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ATTORNEYS AT LAW

August 8, 2001

BY HAND DELIVERY

Thomas Sugrue
Chief, Wireless Telecommunications Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: ***Written Ex Parte Presentation***
Establishment of Rules and Policies for the Satellite Digital Audio Radio Service in the 2310-2360 MHz Band, IB Docket No. 95-91
XM Radio Request for STA, File No. SAT-STA-20010712-00063
Sirius Request for STA, File No. SAT-STA-20010724-00064

Dear Mr. Sugrue:

At our meeting on July 13, 2001, in which we presented the concerns of AT&T Wireless Services, Inc. ("AWS") over the potential for harmful interference that would be caused by proposed high power terrestrial repeaters in the satellite Digital Audio Radio Service ("SDARS") to AWS' fixed voice and data network in the Wireless Communications Service ("WCS"), you requested additional information. In response to your request, this letter makes the following points:

- The SDARS licensees have used experimental authorizations clandestinely to deploy a nationwide network of high power terrestrial repeaters. By sharing their network information with the Commission only coincident with public announcement of impending commercial launch, they are attempting to box the Commission into granting authorizations that would transmute this "experimental" deployment into an operational commercial service. They have done so while ignoring that (1) the commission has not yet adopted service rules, and (2) they would be deploying a high power commercial service, nationwide, in the absence of any equipment authorization.

- The SDARS licensees have built their networks without answering the substantial technical evidence of blanketing interference presented by WCS licensees. Nor have they justified their need for power levels above the 2 kW EIRP – the power level that even *they* recognize is standard in the band.

- Commission precedent recognizes that blanketing interference from neighboring services must be addressed. Indeed, in the WCS proceeding, the Commission adopted rules to prevent possible blanketing interference to MDS/ITFS operators.

- Because the Commission imposed a 2 kW EIRP limitation on WCS to address blanketing interference, it would be arbitrary and capricious to do otherwise for SDARS, which uses adjacent spectrum. Indeed, it would be irrational to do so, since WCS spectrum can also be used for SDARS repeaters. Those repeaters, existing in the WCS band, would then be able to operate at whatever power levels are set for SDARS.

- As the SDARS licensees have submitted information on the magnitude of their networks only in the last three weeks, WCS licensees have had additional bases for concern. The technical issues were fully joined a year and a half ago – many months before either SDARS licensee was authorized to deploy high power repeaters under experimental authorizations. The SDARS licensees have not seriously addressed the brute force overload issues, much less attempted to refute the technical analyses presented by the WCS licensees.

- Unlike SDARS repeaters, WCS equipment has been thoroughly reviewed and approved by the Commission. It is not unduly susceptible to overload.

DISCUSSION

As you know, AWS is currently deploying a WCS-based broadband fixed wireless network to bring additional competition to the residential broadband and local exchange markets. Pursuant to the rules for WCS networks, these deployments are limited to no more than 2 kW EIRP – the power limit that is standard for services in this part of the band.[1] The two SDARS licensees, XM Radio, Inc. and Sirius Satellite Radio, Inc., have proposed rules that would allow terrestrial repeaters to operate at up to 40 kW EIRP – twenty times the maximum allowed for WCS and all other services operating in this part of the spectrum. Yet there is no evidence in the record of any technical reason why they could not accomplish using 2 kW repeaters what they desire to accomplish using high power repeaters; in fact, the evidence is to the contrary. In light of the significant risk of harmful interference to AWS' lifeline local service, and past precedent in dealing with such interference, the Commission should limit SDARS repeaters to a maximum of 2 kW as well.

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[1] *See, e.g.*, 47 C.F.R. §§ 21.904, 27.50(a).

