

by AMT interests,⁴⁵⁷ we want to be clear that we are adopting this conservative coordination trigger only to allow thorough consideration of possible interference scenarios and it is in no way to be considered an exclusion zone around AMT facilities.

184. Although this coordination distance is conservative in that it does not consider terrain shielding or other propagation factors that would mitigate possible interference between these services and such a large coordination distance could slow deployment of WCS base stations near AMT facilities while coordination takes place, we find that adopting such a conservative coordination distance is preferable to adopting too small of a coordination distance and then having to address instances of harmful interference after the facilities are deployed and operational. We believe that in most cases, the line of sight from a WCS base station to an AMT receiver will be less than 45 km, but to account for the possibility that a WCS base station could be deployed on a mountain overlooking an AMT facility, we will require coordination for a radius of 45 km or line of sight from the AMT receiver, whichever distance is greater. In addition, we note that because the WCS Coalition is considering the use of TDD technology for the WCS band, the lower WCS-band channels can be used in areas around AMT receivers even if use of the upper WCS-band channels is hindered. Also, although the interference protection mechanism outlined in Recommendation ITU-R M.1459⁴⁵⁸ has been used in the past for the coordination of base stations and AMT receivers,⁴⁵⁹ we will rely upon the AMT entity and the WCS licensee to use accepted engineer practices and/or standards to evaluate each AMT/WCS deployment based on the relevant operating characteristics and to come to a mutually acceptable agreement. Although the line of sight distance will be likely less than 45 km in most cases, to account for the possibility that a WCS base station or AMT receiver could be higher than 30 meters above ground or deployed on a mountain overlooking an AMT facility, we will require coordination for a minimum of 45 km or line of sight, whichever is greater.

185. We will also require WCS licensees and AMT receiver operators to cooperate in good faith in the coordination and deployment of WCS and AMT facilities. WCS licensees must also cooperate in good faith in the selection and use of new station sites and new frequencies when within radio line of site of AMT receiver facilities to minimize the potential for harmful interference and make the most effective use of the authorized facilities. If the parties are not able to reach a mutually acceptable coordination agreement in an acceptable timeframe, either party can approach the Wireless Telecommunications Bureau of the FCC, which, in cooperation with the Office of Engineering and Technology and NTIA, may impose restrictions including specifying the transmitter power, antenna height, or area or hours of operation of the stations. Licensees of stations suffering or causing harmful interference must also cooperate in good faith to resolve such problems by mutually satisfactory arrangements. At this time, we decline to specify a specific timeframe within which parties must remedy interference because we believe the complexity and demand on resources will vary from deployment to deployment. The details for remedying interference should be thoroughly documented in the coordination agreements between the WCS and AMT licensees. We would expect the agreements to contain sufficient specificity as to the mechanism, response time, and points of contact needed to expeditiously remedy harmful interference, should it occur. If it appears the parties are not able to work to a mutually acceptable arrangement within a reasonable time period, we may reconsider this decision in the future and

⁴⁵⁷ We note that the 45-km coordination distance proposed by NTIA would be the line of sight distance for an AMT receiver at a 30-meter height pointed at a WCS base station at a 30-meter height assuming a smooth earth with no terrain obstructions.

⁴⁵⁸ See Recommendation ITU-R M.1459, "Protection criteria for telemetry systems in the aeronautical mobile service and mitigation techniques to facilitate sharing with geostationary broadcasting-satellite and mobile-satellite services in the frequency bands 1 452 1 525 and 2 310 2 360 MHz." This Recommendation provides the framework for conducting sharing studies between the mobile aeronautical test service and the mobile satellite service.

⁴⁵⁹ See 47 C.F.R. § 25.253(f)(2), Mobile Satellite Service Ancillary Terrestrial Component base stations.

establish specific deadlines for remedying the interference. We also expect the coordinating parties to share accurate and relevant information in a timely and efficient manner. This applies equally to the AFTRCC on behalf of the AMT community, NASA, and the WCS licensees. This coordination also must address instances where an AMT licensee wishes to deploy temporary or future AMT facilities.

186. We note that both of these services have primary status in their allocation, so we reject the AMT interests' request that mobile, transient, and future AMT deployments have priority status over WCS deployments. We also reject their request that WCS operations be required to immediately cease operation at the request of an AMT operator. Such requirements would essentially elevate the allocation status of AMT over that of WCS and we are not persuaded that such action is appropriate or justified. Further, as is typically the case when co-primary services coordinate, we find a first-in, first-protected coordination approach is appropriate to address future AMT deployments. We will also require the parties to resolve interference complaints swiftly and in a mutually acceptable manner or either party may request intervention by the Commission. We also encourage the parties to work together to address any special needs each party might have. Although we adopt a conservative coordination distance, we do not anticipate the creation of large exclusion zones around AMT facilities or for WCS to lock out or impede future AMT growth. Our analysis of the record leads us to believe that these two services are capable of operating in adjacent spectrum if they consider real world factors and deploy facilities in consideration of their environment. We will also require the parties in the coordination process to determine what modifications to either parties' facilities would be considered minor, and the modifications that would be considered major and in need of subsequent coordination. We believe WCS mobile/portable operations and base stations would likely be shielded by foliage, buildings, and other structures that would attenuate the WCS emissions. We believe that WCS base stations should be able to operate within the coordination area if they use sound engineering practices and take local conditions into account. We also reject the idea of the exclusion zones around AMT test facilities because we believe any potential interference can be better evaluated in light of the specific factors applicable at each specific AMT receive location and mitigated with coordination between the parties.

187. Finally, we reject AFTRCC's suggestions that we limit the use of the 2345-2360 MHz portion of the WCS spectrum to fixed transmitters, and that power be limited to peak power because these suggestions would unnecessarily limit the technology and service choices of the licensees. Although, as AFTRCC notes, average power measurement instead of peak power measurement also influences the amount of signal energy allowed outside of the band under our OOB limits, we do not find it is necessary to limit the technology choices of the WCS licensees to prevent WCS from causing harmful interference to AMT receivers.⁴⁶⁰ As outlined above, we are adopting very conservative coordination protections for AMT facilities that are more than adequate to allow for the consideration of the WCS licensees' technology choices, including average power measurement and mobile device operations in the 2347.5-2360 MHz band.

G. Performance Requirements

1. Background

188. On March 29, 2010, the Commission issued a public notice requesting comment on possible revision of the performance requirements (also known as buildout or construction requirements) for the 2.3 GHz WCS band.⁴⁶¹ In the public notice, we asked whether the Commission should replace the

⁴⁶⁰ See AFTRCC *Ex Parte* filing (filed May 13, 2010).

⁴⁶¹ See "Federal Communications Commission Requests Comment on Revision of Performance Requirements for 2.3 GHz Wireless Communications Service," WT Docket No. 07-293, *Public Notice*, FCC 10-46 (rel. March 29, 2010) (*WCS Performance Public Notice*). A summary of the Public Notice was published in the *Federal Register*

(continued...)

current WCS substantial service performance requirement⁴⁶² with enhanced performance benchmarks if we decide to modify technical requirements for the WCS band.⁴⁶³ Specifically, we sought comment on whether, for mobile and point-to-multipoint services, we should require a licensee to provide reliable signal coverage to 40 percent of a license area's population within 30 months, and 75 percent of a license area's population within 60 months.⁴⁶⁴ We also asked whether, for point-to-point fixed services, the Commission should require construction and operation of 15 point-to-point links per million persons in a license area within 30 months, and 30 point-to-point links per million persons within 60 months, together with a minimum payload capacity to ensure that the spectrum is used intensively.⁴⁶⁵

189. In the public notice, we also asked whether the Commission should require WCS licensees to satisfy submarket construction requirements in addition to satisfying the above construction requirements for each license market area. For Major Economic Area (MEA) licenses, the submarkets would be Economic Areas (EAs), and for Regional Economic Area Grouping (REAG) licenses, the submarkets would be MEAs.⁴⁶⁶ Specifically, we asked whether for mobile and point-to-multipoint services, in addition to the performance requirements for licensed market areas discussed above, we should require licensees to serve 25 percent of each submarket's population within 30 months, and 50 percent of each submarket's population within 60 months.⁴⁶⁷ For fixed point-to-point systems, we requested comment on the minimum number of links we should require licensees to construct and operate in each submarket within 30 and 60 months, respectively.⁴⁶⁸ Finally, we sought comment on whether a license should automatically terminate in its entirety if a licensee failed to meet either its license area benchmark, or any related submarket benchmark.

190. Individual comments on the public notice were filed by Broadband South LLC, a WCS spectrum lessee (Broadband South), WCS licensee Horizon Wi-Com, LLC (Horizon), WCS licensee Stratos Offshore Services Company (Stratos), and Sirius XM. The WCS Coalition filed comments on behalf of two AT&T WCS licensee subsidiaries (BellSouth Mobile Data, Inc., and AWACs, Inc.), Horizon, NextWave-NW Spectrum Co (NextWave), and WCS Wireless License Subsidiary, Inc. (Sprint).⁴⁶⁹ Green Flag Wireless, LLC, CWC License Holding, Inc. and James McCotter (collectively, Green Flag), which filed applications that compete with the renewal applications filed in 2007 by certain WCS licenses, filed joint comments. Reply comments were filed by AT&T (on behalf of its WCS

(Continued from previous page)

on April 6, 2010. 75 Fed. Reg. 17349 (April 6, 2010). Comments and reply comments were due on or before April 21 and May 3, 2010, respectively.

⁴⁶² Section 27.14(a) of the Commission's rules provides that 2.3 GHz WCS licensees "must, as a performance requirement, make a showing of 'substantial service' in their license area within the prescribed license term set forth in § 27.13." 47 C.F.R. § 27.14(a). The rule defines substantial service "as service which is sound, favorable and substantially above a level of mediocre service which just might minimally warrant renewal." *Id.* Section 27.14(a) provides that failure by any WCS licensee to meet its performance "requirement will result in forfeiture of the license and the licensee will be ineligible to regain it." *Id.*

⁴⁶³ *WCS Performance Public Notice* at 1.

⁴⁶⁴ *Id.* at 2.

⁴⁶⁵ *Id.*

⁴⁶⁶ *Id.* The WCS A and B blocks are licensed in 52 MEAs, which are comprised of 172 EAs; the WCS C and D blocks are licensed in 12 REAGs.

⁴⁶⁷ *WCS Performance Public Notice* at 2.

⁴⁶⁸ *Id.*

⁴⁶⁹ Sprint is the parent of WCS Wireless License Subsidiary, Inc.

licensee subsidiaries, AWACs, Inc. and BellSouth Mobile Data, Inc.), Broadband South, WCS licensee Comcast Corporation (Comcast), Green Flag; Horizon, the WCS Coalition, and Sirius XM.

2. Discussion

191. For the reasons stated below, we hereby adopt new performance requirements for the 2.3 GHz WCS band. The new requirements supersede the existing WCS substantial service performance requirement, and will commence on the effective date of the revised WCS technical rules adopted above.⁴⁷⁰

192. *Request for Further Notice of Proposed Rulemaking.* As an initial matter, we reject the claim of the WCS Coalition and others that they could not file informed comments on performance requirements due to uncertainty regarding the technical rule revisions we are adopting today.⁴⁷¹ These commenters argue that WCS licensees and the public had no clear guidance regarding which of the technical proposals advanced in the record would be adopted by the Commission.⁴⁷² The Commission has provided WCS licensees more than adequate notice of the technical requirements under consideration. In fact, on April 2, 2010, staff issued a public notice, which invited comment on the specific text of the likely technical rules.⁴⁷³ Interested parties thus have had ample opportunity to analyze and comment on the relationship of the technical and performance requirements under consideration.

