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February 27, 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:

This letter responds to a recent *ex parte* submission by AT&T Wireless Services ("ATTW"), filed February 20, 2001.[1]

There is only a single unresolved issue remaining in this six year-old docket: final authorization of terrestrial repeaters for satellite digital audio radio service ("DARS") licensees. The Federal Communications Commission ("FCC" or "Commission") issued its Notice of Proposed Rulemaking on this subject nearly four years ago.[2] Few comments were received, and no profound objections were lodged at that time.

Recently, licensees in the Wireless Communications Service ("WCS") objected to the long-standing terrestrial repeater proposals, claiming potential interference. To begin to resolve the question, the FCC on January 11, 2001, held a helpful meeting between satellite DARS licensees and repeater opponents. At that meeting, satellite DARS licensees were asked to consider limitations that might make the interference environment for WCS systems more

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[1] *See Letter of William M. Wiltshire to Magalie R. Salas* (filed Feb. 20, 2001) ("*ATTW Ex Parte*"). ATTW claims that authorizing satellite DARS repeaters to employ 40 kW, as opposed to 2 kW, would increase the "interfering distance" to WCS base stations from 2,600 meters to 11,500 meters. *See ATTW Ex Parte*, Appendix A at 2.

[2] *See 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 (1997) ("*Satellite DARS Service Order*").

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predictable. (Interference to MDS appears to be resolved.) Our letter of January 25, 2001 represented a concession by satellite DARS providers—a cap on power.

The meeting also recognized that any limitations on the placement of satellite DARS terrestrial repeaters would have to be sufficiently flexible to avoid hamstringing this new consumer radio service from the start. In that spirit, Sirius and XM offered some good faith suggestions that set limits but allowed for expansion over time, to avoid undermining the public's access to satellite DARS programming. Sirius is disappointed that the WCS community seems unwilling to respond to our suggestions in any meaningful way.

Complicating resolution of this issue may be the continued insistence of WCS licensees that mandating multiple 2 kW repeaters to mimic the coverage of 40 kW repeaters would reduce interference. ATTW repeats this claim in its most recent filing. This is not so, as shown in our February 5, 2001 letter[3] and below. Moreover, despite ATTW's claim, it was always envisioned that satellite DARS licenses would deploy high powered repeaters.

1) Satellite DARS Service Always Has Contemplated High Power Terrestrial Repeaters

ATTW has known since the time it acquired its WCS spectrum that it would have to operate without causing interference to satellite DARS. ATTW conveniently forgets that its service rules were changed to *protect* satellite DARS transmissions,[4] and that these restrictions reflected the fact that the Commission designed WCS to protect satellite DARS, not the other way around.

Moreover, WCS licensees, including ATTW, always have known that the satellite DARS service would include higher power terrestrial repeaters. The Commission concluded, four months prior to granting WCS licenses, in its March 1997 *Satellite DARS Service Order*, that the satellite DARS service inherently requires terrestrial repeaters.[5] Even prior to that date, Sirius'

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[3] *See Letter from Sirius Satellite Radio Inc. to Magalie R. Salas, Secretary, FCC*, at 2-3 (filed Feb. 5, 2001).

[4] *See Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Services ("WCS")*, Report and Order, 12 FCC Rcd 10785, 10854-855 (1997) ("1997 *WCS Report and Order*") (noting the FCC's intent to "ensure that WCS operations do not cause harmful interference or disruption to adjacent satellite DARS reception" and adopting "changes [that] will provide significantly improved interference protection to DARS from WCS operations.").

[5] The Commission's definition of satellite DARS, adopted in the *Satellite DARS Service Order*, unequivocally includes a terrestrial repeater component. 47 C.F.R. § 25.201 (2000) ("Satellite Digital Audio Radio Service ("DARS"). A radiocommunication service in which

terrestrial repeater plans were included in the record of that rulemaking. Moreover, as ATTW concedes,[6] Sirius made absolutely clear in a November 1997 letter that its satellite DARS service would require "100-150 active terrestrial repeaters" with possible power levels exceeding 40 kW.[7] The FCC put that letter, and XM's similar filing, on public notice, and neither ATTW nor any WCS licensee expressed any concern.[8]

Sirius appreciates ATTW's acknowledgment that it has "no interest" in restraining satellite DARS offerings.[9] But, it remains hard to reconcile this worthy goal with ATTW's claim that higher power repeaters are new and justify late intervention in this proceeding.[10] The FCC should not be fooled by such a misrepresentation of the record.

