Wireless in the AWS-3 proceeding.⁶⁸

In contrast, the WCS Coalition's formula yields approximately 62.5 dB of attenuation for the same distance and is clearly overestimated to benefit the WCS Coalition's analysis. Overestimating the path loss between the interfering device and the victim receiver will minimize the harmful affects of operations within close proximity. The prevailing literature and Sirius' measured data shows that the WCS Coalition has selected assumptions that support its desire for rule relaxation but that are not supported by science.

3. The WCS Coalition's Probabilistic Arguments Are Insufficient

The WCS licensees argue that a mobile WCS WiMAX-based transceiver may operate within the interference zone of a satellite radio without causing muting interference because the WCS WiMAX device is not always on and so might not be transmitting near a satellite radio receiver.⁶⁹ Whatever the relevance of such probabilistic considerations in general, they have no application here. In this case, Sirius and XM have submitted data that shows a high level of incompatibility between the two services and interference zones reaching out for tens of meters. With interference zones of this

⁶⁸ See Comments of Motorola, Inc., WT Docket No 07-195, at 4 (filed Dec. 14, 2007) (analyzing the potential for interference between two mobile devices and "assuming free space path loss between the two devices in close proximity (with each device having an additional loss of 3 dB to account for antenna and other internal losses."); Comments of Verizon Wireless, WT Docket No 07-195, at Attachment A, 5 (filed Dec. 14, 2007) ("assuming 3 dB of additional loss to account for head and body losses and other factors") ("Verizon Wireless AWS-3 Comments").

⁶⁹ WCS Coalition Comments at 19.

size, the likelihood of multiple-WCS-device interference is significant and a more complex analysis is warranted.

In Exhibit B of the attached appendix Sirius discusses the more typical use scenarios where WCS mobile transmitters and Sirius satellite receivers would come into close proximity. Sirius satellite service is delivered predominately to vehicles so a logical case study would be interference to satellite receivers located in cars traveling in rush hour traffic on a multi-lane highway. As the interference zones increase to tens of meters, the probability of interaction between the two services increases tremendously, assuming any level of commercial success for WCS. Given the interference zones measured by Sirius, it is easy to show that one WCS transmitter traveling down a busy highway would interfere with scores of satellite radio receivers. For example, Sirius estimates that a single WCS device operating in a car traveling on a 16 mile stretch of the New Jersey turnpike during rush hour would cause almost 300 individual muting events of two seconds or longer.⁷⁰ If the WCS Coalition were allowed to deploy millions of these mobile devices, it is easy to imagine a situation where a customer experiences frequent muting during their rush-hour commute, resulting in significant harm to consumers and to the reputation and viability of satellite radio service.

The WCS Coalition also relies on the fact that WiMAX transmissions are “bursty” and brief or that the WiMAX user and satellite radio subscriber may be moving at high speeds so as to lessen the interference probability.⁷¹ However, a proper analysis must recognize the cumulative effect of the bursts from one or more WCS devices, some

⁷⁰ Exhibit B at 14-19.

⁷¹ WCS Coalition Comments at 20-21.

of which may be within the interference zone for long periods. Also, reliance on a singular waveform as an interference mitigation factor would require that waveform to be mandated by the FCC's rules – a practice rarely adopted. Sirius notes that the WCS Coalition does not propose to mandate the use of WiMAX waveform and that other waveforms may result in even greater interference conditions.

The WCS Coalition claims that Sirius' technical analysis exaggerates the risk of interference to satellite receivers because it fails to recognize the path redundancy of the satellite and terrestrial signals as well as the impact of the buffers engineered into satellite radio receivers that help reduce the effects of intermittent interference.⁷² However, as Sirius made clear in its White Paper and in initial comments, the standard proposed by Sirius contemplates that WCS interference will overcome the reception of one satellite signal, *i.e.*, one of the satellite paths is blocked to the receiver, and the other satellite signal is received with low link margins as a result of interference.⁷³ Sirius' proposed rules were carefully calculated to accept the maximum level of WCS interference that only barely preserved one satellite's space-to-earth path at an interference power level of -44 dBm while muting the other satellite link long before at the lower interference power level of -57 dBm.⁷⁴ Ignoring the engineering fact that the other satellite is lost at -57 dBm long before the proposed interference coordination level of -44 dBm amounts to

⁷² *Id.*

⁷³ This is not an unlikely scenario especially considering the limited repeater coverage across the country.