193. We find that the record regarding performance requirements, as well as the technical rules, is well developed and there is no need to issue a Further Notice of Proposed Rulemaking as urged by the WCS Coalition. Indeed, the WCS Coalition and others filed detailed comments seeking adjustment of the proposed performance requirements, despite claiming that they lacked sufficient notice of the likely technical rules to inform their comments.⁴⁷⁴ We note that in response to the detailed comments of the WCS Coalition and others, we are easing performance requirements for license areas where a substantial portion of the population is within an aeronautical mobile telemetry (AMT) coordination zone.

194. Several parties also contend that delay is warranted because certain WCS renewal applications are pending or subject to challenge by third parties.⁴⁷⁵ Today, we are adopting a Notice of Proposed Rulemaking that commences a proceeding to examine the Commission's rules and policies governing the renewal of wireless radio services authorizations. In a companion order to that notice, we are granting all pending WCS renewal applications conditioned on the outcome of that proceeding.⁴⁷⁶ In

⁴⁷⁰ The revised technical rules will become effective 30 days after publication in the Federal Register subject to OMB approval for new information collection requirements.

⁴⁷¹ AT&T Reply Comments at 2 (filed May 3, 2010); Horizon Comments at 4-5 (filed April 21, 2010); WCS Coalition Comments at 7 (filed April 21, 2010).

⁴⁷² See, e.g., WCS Coalition Comments at 7 (filed April 21, 2010).

⁴⁷³ See *WCS/SDARs Technical Rules Public Notice*, DA 10-592 (rel. April 2, 2010).

⁴⁷⁴ See, e.g., WCS Coalition Comments at 12-23 (filed April 21, 2010); WCS Coalition Reply Comments at 3-12 (filed April 29, 2010).

⁴⁷⁵ See Broadband South Comments at 5 (filed April 21, 2010); Horizon Comments at 6 (filed April 21, 2010); WCS Coalition Comments at 11-12 (filed April 21, 2010).

⁴⁷⁶ See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Policies and Procedures for Certain Wireless Radio Services; Imposition of a Freeze on the Filing of Competing Renewal Applications for Certain Wireless Radio Services and the Processing of Already-Filed Competing Renewal Applications, *Notice of Proposed Rulemaking and Order*, FCC 10-86 (adopted May 20, 2010).

view of the foregoing, we decline to postpone adoption of new performance requirements.⁴⁷⁷ We find that such delay is unnecessary and would be contrary to the public interest.

195. *Performance Requirements.* Our adoption of enhanced performance requirements below, together with today's revision of certain technical rules, will further the public interest by promoting the rapid deployment of new broadband services to the American public.⁴⁷⁸ Specifically, we find that requiring WCS licensees to meet enhanced performance requirements will serve the public interest by ensuring that underutilized spectrum will be used intensively in the near future. The new requirements will provide licensees much needed certainty regarding their construction obligations and will help ensure widespread system deployments.⁴⁷⁹

196. When the Commission originally adopted the 2.3 GHz WCS substantial service requirement in 1997, it was "the most liberal construction requirement adopted by the Commission to date."⁴⁸⁰ The Commission reasoned that "[p]articularly in light of the technological uncertainties associated with use of WCS spectrum to provide certain services consistent with the interference levels we adopt today, we believe that stringent build-out requirements are not warranted."⁴⁸¹ The Commission provided two examples of construction that would satisfy the substantial service requirement: (1) for fixed, point-to-point services, construction of four permanent links per one million people in a licensed service area; and (2) for mobile services, coverage of 20 percent of a license area's population.⁴⁸² Today, we are reducing the technological uncertainties that existed in 1997 by revising technical restrictions to enable WCS licensees to provide new high-value broadband and other innovative services in the band. Accordingly, enhanced performance requirements are appropriate.⁴⁸³

⁴⁷⁷ See, e.g., WCS Coalition Comments at 3-12 (filed April 21, 2010).

⁴⁷⁸ See Connecting America: The National Broadband Plan, Recommendation 5.8.1 ("the FCC should accelerate efforts to ensure that the WCS spectrum is used productively for the benefit of all Americans"). The National Broadband Plan is available at <http://www.broadband.gov/plan/>.

⁴⁷⁹ The enhanced requirements also are consistent with Congress' directive, under Section 309(j) of the Act, that we adopt "performance requirements, such as appropriate deadlines and penalties for performance failures, to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services." 47 U.S.C. § 309(j)(4)(B).

⁴⁸⁰ See *WCS Report and Order*, 12 FCC Rcd at 10843 ¶112.

⁴⁸¹ *Id.*

⁴⁸² *Id.*, at 10844 ¶113.

⁴⁸³ We disagree with Sirius XM's contention that we are required to auction new spectrum licenses because the revised technical rules afford WCS licensees enhanced spectrum rights. See Comments of Sirius XM on April 2, 2010 WCS/SDARS Technical Rules at 57-59. Our overriding goal in this proceeding is to promote the rapid deployment of innovative broadband services to the public in the WCS band. On balance, we believe that the public interest is better served here by applying the new performance requirements to the incumbent WCS licensees, within a more flexible technical regime, rather than attempting to displace the existing pool of WCS licensees or otherwise to restructure license assignments in order to license new spectrum rights by auction (with or without revised performance requirements). And it is the public interest that determines which mechanism should be used for modifying licenses or licensing new rights. See, e.g., Amendment of the Commission's Rules Regarding Multiple Address Systems, *Report and Order* in WT Docket No. 97-81, 15 FCC Rcd 16415 (2000) (holding that, under the relevant circumstances, the public interest would be best served by adopting a mixed licensing regime whereby certain types of MAS licenses would be subject to auction, but other types of these licenses would be structured to avoid mutual exclusivity and any consequent requirement to issue them by auction). Accordingly, we disagree with Sirius XM's contention that we are required to auction new spectrum licenses simply because the

(continued...)

a. Mobile and Point-to-Multipoint Service Performance Requirements

197. We find that to accomplish our goal of ensuring the rapid provision of innovative services to the public, the performance requirements that we adopt must be ambitious, yet reasonable, both temporally and quantitatively. Based on our analysis of the record in this proceeding and for the public interest reasons discussed above, we conclude that WCS licensees that provide mobile or point-to-multipoint services must provide reliable signal coverage to 40 percent of a license area's population within 42 months, and 75 percent of a license area's population within 72 months. We are thus extending by one full year the 30-month and the 60-month performance milestones that we proposed in the public notice.

198. We conclude that the revised requirements will promote the public interest by ensuring that there is meaningful deployment of new broadband services in the WCS band in the near future. The new requirements also will afford WCS licensees bright-line certainty regarding their performance obligations, and will facilitate Commission review of WCS performance showings.

199. The additional year that we are providing licensees to meet each performance benchmark responds in a measured way to the comments of the WCS Coalition and others that additional time is warranted to allow for the development and deployment of new equipment in the band.⁴⁸⁴ The record demonstrates that it would not be difficult to modify existing equipment to meet the technical parameters we are adopting today. The WCS Coalition, for example, foresees that it would take approximately 12 to 18 months to develop and commence deployment of mobile broadband service in the 2.3 GHz band.⁴⁸⁵ Based on the record, we believe that existing mobile WiMAX and other equipment can be adapted efficiently to comply with the revised WCS technical rules, and that the construction deadlines of 42 and 72 months provide adequate time for licensees to obtain financing, and reasonably accommodate equipment manufacturing and deployment cycles.

200. The 42- and 72-month milestones we are adopting today will accommodate the development and deployment of a range of technologies in the WCS band, including WiMAX. We note that according to the WiMAX Forum, there are currently 53 WiMAX systems deployed in the 2.3 GHz band and 112 systems in the 2.5 GHz band.⁴⁸⁶ There are also numerous certified WiMAX mobile devices that, with some modification, could be used in the 2.3 GHz WCS band under the revised technical rules that we adopt today, including broadband dongles, handsets, and netbooks.⁴⁸⁷ There are many major vendors of WiMAX equipment—including Airspan, Alcatel-Lucent, HTC, Huawei, Motorola, NEC,

(Continued from previous page) _____
revised technical rules afford WCS licensees enhanced spectrum rights. *See* Sirius XM Comments at 57-59 (filed April 23, 2010).

⁴⁸⁴ Green Flag Comments at 4 (filed April 21, 2010); WCS Coalition Reply Comments at 6 (filed April 29, 2010). Columbia Capital notes that while established service providers "have a realistic possibility of meeting the Commission's WCS [proposed] performance requirements," doing so could be challenging for a new entrant that seeks to obtain venture capital financing. *See* Letter from James B. Fleming, Jr., Partner, Columbia Capital to Julius Genachowski, Chairman, FCC (dated May 12, 2010).

⁴⁸⁵ *See* Letter from Paul J. Sinderbrand, counsel for the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, WT Docket 07-293 (dated May 11, 2010). WCS Coalition Comments at 6 (filed April 21, 2010).

⁴⁸⁶ *See* WiMAX Forum[®] Industry Research Report April, 2010 at 3. The report is available at <http://www.wimaxforum.org/resources/monthly-industry-report> (last visited May 14, 2010).

⁴⁸⁷ *See* <http://www.wimaxforum.org/certification/certified-product-showcase> (last visited May 14, 2010).

Nokia, Samsung and Tellabs—and they sold more than \$1 billion of equipment and devices in each of 2008 and 2009.⁴⁸⁸

201. Accordingly, we reject, as unsupported by the record, the WCS Coalition's claim that it is necessary to afford licensees a minimum of five years to serve 35 percent of a license area's population,⁴⁸⁹ and seven and one-half years to serve 70 percent of a license area's population, which the WCS Coalition argues will provide them with benchmarks comparable to certain 700 MHz requirements.⁴⁹⁰ In the 700 MHz proceeding, the Commission applied these lower benchmarks to licensees that must meet geographic, rather than population-based, performance requirements. We also are not persuaded by TelCom Ventures' claim that, based on the period it has taken Clearwire to develop and deploy WiMAX in the 2.5 GHz band and its current level of service, we should provide WCS licensees five years to serve 35 percent of a license area's population.⁴⁹¹ Indeed, we believe that Clearwire's trailblazing efforts to deploy WIMAX in the 2.5 GHz band will facilitate expeditious deployment of WiMAX services in the 2.3 GHz band.

202. *Submarket Performance Requirements.* Based on the record before us, we find that it is unnecessary to mandate specific construction requirements for each submarket within a WCS license area (*i.e.*, construction within each EA of an MEA license area and within each MEA of a REAG license area) to ensure extensive system deployments in the public interest.⁴⁹² We also note that this approach will provide WCS licensees additional flexibility to design and deploy systems in their principal license areas. We conclude that our general requirements to serve 40 percent of a license area's population within 42 months and 75 percent within 72 months are adequate to ensure that licensees will promptly put their spectrum to use and provide service to a significant portion of the population in their license areas.

203. *AMT Coordination Zones.* We adopt alternative performance requirements for aeronautical mobile telemetry zones, but reject the call of the WCS Coalition and others to exempt AMT coordination zones altogether from our revised performance requirements.⁴⁹³ While the requirement to coordinate with AMT sites may slow deployment in these areas, we reiterate that such zones are not exclusion zones. WCS licensees will be able to construct facilities within these areas.⁴⁹⁴ Instead, based

⁴⁸⁸ Infonetics Research: WiMAX equipment/device market up for third consecutive quarter, subscribers up 75 percent in '09, Report Highlights at 1 (March 1, 2010), available at <http://www.infonetics.com/pr/2010/4Q09-WiMAX-Market-Highlights.asp> (last visited May 14, 2010).

⁴⁸⁹ WCS Reply Comments at 8 (filed April 29, 2010). *Cf.* Green Flag Comments at 6 (filed April 21, 2010) (proposing we adopt a 35 percent population coverage requirement at four years).

