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FEDERAL COMMUNICATIONS COMMISSION
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Federal Communications Commission
Office of the Secretary

*XM Radio Inc. Request for Special Temporary
Authority to Operate Satellite Digital Audio
Radio Service Terrestrial Repeaters for 30 Days*

SAT-STA-20061002-00114

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Policy Branch
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EX PARTE MEMORANDUM IN SUPPORT OF STA REQUEST

Over the past five years, XM Radio Inc. (“XM”) has deployed an extensive network of terrestrial repeaters licensed by Commission in a series of special temporary authority orders (“STAs”). The operating characteristics of many of the repeaters vary, often in immaterial ways, from the characteristics identified in the STAs. XM has now filed a 30-day STA request (“STA Request”) designed temporarily to modify the details of the existing STAs so its repeater network “as built” will conform in its entirety to Commission authorization.¹

Under long-standing precedent, the Commission should grant the STA Request in its entirety. Failure to do so would distort existing law, needlessly cause harm to consumers, and undermine the public interest:

- The Commission has repeatedly decided that extraordinary circumstances and public interest benefits entitle XM to STAs for a nationwide terrestrial repeater network.
- The Commission allowed XM to construct its repeater network in the manner XM thought would provide the best service to consumers.

¹ While XM is seeking a modification of the existing STAs, it has styled its request as a new STA for the administrative convenience of Commission staff. XM’s repeater authorizations are currently spread among several file numbers; granting a new STA would consolidate all of them within a single file – which we understand would simplify staff oversight.

worked to finalize technical rules for SDARS services (rules that have yet to be issued).⁴ In granting the STA, the Commission recognized that XM “needs to employ terrestrial repeaters to provide adequate service.”⁵ This, of course, is particularly true in urban areas where buildings, overpasses, and roadside barriers can come between a satellite receiver and a satellite. XM has subsequently requested and received additional STAs to operate repeaters in additional markets.⁶ It now operates repeaters in 63 markets⁷.

Since the grant of the original STA, satellite radio has become a highly popular service with American consumers, confirming the Commission’s vision in licensing the satellite radio service. Using its integrated satellite system and repeater network, XM provides virtually seamless coverage to most of the United States. Indeed, it seeks to provide coverage that is available 99.4% of the time – the level of reliability that both XM and its automobile industry partners believe is needed to meet consumer demands. Although the service is only about five years old, XM already has more than 7 million subscribers and roughly 15 million listeners. Thousands more subscribe every day.

As explained below, XM’s as-built network is significantly smaller, less powerful, and has less interference potential than the network the Commission has already authorized. Moreover, while most of the variances between the as-built network

⁴ See *XM Radio, Inc., Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complimentary Terrestrial Repeaters*, Order and Authorization, 16 FCC Rcd 16781, 16787-88 (¶ 18) (2001) (“*Original STA Order*”).

⁵ *Id.* at 16783 (¶ 7).

⁶ See, e.g., *XM Radio, Inc. Request for Special Temporary Authority*, File No. SAT-STA-20020815-00153 (granted September 30, 2002); *XM Radio Inc., Request for Special Temporary Authority to Operate Additional Satellite Digital Audio Radio Service Terrestrial Repeaters*, Order and Authorization, 19 FCC Rcd 18,140 (2004).

⁷ The FCC granted XM an STA on September 15, 2004, authorizing the construction of repeaters serving markets beyond these 63. See File Number SAT-STA-20031112-00371. However, as XM has previously notified the Commission, none of these repeaters has been constructed.

and the authorized network are inconsequential from a regulatory perspective, XM has already taken steps to eliminate many of these variances. It has turned down to authorized levels 210 repeaters that were operating above their authorized power levels by less than 2 dB,⁸ and it has turned down to authorized levels nine repeaters (out of a total of eleven) that were operating above their authorized levels by more than 2 dB. In addition, XM has turned off the transmitters on fifteen repeaters (out of a total of nineteen) that were operating in locations that were not identified on an STA.⁹

On October 2, 2006, XM filed the STA Request covering the as-built network.¹⁰ XM requested the STA to bring its network into compliance, to ensure that consumers can continue to receive robust service, and to establish a framework in which the Commission could consider the 180-day STA request that XM subsequently filed on October 13, 2006.¹¹ The Commission should promptly grant the STA Request and leave it in place until it can rule on the pending 180-day STA request.

I. THE COMMISSION GRANTS OR MODIFIES STAs IN THE PUBLIC INTEREST WHERE, AS HERE, DOING SO ADVANTAGES CONSUMERS WITHOUT HARMING OTHERS

The Communications Act and the implementing regulations provide that STAs may be granted when “there are extraordinary circumstances requiring temporary operations in the public interest and . . . delay . . . would seriously prejudice the public

⁸ XM is not seeking authority to increase the power levels of these 210 repeaters in the STA Request.

⁹ We have previously described these repeaters as not being obviously authorized. In each of these cases, XM held one or more STAs in the market that were unused, but built the repeater in a location that the existing unused STAs did not identify.

¹⁰ See *XM Radio, Inc. Request for Special Temporary Authority*, File No. SAT-STA-20061002-00114 (filed Oct. 2, 2006).

¹¹ See *XM Radio, Inc. Request for Special Temporary Authority*, File No. SAT-STA-20061013-00119 (filed Oct. 13, 2006).

interest.”¹² The statute and regulations do not provide guidance on what is meant by “extraordinary” or how great an impact on the public is required before an STA should be granted. The Commission, therefore, has a fair degree of discretion in determining when circumstances and the public interest warrant granting an STA.

The Commission has consistently exercised its discretion to grant STAs when doing so “*would not cause harmful interference to other licensed operations and would serve the public interest, convenience and necessity.*”¹³ For instance, the Commission has granted an STA temporarily lifting limitations on satellite transponder operations in order to promote “the benefits of competition” and protect the licensee’s “ability to serve its customers.”¹⁴ Similarly, it granted an STA to a direct broadcast service licensee because the STA, which authorized temporary use of unused channels, would “serve[] the public interest” by allowing the licensee “to provide immediate expanded service to its customers.”¹⁵ And it granted an STA to a satellite licensee and modified the terms of the licensee’s original launch authorization in order to “allow [the licensee] the flexibility to implement its business plans without impairing service to its customers,” and to “ensure continuity of service for [the licensee’s] customers.”¹⁶ Simply put, the Commission has

¹² 47 U.S.C. § 309(f); 47 C.F.R. § 25.120(b)(1).

¹³ *EchoStar Satellite Corporation; Application for Renewal of Special Temporary Authority; Rainbow DBS Company LLC; Application for Special Temporary Authority*, Order and Authorization, 18 FCC Rcd 19825, 19827 (¶ 5) (2003) (emphasis supplied).

¹⁴ *Columbia Communications Corporation Application for Special Temporary Authority*, Order and Authorization, 11 FCC Rcd 13,710, 13,710, 13,716-17 (¶¶ 2, 14, 18) (1996).

¹⁵ *Direct Broadcast Satellite Corporation; Application for Special Temporary Authority to Operate a Direct Broadcast Satellite Over Channels 1-21 (odd) and 23-32 (odd and even) at 61.5 [degrees] W.L.*, Memorandum Opinion and Order, 13 FCC Rcd 6392, 6394 (¶ 7) (1998).

