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April 23, 2001

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Magalie Roman Salas, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: IB Docket No. 95-91

Dear Ms. Salas:

Sirius Satellite Radio Inc. ("Sirius"), by its attorneys, files this *ex parte* letter to:
(1) summarize several issues discussed during the March 1, 2001 engineering meeting between satellite digital audio radio service ("DARS") and WCS licensees; (2) respond to the technical information submitted by the WCS licensees on March 8, 2001;¹ and (3) attach, as Exhibit 1, a revised rule for the operation of terrestrial repeaters.² The technical information provided during the meeting of engineers and in the March 8, 2001 letters demonstrate conclusively that the WCS licensees have no legitimate engineering basis for their continued opposition to Sirius' planned terrestrial repeater deployment. In fact, as discussed below, it is abundantly clear that any interference experienced by the WCS licensees will result directly from their own inadequate engineering design, and not from Sirius' operation of satellite DARS terrestrial repeaters at any power level. Nevertheless, in the spirit of cooperation and compromise and in order to expedite resolution of the last remaining issue regarding satellite DARS terrestrial repeaters, Sirius offers in the attached rule a cap on the number of high-power repeaters that the satellite DARS licensees will deploy without first coordinating with WCS licensees. Sirius respectfully requests that the Commission quickly conclude the above-referenced rulemaking by issuing a report and order adopting this rule.

¹ Letter of William M. Wiltshire, on behalf of AT&T Wireless Services, Inc. ("ATTWS") to Ronald Repasi, FCC (dated Mar. 8, 2001) ("ATTWS Letter"); Letter of Michael Hamra, Metricom to Magalie R. Salas, FCC (dated Mar. 8, 2001) ("Metricom Letter"); and Letter of John Tehan, BellSouth Science & Technology, to Ron Repasi, FCC (dated Mar. 8, 2001) ("BellSouth Letter").

² These new rules replace the rules suggested by Sirius in its letter dated January 25, 2001. See Letter of Carl R. Frank to Magalie Roman Salas, FCC (dated Jan. 25, 2001).

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List A B C D E

1. *The WCS Licensees' Chosen System Design Limitations Do Not Justify Unduly Restricting Satellite DARS Terrestrial Repeaters*

First, the WCS licensees are building receivers that have *no* protection against overload (*i.e.*, receiver linearity) and *no* front-end selectivity (*i.e.*, filtering).³ By failing to employ customary radio-frequency discrimination in their system design, the WCS licensees have developed technically inferior receivers susceptible to *all* neighboring interference, including interference from other WCS deployments as well as from satellite DARS terrestrial repeaters.⁴ Now that this engineering mistake has been revealed years after the satellite DARS licensees' terrestrial intents were properly documented and filed, Sirius finally understands why the WCS licensees continue to insist on exceptional terrestrial repeater restrictions despite Sirius' demonstrations that such restrictions are unnecessary to protect up-to-date WCS technology.

However, the FCC should not prevent the satellite DARS licensees from employing their proposed state-of-the art high power repeaters solely in order to protect the WCS licensees' chosen limitations. As one of Sirius' engineers attempted to explain during the March 1, 2001 meeting, the WCS licensees should have followed the assertion by former Chairman Kennard for MMDS operators and employed receivers with sufficient front-end selectivity to reject, the amount of interference that the rules already permit from nearby WCS operations,⁵ as well as other neighboring services. Instead, WCS providers designed their receivers with "overload" points of -34dBm, with implicit plans to coordinate among other WCS providers but without notification or communication of their desire to coordinate with satellite DARS until years after satellite DARS information was filed and months before anticipated service commencement. The key issue perpetuating this debate is the established intent of WCS providers to coordinate their deployments to avoid interference. Granted the WCS rules (47 C.F.R. §27.64) limit interference protection for specific WCS deployment scenarios, but they also reference satellite DARS. Ironically, WCS services overload effects on neighboring satellite DARS signals far exceed the 13dB difference in transmit powers under debate with the only remedy being deployment of additional satellite DARS terrestrial repeaters! The worse case assumption of

³ WCS licensees stated in our March 1st meeting that receivers have no front-end selectivity. Their March 8th letters also show the lack of selectivity.

⁴ ATTWS, for example, disclosed that its concerns are based on its having designed the front end of its receivers to tune to the entire 2305 – 2360 MHz band, covering both the WCS and the DARS band, and has no filtering to eliminate DARS transmissions in the 2320 – 2345 MHz band.

⁵ 47 C.F.R. §§ 27.50 (power limits), 27.53 (emission limits) and 27.64 (protection from interference).