I. A BRIEF HISTORY OF THE SDARS PROCEEDING

Neither SDARS licensees is authorized to operate any terrestrial repeaters on a commercial basis. However, XM and Sirius have consistently maintained that they would need to supplement their satellite networks with terrestrial "gap fillers" to be used in urban canyons, under bridges, in high mountain passes, in tunnels, and in other areas where it may be difficult to receive SDARS signals transmitted by satellite. Until fairly recently, little information was disclosed on the number, power, and locations of such transmitters. In its 1995 SDARS NPRM, the Commission declined to even propose rules for terrestrial repeaters "because we do not have sufficient information," and concluded that "[u]ntil such information is available and applicants demonstrate how these complementary terrestrial networks would be implemented in the overall satellite system design, we cannot determine if terrestrial gap-fillers should be permitted and what rules should govern their use." [2] In March 1997, the Commission adopted SDARS service rules but left open the question of how to regulate terrestrial repeaters.[3] The Commission made no proposal, but simply requested comment on a proposal submitted by Sirius that would authorize SDARS licensees to construct and operate terrestrial transmitters to retransmit signals received from their operating SDARS satellite(s). The Commission reminded the parties that such "[t]errestrial gap-fillers may be implemented by a satellite DARS licensee only after obtaining prior Commission authorization" and establishing compliance with international coordination, antenna structure clearance, and environmental processing requirements.[4] Sirius' proposal contained no power limit.

At the time Sirius made its proposal, there were no WCS licensees. In fact, WCS licenses were not issued until July 21, 1997 – two months *after* the period for comment on the repeater proposal had passed. It is not surprising, then, that the WCS industry did not participate in this round of the proceeding.

After the comment period had closed – apparently in recognition of the dearth of information in the record -- the International Bureau requested that the two SDARS licensees provide information about the planned deployment of terrestrial repeater networks. In a one-page response, XM stated that the EIRP of its repeaters "will not exceed 10 kW."[5] Sirius filed a response in which it estimated that the maximum transmitter useful output power would be "under one kilowatt" and that antenna gains "would

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2 *Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, 11 FCC Rcd. 1, 18 (1995).

3 *Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, 12 FCC Rcd. 5754 (1997).

4 *Id.* at 5812, 5845.

5 *See* Letter from William Garner to Rosalee Chiara, IB Docket No. 95-91 (dated Nov. 14, 1997).

generally be between 15-28 dBi."[6] Neither licensee included any information on specific deployment plans. ***Significantly, the Commission did not issue a public notice or request further comment in light of this supplemental information.***[7]

Two years later, in late 1999, the SDARS licensees submitted another thumbnail sketch of their planned repeater deployment. In its filing, XM represented that its "standard" repeater would generally have an EIRP of 2 kW (1 kW for each of two carriers) and its "intermediate" repeater would operate with an EIRP of 5 kW.[8] As for "high power" repeaters, XM stated that most of the 150 it planned to deploy would have an EIRP ranging between 6 kW and 20 kW, while approximately 25 would have an EIRP of 20 kW to 40 kW.[9] Sirius indicated that it would initially need repeaters operating at up to 40 kW EIRP at approximately 105 sites in the urban cores of 46 cities.[10] This time, the Commission issued a public notice calling for comment on these supplemental submissions.[11]

In response, BellSouth, Metricom, WorldCom, and the Wireless Cable Association ("WCA") filed timely comments in early 2000, raising (among other issues) concerns about potential interference to WCS transmitters. ***Thus, at the first request for public comment after the SDARS licensees submitted technical information on their proposed terrestrial systems, the WCS community raised its interference concerns.*** The SDARS licensees countered with their own calculations that purported to demonstrate that systems in other parts of the band would not suffer debilitating interference from out of band emissions. They did not, however, address the issue of blanketing interference. (See Section II, below.) After the close of the comment cycle, WCA continued a dialogue with XM in an attempt to explore and resolve interference concerns.

Unbeknown to WCA and the WCS licensees, while these discussions were ongoing and despite the evidence of potential interference submitted in the record throughout the spring, XM and Sirius obtained experimental authorizations that allowed them to test nationwide networks of high power terrestrial repeaters. Because such experimental authorizations are issued without public notice and comment, and because both XM and Sirius ignored their obligation to file reports detailing their activities, they were able to begin deploying their high power networks without any oversight or accountability beginning late in the summer of 2000.

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6 *See* Letter from Robert D. Briskman to Rosalee Chiara, IB Docket No. 95-91, at p. 5 (dated Nov. 14, 1997).

7 Because there was no Internet access to filings at that time, the only way a party could have known about these submissions would have been to send someone to the Commission to check the docket on a regular basis.