¹⁶ *Columbia Communications Corporation, Application for Modification of Authorization to Launch and Operate a C-Band Satellite at 37.5 [degrees] W.L.*, Order and Authorization, 20 FCC Rcd 1863, 1863, 1868 (¶¶ 1, 12) (2005) (“*Columbia 2005 Order*”).

adopted a common sense approach to STAs involving radio services; *if the grant of a temporary authorization will provide more service or competition to consumers, without adversely affecting another licensee or other consumers, the STA will be granted until the Commission can decide if a permanent authorization is warranted.*

Moreover, the Commission grants STAs with particular speed where, as here, it has already granted an STA and the licensee seeks changes that have no impact on the Commission's underlying rationale for granting the existing STA. For instance, in 1995, the Commission granted an STA allowing AMSC to operate 3,100 mobile earth terminals ("METs") in the lower L-band during its phased transition to the upper L-band.¹⁷ The Commission explained that the STA would advance the Commission's policy goals without harming any other MET users.¹⁸ Immediately after the decision was issued, AMSC applied for another STA for an additional 12,000 METs, noting that it had already committed to buy them.¹⁹ Although AMSC was seeking authorization for four times as many terminals as previously allowed, the Commission recognized that the public interest considerations had not changed and that none of the facts underlying the new request would alter the original STA analysis. Accordingly, it decided to "simply amend our recent order" to include the 12,000 new terminals within the STA.²⁰

¹⁷ See *Application of AMSC Subsidiary Corporation for Modification of its Blanket License to Construct and Operate 30,000 L-Band Mobile Earth Stations*, Order and Authorization, 10 FCC Rcd 10458, 10462 (¶ 27) (1995).

¹⁸ See *id.*

¹⁹ See *Application of AMSC Subsidiary Corporation for Modification of its Blanket License to Construct and Operate 30,000 L-Band Mobile Earth Stations*, Order and Reconsideration, 11 FCC Rcd 5527, 5528 (¶ 3) (1995).

²⁰ *Id.*

XM's case for an STA is even more compelling than AMSC's. Whereas AMSC sought to *expand* its original STA to include thousands of additional transmit/receive terminals, XM effectively seeks to *contract* the scope of its original STA. As explained in detail below, its actual as-built network of terrestrial repeaters is much *less* intrusive than the network originally authorized. Indeed, the as-built network consists of fewer repeaters, operates with much less power, and – most importantly – creates far less interference potential for other licensed operators. Indeed, this last consideration (*i.e.*, concern about interference potential) was the focal point of the analysis of XM's original STA request.²¹ The fact that the interference potential of the as-built network is lower than the interference potential of the authorized network makes the STA Request a straight-forward case – all the more so because, during the network's five-year operating history, XM has not received a single interference complaint from a WCS licensee.²²

Granting revised authority following a licensee's technical alterations also conforms to the Commission's understanding of the complexity and long time horizons that define satellite services and related networks.²³ Recognizing the “constantly evolving” nature of satellite systems as well as the years-long lead time necessary to develop such systems, the Commission generally permits technical modifications to satellite systems, “provided the modifications are consistent with Commission policies and do not present any significant interference problems.”²⁴

²¹ See, e.g., *XM, Inc., Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters*, Order, 16 FCC Rcd 18,484, 18,485 (¶ 4) (2001).

²² XM and Sirius, the other SDARS operator, have occasionally worked out interference issues between their respective repeater networks. These have been handled as routine operational matters.

²³ The FCC considers XM's terrestrial repeater network to be part of XM's satellite system. See *Original STA Order*, 16 FCC Rcd at 16783 (¶ 7).

²⁴ *Columbia 2005 Order*, 20 FCC Rcd at 1866 (¶ 9).

This describes XM's situation precisely. XM sought (and received) authorization for the robust terrestrial repeater network that it believed at the time it would need to offer nationwide SDARS service. When granting the original STA, the Commission stated that the terrestrial component of XM's SDARS service "will be especially useful where the satellite signal is blocked or will be subject to multipath interference."²⁵ Developing the terrestrial component proved to be a complex and time-consuming process, and XM modified its original plans to overcome various structural, topographical, and technological challenges that it was only able to appreciate after it began deploying the actual network. XM also modified its plans after deployment experience demonstrated that sectored antennas can prevent overlap with other repeater coverage areas and thereby eliminate self-interference. XM therefore in many instances installed sectored antennas in place of omnidirectional antennas.

While XM should have notified the Commission, these modifications "are consistent with Commission policies" and do not "present any significant interference problems."²⁶ Indeed, as discussed in detail below, XM's modifications have *decreased* interference potential and simply reflect the reality that operators of complex integrated satellite/terrestrial networks cannot predict with complete accuracy the way their networks will operate when built. The Commission has always understood this reality and, in the interest of encouraging the development of satellite services like XM's, it has allowed providers to modify their designs.²⁷

²⁵ *Original STA Order*, 16 FCC Rcd at 16781 (¶ 1).

²⁶ *Columbia 2005 Order*, 20 FCC Rcd at 1866 (¶ 9).

²⁷ *Id.*

II. THE COMMISSION SHOULD PROMPTLY GRANT THE STA REQUEST FOR XM'S ENTIRE REPEATER NETWORK

XM's as-built network of terrestrial repeaters would satisfy the statutory and regulatory standard governing STAs even if XM was seeking an STA for the first time. But, in fact, XM is seeking only to modify STAs that the Commission has already granted on three separate occasions. All of the reasons justifying the grant of the original STAs still apply and, indeed, are even more compelling today than they were five years ago. Moreover, the modifications XM seeks would merely grant it permission to continue the operation of a repeater network that is more in line with Commission goals than the network that the Commission has already authorized. Finally, the Commission would likely have granted XM STA authority for the "as-built" network had XM sought such authorization at the time.²⁸ There is no reason, therefore, why the Commission should not grant the STA Request in its entirety.

When the Commission originally licensed XM to provide SDARS service, it imposed a series of milestone requirements.²⁹ XM satisfied each, spending several years and over a billion dollars to launch satellites and otherwise lay the groundwork for its planned service. Yet without rules governing terrestrial repeater deployment, XM could not, absent special temporary authority, implement the final step necessary to offer service commercially. The Commission recognized this as an "extraordinary circumstance" created by (1) the decision to license XM to develop an SDARS service

²⁸ As noted elsewhere, XM does not attempt to justify its failure earlier to consult with the Commission about the actual deployment of its network. Any such failure, however, should have no bearing on the STA Request.

²⁹ See *American Mobile Radio Corporation; Application for Authority to Construct, Launch, and Operate Two Satellites in the Satellite Digital Audio Radio Service*, Order and Authorization, 13 FCC Rcd 8829, 8849-50 (¶¶ 47-48) (1997).

and (2) the inability to promulgate the final rules necessary to complete deployment and enable commercial operation.³⁰ Given these circumstances, the Commission granted XM an STA to operate a nationwide repeater network.

Nothing has changed that would undermine this analysis; the same “extraordinary circumstances” that justified the original STA (and the subsequent STAs) still exist. XM, having been licensed to begin operations and having adhered to FCC-mandated milestones, developed its SDARS system – and it must operate a nationwide repeater network to provide a robust commercial SDARS service. In the continued absence of final repeater rules, it can only do so with an STA covering that entire repeater network.

Moreover, the Commission previously observed that an STA would allow “listeners in areas that have limited radio service” to receive “high quality radio signals” and would provide motorists with “continuous radio coverage on long-distance trips.”³¹ The Commission also noted that SDARS provides many channels, thereby enabling “[d]iverse program formats, including educational, ethnic and religious programming.”³² These public interest benefits continue to warrant an STA. Indeed, with more than seven million subscribers and roughly fifteen million listeners, and with its increasing role in providing public safety information, the public interest benefits from granting an STA to XM are far greater today than they were five years ago. Degrading the reception of this programming for hundreds of thousands of consumers, in some cases severely, by failing

³⁰ See *Original STA Order*, 16 FCC Rcd at 16783 (¶ 7); *XM Radio Inc.; Request for Special Temporary Authority to Operate Additional Satellite Digital Audio Radio Service Terrestrial Repeaters*, Order and Authorization, 19 FCC Rcd 18140, 18142 (¶ 7) (2004); *XM Radio Inc.; Request for Special Temporary Authority To Operate a Lower Power Terrestrial Repeater At PGA Tour Events*, Order, 20 FCC Rcd 10,661, 10,663 (¶ 8) (2005).