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audio programming is digitally transmitted by one or more space stations directly to fixed, mobile, and/or portable stations, and which may involve complementary repeating terrestrial transmitters, telemetry, tracking and control facilities."). *See Satellite DARS Service Order*, 12 FCC Rcd at 5846.

[6] *See ATTW Ex Parte* at 4.

[7] See *Letter from Robert D. Briskman, CD Radio, Inc. to Rosalee Chiara, FCC* at 4-5 (filed Nov. 14, 1997) ("*Sirius Terrestrial Repeater Supplemental Information*") (estimating maximum transmitter useful output power "at under one kilowatt" and antenna gain "between 15-28 dBi" which corresponds to EIRPs from 32 kW to well above 40 kW. Sirius has agreed previously to cap total repeater power at 40 kW. Indeed, because Sirius can only achieve 40 kW power with highly directional sectorized antennas, sites radiating 40 kW are rare. Typical power levels at any given point will be between 10 kW and 25 kW.

[8] *See Satellite Policy Branch Information: Applications Accepted for Filing*, Report No. SPB-112 (Dec. 23, 1997) (accepting for filing and requesting public comment on the *Sirius Terrestrial Repeater Supplemental Information*). No comments were received from WCS licensees on this public notice.

[9] *See ATTW Ex Parte* at 9.

[10] ATTW's confusion may stem from a persistent inability to read power numbers accurately. The *Sirius Terrestrial Repeater Supplemental Information* letter proposed repeaters with power levels many times greater than the final design will implement, but included the 40 kW range. *See note* 7, *supra*. ATTW gets the math wrong and now erroneously claims that this letter gave them notice of repeaters of only 25 kW, which is actually below the minimum power level specified. (In any event, there is less than 3 dB difference between 25 kW and 40 kW.) Similarly, ATTW quotes XM's December 1999 filing as proposing only 20 kW per carrier (*ATTW Ex Parte* at 4), without recognizing that—because XM employs two carriers—this, too, totals 40 kW.

2) Interference To ATTW Base Stations:

Sirius's analysis showed minimal interference to WCS base stations because we assumed that not-yet-deployed WCS systems would be designed with state of the art equipment. For example, Metricom—the sole WCS licensee that has deployed—developed a low-cost system that can withstand blanketing interference up to -25 dBm. Until this filing, no WCS licensee had even mentioned equipment more sensitive than -35 dBm.[11] ATTW now reveals that it plans deployment of base stations with sensitive overload points at -45.1 dBm![12] At the same time, ATTW implies that additional limitations on satellite DARS repeaters are critical to preserve the "operational flexibility" of both systems.[13]

But, ATTW's purported "sensitivities" are not the appropriate measure. ATTW's sensitivity numbers are derived to protect its links from a 1 dB increase in system noise. However, fixed wireless systems such as ATTW's are contemplated to employ frequency reuse, and thus the protection required is from interference, not noise. In other words, margin above the noise floor is not the real measure of ATTW base station susceptibility—such stations will operate at large margins above the noise floor. Rather, ATTW and systems like it are limited by interference and can expect far greater interference from themselves, and their WCS licensee neighbors. As Sirius always has suggested, satellite DARS interference to WCS—even from 40 kW terrestrial repeaters—will be far less than that generated by nearly co-located, adjacent channel WCS systems.[14]

Even assuming ATTW's proposed sensitivity figure were accurate, ATTW should be required to do better. In any fixed wireless access system, there will be relatively few base stations, and proper equipment designs with less susceptibility can be employed without dramatic increases in cost. ATTW concedes that it is examining this issue, as it should.[15] Were it to