8 *See* Supplemental Comments of XM Radio Inc., IB Docket No. 95-91, App. A at p. 4 (dated Dec. 17, 1999).

9 *Id.* at p. 5.

10 *See* Supplemental Comments of Sirius Satellite Radio, IB Docket No. 95-91, at p. 3 (dated Jan. 18, 2000).

11 *See* Satellite Policy Branch Information, IB Docket No. 95-91 and GEN Docket No. 90-357 (issued Jan. 21, 2000).

During the summer and fall of 2000, WCA obtained information on only a few markets from XM – and what information it did get served to verify interference concerns. In December 2000, WCA filed an interference analysis in this docket.[12] Interested parties have actively engaged on the interference issues ever since. For example, on January 11, staff from the International, Wireless Telecommunications, and Mass Media Bureaus and the Office of Engineering and Technology hosted a meeting at which representatives of XM, Sirius, and a number of WCS licensees were encouraged to explore potential solutions to the interference concerns that had been raised in the record. At that meeting, XM distributed a document that purported to summarize its terrestrial repeater network as a basis for negotiation. Attached hereto is a copy of that document with annotations comparing the XM's representations of January 11 against XM's STA request filed on July 12. This document demonstrates that even six months ago the information provided to the Commission and the WCS licensees was (at best) a less than accurate basis for devising rules. Only now, with the filing of STA requests, have the SDARS licensees provided the kind of data necessary to fully assess the potential impact of their terrestrial networks.

II. BLANKETING INTERFERENCE IN THE 2.3 GHZ BAND

As various WCS licensees have documented in this proceeding,[13] the interference generated by high power SDARS repeaters will create large exclusion zones within which WCS operators will be effectively precluded from offering their services. This is not a problem caused by out of band emissions; in fact, the SDARS licensees have proposed an out of band emission limit that AWS believes is sufficient – so far as it goes. However, there is another type of interference – blanketing interference, or brute force overload – that the proposed emission mask does not address. Blanketing interference results when a very high power signal in one band overwhelms lower power signals in nearby bands, overloading the front end of the radio receivers in those other bands. This phenomenon is well recognized, and the Commission routinely has adopted rules – for example, in the AM, FM, television, and Public Mobile Services (*e.g.*, cellular, paging) -- to address blanketing interference concerns.[14]

If there were any question whether blanketing interference is a concern in the 2.3 GHz band (where WCS and SDARS operate), the Commission definitively laid that issue to rest over four years ago. At that time, the Commission imposed the 2 kW limitation on fixed WCS operations precisely in order to address the blanketing interference concerns of MDS and ITFS licensees using spectrum the 2.1

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12 *See* Letter from Paul J. Sinderbrand to Magalie Roman Salas, IB Docket No. 95-91 (dated Dec. 15, 2000)(analysis of George W. Harter).

13 *See, e.g., ex parte* filings by AWS (dated April 30, 2001 and Feb. 20, 2001) and BellSouth (dated May 18, 2001). Neither XM nor Sirius has seriously addressed the brute force overload issues raised by the WCS licensees, much less attempted to refute the technical analyses demonstrating the impact of blanketing interference.

14 *See* 47 C.F.R. §§ 22.353, 73.88, 73.318, and 73.685(d). *See also Amendment of Part 73 of the Commission's Rules to More Effectively Resolve Broadcast Blanketing Interference*, 11 FCC Rcd. 4750 (1996)(pending NPRM).

GHz and 2.5 GHz bands. The Commission adopted a 2 kW limitation in recognition of the norms in this part of the band – a norm that even the SDARS licensees recognize.[15]

This proceeding presents a mirror image of the interference issues faced by the Commission when it established the service rules for WCS in 1997. In its initial report and order, the Commission declined to impose any power limits on WCS operators to protect other services operating in nearby spectrum.[16] At that time, the Commission concluded that the record before it – which consisted solely of a late filed *ex parte* comment by a single MDS/ITFS operator – was incomplete and insufficient to demonstrate that the operation of WCS facilities would harm the MDS and ITFS services in light of (1) the impending conversion to digital downconverters that are less susceptible to overload, and (2) the uncertainty over exactly what services WCS licensees would choose to provide.