³¹ *Original STA Order*, 16 FCC Rcd at 16784 (¶ 9).

³² *Id.*

to grant the STA in its entirety is surely not in the public interest. While we set forth below the impact on consumers of the failure to grant the STA on a market-by-market basis, the overall picture is the same regardless of the market. Millions of people around the country rely on the XM service, which in turn relies on the combination of satellite signals and the repeater network. It is simply not possible to shut down repeaters without injuring consumers.

The differences between the authorized network and the as-built network also make plain that granting the STA Request in its entirety is in the public interest. As noted, XM's actual as-built network is smaller, less powerful, and less likely to cause interference than the network the Commission originally authorized. Moreover, the vast majority of the differences between the authorized network and the as-built network are noteworthy only for their insignificance.

The Commission's original STA authorized XM to develop a nationwide network consisting of more than 1139 repeaters. The as-built network, however, consists of only 799 repeaters, meaning that XM has opted not to deploy more than 340 authorized repeaters. In addition, as reflected in the chart below, XM's as-built network operates at a far lower aggregate power level than the originally authorized network.

	Low Power (<2000 watts average power)	Medium Power (2000-10000 watts average power)	High Power (>10,000 watts average power)	Total
STA Granted Sites	422	599	118	1139
XM Built Sites	439	328	32	799
Difference	17	(271)	(86)	(340)

Most importantly, XM's as-built network poses a significantly smaller risk of interference for other licensed operators. Because potential interference concerns were the focal point of the original STA analysis, and because granting the STA Request will

allow operation of a network with less interference potential than the authorized network, the Commission should grant the STA promptly.

The requested STA would certainly benefit the public interest more than the alternative of requiring XM to replace the variant repeaters with hundreds of additional repeaters – many of them operating at high power – that conform exactly to the existing STAs. This expensive alternative plainly would not serve the Commission’s objectives, but instead would inevitably lead to degraded or lost service for consumers while the changes are underway – and would result, as reflected in the above chart, in a repeater network that is larger, more powerful, and creates more interference potential than the network XM built. Since the Commission’s chief concern when assessing the original STA was interference potential, requiring the build-out of a network with greater interference potential makes little sense from any perspective.

Finally, there is little doubt that the Commission would have granted an STA for the as-built network had it been asked to do so. The Commission recognized that SDARS operators had to deploy terrestrial repeater networks³³ and acknowledged that satellite service operators must often modify deployment plans to address actual on-the-ground conditions.³⁴ In keeping with that understanding of the service at issue here, the Commission effectively authorized XM to deploy its network in a manner it believed met its service requirements, provided that the repeaters did not cause interference for other licensees.

³³ See *SDARS Order*, 12 FCC Rcd at 5770 (¶ 37).

³⁴ See *Columbia 2005 Order*, 20 FCC Rcd at 1866 (¶ 9).

The Commission essentially granted XM a “blanket” STA to operate repeaters below 2 kW EIRP, placing no limits on XM’s deployment plan for these low power repeaters and requiring only that XM provide a list of those repeaters and their locations upon request (limiting XM’s authority to operating repeaters as described on the self-identified list).³⁵ With respect to repeaters operating above 2 kW EIRP, the Commission granted an STA for the deployment plan that XM had attached to its application.³⁶ Nothing in the STA Order suggests that the Commission was concerned about the precise operational characteristics of the repeaters. Rather, it authorized them all and imposed one key condition: XM was required to turn off any repeater that caused actual interference, or otherwise coordinate operations with the affected licensee.

When XM deployed its network after receiving the STA, it discovered that actual on-the-ground conditions required modification to its authorized plan in many (usually minor) respects. XM should have informed the Commission of these modifications at the time and does not seek to excuse itself for failing to do so. But that is not the issue here. As discussed above, the Commission has a policy of approving modifications of this type,³⁷ and in this case the modified network is smaller, less powerful, and less likely to cause interference than the authorized network.

The bottom line is quite simple. The Commission has already found that XM is deserving of an STA for a nationwide terrestrial network, deployed in the manner that XM thought would provide the best service to the public. Since it reached that conclusion, XM has built a robust service that serves more than seven million

³⁵ See *Original STA Order*, 16 FCC Rcd at 16787 (¶ 17).

³⁶ See *id.*

³⁷ See *Columbia 2005 Order*, 20 FCC Rcd at 1866 (¶ 9).

subscribers, roughly 15 million listeners, and is growing rapidly. It has also built a repeater network that is dramatically smaller and less likely to create interference than the authorized network – and that, in fact, has not actually caused any interference. The STA Request seeks merely to modify the existing STAs so that XM can continue to operate this smaller, less powerful network while the Commission evaluates the 180-day STA request and considers final rules for the SDARS repeater network. Denying the STA Request would reduce service to hundreds of thousands of consumers and create the need for XM to build a larger more powerful network, increasing the risk of interference. Granting the STA Request would harm no one. Existing law compels the grant of the STA Request.

III. A MARKET SPECIFIC ANALYSIS ALSO DEMONSTRATES THAT XM SHOULD BE GRANTED AN STA FOR ITS ENTIRE REPEATER NETWORK

Reviewing each market in which XM has a variant repeater provides another demonstration that XM should be granted an STA for its entire network. Four markets, which constitute a representative sample of the markets in which XM has deployed its repeater network, are discussed in some detail below. Unless the Commission advises otherwise, XM intends soon to file additional memoranda analyzing additional markets.

A. XM Should Be Granted an STA for Its Repeaters in the Boston Market

The Commission authorized XM to deploy *fifty-two* repeaters to provide seamless coverage in the Boston market. More specifically, it authorized 20 high-power repeaters (above 10 kW), 9 medium-power repeaters (between 2 kW and 10 kW), and 23 low-power repeaters (below 2 kW). In actuality, *XM has installed a total of only thirty repeaters* – 42 percent fewer than authorized. XM installed only one high-power repeater (out of 20 authorized by the Commission) and only 2 medium-power repeaters (out of the

9 authorized by the Commission). The remaining 27 repeaters in Boston all operate at 2 kW or below. In other words, like the rest of XM's network, the network in Boston is much smaller, less powerful, and less likely to cause interference than the network the Commission authorized XM to build.

Of course, the fact that the as-built network is smaller and less intrusive means that it varies in some respects from the as-authorized network. Thirteen of the 30 XM repeaters differ from the STA in at least one respect, although none of the differences impact the STA analysis.

- Three of the thirteen variant repeaters (BOS124, BOS127, and BOS132) vary from the original STA only because their antennae differ from their authorized heights by 13, 18, and 21 feet respectively.
- Two repeaters vary in antenna orientation. One of them (BOS202) varies because it uses a two-panel antenna rather than the authorized omnidirectional antenna, and it was reoriented by 40 degrees as a result. The other (BOS232) varies in orientation by 240 degrees.
- Seven repeaters (BOS109, BOS122, BOS125, BOS128, BOS134, BOS135, and BOS226) vary because they have been installed away from their authorized locations by more than five seconds longitude or latitude (distances ranging from 489 feet to 2,963 feet). One of these (BOS125) also varies in antenna height by 21 feet.
- The final variant repeater (BOS101) was constructed at a location that the STA did not clearly identify. This does not mean that XM has added an extra repeater for BOS101, but simply that none of the 22 authorized *but unused* repeater locations clearly applies to it.