⁷⁴ See White Paper: Interference to the SDARS Service from WCS Transmitters at 11-15 (attached to Letter from Carl Frank, Counsel to Sirius to Marlene H. Dortch, Secretary, FCC, IB Dkt. No. 95-91 (filed Mar. 30, 2006)).

“double counting.”⁷⁵ If the satellite radio receiver is only receiving a single stream, the mitigating impact of the buffer is entirely absent because there is no redundancy to feed the buffer.⁷⁶

Finally, the WCS Coalition claims that power control will mitigate interference to satellite radio, as it will be engaged the great majority of the time for WCS mobile devices. Obviously, the lower the power of the WCS transmitter, the lower the risk that they will interfere with satellite reception. However, Sirius’ measurements show that WCS power must be on the order of 10 mw in the A and B blocks and 1 mw in the C and D Blocks to avoid interference with satellite radio receivers at 3 meters. Sirius expects that the WCS Coalition is not anticipating mobile power restrictions of this magnitude.

However, as Sirius previously noted, its recommendations for power restrictions on WCS mobile devices are consistent with and, in some cases, higher than levels discussed in the AWS-3 proceeding. Attached as Exhibit E is a summary review of the issues raised in the Commission’s proceeding relating to the use of the 2155-2175 MHz (AWS-3) for mobile services and the interference potential to mobile receivers operating in the adjacent 2110-2155 MHz AWS-1 band. As discussed in that exhibit, the adjacent band interference issues raised in both proceedings are quite similar and, therefore, it is not surprising that the proposals of Sirius to limit WCS mobile transmit power to 10 milliwatts or less correspond well with the recommendations of T-Mobile, Verizon Wireless, AT&T and Motorola with respect to mobile transmitter use in the 2155-2175

⁷⁵ WCS Coalition Comments at 15-21.

⁷⁶ September 2007 Ex Parte at Annex 3, 4.

MHz band.⁷⁷ Sirius notes that WCS licensee Nextwave also expressed similar views in that proceeding and, in fact, recommended the AWS-3 mobile transmitters at 10 dBm or less.⁷⁸

It is not appropriate, however, for the WCS Coalition to request mobile transmit powers of 2 Watts and then claim that power control will effectively ensure that devices will not operate at those powers. To base technical rules on such an approach would require an exhaustive study with the WCS service model for all licensees clearly defined. It would also require rules to specify a minimum density of WCS base stations to ensure that mobiles are always in close proximity to base stations and thus operating at lower powers. The FCC must base its interference predictions using the maximum powers requested by the WCS Coalition, not on speculations about power control.

D. The WCS Coalition Admits that Mobile WCS Devices Will Interfere with Satellite Radio Receivers

The WCS Coalition makes the remarkable argument that the Commission should relax the $110 + 10 \log (P)$ OOB restriction because satellite radio receivers will experience overload interference from mobile WCS devices before they are impacted by OOB interference. In particular, the WCS Coalition claims that the OOB limit on 2 watt WCS mobile units can be relaxed to the point that adjacent band satellite receivers mute from OOB at the same distance they mute from overload. By Sirius'

⁷⁷ See e.g., Verizon Wireless AWS-3 Comments at 13 (“AWS-3 mobiles transmitting in the 2155-2165 MHz band would have to be limited to a power level of 0 dBm (1 mW) to avoid harmful interference to AWS-1 mobile receivers”); Comments of T-Mobile, WT Docket No. 07-195, at 6 (filed Dec. 14, 2007) (proposing to “limit AWS-3 mobile radios to a maximum transmit power of 17 dBm in the 2155 to 2170 MHz band”).

⁷⁸ Reply Comments of NextWave Wireless, Inc., WT Docket No. 07-195, at 5 (filed Jan. 14, 2008) (indicating that AWS-3 mobiles would “be limited to an EIRP in the range of 5-10 dBm”).

measurements, under normal satellite coverage, this would occur somewhere between 17.7 and 39 meters from the WCS transmitter.

