Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band	)	WT Docket No. 07-293
	)	
Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band	)	IB Docket No. 95-91

ORDER ON RECONSIDERATION

Adopted: October 17, 2012 **Released: October 17, 2012**

By the Commission: Chairman Genachowski and Commissioners McDowell, Clyburn, Rosenworcel, and Pai issuing separate statements.

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Heading Paragraph #

I. INTRODUCTION

1. In this decision, we affirm, modify, and clarify the Commission's actions in the *Report and Order* in WT Docket No. 07-293 and the *Second Report and Order* in IB Docket No. 95-91 adopted in May 2010 (collectively, *2010 WCS R&O and SDARS 2nd R&O*).[1] The actions we take will unlock innovation and investment in the 2305-2320 MHz and 2345-2360 MHz (2.3 GHz) Wireless Communications Service (WCS) bands, allow for the development of vital new broadband services, and further our larger goal of making more spectrum available for broadband services in the highest value frequency ranges.

2. This Order on Reconsideration represents a significant milestone in the development of the WCS bands, as it will enable the deployment of greatly needed new broadband services while continuing to protect satellite radio and aeronautical mobile telemetry operations in adjacent bands, and the deep space network earth station in Goldstone, California. We establish parameters and procedures that will further enhance 2.3 GHz WCS licensees' ability to offer fixed and mobile broadband services while further mitigating the potential for harmful interference[2] from WCS operations to Satellite Digital Audio Radio Service (SDARS) receivers and promoting the co-existence of the WCS and SDARS. We also take additional actions to standardize the operation and licensing of SDARS terrestrial repeaters in the 2320-2345 MHz band, while protecting adjacent bands WCS users. Collectively, these actions will help us to realize the long-awaited goal of delivering broadband services to the public via the WCS frequencies and to facilitate the flexible deployment and operation of SDARS terrestrial repeaters.

3. Specifically, we address five petitions for reconsideration of the *2010 WCS R&O* in WT Docket No. 07-293 and the *SDARS 2nd R&O* in IB Docket No. 95-91. The *2010 WCS R&O* modified the technical rules and performance (*i.e.*, buildout) requirements for the WCS in the 2305-2320 MHz and 2345-2360 MHz radio frequency (RF) bands (bands); the *SDARS 2nd R&O* established technical and

[1] *See* Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, WT Docket No. 07-293, Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Band, IB Docket No. 95-91, GEN Docket No. 90-357, RM-8610, *Report and Order and Second Report and Order*, 25 FCC Rcd 11710 (2010) ("*2010 WCS R&O and SDARS 2nd R&O"*). We refer to the *Report and Order* in WT Docket No. 07-293 as the "*2010 WCS R&O*." We refer to the *Second Report and Order* in IB Docket No. 95-91 as the "*SDARS 2nd R&O*."

[2] Under the Commission's rules, harmful interference is defined as "[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations." 47 C.F.R. § 2.1(c).

licensing rules for SDARS terrestrial repeaters in the 2320-2345 MHz band.[3] ARRL, the national association for Amateur Radio ("ARRL");[4] WCS licensee AT&T, Inc. (AT&T);[5] competing applicants Green Flag Wireless ("Green Flag"), LLC, James McCotter ("McCotter"), and CWC License Holdings, Inc. ("CWC") (collectively Green Flag);[6] SDARS licensee Sirius XM Radio Inc. (Sirius XM);[7] WCS licensee Stratos Offshore Services Company ("Stratos");[8] and the WCS Coalition[9] filed petitions for reconsideration of the *2010 WCS R&O and SDARS 2nd R&O*. These petitions largely raise issues that the Commission considered and addressed in the *2010 WCS R&O and SDARS 2nd R&O*.

4. For the WCS, we establish maximum design ground power level targets for WCS base and fixed station operations to serve as triggers for interference resolution if exceeded on roadways and harmful interference (*i.e.*, muting) to SDARS operations occurs, eliminate the frequency band restrictions

[3] *Id*. The WCS is a radiocommunication service licensed pursuant to Part 27 of the Commission's rules in specified frequency bands, including the 2305-2320 MHz and 2345-2360 MHz bands. WCS licensees are permitted to provide fixed, mobile, and radiolocation services. In addition, WCS licensees are permitted to provide SDARS in the 2310-2320 and 2345-2360 MHz bands. *See* 47 C.F.R. §§ 2.106, 27.2(a), (c), 27.4, 27.5(1)-(2). SDARS – commonly referred to as "satellite radio" – is "[a] radiocommunication service in which audio programming is digitally transmitted by one or more space stations directly to fixed, mobile, and/or portable stations, and which may involve complementary repeating terrestrial transmitters, telemetry, tracking and control facilities." 47 C.F.R. § 25.201. An SDARS terrestrial repeater is a complementary repeating terrestrial transmitter whose construction and operation is permitted only in conjunction with at least one SDARS space station (*i.e.*, satellite) that is concurrently authorized and transmitting directly to subscribers. SDARS terrestrial repeaters are restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the SDARS licensee's satellite(s) directly to the SDARS licensee's subscribers' receivers, and may not be used to distribute any information not also transmitted to all subscribers' receivers. Operators of SDARS terrestrial repeaters are prohibited from using those repeaters to retransmit different transmissions from a satellite to different regions within that satellite's coverage area. *See* 47 C.F.R. §§ 25.144(e)(1), (4), and (5). SDARS operators use complementary terrestrial repeaters to fill in gaps in satellite coverage where direct reception of satellite signals is blocked and signal levels are inadequate to provide uninterrupted service.

[4] *See* Petition for Clarification or Partial Reconsideration (filed Sept. 1, 2010) ("ARRL Petition").

[5] *See* Petition for Partial Reconsideration (filed Sept. 1, 2010) ("AT&T Petition").

[6] *See* Petition for Reconsideration (filed Sept. 1, 2010) ("Green Flag Petition"). In 2007, Green Flag filed competing (*i.e.*, mutually exclusive) applications against AT&T's applications for renewal of its WCS authorizations. Green Flag recently withdrew those applications and related pleadings, including the Green Flag Petition. *See* Wireless Telecommunications Bureau Approves Settlement Agreement and Dismisses Competing Renewal Applications, WT Docket 10-112, *Public Notice*, DA 12-1640 (WTB Oct. 15, 2012). We therefore do not address Green Flag's withdrawn petition in this order. We also note that AT&T has filed applications to acquire certain WCS authorizations currently held by Comcast Corporation, Horizon Wi-Com, LLC, NextWave Wireless, Inc., and San Diego Gas & Electric Company. *See* AT&T Seeks FCC Consent to the Assignment and Transfer of Control of WCS and AWS-1 Licenses, WT Docket No. 12-240, *Public Notice*, DA 12-1431 (WTB rel. Aug. 31, 2012), and AT&T Mobility Spectrum LLC and San Diego Gas & Electric Company Seek FCC Consent to the Assignment of Two WCS Licenses, WT Docket No. 12-240, *Public Notice*, DA 12-1513 (WTB rel. Sept. 19, 2012).

[7] *See* Petition for Partial Reconsideration and Clarification of Sirius XM Radio Inc. (filed Sept. 1, 2010) ("Sirius XM Petition").

[8] *See* Petition for Clarification (filed Sept. 1, 2010) ("Stratos Petition").

[9] *See* Petition of the WCS Coalition for Partial Reconsideration (filed Sept. 1, 2010) ("WCS Coalition Petition"). The WCS Coalition includes WCS licensees Horizon Wi-Com, LLC, AT&T Inc., Comcast Corporation, NTELOS Inc., and NextWave Broadband Inc., which collectively hold virtually all the licenses to the 2305-2320 MHz and 2345-2360 MHz WCS spectrum within the United States. *See 2010 WCS R&O*, 25 FCC Rcd at 11723 n.85.

on WCS frequency division duplexing (FDD)[10] base station operations, and relax the restrictions on low-power fixed WCS customer premises equipment (CPE) (average equivalent isotropically radiated power (EIRP) of 2 Watts or less) outdoor use and outdoor antenna use under certain circumstances. In addition, we prohibit WCS mobile and portable devices' transmissions in WCS Blocks C and D, relax the WCS licensee notification requirements for low-power WCS stations (EIRP less than 2 Watts) and minor WCS station modifications, and, under certain circumstances, modify the technical operating parameters (*e.g.*, duty cycle and power spectral density limits) for WCS mobile and portable devices and fixed WCS CPE (*e.g.*, duty cycle limit) that were adopted in the *2010 WCS R&O*. We clarify that WCS fixed stations (except fixed CPE) are subject to the SDARS notification process and to the Aeronautical Mobile Telemetry (AMT) and Deep Space Network (DSN) coordination process. Furthermore, we encourage WCS licensees to enter into coordination agreements with SDARS licensees to mitigate interference and to facilitate efficient deployment of and coexistence between each service. We are also providing a limited extension of the WCS performance periods established in the *2010 WCS R&O* and restarting the construction periods currently applicable to existing WCS licensees to enable licensees to respond to the revisions we are making to our technical rules while ensuring significant deployment of facilities in the near term. However, we decline to replace the coverage-based performance requirements for WCS Blocks C and D or the automatic license forfeiture provisions for failure to comply with the WCS performance requirements.

5. For the SDARS, we decline to modify the site-by-site licensing procedures that the Commission established in the *SDARS 2nd R&O* for high power SDARS terrestrial repeaters that are not eligible for blanket licensing (*e.g.*, repeaters with average EIRP greater than 12 kilowatts (kW)). In addition, we modify the definition of which WCS licensees would be "potentially affected" by SDARS terrestrial repeaters operating with greater than 12 kW average EIRP or relaxed out-of-band emissions (OOBE) limits. We also eliminate SDARS licensee notification requirements for low-power SDARS terrestrial repeaters (EIRP less than 2 Watts) and adopt notification requirements for minor modifications to SDARS terrestrial repeaters to match the SDARS licensee notification requirements to those for similarly situated low-power WCS stations and minor modifications to WCS stations.

II. BACKGROUND

A. WCS and SDARS Overview

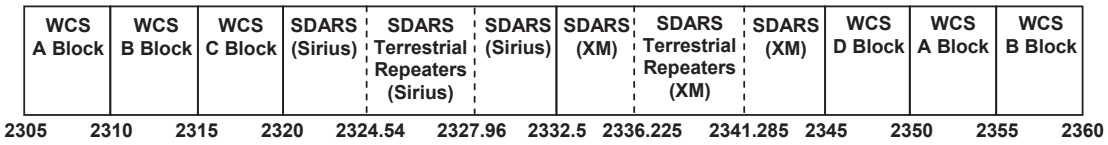
6. The WCS and SDARS occupy 55 megahertz of RF spectrum, frequently referred to as the "2.3 GHz band," from 2305-2360 MHz. The SDARS occupies the center portion of the 2.3 GHz band at 2320-2345 MHz, and this spectrum is divided evenly between two separate, but co-owned, SDARS networks, Sirius and XM.[11] The WCS occupies frequency bands on either side of the SDARS allocation

[10] FDD allows simultaneous radio transmission and reception between a subscriber's device and a base station by providing two simultaneous but separate frequencies (aka channels). In a time division duplexing (TDD) system, a common channel is shared between the uplink (subscriber to base station transmission) and downlink (base station to subscriber transmission), with the resource being switched in time.

[11] The Commission established the SDARS in March 1997. *See* Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, IB Docket No. 95-91, *Report and Order, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 12 FCC Rcd 5754 (1997) (*"SDARS Order and FNPRM"* or "*1997 Further Notice*"). The 2320-2345 MHz band is assigned to the SDARS under the primary broadcasting-satellite service allocation in the U.S. Table of Frequency Allocations (U.S. Table). 47 C.F.R. §§ 2.106, 25.202(a)(6). The Commission awarded licenses to provide SDARS within the United States by auction in early April 1997. *See* FCC Announces Auction Winners for Digital Audio Radio Service, *Public Notice*, 12 FCC Rcd 18727 (rel. Apr. 2, 1997). The Commission originally assigned the 2320-2332.5 MHz band to Sirius Satellite Radio Inc. (Sirius) (formerly, Satellite CD Radio, Inc.), and assigned the 2332.5-2345 MHz band to XM Radio Inc. (XM) (formerly, American Mobile Radio Corporation). In August 2008, Sirius and XM merged to form a single company – Sirius XM Radio, Inc. (Sirius XM) – but the merged entity continues to operate the Sirius and XM (continued….)

and consists of 4 blocks in the 2305-2320 and 2345-2360 MHz bands: two 10-megahertz blocks (paired 5-megahertz blocks) and two unpaired 5-megahertz blocks.[12] Below the 2305-2320 MHz WCS band, the amateur radio service (ARS) is authorized to use the 2300-2305 MHz band on a secondary basis; the 2290-2300 MHz band is allocated on a primary basis for Federal and non-Federal deep space research operations and Federal fixed and mobile (except aeronautical mobile) operations.[13] Above the 2345-2360 MHz WCS band, the 2360-2395 MHz band is allocated on a primary basis for Federal and non-Federal AMT operations (*i.e.*, flight testing of aircraft, missiles, and major components thereof).[14] The figure below shows the WCS and SDARS spectrum allocations in the 2305-2360 MHz band.

2305-2360 MHz Band Plan



B. Procedural History

7. Although the Commission adopted service rules for most aspects of SDARS operations when it established the SDARS in 1997,[15] it did not adopt rules governing terrestrial repeater operations at that time. Instead, the Commission concurrently issued a Further Notice of Proposed Rulemaking (*1997 Further Notice*) seeking comment on the proposed use and authorization of SDARS terrestrial repeaters.[16] In response to the *1997 Further Notice* and later supplemental filings by SDARS licensees Sirius and XM,[17] WCS licensees expressed concern about the possibility of harmful blanketing interference to WCS

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systems as separate networks and there is still a separate license for each system. *See* Applications for Consent to the Transfer of Control of Licenses XM Satellite Radio Holdings Inc., Transferor, to Sirius Satellite Radio Inc., Transferee, MB Docket No. 07-57, *Memorandum Opinion and Order and Report and Order*, 23 FCC Rcd 12348 (2008) (*"SDARS Merger Order"*). Sirius and XM were separate entities at the time they filed pleadings in this proceeding prior to their merger, but filed as the combined entity, Sirius XM, subsequent to the merger. We shall refer to them as separate entities or the combined entity, hereinafter, as appropriate.

[12] The Commission established the WCS in February 1997. *See* Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service, GN Docket No. 96-228, *Report and Order*, 12 FCC Rcd 10785 (1997) (*"1997 WCS R&O*"). The 2305-2320 MHz and 2345-2360 MHz bands are assigned to the WCS under the primary fixed, mobile, and radiolocation service allocations in the U.S. Table. 47 C.F.R. §§ 2.106, 27.1(b)(1), 27.2(a), (c), 27.5(a)(1)-(2). The WCS spectrum is separated into paired blocks (A and B) that the Commission allocated on a regional basis, and unpaired blocks (C and D) that have been allocated over very wide service areas. 47 C.F.R. § 27.5(a)(1)-(2). The Commission auctioned 128 WCS licenses in April 1997. *See* WCS Auction Closes, Winning Bidders in the Auction of 128 Wireless Communications Service Licenses, *Public Notice*, DA 97-886, 12 FCC Rcd 21653 (rel. Apr. 28, 1997). In July 1997, the Commission issued licenses to the WCS auction winners. *See* FCC Announces the Grant of Wireless Communications Service ("WCS") Licenses, Balance of Winning Bids are Due by August 4, 1997, *Public Notice*, 13 FCC Rcd 4782 (rel. Jul. 21, 1997).

[13] 47 C.F.R. §§ 2.106. Under the Commission's rules, stations of a secondary service "[c]annot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date." 47 C.F.R. § 2.105(c)(2)(ii).

[14] 47 C.F.R. §§ 2.106; 87.303(d)(1).

[15] *See SDARS Order and FNPRM*, 12 FCC Rcd 5754.

[16] *See SDARS Order and FNPRM*, 12 FCC Rcd at 5810-12 paras. 138-142.

[17] *See* Letter from Robert D. Briskman, Chief Technical Officer, CD Radio Inc., to Rosalee Chiara, Deputy Chief, Satellite Policy Branch, International Bureau, FCC, dated Nov. 14, 1997; Letter from William Garner, Chief Scientist, American Mobile Radio Corporation, to Rosalee Chiara, Deputy Chief, Satellite Policy Branch, (continued….)

base stations and fixed CPE from SDARS terrestrial repeaters operating at more than 2 kW EIRP.[18] In response, Sirius and XM generally acknowledged the possibility of blanketing interference and intermodulation distortion, but opposed placing a 2 kW EIRP limit on their terrestrial repeater operations. Sirius and XM argued that such a limit would impose substantial costs on SDARS licensees and that WCS and other terrestrial wireless licensees could mitigate any potential interference from SDARS repeater operations, respectively, by converting wireless operations from analog to digital, and by using WCS down-converters that are sufficient to protect against interference from the proposed SDARS terrestrial repeaters.[19]

8. In November 2001, the Commission's International Bureau sought comment on various additional proposals to resolve interference (*"2001 Public Notice"*),[20] but the supplemental record developed in response to that Public Notice did not provide a basis for resolving these issues.[21] In May 2002, at the request of SDARS and WCS licensees, the Commission decided to refrain from adopting SDARS repeater rules and to allow SDARS and WCS licensees to attempt to resolve the interference concerns privately.[22] Although initially promising, the negotiations were ultimately unsuccessful.[23] After nearly 4 years of private negotiations, Sirius filed a White Paper in which it examined the technical difficulties involved in SDARS and WCS co-existence in the 2.3 GHz band.[24] In October 2006, Sirius filed a petition for rulemaking based on its White Paper, which included new

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International Bureau, FCC, dated Nov. 14, 1997; Supplemental Comments of Sirius Satellite Radio (filed Jan. 18, 2000) ("Sirius Supplemental Comments"); Supplemental Comments of XM Radio Inc. (filed Dec. 17, 1999) ("XM Radio Supplemental Comments").

[18] *See* WCS Coalition Comments (dated Dec. 14, 2001) at 3-4. Blanketing interference occurs when a receiver is near a relatively high-powered adjacent-band transmitter and the high-power signal overloads the components of the receiver and prevents reception of the desired signal by the receiver. *See* Sirius Satellite Radio, Inc., Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters, DA 01-2171, *Order and Authorization*, 16 FCC Rcd 16773, 16774 n.5 (Int'l Bur. 2001) ("*Sirius 2001 STA Order*"); XM Radio, Inc., Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters, DA 01-2172, *Order and Authorization*, 16 FCC Rcd 16781, 16782 n.5 (Int'l Bur. 2001) ("*XM Radio 2001 STA Order*").

[19] *See* Reply Comments of Sirius Satellite Radio (filed Mar. 8, 2000) at 2-3; Consolidated Reply of XM Radio Inc. (filed Mar. 8, 2000) at 8.

[20] Request for Further Comment on Selected Issues Regarding the Authorization of Satellite Digital Audio Radio Service Terrestrial Repeater Networks, *Public Notice*, Report No. SPB-176, 16 FCC Rcd 19435 (Int'l Bur., 2001) ("*2001 Public Notice*").

[21] *See* Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band and Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, WT Docket No. 07-293 and IB Docket No. 95-91, *Notice of Proposed Rulemaking and Second Further Notice of Proposed Rulemaking*, 22 FCC Rcd 22123, 22127 para. 10 (2007) (we refer to the item containing the two notices as the "*2007 Notice"*). Because of the inability to reach a consensus on final rules, SDARS licensees have been operating terrestrial repeaters pursuant to grants of special temporary authority (STA), which were granted on a non-interference basis and subject to other conditions. *See generally Sirius 2001 STA Order* and *XM 2001 STA Order*.

[22] *2007 Notice*, 22 FCC Rcd at 22127 para. 10.

[23] *Id*.