It seems obvious that all the considerations which justified grant of the original STAs for repeaters in Boston apply even more strongly to the as-built repeaters. Most of the differences between the authorized and as-built are of little consequence, and the as-built network is less likely to cause interference than the authorized network.

Moreover, shutting down the variant repeaters would disserve the public interest. XM's variant repeaters cover 33% of the Boston market (as measured by resident

location). In the event of a shut down, the population benefiting from repeater coverage would drop by more than 627,000 (again, measured by resident location). Commuters on some of Boston's busiest highways – I-90, I-93, I-95, I-190, and I-290 – would suffer from degraded service and complete service loss in some areas. In aggregate, those routes serve nearly 340,000 vehicles every day. Boston Plot 1 (repeater coverage with the variant repeaters on) and Boston Plot 2 (repeater coverage with the variant repeaters off) provide a graphical representation of the impact of the variant repeaters. *See Exhibits 1 and 2, attached.* They work in concert with direct satellite coverage to provide seamless coverage throughout the market. As these exhibits reflect, turning them off would degrade or eliminate service in core downtown areas and on major commuter routes, resulting in tangible consumer harm. By contrast, granting the STA and authorizing the smaller, less powerful network would not cause harm to anyone.

Accordingly, the Commission should issue an STA covering all of the repeaters in the Boston market. There is no reason to deny such temporary authorization, and doing so would reduce service to thousands of consumers.

B. XM Should Be Granted an STA for its Repeaters in the Buffalo Market

The Commission authorized XM to deploy nine repeaters in the Buffalo market. It authorized three high-power repeaters and six medium-power repeaters to ensure seamless coverage. In fact, *XM only deployed six of the authorized nine repeaters.* Moreover, it installed only one of the three permitted high-power repeaters, four medium-power repeaters, and one low-power repeater. As is true for the repeater network as a whole, the network in Buffalo is smaller (by 33%), less powerful, and less likely to cause interference that the network XM was authorized to build.

The downside of building this less intrusive network in Buffalo is that five of the six repeaters vary from the existing STAs in some respect. But, again, as is true for the network as a whole, many of the variances are of little or no consequence. In Buffalo, two of the five repeaters (BUF001 and BUF003) vary from the STA only because the height of their antennae varies by three feet or less from what the Commission approved. Another (BUF012) uses a different model antenna (omni-directional instead of 90-degree sector) and the antenna's height and orientation vary by less than two feet and 135 degrees, respectively. The fourth variant repeater (BUF006) is located more than five seconds longitude or latitude from its authorized location (6,218 feet), its antenna's orientation varies by 20 degrees, and its downtilt varies by 3 degrees. The fifth variant is not *de minimis*, since the repeater (BUF004) has no obvious STA, and thus while XM's network does not exceed the total number of authorized repeaters in Buffalo, none of the four unused STAs in Buffalo obviously would seem to cover this fifth repeater.

Given that the Commission has decided that extraordinary circumstances justified building a nine-repeater network, with three high-power repeaters, in Buffalo, it must surely conclude that operating a six-repeater network, with just one high-power repeater, is equally justified – particularly when most of the variances from the authorized network are of little or no consequence.

As importantly, the failure to grant the STA to the entire repeater network in Buffalo would cause immediate and severe harm to the public. As noted, five of the six repeaters in the Buffalo market vary from the existing STAs. By resident location, these variant repeaters cover 96% of the repeater footprint in Buffalo. The population of Buffalo benefiting from repeater coverage would drop from more than 135,000 to fewer

than 5,000. Shutting down the five variant repeaters would also lead to significant coverage losses on three of the city's major commuter routes – I-90, I-190, and I-290 – that collectively serve as many as 187,000 vehicles per day. Buffalo Plot 1 (repeater coverage with the variant repeaters on) and Buffalo Plot 2 (repeater coverage with the variant repeaters off) provide a graphical representation of the impact on repeater coverage. See Exhibits 3 and 4, attached. In short, the variant repeaters working together with the satellite system allow thousands of consumers to get excellent service. Shutting down the variant repeaters would undermine this service and cause real consumer harm. Granting the STA, by contrast, would cause no injury to anyone.

There is, in short, no rational reason not to grant the STA for all of the repeaters in the Buffalo market, and it would make no sense to shut down the variant repeaters and cause the resulting reduction in service.

C. XM Should Be Granted an STA for Its Repeaters in the Detroit Market

The Commission's original STA authorized XM to build twenty-five repeaters in Detroit. More specifically, it authorized one high-power repeater, 23 medium-power repeaters, and one low-power repeater to ensure seamless coverage in the market. XM has installed twenty-five repeaters, as authorized, but the repeaters it has deployed are much less powerful than those that were authorized. Indeed, *XM has installed no high-power repeaters in Detroit and only twenty medium-power repeaters* (out of the 23 it was authorized to build). Its remaining 5 repeaters in Detroit operate at 2 kW or below. As a result, the Detroit network (like the rest of the XM network) is much less likely to cause interference than the network authorized by the original STA.

Of course, the Detroit network can only be less powerful and less intrusive than the authorized network by varying from the authorized parameters in some respects. In fact, 22 of XM's 25 repeaters in Detroit exhibit some kind of variance, although none of the variances undermine the Commission's original STA analysis.

- Five repeaters (DET005, DET014, DET035, DET037, and DET043) vary only with respect to antenna downtilt – by 1, 5, 3, 3, and 3 degrees, respectively.
- Five repeaters (DET001, DET012, DET038, DET040, and DET515) vary in their antenna heights by 23 feet, 5 feet, 9 feet, 5 feet, and 13 feet, respectively. Of these, DET038 and DET515 also vary in antenna downtilt by 6 and 3 degrees, respectively, and DET040 varies in location by more than five seconds longitude or latitude (1,139 feet).
- One repeater (DET048) varies in antenna orientation by 65 degrees.
- Seven repeaters (DET008, DET016, DET029, DET030, DET031, DET034, and DET044) vary because they have been installed away from their authorized locations by more than five seconds longitude or latitude (distances ranging from 487 feet to 3,766 feet) – except DET029, which is 109,000 feet from the location identified in the STA (XM believes there was a one digit data entry error when information about DET029 was submitted).³⁸ Four of these (DET008, DET030, DET031, and DET034) also vary in antenna downtilt by 4, 3, 3, and 6 degrees, respectively.
- Finally, four repeaters (DET301, DET302, DET303, and DET549) were constructed at locations that were not clearly identified in the STA. In other words, the four remaining authorized but unused locations contained in the STA do not clearly apply to these repeaters.

When considering this market, the Commission must begin by recognizing that it has already approved a much more powerful network including one high-power repeater and 23 medium-power repeaters. As a result, it stands to reason that the Commission should also authorize the less powerful network (zero high-power repeaters and 20

³⁸ The STA reflects a location of 42° 18' 35" (42.3097°) for this repeater. XM believes that the intended location was 42° 36' 35" (42.6097°). This one digit change explains the wide variation between the STA location and the actual location which is: 42° 36' 33" (42.6092°)

medium-power repeaters) that XM has deployed. Indeed, the extraordinary circumstances justifying the original STA have not changed, and the public interest considerations have actually intensified because the existing network is actively serving consumers.

In fact, turning off the variant repeaters in Detroit would decimate service for thousands of XM consumers and deal a severe blow to the public interest. XM's variant repeaters cover 94% of the Detroit market (as measured by resident location). Shutting them down, therefore, would wipe out repeater coverage for a resident population of more than 750,000 people. Moreover, shutting down the variant repeaters would disrupt, and in some areas eliminate, service on key commuter routes – including I-75, I-94, I-96, I-275, I-475, and I-696 – that collectively serve more than 500,000 vehicles per day.