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[11] Indeed, Bell South—a WCS licensee and recent opponent of high-power satellite DARS repeaters—itself urged the FCC to require WCS licensees to deploy receivers with saturation points no lower than –12 dBm! *See Letter from Karen B. Possner, Executive Director, Legislative & Regulatory Policy, BellSouth to William F. Caton, Acting Secretary, FCC,* GN Docket No. 96-228 (filed Jan. 30, 1997) (attaching analysis of Robert A. Saunders). Were interference into WCS calculated with the overload point Bell South itself recommended, WCS licensees could claim *no* interference from satellite DARS repeaters.

[12] *See ATTW Ex Parte* at 6.

[13] *Id.* at 8.

[14] *See Supplemental Comments of Sirius* at 9 (filed Jan. 18, 2000).

[15] *See ATTW Ex Parte* at 3.

reduce base station receiver susceptibility to the same level as Metricom, ATTW could reduce the area of its potential interference zone by a factor of 100! Indeed, at –25 dBm, and employing ATTW's own methodology, the potential interfering distance drops to 1,145 meters. This is less than half ATTW's prediction for 2 kW repeaters,[16] and thus, per force, already acceptable to it.

If ATTW truly wants to avoid limiting satellite DARS's operational flexibility, as it claims, let it complete the planned redesign now, before it becomes operational, and let this rulemaking conclude.

3) Interference To ATTW Receivers:

ATTW goes to great length to calculate the size of the interference zone to customer receivers, and to claim that higher power satellite DARS transmitters will increase interference. This analysis is wrong, for four reasons. First, ATTW measures interference by hypothesizing receivers whose reception is impaired by signal levels below the astonishing low level of –58.6 dBm! As addressed above, Sirius disputes any prediction of "blanketing interference" to a terrestrial fixed wireless system based on increases in system noise.

Second, interference to ATTW receivers will be relatively rare. Fixed wireless systems typically employ higher-gain receiver antennas, to avoid interference from other co-channel base stations. Thus, ATTW receivers will be free from interference except when pointing directly at a satellite DARS repeater. As a result, this situation is similar to the potential interference to MDS receivers, already extensively analyzed by Sirius in reply comments filed a year ago.[17] That study showed a statistically tiny probability of actual interference. So long as ATTW does not co-locate its base stations with satellite DARS repeaters, the same conclusion is applicable here.

Third, any improbable interference between satellite DARS transmitters and ATTW fixed wireless receivers will best be remedied through receiver antenna repointing or shielding. Limiting satellite DARS terrestrial repeaters to 2 kW will not eliminate the line-of-sight problem. Sirius commits to working in good faith with ATTW, and all other WCS licensees.

Finally, it is important to note that ATTW's engineering missteps likely account for its erroneous conclusion that more lower power repeaters will reduce potential interference to WCS. The plain fact is that limiting satellite DARS repeaters to 2 kW will increase the number of such repeaters, which will increase the probability that any particular ATTW receiver is pointed directly at a satellite DARS terrestrial repeater. Thus, as Sirius has repeatedly shown, the relief requested by WCS licensees actually will *increase* interference to them.

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[16] *See ATTW Ex Parte*, Appendix A at 2 (showing an interference distance of 2,600 meters for 2 kW repeaters).

[17] *See Sirius Reply Comments*, Exhibit A, at 9-17 (filed Mar. 8, 2000).

4) Number of Transmitters:

As Sirius has noted, satellite DARS licensees face two practical limits on repeater deployment: money and design constraints to avoid interference to the other DARS licensee.

The first is simple: Sirius has built and launched a $1 billion satellite system that was designed to serve customers from space. Sirius's design, confirmed by recent operational testing, provides good signal coverage throughout all of the contiguous United States except urban areas where repeaters will be employed to remedy the relatively rare circumstance where the satellite signal can be expected to undergo severe shadowing or multipath. Repeater transmitters are expensive to build and expensive to run. Satellite DARS licensees *simply have no incentive to build extra repeaters*. Since our incentives are to minimize repeaters, no comprehensive FCC oversight is necessary to achieve the result WCS licensees desire.