[24] *2007 Notice*, 22 FCC Rcd at 22128 para. 12, *citing* White Paper: Interference to the SDARS Service from WCS Transmitters, attached to Letter from Carl R. Frank, Counsel to Sirius Satellite Radio Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 05-256 and IB Docket No. 95-91 (Mar. 29, 2006) ("Sirius 2006 White Paper").

proposals for resolving interference issues between SDARS and WCS licensees.[25] In response to Sirius' petition, WCS licensees offered their own counterproposals for the resolution of SDARS and WCS interference issues.[26]

9. The Commission determined that Sirius' proposal and WCS licensees' counterproposals could provide a basis for resolving the ongoing issues of potential interference between SDARS terrestrial repeaters and WCS stations.[27] The Commission also decided to take the opportunity to update and refresh the record on other issues raised in the *1997 Further Notice* and the *2001 Public Notice*.[28] Accordingly, in December 2007, the Commission issued a *Second Further Notice of Proposed Rulemaking* in IB Docket No. 95-91, inviting comment on issues related to the operation of SDARS terrestrial repeaters. In order to have the greatest flexibility in resolving interference issues between SDARS and WCS licensees and develop a record that would enable the provision of innovative broadband services in the 2.3 GHz WCS band, the Commission also issued a *Notice of Proposed Rulemaking* in a new docket (WT Docket No. 07-293), which sought comment on proposals to make changes to the Commission's rules in Part 27 governing 2.3 GHz WCS operations.[29]

10. On April 2, 2010, Commission staff issued a public notice seeking comment on draft interference rules for the WCS and SDARS (*2010 Public Notice*).[30] Specifically, Commission staff sought comment on provisions intended to minimize the risk of harmful interference from WCS mobile and portable devices to SDARS, AMT, and DSN receivers. In addition, Commission staff sought comment on draft technical rules for SDARS terrestrial repeaters intended to minimize the potential for harmful interference to WCS receivers. Commission staff also sought comment on licensing provisions for SDARS terrestrial repeaters, as well as rules regarding the use of terrestrial repeaters to originate local programming.[31] In May 2010, the Commission adopted the *2010 WCS R&O* in WT Docket No. 07-293 and the *SDARS 2nd R&O* in IB Docket No. 95-91. The *2010 WCS R&O* adopted final rules for the 2.3 GHz WCS that modified the technical parameters governing the operation of WCS mobile and portable devices and thereby provide WCS licensees with the ability to offer mobile broadband services, while limiting the potential for harmful interference to incumbent services in adjacent bands. The *SDARS*

[25] *2007 Notice*, 22 FCC Rcd at 22128 para. 12, *citing* Sirius Satellite Radio Inc., Petition for Rulemaking and Comments (filed Oct. 17, 2006) ("*2006 Sirius Petition for Rulemaking*"). XM supported Sirius' proposals and urged the Commission to seek comment on them expeditiously. *See 2007 Notice*, 22 FCC Rcd at 22128 para. 12.

[26] *2007 Notice*, 22 FCC Rcd at 22128 para. 12, *citing* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, dated July 9, 2007 ("*WCS July 2007 Letter"*).

[27] *2007 Notice*, 22 FCC Rcd at 22124 para. 2 and 22128-29 para. 14.

[28] *2007 Notice*, 22 FCC Rcd at 22128-29 para. 14.

[29] *2007 Notice*, 22 FCC Rcd at 22124 para. 3. In a related matter, on March 29, 2010, the Commission sought comment on whether, if it altered the technical rules for this band, it should also revise the substantial service performance requirements ("*WCS Performance Public Notice*"). *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, 75 Fed. Reg. 17349 (rel. Mar. 29, 2010). Specifically, the Commission sought comment on particular reliable signal and license area coverage benchmarks for WCS mobile and point-to-multipoint services and possible alternatives, on particular link construction and operation benchmarks for WCS point-to-point services and possible alternatives, and on related construction notification filing requirements. *Id.* at 2-3.

[30] *See* Commission Staff Requests That Interested Parties Supplement the Record On Draft Interference Rules for Wireless Communications Service and Satellite Digital Audio Radio Service, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610, Public Notice, DA 10-592 (rel. Apr. 2, 2010) ("*2010 Public Notice*").

[31] *Id.*

2nd R&O adopted technical rules governing the operation of SDARS terrestrial repeaters that were designed to limit the potential for harmful interference to adjacent bands WCS spectrum users but not impede the deployment or function of the repeaters, along with a blanket-licensing regime for SDARS terrestrial repeaters that was intended to promote their flexible deployment.

11. The Commission's primary objectives in the *2010 WCS R&O and SDARS 2nd R&O* were to establish a permanent regulatory framework for the co-existence of WCS and SDARS operations in the 2305-2360 MHz band while limiting their potential to cause harmful interference (*i.e.*, interference which seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service) to other adjacent bands services. In modifying the technical regulations governing WCS operations and establishing technical and licensing regulations governing SDARS terrestrial repeaters, the Commission sought to strike a balance between the goal of allowing WCS and SDARS licensees to provide viable services and the need to limit these services potential to cause harmful interference.[32]

12. *Modification of 2.3 GHz-Band WCS Rules*. To resolve ongoing issues of potential interference between WCS and SDARS licensees and enable the provision of innovative broadband services in the 2.3 GHz WCS band, while protecting adjacent-band AMT and nearby DSN operations from harmful interference, in the *2010 WCS R&O*, the Commission modified the technical parameters governing the operation of WCS base, fixed, and mobile stations in the 2.3 GHz band.[33] Specifically, for WCS base and fixed stations that operate in WCS Blocks A and B, the Commission modified the maximum allowed EIRP, established power spectral density (PSD) and peak-to-average power ratio (PAPR) limits, restricted the bands of operation of base stations using FDD technology, and relaxed the OOBE limits. For WCS base and fixed stations that operate in WCS Blocks C and D, the Commission maintained the existing peak EIRP limit of 2 kW but established a PSD limit, relaxed the OOBE limits, and restricted the bands of operation for base stations using FDD technology.[34]

13. For fixed WCS CPE, the Commission established maximum EIRP, duty cycle, and OOBE limits, required use of automatic transmit power control (ATPC),[35] and prohibited the use of outdoor antennas and installations for low-power fixed WCS CPE (*i.e.*, average EIRP of 2 Watts per 5 megahertz (2 W/5 MHz) or less).[36] For low-power fixed WCS CPE, the Commission adopted the same OOBE limits that it adopted for WCS mobile devices; for fixed WCS CPE operating with an average EIRP of more than 2 W/5 MHz, it adopted the same OOBE limits that it adopted for WCS base and fixed stations.[37] For WCS mobile and portable devices (hereinafter referred to as mobile devices),[38]

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[32] *See 2010 WCS R&O and SDARS 2nd R&O*, 25 FCC Rcd at 11712 para. 2.

[33] *See* 25 FCC Rcd at 11723-99, paras. 28-224. Under the Commission's rules, a base station is defined as a land station in the land mobile service; a fixed station is a station in the fixed service; and a mobile station is a station in the mobile service intended to be used while in motion or during halts at unspecified points. 47 C.F.R. § 27.4.

[34] *See 2010 WCS R&O*, 25 FCC Rcd at 11759-66 paras. 114-136.

[35] ATPC is a feature of a digital microwave radio link that adjusts the transmitter output power based on the varying signal level at the receiver. ATPC allows the transmitter to operate at less than maximum power for most of the time, thereby minimizing the potential for intra and inter-service interference; when fading conditions occur, transmit power is increased as needed until the maximum is reached. An ATPC equipped system has several potential advantages over a fixed transmit power system, including less transmitter power consumption, longer amplifier component life, and reduced interference potential to other microwave radio systems. *See* National Spectrum Managers Association Recommendation WG 18.91.032 Automatic Transmit Power Control (ATPC) at 1, *available at* http://www.nsma.org/recommendation/WG18-91-032.pdf (last visited Oct. 16, 2012).

[36] *See 2010 WCS R&O*, 25 FCC Rcd at 11768-69, paras. 140, 142-143; 47 C.F.R. § 27.50(a)(2); 27.53(a)(2)(i)-(iii), (3)(i)-(iii).

[37] *See 2010 WCS R&O*, 25 FCC Rcd at 11768-69, paras. 140, 142; 47 C.F.R. §§ 27.53(a)(2)(i)-(iii), (3)(i)-(iii).

the Commission reduced the maximum allowed EIRP from 20 W to 250 milliwatts (mW), relaxed the OOBE limits, established PSD and duty cycle limits,[39] required use of ATPC, designated guard bands in the 2.5 megahertz of WCS Blocks C and D nearest the SDARS band (*i.e.*, 2317.5-2320 MHz and 2345-2347.5 MHz) where WCS mobile devices are prohibited from transmitting, restricted the operation of WCS mobile devices employing FDD technology to the lower WCS A and B Blocks and the 2.5-megahertz portion of the WCS C Block furthest removed from the SDARS band (*i.e.*, 2305-2317.5 MHz), and prohibited the use of external vehicle-mounted antennas for WCS mobile devices transmitting in the 2305-2317.5 MHz and 2347.5-2360 MHz bands.[40]

14. To help limit the potential for harmful interference to SDARS subscribers from WCS operations, the Commission also established SDARS licensee notification requirements for WCS licensees, whereby WCS licensees are required to notify SDARS licensees regarding the location and operation of new and modified WCS base and fixed stations prior to their deployment.[41] In addition, it required WCS licensees to coordinate WCS base and fixed stations within 145 kilometers (km) of the Goldstone, California DSN site and within 45 km or line of sight, whichever is greater, of an AMT receiver.[42] It also required WCS licensees to cooperate in good faith in the selection and use of new station sites and new frequencies to minimize the risk of harmful interference and, if causing harmful interference, to cooperate in good faith to resolve such problems by mutually satisfactory arrangements.[43]

15. In a related matter in the *2010 WCS R&O*, to ensure that WCS licensees would use the WCS spectrum intensively in the public interest, the Commission also moved from a substantial service performance requirement to quantitative mobile or fixed wireless benchmarks. Under the revised performance requirements, if a WCS licensee does not meet a performance deadline for its license area, then it would be subject to automatic license termination.[44]

16. *Establishment of Rules for 2.3 GHz-Band SDARS Terrestrial Repeaters*. As part of the effort to resolve the ongoing issues of potential interference between WCS and SDARS licensees, the *SDARS 2nd R& O* established a blanket-licensing regime for SDARS terrestrial repeaters that operate at 12 kW or less average EIRP and that otherwise comply with agreements with Canada and Mexico on use of the 2.3 GHz bands, as well as the Commission's rules regarding out-of-band emissions limits, RF safety, antenna marking and lighting, and equipment authorization.[45] The Commission found that such blanket licensing would facilitate the flexible deployment of SDARS terrestrial repeaters, but would

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[38] Under the Commission's rules for radio frequency (RF) exposure evaluation, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. 47 C.F.R. § 2.1091. A portable device is defined as a transmitting device where the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. 47 C.F.R. § 2.1093.

[39] Duty cycle (also known as duty factor) is the percentage a transmission frame that a WCS user device uses to transmit information to the base station (*i.e.*, the "on time" of a WCS user device's transmitter in a given transmission frame).

[40] *See 2010 WCS R&O*, 25 FCC Rcd at 11738-39 para. 63; 11741-44 paras. 68-72, 76; 47 C.F.R. § 27.50(a)(3)(iv).

[41] *Id.*, 25 FCC Rcd at 11772 paras. 150-151; 47 C.F.R. § 27.72. 47 C.F.R. § 27.72(b).

[42] *See 2010 WCS R&O*, 25 FCC Rcd at 11778-9 para. 166; 11786 para. 184. *See also* 47 C.F.R. § 27.73(a), (b).

[43] *See 2010 WCS R&O*, 25 FCC Rcd at 11786 para. 185. *See also* 47 C.F.R. § 27.73(d).

[44] *See 2010 WCS R&O*, 25 FCC Rcd at 11790-99 paras. 195-224; 47 C.F.R. § 27.14(p)(1)-(8).

[45] *See id.*, 25 FCC Rcd at 11812-14 paras. 270-275; 47 C.F.R. § 25.144(e)(2).

also limit the potential for harmful interference to WCS licensees in adjacent frequency bands.[46] Repeaters that are not eligible for blanket licensing may be licensed on a site-by-site basis.[47] To further reduce the potential for harmful interference from SDARS terrestrial repeaters to 2.3 GHz-band WCS subscribers, the Commission also established WCS licensee notification requirements for SDARS licensees which required SDARS licensees to share information with WCS licensees regarding the location and operation of new and modified SDARS terrestrial repeaters prior to their deployment.[48] These notification requirements parallel the notification requirements that the Commission adopted for WCS licensees.

17. *Petitions*. ARRL, the national association for Amateur Radio (ARRL);[49] WCS licensee AT&T, Inc. (AT&T);[50] SDARS licensee Sirius XM Radio Inc. (Sirius XM);[51] WCS licensee Stratos Offshore Services Company (Stratos);[52] and the WCS Coalition[53] filed petitions for reconsideration of the *2010 WCS R&O and SDARS 2nd R&O*. The five petitions seek reconsideration, clarification, or both of the Commission's decisions in the *2010 WCS R&O and SDARS 2nd R&O* regarding: a) WCS base and fixed stations' ground level emissions limit, b) fixed WCS CPE power and PSD limits, bands of operation, and outdoor antenna use, c) distinction between fixed WCS CPE and fixed WCS point-to-point stations, d) mobile and portable devices' PSD and OOBE limits, e) restrictions on WCS FDD mobile and portable devices' bands of operation, f) WCS mobile and portable devices' and fixed WCS CPE duty cycle limits, g) WCS protection of ARS operations and WCS base/fixed stations' and mobile devices' OOBE limits in the 2300-2305 MHz band, h) WCS coordination, notification, and interference mitigation requirements; base station separation distance, i) WCS performance requirements, j) WCS/SDARS coordination zones, k) interference protection for WCS from SDARS terrestrial repeaters, and l) WCS and SDARS licensees' duty to cooperate in sharing information and preventing/mitigating interference. On September 22, 2010, the Commission placed the *2010 WCS R&O and SDARS 2nd R&O* petitions for reconsideration on public notice for comment.[54]

18. *Subsequent Filings*. Most recently, as part of a coordination agreement to resolve interference concerns between themselves and facilitate efficient deployment of and coexistence between their services, AT&T and Sirius XM have submitted a request that the Commission modify the Part 27 WCS rules on reconsideration in accordance with the terms of their agreement.[55] A copy of this request

[46] *See id.*, 25 FCC Rcd at 11803 para. 240.

[47] *See id.* 25 FCC Rcd at 11809-10 paras. 259-261; 47 C.F.R. § 25.144(e)(9).

[48] *See id.* 25 FCC Rcd at 11772 paras. 150-151.

[49] *See* ARRL Petition.

[50] *See* AT&T Petition.

[51] *See* Sirius XM Petition.

[52] *See* Stratos Petition.

[53] *See* WCS Coalition Petition.

[54] *See* Petitions for Reconsideration of Action in Rulemaking Proceeding, *Public Notice*, Report No. 2917 (rel. Sept. 22, 2010). Oppositions were due Oct. 18, 2010; Replies to Oppositions were due Oct. 28, 2010. *See* FR 60748, Oct. 1, 2010. The petitions, oppositions, replies to oppositions and other related documents may be viewed in the Commission's Electronic Comment Filing System (ECFS) at http://fjallfoss.fcc.gov/ecfs/comment_search/input?z=k504b in WT Docket No. 07-293 and IB Docket No. 95-91, which can be accessed from the Commission's main web page at http://www.fcc.gov under Quick Links Public Comment (ECFS).

[55] *See* Letter from Joan Marsh, Vice President – Federal Regulatory, AT&T Inc., Kristin S. Rinne, Sr. Vice President – Network Technologies, AT&T Inc., James S. Blitz, Vice President, Regulatory Counsel, Sirius XM (continued….)

and agreement was filed in the dockets in this proceeding on June 15, 2012. AT&T and Sirius XM request that the Commission: 1) prohibit mobile/portable transmitters in WCS Blocks C and D; 2) exempt mobile/portable stations in WCS Blocks A and B Blocks using appropriate uplink (user device to base station) transmission protocols from the 50 mW/MHz PSD limit; 3) exempt mobile and portable devices and fixed CPE using FDD technology from all uplink duty cycle limits; 4) permit FDD base station operations in the lower WCS blocks; 5) establish maximum design ground power level targets on roadways for WCS base and fixed stations to serve as triggers for interference resolution if exceeded on roadways and harmful interference to SDARS operations occurs; 6) permit outdoor and outdoor antenna use under certain circumstances by fixed WCS CPE stations operating with 2 W/5 MHz or less average EIRP (*i.e.*, low-power fixed WCS CPE) and the stepped OOBE mask applicable to WCS mobile/portable devices; 7) require other WCS licensees to enter into coordination agreements with Sirius XM that is similar to AT&T's and Sirius XM's agreement, which would supersede any conflicting requirements in Section 27.72 of the Commission's rules; and 8) define harmful interference to SDARS operations.[56] AT&T and Sirius XM claim that adoption of these requested rule changes would allow WCS licensees more flexibility to deploy the most efficient new mobile broadband standards, including Long Term Evolution (LTE),[57] while limiting the potential for harmful interference to SDARS receivers to acceptable levels, and resolve many of the issues on reconsideration in this proceeding.[58] Gogo, Inc. (Gogo), which is interested in providing ground-to-air service in WCS Blocks C and D, supports AT&T and Sirius XM's proposals because it supports use of the C and D Blocks for broadband related uses such as fixed operations, wireless backhaul, and unidirectional transmissions like Gogo's ground-to-air transmissions.[59]

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Radio Inc. and Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293; IB Docket No. 95-91(filed June 15, 2012) ("AT&T/Sirius XM June 15, 2012 Agreement").

[56] *Id*. at 3-7 and 16-19. Although in the body of their request, AT&T and Sirius XM requested that we require WCS licensees to enter into a coordination agreement with Sirius XM that is similar to the their agreement, in their proposed rules, they request that WCS licensees be encouraged to develop separate coordination agreements with SDARS licensees to facilitate efficient deployment of and coexistence between each service. *See id.* at 7 and 18.

[57] LTE is a high performance wireless broadband technology that is based on Orthogonal Frequency Division Multiple Access (OFDMA) and uses Internet Protocol (IP) packets rather than a proprietary packet structure. Developed by the Third Generation Partnership Project (3GPP), an industry trade group, LTE supports both FDD and TDD modes of operation, provides a framework for increasing data rates and overall system capacity, reducing latency, and improving spectral efficiency and cell-edge performance. *See* Agilent Technologies LTE Overview, *available at* http://www.home.agilent.com/agilent/editorial.jspx?cc= US&lc=eng&cke y=1803101&nid=34867.0.00&id=1803101.

[58] *See* AT&T/Sirius XM June 15, 2012 Agreement at 1-2. San Diego Gas & Electric (SDG&E), which acquired portions of the WCS C and D block licenses in the West Regional Economic Area Grouping (REAG 6) in late 2010, initially objected to AT&T's and Sirius XM's request for the Commission to adopt the terms and conditions of their private coordination agreement and the proposals set forth in AT&T's and Sirius XM's June 15, 2012 joint submission. *See* Letter from Jeffrey C. Nichols, Director, Information Security & Information Management, San Diego Gas & Electric Company at 1-3 (filed July 26, 2012) ("SDG&E July 26, 2012 *Ex Parte* Letter"). However, SDG&E subsequently advised the Commission that "it has reached an acceptable commercial agreement with AT&T that addresses SDG&E's concerns," and withdrew its opposition to AT&T's and Sirius XM's proposals. *See* Letter from Jeffrey C. Nichols, Director, Information Security & Information Management, San Diego Gas & Electric Company at 1 (filed Sept. 4, 2012) ("SDG&E Sept. 4, 2012 *Ex Parte* Letter").