The consumer impact of shutting down the variant repeaters in Detroit has been foreshadowed by XM's decision to shut down three of the four repeaters (DET301, DET302, DET303) that were not clearly identified on the STA. These repeaters served shadowed portions of I-96, Rte. 39, I-75, and I-696, all of which are high traffic commuter routes. Turning off these repeaters has adversely affected a large number of consumers in the Detroit market, and caused great concern at GM – XM's partner – which has been directly affected by reduced service on these heavily traveled roads.

Detroit Plot 1 (repeater coverage with all of the variant repeaters on) and Detroit Plot 2 (repeater coverage with all of the variant repeaters off) demonstrate the impact of the variant repeaters graphically. *See Exhibits 5 and 6, attached.* Clearly, turning off all the variant repeaters would have grave consequences for thousands of additional consumers. Granting the STA, by contrast, would allow XM to turn back on the three

now silent repeaters and continue operating the other variant repeaters, allowing XM to provide its usual seamless service to the Detroit market *without causing harm to anyone*.

Thus, the Commission should authorize all of XM's repeaters in Detroit. There is simply no reason not to do so. Turning the variant repeaters off, on the other hand, would inflict real harm on consumers.

D. XM Should Be Granted an STA for its One Repeater in the Providence Market

The case for an STA in Providence is equally compelling. The Commission authorized XM to deploy *five high-power* repeaters and one medium-power repeater. In actuality, XM has installed only *one low-power* repeater. Thus, as is true nationwide, XM's network in Providence is much smaller, much less powerful, and much less likely to cause interference than the network XM was authorized to build.

The solitary Providence repeater varies from the original STA, however, because it was constructed at a location that was not clearly identified in the STA. Again, this does not mean that XM has grabbed an extra repeater location; rather, it means only that none of the six authorized *but unused* repeater locations clearly applies to the one repeater XM installed.

The Commission has already concluded that extraordinary circumstances and public interest considerations justify a relatively powerful network of six repeaters in the Providence market. It must surely find that those same factors – which have not changed – also justify the deployment of a single low-power repeater.

The Commission must also consider the severe injury to the public interest that would result from shutting down the only repeater in the Providence market. Since the market is covered by just one repeater, shutting it down would wipe out repeater

coverage entirely. The repeater's coverage footprint, shown on Providence Plot 1 currently covers a population of 145,682, and it ensures seamless coverage on I-95 and I-195, major commuter and inter-city routes that collectively serve more than 194,000 vehicles per day. *See Exhibit 7, attached.* While the satellite would provide direct service in some areas, many areas in the market would experience drastic service degradation if XM had to shut down the repeater.

Providence Plot 2, which presents drive-test data for downtown Providence, illustrates the result graphically. *See Exhibit 8, attached.* In the image on the left, which represents coverage provided by the repeater and the satellite together, virtually every mile of every drive-tested route has excellent service (represented by blue dots). The image on the right, which represents satellite-only coverage following repeater shut down, makes the impact abundantly clear. Many routes have marginally acceptable service (represented by yellow dots), and many more have unacceptable service (represented by red dots).³⁹ In a nutshell, Providence Plot 2 demonstrates that the satellite and the repeater, working together, provide seamless service for consumers in Providence, but shutting the repeater down would degrade service and cause consumer harm. By contrast, authorizing the repeater would cause no harm to anyone.

As with Buffalo, Boston, and Detroit, therefore, there is no reason to deny an STA that authorizes the solitary Providence repeater. It would make no sense to reduce service to thousands of consumers by shutting it down.

³⁹ The service quality described for the blue, yellow, and red points on the plot correspond to measured signal quality data (e.g. Channel Bit-Error Rate) collected during drive testing. Loss of audio will sometimes be experienced at yellow points on the map, particularly at low vehicular speeds and very frequent mutes or complete loss of audio will be experienced at red points.

CONCLUSION

Whether considering the XM repeater network as a whole, or on a market-by-market basis, the conclusion must be the same: the Commission should grant the STA Request for XM's entire repeater network. No one would be harmed by the grant of the STA and failing to do so would harm consumers in every affected area, and thereby disserve the public interest.