⁴⁹⁰ WCS Reply Comments at 8 (filed April 29, 2010).

⁴⁹¹ Letter from Rajendra Singh, Chairman and President, Telcom Ventures, LLC to Julius Genachowski, Chairman, FCC (dated May 11, 2010).

⁴⁹² See *WCS Performance Public Notice* at 2 (proposing submarket construction requirements of 25 percent and 50 percent at 30 and 60 months, respectively). 700 MHz C block licensees must meet performance benchmarks for each EA of a REAG. The 12 REAG license areas include 172 EA license areas.

⁴⁹³ WCS Coalition Reply Comments at 6-8.

⁴⁹⁴ We note that approximately 25 percent of the U.S. population resides within AMT coordination zones. WCS licensees can serve this population, without undertaking any prior coordination, using the lower five megahertz portions of the WCS A and B spectrum blocks and the entire C spectrum block. There is thus 15 megahertz of contiguous spectrum available in the band for which no prior coordination is required. For a list of the non-federal AMT sites, see attachment to Letter from William K. Keane, Counsel for AFTRCC, to Marlene H. Dortch, Secretary, FCC, WT Docket 07-293 (dated May 10, 2010). For a list of federal AMT sites, see attachment to Letter from William K. Keane, Counsel for AFTRCC, to Marlene H. Dortch, Secretary, FCC, WT Docket 07-293 (dated May 12, 2010).

on the record before us, we are adopting alternative performance requirements for those license areas where WCS licensees that deploy mobile or point-to-multipoint systems in the upper five megahertz portions of the A and B blocks or the D block must undertake substantial coordination with AMT receive sites. We do so because in markets where a substantial portion of the population is within an AMT coordination zone, licensees may require additional time and resources to design, site and deploy base station facilities.

204. Therefore, to account for these considerations, we are reducing the construction thresholds in any market (MEA or REAG) where a licensee can demonstrate that at least 25 percent of the population is within an AMT coordination zone. Thus, in markets where at least 25 percent of the population is within an AMT coordination zone, licensees must provide reliable signal coverage to 25 percent (rather than 40 percent) of a license area's population within 42 months and 50 percent (rather than 75 percent) of a license area's population within 72 months. These alternative requirements do not apply to spectrum block C, which is not subject to AMT coordination. These tailored requirements will afford WCS licensees considerable leeway to deploy systems efficiently where they may face a challenge meeting our general requirements to serve 40 percent of a license area's population within 42 months and 75 percent within 72 months.

205. In sum, we find that based on the totality of the circumstances described above, the performance requirements we are adopting strike an appropriate balance between our goal of enabling the provision of timely, appreciable service to the public with accommodating the needs of licensees to secure financing and equipment. The performance requirements are achievable without unduly burdening licensees. Accordingly, we find that it is public interest to adopt the 40- and 75-percent performance benchmarks as proposed in the WCS Performance Public Notice, but are extending the performance periods to 42 and 72 months, respectively. The performance periods will commence on the effective date of the revised WCS technical rules adopted above.

b. Point-to-Point Fixed Service Performance Requirements

206. Based on the record before us, we are modifying our proposal to require licensees that provide point-to-point fixed services to construct and operate 15 point-to-point links per million persons in a license area within 30 months, and 30 point-to-point links per million persons in a license area within 60 months, together with a minimum payload capacity to ensure that the spectrum is used intensively.⁴⁹⁵ The WCS Coalition supports the proposed 15 and 30-link benchmarks but urges us to apply them at 5 and 7 and one-half years, respectively.⁴⁹⁶ We believe that uniform performance milestones are desirable for the 2.3 GHz WCS band. Therefore, consistent with our approach above governing mobile and point-to-multipoint services in the band, we are extending each point-to-point fixed service milestone by 1 year, to 42 months and 72 months.

207. Accordingly, WCS licensees that provide a point-to-point fixed service must construct and operate a minimum of 15 point-to-point links per million persons in a license area within 42 months (one link per 67,000 persons), and 30 point-to-point links per million persons in a license area within 72 months (one link per 33,500 persons). The exact link requirement is calculated by dividing a license area's total population by 67,000 and 33,500 for the first and second milestones, respectively, and then rounding upwards to the next whole number.⁴⁹⁷ For a link to be counted towards these benchmarks, both

⁴⁹⁵ *WCS Performance Requirements Public Notice* at 2.

⁴⁹⁶ WCS Reply Comments at 8 n.20 (filed April 29, 2010).

⁴⁹⁷ For example, if a license area's population is 175,000, a licensee must construct at least 3 links ($180,000/67,000=2.68$, rounded upwards to 3) within 42 months, and at least 6 links ($180,000/33,500=5.37$, rounded upwards to 6) within 72 months.

of its endpoints must be in the license area. If only one endpoint of a link is in a license area, it may be counted as a half link towards the benchmarks. We find that these requirements are achievable, and will further our goal of ensuring meaningful wireless deployment. Because it will be easier to coordinate point-to-point systems in the vicinity of AMT receive sites,⁴⁹⁸ we find that it is not necessary to reduce the applicable construction thresholds as we do above for mobile and point-to-multipoint systems in certain license areas.

208. *Submarket Performance Requirements.* Based on the record before us, we find that it is unnecessary to also mandate construction requirements for each submarket of a license area (*i.e.*, construction within each EA of an MEA license area and within each MEA of a REAG license area) to ensure widespread system deployments in the public interest. We find that our general requirements to construct and operate a minimum of 15 point-to-point links per million persons in a license area within 42 months, and 30 point-to-point area within 72 months, are sufficient to ensure that licensees use their spectrum intensively.

209. *Minimum Payload Requirement.* In the public notice, we also sought comment on whether, for point-to-point services, we should adopt a minimum payload capacity requirement to ensure that the WCS spectrum is used intensively.⁴⁹⁹ We find that a minimum payload capacity requirement will serve the public interest by ensuring that point-to-point systems are constructed to provide robust services to the American public. Second, and equally important, a minimum payload requirement will discourage the construction of skeletal systems and fulfill Congress' mandate that we adopt performance requirements to help "prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services."⁵⁰⁰ Several parties commented on this requirement and urged us to craft a minimum payload requirement that will achieve these objectives while affording licensees flexibility to design and deploy systems efficiently.⁵⁰¹

210. Based on the record before us, we find that our goal to ensure that the WCS spectrum is used intensively in the public interest will be furthered by requiring that each point-to-point link have a minimum payload capacity (megabits/second (Mbits/s) for a given bandwidth). We agree with the WCS Coalition that the capacity requirements in section 101.141(b) of our rules—which require for nominal bandwidths of 1.25, 2.5, 3.75 and 5 megahertz, a minimum payload capacity of 3.08 Mbits/s, 6.17 Mbits/s, 12.30 Mbits/s, and 18.5 Mbits/s, respectively—may require more construction than would be necessary to ensure meaningful deployment in certain markets.⁵⁰² Rather, we believe that the less stringent payload requirement specified in section 101.141(a) of the rules⁵⁰³ is sufficient to ensure that the valuable WCS spectrum is used efficiently and intensively, while affording licensees ample flexibility to

⁴⁹⁸ In a fixed point-to-point system deployment, communication signals are sent between two stationery facilities using highly directional antennas, which focus the signal energy into a pencil beam. Mobile system deployments, by contrast, typically require construction of multiple interdependent base stations, which communicate with mobiles within a point radius of the base station's antennas to achieve service over a wide area. Fixed systems can tightly control the direction of their signal and thus are better able to coordinate deployments near adjacent spectrum users.

⁴⁹⁹ *WCS Performance Public Notice* at 2.

⁵⁰⁰ 47 U.S.C. § 309(j)(4)(B).

⁵⁰¹ See AT&T Reply Comments at 3 (filed May 3, 2010) (supporting adoption of payload requirements based on section 101.141(a); Letter from Christine Crowe, counsel for Stratos, to Secretary, FCC, dated Apr. 26, 2010 (same); WCS Coalition Comments at 19-22 (same) (filed April 21, 2010); *but, cf.* Green Flag Comments at 7 (filed April 21, 2010) (opposing payload requirements).

⁵⁰² WCS Coalition Comments at 20-21 (filed April 21, 2010).

⁵⁰³ See 47 C.F.R. § 101.141(a).

design fixed systems, and therefore adopt an analogous requirement here. Specifically, a fixed link must provide a minimum bit rate, in bits per second, equal to or greater than the bandwidth specified by the emission designator in Hertz (*e.g.*, equipment transmitting at a 5-Mbits/s rate must not require a bandwidth greater than 5 MHz), except the bandwidth used to calculate the minimum rate may not include any authorized guard band.

211. *Gulf of Mexico.* We note that the deployment and provision of wireless telecommunications services in the Gulf of Mexico presents unique circumstances, and we therefore tailor the WCS point-to-point performance requirements accordingly. We also note that application of our general performance metrics, which are based on population counts, would yield anomalous and insubstantial performance benchmarks for Gulf of Mexico licensees.⁵⁰⁴ Accordingly and for the reasons stated below, we will require the construction and operation of 15 point-to-point links at both 42 and 72 months from the effective date of the new WCS technical rules for each WCS spectrum block in the Gulf.

212. Stratos Offshore Services Company currently holds all four WCS licenses for the Gulf.⁵⁰⁵ Stratos has deployed and is operating 200 fixed point-to-point transmitters within its Gulf service area (32 on the A block, 122 on the B block, and 23 on each of the C and D blocks).⁵⁰⁶ Stratos explains that while its total link count is generally stable, it can vary as links are discontinued and replaced. On average, 5 percent of Stratos' links may be discontinued in a given month, and its link count on a given day therefore may not reflect the level of service it has been providing.⁵⁰⁷ Stratos argues that given this variability, we should allow it to count a link towards its performance requirements if it is either operational on the performance date or, if discontinued, was operational within one year of the performance date for 12 continuous months.⁵⁰⁸ We find it unnecessary to adopt such a requirement, and note that even if its link-count were to decrease 20 percent, Stratos would still meet the performance requirements for each of its spectrum blocks licensed in the Gulf.

213. We note that Stratos has used WCS and other spectrum solutions to provide service in the Gulf for over a decade and now serves over 60 percent of the oil and gas platforms in the Gulf.⁵⁰⁹ We also note that the market for communications services in the Gulf is generally limited. Because the potential for increasing its coverage or customer base in the Gulf is limited and because Stratos already provides significant services in the Gulf, we find that it would be inequitable to require the company to meet performance requirements materially above its current level of service. Accordingly, we are adopting the same performance requirement of construction and operation of 15 point-to-point links at both 42 and 72 months for each of its WCS spectrum blocks in the Gulf of Mexico. These requirements acknowledge the level of service that Stratos currently provides in the Gulf and provide Stratos certainty regarding its minimum performance obligations.

⁵⁰⁴ See Stratos Comments at 4 (filed April 21, 2010) (based on an estimated population of less than 100,000 in the Gulf of Mexico license area, a licensee would only have to construct one fixed link per spectrum block on a pro rata basis).

⁵⁰⁵ Stratos' WCS call signs are KNLB212, KNLB319, KNLB320 and KNLB321. The company serves over 100 oil and gas exploration and production platforms in the Gulf, using microwave, satellite, and other forms of radio communications. Stratos Comments at 1 (filed April 21, 2010).

⁵⁰⁶ Stratos Comments at 1 (filed April 21, 2010).

⁵⁰⁷ *Id.* at 4.

⁵⁰⁸ *Id.* at 5.