[59] *See* Letter from Thomas Gutierrez, Counsel to Gogo, Inc. to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1-2 (filed June 27, 2012). We also note that on October 10, 2012, Stratos submitted a waiver request seeking exemption for its operations in the Gulf of Mexico from the suggested rule changes submitted by AT&T and Sirius XM in their June 15, 2012 joint submission. *See* Stratos Offshore Services Company Contingent Request for Waiver, WT Docket No. 07-293 (filed Oct. 10, 2012). Because Stratos' waiver request does not affect the substance of the rules under consideration, it will be addressed separately.

19. Below we resolve the petitions for reconsideration filed in response to the *2010 WCS R&O and SDARS 2nd R&O*. Doing so will further promote the deployment of broadband services in the 2.3 GHz WCS spectrum while further facilitating the co-existence of the WCS and SDARS. Our disposition of these matters is detailed below in Section III for petitions regarding the WCS rules adopted in the *2010 WCS R&O*, and in Section IV for petitions regarding the SDARS rules adopted in the *SDARS 2nd R&O*.

III. ORDER ON RECONSIDERATION IN WT DOCKET NO. 07-293

A. WCS Base and Fixed Stations

20. *Background*. In the *2010 WCS R&O*, for WCS base and fixed stations, the Commission adopted OOBE attenuation factors below the transmitter power P, in Watts (W), of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band of operation, not less than 75 + 10 log (P) dB in the 2320-2345 MHz band, not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2362.5 MHz bands, not less than 55 + 10 log (P) dB in the 2362.5-2365 MHz band, not less than 70 + 10 log (P) dB in the 2287.5-2300 MHz and 2365-2367.5 MHz bands, not less than 72 + 10 log (P) dB in the 2285-2287.5 and 2367.5-2370 MHz bands, and not less than 75 + 10 log (P) dB below 2285 MHz and above 2370 MHz.[60] It also prohibited FDD WCS base stations from transmitting in the lower WCS blocks at 2305-2320 MHz.[61] However, it declined to adopt ground-level emissions limits for WCS base and fixed stations' in-band signals or specify a minimum distance at which SDARS receivers are expected to tolerate muting by WCS base stations.[62]

1. Emissions

21. *Petition*. Sirius XM asks the Commission to establish ground-level emissions limits for WCS base and fixed stations of -44 dBm (100 dBμV/m) in WCS Blocks A and B and -55 dBm (90 dBμV/m) in WCS Blocks C and D, which must be adhered to in all instances and locations, as Sirius proposed in its 2006 Petition for Rulemaking.[63] Sirius XM asserts that such limits would better

[60] *See 2010 WCS R&O*, 25 FCC Rcd at 11766 para. 135; 47 C.F.R. §§ 27.53(a)(1)(i)-(iii). A decibel (dB) is a logarithmic unit of measurement of an RF signal's strength in relation to a standard reference signal source. The number of dB for a given ratio of two power levels is obtained by multiplying the common logarithm of the ratio of the two power levels by 10, *i.e.*, 10 x $\log_{10}$(P1/P2). Decibels relative to 1 Watt (W) are denoted as dBW; decibels relative to 1 milliwatt (mW) are denoted as dBm. For example, 10 W equates to 10 dBW; 10 mW equates to 10 dBm. Attenuation of a signal, the difference in dBW or dBm, is expressed in units of decibels, which is commonly abbreviated as dB. *See* ATIS Telecom Glossary 2012; ITU Recommendation ITU-R V.574-4.

[61] *See 2010 WCS R&O* 25 FCC Rcd at 11766 para. 134.

[62] *Id*. at 11766 para. 136.

[63] *See* Sirius XM Petition at 15-17. 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 emissions limit of -44 dBm (100 dBμV/m) for both SDARS terrestrial repeaters and WCS stations. *See* Sirius 2006 Petition for Rulemaking at 4-5, *cited in 2007 Notice*, 22 FCC Rcd at 22129 para. 15. However, in its comments to the *2007 Notice* in this proceeding, Sirius stated that for base and fixed station operations, although a ground-level emissions limit of -44 dBm (100 dBμV/m) would be appropriate in WCS Blocks A and B, such operations in WCS Blocks C and D should be limited to a ground-level emissions limit of -55 dBm (90 dBμV/m), where both limits would be measured 2 meters above the ground in a 5-megahertz bandwidth. *See* Comments of Sirius Satellite Radio Inc. at A10, A13 (filed Feb. 14, 2008). Although Sirius and XM have referred to the proposed "ground-level emission limit" as a power flux density (PFD) limit (*see* letter from Carl R. Frank, Counsel to 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 (continued….)

address the potential for overload interference[64] to SDARS receivers than WCS transmitter power limits because they would address what Sirius XM argues is the actual cause of such interference: an over-abundance of received energy in adjacent bands. Sirius XM also argues that ground-level emissions limits for WCS base stations would afford licensees increased flexibility and greater overall protection by recognizing that in certain circumstances higher WCS transmitter powers may not pose a substantial risk of overload interference. Sirius XM further contends that ground-level emissions limits would account for other scenarios where lower WCS signal strengths could cumulatively cause overload interference to adjacent channel receivers.[65]

22. *Oppositions*. AT&T and the WCS Coalition filed separate oppositions to Sirius XM's petition requesting adoption of ground-level emissions limits for WCS base stations.[66] The WCS Coalition submits that recognizing both the practical difficulties associated with the proposed ground-level emissions limits and the adverse consequences for the WCS if these limits were adopted, the Commission correctly rejected Sirius XM's previous proposal to impose such limits on WCS base and fixed stations in the *2010 WCS R&O*.[67] In addition, the WCS Coalition states that Sirius XM has not established the need for imposing ground-level emissions limits on the WCS, especially given that such limits have not been needed to prevent WCS base stations from interfering with SDARS receivers since inception of the WCS. The WCS Coalition further asserts that Sirius XM's position that ground-level emissions limits for WCS base and fixed stations are needed to avoid overload interference to SDARS receivers is not consistent with Sirius' statement that both Sirius and XM "designed, built and deployed their systems to withstand interference that could be anticipated from Part 27-compliant systems."[68]

23. The WCS Coalition also submits that it would be difficult for WCS base and fixed stations to meet the ground-level emissions limits proposed by Sirius XM and still provide the high quality, ubiquitous service the public demands since base stations in WCS networks would tend to be low to the ground and utilize significant down-tilt to facilitate spectrum reuse and assure ubiquitous coverage. Further, the WCS Coalition claims that ground-level emissions limits would cause the number of base

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Marlene H. Dortch, Secretary, FCC (dated Sept. 19, 2007) at 7-8 and Annex 2), in the *2007 Notice* in this proceeding, 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 power flux density (PFD) or electric field strength limit. Assuming a 0 decibel over isotropic (dBi) measurement antenna (as Sirius does), the -44 dBm received power limit is equivalent to a PFD limit of -45.3 dBW/m² (decibels referenced to a PFD of 1 W per square meter) at 2315 MHz or a field strength limit of 100.5 dBµV/m (decibels referenced to field strength of 1 microvolt per meter). The -55 dBm limit is equivalent to a PFD limit of -56.26 dBW/m² at 2315 MHz, or a field strength limit of 90 dBµV/m. *See 2007 Notice*, 22 FCC Rcd at 22129 n.42.

[64] Overload interference occurs when energy from the fundamental frequency (necessary emissions) of an undesired signal – typically adjacent band – saturates the victim receiver's front-end (low nose amplifier in some systems), resulting in gain compression of the desired signal sufficient to degrade the receiver's performance. Receiver front-end overload is typically a result of inadequate RF selectivity (*i.e.*, inadequate filtering of the undesired signal) in the front-end of the victim receiver. *See* International Telecommunication Union Recommendation ITU-R M.1461-1, Procedure for determining the potential for interference between radars operating in the radiodetermination service and systems in other services, at 2.

[65] *See* Sirius XM Petition at 15-17.

[66] *See* AT&T Opposition at 8 and the WCS Coalition Opposition at 14-18. In its opposition, AT&T fully endorses the WCS Coalition's opposition to Sirius XM's petition regarding ground-level emissions limits on WCS base station transmissions, and agrees with the WCS Coalition's position. *See* AT&T Opposition at 8.

[67] *See* WCS Opposition at 14-15.

[68] *See* WCS Opposition at 15-16.

stations necessary to provide equivalent metropolitan area coverage to at least double when compared to deployments under the original rules, thereby making it impossible for WCS licensees to provide economically viable service.[69] In its opposition, AT&T endorses and agrees with the WCS Coalition's opposition to Sirius XM's request for ground-level emissions limits for WCS base stations.[70]

24. *Reply*. In reply to AT&T's and the WCS Coalition's opposition to its request for WCS base and fixed station ground-level emissions limits, Sirius XM asserts that because the WCS Coalition's petition for reconsideration proposes measuring emissions at ground level to facilitate coordination of WCS base stations and SDARS terrestrial repeaters, the WCS Coalition should not complain about the practical difficulties associated with complying with ground-level emissions limits for WCS base and fixed stations.[71]

25. However, in their June 15, 2012 joint filing, AT&T and Sirius XM request that the Commission establish maximum design ground power level targets for WCS base and fixed station operations that would serve as triggers for interference resolution if exceeded on roadways and harmful interference to SDARS operations occurs.[72] Specifically, AT&T and Sirius XM suggest maximum design ground power level targets of -44 dBm in WCS Blocks A and B and -55 dBm in WCS Blocks C and D. AT&T and Sirius XM suggest that the revised rules should require WCS operators to work cooperatively with SDARS operators to address areas on roadways where such power levels are exceeded and harmful interference (*i.e.*, muting) to SDARS receivers occurs.[73] AT&T and Sirius XM also claim that these levels will help facilitate WCS use of the 2.3 GHz spectrum while minimizing the risk of harmful interference from WCS operations to SDARs receivers to acceptable levels.[74]

26. *Discussion*. Although we decline to revisit the issue of ground-level emissions limits that must be adhered to in all instances and locations for 2.3 GHz WCS base and fixed stations, we decide to establish maximum design ground power level targets for WCS base and fixed stations. As discussed below, if these power levels are exceeded on roadways and harmful interference (*i.e.*, muting) to SDARS receivers occurs, WCS operators would be required to work cooperatively with SDARS operators to address the areas where the levels are exceeded and muting of SDARS receivers occurs. These maximum design ground power level targets are -44 dBm in WCS Blocks A and B and -55 dBm in WCS Blocks C and D. We are encouraged that AT&T and Sirius XM have agreed upon ground power level targets for WCS base and fixed stations that will facilitate the deployment of mobile broadband services in the WCS spectrum while further mitigating the potential for harmful interference to SDARS receivers and facilitating the co-existence of the WCS and SDARS. Furthermore, by adopting these maximum design ground power level targets for the WCS band, the issue of ground level emissions limits that Sirius XM raised on reconsideration is moot. To ensure the success of the maximum design ground power level targets approach, we expect WCS licensees to work cooperatively with SDARS licensees to address any areas on roadways where these power levels are exceeded and harmful interference to SDARS receivers occurs.

[69] *Id.* at 16-18.

[70] *See* AT&T Opposition at 8.

[71] *See* Sirius XM Reply at 8.

[72] *See* AT&T/Sirius XM June 15, 2012 Agreement at 5-6.

[73] *See id.* at 5-6 and at Proposed Revisions to WCS Service Rules, § 27.64.

[74] *See* AT&T/Sirius XM June 15, 2012 Agreement at 2.

2. Circumstances Requiring Coordination to Resolve Interference

27. *Petition*. To provide guidance on the circumstances that would constitute harmful interference to SDARS receivers and help minimize licensee disputes and expedite efforts to mitigate such interference, Sirius XM asks the Commission to clarify the distance at which an SDARS subscriber is expected to tolerate muting of SDARS signals by WCS base station transmitters. Although Sirius XM disagrees with the methodology the Commission used to estimate a horizontal separation distance needed to avert overload interference to an SDARS receiver from a WCS base station, Sirius XM argues that the separation distance the Commission estimated in the *2010 WCS R&O* supports its previous suggestions for ground level emissions limits for WCS base station transmissions. Sirius XM also asserts that if its receivers experience muting every time they come within a few hundred meters of a WCS base station, it could disrupt the SDARS. Sirius XM suggests that the Commission must define a more appropriate coexistence paradigm between the WCS and SDARS.[75]

28. *Opposition*. In reply to Sirius XM's request for clarification of the WCS base station separation distance for muting SDARS signals, the WCS Coalition states that despite Sirius XM's disagreement with the Commission's methodology, Sirius XM has not demonstrated that the decision to modify the maximum permissible power limit for base and fixed stations in WCS Blocks A and B will result in greater risk of harmful interference to SDARS receivers than the initial WCS power limit (*i.e.*, 2 kW peak power), which is still applicable to WCS base and fixed stations in WCS Blocks C and D. The WCS Coalition further asserts that although the separation distance cited in footnote 315 of the *2010 WCS R&O* could change if another signal propagation model or WCS base station height is assumed, the point of the footnote would not change (*i.e.*, WCS base stations operating at up to 2 kW average EIRP within any 5 megahertz of authorized bandwidth, but subject to a PSD limit of 400 W within any 1 megahertz of bandwidth, would still be less likely to cause harmful interference to SDARS receivers than WCS base and fixed stations transmitting at a peak EIRP of 2 kW without a PSD limit, as was originally allowed in the Part 27 WCS rules).[76] The WCS Coalition also claims that adoption of ground level emissions limits would double the number of WCS base stations needed to provide equivalent metropolitan area coverage and thereby undermine the ability of WCS licensees to provide broadband services.[77]

29. However, in their June 15, 2012 joint submission, AT&T and Sirius XM request that the following circumstances be presumed to constitute harmful interference to Sirius XM operations that "should require WCS operators to work cooperatively with SDARS operators to address areas where such power levels are exceeded and harmful interference occurs."[78] Specifically, WCS and SDARS operators would work cooperatively to resolve harmful interference in a location where a WCS signal level is present on a roadway at a level greater than -44 dBm in the A or B Blocks, or -55 dBm in the C or D Blocks, and a test demonstrates that the SDARS customer would be muted over a road distance of greater than 50 meters; or for a mutually agreeable drive test route, if the ground signal level on roadways exceeds -44 dBm in the A or B Blocks, or -55 dBm in the C or D Blocks, for more than 1 percent of the cumulative surface road distance on that drive route, and a test demonstrates that the SDARS customer would be muted over a cumulative road distance of greater than 1/2 of 1 percent (incremental to any muting present prior to use of WCS frequencies in the area of that drive test).[79]

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[75] *See* Sirius XM Petition at 17-18.

[76] *See* WCS Coalition Opposition at 18, n.66, citing *2010 WCS R&O*, 25 FCC Rcd at 11765, n.315.

[77] *Id*. at 17-18.

[78] *See* AT&T/Sirius XM June 15, 2012 Agreement at 6.

[79] *See id* at 7.

30. *Discussion*. We agree with the WCS Coalition that the point of footnote 315 in the *2010 WCS R&O* was for illustrative purposes only and was not intended to imply that a minimum separation distance for WCS base stations should be adopted. Because we are adopting AT&T's and Sirius XM's ground level power targets and interference resolution coordination regime, we do not find it necessary to establish a specific separation distance for WCS base or fixed station transmitters.

31. In the *2010 WCS R&O*, the Commission did not modify the Part 2 rule defining harmful interference, but it did establish an RF environment that was intended to mitigate the risk of harmful interference from WCS operations to SDARS receivers and allow both the WCS and SDARS to coexist and grow by modifying the technical and operating parameters for the WCS. AT&T and Sirius XM assert that adoption of their suggested conditions for requiring interference resolution will help ensure that SDARS customers continue to receive a high-quality, high-availability service, while permitting deployment of innovative mobile broadband services in the WCS bands and helping to achieve the Commission's goal of making additional spectrum available for mobile broadband service.[80] We agree with AT&T and Sirius XM that the need to facilitate wireless broadband operations in the WCS spectrum, coupled with the unique technical challenges associated with allowing a fixed and mobile service to operate adjacent to a broadcasting-satellite service, justify enacting rules, such as their proposed conditions for requiring interference resolution, with more specific obligations and greater regulatory oversight than the Commission requires in other contexts.[81] Thus, to foster deployment of innovative broadband services in the WCS spectrum and further mitigate the risk of harmful interference to SDARS operations, we decide to adopt AT&T's and Sirius XM's proposed roadway signal levels and harmful interference conditions which would trigger coordinated efforts between WCS and SDARS licensees to mitigate the interference. See Section 27.64 in Appendix A for the revised rules implementing the WCS base and fixed stations' signal levels on roadways and harmful interference conditions under which WCS licensees would be required to work cooperatively with SDARS licensees to resolve instances of harmful interference to SDARS operations.

3. Bands of Operation

32. *Background*. To mitigate the potential for WCS mobile devices to cause harmful interference to SDARS receivers in the upper portions of the SDARS band and AMT receivers in the 2360-2395 MHz band, the *2010 WCS R&O* restricted WCS FDD mobile devices to transmitting in the lower WCS bands at 2305-2317.5 MHz and restricted WCS FDD base stations to transmitting in the 2345-2360 MHz band. The Commission determined that restricting WCS FDD mobile devices transmissions to the lower WCS bands and WCS FDD base stations transmissions to the upper WCS bands at 2345-2360 MHz would reduce the likelihood of interference to legacy XM receivers in the upper portions of the SDARS band and improve the protection of adjacent-band AMT receivers from harmful

[80] *See* AT&T/Sirius XM June 15, 2012 Agreement at 2.

[81] In its Reconsideration Petition, Sirius XM presented an alternative request to help the parties resolve interference disputes. *See* Sirius XM Reconsideration Petition at 17 (stating that the Commission, if it declines to adopt ground-based power limits, "must at least provide further guidance as to what would constitute harmful interference to help minimize licensee disputes and expedite efforts to remove interference"). The use of power levels to trigger coordination requirements if harmful interference (*i.e.*, muting) occurs is an effective way of quantifying interference to move parties closer toward a resolution of interference disputes. Additionally, this approach is a logical outgrowth of the issues upon which the Commission sought comment in the notice underlying the *2010 WCS R&O*. *See, e.g.*, *2007 Notice*, 22 FCC Rcd at 22135 para. 32 (asking whether "some other form of coordination [would] be more efficient or effective," and whether WCS licensees or some subgroup of those licensees should be required to coordinate with SDARS repeater operators, and if so, under what circumstances). Similar support for adoption on reconsideration of AT&T's and Sirius XM's other proposals can be found in the petitions for reconsideration filed in response to the *2010 WCS R&O*, and in the *2001 Public Notice*, the *2007 Notice*, or the *2010 Public Notice*.

interference by eliminating the need to coordinate WCS FDD mobile devices' operations with AMT entities.[82]

33. *Petition*. AT&T asks the Commission to eliminate the restriction prohibiting WCS FDD base stations from transmitting in the lower WCS blocks at 2305-2320 MHz.[83] AT&T argues that the public interest requires that the Commission not constrain WCS FDD base stations in this manner. AT&T further argues that because the Commission based this restriction on the need to prevent WCS FDD mobile devices from operating in the upper WCS bands, there is no need to restrict WCS licensees from using the lower band for WCS FDD base station operations to serve the public.[84]

34. *Opposition*. Out of concern that WCS FDD mobile devices would be allowed to be deployed in the upper WCS bands, AFTRCC submits that WCS licensees should not be allowed to deploy FDD base stations in the 2305-2320 MHz WCS band.[85] Boeing states that to facilitate successful coordination with AMT operations, WCS base stations using FDD technology should be restricted to the upper 2345-2360 MHz WCS band.[86] Boeing contends that critical AMT receive sites can be better protected by: 1) restricting FDD WCS base stations to transmitting only in the upper portion of the WCS band (*i.e.*, 2345-2360 MHz) where they can be coordinated with AMT entities, and 2) restricting WCS FDD mobile devices to transmitting only on the lower WCS frequencies (*i.e.*, 2305-2317.5 MHz) where they will not interfere with AMT receivers and need not be coordinated with Federal and non-Federal AMT entities. To ensure this outcome, Boeing states that the Commission should reject AT&T's petition and maintain the WCS rules, which restrict WCS base stations using FDD technology to transmitting in the 2345-2360 MHz band, in their current form.[87]

35. In their June 15, 2012 joint filing, AT&T and Sirius XM request that WCS FDD base station operations in the lower WCS blocks at 2305-2320 MHz be permitted while retaining the prohibition against FDD mobile and portable devices transmitting in the upper WCS A and B Blocks.[88] AT&T and Sirius XM agree that a limitation on FDD base stations in the lower WCS blocks is not needed since time division duplexing (TDD)[89] base stations are allowed to operate in both the upper and lower WCS blocks. AT&T and Sirius XM submit that any interference concerns attendant with FDD base stations in the lower WCS blocks will be minimized through their proposed ground power limit and definition of harmful interference. Subsequently, any remaining concerns could be resolved on a case-by-case basis through coordination agreements between WCS licensees and Sirius XM, without the wholesale prohibition of base stations from the lower WCS blocks, to allow support of asymmetrical data bandwidth allocation.[90] In response to AT&T's and Sirius XM's request, AFTRCC submits that because the AT&T/Sirius XM submission does not request that WCS FDD mobile devices be allowed to transmit

[82] *See* 25 FCC Rcd at 11743 para. 74

[83] *See* AT&T Petition at 20-21.