Respectfully Submitted,

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EXHIBIT 1

Boston Plot 1

Current Repeater Coverage

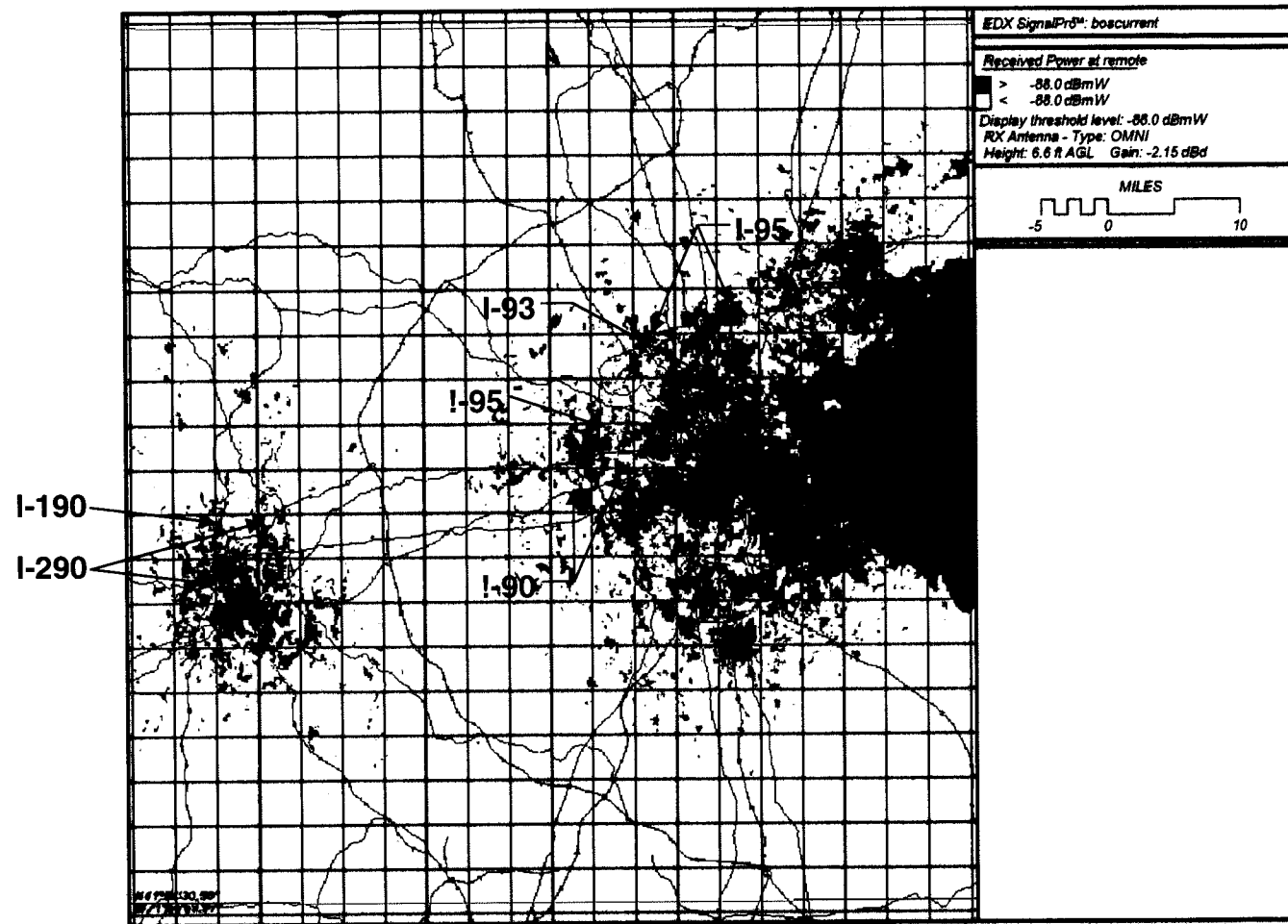


EXHIBIT 2

Boston Plot 2

Repeater Coverage with Variant Repeaters Off

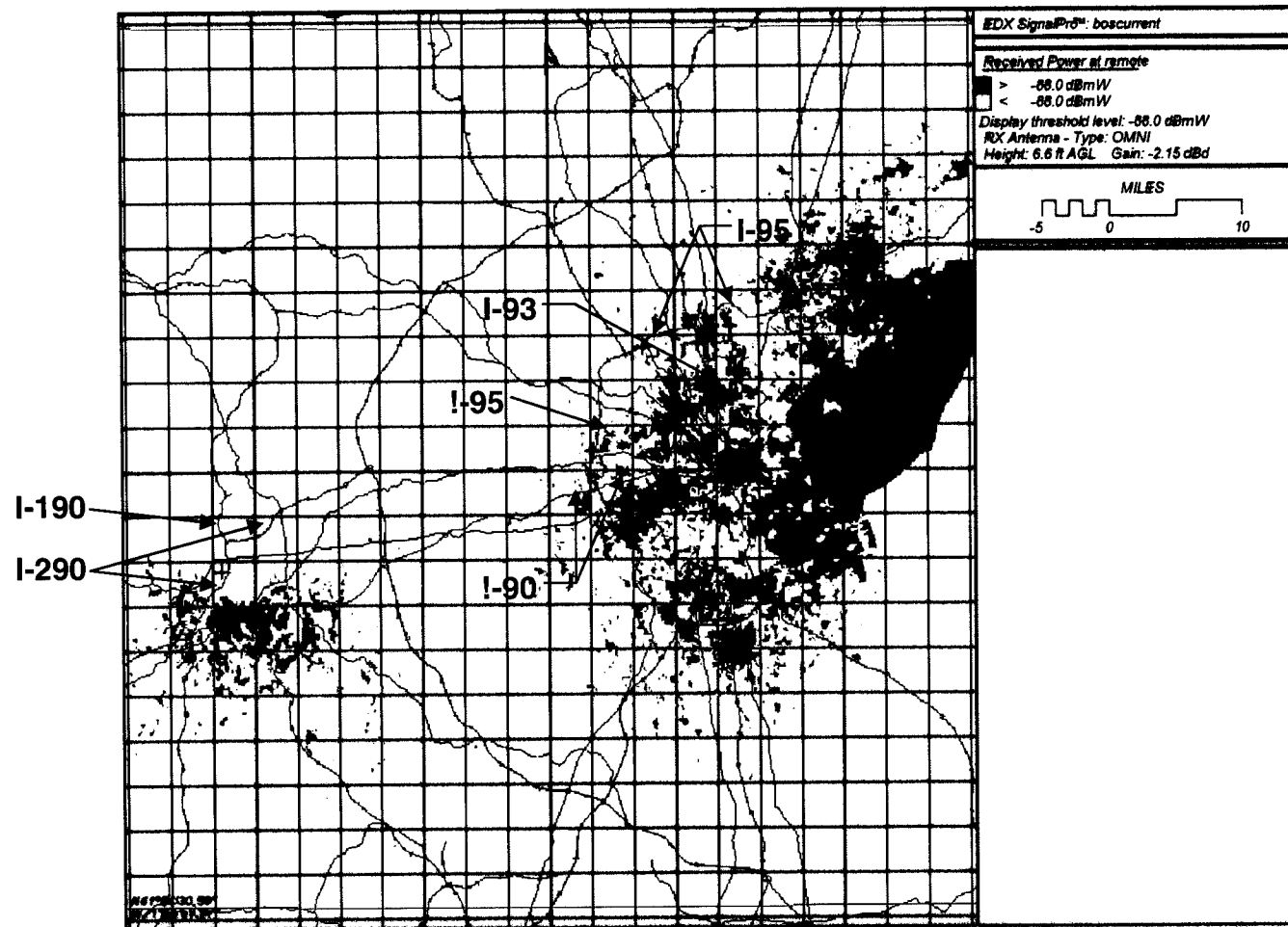


EXHIBIT 3

Buffalo Plot 1

Current Repeater Coverage