13dB difference in transmitter power (between WCS and satellite DARS transmitters) could and should have been accommodated in the equipment design which occurred long after the intent of satellite DARS terrestrial repeaters was known.⁶ Furthermore, the proposed rule for terrestrial repeaters (attached as Exhibit 1) caps the number of high-power repeaters a DARS licensee can deploy without first coordinating with WCS licensees. Current technology limits the use of powers over 20kW to few cases. Because there is only limited deployment of most WCS providers,⁷ the satellite DARS licensees' proposal to disclose site locations by October 1, 2001 should be acceptable. The lack of interference to existing services (*i.e.*, Metricom, BellSouth) while terrestrial satellite DARS repeaters have been tested in several markets, show the issue has been overstated and unproven. Note that Sirius supported and coordinated efforts for ATTWS testing of a terrestrial transmitter in New York earlier this year, which ATTWS conveniently avoided mentioning. Having failed to employ the good engineering practice required by the rules to avoid WCS-to-WCS interference, the WCS licensees now seek to limit interference into their poorly designed equipment from satellite DARS terrestrial repeaters. Because interference from adjacent terrestrial repeaters should have—and easily could have—been avoided by the WCS licensees through compliance with existing rules, the Commission should not shift the consequences of this engineering mistake to the satellite DARS licensees by restricting terrestrial repeaters unreasonably.

Second, ATTWS' expectation of protection from any source that raises the noise floor in the "fringe area" of coverage is wholly unrealistic and not supported by the Commission's rules. As with all radio-frequency services (paging or otherwise) elevation in the noise floor for terrestrial transmitters is not an accurate measure of actual interference. Indeed, ATTWS could not articulate at the March 1, 2001 meeting why it believes that noise floor elevation is a relevant metric for its service. The International Telecommunication Union utilizes noise floor elevation metrics to trigger coordination requirements among satellite services, not terrestrial services. But this condition is due to out-of-band energy of a neighboring service not the overload effect of current discussion. In any event, ATTWS already has confirmed that it will redesign its receivers to accommodate the interference. They should be held to this, as well as to provide details about when the redesign would occur.⁸

⁶ See Letter from Robert D. Briskman, CD Radio, Inc. to Rosalee Chiara, FCC (filed Nov. 14, 1997) ("*Sirius Terrestrial Repeater Supplemental Information*"); *Supplemental Comments of Sirius* (filed Jan. 8, 2000); and *Supplemental Reply Comments of Sirius* (filed Mar. 8, 2000).

⁷ It was Sirius' understanding that the WCS community was to provide actual deployment locations along with their height ranges for deployment.

⁸ Indeed, the simple fact that ATTWS plans to update its receiver technology prior to full deployment and operation of its existing system underscores that the present technology is antiquated and thus not worthy of protection from state-of-the-art satellite DARS terrestrial repeaters.

Third, none of the engineers for the WCS licensees could explain why the free space loss model was appropriate to estimate interference with respect to satellite DARS terrestrial repeaters nor did they explain, after numerous requests, their claimed difference between measured signal strength and interference.⁹

Fourth, the WCS engineers did not refute Sirius' demonstration that 40kW repeaters will cause *less* interference in the city of Houston than many more 2kW terrestrial repeaters regardless of service limitations.¹⁰ Unfortunately, the WCS licensees have clouded this fact by employing receivers that lack discrimination on the front-end and avoiding the reason, which is probability of interference, not transmit power. Again, the Commission should not penalize the satellite DARS licensees for the WCS licensees' engineering shortsightedness by compelling deployment of 2kW terrestrial repeaters.

Fifth, the WCS licensees offered no proof that interference occurs. The simple truth is that WCS providers have not experienced any interference even though Sirius' terrestrial repeaters have been tested in various cities for several months now. What's more, during the March 1, 2001 meeting, the WCS licensees agreed with Sirius that the height/antenna discrimination between satellite DARS terrestrial repeaters and WCS receivers would reduce overload interference to a reasonable level.

Finally, the WCS licensees unreasonably request that the Commission require satellite DARS terrestrial repeaters to accommodate deployment of any type of WCS in any configuration (*e.g.*, point-to-point, point-to-multipoint, mobile, broadcast, etc.). As the Sirius engineers noted during the March 1, 2001 meeting, there is no way to immunize an unrestricted service with an undefined deployment methodology from all types of interference. Since no specific deployment information was given, the height ranges for deployment vary greatly¹¹ and antenna discrimination is not clearly defined,¹² it is difficult to ascertain the probability of interference.

⁹ Confusingly, after asserting the free space loss model requirements, they attempted to establish a "simple" path loss model, which was not representative of free space loss.

¹⁰ See Letter from Carl R. Frank to Magalie R. Salas (dated Feb. 5, 2001).