[84] *Id.*

[85] *See* AFTRCC Opposition to Petitions for Reconsideration at 8-9.

[86] Opposition of the Boeing Company, filed Oct. 18, 2010, at 8.

[87] *See id.* at 9.

[88] *See* AT&T/Sirius XM June 15, 2012 Agreement at 4-5.

[89] *See* n.10, *supra*, for a description of TDD.

[90] *Id*.

in the upper WCS blocks, AFTRCC's concerns regarding use of the upper WCS bands for WCS FDD mobile and portable devices' transmissions in those bands have been addressed.[91]

36. *Discussion*. To provide WCS licensees with more flexibility to enhance service to the public and to support FDD downlink carrier aggregation, we decide that WCS FDD base stations may also transmit in the lower WCS blocks at 2305-2320 MHz in addition to operating in the upper WCS bands at 2345-2360 MHz, subject to the power and OOBE attenuation factors adopted for WCS base station operations in those bands.[92] We agree with AT&T and Sirius XM that WCS FDD base stations operating in the lower WCS blocks at 2305-2320 MHz will not increase the potential for harmful interference to adjacent-band services and there is no need to restrict their operation to the upper WCS bands. See Section 27.50 in Appendix A for the revised rules regarding WCS FDD base station operations in the lower WCS spectrum blocks.

4. Point-To-Point/Point-To-Multipoint Station Description Clarification

37. *Petitions*. In their separate petitions, the WCS Coalition and Stratos Offshore Services Company (Stratos) ask the Commission to confirm that fixed WCS point-to-point microwave radio equipment under the control of the WCS licensee and in compliance with the spectral mask applicable to WCS base and fixed stations is not considered to be fixed WCS CPE, even if installed at a subscriber's premises.[93] Stratos argues that because it controls the equipment at both ends of the link and the transmitter complies with the more restrictive OOBE limits applicable to WCS base and fixed stations, such transmitting equipment should not be considered fixed WCS CPE and subject to the power and duty cycle limits and other restrictions governing fixed WCS CPE operations.[94] In support of its petition, Stratos states that the fixed point-to-point stations it deploys to provide service in the Gulf of Mexico generally operate with an EIRP exceeding 20 W, a duty cycle of 100 percent, and employ outdoor antennas that are mounted on the oil and gas platforms that are either owned or leased by the subscribers, but are controlled by Stratos. Stratos also states that if such equipment is deemed to be fixed WCS CPE and thereby subject to those devices' more restrictive power and duty cycle limits, critical communications services throughout the Gulf of Mexico would be jeopardized. Stratos further argues that its deployed facilities fully comply with the technical requirements that govern WCS fixed operations set forth in Sections 27.50(a)(1) and 27.53(a)(1) and neither the Commission nor any other party has taken issue with Stratos' position that those rules should govern its operations.[95]

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[91] *See* Letter from William K. Keane, Counsel to AFTRCC, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 2 (filed June 21, 2012) ("AFTRCC June 21, 2012 *Ex Parte*"); Letter from Joan Marsh, Vice President - Federal Regulatory, AT&T Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293; IB Docket No. 95-91 at 1 (filed June 18, 2012) ("AT&T June 18, 2012 *Ex Parte*").

[92] In the WCS A and B blocks, WCS base and fixed stations are limited to an average EIRP of 2000 Watts (2 kW) with a peak to average power ratio of 13 dB. In WCS Blocks C and D, WCS base and fixed stations are limited to a peak EIRP of 2 kW. WCS base and fixed stations OOBE must be attenuated below the transmitter power P, in Watts (W), by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band of operation, not less than 75 + 10 log (P) dB in the 2320-2345 MHz band, not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2362.5 MHz bands, not less than 55 + 10 log (P) dB in the 2362.5-2365 MHz band, not less than 70 + 10 log (P) dB in the 2287.5-2300 MHz and 2365-2367.5 MHz bands, not less than 72 + 10 log (P) dB in the 2285-2287.5 and 2367.5-2370 MHz bands, and not less than 75 + 10 log (P) dB below 2285 MHz and above 2370 MHz.

[93] *See* Stratos Petition at 1; WCS Coalition Petition at 13.

[94] *See* Stratos Petition at n.8.

[95] *See* Stratos Petition at 3-6.

38. The WCS Coalition submits that because the WCS community has deployed, and intends to continue to deploy, fixed point-to-point equipment links that are located on a subscriber's premises, it is imperative that the Commission clarify what constitutes WCS CPE. The WCS Coalition further states that although it appears that the Commission did not intend to impose the power limits applicable to fixed WCS CPE on fixed point-to-point stations, absent the adoption of a clarifying definition, there may be confusion where point-to-point stations are located at a subscriber's premises. The WCS Coalition also argues that there is no rationale for imposing stringent power and duty cycle limits on fixed point-to-point stations that are located on subscribers' property.[96]

39. *Opposition*. Sirius XM agrees that the definition of fixed WCS CPE should be clarified in the Commission's rules, especially since there is a conflict between the technical rules adopted for fixed WCS CPE and the operations of point-to-point stations that some WCS licensees have already deployed. Sirius XM states that different types of fixed WCS applications, such as the stations Stratos has deployed in the Gulf of Mexico, have a lower interference potential than some residential or business deployments, and thereby warrant different regulatory treatment. However, Sirius XM suggests that before the Commission modifies any WCS technical rules, the WCS Coalition should clarify its expected fixed WCS CPE applications and the Commission should develop a record through testing to assess the potential interference impacts of those fixed WCS CPE applications. Sirius XM further asserts that the Commission could remove the uncertainty about the treatment of fixed WCS CPE and point-to-point stations by removing the fixed CPE classification from the rules and addressing the issue in a future rulemaking proceeding, especially since the record in this proceeding demonstrates that fixed services can be provided using equipment approved under the previous rules.[97] AT&T and Sirius XM did not address this issue in their June 15, 2012 joint submission.

40. *Discussion*. We agree with Stratos and the WCS Coalition that fixed WCS point-to-point stations that are controlled and operated by the WCS licensee that comply with the power levels and spectral mask (*i.e.*, OOBE limits) applicable to WCS base and fixed stations are not considered to be fixed WCS CPE, regardless of where the transmission equipment is installed. Furthermore, fixed WCS CPE stations' operations commenced several years before the Commission adopted the *2010 WCS R&O* in May 2010, and the Commission has not received reports of harmful interference to SDARS receivers due to their operation.[98] For these reasons, we do not believe that testing of all potential fixed WCS CPE applications, as suggested by Sirius XM, is warranted to clarify that fixed WCS point-to-point and point to multipoint stations that are controlled and operated by the WCS licensee and comply with the power levels and spectral mask applicable to WCS base and fixed stations are not considered to be fixed WCS CPE. Therefore, as Stratos and the WCS Coalition request, we clarify that fixed WCS point-to-point stations controlled and operated by the WCS licensee and that comply with the more restrictive OOBE attenuation factors applicable to WCS base and fixed stations are not considered to be fixed WCS CPE, regardless of where the equipment is installed. We also clarify that fixed WCS point-to-multipoint stations controlled and operated by the WCS licensee that comply with the more restrictive OOBE attenuation factors applicable to WCS base and fixed stations are not considered to be fixed WCS CPE, regardless of where the equipment is installed.

[96] *See* WCS Coalition Petition at 13-14.

[97] *See* Sirius XM Opposition at 8-10.

[98] The Commission established the WCS in February, 1997. *See 1997 WCS R&O*, 12 FCC Rcd at 10785.

B. Fixed WCS Customer Premises Equipment

41. *Background*. In the *2010 WCS R&O*, the Commission adopted a peak EIRP limit of 20 Watts per 5 megahertz (20 W/5 MHz) for fixed WCS CPE.[99] For low-power fixed WCS CPE (*i.e.*, average EIRP of 2 Watts per 5 megahertz (2 W/5 MHz) or less), it adopted the same OOBE attenuation factors that it adopted for WCS mobile stations, and restricted such CPE to indoor and indoor antenna use only.[100] For fixed WCS CPE transmitting with more than 2 W/5 MHz average EIRP, the Commission adopted the same OOBE attenuation factors that it adopted for WCS base and fixed stations.[101] In addition, it required all fixed WCS CPE to employ ATPC to limit the power transmitted to that which is necessary for successful communications.[102] However, the Commission elected not to define guard bands for fixed WCS CPE in WCS Blocks C and D, where such devices would be prohibited from transmitting, as it did for WCS mobile devices.[103]

1. Power and Power Spectral Density Limits

42. *Petition*. Sirius XM asks the Commission to restrict low-power fixed WCS CPE operating with the same OOBE limits as WCS mobile devices to a maximum EIRP of 250 milliwatts (mW) per 5 megahertz (250 mW/5 MHz). Sirius XM argues that there is no evidence in the record that allowing low-power fixed WCS CPE to comply with the less restrictive OOBE limits applicable to WCS mobile devices will prevent these devices from causing harmful interference to SDARS receivers. Sirius XM states that its support in this proceeding for treating low-power fixed WCS CPE differently than other WCS devices was based on an OOBE attenuation factor of 75 + 10 log (P) dB for these devices, rather than the less restrictive OOBE attenuation factors that the Commission ultimately adopted for low-power fixed WCS CPE. Sirius XM submits that if the Commission retains the relaxed WCS mobile device OOBE attenuation factors for low-power fixed WCS CPE, then these devices should be limited to the 250 mW/5 MHz (50 mW/MHz) EIRP limit established for WCS mobile devices.

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[99] *See 2010 WCS R&O*, 25 FCC Rcd at 11768 para. 140. Prior to adoption of the *2010 WCS R&O and SDARS 2nd R&O*, fixed WCS CPE stations were limited to a peak EIRP of 2 kW.

[100] *See id.*, 25 FCC Rcd at 11769 para. 142-143. Specifically, fixed WCS CPE transmitting with an average EIRP of 2 W/5 MHz or less must attenuate their OOBE below the transmitter power P in Watts by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band of operation; 55 + 10 log (P) dB in the 2320-2324/2341-2345 MHz bands; 61 + 10 log (P) dB in the 2324-2328/2337-2341 MHz bands; 67 + 10 log (P) dB in the 2328-2337 MHz band; 43 + 10 log (P) dB in the 2300-2305 and 2360-2365 MHz bands; 55 + 10 log (P) dB in the 2296-2300 MHz band; 61 + 10 log (P) dB in the 2292-2296 MHz band; 67 + 10 log (P) dB in the 2288-2292 MHz band; 70 + 10 log (P) dB below 2288 MHz and above 2365 MHz.

[101] *See id.* Specifically, fixed WCS CPE transmitting with more than 2 W/5 MHz average EIRP must attenuate their OOBE below the transmitter power P in Watts by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band of operation, not less than 75 + 10 log (P) dB in the 2320-2345 MHz band, not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2362.5 MHz bands, not less than 55 + 10 log (P) dB in the 2362.5-2365 MHz band, not less than 70 + 10 log (P) dB in the 2287.5-2300 MHz and 2365-2367.5 MHz bands, not less than 72 + 10 log (P) dB in the 2285-2287.5 and 2367.5-2370 MHz bands, and not less than 75 + 10 log (P) dB below 2285 MHz and above 2370 MHz. *Id.*

[102] *See 2010 WCS R&O*, 25 FCC Rcd at 11769 para. 143.

[103] *Id*. WCS mobile devices are prohibited from operating in the 2.5 megahertz portions of WCS Blocks C and D nearest the SDARS band (*i.e.*, 2317.5-2320 MHz and 2345-2347.5 MHz). *See* 47 C.F.R. § 27.50(3)(ii).

43. Sirius XM also asks the Commission to clarify that fixed WCS CPE subject to a peak EIRP of 20 W within any 5 megahertz of authorized bandwidth are subject to a PSD limit of 4 W/MHz.[104] Although Section 27.50(a)(2) of the rules provides that the peak EIRP of fixed WCS CPE stations transmitting in the 2305-2320 or 2345-2360 MHz bands must not exceed 20 W/5 MHz, Sirius XM argues that because the rule expresses the power limit as a ratio, it could be interpreted to allow licensees aggregating adjacent WCS spectrum blocks to deploy transmitters with a total peak EIRP of 40 W or even 60 W. Sirius XM submits that the Commission's prior WCS rules did not allow such flexibility, and the potential impact of such a change was not sufficiently analyzed during the course of this proceeding. Sirius XM also states that the revised rules for WCS base, fixed, and mobile stations, which include per-megahertz PSD limits, are clear that no increase in transmitted power due to spectrum aggregation is permitted.[105]

44. *Oppositions*. AT&T and the WCS Coalition separately oppose Sirius XM's request to restrict the maximum EIRP of low-power fixed WCS CPE that operates with the OOBE attenuation factors applicable to WCS mobile devices to 250 mW.[106] The WCS Coalition states that there is ample evidence in the record that supports the Commission's conclusion that low-power fixed WCS CPE operating with the OOBE attenuation factors applicable to WCS mobile devices will not cause harmful interference to SDARS receivers. For example, the WCS Coalition argues that the additional path loss resulting from the distance a low-power fixed WCS CPE device is likely to be separated from a vehicle containing an SDARS receiver, as compared to a vehicle-to-vehicle scenario, is greater than the 9 dB difference between the 250 mW power limit for WCS mobile devices and the 2 W power limit for low-power fixed WCS CPE.[107]

45. AT&T and the WCS Coalition also separately oppose Sirius XM's request that we specify a maximum PSD limit of 400 mW/MHz for fixed WCS CPE operating with an EIRP of 20 W/5 MHz.[108] AT&T argues that such a limit would reduce the maximum allowed EIRP for fixed WCS CPE to 2 W, creating a disincentive for WCS licensees to offer fixed broadband services by vastly increasing the number of WCS base stations necessary to provide viable service. AT&T states that because such a restrictive PSD limit for fixed WCS CPE is not needed to prevent harmful interference to SDARS receivers, the Commission should reject Sirius XM's request for this limit.[109] The WCS Coalition states that for the reasons set forth in AT&T's opposition, the Commission should reject Sirius XM's proposal and retain the current formulation of the rule.[110]

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[104] *See* Sirius XM Petition at 3. In its petition, Sirius XM erroneously requested that we specify a PSD limit of 400 mW/MHz (0.4 W/MHz) for fixed WCS CPE, but corrected this in its reply comments to request that we specify a PSD limit of 4 W/MHz for fixed WCS CPE. *See* Sirius XM Reply at 7, n.20.

[105] *See* Sirius XM Petition at 9-10.

[106] *See* AT&T Opposition at 8. AT&T endorses the opposition of the WCS Coalition and agrees with the WCS Coalition's position with respect to WCS CPE. *Id*.

[107] *See* WCS Coalition Opposition to Sirius XM Petition at 13-14. For reference, each time a given power is doubled results in a 3 dB increase in power. In this case, doubling the 250 mW WCS mobile device power limit to 500 mW is a 3 dB increase from 250 mW; doubling 500 mW to 1 W is a 6 dB increase from 250 mW; doubling 1 W to 2 W is a 9 dB increase from 250 mW. Therefore, 2 W, which equals 2000 mW (33 dBm), is 9 db greater than 250 mW (24 dBm). A 3 dB reduction in power equates to reducing the power by one-half. *See* n.60, *supra*, for an explanation of dB (decibel).

[108] *See* AT&T Opposition at 2-5; WCS Coalition Opposition at 14. The WCS Coalition supports AT&T's opposition. *Id*.

[109] *See* AT&T Opposition at 3-5.

[110] *See* WCS Coalition Opposition at 14.

46. *Reply*. In reply to AT&T's and the WCS Coalition's oppositions to its petition to reduce the maximum allowed EIRP for low-power fixed WCS CPE, Sirius XM reiterates that there is no evidence in the record of this proceeding demonstrating the effect that increased path loss for indoor low-power fixed WCS CPE will have on the potential for harmful interference to SDARS receivers. Thus, Sirius XM asserts that the Commission should not allow the deployment and operation of low-power fixed WCS CPE without further analysis.[111]

47. In its reply comments, Sirius XM also states that it made a typographical error in its petition and instead of a PSD limit of 400 mW/MHz for fixed WCS CPE operating with an EIRP of 20 W/5 MHZ, it meant to request a PSD limit of 4 W/MHz. Sirius XM submits that it does not challenge the 20 W peak EIRP limit for fixed WCS CPE, but asserts that this power limit rule should be modified so it is consistent with the rules for WCS base, fixed, and mobile stations, which specify per-megahertz PSD limits. Sirius XM argues that because the fixed WCS CPE rules do not clearly state the maximum power allowed in 1 megahertz of spectrum, WCS licensees could concentrate the power in narrow bands of spectrum nearest the SDARS band, and thereby significantly increase the potential for harmful interference to SDARS receivers. Thus, Sirius XM asks the Commission to reword the fixed WCS CPE PSD limit contained in Section 27.50(a)(2) to specify that "the peak EIRP must not exceed 20 watts within any 5 megahertz of authorized bandwidth and must not exceed 4 watts within any 1 megahertz of authorized bandwidth."[112]

48. In opposition to Sirius XM's request for a PSD limit of 4 W/MHz on fixed WCS CPE, the WCS Coalition argues that this limit is not necessary to prevent harmful interference to SDARS receivers, especially given that even though WCS licensees were previously permitted to operate fixed WCS CPE across the entire WCS frequency bands at power levels far in excess of the 20 W limit now in force and without any restriction on the use of outdoor antennas, SDARS licensees have not experienced any harmful interference from fixed WCS CPE operations.[113] The WCS Coalition further argues that a 4 W/MHz PSD limit should not be adopted because Sirius XM has not justified a need for this limit. In addition, because there is no commercial equipment capable of supporting such a PSD limit, WCS CPE would need to be limited to a transmitter power of 4 W/5 MHz in order to comply with a 4 W/MHz PSD limit. This would increase by five times the number of cells required to provide equivalent coverage and make applications such as smart grids uneconomical.[114] The WCS Coalition also argues that further restricting fixed WCS CPE operations to protect SDARS receivers is not consistent with Sirius Satellite Radio, Inc.'s comment that "both satellite radio licensees designed, built and deployed their systems to withstand interference that could be anticipated from Part 27-compliant systems."[115] AT&T and Sirius XM did not address this issue in their June 15, 2012 joint submission.

49. *Discussion*. We disagree with Sirius XM that low-power fixed WCS CPE operating with the OOBE attenuation factors applicable to WCS mobile devices should be restricted to a maximum EIRP of 250 mW. We believe that the signal attenuation from the propagation losses due to the likely separation distances between low-power fixed WCS CPE and SDARS receivers, coupled with the requirement to employ ATPC, which is used to prevent inter-cell interference (*i.e.*, interference to adjacent cells base stations receiving on the same frequencies), will help limit the potential for harmful interference (*i.e.*, interference which seriously degrades, obstructs, or repeatedly interrupts a

[111] *See* Sirius XM Reply at 6-7.