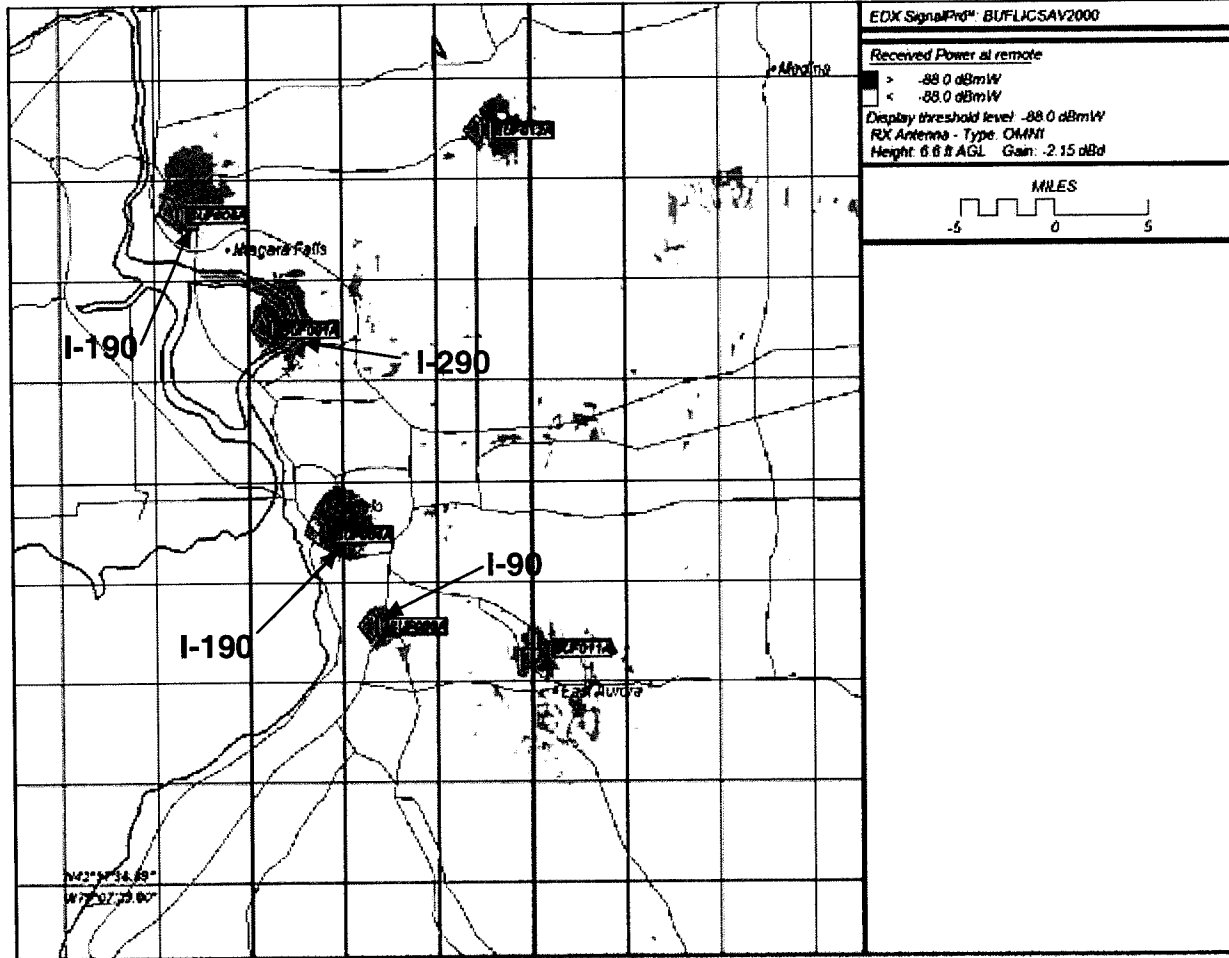


EXHIBIT 4

Buffalo Plot 2

Coverage with Variant Repeaters Off

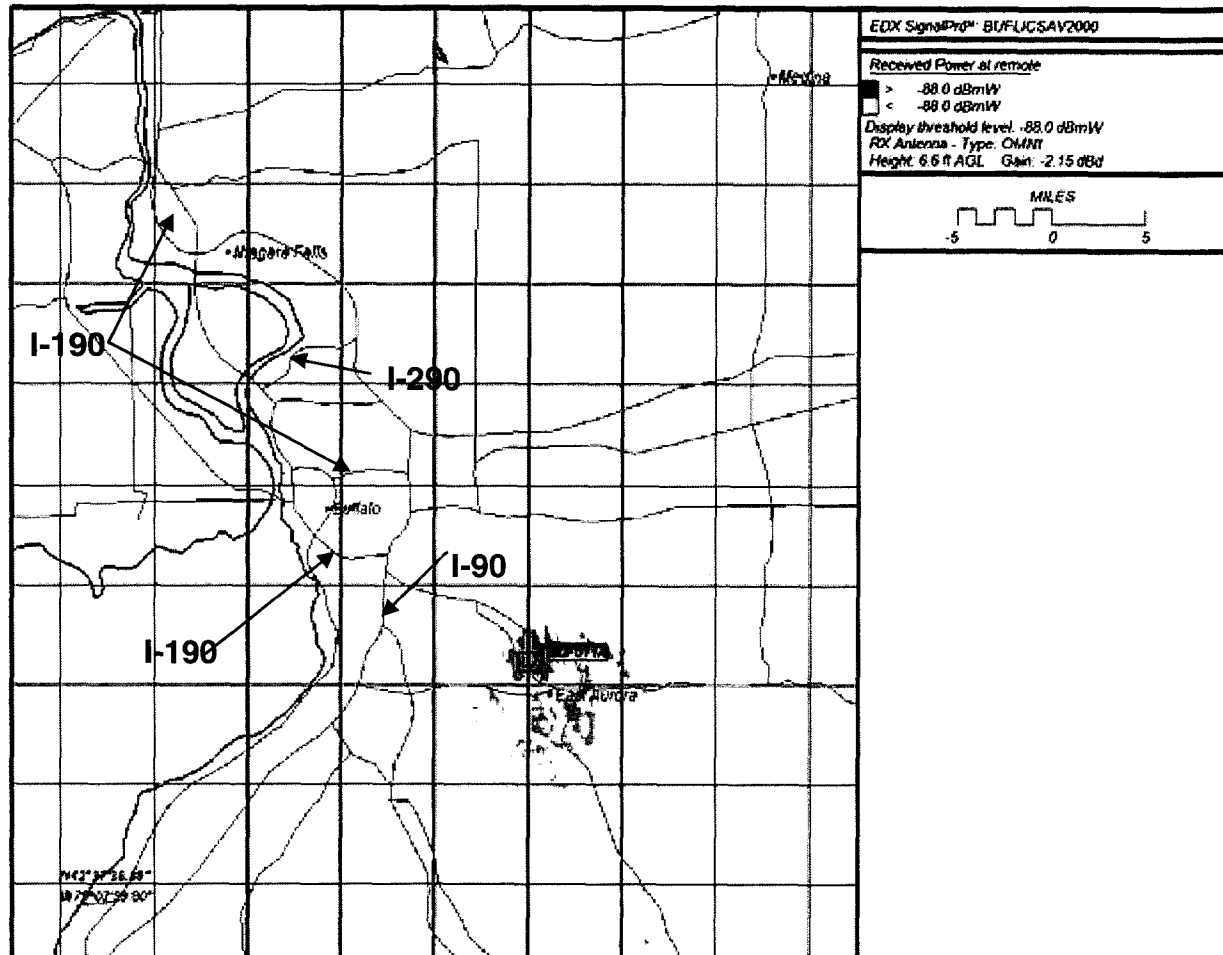
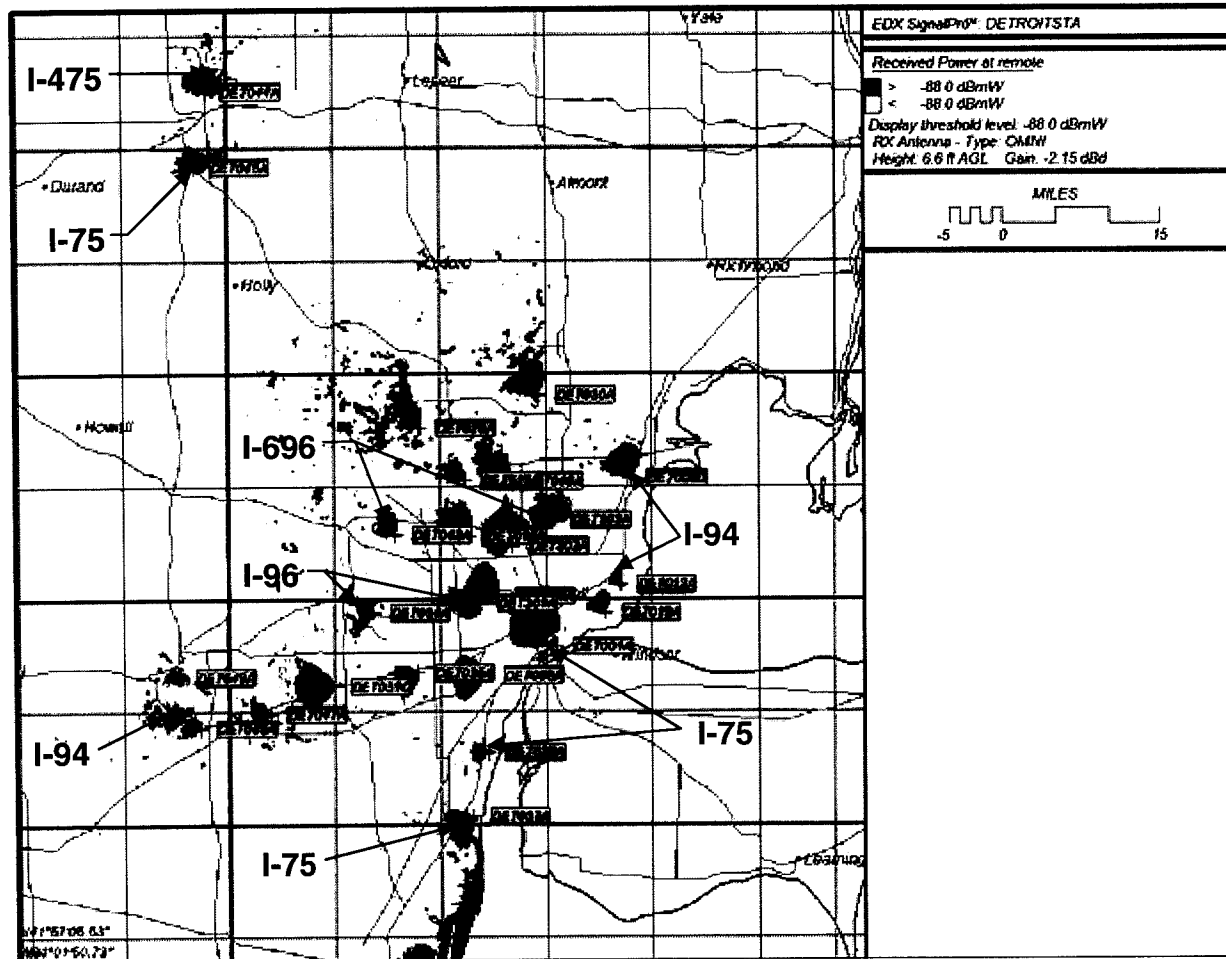


EXHIBIT 5

Detroit Plot 1

Coverage With All Repeaters Operating ¹



¹ On September 28, 2006, XM turned off three repeaters in the Detroit market, repeater numbers DET301, DET302, and DET303.