Initially, it is important to recognize that this is an admission by the WCS licensees that their proposed rule changes would sanction a system that blocked satellite radio reception over huge areas. The bottom line is that such a result is flatly inconsistent with the decade-old 2.3 GHz band plan and disregards OOB and power limits adopted precisely to prevent interference to satellite radio from WCS mobiles. Worse still, using muting from overload interference to bootstrap relaxation of limits on spurious emissions is nothing short of a plea to harm satellite radio twice. Therefore, the Commission cannot adopt these proposals.

In fact, WCS has the appropriate result exactly backwards. Instead of relaxing the spectral mask, the Commission should adopt more restrictive power limits on WCS mobile devices that limit C and D block operations to 1 milliwatt or less and A and B block operations to 10 milliwatts or less to protect satellite radio receivers at a 3 meter distance. This would avoid interference to the 17 million satellite radio subscribers and is consistent with the Commission's long-held policy to protect satellite radio subscribers. If the Commission adopts these power limits, it can provide limited relief of the OOB limits to the WCS operators. As Sirius noted in its earlier comments, the OOB limits can be reduced by 7 dB if these power limits are also adopted.⁷⁹

⁷⁹ Sirius Comments at 34-35.

E. The WCS Coalition's 2000 Watt Average Power Base Station Proposal Will Not Meet the Needs of Either Service

As the satellite radio operators have already established, and the WCS Coalition has not rebutted, WCS base stations operating at the 2000 Watt average power level would, absent additional restrictions, result in crippling interference to satellite radio. From Sirius' perspective, it is unclear why the WCS Coalition requires these high-power stations for the business model it proposes.

Nevertheless, the WCS Coalition argues that "at the time of the Commission's SDARS auction, the WCS rules imposed no limit whatsoever on WCS transmissions" and that "*WCS licensees are, and always have been, free to design their networks with power concentrated at ground level to facilitate provision of ubiquitous cellularized systems.*"⁸⁰ Sirius does not disagree that the WCS licensees can operate at 2000 watts *peak* power and may in some few cases not interfere with satellite radio service⁸¹ and that they could concentrate their power at ground level. Sirius does, however, strenuously object to the operation of a mobile system that would necessitate such a system design, the type of system that Commission explicitly warned WCS licensees was likely infeasible and would undoubtedly cause interference to satellite radio. Though the WCS Coalition makes much of the dubious fact that the satellite radio operators took part in the auction before any WCS power limits were put in place, it should be duly noted that the OOB limits placed on WCS operations were released two weeks prior to the

⁸⁰ WCS Coalition Comments at 27 (emphasis in original).

⁸¹ Sirius generally agrees with the WCS Coalition that peak power needs to be more precisely defined and that the WCS Coalition's definition of peak power is largely adequate. However, Sirius believes that any definition should take into account the cumulative amplitude probability associated with the peak-to-average ratio. See Exhibit D at 3-4.

commencement of the WCS auction, providing the WCS auction participants plenty of time to understand the impact of these rules.

Indeed, the WCS Coalition's objection to the superior ground-level emission limit proposed by Sirius is premised almost entirely on its claim that such a rule would restrict its ability to deploy a mobile WiMAX system.⁸² But such a claim presupposes that the WCS licensees could deploy that system in any case, which, as established by the WCS Coalition's request for rule changes, is not true today. To be clear, though Sirius does not object to the WCS licensees operating a system that results in the commercial use of its long-warehoused spectrum, it strenuously objects to any rule changes that would result in massive levels of interference to the 17 million satellite radio subscribers.