[112] *See* Sirius XM Reply at 7.

[113] *See* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293,; IB Docket No. 95-91 at 3 (filed June 27, 2011).

[114] *Id.* at n.18.

[115] *Id*. at 3, quoting Comments of Sirius Satellite Radio Inc., WT Docket No. 07-293, at 17 (filed Feb. 14, 2008).

radiocommunication service) from fixed WCS CPE to SDARS receivers receiving unwanted energy in the adjacent band. In addition, although most 2.3 GHz-band fixed WCS CPE devices have been authorized for and are operating at 1 to 2 W EIRP, and some fixed WCS CPE devices have been authorized for and are operating at up to 20 W EIRP, which occurred before we relaxed the OOBE limits for fixed WCS CPE, SDARS licensees have not reported any instances of harmful interference due to this fixed WCS CPE. For these reasons, we expect that maintaining the average EIRP at 2 W or less for low-power fixed WCS CPE operating with the same OOBE limits as WCS mobile devices will not result in harmful interference to SDARS receivers. Therefore, we decline to restrict the maximum allowed power of low-power fixed WCS CPE operating with the same OOBE limits as WCS mobile devices to 250 mW, and deny that portion of Sirius XM's petition.

50. Furthermore, because imposition of a PSD limit on fixed WCS CPE would likely preclude the provision of fixed WCS services by making it uneconomical to provide the necessary base station coverage, we also decline to impose a PSD limit of 4 W/MHz on fixed WCS CPE. In support of this decision, we note that the *2010 WCS R&O* significantly reduced the potential for fixed WCS CPE to cause harmful interference to SDARS receivers by reducing the maximum allowed EIRP for these devices from 2 kW over any bandwidth to 20 W/5 MHz. Sirius XM has previously claimed that its receivers, which were designed prior to adoption of the *2010 WCS R&O*, provide excellent adjacent band blocking performance.[116] In addition, because of the likely sources of blockages – foliage, building walls, parked and moving vehicles, etc. – that will attenuate fixed WCS CPE devices' signals, we expect that if we continue to allow fixed WCS CPE to use up to 20 W/5 MHz peak EIRP without a specific per-megahertz PSD limit, SDARS licensees are not likely to experience harmful interference from the operation of these devices. We also affirm that if WCS licensees were to aggregate spectrum for fixed WCS CPE, the power level in any 5-megahertz bandwidth would not be permitted to exceed 20 W.

51. We further note that the technologies that are being considered to provide WCS service – Long Term Evolution (LTE),[117] Worldwide Interoperability for Microwave Access (WiMAX),[118] and Wideband-Code Division Multiple Access (W-CDMA)[119] – spread user devices' signals across the channel bandwidth and control the power of the RF subcarriers assigned to a particular device to prevent self-interference. Thus, even absent a specific PSD limit for fixed WCS CPE, we expect that WCS licensees' efforts to prevent self-interference will effectively limit the PSD of fixed WCS CPE and further mitigate the potential for harmful interference to SDARS receivers. Finally, because wireless networks

[116] *See* Letter from James S. Blitz, Vice President, Regulatory Counsel, Sirius XM Radio Inc., Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 3 (filed March 30, 2012).

[117] *See* n.57, *supra*, for a description of LTE.

[118] WiMAX, based on the Institute of Electrical and Electronics Engineers (IEEE) 802.16 standard, supports the delivery of non-line-of-sight connectivity between a subscriber station and base station with a typical cell radius of 3 to 10 km. WiMAX supports fixed and nomadic, as well as portable and mobile wireless broadband applications. The latest WiMAX standard, IEEE 802.16m-2011, has specifications for the 2 to 11 GHz range, uses scalable OFDMA, and supports both FDD and TDD profiles. *See generally* http://www.wimaxforum.org/resources/frequently-asked-questions.

[119] W-CDMA – the radio technology of Universal Mobile Telephone Service (UMTS) - is a part of the International Telecommunication Union IMT-2000 family of 3G Standards. W-CDMA, which supports both FDD and TDD variants, is a spread-spectrum modulation technique which uses channels whose bandwidth is much greater than that of the data to be transferred. Instead of each connection being granted a dedicated frequency band just wide enough to accommodate its envisaged maximum data rate, W-CDMA channels share a much larger band. The modulation technique encodes each channel in such a way that a decoder, knowing the code, can pick out the wanted signal from other signals using the same band, which simply appear as so much noise. *See* http://www.3gpp.org/article/w-cdma.

are typically initially designed for coverage and subsequently for capacity, the size of WCS cell sites is likely to decrease over time, which will decrease the maximum power transmitted by WCS CPE and ultimately lower these devices' resultant PSD.[120] For these reasons, we deny Sirius XM's request to impose a PSD limit of 4 W/MHz on fixed WCS CPE.

2. Bands of Operation

52. *Petition*. Sirius XM asks the Commission to impose guard bands for fixed WCS CPE in the 2.5-megahertz portions of WCS Blocks C and D closest to the SDARS band (*i.e.*, 2317.5-2320 MHz and 2345-2347.5 MHz).[121] Sirius XM contends that there is no evidence in the record of this proceeding that increased propagation losses associated with increased distances between fixed WCS CPE and SDARS receivers and structural blockages will be sufficient to limit the potential for harmful interference from fixed WCS CPE, as the Commission claimed in the *2010 WCS R&O*. Instead, Sirius XM asserts that the record only shows that the amount of signal attenuation varies greatly, depending on the antenna location and the structural characteristics of the building. Sirius XM also submits that although the Commission has authorized fixed WCS CPE devices to use up to 20 W/5 MHz, this does not demonstrate that such devices can operate without causing harmful interference to SDARS receivers, especially since it appears that no licensee is providing service using WCS Blocks C and D, which are closest to the SDARS band. Sirius XM also notes that prior to modification of the WCS rules, fixed WCS CPE would have been authorized with an OOBE attenuation factor of 80 + 10 log (P) dB in the 2320-2345 MHz SDARS band that was previously applicable to WCS fixed stations, which would provide a greater level of protection from interference than the relaxed OOBE attenuation factor in the revised rules. In addition, although outdoor installations are prohibited for low-power fixed WCS CPE, Sirius XM states that it is unsure how this prohibition can be enforced at the consumer level and suggests that any potential interference protection due to physical separation and structural blockage could be illusory.[122]

53. *Oppositions*. The WCS Coalition and AT&T separately oppose Sirius XM's request to impose guard bands in the WCS C and D Blocks for fixed WCS CPE.[123] In response, the WCS Coalition notes that Sirius' 2007 Petition for Rulemaking proposed a 5 dB reduction in the fixed WCS CPE OOBE attenuation factor from 80 + 10 log (P) dB to 75 + 10 log (P) dB, which XM, among others, subsequently endorsed. The WCS Coalition also notes that since the Commission first established the WCS in 1997, fixed WCS CPE has been allowed to operate across the entire 2.3 GHz WCS bands at power levels far in excess of the maximum power limit adopted in the *2010 WCS R&O*. Thus, the WCS Coalition asserts that Sirius XM cannot legitimately complain that its receivers will suffer overload interference unless the Commission adopts guard bands at 2317.5-2320 MHz and 2345-2347.5 MHz for fixed WCS CPE. The WCS Coalition further asserts that Sirius XM has long been on notice that the Commission's Part 27 regulatory regime allows WCS licensees to deploy high-power fixed CPE without any guard band surrounding the SDARS band, and that SDARS licensees would be responsible for protecting their receivers from overload interference due to fixed WCS CPE. The WCS Coalition notes that Sirius XM's claim that guard bands are necessary for fixed WCS CPE cannot be reconciled with Sirius' 2008 admission that "[b]oth satellite radio licensees designed, built and deployed their systems to withstand

[120] For example, to provide flexible capacity expansion and optimize inter-cell interference management, the latest version of the LTE industry standard supports the deployment of low-power nodes, known as heterogeneous networks, throughout a macrocell layout. *See* LTE-Advanced and 4G Wireless Communications, Prakash Bhat, Vodafone, Satoshi Nagata, NTT DoCoMo, Luis Campoy and Ignacio Berberana, Telefonica, Thomas Derham, Orange, Guangyi Liu and Xiaodong Shen, China Mobile, Pingping Zong and Jin Yang, Verizon, "LTE-Advanced: An Operator Perspective," IEEE Communications Magazine, Feb. 2012, at 112-113.

[121] *See* Sirius XM Petition at 6-7.

[122] *See id.* at 7-8.

[123] *See* WCS Coalition Opposition to Sirius XM Petition at 9.

interference that could be anticipated from Part 27 compliant systems."[124] In its opposition to Sirius XM's petition, AT&T fully endorses the WCS Coalition's opposition to Sirius XM's petition.[125]

54. The WCS Coalition further asserts that a lack of guard bands for fixed WCS CPE is amply supported by the Commission's supposition that there is likely to be substantially greater WCS signal attenuation between fixed WCS CPE and SDARS receivers due to increased separation and blockages, especially when compared to the vehicle-to-vehicle scenario for WCS mobile devices' potential to interfere with SDARS receivers. The WCS Coalition contends that Sirius XM fails to present any credible evidence supporting its assertion that SDARS receivers will suffer harmful interference from fixed WCS CPE absent the imposition of guard bands. The WCS Coalition also argues that without full disclosure of the testing setup, the reported results from Sirius XM's testing for interference from fixed WCS CPE have no probative value.[126]

55. *Reply*. In reply to the WCS Coalition's and AT&T's opposition to its petition to impose guard bands on fixed WCS CPE, Sirius XM asserts that although it previously supported an OOBE attenuation factor of 75 + 10 log (P) dB for fixed WCS CPE, it did not support the fixed WCS CPE rules that the Commission ultimately adopted without a guard band. Instead, Sirius XM claims its 2006 Petition for Rulemaking coupled its proposed OOBE limit for base and fixed stations with ground level emissions limits on fixed WCS stations measured more than 1 meter from the fixed WCS CPE transmitter, which would provide additional protection for SDARS receivers and might reduce the need for a guard band.[127]

56. Sirius XM states that its main concern with the new fixed WCS CPE rules is the potential for interference from fixed WCS CPE transmitting with an average EIRP of 2 W/5 MHz or less and the same stepped OOBE attenuation factors as WCS mobile devices, but without a guard band in WCS Blocks C and D. Sirius XM argues that regardless of the potential for increased path loss for indoor low-power fixed WCS CPE there is no evidence in the record of this proceeding about how these operations would affect the potential for harmful interference to SDARS receivers. Sirius XM again asserts that the Commission should not allow deployment and operation of fixed WCS CPE without further analysis. Sirius XM further contends that the lack of interference complaints due to existing WCS fixed deployments does not eliminate any basis for concern about interference, especially given that WCS licensees have not completed system-wide deployment.[128] However, in their June 15, 2012 joint submission, AT&T and Sirius XM agree that all portions of WCS Blocks C and D may be used for fixed services or base stations under rules that protect SDARS receivers, such as wireless backhaul and other fixed operations necessary for broadband-related uses.[129]

57. *Discussion*. Sirius XM's petition regarding the establishment of guard bands for fixed WCS CPE in the 2.5-megahertz portions of WCS Blocks C and D nearest the SDARS band (*i.e.*, 2317.5 MHz-2320 MHz and 2345-2347.5 MHz) asserts arguments that Sirius XM raised – and the Commission considered and rejected – in the *2010 WCS R&O*.[130] We decline to revisit those contentions

[124] *See* WCS Coalition Opposition to Sirius XM Petition at 10-11.

[125] *See* AT&T Opposition to Sirius XM Petition at 8.

[126] *See id*. at 12.

[127] *See* Sirius XM Reply at 6.

[128] *See id*. at 6-7.

[129] *See* AT&T/Sirius XM June 15, 2012 Agreement at 3 and n.8.

[130] *See*, *e.g.*, Comments of Sirius XM at 32, 34-35 (no evidence has been submitted in the record that increased propagation losses associated with increased distances between WCS CPE and SDARS receivers and structural (continued….)

here. Sirius XM fails to present any new evidence that would compel us to reconsider the Commission's previous findings. Moreover, it is "settled Commission policy that petitions for reconsideration are not to be used for the mere re-argument of points previously advanced and rejected."[131] Thus, we deny this portion of Sirius XM's petition. We note that Sirius XM states that its main concern with the low-power fixed WCS CPE rules is the potential for interference from these devices operating with the same stepped OOBE attenuation factors applicable to WCS mobile devices. We address the OOBE levels for all fixed WCS CPE separately, below.

3. Outdoor and Outdoor Antenna Use

58. *Petitions*. In their separate petitions, AT&T and the WCS Coalition ask the Commission to reconsider its decision to restrict low-power fixed WCS CPE (*i.e.*, 2 W or less average EIRP) from being used outdoors and with outdoor antennas.[132] AT&T states that to prevent WCS licensees from having to discontinue service and allow WCS licensees to expand the deployment of broadband service in unserved and underserved areas, WCS licensees should be allowed to use low-power fixed WCS CPE with outdoor antennas and in outdoor installations if it meets the former more restrictive WCS OOBE limits or the new WCS OOBE limits that the WCS Coalition proposes. AT&T notes that WCS licensees have served customers with fixed WCS CPE and outdoor antennas that meet the former more restrictive WCS OOBE limits for a number of years without causing interference to SDARS receivers.[133] AT&T and the WCS Coalition both contend that maintaining the ban on outdoor antennas for low-power fixed WCS CPE would impede the use of the WCS C and D Blocks for potentially valuable applications such as low-power smart grid applications.[134] AT&T submits that with appropriate OOBE limits, there is no reason to prevent the WCS C and D Blocks from being used for such applications.[135]

59. The WCS Coalition contends that given the lack of any reliable record in this proceeding supporting a ban on outdoor use and antennas for low-power fixed WCS CPE, the Commission should repeal the ban. However, if the Commission believes that some restrictions on outdoor use and antennas are necessary in light of the new reduced WCS OOBE limits, the WCS Coalition suggests that the Commission: 1) modify the OOBE limits in Section 27.53(a)(2) and (3) to allow fixed WCS CPE authorized to operate with an average EIRP of 250 mW or less and that complies with the OOBE limits applicable to WCS mobile devices to be installed outdoors or connected to an outdoor antenna provided the gain of the antenna does not exceed 3 dB in any direction; and 2) allow fixed WCS CPE authorized to operate at no greater than 2 W average EIRP to be installed outdoors or connected to an outdoor antenna without any restriction on the antenna gain so long as the CPE complies with the more restrictive OOBE limits that are currently applicable to fixed WCS CPE operating with an average EIRP greater than 2 W.

(Continued from previous page)
blockages will be sufficient to limit the potential for harmful interference from WCS CPE; the required OOBE attenuation for fixed WCS CPE should be maintained at the existing 80 + 10 log P dB level on all frequencies between 2320-2345 MHz) (filed April 23, 2010) ("Sirius XM Apr. 23, 2010 *Ex Parte*"). *See also 2010 WCS R&O*, 25 FCC Rcd at 11767-69 paras. 139-143.

[131] *In re* S&L Teen Hosp. Shuttle, *Order on Reconsideration*, 17 FCC Rcd 7899, 7900 para. 3 (2002) (citations omitted). *See also* General Motors Corp. and Hughes Electronics Corp., Transferors, and The News Corp. Ltd., Transferee, For Authority to Transfer Control, MB 03-124, *Order on Reconsideration*, 23 FCC Rcd 3131, 3135 para. 11 (2008) (stating that the Commission has rejected petitions for reconsideration where the petitioner essentially repeats previously-relied upon arguments and "fails to raise new arguments or facts that would warrant reconsideration") (citations omitted).

[132] *See* AT&T Petition at 23; WCS Coalition Petition at 8.

[133] *See* AT&T Petition at 23-24.

[134] *See id.*; WCS Coalition Petition at 11.

[135] *See* AT&T Petition at 24.

60. *Opposition*. Sirius XM opposes AT&T's and the WCS Coalition's petitions to allow low-power fixed WCS CPE to use outdoor antennas and installations. Sirius XM contends that there is no evidence that fixed antennas mounted to a side of a building for WCS CPE stations operating with up to 2 W average EIRP would have the same potential to cause interference to SDARS receivers as WCS mobile devices operating at a maximum EIRP of 250 mW over 5 megahertz. Sirius XM argues that the interference limiting effects of attenuation from indoor use of fixed WCS CPE would be nullified if such stations were allowed to use outdoor antennas. Sirius XM also argues that a lack of harmful interference complaints due to existing fixed WCS CPE operations with outdoor antennas does not justify removing the outdoor antenna ban for low-power fixed WCS CPE. Sirius XM concludes that fixed WCS CPE outdoor operations should be subjected to further testing before the Commission modifies the WCS rules, and any loosened restrictions on fixed WCS CPE should be addressed through a future rulemaking proceeding.[136]

61. *Replies*. AT&T and the WCS Coalition filed separate reply comments to Sirius XM's opposition to their petitions to allow low-power fixed WCS CPE to use outdoor antennas.[137] AT&T asserts that Sirius XM does not provide any convincing argument for retaining the ban on outdoor antennas for low-power fixed WCS CPE. AT&T reiterates that a continued ban on WCS CPE outdoor antenna use for such WCS CPE will require WCS licensees to discontinue existing service, curtail the deployment of broadband service in unserved and underserved areas, and preclude potentially valuable uses of WCS Blocks C and D. AT&T further asserts that there is no reason to believe that low-power fixed WCS CPE using outdoor antennas will interfere with SDARS receivers, especially given that there have not been any reports of harmful interference due to fixed WCS CPE operating with 1,000 times more power.[138] The WCS Coalition submits that Sirius XM has failed to identify any credible evidence supporting the ban on outdoor antennas and installations for low-power fixed WCS CPE. The WCS Coalition also argues that the question here is not whether the restrictions on low-power fixed WCS CPE use pose the same risk of interference as the restrictions on WCS mobile device use, but rather it is whether the public interest is served by changing the Commission's long-standing rule allowing outdoor antennas without regard to the power level of the fixed WCS CPE. The WCS Coalition further argues that Sirius XM has failed to show that the public interest is served by only allowing high-power fixed WCS CPE (*i.e.*, average EIRP greater than 2 W) to use outdoor antennas.[139]

62. However, in their June 15, 2012 joint submission, AT&T and Sirius XM request that low-power fixed WCS CPE stations operating with the stepped emission mask applicable to WCS mobile devices be permitted to operate with outdoor antennas if professionally installed in locations that are 20 meters or more from roadways or in locations where it can be shown that the ground power level of -44 dBm in WCS Blocks A and B or -55 dBm in WCS Blocks C and D will not be exceeded at the nearest road location. AT&T and Sirius XM argue that these restrictions will help limit the potential for harmful interference to SDARS receivers from these fixed WCS CPE. AT&T and Sirius XM also note that WCS licensees have been serving fixed wireless customers via outdoor antennas with transmissions that meet the former more stringent OOBE limits for years without any reported instances of harmful interference to SDARS operations.[140]

63. *Discussion*. Based on the record in this proceeding, we decide to remove the restrictions on low-power fixed WCS CPE operating with the stepped emission mask applicable to WCS mobile

[136] *See* Sirius XM Opposition at 11-12

[137] *See* AT&T Reply Comments at 9; WCS Coalition Reply Comments at 5-7.

[138] *See* AT&T Reply Comments at 9.

[139] *See* WCS Coalition Reply Comments at 6-7.