EXHIBIT 6

EXHIBIT 7

Providence Plot 1

Current Repeater Coverage

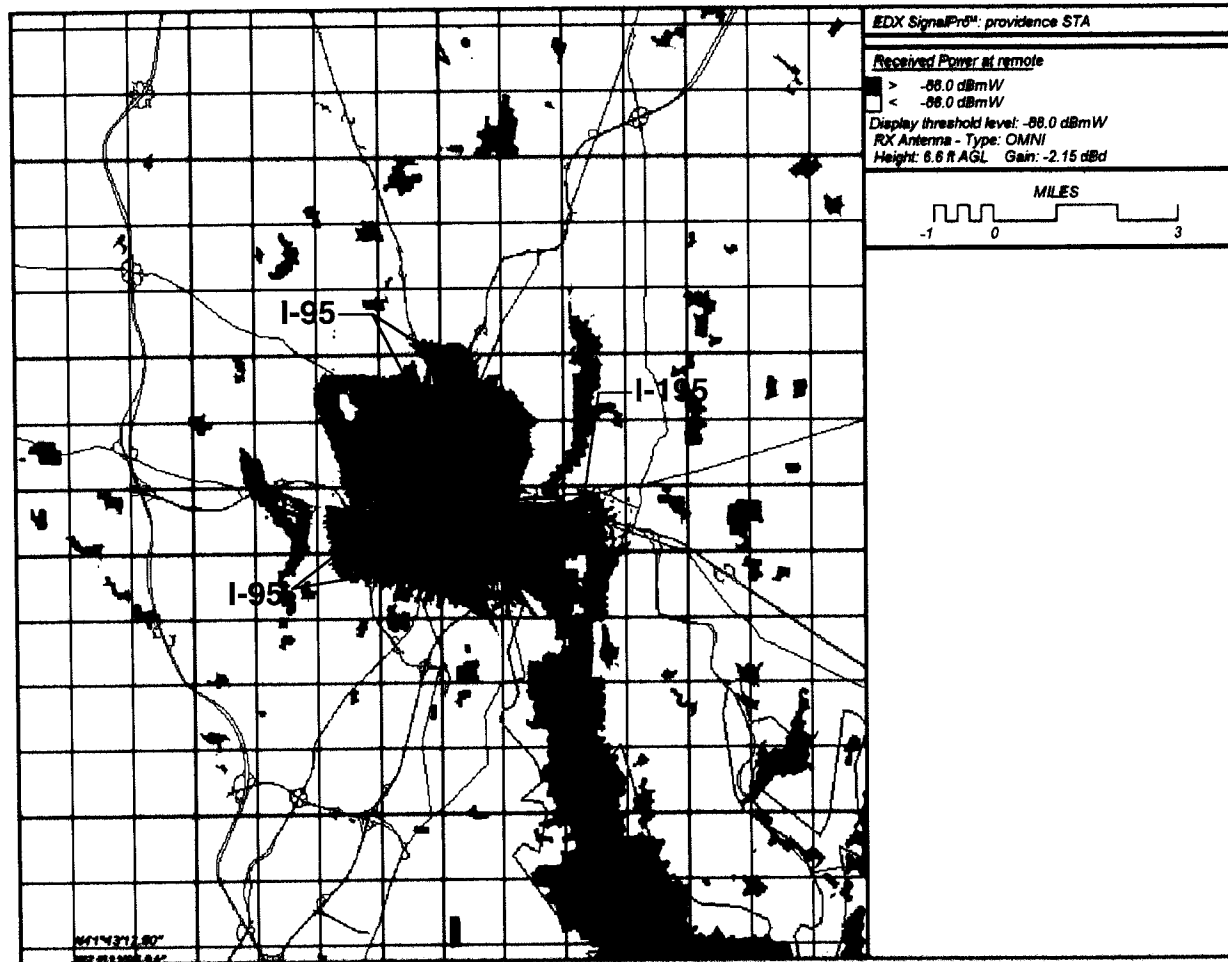
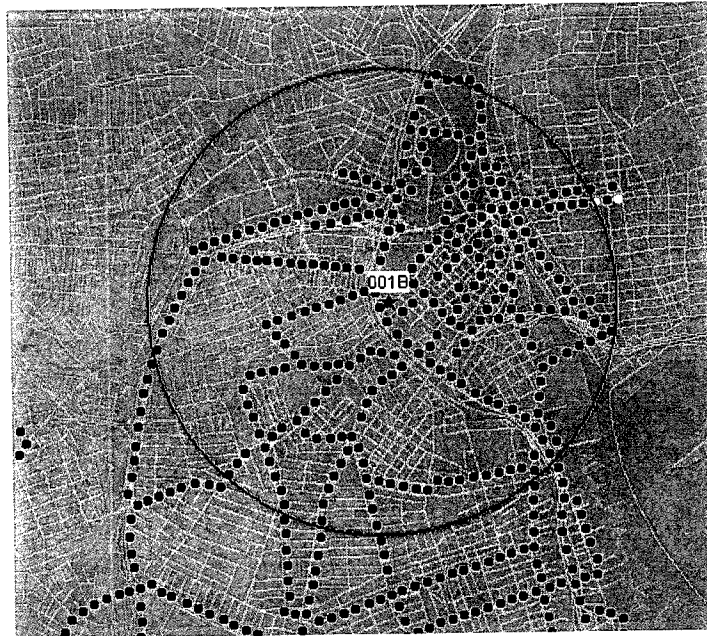
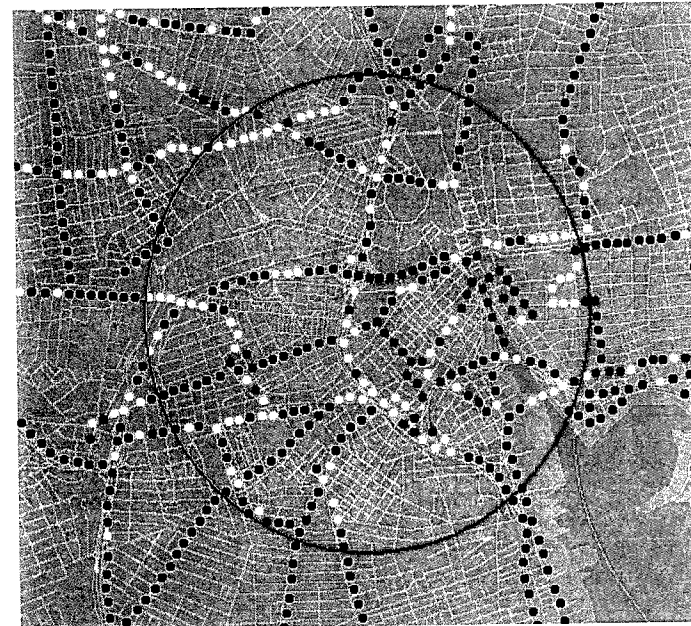


EXHIBIT 8

Plot 2- Providence Drive Test Data



Providence Drive Test
(Satellites+Repeater On)



Providence Drive Test-Satellites Only
(Repeater OFF)

Legend:

Blue: Good reception, no audio mutes

Yellow: Marginal reception—may experience mutes, particularly at low vehicular speeds

Red: Bad reception, or no signal—very frequent mutes, or complete loss of audio