In sum, Sirius recommends that the Commission reject the 2000 Watt average power base station proposal of the WCS Coalition and instead adopt the ground-level emission limits proposed by Sirius and supported by XM. However, should the Commission believe that specific transmitter power restrictions remain applicable, it needs to address significant issues associated with the measurement of power in OFDM waveforms such as WiMAX. In Exhibit D Sirius addresses the great variability in power measurement results that can be achieved depending on the duration of the measurement. As recommended in this exhibit, in order to avoid the possibility of extremely high power bursts from WCS equipment, the measurement must be limited to that portion of time when the transmitter is actually operating and avoid including within the average those

⁸² WCS Coalition Comments at 29-34.

periods of time when the transmitter is not operating and the Commission must adopt an unambiguous limit on the “burst” power.⁸³

F. Claims that Satellite Terrestrial Repeaters Will Cause Harmful Interference to WCS Mobile and Fixed Receivers Are Not Technically Supported

In opposing the ground based power limits supported by both Sirius and XM, the WCS Coalition claims that their fixed and mobile receivers would be subjected to high levels of energy originating from the satellite radio terrestrial repeaters over vast areas that would render their receivers inoperable.⁸⁴ The WCS Coalition is apparently concerned that terrestrial repeaters will place high signal levels on the ground that will mute WCS subscriber devices and, also, the repeaters will place even higher levels at heights where the WCS fixed infrastructure receivers are located (*e.g.* 30 meters AGL). The WCS Coalition is also concerned about interference from terrestrial repeater out-of-band emissions to its base station receivers.

In response, Sirius first notes that these arguments are inadequately supported by the WCS Coalition. There is no data in their filing describing the performance of WCS handsets or WCS base station receivers and very little in the way of evidence of the large zones of interference to WCS operations that would be caused by satellite radio repeaters. Appendix B of Exhibit A shows that the actual zones of interference to WCS base stations would be much smaller than that proposed by WCS and that even a limited use of

⁸³ Thus, as Sirius has previously recommended, the Commission should adopt an average power measurement methodology based on a time gated, average power measurement of the transmitted frame. Sirius Comments, Exhibit A at Section 3.3.

⁸⁴ WCS Coalition Comments at 22-28.

antenna downtilt by the WCS licensees would reduce the exclusion zones to inconsequential sizes.⁸⁵

IV. SATELLITE RADIO IS PRIMARILY A SATELLITE SERVICE THAT REQUIRES GRANDFATHERING A LIMITED NUMBER OF TERRESTRIAL REPEATERS AND ADOPTING A FLEXIBLE LICENSING REGIME FOR NEW TERRESTRIAL REPEATERS

Grandfathering of Sirius and XM's existing terrestrial repeaters is an essential and appropriate means of continuing the level of service provided by satellite radio, and any attempt to require the satellite radio operators to come into compliance with the WCS Coalition's proposed rules would be expensive and would not necessarily result in a better interference environment for the WCS operators. In addition, flexible rules are required for the licensing of these repeaters in order to maintain this level of service.

A. The Commission Should Grandfather Existing Satellite Radio Terrestrial Repeaters

The Commission should grandfather existing satellite radio terrestrial repeaters so that they can continue to operate under present parameters. The grandfathering of existing satellite radio repeaters is fair and feasible, given the high level of service provided currently, the enormous expense associated with converting the terrestrial repeater systems, and the potential for disruption to current satellite radio customers. Satellite radio licensees have spent hundreds of millions of dollars to deploy terrestrial repeaters and have millions of subscribers who depend on repeaters to receive the diverse content that satellite radio provides. WCS licensees' networks, on the other hand, have only been built out minimally, and the licensees' monetary investments are insignificant when compared to Sirius and XM's. Moreover, as Sirius has established, replacing

⁸⁵ Exhibit A, Appendix B at 15-16.

individual higher-power repeaters with many lower-power repeaters will result in more interference to WCS operations, not less.

The WCS Coalition's suggestion that the Commission intended terrestrial repeaters to operate at power levels much lower than that authorized today is without merit. The Commission's use of the term "gap-filler" lends no evidence that the Commission intended repeaters to operate at very low powers.⁸⁶ Instead, Commission precedent in the form of repeated STA grants indicates that the Commission understands the term "gap-filler" to encompass the very power levels authorized at present. No power limits were discussed or adopted when the initial SDARS rules were adopted, and no power limit rules are in place now.

Finally, the interference that would be caused by the proposals the WCS Coalition makes to facilitate the deployment of WCS mobile services could not be overcome even if satellite radio operators were to spend tens of millions of dollars on a new repeater configuration. The investment by satellite radio to build and maintain their terrestrial networks was essential to serve customers and should be protected by the Commission through grandfathering.