[140] *See* AT&T/Sirius XM June 15, 2012 Agreement at 6.

devices that prohibited such equipment from being used outdoors or with outdoor antennas. If low-power fixed WCS CPE operating with the OOBE limits applicable to WCS mobile devices is professionally installed in locations that are removed by 20 meters from roadways or in locations where it can be shown that the ground power level of -44 dBm in WCS Blocks A and B or -55 dBm in WCS Blocks C and D will not be exceeded at the nearest road location, then such equipment may be used outdoors and with outdoor antennas. We also decide to remove the prohibitions on the use of low-power fixed WCS CPE outdoors and with outdoor antennas if the fixed WCS CPE complies with the more restrictive OOBE attenuation factors applicable to WCS base and fixed stations. We expect that when used outdoors or with outdoor antennas, low-power fixed WCS CPE that is professionally installed or that meets the more restrictive OOBE attenuation factors applicable to WCS base and fixed stations will avert the discontinuance of existing WCS service, foster the provision of wireless broadband services, especially in unserved and underserved areas, and enhance user experience without causing harmful interference to SDARS receivers. We also expect that the signal attenuation due to the separation distances and outdoor blockages (*i.e.*, building walls and other structures in urban settings; trees)[141] that are likely to exist between low-power fixed WCS CPE transmitters and SDARS receivers and the requirement to use ATPC, will help limit the potential for harmful interference to SDARS receivers from low-power fixed WCS CPE being used outdoors or with outdoor antennas. See Section 27.50 in Appendix A for the text of the revised rules regarding the operation of low-power fixed WCS CPE.

C. WCS Mobile and Portable Devices

64. *Background*. In the *2010 WCS R&O*, the Commission reduced the maximum power for WCS mobile devices from 20 W to 250 mW per 5 megahertz (250 mW/5 MHz) and established a 50 mW/MHz PSD limit for WCS mobile devices that operate in the 2305-2317.5 MHz and 2347.5-2360 MHz bands.[142] To further limit the potential for harmful interference to SDARS receivers in the 2320-2345 MHz band, the Commission also established guard bands in the 2317.5-2320 MHz and 2345-2347.5 MHz bands of the 2.3 GHz WCS spectrum where WCS mobile devices are prohibited from operating. In addition, the Commission required that WCS mobile devices' OOBE be attenuated below the transmitter power P, in Watts, by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2317.5 MHz and between 2347.5-2360 MHz that are outside the licensed band of operation, 55 + 10 log (P) dB in the 2320-2324/2341-2345 MHz bands, 61 + 10 log (P) dB in the 2324-2328/2337-2341 MHz bands, and 67 + 10 log (P) dB) in the 2328-2337 MHz band. It also required that WCS mobile devices' OOBE be attenuated below the transmitter power P, in Watts, by a factor of not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2365 MHz bands, 55 + 10 log (P) dB in the 2296-2300 MHz band, 61 + 10 log (P) dB in the 2292-2296 MHz band, 67 + 10 log (P) dB in the 2288-2292 MHz band, and 70 + 10 log (P) dB below 2288 MHz and above 2365 MHz.[143] To limit the potential for harmful interference to legacy SDARS receivers in the 2320-2345 MHz band and AMT receivers in the 2360-2395 MHz band, the Commission limited WCS mobile devices using FDD

[141] In a study by Dr. Wolfhard Vogel, Dr. Vogel calculates that "outdoor" users of ancillary terrestrial component mobile terminals would have a blockage factor of 13.8 dB. *See* Julius Goldhirsh and Wolfhard Vogel, *Handbook of Propagation Effects for Vehicular and Personal Mobile Satellite Systems*, (Dec. 1998), available at http://www.utexas.edu/research/mopro/ (last visited June 5, 2012).

[142] *See 2010 WCS R&O* 25 FCC Rcd at 11754-58 paras. 99-113.

[143] *See 2010 WCS R&O*, 25 FCC Rcd at 11754 para. 100. Measurement for compliance with the required WCS OOBE limits may be based on a narrower resolution bandwidth than 1 megahertz (*e.g.*, 1 percent of the emission bandwidth) so long as the measured power is integrated over a 1-megahertz bandwidth. *See 2010 WCS R&O*, 25 FCC Rcd at 11758 para. 112.

technology to transmitting in the lower WCS Blocks A and B and the 2.5-megahertz portion of the WCS C Block furthest removed from the SDARS band (*i.e.*, 2305-2317.5 MHz).[144]

1. Power Spectral Density Limit

65. *Petitions*. AT&T and the WCS Coalition filed separate petitions requesting that we remove the 50 mW/MHz PSD limit for WCS mobile devices from Section 27.50(a)(3)(i).[145] AT&T contends that the record in this proceeding does not justify adoption of a 50 mW/MHz PSD limit because no commenter suggested that such a limit should apply to any of the WCS spectrum blocks; AT&T notes that Sirius XM only suggested a PSD limit for WCS Blocks C and D as part of its support for an overall mobile device power limit of 150 mW in WCS Blocks C and D.[146] AT&T contends that a 50 mW/MHz PSD limit will prevent WCS licensees from flexibly using spectrum and will reduce the quality, throughput, and efficiency of a WCS mobile network.[147] In addition, AT&T claims that the 50 mW/MHz PSD limit will reduce the size of a network's cells (*i.e.*, the areas served by WCS base stations) and thereby increase the required number of cell sites necessary to ensure adequate service by approximately 4 times in an LTE network and 2 times in a WiMAX network, which, in turn, will make it economically unfeasible to construct a WCS mobile network. AT&T further claims that current mobile wireless networks assume a signal link budget[148] that cannot be met with a 50 mW/MHz PSD limit and current mobile devices do not have the capability to adjust power proportionally with occupied bandwidth. AT&T adds that WCS mobile devices should not be subject to a PSD limit because the rules for other wireless services do not impose PSD limits on mobile transmitters.[149]

66. *Opposition*. In opposition to AT&T's and the WCS Coalition's petitions to eliminate the PSD limit for WCS mobile devices, Sirius XM claims that the PSD limit cannot apply only to WCS Blocks C and D. Sirius XM also notes that the WCS Coalition proposed PSD limits for WCS Blocks C and D, WCS licensee NextWave Wireless endorsed PSD limits for WCS Blocks C and D, and WCS licensees claim to have demonstrated a PSD limit's impact during the testing of a WCS system's interference potential to SDARS receivers in Ashburn, Virginia.[150] Sirius XM asserts that a 50 mW/MHz PSD limit is essential to protect SDARS subscribers from harmful overload interference[151] and should be applied equivalently to all WCS devices. Sirius XM submits that without such a limit, several WCS mobile devices' full power transmissions could be concentrated in bandwidths narrower than 5 megahertz near the SDARS spectrum, and thereby increase the potential for interference by up to 6 dB (*i.e.*, 4 times) for a 1.25-megahertz wide WiMAX channel. Sirius argues that this concentration of power could effectively nullify the protective benefits of the guard bands established in the 2317.5-2320 MHz and 2345-2347.5 MHz portions of WCS Blocks C and D, respectively. Sirius XM further asserts that WCS

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[144] *Id*., 25 FCC Rcd at 11743 para. 74.

[145] *See* AT&T Petition at 16; WCS Coalition Petition at 14. The WCS Coalition endorses AT&T's request to remove the PSD limit and incorporates AT&T's request by reference in its petition. *Id*.

[146] *See* AT&T Petition at 14-15.

[147] *See id*. at 14, 16.

[148] A signal link budget is the accounting of all the gains and losses from the transmitter to the receiver within an RF link. A simple link budget equation is:
Received Power (dBm) = Transmitter Power (dBm) + Gains (dB) - Losses (dB).

[149] *See* AT&T Petition at 15.

[150] *See* Sirius XM Radio Inc. Opposition to Petitions for Reconsideration of the WCS Coalition and AT&T Inc., WT Docket No. 07-293; IB Docket No. 95-91 at 12-13 (filed Oct. 18, 2010) (Sirius XM Opposition).

[151] *See* n.64, *supra*, for a description of overload interference.

licensees should not be allowed to use more transmitter power than they could otherwise transmit in a 5-megahertz block by aggregating spectrum blocks.[152]

67. *Replies*. AT&T and the WCS Coalition filed separate reply comments to Sirius XM's opposition to their petitions seeking elimination of the PSD limit for WCS mobile devices.[153] AT&T states that given the WCS guard bands for mobile devices, a PSD limit is not needed to protect SDARS users. AT&T also argues that the WCS Coalition only supported the notion of a PSD limit for mobile devices that would operate in the WCS C and D Blocks without a guard band. AT&T contends that WCS licensees are not allowed to aggregate power as Sirius XM envisions, since the WCS rules place a per 5-megahertz block power limit of 250 mW on WCS mobile transmitters; while WCS licensees may aggregate spectrum, they may not aggregate power. AT&T further contends that WCS licensees are not permitted to deploy mobile devices with power outputs of 500 mW unless they are designed to put no more than 250 mW into each 5-megahertz block. AT&T also states that the differences between WCS Blocks A and B and WCS Blocks C and D preclude combining the spectrum from these blocks.[154]

68. The WCS Coalition states that eliminating the 50 mW/MHz PSD limit for WCS mobile devices will assure that WCS licensees have technological flexibility without risk of causing harmful interference to SDARS subscribers.[155] It also argues that Sirius XM has mischaracterized the WCS Coalition's proposal for a PSD limit for WCS mobile devices. The WCS Coalition further asserts it did not propose any PSD limit for WCS mobile devices operating in WCS Blocks A and B, and only proposed PSD limits for segments of WCS Blocks C and D to maximize use of those blocks.[156] The WCS Coalition also states that because current and forecasted mobile devices lack the capability to adjust power proportionally with occupied bandwidth, the 50 mW/MHz PSD limit, or any PSD limit for that matter, is inconsistent with the manner in which mobile 2.3 GHz equipment is designed.[157]

69. In subsequently filed *Ex Parte* submissions, the WCS Coalition argues that implementing the algorithms in the base station resource allocation and scheduler to enforce a PSD limit is unnecessary to protect SDARS receivers from harmful interference. The WCS Coalition also argues that because a per-megahertz PSD limit for WCS mobile devices would make the WCS base station a non-standard implementation of WiMAX or LTE technology, it will only hamper the deployment of viable broadband wireless deployments in the band. The WCS Coalition also states that although LTE technology has become the *de facto* global standard for next generation mobile broadband services, the 50 mW/MHz PSD limit for WCS mobile devices effectively precludes the use of LTE technology because it is not designed in a manner that permits a broadband service provider to control the PSD within 1-megahertz wide sub-bands.[158] Instead, LTE mobile devices' transmissions are spread evenly across the available

[152] *See* Sirius XM Opposition at 13.

[153] *See* Reply to Oppositions of Sirius XM Radio Inc., Aerospace and Flight Test Radio Coordinating Council, and The Boeing Company to the Petition for Partial Reconsideration of AT&T Inc., WT Docket No. 07-293; IB Docket No. 95-91 at 3-5 (filed Nov. 1, 2010) (AT&T Reply); Reply of the WCS Coalition, WT Docket No. 07-293, IB Docket No. 95-91 at 9-10 (filed Nov. 1, 2010) (WCS Coalition Reply). In its reply, the WCS Coalition incorporates by reference the PSD discussion in AT&T's Reply. *Id.* at 10.

[154] *See* AT&T Reply at 4-5.

[155] *See* WCS Reply at 9.

[156] *See* WCS Coalition Reply at n.30.

[157] *See* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 2 (filed July 21, 2011) ("WCS Coalition July 21, 2011 *Ex Parte*").

[158] *See* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1, 3; Attachment at 9 (filed Dec. 1, 2011) ("WCS Coalition Dec. 1, 2011 *Ex Parte*"); (continued….)

bandwidth and the technology dynamically allocates spectrum among mobile devices and sets their power levels on a frame-by-frame (*i.e.*, millisecond) basis. However, the WCS Coalition asserts that based on the results of its simulation of a high-capacity WCS LTE network in which 5- and 10-megahertz bandwidths were simulated, the power from LTE WCS mobile devices used outdoors would tend to be evenly distributed across the available WCS channel bandwidth when viewed over an appropriate period of time, similar to WiMAX, and may on only rare occasions exceed the 50 mW/MHz PSD limit, such as when a WCS mobile device is being used at the edge of coverage in a cell site with a full transmit buffer (high uplink data rate).[159] As a result, the transmit power from an LTE mobile device will tend to be distributed over the available channel bandwidth in a generally uniform manner, which will prevent power concentration in any segment of the channel bandwidth for a period of time that would cause harmful interference to an SDARS receiver. The WCS Coalition states that in this manner, current off-the-shelf LTE technology would provide SDARS subscribers with the protection from harmful interference that was intended in the *2010 WCS R&O*.[160]

70. The WCS Coalition further submits that the data it collected from examination of an operational LTE mobile broadband system confirms that under real world operating conditions, a power spectral density limit of 50 mW/MHz may only be exceeded in rare instances in LTE networks, and that these events are so fleeting that nearby SDARS receivers will not suffer muting.[161] The WCS Coalition argues that in practice, it is highly unlikely that a WCS LTE mobile device located near an SDARS receiver would be assigned repetitive frequency allocations near the SDARS band with an EIRP at or near full power for a period of time long enough to cause muting of the SDARS signal.[162] The WCS Coalition also argues that because the algorithms in the WCS base station resource allocation and scheduler that would enforce the existing WCS mobile device PSD limit would make the WCS base station control software a non-standard implementation of WiMAX or LTE technology, keeping the PSD limit in the Commission's WCS rules would hamper the deployment of viable broadband wireless networks in the WCS band.[163] For these reasons, the WCS Coalition states that the 50 mW/MHz PSD limit for WCS mobile devices is unnecessary and should be removed from the Commission's rules.[164]

71. In response to these assertions, Sirius XM argues that the WCS Coalition's simulation of a WCS network's interference potential to SDARS receivers underestimates the increased potential for harmful interference to SDARS receivers if the WCS PSD limit was eliminated by 1) limiting WCS mobile device uplink power to 100 mW, well below the 250 mW maximum allowed, and failing to test the worst-case impact of eliminating this requirement; 2) assuming artificially small cell ranges; 3)

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Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1 (filed Mar. 8, 2012) ("WCS Coalition Mar. 8, 2012 *Ex Parte*").

[159] *See* Dec. 1, 2011 WCS Coalition Dec. 1, 2011 *Ex Parte*, Attachment at 9; Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293, Attachment at 8-9 (filed Jan. 26, 2012) ("WCS Coalition Jan. 26, 2012 *Ex Parte"*); Mar. 8, 2012 WCS Coalition *Ex Parte* at 2. In its simulation, the WCS Coalition assumed outdoor use only of a mobile device with an EIRP of 100 mW, channel bandwidths of 5 and 10 megahertz, and, because high system capacity necessitates smaller cell sizes, a cell radius of 1 km. *See* WCS Coalition Jan. 26, 2012 *Ex Parte*, Attachment at 8.

[160] *See* Dec. 1, 2011 WCS Coalition *Ex Parte* at 1-3; WCS Jan. 6, 2012 Coalition *Ex Parte* at 1; WCS Coalition Mar. 8, 2012 *Ex Parte* at 2.

[161] *See* Jan. 26, 2012 WCS Coalition *Ex Parte* Letter, Attachment at 9; Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1 (filed March 19, 2012) ("WCS Coalition Mar. 19, 2012 *Ex Parte*").

[162] *See* WCS Coalition Dec. 1, 2011 *Ex Parte*, Attachment at 1-3.

[163] *Id.* at 3.

[164] *Id*. at 1.

ignoring the effects of possible WCS transmissions over multiple aggregated WCS spectrum blocks; 4) making technology-specific arguments, such as that LTE technology will be deployed in all WCS networks; and 5) assuming use of the 2300-2305 MHz band in its simulation, which is not part of the WCS bands, 6) only simulating downlink-intensive applications, and 7) only assuming 10-15 user devices per cell, which fails to simulate higher device transmit power levels that would be needed in a loaded cell.[165] For these reasons, Sirius XM argues that the Commission should reject the WCS Coalition's request to eliminate the WCS mobile device PSD limit and instead grant Sirius XM's Petition for Reconsideration and Clarification for the reasons set forth therein and in related pleadings.[166]

72. However, in their June 15, 2012 joint submission, AT&T and Sirius XM agree that the PSD limit of 50 mW/MHz can be eliminated for WCS mobile devices that operate solely in the WCS A and B Blocks using uplink transmission protocols that avoid concentrating energy at the edge of the operating band, such as LTE Single Carrier FDMA (SC FDMA) with Proportional Fair Scheduling.[167] AT&T and Sirius XM agree that because testing by the WCS Coalition has shown that air interfaces using these technologies significantly reduce the occurrence of concentrated power in any part of the operating bandwidth, a 50 mW/MHz PSD limit is not necessary to prevent harmful overload interference to SDARS receivers from WCS mobile devices that operate with these technologies solely in WCS Blocks A and B. Thus, for WCS mobile devices which employ a technology that avoids concentrating energy at the edge of the operating band, such as LTE SC FDMA with Proportionally Fair Scheduling, AT&T and Sirius XM suggest that the Commission eliminate the PSD limit of 50 mW/MHz while retaining the 250 mW/5 MHz maximum EIRP and ATPC requirements.[168]

73. *Discussion*. Based on our analysis of the record, we decide to eliminate the PSD limit for WCS mobile devices that operate with bandwidths greater than or equal to 5 megahertz in WCS Blocks A and B. In support of this decision, we note that in cellular systems, mobile device transmit (*i.e.*, uplink) power control is a key radio resource management function for improving system capacity, coverage, and user quality (data rate or voice quality), lowering battery consumption, and controlling interference to adjacent cells of the same system, and per-megahertz PSD limits are not standardized for wideband wireless technologies such as W-CDMA, WiMAX, or LTE.[169] Instead of controlling mobile devices' transmit power on a per-megahertz basis, LTE technology is designed to control mobile devices' transmit power by dynamically allocating spectrum resources, known as Physical Resource Blocks (PRBs), among

[165] Letter from James S. Blitz, Vice President, Regulatory Counsel, Sirius XM Radio Inc. and Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293; IB Docket No. 95-91 Attachment at 2-5 (filed Apr. 17, 2012) ("Sirius XM Apr. 17, 2012 *Ex Parte*").

[166] *Id*. at 3.

[167] Localized Single Carrier FDMA (L-SC FDMA) with Proportional Fair Scheduling, which has been selected as the uplink transmission scheme in 3GPP LTE due to its low peak to average power ratio versus that of orthogonal frequency division multiple access (OFDMA), exploits the link adaptation information available at the medium access control (MAC) layer to form virtual clusters. The distributed proportional fairness scheduler ensures a minimum throughput for all users in the coverage area by assigning contiguous resource blocks, proportional to the throughput and number of users in a particular cluster or group. *See* Irfan Ahmed, Amr Mohamed, Fairness Aware Group Proportional Frequency Domain Resource Allocation in L-SC-FDMA Based Uplink, available at http://www.scirp.org/journal/PaperInformation.aspx?paperID=6918.

[168] *See* AT&T/Sirius XM June 15, 2012 Agreement at 3-4.

[169] We agree with the WCS Coalition's assertions that the PSD limits established in the *2010 WCS R&O* are not in agreement with the current industry standards for LTE, WiMAX, and W-CMDA technologies and appear to have impeded the development of equipment that would facilitate the deployment of mobile broadband service in the U.S 2.3 GHz band.

mobile devices and setting the power levels of these PRBs on a frame-by-frame basis.[170] Similarly, despite having different uplink physical layer and transmission schemes, WiMAX technology controls mobile devices' transmit power by uniformly distributing the uplink transmissions from a given mobile device across the operating channel bandwidth and controlling the power of the RF subcarriers assigned to a particular device.[171] In Wideband Code Division Multiple Access (W-CDMA), also known as Universal Mobile Telecommunication System (UMTS), networks, to balance the power received at the base station from all mobile devices to within a few dB and optimize system performance, uplink power control information is transmitted from the base station in every time slot to control the power transmitted in each data channel frame assigned to a particular mobile device.[172]

74. Thus, in the same manner that uplink power control is used in LTE, WiMAX, and W-CDMA networks to optimize system performance, we find that WCS licensees may use LTE, WiMAX, and W-CDMA technologies' uplink power control algorithms to effectively limit the PSD of WCS mobile devices to avoid self-interference, maximize the capacity and efficiency of the network, and mitigate the risk that these devices will cause harmful interference to SDARS receivers. Although the PSD of WCS mobile devices may occasionally exceed 50 mW/MHz, we expect that such instances will be rare and short lived. We conclude that WCS licensees can control WCS mobile devices' transmitter power via power control, signal spreading, and/or other signal modulation techniques to prevent these devices from concentrating power greater than 50 mW/MHz in narrow segments of bandwidth that are near the SDARS band and avoid causing harmful interference to SDARS receivers.

