Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 2 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems	ET Docket No. 00-258
Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 and 2385-2390 MHz Government Transfer Bands	WT Docket No. 02-8

JOINT COMMENTS OF SIRIUS SATELLITE RADIO INC. AND XM RADIO INC.

Sirius Satellite Radio Inc. ("Sirius") and XM Radio Inc. ("XM"), by its attorneys, hereby comment on the Commission's Fourth Notice of Proposed Rulemaking ("*Fourth NPRM*") in the above-captioned proceedings.[1] The *Fourth NPRM* proposes, *inter alia*, to license non-Federal Government flight test stations in the 2385-2395 MHz band and to allocate the 2360-2395 MHz band for all forms of governmental aeronautical mobile operations on a primary basis.[2] Sirius and

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[1] *In the Matter of Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 2 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems; Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 and 2385-2390 MHz Government Transfer Bands*, 18 FCC Rcd 13235 (2003) ("*Fourth NPRM*").

[2] *Fourth NPRM*, ¶ 61.

XM currently provide satellite digital audio radio service ("satellite DARS") in the nearby 2320-2345 MHz frequency bands.[3] The Commission concedes in the *Fourth NPRM* that "appropriate out-of-band emission limits...are necessary to protect Satellite DARS reception from both aeronautical (ground) stations and from aircraft stations...."[4] Sirius and XM agree and thus file these comments to request that the Commission impose a sufficiently stringent limit on unwanted emissions from new aeronautical operations in the 2360-2395 MHz band to avoid harmful interference to satellite DARS.

Limits on out-of-band interference from non-Federal Government aeronautical flight testing and Federal Government aeronautical services are necessary to protect the public interest in reception of satellite DARS. As the Commission is aware, the two satellite DARS licensees already serve more than one million subscribers, and the market is growing fast. Sirius and XM provide continuous digital radio with over 200 audio channels in total, substantially augmenting the diversity and choice available to American consumers.[5] As a result, satellite DARS licensees have dramatically reduced the disparity in access to radio to 45 million underserved consumers in the U.S., particularly those in rural areas with more limited terrestrial coverage.

The services available to satellite DARS listeners and the business of satellite DARS licensees could be undermined, however, absent adequate protection from out-of-band emissions. By definition, adjacent channel interference stems from "unwanted" emissions—RF energy

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[3] Sirius, through its subsidiary, Satellite CD Radio, Inc., provides satellite DARS in the 2320-2332.5 MHz band. XM provides satellite DARS in the 2332.5-2345 MHz band.

[4] *Fourth NPRM*, ¶ 60 (footnotes omitted).

[5] *Satellite CD Radio, Inc., Application for Authority to Construct, Launch, and Operate Two Satellites in the Satellite Digital Audio Radio Service*, Order and Authorization, 13 FCC Rcd 7971, 7971-72 (1997), *affirmed*, 16 FCC Rcd 21458 (2001); *American Mobile Radio Corporation*, 13 FCC Rcd 8829 (1997).

neither needed nor desired.[6] But, excessive adjacent channel energy in the satellite DARS band could hinder the ability of the satellite DARS licensees to deliver service and thus jeopardize the rapid deployment envisioned by the Commission.

Satellite DARS consumer receivers are particularly susceptible to interference from the out-of-band energy of airborne transmitters. Satellite radio receivers employ very small aperture, near omni-directional antennas and receivers that operate near the noise floor. Satellite DARS user receivers are designed with sufficient link margin to overcome outages from small or brief blockage, multi-path fading, and foliage attenuation. However, providing uninterrupted high quality audio in a mobile environment typically leaves little excess margin to overcome out-of-band interference from adjacent services.[7] Moreover, because satellite DARS users demand nationwide coverage and the proposed new operators in the 2360-2395 MHz band include airborne transmitters—which will always be in line of sight of satellite DARS receivers—any out-of-band interference into the satellite DARS spectrum will be pervasive and continuous.[8] Indeed, the satellite DARS licensees already have supplied detailed analysis demonstrating that, in order to stay within the available link margin, the aggregate interference in the satellite DARS band

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[6] "Unwanted" emissions "consist of spurious emissions and out-of-band emissions." 47 C.F.R. §2.1.

[7] *Joint Petition of Sirius Satellite Radio and XM Radio, Inc. for Partial Reconsideration*, ET Docket No. 98-153, at 2 (filed June 17, 2002) ("Joint Petition").

[8] Put differently, antenna discrimination could not reduce or eliminate harmful interference. The National Telecommunications Industry Association ("NTIA"), when considering relocating Department of Defense ("DOD") airborne operations to the 2360-2395 MHz band, also recognized that aeronautical operations involving high altitude aircraft illuminate huge areas and operate within line-of-sight of a large population of victim receivers. *See* NTIA, "An Assessment of the Viability of Accommodating Advanced Mobile Wireless (3G) Systems in the 1710-1770 MHz and 2110-2170 MHz Bands" (July 22, 2002) ("NTIA 3G Report"), *available at* http://www.ntia.doc.gov/ntiahome/threeg/va7222002/3Gva072202web.htm.

must not raise the noise floor more than 1.0 dB.[9] Attachment 1 depicts how interference into the satellite DARS bands from out-of-band services could raise unacceptably the noise floor and degrade operation of satellite DARS user receivers.