B. The Commission Should Adopt A Licensing System For Terrestrial Repeaters And Notification Requirements Which Maintain Operator Flexibility To Use Spectrum Within The Confines Of The Rules

Contrary to complaints by the WCS Coalition, Sirius' proposals for terrestrial repeater licensing and notification are reasonable. These proposed rules will provide both satellite radio and WCS licensees sufficient time to determine the interference potential of the proposed operations. They will thus allow licensees to avoid overload or

⁸⁶ WCS Coalition Comments at 9.

intermodulation interference situations where adjacent band operations are significantly interfered with by new operational parameters.

The WCS Coalition acknowledges that an exchange of information will reduce the prospects for interference⁸⁷ but objects that requiring a licensee to provide 90 days advance notice of the technical parameters of all transmitter deployments would place an undue burden on WCS licensees.⁸⁸ However, it is important to note that all licensees, not just WCS licensees, will be subject to the 90-day requirement. Moreover, the WCS Coalition's argument that this notification requirement is overly burdensome is inconsistent with its proposed requirement that satellite radio licensees coordinate any terrestrial repeaters that would operate at levels higher than two kilowatts EIRP.⁸⁹

Additionally, the Commission should not adopt a rule limiting the operation of terrestrial repeaters to certain spectrum.⁹⁰ Satellite radio licensees have carefully calculated the best means of providing satellite radio services to consumers. They require flexibility to modify their operations over time in response to engineering and consumer demand. Moreover, if the Commission adopts Sirius' proposed ground-level emissions limit, satellite radio licensees will be required to meet those limits regardless of the band in which terrestrial repeaters operate.

⁸⁷ *Id.* at 38.

⁸⁸ *Id.* at 38-39.

⁸⁹ *See Notice* at 22134 (¶ 29).

⁹⁰ *See WCS Coalition Comments* at 34-35.

V. THE COMMISSION HAS ALREADY DETERMINED THAT SATELLITE RADIO COVERAGE BEYOND THE CONTINENTAL UNITED STATES IS IN THE PUBLIC INTEREST

The Commission should allow the satellite radio operators to deploy terrestrial repeaters outside of the footprint of their satellite coverage. Though the terrestrial broadcasters resist satellite radio's attempts to do so, their concerns are unfounded and fundamentally anticompetitive.

Contrary to the terrestrial broadcasters' assertions, Sirius' service area covers the entire United States, including Alaska and Hawaii, and the Commission has not previously ruled on the use of terrestrial repeaters outside of the satellite footprint.⁹¹ In its 1997 Report and Order, the Commission determined that the service area of satellite DARS licensees would not be limited to CONUS and extends throughout the United States.⁹² In fact, the Commission expressed its desire for satellite radio to extend beyond the continental United States, stating "[w]e strongly encourage coverage to other areas or territories of the United States where practical to do so for first generation systems."⁹³ The Commission's reluctance to mandate service beyond the lower 48 state's boundaries rested in its understanding of the technological limitations present in 1997, limitations that Sirius and XM have worked studiously to eliminate. Thus, the Commission

⁹¹ The Alaska and Hawaii Associations of Broadcasters claim that "[e]xisting rules and precedents were shown, in [the Commission's consideration of Sirius' application to operate repeaters in AL and HI] to preclude such satellite-free SDARS activity." However, the Commission has neither granted nor denied Sirius' application. *See* Comments of Alaska Broadcasters Association and Hawaii Association of Broadcasters, WT Dkt. No. 07-237, IB Dkt. No. 95-91, 3 (filed Feb. 14, 2008) ("AL/HI Broadcaster Comments").

⁹² *Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, Report and Order, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754, 5793-94 (¶¶ 97-99) (1997) ("1997 Report and Order").

⁹³ 1997 Report and Order at 5794 (¶ 99).

recognized in 1997 that satellite radio's service area covered Alaska and Hawaii, encouraged satellite radio providers to extend coverage to these states, and the satellite radio licensees have acted in accordance with this instruction by overcoming technological impediments and carrying out the Commission's goals.