Second, to avoid interference with the neighboring system, each satellite DARS licensee had to design its repeaters with a great degree of care and lots of filtering. Meeting those self-interference requirements alone will be a check on terrestrial repeater deployment, and another incentive not to "overbuild" repeaters.

5) Tradeoffs Between 40 kW and 2 kW Transmitters:

One of the reasons for the WCS Community's lingering misperception that 2 kW repeaters have less potential for interference than higher power repeaters appears grounded on a simple engineering mistake. ATTW, and other WCS licensees, appear to assume that a small number of 2 kW repeaters could substitute for a 40 kW repeater. At the January meeting at the FCC, Sirius specifically noted that the tradeoff depended on the morphology and available site locations/heights, and that the number would not necessarily be the same in all cases.

We reaffirm this conclusion. Depending on the terrain and locations chosen, the number could vary widely. The Houston analysis, in Sirius' February 5th filing, was one example: it ignored site availability and postulated a hypothetical grid of 200 foot-high 2 kW sites. Sirius had no preconceived notion of the number of sites required to provide the same coverage as a single high-powered site. In Houston, that necessitated 13 repeaters operating at 2 kW. In hilly terrain, more repeaters could be required—San Francisco or Boston might require a repeater on the top of each urban hill.

6) Conclusion:

Satellite DARS licensees remain open to discussions with WCS licensees to ensure that each are good spectral neighbors. To that end, Sirius notes that it still has no current plan to build more than the 100-150 high power repeaters it has always envisioned.

Indeed, ATTW's analysis appears to confirm Sirius's long-held views: If WCS fixed wireless base stations employ state-of-the-art filtering receivers, they will be subject to less interference than the 2 kW situation that ATTW concedes is acceptable. Moreover, interference to WCS fixed wireless receivers is more a function of pointing geometry than of power levels, and thus will be ameliorated as much as possible by employing a fewer number of higher power repeaters. Indeed, the solution proposed by WCS licensees—limiting satellite DARS repeaters to 2 kW EIRP—would dramatically multiply the number of sites required and thus substantially increase the probability of interference to WCS.

The instant rulemaking is nearly four years old, and should have been completed long ago. Despite being on notice of satellite DARS plans, WCS licensees withheld any objection until nearly the last moment. They should gain no advantage from this regulatory gamesmanship.

The FCC rapidly should adopt a Report and Order in this docket, in time for the fast-approaching service start date of both satellite DARS licensees.

Sincerely,

Carl R. Frank
Counsel for Sirius Satellite Radio Inc.

cc: Chris Murphy
Thomas Tycz
Ron Repasi
Rockie Patterson
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Diane Cornell
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Bruce Franca
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Bill Wiltshire
Paul Sinderbrand

CERTIFICATION OF PERSON REVIEWING TECHNICAL INFORMATION

I am the Executive Vice President Engineering of Sirius Satellite Radio Inc., the parent company of Satellite CD Radio, Inc. I certify that I am qualified to review the technical information contained in this *ex parte* presentation in IB Docket No. 95-91, that I am familiar with Part 25 of the Commission's Rules, that I have reviewed the technical information submitted in this document, and that it is complete and accurate to the best of my knowledge.

My technical qualifications comprise over 40 years of direct experience in satellite systems engineering including 22 years at COMSAT and its subsidiaries. I hold a B.S.E. degree from Princeton University and a M.S. degree from the University of Maryland. I am a Fellow of IEEE, AIAA, and WAS and have received the APOLLO Achievement Award from NASA for development of the Unified S-Band System, the Army Commendation Medal, and the IEEE Centennial Medal. I hold nine United States patents and have authored over 50 technical papers.

By: R D Briskman

Robert D. Briskman
Executive Vice President - Engineering

Professional Engineer
DC License # 749008279

Date: 2-27-01

Sworn and subscribed to before me
this 27th day of February 2001.

Roberta P. Barbee
Notary Public

My Commission Expires: 1-31-03