⁵⁰⁹ *Id.* at 3.

c. Performance Penalties

214. Consistent with the *WCS Performance Public Notice*, we conclude that a WCS license will automatically terminate without further Commission action if a licensee fails to meet a performance benchmark.⁵¹⁰ We disagree with the WCS Coalition and others who argue that this approach is unfair.⁵¹¹ In fact, the approach is entirely consistent with the approach adopted in the 1997 *WCS Report and Order*. There, the Commission explained unequivocally that “[l]icensees failing to demonstrate that they are providing substantial service will be subject to forfeiture of their licenses.”⁵¹² This approach applies to nearly all geographically-licensed wireless services. The wireless industry has invested tens of billions of dollars over the past decade and thrived under this pragmatic approach. We are therefore not persuaded that retaining the approach would deter capital investment.

215. We find no basis in the record to adopt a “keep-what-you-use” approach similar to that adopted for certain 700 MHz licenses as urged by the WCS Coalition and others.⁵¹³ The approach, which applies to select 700 MHz band licensees, is specifically tied to submarket performance requirements. We note, for example, that 700 MHz C Block REAG licensees must meet performance requirements in each Economic Area (EA) of their REAG license areas. In the 700 MHz proceeding, the Commission provided that if a licensee failed to build a submarket, it would only lose that submarket.⁵¹⁴ We are not requiring WCS licensees to undertake any submarket construction and find the keep-what-you-use approach inapposite.

216. We also note that a central component of the keep-what-you-use paradigm used in the 700 MHz context cannot be applied to the 2.3 GHz WCS band. Under the paradigm, if a 700 MHz C-block REAG licensee fails to meet its initial 40-percent performance requirement in even a single Economic Area (submarket), its REAG license term would be reduced by two years and its end-of-term construction requirement would be accelerated accordingly.⁵¹⁵ The current WCS license term expires on July 21, 2017. Thus, under keep-what-you-use, if a WCS licensee missed their first benchmark (at 5 years as urged by the WCS Coalition for example), it would then have to meet its accelerated end-of-term requirement immediately. Such an approach is untenable.

217. Nor are we moved by the WCS Coalition’s claim that if a licensee were to serve “74.49999 percent of the population of its authorized serve area,” it would “be forced to immediately cease its service offerings” for noncompliance with the 75-percent population coverage requirement.⁵¹⁶ The public interest requires that we closely examine such situations and, where appropriate, afford a licensee a reasonable opportunity to fulfill their obligations.⁵¹⁷ Further, as the WCS Coalition should be

⁵¹⁰ *WCS Performance Public Notice* at 2.

⁵¹¹ See, e.g., WCS Coalition Comments at 18 (filed April 21, 2010); Horizon Comments at 5 (filed April 21, 2010).

⁵¹² See *WCS Report and Order*, 12 FCC Rcd at 10843 ¶113. Section 27.14(a) codifies this penalty and provides that failure by any WCS licensee to meet its performance “requirement will result in forfeiture of the license and the licensee will be ineligible to regain it.” 47 C.F.R. § 27.14(a).

⁵¹³ Green Flag Comments at 6 (filed April 21, 2010); WCS Coalition Comments at 18-19 (filed April 21, 2010).

⁵¹⁴ See Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, et al., *Second Report and Order*, 22 FCC Rcd 15289, 15356 ¶163 (2007) (subsequent history omitted).

⁵¹⁵ 47 C.F.R. § 27.14(h).

⁵¹⁶ WCS Coalition Comments at 19 (filed April 21, 2010).

⁵¹⁷ The Commission may grant a waiver where it finds that the purpose of a rule would not be served and that a grant of the waiver would be in the public interest. See 47 C.F.R. § 1.925(b)(3)(i). See also 47 C.F.R. § 1.946(e)(1)

(continued...)

well aware, the Commission has consistently afforded licensees ample time to wind up operations where they have had actual subscribers but materially failed to meet their performance requirements.⁵¹⁸ Accordingly, we adopt our proposal that a WCS license will terminate automatically without Commission action if a licensee fails to meet its performance requirements.

d. Relationship of New and Original Performance Requirements

218. The new performance requirements supersede the substantial service performance requirement for all WCS licensees, including any licensee that previously filed a substantial service demonstration.⁵¹⁹ Thus, we hereby dismiss as moot all pending requests for an extension of time to demonstrate substantial service.⁵²⁰ We also dismiss as moot an application for review of the Wireless Telecommunications Bureau's *Horizon Order*,⁵²¹ jointly filed by Green Flag and James McCotter. In that order, the Mobility Division dismissed as untimely a challenge to four substantial service performance showings of Horizon for its 2.3 GHz WCS licenses, and denied a request to reconsider or rescind acceptance of four other Horizon showings.⁵²²

219. Although Comcast acknowledges the Commission's authority "to change a licensee's performance obligations under proper circumstances," it claims that doing so here could undermine investment in new wireless services.⁵²³ We disagree. Comcast and Broadband South both argue that any licensee that demonstrates substantial service on or before July 21, 2010 should not be subject to further performance requirements.⁵²⁴ Horizon likewise argues that we should exempt it from any new performance requirements, noting that the Wireless Telecommunications Bureau accepted its substantial service showings in 2007.⁵²⁵ We find that our goal of intensive use of the WCS spectrum in the public interest will best be served by requiring all WCS licensees to meet the new performance requirements. We also find that the public interest will be served by the regulatory certainty afforded by uniform application of the performance requirements in the 2.3 GHz band.

220. However, to the extent that Horizon (or any other licensee or interested party) has constructed and is operating facilities that meet the new performance requirements and provided that such

(Continued from previous page) _____

("An extension request may be granted if the licensee shows that failure to meet the construction or coverage deadline is due to involuntary loss of site or other causes beyond its control.").

⁵¹⁸ See, e.g., Comtec Communications, Inc., Request for Waiver of Automatic Cancellation of 900 MHz Specialized Mobile Radio Service Licenses, *Order*, 23 FCC Rcd 8789 (WTB 2008) (providing licensee 180 days to facilitate subscribers' transition to an alternate service provider); Pinpoint Wireless, Inc., Request for a Waiver and Extension of the Broadband PCS Construction Requirements, *Order*, 18 FCC Rcd 1904 (WTB 2003) (same).

⁵¹⁹ Substantial service demonstrations were filed for only 20 of 155 WCS licenses by the end of the initial 10-year license term (July 21, 2007). In December 2006, the Wireless Telecommunications Bureau granted a three-year extension of the initial WCS construction deadline, until July 21, 2010, for certain WCS licensees. See Consolidated Request of the WCS Coalition for Limited Waiver of Construction Deadline for 132 WCS Licenses, *Order*, 21 FCC Rcd 14134 (WTB 2006).

⁵²⁰ A list of such requests is provided in Appendix F hereto.

⁵²¹ Applications of Horizon Wi-Com, LLC, File Nos. 0003014435, 0003014449, 0003014463, 0003014470, 0003045272, 0003045277, 0003045282, and 0003067727, *Memorandum Opinion and Order*, 24 FCC Rcd 359 (WTB Mobility Div. 2009) (*Horizon Order*).

⁵²² *Id.*

⁵²³ See Comcast Reply Comments at 4 (filed May 3, 2010).

⁵²⁴ *Id.*; Broadband South Comments at 6-7 (filed April 30, 2010).

⁵²⁵ Horizon Comments at 3-4 (filed April 21, 2010).

facilities are operational on any applicable future performance milestone, it will count towards meeting the performance obligations. To the extent that Broadband South or another party has undertaken any construction and operation towards meeting that standard, it too may be counted towards any future performance obligation provided that it comports with the new performance standards.

221. The new performance requirements also supplant AT&T's obligation to serve 25 percent of the population for each of its WCS licenses for mobile or point-to-multipoint services, or to construct at least five permanent links per one million people in the service area for fixed point-to-point services.⁵²⁶ Further, because the new performance requirements supersede the substantial service requirement for all WCS licensees, it is unnecessary for the Wireless Telecommunications Bureau to process any pending substantial service demonstrations, and any such demonstrations and pleadings filed in opposition are hereby missed as moot.

e. Compliance Procedures

222. Consistent with section 1.946(d) of the Commission's rules, we will require WCS licensees to demonstrate compliance with the new performance requirements by filing a construction notification within 15 days of the relevant milestone certifying that they have met the applicable performance benchmark.⁵²⁷ Each construction notification must include electronic coverage maps and supporting documentation, which must be truthful and accurate and must not omit material information that is necessary for the Commission to determine compliance with its performance requirements.⁵²⁸

223. Electronic coverage maps must accurately depict the boundaries of each license area (REAG or MEA) in the licensee's service territory. Further, REAG maps must depict MEA boundaries and MEA maps must depict EA boundaries. If a licensee does not provide reliable signal coverage to an entire license area, its map must accurately depict the boundaries of the area or areas within each license area not being served. Each licensee also must file supporting documentation certifying the type of service it is providing for each REAG or MEA within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.⁵²⁹

224. We note that the technical rules adopted today are technology neutral and will enable licensees in the 2.3 GHz Band to select from a variety of technologies to provide a range of services. Coverage determinations therefore may need to be made on a case-by-case basis to account for the variety of services and technologies that may be offered in the band. We seek to ensure that the above requirements are implemented consistently, and therefore we hereby delegate to the Wireless Telecommunication Bureau the responsibility for establishing the specifications for filing maps and other documents (*e.g.*, file format and appropriate data) needed to determine a licensee's compliance with the new performance requirements. If the Commission determines that a licensee has not met its requirements

⁵²⁶ See AT&T Inc. and BellSouth Corporation; Application for Transfer of Control, WC Docket No. 06-74, *Memorandum Opinion and Order*, 22 FCC Rcd 5662, 5816 (2007).

⁵²⁷ See 47 C.F.R. § 1.946(d) ("notification[s] must be filed with Commission within 15 days of the expiration of the applicable construction or coverage period").

⁵²⁸ See, *e.g.*, 47 C.F.R. § 1.17 (Truthful and accurate statements to the Commission); 47 C.F.R. § 1.917(c) ("[w]illful false statements . . . are punishable by fine and imprisonment, 18 U.S.C. 1001, and by appropriate administrative sanctions, including revocation of station license pursuant to 312(a)(1) of the Communications Act of 1934, as amended").

⁵²⁹ After a review of the record, we are persuaded that it is unnecessary to formally put the construction notifications out for public comment as interested parties currently have the ability to comment on or oppose such filings.

for a license area, the license will be deemed to have terminated automatically as of the applicable performance benchmark deadline without further Commission action.

IV. SECOND REPORT AND ORDER IN IB DOCKET NO. 95-91

225. In this *Second Report and Order*, we adopt a framework for the regulation of SDARS terrestrial repeaters. First, we adopt technical rules governing the operation of SDARS repeaters that will not unduly constrain the deployment of SDARS repeaters, but that will, at the same time, limit the potential for harmful interference to adjacent WCS spectrum users. Second, we adopt a blanket-licensing regime to facilitate the flexible deployment of SDARS repeaters, which are necessary to ensure a high-quality service to the public, while ensuring that such repeater operations comply with the Commission's rules regarding RF safety, antenna marking and lighting, and equipment authorization, as well as with international agreements. Finally, we address other issues regarding SDARS repeater operations that are not associated with the interference concerns raised by WCS licensees. Specifically, we adopt rules to ensure that SDARS repeaters remains truly complementary to a satellite-based service, and that SDARS terrestrial repeaters are not used to transmit local programming or advertising.

A. Terrestrial Repeater Power and Out-of-Band Emissions Limits

1. Power Limits

226. *Background.* In the *2007 Notice*, the Commission invited comment on three proposals for power limits for SDARS terrestrial repeaters and WCS transmitting stations. One proposal, from Sirius, is to limit ground-level emission levels. The second, proposed by WCS licensees, is to limit average EIRP and the ratio between average and peak EIRP. The third proposal is a hybrid of the ground-level emission limit and the average EIRP limit. We discuss each of these proposals in more detail below.