Less than two months later, however, the Commission adopted an order on reconsideration in which it imposed a 2 kW EIRP limitation on WCS operators precisely in order to address blanketing interference concerns raised by the MDS/ITFS community.[17] During the reconsideration period, the parties submitted additional technical analyses of the interference issues. Based upon this fuller record, the Commission determined that a 2 kW limitation was appropriate because (1) 2 kW is the maximum EIRP allowable for MDS and ITFS services and is comparable to the maximum for broadband PCS, (2) wireless cable service such as that provided over MDS/ITFS systems was a permissible use for WCS spectrum, and (3) setting maximum power limits on WCS operations would provide MDS/ITFS equipment manufacturers and service providers with the necessary certainty to enable them to design and purchase more robust receiving installations, including better designed downconverters.[18] The Commission concluded that this approach would encourage MDS/ITFS operators to deploy upgraded equipment in the future that "will not require undue power restrictions on users of nearby spectrum."[19] In other words, given that 2 kW EIRP was the norm in this band, the Commission did not consider it to be an "undue restriction" on WCS operations.

The parallels with the instant proceeding are striking. The SDARS spectrum sits in the middle of the WCS band, so there is no argument to be made that the propagation characteristics of the two

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15 *See, e.g.*, Letter from Bruce D. Jacobs to Magalie Roman Salas, dated April 25, 2001, at p. 2 (recognizing 2 kW as "a power level that is completely standard in this part of the spectrum").

16 *See Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, 12 FCC Rcd. 10785, 10863 (1997)("*WCS Order*").

17 *See Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, 12 FCC Rcd. 3977 (1997)("*WCS Recon Order*").

18 *Id.* at 3983-84.

19 *Id.* at 3984.

services will be different.[20] Thus, if WCS operations needed to be limited to no more than 2 kW EIRP in order to protect MDS/ITFS operators from blanketing interference in the 2.1 and 2.5 GHz bands, the same ***must*** be true with respect to SDARS operations. The fact that the SDARS band is situated in the middle of the WCS band exposes WCS operations to a far greater potential for blanketing interference than that potentially created by WCS services for MDS/ITFS operations located 150 MHz or more away in the band. There is no principled basis – nor any technical basis in the record – for arriving at any conclusion in this proceeding that is at odds with the conclusion reached just four years ago in the WCS proceeding: that operations in the 2.3 GHz band should be limited to 2 kW in order to protect users of nearby spectrum from blanketing interference.

Another aspect of the WCS orders further demonstrates this point. SDARS is among the services that WCS operators are authorized to provide -- including the use of complimentary terrestrial repeaters.[21] If WCS spectrum is used for SDARS services, however, "those services will be governed by the satellite DARS regulations currently under development in IB Docket No. 95-91."[22] Those rules would necessarily include rules on terrestrial repeaters. Accordingly, if the Commission were to authorize SDARS repeaters to operate at more than 2 kW EIRP and a WCS licensee were to choose to provide SDARS service, it would also be authorized to operate terrestrial transmitters at more than 2 kW EIRP. Even ignoring the impact on other WCS operators, such a result would clearly contravene the Commission's conclusion that power levels in the WCS band should be maintained below the 2 kW level in order to protect MDS/ITFS. Such a result would be illogical, arbitrary, and capricious.

III. SDARS EXPERIMENTAL AUTHORIZATIONS

The Commission has noted instances in which its processes "have been abused by companies attempting to establish commercial businesses under the guise of experimental licenses."[23] Both SDARS licensees have been granted blanket experimental authorizations (without an opportunity for public notice and comment) under which they can test high power repeaters nationwide. Testing of equipment developed in a new radio service is not unusual. What is unusual is for the an experimental licensee to deploy stations intended to be used for permanent, commercial operations under the guise of "experimentation."

If their recent requests for special temporary authorization are any indication, XM and Sirius used their experimental authorizations to all but complete the build-out of the high power repeater

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20 SDARS is authorized in the 2320-2345 MHz band, while WCS is authorized immediately adjacent in the 2305-2320 MHz and 2345-2360 MHz bands.