The Commission previously has acknowledged the severity of this problem and codified the out-of-band suppression necessary to protect satellite DARS. For example, when allocating spectrum adjacent to the satellite DARS band for the Wireless Communications Service ("WCS"), the Commission began with the premise that the satellite DARS allocation was intended "to ensure a high quality radio service."[10] As a result, the agency warned that were satellite radio "subject to excessive interference, the service will not be successful and the American public will not benefit from the service."[11] The Commission thus required adjacent mobile WCS transmitters[12] to attenuate emissions in the satellite DARS band to 110 + 10 log (p) dB below transmitter power.[13] The Commission has also required adjacent fixed WCS transmitters to attenuate emissions in the satellite DARS band to 80 + 10 log (p) dB below transmitter power.[14]

The *Fourth NPRM* notes that existing non-governmental flight test stations in the 2310-2390 MHz band are required to meet an out-of-band emission limit in the satellite DARS band of

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9 See Sirius Petition for Rulemaking In the Matter of Revision of Part 15 and Part 18 of the Rules regarding the Out-of-Band Emissions of Radio Frequency Devices, at 22-26 (Filed January 23, 2002).

10 *Agreement of the Commission's Rules to Establish Part 27, the Wireless Communications Services,* Memorandum Opinion and Order, 12 FCC Rcd 3977, 3991-92 (1997) ("*WCS Order*").

11 *Id.*

12 In addition, WCS rules limit mobile transmitters to 4 watts E.I.R.P. peak power. *See* 47 C.F.R. § 27.50(f)(2).

13 *See* 47 C.F.R. § 27.53(a)(2). For a 1 W mobile transmitter, this equates to a signal level of –80 dBm at the source (5.8 μV/m at 3 m). This is the limit that should be applicable to new airborne mobile transmitters in the 2360-2395 MHz band.

14 *See* 47 C.F.R. §27.53(a)(1). Assuming a 1 Watt WCS fixed transmitter, this equates to a signal level of -50 dBm (186 μV/m at 3 meters) in the SDARS band. This is the limit that should be applicable to new fixed transmitters in the 2360-2395 MHz band.

55 + 10 log (p) dB and proposes to continue to apply this limit.[15] Such a rule would permit new non-Federal Government aeronautical flight testing and Federal Government aeronautical mobile transmitters, operating in the 2385-2395 MHz and 2360-2395 MHz bands respectively, to exceed the existing DARS interference protection standard by as much as 55 dB.[16] The resulting spurious energy would be far greater than the interference rejection in satellite DARS user receivers, causing signal dropouts. In short, the proposed rule could preclude the high quality audio long sought by the FCC and now widely demanded by consumers.[17]

The *Fourth NPRM's* proposed limit defies both logic and law. It makes no sense to permit greater spurious emissions from one service than another—interference from either will harm the public interest in satellite DARS reception.[18] Moreover, the FCC neither justifies reversing prior policies[19] nor supplies any basis for relaxing spurious emission limits in one instance but not another.[20]

Thus, to protect satellite DARS from harmful interference, Sirius and XM recommend that the Commission require all new Government and non-Government operators in the 2360-2395 MHz band to meet the same out-of-band emission limits that apply to adjacent band WCS

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15 *Fourth NPRM*, ¶ 60 n.132.

16 *Fourth NPRM*, ¶ 60.

17 Such interference also might force the satellite DARS licensees to seek a substantial, and costly, augmentation of their terrestrial repeater networks. However, absent advance prior knowledge of the time and location of testing, even adding terrestrial repeaters is unlikely to be either an efficient or effective solution to the additional interference caused by new flight test stations. Also, such augmentation certainly would be opposed by WCS.

18 47 U.S.C. §303 (authorizing the Commission to make regulations "necessary to prevent interference between stations").

19 *Cf. Melody Music, Inc. v. FCC*, 345 F.2d 730, 732-33 (D.C. Cir. 1965), *cert. denied*, 403 U.S. 923 (1971).

20 *Cf. Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1970).

licensees. 47 C.F.R. § 27.53(a). Specifically, new aeronautical mobile transmitters in the 2360-2395 MHz band should be required to attenuate emissions into the 2320-2345 MHz satellite DARS band below the transmitter power (p)[21] by a factor of 110 + log (p) dB.[22] Of course, if aeronautical mobile transmitters satisfy a minimum altitude restriction, it would be reasonable to adopt a lesser degree of protection.[23] New fixed transmitters in the 2360-2395 MHz band should be required to attenuate emissions into the 2320-2345 MHz satellite DARS band below the transmitter power (p)[24] by a factor of 80 + log (p) dB. The growing audience of enthusiastic satellite DARS listeners deserves no less.