227. In its *2006 Petition for Rulemaking*, Sirius asserted that the Commission could limit interference between SDARS repeaters and WCS stations by establishing a "ground-level emission limit" of -44 dBm for both SDARS terrestrial repeaters and WCS stations.⁵³⁰ To verify compliance, Sirius proposed that the received power from either an SDARS repeater or a WCS base station would be measured at a height of 2 meters above ground level, at a distance from the base of the antenna that is equal to or greater than the effective height above ground level of the SDARS or WCS station's antenna.⁵³¹ Additionally, under Sirius' proposal, the average power received at a distance of 1 meter from a transmitting WCS subscriber station's antenna would also be limited to -44 dBm.⁵³²

⁵³⁰ *2006 Petition for Rulemaking* at 4-5, cited in *2007 Notice*, 22 FCC Rcd at 22129 ¶ 15. XM and Sirius have referred to the proposed "ground-level emission limit" as a PFD limit. See also Letter from Carl R. Frank, Counsel for XM/Sirius, to Marlene H. Dortch, Secretary, FCC (dated Aug. 14, 2006) at 1; Letter from Patrick L. Donnelly, Executive Vice President, General Counsel, and Secretary, Sirius, and James S. Blitz, Vice President and Regulatory Counsel, XM Radio Inc., to Marlene H. Dortch, Secretary, FCC (dated Sept. 19, 2007) at 7-8 and Annex 2. In the *2007 Notice*, however, the Commission explained that the ground-level emission limit is actually a received power limit (similar to the limits on incidental radiator emissions in Section 15.209 of the Commission's Rules, 47 C.F.R. § 15.209). The Commission explained further that a rule incorporating Sirius' basic idea could be expressed as an equivalent PFD or electric field strength limit. Assuming a 0-dBi measurement antenna (as Sirius does), the -44 dBm received power limit is equivalent to a PFD limit of -45.3 dBW/m² or a field strength limit of 100.5 dBµV/m. *2007 Notice*, 22 FCC Rcd at 22129 n.42.

⁵³¹ See *2006 Sirius Petition for Rulemaking*, Appendices A, proposed Section 25.214(d)(2)(A)(i) and B, proposed Section 27.50(a)(1)(A), cited in *2007 Notice*, 22 FCC Rcd at 22129 ¶ 15.

⁵³² See *2006 Sirius Petition for Rulemaking*, Appendix B, proposed Section 27.50(a)(1)(C), cited in *2007 Notice*, 22 FCC Rcd at 22129 ¶ 15. SDARS subscriber units are receivers only and do not transmit, therefore, there is no similar provision applicable for SDARS.

228. The *2007 Notice* invited interested parties to discuss whether a ground-level emission limit of the kind proposed by Sirius would facilitate deployment of both SDARS and WCS services.⁵³³ Specifically, interested parties were invited to discuss the interference potential of a -44 dBm limit on WCS and SDARS operations and to balance that potential with the economic and business impact of such a limit on WCS and SDARS operations.⁵³⁴ In addition, the *2007 Notice* sought comment on how easy it would be to verify compliance with, and to resolve disputes arising under a ground-level emission limit requirement.⁵³⁵

229. The *2007 Notice* also invited parties to propose alternative ground-level emission limits and encouraged them to provide technical studies demonstrating the effect such alternative limits would have on the ability of SDARS and WCS licensees to serve the public.⁵³⁶ Further, the *2007 Notice* stated that it would consider an equivalent PFD limit expressed in dBW/m², or field strength limit expressed in dBμV/m, because these alternative measurements would eliminate the need to make an assumption about receiver antenna gain.⁵³⁷ The *2007 Notice* also asked parties to recommend the bandwidth to be used in calculation of a PFD limit if the Commission were to adopt such a limit.⁵³⁸

230. As an alternative to Sirius' ground-level emission limit proposal, WCS licensees proposed allowing SDARS repeaters to operate up to 2 -kW EIRP, based on average rather than peak power, per 5 megahertz, with a 6 dB PAPR.⁵³⁹ The WCS licensees further proposed a power spectral density limit such that only 400-W average EIRP could be emitted per 1 megahertz, to ensure the transmitted energy is spread across the band.⁵⁴⁰

231. In the *2007 Notice*, the Commission asked several questions regarding the WCS Coalition's proposal and the methodology on which it is based.⁵⁴¹ For example, the *2007 Notice* asked whether the adoption of a 2-kW EIRP average power limit would permit the deployment of SDARS services. It also asked whether the adoption of an average rather than a peak power limit for SDARS stations would have any effect on the ability of the licensees to deploy their services. Finally, the *2007 Notice* requested that parties discuss whether an average, rather than peak, power limit would increase the risk of interference with adjacent channel licensees such as WCS or SDARS licensees, or licensees outside of the 2305-2360 MHz band. It also invited comment on whether to adopt the 6 dB PAPR suggested by the WCS Coalition, or whether a different PAPR would be appropriate.⁵⁴² As an alternative, the Commission noted that it adopted a PAPR of 13 dB for wireless services in the 700 MHz band.⁵⁴³

⁵³³ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁴ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁵ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁶ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁷ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁸ *2007 Notice*, 22 FCC Rcd at 22130 ¶ 18.

⁵³⁹ WCS July 9, 2007, *Ex Parte* at 3-4, cited in *2007 Notice*, 22 FCC Rcd at 22131 ¶ 21. As proposed by the WCS Coalition, average EIRP would be calculated using the average power of the transmitter measured in accordance with the definition of "mean power" in Section 2.1 of the Commission's rules.

⁵⁴⁰ WCS July 9, 2007 *Ex Parte*, Appendix A, proposed Sections 27.50(a)(1) and 25.XX(a), cited in *2007 Notice*, 22 FCC Rcd at 22131 ¶ 21.

⁵⁴¹ *2007 Notice*, 22 FCC Rcd at 22131 ¶ 22.

⁵⁴² *2007 Notice*, 22 FCC Rcd at 22131 ¶ 22.

⁵⁴³ *2007 Notice*, 22 FCC Rcd at 22131 ¶ 22, citing *700 MHz Report and Order*, 22 FCC Rcd at 8103-04 ¶¶ 105-06.

232. The 2007 Notice further noted that the National Association of Broadcasters (NAB) had previously proposed a power limit of 1-kW equivalent radiated power (ERP) for SDARS repeaters, which corresponds to 1.640-kW EIRP. NAB contends this limit is necessary to ensure that the repeaters are used solely to fill in coverage in limited areas where the satellite signal cannot be received. The 2007 Notice invited comment on NAB's proposal as an alternative to the proposed 2 kW limit discussed above, and requested that such comments be supported with a technical analysis and a realistic assessment of the impact of this limit on all relevant services.⁵⁴⁴

233. Finally, the 2007 Notice invited interested parties to discuss whether a hybrid power approach might be appropriate. The Commission explained that such an approach would give SDARS licensees flexibility to place their repeaters on high towers and operate them with more power if they meet a certain emission limit on the ground, while WCS would have the flexibility to meet an average EIRP limit using towers lower to the ground.⁵⁴⁵ The 2007 Notice observed that the Commission adopted a similar approach for the lower 700 MHz band, where commercial base stations must meet an ERP limit of 1 or 2 kW, depending on whether they are deployed in rural areas, but such stations could also transmit at 50-kW ERP if they do not produce signals exceeding a PFD of 3 mW/m² on the ground within 1 km of the station.⁵⁴⁶ Further, the 2007 Notice invited suggestions regarding specific power limits to be used in a hybrid approach if such an approach is adopted.⁵⁴⁷

234. After review of the comments received in response to the 2007 Notice, staff evaluated the various proposals for establishing power limits for SDARS terrestrial repeaters. As a result of this review, the *WCS/SDARS Technical Rules Public Notice* proposed to limit SDARS terrestrial repeaters to 12 kW EIRP with a maximum PAPR of 13 dB.⁵⁴⁸

235. *Position of the Parties.* In their comments, the SDARS licensees have continued to advocate ground-level emission limits as one of the appropriate metrics for SDARS terrestrial repeater power limits.⁵⁴⁹ Specifically, Sirius XM advocates a maximum permissible average EIRP of 12 kW for its terrestrial repeaters, and a field strength limit of 100 dB μ V/m, measured 1.5 meters above the ground, to be exceeded at no more than 5 percent of locations within a specified test area, for each of its repeaters.⁵⁵⁰ Sirius XM has proposed a detailed procedure for a predictive analysis that could be used to show that a new terrestrial repeater would satisfy the field strength requirements.⁵⁵¹ Sirius XM points out that WCS receivers operating in the WCS C and D blocks benefit from 4-megahertz guard bands that separate the edges of the C and D blocks from the terrestrial repeater signals.⁵⁵² Sirius XM also proposes

⁵⁴⁴ 2007 Notice, 22 FCC Rcd at 22131-32 ¶ 23.

⁵⁴⁵ 2007 Notice, 22 FCC Rcd at 22131-32 ¶ 23.

⁵⁴⁶ 2007 Notice, 22 FCC Rcd at 22132 ¶ 23, citing 47 C.F.R. §§27.50(c), 27.55(b).

⁵⁴⁷ 2007 Notice, 22 FCC Rcd at 22132 ¶ 23.

⁵⁴⁸ *WCS/SDARS Technical Rules Public Notice*, Appendix A, proposed rule 25.214(d). The proposed rules would also permit the operation of SDARS terrestrial repeaters at power levels higher than 12 kW EIRP, unless notified by a "potentially affected WCS licensee" that it intends to provide commercial service within the following 365 days. *Id.* We address possible operations of SDARS repeaters above 12 kW EIRP in the discussion of a grandfathering/transition period in Part IV.A.3. below.

⁵⁴⁹ See, e.g., Sirius Comments at 25-31; XM Radio Comments at 21-27.

⁵⁵⁰ Sirius XM Sept. 8, 2008, *Ex Parte* at 17.

⁵⁵¹ Sirius XM Sept. 10, 2008, *Ex Parte*, Exhibit D at 2-3.

⁵⁵² Sirius XM Oct. 2, 2008, *Ex Parte*, Attachment at 2. Sirius XM claims these guard bands consist of the band segment occupied by the satellite signals, which are very low in power as compared to the terrestrial repeater signals in the vicinity of a terrestrial repeater.

a PAPR of 13 dB for its terrestrial repeaters, to be exceeded no more than 0.1 percent of the time based on the complementary cumulative distribution function (CCDF) of the signal measured at the transmitter output.⁵⁵³

236. The WCS Coalition advocates a maximum average EIRP limit of 2 kW for both SDARS terrestrial repeaters and WCS base stations.⁵⁵⁴ The WCS Coalition also advocates a PAPR of 13 dB for SDARS repeaters.⁵⁵⁵ Motorola asserts that the average power criterion for a signal with non-constant envelope modulation avoids the problem of short-duration peaks in signal power placing unnecessary limits on the operating power of base stations and SDARS repeaters.⁵⁵⁶ Motorola also supports the WCS Coalition's proposal to specify the power limit as a power spectral density limit.⁵⁵⁷ The WCS Coalition states that based on testing of WiMAX prototype receivers by NextWave, it believes the receivers of its user devices will suffer from overload interference from SDARS terrestrial repeaters at a received undesired signal level of -44 dBm,⁵⁵⁸ not the -35 dBm overload threshold assumed by Sirius.⁵⁵⁹ The WCS Coalition is also concerned that WCS base stations will suffer overload interference from SDARS terrestrial repeaters' signals that may be sufficiently attenuated by clutter two meters above ground level (so they meet the ground-level emission limit proposed by Sirius XM), but are not sufficiently attenuated at the height of the WCS base stations' receiving antennas.⁵⁶⁰ The WCS Coalition objects to the field strength limits proposed by Sirius XM, stating that a limit of 110 dB μ V/m⁵⁶¹ measured near ground level could result in field strength levels as high as 140 dB μ V/m at the receiving antennas of its base stations.⁵⁶²

237. To protect WCS base station receivers 30 meters above ground level – which WCS licensees believe to be a reasonable compromise for the purpose of establishing a rule – the WCS Coalition states that SDARS terrestrial repeaters should be limited to a field strength of 104 dB μ V/m, the level at which a WCS C or D-block base station receiver will overload, measured at 30 meters above ground level (which converts to a receiver overload interference level of approximately -40 dBm).⁵⁶³ The WCS Coalition also states that an SDARS repeater field strength limit of 64 dB μ V/m, measured 2 meters above the ground (for an approximately -80.6 dBm receiver overload interference level), would fully protect WCS deployment plans.⁵⁶⁴ In addition, the WCS Coalition contends that the Commission should

⁵⁵³ Sirius XM Sept. 10, 2008, *Ex Parte*, Exhibit D at 2.