21 *WCS Order*, 12 FCC Rcd. at 10797, 10800 n.70.

22 *Id.* at 10846.

23 *Amendment of Part 5 of the Commission's Rules to Revise the Experimental Radio Service Regulations*, 11 FCC Rcd. 20130, 20136 (1996).

networks they propose to use for commercial service. Along the way, neither filed with the Commission any information detailing their deployment activities – as they are required to do under their blanket nationwide authorizations.[24]

The Commission cannot allow the SDARS licensees to leverage their "experimental" activities into *de facto* commercial operations. The Commission's rules state that an applicant for an experimental license "accepts the license with the express understanding: (a) that the authority to use the frequency or frequencies assigned is granted upon an experimental basis only and does not confer any right to conduct an activity of a continuing nature; and (b) that said grant is subject to change or cancellation by the Commission at any time without hearing."[25]

Accordingly, to the extent the SDARS licensees have deployed high power repeaters to date, they have done so explicitly at their own risk and with no reasonable expectation of continued use. Moreover, the build-out of high power repeaters was initiated several months ***after*** the WCS licensees had clearly made their interference concerns known in response to the supplemental filings of late 1999. The Commission should feel no obligation to acquiesce in the conversion of experimental facilities to commercial service. In fact, such acquiescence would undermine the Commission's experimental licensing rules by essentially ratifying the abuse of its processes that appears to be unfolding in this case.

IV. WCS EQUIPMENT IS PROPERLY DESIGNED AND FCC APPROVED

Although the SDARS licensees have not presented counter-analyses of the potential for blanketing interference, they have engaged in *ad hominem* attacks in which they attempt to blame WCS receiver design for any interference potential.[26] Specifically, both XM and Sirius have alleged that WCS equipment is unduly susceptible to interference from SDARS repeaters because it is designed "to tune to the entire 2305-2360 MHz band, covering both the WCS and the DARS band, and has no

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24 *See, e.g., Amendment of Part 5 of the Commission's Rules to Revise the Experimental Radio Service Regulations*, 13 FCC Rcd. 21391, 21394 (1998)(holders of blanket experimental licenses are required to "notify [the FCC] of the specific details of each individual experiment, including location, number of base and mobile units, power, emission designator, and any other pertinent technical information not specified by the blanket license").

25 *See* 47 C.F.R. § 5.83. *See also id.* at §§ 5.1 (generally limiting experimental licenses to testing, research, experimentation, and demonstration), 5.5 (defining "experimental station" as one "utilizing radio waves in experiments with a view to the development of science or technique").

26 The SDARS licensees have also quibbled with the metric used to establish harmful interference, arguing that a 1 dB rise in the noise floor is not an appropriate threshold. However, that is a well recognized threshold and in fact was used by the Commission in evaluating potential interference from proposed WCS operations into SDARS operations. *See WCS Recon Order*, 12 FCC Rcd. at 3992. ***See also*** 47 C.F.R. § 101.105(b) (requiring that for Part 101 services, adjacent channel interference "must be such that the interfering signal does not produce more than 1.0 dB degradation of the practical threshold of the protected receiver"); Watson, Robert E., "Receiver Dynamic Range," at p. 3 (available at www.wj.com/pdf/technotes/Rec_dyn_range1.pdf).

filtering to eliminate DARS transmissions in the 2320-2345 MHz band."[27] As AWS has explained, this assertion is clearly erroneous.[28]

The WCS equipment currently being deployed by AWS provides two-way services. In order to do so, the base station transmits and the customer unit receives in one block of WCS spectrum, while the base station receives and the customer unit transmits in a paired block of WCS spectrum. This is the standard design for two-way wireless systems, and is essentially an updating and upbanding of equipment used in the Personal Communications Service. Accordingly, neither the base station nor the customer unit receivers tune over ***any*** portion of the SDARS band. Moreover, AWS' WCS equipment is designed with significant filtering that allows it to tolerate unwanted signals from the SDARS (and other) bands – just not at a power many times its own.