¹¹ See ATTWS Letter at 1 (noting that base stations would "typically be deployed at 30 meters but could be deployed "from a low of 10 meters to a high of 100 meters, or perhaps even more" and that "typical RU antenna centerline is 3 meters" but "may vary from approximately 2 to 10 meters"); Metricom Letter at Attachment (noting WCS receiver heights could vary from 15-600 feet); and BellSouth Letter at Attachment (estimating that the "typical residential receiver system is between 30-100 feet above ground level" and that there is "no way to predict the heights to which each base station will be deployed").

¹² Claimed antenna gains of 17-24 dBi imply high directivity and therefore significant off

The current WCS generic analysis approach of maximum power and worse case height assumptions, without recognition of the positional probability of interference misrepresents the issue.

2. *The Commission Promptly Should Adopt Sirius' Revised Terrestrial Repeater Rule, Which Takes Into Account the WCS Licensees' Technical Information*

Given that the WCS licensees' receiver limitations are now apparent, and to facilitate prompt resolution of this rulemaking, Sirius offers the attached revised rule that takes into account the recent technical information offered by the WCS licensees. For example, the proposed rule makes clear that the amplitude of a high power terrestrial repeater's main signal should not exceed -25dBm per 1 MHz measured anywhere between ground level and 30 feet above ground level. In addition, the proposed rule clarifies the circumstances under which coordination of certain high-power terrestrial repeaters with WCS base stations would be required. These rules now reflect the full information gathered from interested parties throughout the course of this four-year-old rulemaking and should be adopted promptly.

axis discrimination, however no antenna plots were given.

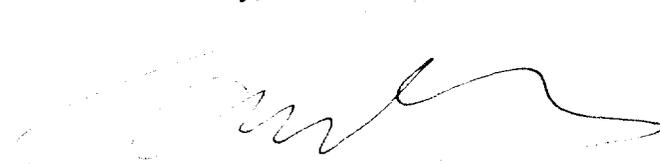
Magalie Roman Salas, Secretary

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In sum, the WCS licensees presented no engineering rationale during the March 1, 2001 meeting or in the March 8, 2001 filings to support their calls for interference protection from satellite DARS terrestrial repeaters. Because the WCS licensees failed to design a receiver that complies with the interference mitigation required under the FCC's rules or to offer any proof of interference, the Commission must reject their claims and adopt the attached rules proposed by the satellite DARS licensees.

Sincerely,

A handwritten signature in black ink, appearing to read 'Carl R. Frank', is written over a faint, circular embossed seal or watermark.

Carl R. Frank
Counsel for Sirius Satellite Radio Inc.

Enc. Exhibit 1
cc: Ron Netro
Tom Stanley
John O'Connor
Ronald Repasi
Rockie Patterson
Rosalee Chiara
Jeff Snyder
Phil Barsky
Rob Briskman
Mark Gaudino
Bob Friday
Mike Hamra
Bob Saunders
John Tehan
Bob Maxwell
George Harter
Bruce Jacobs

Exhibit 1

§ 25.144 Licensing provisions for the 2.3 GHz satellite digital audio radio service.

* * * * *

(e)(1) *Licensing of satellite DARS terrestrial repeaters.* Satellite DARS licensees may construct and operate ground-based transmitters with a total EIRP of each transmitter not exceeding 40 kW in the frequency assignment of the licensee (“terrestrial repeaters”). Terrestrial repeaters shall not be used to originate programming not also transmitted from authorized DARS satellites. Any high power repeater must be operated so that the amplitude of the repeater’s main signal within the spectrum assigned to the licensee, measured anywhere between ground level and 30 feet above ground level, shall not exceed minus 25 dBm per 1 MHz, using a calibrated field measurement set to measure 1 MHz intervals.

(2) *Notification Requirement.* Each satellite DARS licensee shall file a report with the Commission’s International Bureau containing the geographic coordinates, total EIRP, antenna pattern, and antenna height above average terrain:

- (i) for each high power terrestrial repeater constructed and operational pursuant to Section 25.144(e)(3)(ii)(A) no later than October 1, 2001; and
- (ii) for each high power terrestrial repeater constructed and operational pursuant to Sections 25.144(e)(3)(ii)(B)-(C) and Section 25.144(e)(4) no later than 30 days before beginning operation of the applicable terrestrial repeater.

(3) *No Commission approval required.* A satellite DARS licensee may construct and operate terrestrial repeaters without obtaining Commission approval in any of the following circumstances:

- (i) *Low power.* A satellite DARS licensee may construct and operate an unlimited number of low power terrestrial repeaters.
- (ii) *High power.* A satellite DARS licensee may construct and operate:
 - (A) up to 150 high power terrestrial repeaters;
 - (B) a replacement for any high power terrestrial repeater identified pursuant to Section 25.144(e)(2)(i);
 - (C) an unlimited number of high power terrestrial repeaters that have been coordinated successfully on a co-equal basis with WCS base stations licensed pursuant Part 27 of the Commission’s Rules.