⁵⁵⁴ WCS Coalition July 22, 2008, *Ex Parte* at 3, Exhibit A at 3. Motorola also supports adoption of a 2 kW-average EIRP limit for SDARS terrestrial repeaters. *See* Motorola Comments at 4-5.

⁵⁵⁵ WCS Coalition Comments at 24.

⁵⁵⁶ Motorola Comments at 4-5.

⁵⁵⁷ Motorola Comments at 5.

⁵⁵⁸ WCS Coalition Reply Comments at 25.

⁵⁵⁹ Sirius Comments at 30.

⁵⁶⁰ WCS Coalition Comments at 33.

⁵⁶¹ Sirius XM proposed the 110 dB μ V/m field strength limit be met in 99 percent of the locations in a defined test area, and the 100 dB μ V/m field strength limit be met in 95 percent of the locations in the test area. Sirius XM September 8, 2008, *Ex Parte* at 17.

⁵⁶² Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC (May 5, 2008), Attachment at 8) (“WCS Coalition May 5, 2008, *Ex Parte*”).

⁵⁶³ WCS Coalition Reply Comments at 28-29.

⁵⁶⁴ WCS Coalition May 5, 2008, *Ex Parte*, Attachment at 10.

mandate that SDARS terrestrial repeaters be operated between 2324.2 and 2341.285 MHz so that Sirius or XM will not be able to move transmissions closer in frequency to the WCS frequency bands edges, which the WCS Coalition contends could worsen potential interference to WCS operations.⁵⁶⁵ Also, the WCS Coalition argues that a ground-level field strength limit without an EIRP component is a very poor predictor of interference to WCS,⁵⁶⁶ and that limiting EIRP is the best available mechanism for assuring that WCS and SDARS can provide viable service offerings in their spectrum allocations.⁵⁶⁷

238. In reply, Sirius contends that the WCS Coalition fails to provide any information about the performance of WCS mobile or base station receivers and provides very little evidence to support the large zones of interference to WCS operations that the WCS Coalition contends would be caused by SDARS terrestrial repeaters. Furthermore, Sirius argues that even a limited use of antenna down-tilt by the WCS licensees could significantly reduce the actual zones of interference to “inconsequential” sizes.⁵⁶⁸ In addition, XM contends that the WCS Coalition has disregarded the availability of band-pass filters that would provide an additional 10 to 20 dB of protection to mitigate interference.⁵⁶⁹

239. In response to the *WCS/SDARS Technical Rules Public Notice*, Sirius XM and the WCS Coalition have stated that the proposal to limit SDARS repeaters to a 12-kW EIRP power level with a maximum PAPR of 13 dB is a generally acceptable compromise.⁵⁷⁰

240. *Discussion.* We adopt a power limit of 12 kW average EIRP for SDARS repeaters, with a maximum PAPR of 13 dB.⁵⁷¹ We find that adoption of this power limit balances the objectives of protecting WCS operations from harmful interference and avoiding unnecessary and costly re-configuring of existing SDARS repeater networks, which could degrade service to the public.⁵⁷² We note that both Sirius XM and the WCS Coalition have accepted this power limit for SDARS repeaters.⁵⁷³

⁵⁶⁵ WCS Coalition Comments at 34-35; WCS Comments on *WCS/SDARS Technical Rules Public Notice* at 16 (filed April 23, 2010).

⁵⁶⁶ WCS Coalition Reply Comments at 26.

⁵⁶⁷ WCS Coalition Reply Comments at 27.

⁵⁶⁸ Sirius Reply Comments at 32-33.

⁵⁶⁹ XM Reply Comments at 37.

⁵⁷⁰ Comments of Sirius XM Radio Inc. at 36 (filed April 23, 2010) (stating that the proposed 12-kW average EIRP and 13-dB peak to average power ratio limits are generally acceptable for most situations); Comments of the WCS Coalition at 12 (filed April 23, 2010) (stating that, although the WCS community would prefer to see SDARS repeaters' power limits set at 2-kW EIRP, it is prepared to adapt to SDARS repeaters operating at up to 12-kW (average) EIRP).

⁵⁷¹ The peak-to-average power ratio (PAPR) measurements must be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that the PAPR will not exceed 13 dB for more than 0.1 percent of the time or another Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission. See *infra*, Appendix B, Section 25.144(e)(7)(ii).

⁵⁷² We also note that Industry Canada has imposed a similar maximum power limit of 12.5 kW average EIRP on SDARS repeater operations in Canada. See Industry Canada, Spectrum Management and Telecommunications, Broadcasting Procedures and Rules, *Part 9: Application Procedures and Rules for Terrestrial S-DARS Undertakings (Satellite Digital Audio Radio Service)*, BPR-9, Issue 2 (January 2009), available online at <http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf08569e.html> (last visited April 27, 2010).

⁵⁷³ See *supra.*, n.570.

241. Based on our evaluation of the record before us and the experience gained in this and other proceedings involving advanced wireless communications, we find that SDARS repeaters operating up to 12-kW average EIRP and a maximum PAPR of 13 dB will not cause substantially more interference to actual WCS operations than repeaters operating at 2-kW average EIRP – the power limit proposed by the WCS Coalition. In reaching this finding, we calculate that with a 2-kW average EIRP and a maximum PAPR of 13 dB for the repeaters, coupled with the WCS mobile receiver overload interference threshold of -44 dBm claimed by the WCS licensees, SDARS terrestrial repeaters would have to be separated from WCS mobile receivers by a distance of 328 meters to avoid overload interference the WCS mobile receivers. If SDARS repeaters operate at 12-kW average EIRP, with a 13-dB maximum PAPR, and a WCS receiver overload interference threshold of -35 dBm is assumed (as suggested by the SDARS licensees), the separation distance necessary to avoid overload interference from SDARS terrestrial repeaters and WCS mobile receivers is calculated to be approximately 300 meters. We also note that the AWS testing showed that the receiver overload interference improves with increased frequency separation.⁵⁷⁴ Thus, the approximately 300-meters separation distance calculated using a 12-kW average EIRP, a maximum PAPR of 13 dB, a -35 dBm receiver overload interference threshold, as suggested by Sirius XM, and no frequency separation is an upper bound on the separation distance. Because the nearest WCS bands (Blocks C and D) are located approximately four megahertz from an SDARS terrestrial repeater band, we expect that the separation distance will, in most cases, be significantly less than the 300 meters. Thus, the interference environment from SDARS repeaters operating at 12 kW average EIRP (with a 13 dB maximum PAPR) is no worse than that posed by SDARS repeaters operating at 2-kW average EIRP, assuming that the overload interference threshold of WCS mobile receivers is -35 dBm. We therefore conclude that adopting a power limit of 12-kW average EIRP, with a maximum PAPR of 13 dB, for SDARS terrestrial repeater operations will not unduly impair operations of WCS mobile receivers.

242. We find that adoption of a power limit of 12-kW average EIRP (with a maximum PAPR of 13 dB) for SDARS terrestrial repeaters will not unduly impair the ability of WCS licensees to provide mobile broadband services. The WCS Coalition does not object to the 12-kW level proposed in the April 2, 2010 *WCS/SDARS Technical Rules Public Notice*.⁵⁷⁵ WCS licensees can initially deploy currently available equipment and request that manufacturers design and produce WCS mobile devices with more robust receiver overload interference tolerance (*i.e.*, a level) that is better than -44 dBm.

243. We also conclude that SDARS terrestrial repeaters can operate at an average EIRP of 12 kW with a maximum PAPR of 13 dB without causing harmful interference to WCS base station receivers. The WCS Coalition assumes that such base stations will operate with an overload interference level of -40 dBm.⁵⁷⁶ As in the case of the WCS mobile receivers, however, we believe that because the WCS is in its early stages of deployment, WCS licensees can request that manufacturers design and produce WCS base stations with more robust overload interference thresholds. The ability to provide more robust overload interference protection for base stations is supported by the fact that base stations will not be as numerous as mobile devices and that they are not subject to the same size and cost restraints as consumer mobile devices. An improved receiver overload interference threshold, combined with judicious WCS base station site selection and receiving antenna down-tilting, would substantially reduce the potential for SDARS terrestrial repeaters to cause harmful interference to WCS base station receivers.

⁵⁷⁴ See Advanced Wireless Service Interference Test Results and Analysis, Federal Communications Commission Office of Engineering and Technology, at 11 (rel. Oct. 10, 2008), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-08-2245A2.pdf.

⁵⁷⁵ See Comments of the WCS Coalition at 12 (filed April 23, 2010).

⁵⁷⁶ See WCS Coalition Comments in response to 2007 Notice at n.106.

244. Our adoption of a 12-kW average EIRP (with a maximum PAPR of 13 dB) for SDARS terrestrial repeaters is consistent with our goal of reducing the potential for harmful interference to WCS to negligible levels, and avoiding unnecessary and costly re-configuring of existing SDARS repeater networks, which could degrade service to the public. The Commission has previously found that terrestrial repeaters are needed to overcome multipath interference and signal blockage inherent to the satellite radio service,⁵⁷⁷ and has permitted SDARS repeater networks to be constructed pursuant to grants of special temporary authority while rules governing their long-term operations were being developed. We do not expect there to be a significant change in the make-up of the SDARS repeater networks, since the SDARS licensees have built out their networks substantially pursuant to grants of STAs. By permitting an average EIRP level of 12 kW and a 13-dB maximum PAPR, we find that SDARS licensees would not need to power down a large number of the existing terrestrial repeaters and supplement them with substantial numbers of lower-power repeaters in order to maintain or improve the provision of a high-quality service.

245. We will not adopt a rule restricting the operation of SDARS terrestrial repeaters to between 2324.2 and 2341.285 MHz, as the WCS Coalition requests.⁵⁷⁸ We believe this to be unnecessary. SDARS terrestrial repeaters already operate at least four megahertz from the edges of the WCS frequency bands. Given the large deployed infrastructure of SDARS satellites, terrestrial repeaters, and consumer receivers – all designed for the current SDARS licensees' band plans – we conclude that a rule requiring SDARS repeater operations to stay within their existing band plans is not needed.⁵⁷⁹

246. We do not adopt the other proposals for power limits on SDARS terrestrial repeaters. In particular, we decline to adopt the ground-level emission limit proposal of Sirius because of the difficulties associated with characterizing and quantifying the case-specific propagation environment's effects on an RF signal's field strength that could influence the interference potential at each terrestrial repeater site. As the WCS Coalition contends,⁵⁸⁰ a ground-level signal strength limit is not a reliable predictor of harmful interference. Because of the variety of obstructions close to the ground that could significantly attenuate a RF signal's field strength, the actual signal strength experienced by WCS base station or user equipment receivers would, in many cases, be greater than the signal strength predicted at ground-level. Furthermore, the rules that would result from an attempt to deal with the anomalies associated with field strength levels would be overly complex and difficult for licensees to comply with and would be difficult, at best, for the Commission to enforce.