75. For these reasons, we decide to eliminate the 50 mW/MHz PSD limit for WCS mobile devices that operate in the WCS A and B Blocks (2305-2315 MHz and 2350-2360 MHz) and employ LTE SC FDMA. However, to address Sirius XM's concerns that WCS licensees' mobile devices could transmit more power than they could otherwise transmit in a 5-megahertz block by aggregating spectrum blocks and consistent with the WCS Coalition's assertion that a WiMAX or LTE mobile device's transmit power is uniformly distributed across the available channel bandwidth, we clarify that WCS mobile devices are limited to a maximum EIRP of 250 mW for any bandwidth greater than or equal to 5 megahertz.

2. Out-of-Band Emissions Limits

76. Sirius XM requests that the Commission adopt a more stringent OOBE attenuation factor for WCS mobile devices of 70 + 10 log (P) dB at 2.5 megahertz into SDARS band.[173] Sirius argues that the OOBE limit for WCS mobile/portable devices of -70 dBW above 2365 MHz that was adopted in the *2010 WCS R&O* to protect AMT operations at 2360-2395 MHz, above the upper edge of the WCS allocation, provides for a 5-megahertz transition band (2360-2365 MHz).[174] Sirius states that it seeks the

[170] *See* LTE Planning Principles Part II – Soft Frequency Reuse, mpirical Technology Update, Sept. 2009, available at lms.mpirical.com/file.php/1/LTE-Planning Principles-Part-II.pdf; Agilent 3GPP Long Term Evolution: *System Overview, Product Development, and Test Challenges* at 11; A. Larmo, *et al.*, "The LTE Link Layer Design," *IEEE Communications Mag.,* Apr. 2009 at 52-53; David Astely, *et al*., "LTE: The Evolution of Mobile Broadband," *IEEE Communications Mag.*, Apr. 2009 at 48-49; LTE Resource Guide at 4, © 2009 Anritsu Company, available at www.us.anritsu.com; 3GPP "E-UTRS Physical layer procedures," TS 36.213 V8.1.0.

[171] *See* LTE and WiMAX Comparison, Tejas Bhandare, Santa Clara University December 2008, at 19-23, available at www.halcyonwireless.com/LTE%20and%20WiMAX%20Comparison-TejasBhandare.pdf.

[172] *See* Agilent Designing and Testing 3GPP W-CDMA User Equipment Application Note 1356 at 7, 20-22.

[173] *See* Sirius XM Petition at 10.

[174] Sirius XM Petition at 13. WCS mobile/portable devices that operate in the 2347.5-2360 MHz band must limit their OOBEs to -43 dBw at 2360 MHz and -70 dBW above 2365 MHz. *See* 47 C.F.R. § 27.54(a)(4)(iii).

same level of protection for SDARS receivers from WCS mobile/portable devices with 5-megahertz transition bands at the edges of the WCS allocation next to the SDARS band which, given the 2.5-megahertz guard bands in the C and D Blocks where WCS mobile/portable devices are prohibited from operating, would be 2317.5-2322.5 MHz and 2342.5-2347.5 MHz (*i.e.*, half of the transition bands for WCS mobile/portable devices' OOBEs to reach -70 dBW would be in the WCS C and D Blocks and the other half would be in the SDARS spectrum).[175] Sirius XM also argues that in deciding to adopt the 55/61/67 + 10 log (P) dB attenuation factors, the Commission placed more significance on WCS licensees' commercial convenience that on technical analyses demonstrating the high likelihood of harmful interference under these limits.[176]

77. Sirius XM further argues that it has submitted extensive technical analyses demonstrating that OOBE limits adopted in the *2010 WCS R&O* will cause harmful interference to SDARS receivers, even when the WCS transmitter and SDARS receiver are separated by significant distances and there is a strong satellite signal.[177] Sirius XM also argues that filters capable of achieving an attenuation factor of 70 + 10 log (P) dB are commercially available at a reasonable cost that would not threaten the commercial viability of WCS mobile broadband service. Finally, Sirius XM argues that the WCS Coalition's acceptance of the OOBE limits deemed necessary to protect AMT operations above 2360 MHz is an acknowledgement that such filtering technology is available.[178]

78. *Oppositions*. The WCS Coalition and AT&T oppose Sirius XM's petition for increased restrictions on WCS mobile devices' OOBEs in the SDARS band because it believes that they are not necessary to limit the potential for harmful interference to SDARS receivers.[179] The WCS Coalition argues that the OOBE limits that the Commission adopted were not meant to eliminate all of the potential for instances of interference but, instead, were meant to limit the potential for interference that repeatedly disrupts or seriously degrades SDARS service (*i.e.*, harmful interference). In addition, the WCS Coalition contends that the fleeting instance of WCS interference to an SDARS receiver that occurred during the testing in Ashburn, Virginia with a worst case high-data rate WCS signal does not warrant adopting more restrictive OOBE limits for WCS mobile devices.[180]

79. The WCS Coalition also opposes stricter OOBE limits because the additional insertion losses associated with such a filter would require a larger, more expensive linear power amplifier that would generate more heat and drain the WCS mobile device's battery more quickly; such a filter may not even be incorporable into a viable handset design. It further asserts that Sirius XM has failed to provide

[175] Sirius XM Petition at 12-13.

[176] *Id*. As noted above, WCS mobile and portable devices are required to attenuate their OOBE below the transmitter power P, in Watts, by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2317.5 MHz and between 2347.5-2360 MHz that are outside the licensed band of operation, 55 + 10 log (P) dB in the 2320-2324/2341-2345 MHz bands, 61 + 10 log (P) dB in the 2324-2328/2337-2341 MHz bands, and 67 + 10 log (P) dB) in the 2328-2337 MHz band. WCS mobile devices' OOBE must also be attenuated below the transmitter power P, in Watts, by a factor of not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2365 MHz bands, 55 + 10 log (P) dB in the 2296-2300 MHz band, 61 + 10 log (P) dB in the 2292-2296 MHz band, 67 + 10 log (P) dB in the 2288-2292 MHz band, and 70 + 10 log (P) dB below 2288 MHz and above 2365 MHz. *See 2010 WCS R&O*, 25 FCC Rcd at 11754 para. 100.

[177] *See id*. at 11. For example, Sirius XM notes the study by Dr. Theodore S. Rappaport, P.E., which concludes that a WCS mobile device OOBE attenuation factor of at least 75 + 10 log (P) dB is required to protect SDARS receivers from harmful interference. *Id*.

[178] *See* Sirius XM Petition at 11-13.

[179] *See* WCS Coalition Opposition at 2-3; AT&T Opposition at 8.

[180] *See* WCS Coalition Opposition at 4-5.

any information on the risk of increased band-pass ripple associated with such a filter, the shoulder roll-off specification of the filter, or issues associated with cascaded filter design (*i.e.*, bandpass plus notch filter).[181] The WCS Coalition concludes that although the record of this proceeding demonstrates the availability of signal filters that could achieve the 70 + 10 log (P) dB level of OOBE attenuation that Sirius XM now requests, the record also demonstrates that requiring WCS mobile devices' OOBE to be further attenuated to such a level at both ends of the WCS spectrum adjacent to the SDARS band would severely impact WCS handset design and availability and likely preclude the viability of WCS mobile broadband services.[182] In its separate opposition, AT&T agrees with the WCS Coalition's position regarding the WCS OOBE mask that the Commission adopted.[183]

80. *Reply*. In reply to the WCS Coalition's opposition to its petition to increase the restrictions on WCS mobile device's OOBE, Sirius XM reiterates that the WCS OOBE limits the Commission adopted in the *2010 WCS R&O* are not sufficient to protect SDARS receivers from harmful interference.[184] Sirius XM also argues that WCS licensees have never considered the feasibility of developing signal filters that would provide greater attenuation of WCS mobile device's OOBE and offer better interference protection to SDARS consumers. Sirius XM submits that the WCS Coalition has not justified the inconsistency in accepting an OOBE attenuation of 70 + 10 log (P) dB to protect AMT operations above 2360 MHz, while claiming that the same level of protection is unreasonable for SDARS operations. Sirius XM argues that if WCS mobile devices can operate with a more restrictive OOBE attenuation factor of 70 + 10 log (P) dB above 2360 MHz, then they should be able to operate with this same attenuation factor above 2320 MHz.[185] Neither AT&T nor the WCS Coalition filed comments in response to Sirius XM's reply comments. AT&T and Sirius XM did not address this issue in their June 15, 2012 joint submission.

81. *Discussion*. Sirius XM's petition regarding the OOBE limits for WCS mobile devices in the 2320-2345 MHz SDARS band asserts numerous arguments that Sirius XM raised – and the Commission considered and rejected – in the *2010 WCS R&O*.[186] We decline to revisit those contentions

[181] A band-pass filter is a device that passes frequencies within a certain desired frequency range (pass band) and rejects (attenuates) frequencies outside that range. A notch (band reject) filter attenuates one frequency band and passes both a lower and a higher frequency band. In practice, an RF filter does not completely attenuate all frequencies outside the desired pass band frequency range; in particular, there is a region just outside the pass band, known as the filter roll-off region, where frequencies are attenuated, but not completely rejected. Generally, an RF filter is designed to make the roll-off as narrow as possible to allow the filter to perform as close as possible to its intended design. However, this "sharp" roll-off performance is often achieved at the expense of significant variations in the frequency magnitude response of the desired signal in the passband frequency range, an undesirable phenomenon known as "ripples." *See* Clint Smith & Curt Gervelis, "Wireless Network Performance Handbook," McGraw-Hill NETWORK Engineering, 2003, at 34-38.

[182] *See* WCS Coalition Opposition at 5.

[183] *See* AT&T Opposition at 8.

[184] *See* Sirius XM Reply at 2.

[185] *See* Sirius XM Reply at 2-3.

[186] *See*, *e.g.*, Sirius XM Petition at 10-13 (Ashburn, VA interference tests conducted in area of strongest satellite signal; studies submitted demonstrating harmful interference; commercial availability and economic viability in WCS handsets of signal filters providing attenuation factor of 70 + 10 log (P) dB). *See also 2010 WCS R&O*, 25 FCC Rcd at 11755, para. 102 (Ashburn, VA interference tests conducted in area of strongest satellite signal); 25 FCC Rcd at 11755-76, paras. 103-106 (studies submitted demonstrating harmful interference); 25 FCC Rcd at 11757, para. 108, and 11758, para. 111 (commercial availability and economic viability in WCS handsets of signal filters providing attenuation factor of 70 + 10 log (P) dB); Comments of Sirius XM Radio Inc. (filed May 13, 2010) at 7-9 (WCS Coalition indicated that it can accommodate a rule requiring WCS mobile devices to meet an OOBE attenuation factor of 70 + 10 log P dB for frequencies above 2365 MHz, which demonstrates that the WCS (continued….)

here. Sirius XM fails to present any new evidence that would compel us to reconsider the Commission's previous findings. Moreover, it is "settled Commission policy that petitions for reconsideration are not to be used for the mere re-argument of points previously advanced and rejected."[187] Thus, we deny this portion of Sirius XM's petition.

3. Bands of Operation

82. *Petition*. AT&T asks the Commission to eliminate the restriction that WCS mobile devices using FDD technology may transmit only in the lower WCS A and B Blocks (*i.e.*, 2305-2315 MHz) and the 2.5-megahertz portion of WCS Block C furthest removed from the SDARS band (*i.e.*, 2315-2317.5 MHz). AT&T contends that the public interest requires that the Commission not constrain WCS FDD mobile devices in this manner. AT&T also argues that since WCS mobile devices that employ TDD technology are authorized to operate in the upper WCS A and B Blocks and the 2.5-megahertz of WCS Block D, the prohibition on FDD mobile devices operating in these same spectrum bands does not provide any interference protection to SDARS or AMT operations. Instead, AT&T asserts, the limitations on WCS FDD and mobile devices' bands of operation only impinge on WCS licensees' ability to effectively use FDD technology and pair the WCS spectrum with other spectrum to enhance service to the public.[188]

83. *Oppositions*. The Aerospace and Flight Test Radio Coordinating Council (AFTRCC) and the Boeing Company (Boeing) filed separate oppositions to AT&T's petition to eliminate the restriction on WCS FDD mobile devices' bands of operation.[189] AFTRCC states that maintaining the restriction that WCS FDD mobile devices transmit only in the lower WCS bands (*i.e.*, 2305-2317.5 MHz) – which would restrict WCS FDD base stations to the upper WCS bands (2345-2360 MHz) – coupled with WCS licensees' migration to LTE technology, would produce a stable coordination environment for AMT operations and outweighs any limitations on the ability of WCS licensees to pair their spectrum with spectrum in other systems. AFTRCC also asserts that even though the upper WCS bands may be used for TDD deployment, the Commission should not make sharing conditions worse by allowing additional WCS mobile operations in the upper WCS bands. AFTRCC submits that the Commission should deny AT&T's petition to remove the restriction on the bands of operation for WCS mobile devices using FDD.[190]

(Continued from previous page)
Coalition has conceded that filtering is available that would allow WSC mobile devices to meet that level of attenuation at frequencies 5 megahertz beyond the WCS band edge; WCS mobile devices should be required achieve 70 + 10 log P dB attenuation on SDARS frequencies that are more than 2.5 megahertz removed from the WCS band edge).

[187] *In re* S&L Teen Hosp. Shuttle, *Order on Reconsideration*, 17 FCC Rcd 7899, 7900 para. 3 (2002) (citations omitted). *See also* General Motors Corp. and Hughes Electronics Corp., Transferors, and The News Corp. Ltd., Transferee, For Authority to Transfer Control, MB 03-124, *Order on Reconsideration*, 23 FCC Rcd 3131, 3135 para. 11 (2008) (stating that the Commission has rejected petitions for reconsideration where the petitioner essentially repeats previously-relied upon arguments and "fails to raise new arguments or facts that would warrant reconsideration") (citations omitted).

[188] *See* AT&T Petition at 20-21.

[189] *See* AFTRCC Opposition to Petitions for Reconsideration, filed Oct. 18, 2010, at 8; Opposition of the Boeing Company, filed Oct. 18, 2010, at 8-9. AFTRCC, founded in 1954, is a not-for-profit organization of Radio Frequency Management Representatives from major aerospace companies and is the Non-Federal Government coordinator for the shared Federal/Non-Federal spectrum allocated for flight testing. *See* http://www.aftrcc.org/. Boeing designs and manufactures both commercial and military aircraft and routinely conducts flight test operations for these aircraft. *See* Opposition of the Boeing Company, filed Oct. 18, 2010, at 2-3.

[190] *See id.* at 8-10.

84. Boeing states that to facilitate successful coordination with AMT operations, WCS mobile devices using FDD technology should be restricted to the 2305-2317.5 MHz WCS band and WCS base stations should be restricted to the 2345-2360 MHz WCS band.[191] Boeing contends that critical AMT receive sites can be better protected by: 1) restricting FDD WCS base stations to transmitting only in the upper portion of the WCS band (*i.e.*, 2345-2360 MHz) where they can be coordinated with AMT entities, and 2) restricting WCS FDD mobile devices to transmitting only on the lower WCS frequencies (*i.e.*, 2305-2317.5 MHz) where they will not interfere with AMT receivers and need not be coordinated with Federal and non-Federal AMT entities. To facilitate this outcome, Boeing states that the Commission should reject AT&T's petition and maintain the WCS rules in their current form, which restrict WCS mobile stations using FDD technology to transmitting in the 2305-2317.5 MHz band.[192]

85. *Reply*. In reply to AFTRCC's and Boeing's oppositions, AT&T states that AFTRCC and Boeing fail to refute AT&T's arguments in its petition.[193] Specifically, although TDD mobiles are allowed to operate in the upper WCS blocks (2347.5-2360 MHz) and WCS FDD mobile devices do not have any more interference potential than WCS TDD mobile devices, AT&T contends that AFTRCC and Boeing have not demonstrated that TDD mobile devices transmitting in the upper WCS spectrum blocks will interfere with AMT receivers. Instead, AT&T argues that AFTRCC and Boeing appear to simply hope that WCS licensees will migrate to FDD-LTE technology to eliminate any difficulties the AMT industry will face under the adopted OOBE limits. AT&T maintains that since WCS FDD mobile transmitters will have no more interference potential than WCS TDD transmitters, there is no reason to restrict WCS FDD mobile devices to the lower WCS blocks and preclude WCS licensees from pairing the upper WCS spectrum with other bands.[194]

86. In their June 15, 2012 joint submission, AT&T and Sirius XM request that WCS mobile and portable transmitters be restricted from operating in all portions of WCS Blocks C and D. AT&T and Sirius XM agree that because testing by the WCS Coalition demonstrates that mobile transmitters operating in WCS Blocks C and D could mute SDARS receivers at significant separation distances, the C and D Blocks should not be used for WCS mobile and portable broadband transmissions. AT&T and Sirius XM state that this prohibition would provide a 5-megahertz guard band for WCS mobile and portable transmissions at each end of the SDARS band while still permitting the spectrum to be used for base stations or fixed services, and, coupled with their other proposals, would allow the WCS and SDARS to flourish while ending the uncertainty that has plagued both services.[195]

87. *Discussion*. Based on our analysis of the record, we decline to remove the restriction that WCS mobile devices using FDD technology may not transmit in the upper WCS A and B Blocks and the 2.5-megahertz portion of the WCS D Block furthest removed from the SDARS band (2347.5-2360 MHz), as requested by AT&T. As the Commission determined in the *2010 WCS R&O*, we continue to believe that restricting WCS FDD mobile devices from transmitting in the upper WCS blocks at 2347.5-2360 MHz band provides added protection from harmful interference to adjacent-band AMT receivers that operate in the 2360-2395 MHz band.[196] Therefore, we deny the portion of AT&T's petition requesting that we allow WCS mobile devices to operate in the upper WCS bands at 2347.5-2360 MHz.

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[191] Opposition of the Boeing Company, filed Oct. 18, 2010, at 8.

[192] *See id.* at 9.

[193] *See* AT&T Reply at 1.

[194] *See id.* at 8.

[195] *See* AT&T/Sirius XM June 15, 2012 Agreement at 3, 8.

[196] *See 2010 WCS R&O*, 25 FCC Rcd at 11743 para. 74.

88. However, although the Commission determined in the *2010 WCS R&O* that the potential for harmful interference to SDARS receivers from mobile transmitters operating in the 2.5-megahertz portions of WCS Blocks C and D furthest removed from the SDARS band was negligible, AT&T and Sirius XM assert that mobile operations in WCS Blocks C and D hold the most potential to cause harmful interference to satellite radio consumers. AT&T and Sirius XM agree that expanding the guard bands for WCS mobile and portable device transmissions to encompass all of WCS Blocks C and D will further reduce the risk that operation of WCS mobile transmitters in these bands could pose an unacceptable interference threat to SDARS reception. Thus, to further mitigate the potential for harmful interference to SDARS operations, we decide to prohibit WCS mobile and portable transmitters from operating in all portions of WCS Blocks C and D. We believe this action will, in effect, provide a 5-megahertz transition band for SDARS receivers at each end of the SDARS band that will further decrease the potential for harmful interference to SDARS operations from WCS mobile devices operating in adjacent spectrum, while permitting the C and D Blocks spectrum to be used for WCS base stations or fixed services. Coupled with the relaxed PSD and duty cycle limits that we are adopting for WCS mobile devices, this action will provide added interference protection to SDARS operations while advancing the Commission's goal of making mobile broadband services over the WCS spectrum widely available.