Moreover, allowing the deployment of terrestrial repeaters to areas outside the satellite footprint will ensure that the benefits of satellite radio are available to *everyone*—including residents of Alaska and Hawaii. This is clearly in the public interest. In the FCC's initial grant of authorization for Sirius' terrestrial repeater network, the agency noted that the public interest is served by Sirius' provision of "high quality radio signals to listeners in areas that have limited radio service," continuous radio coverage for individuals on long-distance trips, and "[d]iverse program formats, including educational, ethnic and religious programming."⁹⁴ These benefits should be experienced by all U.S. citizens, including those in Alaska and Hawaii.

Moreover, any repeaters deployed outside of the satellite footprint will operate in a manner identical to Sirius and XM's other deployed repeaters. Specifically, they would be used exclusively for the "simultaneous retransmission of [the complete] programming, [and only that programming,] transmitted by the satellite directly to SDARS subscriber[s]' receivers."⁹⁵ Finally, the purpose of these proposed repeaters mirrors that

⁹⁴ *Sirius Satellite Radio Inc. Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters*, Order and Authorization, 16 FCC Rcd 16,773, 16,776 (¶ 9) (Int'l Bur. 2001) ("2001 STA Order").

⁹⁵ *2001 STA Order*, 16 FCC Rcd at 16,777 (¶ 11). Contrary to the suggestion of the National Association of Broadcasters ("NAB"), *see* Comments of NAB, WT Dkt. No. 07-237, IB Dkt. No. 95-91, 6 (filed Feb. 14, 2008) ("NAB Comments"), the purpose of the limit on terrestrial repeater transmissions was to confine programming to that sent over the licensees' satellites, not to restrict how the licensees feed their repeaters.

of Sirius' operating repeaters: overcoming satellite signal shortfalls and thus ensuring consistent and reliable service to the public.

The concerns regarding localism presented by Alaska and Hawaii are irrelevant to the current proceeding and hypocritical in light of terrestrial broadcasters' continued objections to satellite radio operators' provision of local content.⁹⁶ Terrestrial broadcasters provide no valid link between the protectionism they seek and satellite radio repeaters. The terrestrial broadcasters again fail to establish that there is greater harm by operation of these repeaters than by the provision of satellite radio to these areas without the proposed repeaters. Moreover, many of the rationales cited by the broadcasters for the protection of localism in these areas – including remoteness and unique terrain⁹⁷ – also support the provision of more reliable satellite radio in these areas.

Finally, terrestrial broadcasters' claims are particularly ironic given their historical objection to the provision of any local content by satellite radio operators – a concern that stems from broadcasters' traditional disdain for competition and not from any purported concerns about localism. In fact, the NAB maintains in this very proceeding that satellite radio repeaters must continue to be prohibited from providing any locally originated programming.⁹⁸ Having fought against any local programming, terrestrial broadcasters' current claim that satellite radio providers now have a competitive advantage because they have no localism requirement is absurd.⁹⁹

⁹⁶ AL/HI Broadcaster Comments at 7.

⁹⁷ NAB Comments at 10-13.

⁹⁸ *Id.* at 12-13.

⁹⁹ *See* AL/HI Broadcaster Comments at 4-5.

VI. THE COMMISSION SHOULD ADOPT THE PROPOSALS OF SIRIUS AND XM IN THIS PROCEEDING

The Commission should adopt the modified ground-level emission limit proposal proposed by Sirius and XM.¹⁰⁰ This proposal will ensure that satellite radio operators and WCS operators are protected, and is the simplest system to ensure coexistence in the 2.3 GHz band. In addition, the Commission should adopt Sirius' proposals to limit mobile WCS power levels in order to avoid crippling interference to the 17 million satellite radio subscribers.¹⁰¹ The WCS Coalition has not presented sufficient evidence to show that their proposed rule changes will not significantly interfere with satellite radio and has failed to effectively rebut any of the evidence presented by the satellite radio operators. Thus, the Commission must continue to protect satellite radio to ensure that it will remain a viable and valuable service to millions of Americans.

¹⁰⁰ Sirius Comments at 25-32.

¹⁰¹ *Id.* at 32-35.

VII. CONCLUSION

The Commission should reject the proposals of the WCS Coalition as unsupported by the record and unworkable in this band. Instead, the Commission should adopt Sirius' proposals.

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