247. We also decline to adopt the 1-kW ERP limit on SDARS repeater power, which NAB states is necessary in order to ensure that the repeaters are used solely to fill in coverage in limited areas where the satellite signal cannot be received. The restrictions adopted below prohibiting the use of SDARS repeaters to originate local programming and advertising and establishing eligibility criteria for operating SDARS repeaters will ensure that use of SDARS repeaters remains complementary to a satellite-delivered service.⁵⁸¹ In addition, the substantial expense of deploying repeaters is a substantial deterrent against deploying them in areas where satellite signals can be adequately received.

⁵⁷⁷ See *SDARS Order and FNPRM*, 12 FCC Rcd at 5810 ¶ 138.

⁵⁷⁸ Comments of the WCS Coalition at 16 (filed April 23, 2010).

⁵⁷⁹ We note that Sirius XM states that such re-deployment is purely hypothetical at the moment, since it would take “many years before Sirius XM could even consider relocating its satellite downlink band” given the “tens of millions of satellite radio receivers currently installed in late model cars and trucks.” Comments of Sirius XM Radio Inc. at 7 (filed May 13, 2010).

⁵⁸⁰ WCS Coalition Reply Comments at 26.

⁵⁸¹ See *infra*, Section IV.B.4 and C.1.

2. Out-of-Band Emissions Limits

248. *Background.* In the 2007 Notice, the Commission sought comment on whether it should require OOB from SDARS repeaters to be attenuated by a factor of not less than $75 + 10 \log(P)$ dB, or whether some other OOB limit would be more appropriate.⁵⁸² Comments were received from both Sirius XM and WCS Coalition on this issue. The WCS Coalition supports the proposal of the 2007 Notice.⁵⁸³ Sirius XM is willing to accept a stricter OOB attenuation factor of $90 + 10 \log(P)$ dB in a 1-megahertz resolution bandwidth for SDARS terrestrial repeaters.⁵⁸⁴ Sirius XM, however, continues to support an OOB attenuation factor of $75 + 10 \log(P)$ dB for SDARS terrestrial repeaters operating with an EIRP of 2 W or less.⁵⁸⁵

249. *Discussion.* We adopt the stricter out-of-band emission limits agreed to by Sirius XM for terrestrial repeaters operating at power levels greater than 2-W average EIRP. Thus, such repeaters will be required to attenuate their OOB by a factor not less than $90 + 10 \log(P)$ dB over a 1-megahertz resolution bandwidth. We believe that such terrestrial repeater OOB attenuation levels will provide WCS licensees sufficient protection from interference under almost all operating conditions and provide SDARS licensees with achievable limits that can reasonably be attained with limited impact on system capacity. SDARS licensees indicate that their repeaters are already capable of meeting this stricter limit,⁵⁸⁶ and stricter OOB limits are always preferable where economically and technically feasible.

250. We adopt the proposal to require repeaters operating at power levels of 2 W or less average EIRP to attenuate their OOB by a factor not less than $75 + 10 \log(P)$ dB over a 1-megahertz resolution bandwidth. Sirius XM supports this proposal. Such devices are likely to be small in size and used to increase SDARS signal strength inside of buildings. We find that this lower level of attenuation is warranted for this class of repeaters, since walls, ceilings, and other materials will limit the range of indoor transmissions and the number of potentially affected WCS stations will also be limited.

3. Grandfathering/Transition Period

251. *Background.* The SDARS licensees have deployed terrestrial repeaters pursuant to grants of special temporary authority from the International Bureau. As the Bureau explained in its orders first authorizing the terrestrial repeater networks in 2001, the grant of STA to operate such repeaters served the public interest because the SDARS licensees were ready to commence commercial service, but no rules were in place to govern the operations of terrestrial repeaters necessary to complete the SDARS network.⁵⁸⁷ Some of these STAs authorized the operation of terrestrial repeaters up to 40 kW EIRP. The International Bureau included explicit statements in its grants of STA that any actions taken under the

⁵⁸² 2007 Notice, 22 FCC Rcd at 22138 ¶ 25.

⁵⁸³ WCS Coalition July 22, 2008, *Ex Parte*, Exhibit A at 3 (proposing a draft rule requiring SDARS repeater OOB to be attenuated by a factor not less than $75 + 10 \log(P)$ dB outside of the SDARS frequency bands)

⁵⁸⁴ Sirius XM Sept. 10, 2008, *Ex Parte*, Exhibit D at 2.

⁵⁸⁵ Sirius XM Sept. 10, 2008, *Ex Parte*, Exhibit D at 5.

⁵⁸⁶ See Sirius Reply Comments at Appendix B to Exhibit A at 15 (“As previously indicated all Sirius current repeaters (including, specifically, the ones used in the WCS Coalition prediction) meet an OOB limit of $90 + 10 \log(P)$ (1MHz BW)...”). See also XM Reply Comments at 39 (“Based on the specifications XM provides to equipment manufacturers, current XM equipment attenuates [OOB] by a factor of approximately $90 + 10 \log(P)$ dB.”).

⁵⁸⁷ See generally *Sirius 2001 STA Order*, 16 FCC Rcd 16773; *XM 2001 STA Order*.

STAs are “solely at [the licensee’s] own risk,” and that the grant of the STAs “shall not prejudice the outcome of any final repeater rules adopted by the Commission.”⁵⁸⁸

252. Sirius proposes to exempt, or “grandfather,” SDARS terrestrial repeaters from the rules adopted in this proceeding, if those repeaters were deployed before those rules take effect.⁵⁸⁹ The 2007 Notice invited comment on Sirius’ proposal. In particular, the Commission invited SDARS licensees and WCS licensees to discuss the specific economic and technical difficulties they would face if currently deployed repeaters are or are not grandfathered.⁵⁹⁰ It also requested comment on whether the Commission should adopt a limit or cutoff point at which a particular repeater will not be eligible for grandfathering, or whether any grandfathering measure should be limited to the authorized parameters of the SDARS licensees’ repeater STAs.⁵⁹¹

253. The 2007 Notice also requested comment on the best transition period for the existing SDARS terrestrial repeaters, in the event that it does not grandfather those repeaters.⁵⁹² It asked if the Commission should adopt the same transition period for all repeaters, or whether it should permit each repeater to continue its existing operations until a WCS licensee requests the SDARS licensee to bring that repeater into compliance with the rules adopted here.⁵⁹³ Commenters were encouraged to provide quantitative analysis and technical studies in support of their comments.⁵⁹⁴

254. Sirius XM supports grandfathering of currently deployed repeaters, particularly if the Commission were to adopt the WCS Coalition proposal to limit terrestrial repeater power levels to 2 kW average EIRP. According to the Sirius XM, complying with such a limit would require it to install many new repeaters,⁵⁹⁵ would cause disruption to existing service,⁵⁹⁶ and would increase the likelihood of interference to WCS licensees.⁵⁹⁷ For example, XM contends that it would need to introduce 39 new repeaters in the Indianapolis market to comply with an average EIRP limit of 2 kW and maintain existing service coverage and quality.⁵⁹⁸ Sirius XM also argues that it will face unreasonable costs to re-configure their existing repeater networks, absent grandfathering. It estimates that the equipment and construction costs, site leases, utilities, and maintenance for each site, if it must comply with this limit, could amount to tens of millions of dollars.⁵⁹⁹ XM also notes that each site would require 12 to 18 months for approval

⁵⁸⁸ See, e.g., *Sirius 2001 STA Order*, 16 FCC Rcd at 16779 ¶ 18; *XM Radio 2001 STA Order*, 16 FCC Rcd at 16787 ¶ 18. Since 2001, both Sirius and XM have submitted additional STA requests to modify their repeater networks or to add new repeaters. See 2007 Notice, 22 FCC Rcd at 22127 ¶ 11. Many of those STA requests have been granted, and all the STAs that have been granted were subject to conditions substantially similar to the conditions included in the 2001 STAs. A full list of SDARS STA requests are available through the International Bureau Filing System (IBFS), which is available online at <http://licensing.fcc.gov/myibfs/>

⁵⁸⁹ See 2006 Petition for Rulemaking at 6, cited in 2007 Notice, 22 FCC Rcd at 22135 ¶ 33.

⁵⁹⁰ 2007 Notice, 22 FCC Rcd at 22136 ¶ 35.

⁵⁹¹ 2007 Notice, 22 FCC Rcd at 22136 ¶ 35.

⁵⁹² 2007 Notice, 22 FCC Rcd at 22136 ¶ 36.

⁵⁹³ 2007 Notice, 22 FCC Rcd at 22136 ¶ 36.

⁵⁹⁴ 2007 Notice, 22 FCC Rcd at 22136 ¶ 36.

⁵⁹⁵ XM Comments at 25-26.

⁵⁹⁶ Sirius Comments at 36.

⁵⁹⁷ Sirius Reply Comments at 33-34.

⁵⁹⁸ XM Comments at 26.

⁵⁹⁹ Sirius Comments at 36; XM Comments at 27; Sirius Reply Comments at 34.

and construction,⁶⁰⁰ and asks at a minimum that, if the Commission does not grandfather its existing repeaters, that it be given adequate time to come into compliance with the new rules.⁶⁰¹

255. The WCS Coalition opposes grandfathering, and recommends that all repeaters be brought into compliance with any new rules within a year of adoption.⁶⁰² As the WCS Coalition points out, the STAs were expressly conditioned on compliance with any SDARS repeater rules that may be adopted.⁶⁰³ The WCS Coalition further contends that when the SDARS operators deployed their repeater networks pursuant to grants of special temporary authority, they accepted the risk that they would incur costs in bringing their repeaters into compliance with future rules.⁶⁰⁴ Finally, the WCS Coalition argues that developing a different set of rules for new and grandfathered repeaters would be confusing and difficult to administer.⁶⁰⁵ However, the WCS Coalition has stated that it was willing to accept a scenario where the SDARS operators could operate existing repeaters “so long as those operations continue to be subject to the current absolute obligation to cure interference that might occur in the future to WCS operations.”⁶⁰⁶

256. The WCS Coalition also criticizes XM and Sirius for deploying a number of repeaters that did not comply with the technical parameters authorized pursuant to their grants of STA.⁶⁰⁷ The WCS Coalition contends that greater scrutiny is required before grandfathering should be extended to such repeaters.⁶⁰⁸

257. *Discussion.* We decline to adopt the grandfathering proposal proposed by Sirius. Instead, we require terrestrial repeaters to be operated according to the power limits and out-of-band emissions attenuation requirements adopted today in any area in which a WCS licensee would be “potentially affected” and the potentially affected WCS licensee provides written notice to Sirius XM that it intends to commence commercial service within the following 365 days. Sirius XM will have 180 days from the date of this written notice to conform all repeaters in the area to the 12-kW average power limit (with a maximum 13-dB PAPR) and out-of-band emissions attenuation requirements adopted for terrestrial repeater operations. Until a WCS licensee so notifies Sirius XM and the 180-day period to conform operations has passed, Sirius XM may operate terrestrial repeaters above these power limits or with out-of-band emissions attenuation levels less than those established herein on an unprotected, non-harmful interference basis with respect to all permanently authorized radiocommunication facilities.

258. We have previously concluded that the public interest is served by establishing power limits and out-of-band emissions attenuation requirements for SDARS terrestrial repeater operations.⁶⁰⁹

⁶⁰⁰ XM Comments at 26.

⁶⁰¹ XM Reply Comments at 40-41.