At the time the Commission authorized the WCS service, it recognized that equipment would have to be designed to "meet technical standards higher than those used for similar purposes on comparable bands, and therefore may be more costly."[29] Nonetheless, WCS operators such as AWS have successfully met this challenge – *a fact confirmed by the grant of type certification by the Commission after rigorous review of AWS' WCS equipment design.*[30] By contrast, the Commission has *never* had an opportunity to perform a similar analysis of the technical merits of SDARS repeater equipment – including, for example, its out of band emissions and its compliance with the guidelines for human exposure to radiation.[31]

Of course, if size and price were no limitation, theoretically it is true that a radio *could* be designed to tolerate virtually any level of brute force overload. However, two equipment manufactures have submitted comments in this proceeding that demonstrate that building such a receiver is neither practical nor economic for WCS operators in this case. For example, BeamReach Networks has estimated that the price of a filter that could completely attenuate the high power SDARS signal would be approximately $1500 in high volumes and that such a filter would weigh three pounds. Alternatively, a less costly filter could be used that (in combination with the additional power required) would add approximately $70 to the price of WCS equipment, but would not be capable of operating with an

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27 *See* Letter from Bruce D. Jacobs to Magalie Roman Salas, dated April 25, 2001, at p. 1; Letter from Carl R. Frank to Magalie Roman Salas, dated April 23, 2001, at p. 2 n.4.

28 *See* Letter from William M. Wiltshire to Magalie Roman Salas, dated May 10, 2001.

29 *WCS Order*, 12 FCC Rcd. at 10798.

30 *See* FCC Identifiers OF2WCSR30 and OF2FWBASE15WCS.

31 *See generally* OET Bulletin 65. Satisfying these requirements for high power operations in urban areas (such as the SDARS repeaters) would seem to be particularly important.

exclusion zone of 1 to 2 miles around a high power repeater.[32] Similarly, Spike Broadband Systems estimates that the filter needed to shield against overload from a high power SDARS repeater would add an incremental cost of approximately $1500 per transceiver (*not* including the cost of development) and would need approximately 12 inches by 12 inches by 6 inches at both the base station and subscriber locations.[33] Because AWS is deploying a widespread consumer service, the cost and size implications of these theoretical filters render them impractical.

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We hope that this information will be of assistance to you in resolving the pending SDARS rulemaking.

Sincerely yours,

William M. Wiltshire
Karen L. Gulick

cc: Don Abelson
Sam Feder
Bruce Franca
David Furth
Julius Knapp
Adam Krinsky
Jane Mago
Paul Margie
Ron Netro
Ron Repasi
Peter Tenhula
Brain Tramont
David Solomon

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32 *See* Letter from Randall Schwartz to Magalie Roman Salas, dated May 30, 2001, at pp. 4-6.

33 *See* Letter from Tom Peragine to Magalie Roman Salas, dated May 23, 2001, at pp. 2-3.

ATTACHMENT – XM's REPEATER PLANS

Note: Standard text is XM's January 11, 2001 written representation. Bold text reflects XM's July 12, 2001 STA request.

A. 150 repeaters nationwide >2 kW

   a. According to Application for STA, there are 778 repeaters nationwide above 2 kW.

B. Only 25 of these repeaters operate at greater than 20 kW (and many of these use directional antennas)

   a. There are 37 repeaters operating above 20 kW.

C. The maximum power of any repeater is 31.7 kW.

   a. There are 26 repeaters operating above 31.7 kW, ranging up to 40 kW.

D. Only 3 cities with more than 3 repeaters >2 kW.

   a. Of the 61 cities listed, 49 have more than three repeaters operating above 2 kW.

      i. Boston (30)

         a. There are 66 Boston repeaters operating above 2kW.

            1. Repeaters are at low elevations; combined with unusual terrain, this produces substantial attenuation at street level (nothing >-25 dbm)

            2. Only 2 of the Boston repeaters operate with greater than 12 kW, and those are both directional.

               a. There are 34 Boston repeaters that operate at greater than 12 kW.

      ii. New York (20) (metro area covers at least 5K square miles)

         a. There are 22 New York repeaters operating above 2kW.

      iii. Chicago (4) (includes Milwaukee)

            1. Chicago alone has 28 repeaters operating above 2 kW.

            2. Milwaukee is listed separately and has 5 repeaters operating above 2 kW.