Respectfully submitted,

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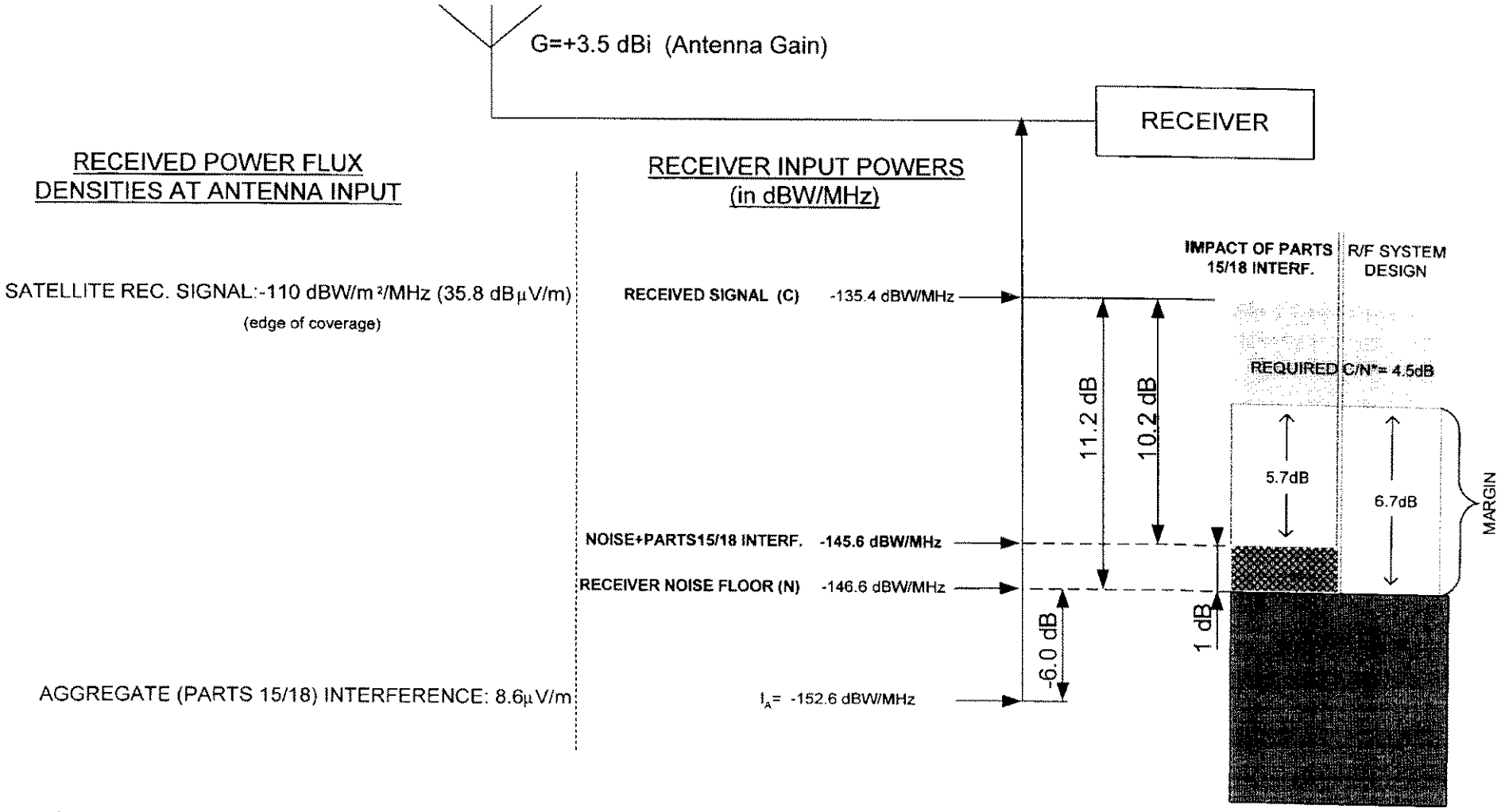
21 Flight test stations are currently limited to 25 watts into the base of the antenna. *See* 47 C.F.R. § 87.131. The Commission proposes to continue to employ this emission limitation. *See Fourth NPRM*, ¶ 60.

22 *See* 47 C.F.R. § 27.53(a)(2).

23 This is because the separation distance between satellite DARS receivers and mobile flight test centers would provide some additional attenuation.

24 Flight test stations are currently limited to 25 watts into the base of the antenna. *See* 47 C.F.R. § 87.131. The Commission proposes to continue to employ this emission limitation. *See Fourth NPRM*, ¶ 60.

ATTACHMENT 1



* C/N required for BER of 1×10^{-5} or better=4.5dB
Typical Receive C/N=11.2dB
System Margin for Propagation, etc.=6.7dB

Interference into SDARS Receiver System

Attachment 1