⁶⁰² WCS Coalition Comments at 41-42.

⁶⁰³ WCS Coalition Comments at 47, citing *Sirius 2001 STA Order*, 16 FCC Rcd at 16777; *XM Radio 2001 STA Order*, 16 FCC Rcd at 16787.

⁶⁰⁴ WCS Coalition Comments at 48-49; WCS Coalition Reply Comments at 48.

⁶⁰⁵ WCS Coalition Comments at 49-50.

⁶⁰⁶ WCS Coalition July 22, 2008, *Ex Parte* at 3. See also WCS Coalition May 5, 2008, *Ex Parte*, Attachment at 7.

⁶⁰⁷ WCS Coalition Reply Comments at 45-46, 49. WCS Coalition July 22, 2008, *Ex Parte* at 3-4.

⁶⁰⁸ WCS Coalition Reply Comments at 46. But see WCS Coalition July 22, 2008, *Ex Parte* at 3-4 (noting that the WCS Coalition takes no position as to whether the Commission should make a distinction between “grandfathering” illegally constructed repeaters and those operations pursuant to the parameters of an STA.)

⁶⁰⁹ See *supra*, Section IV.A.1 and 2.

We found that these power limits and out-of-band emissions attenuation requirements balance the objective of protecting WCS operations from harmful interference with a desire to avoid costly re-configuring of existing SDARS repeater networks, which could degrade existing service to the public. Allowing SDARS repeaters to operate above these power limits or with lesser out-of-band emissions attenuation levels in areas where WCS licensees provide service would upset this balance. Accordingly, we find that Sirius' proposal to permanently exempt all currently deployed terrestrial repeaters from the rules we adopt today is not in the public interest, since there would be no requirement for such repeaters to conform to the power limits and out-of-band emissions attenuation requirements adopted in this proceeding. Although Sirius XM states that grandfathering is necessary to protect its investment in existing repeater facilities, it had no reasonable expectation that repeaters built pursuant to STAs would be able to continue to operate indefinitely, since the STAs explicitly state that any actions taken under the STAs were solely at Sirius XM's own risk, and that the grant of the STAs would not prejudice the outcome of any final repeater rules adopted by the Commission.

259. We conclude, however, that the purpose of the power limits and out-of-band emissions attenuation requirements is not undermined by allowing SDARS repeaters to operate at power levels higher than 12 kW average EIRP, or with out-of-band emissions attenuation levels less than those established herein, in areas where WCS facilities are not providing service. The adoption of power limits and out-of-band emissions attenuation levels facilitates the introduction of WCS services in areas where both SDARS and WCS seek to provide service to the public. There may be areas, however, in which Sirius XM desires to operate repeaters, but in which no WCS licensees provide commercial service. If no WCS licensees are providing commercial service in such areas, there is no public interest in prohibiting SDARS repeaters from operating at power levels greater than 12-kW average EIRP, or operating with out-of-band emissions attenuation levels less than those specified herein.

260. Because WCS is not yet widely deployed, we conclude that the public interest is not served by requiring all SDARS terrestrial repeaters to meet power limits and out-of-band emission attenuation requirements upon the effective date of this Second Report and Order.⁶¹⁰ Instead, SDARS repeaters may be operated at levels greater than 12-kW average EIRP, or with lesser out-of-band emission attenuation levels, until Sirius XM is notified in writing by a potentially affected WCS licensee that it has commenced commercial service already, or that it intends to commence commercial service within 365 days following the notice. This requirement is intended to restrict notice to only those areas where WCS licensees have already commenced commercial service or have immediate plans to commence commercial service, thus discouraging WCS licensees from simply sending notices for all areas that they have licenses to operate, regardless of the timeframe in which service is contemplated in a particular area. WCS licensees can provide this written notice at any time after the effective date of the rules adopted in this Second Report and Order. Sirius XM will then have 180 days from the date it receives the written notice to bring all repeaters in the area into compliance with the 12-kW average EIRP power limit and the out-of-band emissions attenuation requirements adopted today. This 180-day period balances the need for WCS licensees to commence commercial service expeditiously with the goal of avoiding unnecessary and costly re-configuring of existing SDARS repeater networks, which could degrade existing service to the public. Sirius XM may continue to operate repeaters previously authorized under STA – or to operate new or modified repeaters – above the power limits or with lesser out-of-band emissions attenuation levels than those specified herein, in areas for which it does not receive written notice from potentially affected WCS licensees. In these situations, however, operations of such repeaters shall be on a non-interference basis with respect to all permanently authorized radiocommunication facilities.

⁶¹⁰ We note that repeaters operations that do not comply with the power and out-of-band emissions limits adopted herein are not eligible for blanket licensing, but must instead be licensed on a site-by-site basis. *See infra*, Section IV.B.1.

261. For purposes of establishing whether a notifying WCS licensee is “potentially affected” by a SDARS terrestrial repeater operating above the power limits or with lesser out-of-band emissions attenuation levels than those set for such repeater operations, we will use a definition similar to the definition of “potentially affected WCS licensee” set forth in the notification and information sharing requirements that we adopt herein.⁶¹¹ Accordingly, a notifying WCS licensee is “potentially affected” by SDARS terrestrial repeater operating above the power limits or with lesser out-of-band emissions attenuation levels than those set for such repeater operations if it is authorized to operate a base station in the 2305-2315 MHz or 2350-2360 MHz bands in the same Major Economic Area (MEA) as that in which the terrestrial repeater is located, or is authorized to operate a base station in the 2315-2320 MHz or 2345-2350 MHz bands in the same Regional Economic Area Grouping (REAG) as that in which the terrestrial repeater is located. In addition, a notifying WCS licensee is potentially affected if a SDARS terrestrial repeater operating above the power limits or with lesser out-of-band emissions attenuation levels than those established herein for such repeater operations is located within 5 kilometers of the boundary of an MEA or REAG in which the notifying WCS licensee is authorized to operate a WCS base station.

262. We decline to adopt the alternate definition of “potentially affected WCS licensee” proposed by Sirius XM. Sirius XM argues that the definition of “potentially affected” that we adopt today is overbroad, because REAGs are large service areas and may require Sirius XM to modify repeater operations far outside of areas in which the WCS licensee intends to commence commercial service.⁶¹² Instead, Sirius XM urges adoption of a proximity-based approach – rather than a market approach based on the market of the notifying WCS licensee – and proposes a distance of 5 km between an SDARS repeater and a planned WCS base station before a WCS licensee is “potentially affected” by the repeater.⁶¹³ Sirius XM does not, however, provide an engineering basis for its proposed 5-km distance, and the record does not provide sufficient evidence for establishing a proximity-based approach. Furthermore, the approach based on the WCS licensing market we adopt today provides greater regulatory certainty to SDARS and WCS licensees of which repeaters would be required to modify operations in light of imminent WCS commercial deployments and is easier to administer. Although the approach based on licensing market may over-include the number of repeaters that need to be modified, this is consistent with the public interest in having as many SDARS repeaters as possible authorized through a blanket license according to the power level and OOB standards adopted today. These standards are the most effective means of ensuring coexistence of SDARS and WCS operations in the 2.3 GHz band, and we prefer to err on the side of over-inclusion.

263. We also decline to require “potentially affected” WCS licensees to post with the Commission, as part of the notification process, a performance bond that would be forfeited if the WCS licensee does not actually commence commercial operations within 365 days of the notification.⁶¹⁴ Although there may be instances where WCS licensees do not commence commercial operations within this 365-day period, we do not expect bad faith on the part of the notifying WCS licensee to be the reason for the failure to commence on time. We observe that, in the event that the notifying WCS licensee subsequently fails to provide service in the notified area, or ceases to provide such service at a future date, Sirius XM may seek a waiver of the power and power and OOB standards adopted to today to permit operations on specific repeaters above 12-kW average EIRP or with lower OOB attenuation levels.

⁶¹¹ See *infra*, Appendix B, at § 25.263(b)(1).

⁶¹² Sirius XM Comments at 38-40 (filed April 23, 2010). As an example, Sirius XM states that a WCS licensee planning to commence service in San Diego, California could require Sirius XM to modify the operation of a terrestrial repeaters outside Seattle, Washington, well over 1,000 miles away. *Id.* at 39.

⁶¹³ *Id.* at 39-40.

⁶¹⁴ *Id.* at 40.

264. In order to effect an orderly transition from operations under grants of STA to permanent authority to operate terrestrial repeaters, we instruct the International Bureau to extend all existing grants of STA for SDARS repeaters for a period of 180 days from the release date of this *Second Report and Order*.⁶¹⁵ We also instruct the International Bureau to grant all requests for STA to operate repeaters pending at the time this *Second Report and Order* is released.⁶¹⁶ We stress, however, that any operations granted pursuant to a pending STA must be comply with the 12-kW EIRP limit and OOB attenuation standards within 180 days of notice that a potentially affected WCS license has already commenced commercial service, or intends to commence commercial service with the 365 days following the notice. In order that Sirius XM may continue to adjust its repeater network to meet subscriber needs, the International Bureau may continue to grant STAs for new or modified repeaters in the period between the release of this *Second Report and Order* and the date that any permanent authorization to operate SDARS repeaters becomes effective. Any grant of STA to operate terrestrial repeaters shall terminate automatically on the day that permanent authority to operate the covered repeater operations becomes effective, without the need for further action by the International Bureau.

265. We note that the WCS concern regarding unauthorized operation of SDARS terrestrial repeaters not in compliance with the terms of STAs was addressed in the context of the Consent Decrees XM and Sirius reached with the Enforcement Bureau.⁶¹⁷ Furthermore, the adoption of permanent rules governing SDARS repeater operations will result in the eventual termination of operations of repeaters pursuant to STAs. Because we are not exempting repeaters operating under grants of STA from the rules we adopt today, compliance with the terms of prior grants of authority under STA will not affect the interference environment in any areas where WCS licensees commence service to the public.

B. Licensing Regime for Terrestrial Repeaters

1. Blanket Licensing Regime

266. *Background.* In the *1997 Further Notice*, the Commission sought comment on allowing SDARS licensees to deploy an unlimited number of terrestrial repeaters under a single authorization, based on a demonstration that all the repeaters will comply with the Commission's rules.⁶¹⁸ The *1997 Further Notice* did not specify the format of such a demonstration, or whether the authorization should be in the form of a modification to the licensee's space station authorization or through some other procedural vehicle.⁶¹⁹

267. In its *2006 Petition for Rulemaking*, Sirius proposed that the Commission allow SDARS licensees to construct and operate an unlimited number of terrestrial repeaters under their existing SDARS

⁶¹⁵ In the event blanket licenses are not issued within 180 days of the effective date of this Order, SDARS licensees may file applications to extend the STAs for an additional 180 days, or until blanket licenses to operate SDARS repeaters are granted, whichever comes first.

⁶¹⁶ We note that that operation of all repeaters under grants of STA are on a non-interference basis with respect to all permanently authorized radiocommunication facilities. In light of the rules adopted today, this non-interference condition shall not apply to repeaters operating at 12-kW average EIRP or less, with a maximum 13-dB PAPR, since the Commission has already found such operations to be in the public interest.

⁶¹⁷ See Sirius Satellite Radio Inc., *Order*, FCC 08-176 (rel. Aug. 5, 2008) ("*Sirius Consent Decree Order*"), XM Radio, Inc., *Order*, FCC 08-177 (rel. Aug. 5, 2008) ("*XM Consent Decree Order*").

⁶¹⁸ See *1997 Further Notice*, 12 FCC Rcd at 5812 ¶ 142, 5845 (App. C); cited in *2007 Notice*, 22 FCC Rcd at 22138 ¶ 45.

⁶¹⁹ *2007 Notice*, 22 FCC Rcd at 22138 ¶ 45.