(4) *Coordination required between DARS and WCS licensees.* Coordination shall be required between DARS licensees and WCS licensees when the DARS licensee wishes to construct and operate any high power terrestrial repeater not covered by Section 25.144(e)(3)(ii)(A) and (B), as follows:

- (i) Within 30 days of a request by a DARS licensee planning to construct and operate a repeater not covered by Section 25.144(e)(3)(ii)(A) and (B), WCS licensees must provide the DARS licensee with the coordinates and antenna height of any WCS base station located within a reasonable geographic area surrounding the proposed repeater with which coordination is desired.

(ii) If there are no existing WCS base stations within an area for which the signal strength from the high power repeater, based upon line of sight free space loss calculations, is above minus 25 dBm per 1 MHz, no further coordination is required.

(iii) For any existing WCS base station within an area for which the signal strength from the high power repeater is above minus 25 dBm per 1 MHz, based upon line of sight free space loss calculations, the DARS and WCS licensees shall coordinate with each other, including as appropriate:

(A) the DARS licensee reducing radiated power from the repeater by either lowering RF power or by antenna discrimination, and

(B) the WCS licensee installing a band-stop rejection filter to limit DARS energy into the RF front end of the WCS base station.

If practical levels of filtering cannot be added to the WCS base stations or if emissions cannot be altered sufficiently from the DARS repeater, the parties will cooperate in good faith to achieve a satisfactory resolution.

(iv) A DARS licensee is not required to coordinate a repeater covered by Section 25.144(e)(3)(ii) with a WCS base station that is constructed or operated subsequent to the construction of such repeater.

(5) *Commission approval required.* A satellite DARS licensee shall obtain Commission approval to construct and operate terrestrial repeaters in any of the following circumstances:

(i) *International coordination.* To construct and operate any terrestrial repeater that exceeds the power levels and/or proximity restrictions specified in the existing coordination agreements reached with Canada and Mexico for co-frequency systems (see Agreement Concerning the Coordination between U.S. Satellite Digital Audio Radio Service and Canadian Fixed Service and Mobile Aeronautical Telemetry Service in the band 2320-2345 MHz, and Agreement Between the Government of the United States of America and the Government of the United Mexican States Concerning the Use of the 2310-2360 MHz band); *except that* Commission approval shall not be required if the satellite DARS licensee notifies the Commission that the terrestrial repeater has been coordinated successfully with Canada or Mexico.

(ii) *Antenna structure clearance required.* To construct and operate any terrestrial repeater that fails to comply with the requirements of Section 17.4 of the Commission's Rules.

(iii) *Environmental.* To construct and operate any terrestrial repeater that will have significant environmental effects, as defined by Sections 1.1301 through 1.1319 of the Commission's Rules.

(6) *Interference to wide-band analog MDS/ITFS receivers.* A satellite DARS licensee shall have no obligation to remedy interference to wide-band analog MDS/ITFS receivers; *except that* a satellite DARS licensee shall reimburse an MDS/ITFS customer or licensee for a band-pass or band-stop filter if the satellite DARS licensee receives a written complaint prior to February 20, 2002 from such MDS/ITFS customer or licensee and such MDS/ITFS customer or licensee demonstrates by a preponderance of the evidence all of the following:

(i) The wide-band analog MDS/ITFS receiver was installed and operating prior to August 20, 1998;

- (ii) The wide-band analog MDS/ITFS receiver is located within the satellite DARS licensee's high power terrestrial repeater's free space power flux density contour of -34 dBW/m²;
- (iii) The high power terrestrial repeater operated by the satellite DARS licensee is the sole cause of interference to the wide-band analog MDS/ITFS receiver;
- (iv) The interference to the wide-band analog MDS/ITFS receiver would not have been caused by a low power terrestrial repeater; *and*
- (vi) The MDS/ITFS customer or licensee is not entitled to compensation pursuant to Section 27.58 of the Commission's Rules;

provided that the maximum cumulative liability of each satellite DARS licensee under this Section shall not exceed \$500,000.

- (7) *Definitions.* For the purpose of §25.144, the following definitions shall apply:
- (i) *Low power.* The term "low power" means an EIRP not exceeding 2 kW.
 - (ii) *High power.* The term "high power" means an EIRP greater than 2 kW and not exceeding 40 kW.
 - (iii) *Base station.* The term "base station" has the same meaning as that term is defined in Section 27.4 of this chapter.

* * * * *

§ 1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared

Table 1: Transmitters, Facilities and Operations Subject to Routine Environmental Evaluation

Service (title 47 CFR rule part)	Evaluation required if

Satellite Communications (part 25)	<i>Satellite DARS Terrestrial Repeaters:</i> >2000 W EIRP All others included.