89. Our adoption of this approach also furthers our resolution of the interference protection matters raised in Sirius XM's petition for reconsideration.[197] We note that the Commission first provided notice that it was considering the issue of interference management between the WCS and SDARS in the *2001 Public Notice*, in which the Commission sought comment on requiring SDARS licensees to operate their repeaters in frequency bands at least 4 megahertz away from the edge of their licensed frequency bands, among other things.[198] The issue has remained in play with the timely filing of the Sirius XM Reconsideration Petition challenging the Commission's decision in the *2010 WCS R&O* to adopt a different approach.

D. WCS Mobile, Portable, and Fixed Customer Premises Equipment Duty Cycle Limits

90. *Background*. As noted earlier, in the *2010 WCS R&O*, the Commission established uplink duty cycle limits of 38 percent for WCS mobile devices transmitting in the 2305-2317.5/2347.5-2360 MHz bands using TDD technology, and 25/12.5 percent for WCS mobile devices transmitting in the 2305-2315/2315-2317.5 MHz bands, respectively, using FDD technology.[199] For fixed WCS CPE using TDD technology, it set the maximum duty cycle limit to 38 percent; for fixed WCS CPE using FDD technology, it set the maximum duty cycle to 12.5 percent for WCS CPE transmitting in the WCS C Block (*i.e.*, 2315-2320 MHz) and to 25 percent for WCS CPE transmitting in the lower WCS A and B Blocks (*i.e.*, 2305-2315 MHz).

91. *Petitions*. In their separate petitions, AT&T and the WCS Coalition request that the Commission increase the duty cycle for WCS mobile devices and fixed CPE using TDD technology to 43.333 percent.[200] AT&T and the WCS Coalition also ask that we reconsider the reduced duty cycle limits for WCS mobile devices and fixed CPE using FDD technology. AT&T suggests that the duty cycle for WCS devices using FDD should not be limited any more than is necessary to avoid harmful

[197] Our decision provides for additional protection over that offered by the *2010 WCS R&O*, but by a somewhat different approach than Sirius XM suggested. This approach is nevertheless within the range of logical possibilities we can take in response to the position Sirius XM took in its reconsideration petition.

[198] *See 2001 Public Notice*, 16 FCC Rcd at 19437; *see also 2007 Notice*, 22 FCC Rcd at 22123; *2010 Public Notice*.

[199] *See 2010 WCS R&O*, 25 FCC Rcd at 11741-43 paras. 70-74.

[200] *See* AT&T Petition at 16-20; WCS Coalition Petition at 7.

interference to SDARS receivers, which it claims is somewhat higher than the duty cycle limit of 43.333 percent that it requests for WCS mobile devices using TDD technology.[201] AT&T also claims that the duty cycle limits adopted in the *2010 WCS R&O* will unnecessarily limit WCS devices' throughput and will hamper the ability of WCS licensees to provide wireless broadband service via LTE.[202]

92. In addition, AT&T argues that there is no evidence in the record that a 38 percent duty cycle limit is necessary to prevent WCS devices from causing harmful interference to SDARS receivers. AT&T asserts that the testing in Ashburn, Virginia demonstrated that a 38 percent duty cycle for WCS TDD mobile devices using WiMAX technology would, under the worst possible conditions, only produce negligible interference to SDARS receivers, not harmful interference that repeatedly disrupts or seriously degrades service to SDARS users. AT&T argues that because WCS LTE systems using Single Carrier Frequency Division Multiple Access (SC-FDMA)[203] technology can reduce the average power of WCS mobile devices by 2-2.5 dB, this difference in interference potential should be recognized in the WCS rules by allowing WCS mobile devices using LTE technology to operate at a higher duty cycle than WCS mobile devices using WiMAX technology. AT&T also asserts that because the record in this proceeding does not establish what the upper limit for an LTE duty cycle limit should be to avoid causing harmful interference to adjacent bands operations, the Commission should allow WCS licensees to "round up" from a 38 percent duty cycle, which is not a standard Time Division-LTE (TD-LTE) configuration, to the next nearest standard configuration at 43.333 percent.[204]

93. For WCS mobile and CPE devices using FDD technology, AT&T claims that the activity factor[205] does not enter into the determination of potential interference, as the Commission stated. AT&T contends that an FDD transmitter operating at a 38 percent duty cycle will transmit the same proportion of time at the same power levels as a TDD transmitter operating with a 38 percent duty cycle, and thus will have the same interference potential as the TDD transmitter. AT&T also states it is likely that multiple TDD devices would cause more interference than an identical number of FDD devices because TDD devices are limited to transmitting in the same time slots. As a result, their impact necessarily would be cumulative (*i.e.*, transmissions in the same time slot could constructively add together to cumulatively increase the potential for harmful to SDARS receivers). On the other hand, FDD transmissions would be distributed over the whole transmission frame and, thus, would not cumulate to the same degree. Given that WCS FDD devices will have at least the same and possibly lower interference potential as those using TDD transmitters, AT&T asserts that nothing in the record supports a more stringent duty cycle for WCS FDD devices.[206] The WCS Coalition, which endorses AT&T's duty cycle proposals and incorporates them by reference in its petition, agrees that the maximum duty cycle for a WCS TD-LTE

[201] *See* AT&T Petition at 18; WCS Coalition Petition at 7.

[202] *See* AT&T Petition at 16.

[203] SC-FDMA is a multiple access technique that utilizes single carrier modulation, discrete Fourier transform (DFT)-spread orthogonal frequency multiplexing, and frequency domain equalization. Similar in structure and performance to orthogonal frequency division multiple access (OFDMA), SC-FDMA is the uplink multiple access scheme for the 3rd Generation Partnership Project (3GPP) Long Term Evolution (LTE) air interface. *See* SC-FDMA Single Carrier FDMA in LTE, available at www.ixiacom.com/pdfs/library/white_papers/**SC-FDMA**-INDD.pdf, at 9.

[204] *See* AT&T Petition at 7-8, 16-18.

[205] Activity factor is defined as the portion of transmission frames that the base station has allocated for uplink traffic from users' devices. Duty cycle (also known as duty factor) is the percentage of a transmission frame that a user device uses to transmit uplink information to the base station (*i.e.*, the "on time" of a user device's transmitter in a given transmission frame). *See* "activity factor" and "duty cycle" definitions at Federal Standard 1037C Telecommunications: Glossary of Telecommunication Terms at http://www.its.bldrdoc.gov/fs-1037/fs-1037c.htm.

[206] *See* AT&T Petition at 18-20.

system should be set at 43.333 percent and states that there is no basis for imposing a duty cycle penalty on WCS systems using FDD technology.[207]

94. In its petition, Sirius XM asks the Commission to reconsider its decision to allow a duty cycle of 38 percent for WCS subscriber devices using TDD.[208] Sirius XM asserts that the record in this proceeding lacks any technical analyses supporting the Commission's assumption that a 38 percent duty cycle will be sufficient to protect satellite radio receivers. Sirius XM also submits that the Commission should have specified that the duty cycle is measured over a time frame of 5 milliseconds (ms) and to restrict uplink transmissions to every other frame instead of just requiring WCS licensees to apply the duty cycle requirement in a manner that is referenced directly to the frame duration for the technology in use.[209]

95. *Oppositions*. Sirius XM opposes AT&T's and the WCS Coalition's petitions to increase the duty cycle limit for WCS mobile devices and fixed WCS CPE.[210] Sirius XM contends that instead of increasing the duty cycle limit, it should be reduced, especially given that a WCS mobile device duty cycle of 35 percent caused harmful interference to an SDARS receiver during the testing in Ashburn, Virginia. Sirius XM argues that the overload interference that would result from allowing WCS mobile devices to use a higher duty cycle (*i.e.*, transmit for a greater proportion of time) would cause an excessively high bit error rate that would surpass the ability of SDARS receivers to recover the desired SDARS signal. Sirius XM suggests that the Commission should reduce the uplink duty cycle limits for all WCS mobile devices to 25 percent in the WCS A and B Blocks and to 12.5 percent in the WCS C and D Blocks. Sirius XM also states that the Commission should limit WCS transmissions to every other 5 ms transmission frame.[211]

96. In opposition to Sirius XM's petition to reduce the duty cycle limit for WCS mobile devices, the WCS Coalition contends that Sirius XM's proposal is contrary to the public interest because a reduced duty cycle would limit WCS mobile devices' upload speeds.[212] Although the WCS Coalition continues to contend that duty cycle limits are unnecessary to protect SDARS receivers, it asserts that the Commission properly decided that duty cycle compliance should be based upon the frame structure employed by the WCS technology utilized. The WCS Coalition also asserts that the Commission should affirm its decisions that WCS mobile devices' transmissions should not be limited to every other transmission frame.[213] AT&T agrees with the WCS Coalition's opposition to Sirius XM's petition.[214]

97. *Replies*. In reply to Sirius XM's opposition to AT&T's and the WCS Coalition's petitions to increase the duty cycle limits for WCS mobile and CPE devices, the WCS Coalition contends

[207] *See* WCS Coalition Petition at 7.

[208] *See* Sirius XM Petition at 13.

[209] *See* Sirius XM Petition at 13-15.

[210] *See* Sirius XM Opposition at 4.

[211] *See* Sirius XM Opposition at 4-7.

[212] *See* Opposition of the WCS Coalition to Petition of Sirius XM Radio Inc. for Partial Reconsideration and Clarification at 6-7 (filed Oct. 18, 2010) (WCS Coalition Opposition).

[213] *See* WCS Coalition Opposition at 6, 8-9.

[214] *See* Opposition of AT&T Inc. to Petition for Partial Reconsideration and Clarification of Sirius XM Radio Inc.; Petition for Reconsideration of Green Flag Wireless, LLC, Et Al.; and Petition for Clarification or Partial Reconsideration of ARRL at 8 (filed Oct. 18, 2010).

that the WCS should not be restricted to using WiMAX technology.[215] Also, the WCS Coalition asserts that Sirius XM has not demonstrated that using an increased duty cycle for LTE technology will pose a material threat of harmful interference to SDARS subscribers.[216] In a later submission, the WCS Coalition notes that there is currently little manufacturer support for WiMAX technology in the WCS bands and no vendor is known to have developed a mobile WiMAX solution for the U.S. 2.3 GHz band. It also argues that if retained, the current WCS duty cycle and PSD limits, which run counter to the fundamental design of the underlying LTE technology, will together dramatically affect the performance of LTE in the WCS band and impede the commercialization of LTE in the WCS band.[217]

98. In reply to the WCS Coalition's opposition to its petition to reduce the WCS mobile devices' duty cycle limit, Sirius XM contends that the WCS Coalition cannot justify the WCS duty cycle limits adopted in the *2010 WCS R&O*.[218] Sirius XM further contends that the duty cycle limit for WCS mobile devices should not be based on the cheapest commercial technology available without regard for the potential for interference to operations in the adjacent band. Sirius XM asserts that licensees have no right to ready-made technology and are frequently required to develop new solutions to coexist with other spectrum users. Sirius XM also argues that the WCS Coalition's opposition to lower duty cycle limits places them at odds with the *2010 WCS R&O*'s directive that WCS licensees maintain sufficient operational flexibility in their network design to implement one or more technical solutions to remedy harmful interference.[219]

99. However, in their June 15, 2012 joint submission, AT&T and Sirius XM request that the Commission exclude WCS mobile, portable, and fixed WCS CPE stations using FDD technology from all uplink duty cycle limits.[220] AT&T and Sirius XM agree that because FDD transmissions involve no intermittent on-off pulsing, they will not have any mechanism to interfere with the automatic gain control (AGC) circuitry in SDARS receivers, and the effects of FDD devices on the AGC circuitry of SDARS receivers is predictable, low, and manageable. Thus, AT&T and Sirius XM agree that the duty cycle limits for FDD WCS mobile, portable, and fixed CPE stations should be eliminated. Furthermore, AT&T and Sirius XM submit that satellite radio operations can better coexist with WCS usage of FDD rather than TDD technology, and AT&T has significant experience in deploying FDD, which is becoming a critical technology in the development of mobile broadband. AT&T and Sirius XM further agree that abandoning the WCS FDD duty cycle limits will serve the public interest by maximizing the performance of the WCS mobile broadband system while also maximizing the protection of Sirius XM subscribers against AGC disruption.[221]

100. *Discussion*. Based on our analysis of the record, to facilitate the deployment of broadband services in WCS spectrum, we decide to eliminate the duty cycle requirements for WCS

[215] *See* WCS Coalition Reply at 2. In its Reply, the WCS Coalition endorses the duty cycle limits proposed in the AT&T Petition, and incorporates by reference the duty cycle discussion in the AT&T Reply. *Id*. at 9-10.

[216] *Id.* at 10.

[217] *See* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 Attachment at 2-3 (filed May 31, 2011) ("WCS Coalition May 31, 2011 *Ex Parte*").

[218] *See* Sirius XM Radio Inc. Reply to Oppositions of the WCS Coalition and AT&T Inc. at 4 (filed Nov. 2, 2010) (Sirius XM Reply).

[219] *Id*. at 4-6.

[220] *See* AT&T/Sirius XM June 15, 2012 Agreement at 4.

[221] *See id*.

mobile, portable, and fixed CPE employing FDD-based technology.[222] We agree with AT&T that the activity factor a WCS mobile device is not a factor in determining potential interference to SDARS receivers that warrants a 25 percent duty cycle for WCS mobile and portable devices in WCS Blocks A and B, as the Commission determined in the *2010 WCS R&O*. We also agree with AT&T's and Sirius XM's assertions that adjacent-band WCS FDD operations will have minimal impact on the SDARS receivers' AGC circuitry because they involve no intermittent pulsing. However, based on our analysis of the record and reinforced by the results of the testing in Ashburn, Virginia, we maintain the 38 percent duty cycle for WCS mobile devices using TDD-based technologies.

101. Regarding Sirius XM's argument that the 38 percent duty cycle established in *2010 WCS R&O* was not supported by the record in this proceeding, we note that the Commission's decision to adopt a 38 percent duty cycle for TDD-based WCS user devices was a tradeoff based on its analysis of the record leading up to adoption of the 2010 WCS rules and the WCS/SDARS testing in Ashburn, Virginia. The Commission decided in 2010 to round up the permitted TDD duty cycle from the 35 percent used in the Ashburn, Virginia testing to 38 percent to allow for the majority of TDD profiles under an LTE or WiMAX technology selection,[223] because the 35 percent duty cycle used during the testing only resulted in two isolated instances of negligible interference to SDARS receivers, not harmful interference that repeatedly interrupted the SDARS signal.

102. We also decline to limit WCS mobile devices' transmissions to every other 5 ms frame as Sirius XM requests. As determined by the Commission's analyses and verified by the WCS/SDARS testing in Ashburn, Virginia, we find that the WCS mobile device's transmissions need not be limited to every other transmission frame to limit the potential for harmful interference to SDARS receivers. However, to eliminate any uncertainty about how compliance with the duty cycle is measured, we clarify the Commission's requirement that WCS subscriber devices' duty cycle be measured in a manner that is referenced directly to the frame duration for WCS technology being used. Specifically, industry standards for WiMAX and LTE technology specify frame lengths of 5 ms and 10 ms, respectively.[224] Accordingly, for WCS networks using WiMAX technology, the duty cycle should be measured over a 5 ms frame; for WCS networks using LTE technology, the duty cycle should be measured over a 10 ms frame. For TDD technologies other than LTE and WiMAX, the duty cycle should be measured over a frame duration that is referenced directly to the technology being used. See Section 27.50 in Appendix A for the revised rules regarding WCS mobile/portable/fixed CPE duty cycle.

103. We note that although Sirius XM asserts that its receivers already "provide state of the art performance in blocking adjacent band signals,"[225] Sirius XM will be able to take into account the new

[222] We agree with the WCS Coalition's assertions that the duty cycle limits established in the *2010 WCS R&O* are not in agreement with the current industry standards for FDD LTE technology and appear to have impeded the development of equipment that would facilitate the deployment of mobile broadband service in the U.S 2.3 GHz band.

[223] *See* Comments of Ericsson Inc., filed April 22, 2010 (noting that an uplink duty cycle of 38 percent exceeds four of the seven uplink-downlink configurations for TD-LTE set forth in the 3rd Generation Partnership global standard *Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 8)*, 3GPP TS 36.211, v. 8.4.0, at table 4.2-2 (Sept. 2008), available at http://www/quintillion.co.jp/3GPP/Specs/36211-840.pdf.

[224] *See* Mobile WiMAX – Part I: A Technical Overview and Performance Evaluation, Aug., 2006, WiMAX Forum, at 16; 3rd Generation Partnership Project (3GPP) *Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA): Physical Channels and Modulation (Release 10) (Advanced LTE)* 3GPP TS 36.211 v10.4.0 (2011-12), at 9 (Frame Structure).

[225] *See* Letter from James S. Blitz, Regulatory, Sirius XM Radio Inc., Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 and IB Docket No. 95-91 at 1 (filed March 30, 2012).

RF environment that results from the WCS technical rules adopted in this proceeding in designing new SDARS receivers, which in some aspects is actually an improvement over the RF environment which existed prior to adoption of the *2010 WCS R&O*.[226] We anticipate that Sirius XM can design and manufacture future deployments of SDARS receivers so they are less susceptible to overload interference from mobile and fixed WCS operations than current SDARS receivers.[227] There appears to be sufficient spectrum for Sirius XM to provide the same quality of service, using terrestrial repeaters and satellite spatial and frequency diversity, while improving the robustness of the receivers to harmful interference from operations in the adjacent spectrum. Although we are convinced based on our analyses of the extensive technical record that the technical and operating parameters that we are adopting for WCS fixed and mobile devices will protect legacy SDARS receivers, over time, the potential for interference to SDARS receivers may diminish even further as these receivers' susceptibility to interference from signals in adjacent bands decreases. Our rules now provide for all WCS blocks to be used for FDD downlink transmission (although base and fixed stations in WCS Blocks C and D are restricted to a peak, rather than average, EIRP of 2 kW). However, with improved SDARS receiver performance, we anticipate that WCS licensees will eventually be able to maximize the use of the entire WCS band, including the C and D Block licenses, for a total of 30 megahertz of spectrum being made available to address the mobile broadband capacity demands of the future.

E. WCS Out-of-Band Emissions Limit in the 2300-2305 MHz Amateur Radio Service Band

104. *Background*. Amateur Radio Service (ARS) stations are authorized to operate on a secondary basis in the 2300-2305 MHz band adjacent to the 2305-2320 MHz WCS band.[228] Although in the *2010 WCS R&O*, the Commission relaxed the OOBE limits for WCS base, fixed, and mobile stations in the 2320-2345 MHz SDARS band, it maintained the existing OOBE limits for WCS base, fixed, and mobile stations' OOBE in the 2300-2305 MHz band that were established in the *1997 WCS R&O*.[229] Specifically, as measured over a 1-megahertz resolution bandwidth, the OOBE from WCS base, fixed, and mobile stations' OOBE in the 2300-2305 MHz band must be attenuated below the transmitter power P, in watts, by a factor of not less than 43 + 10 log (P) dB,[230] which is derived from an absolute OOBE limit of -43 dBW. Below the 2300 MHz band, WCS mobile stations are required to attenuate their OOBE below the transmitter output power P in Watts by a factor of not less than 55 + 10 log (P) dB in the 2296-2300 MHz band, which is derived from an absolute OOBE limit of -55 dBW. WCS base and fixed stations are required to attenuate their OOBE below the transmitter output power P in Watts by a factor of not less than 70 + 10 log (P) dB in the 2287.5-2300 MHz band, which is derived from an absolute OOBE

[226] For example, prior to adoption of the *2010 WCS R&O*, WCS mobile devices could transmit with a maximum EIRP of 20 W over any bandwidth with no prohibition on roof-mounted vehicle antennas, and fixed WCS CPE could transmit with a maximum EIRP of 2 kW over any bandwidth. *See* 47 C.F.R. § 27.50 (1999 Edition).

[227] *See* Letter from Carl R. Frank, Counsel to Sirius Satellite Radio Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 05-256, WT Docket No. 03-264, IB Docket No. 95-91 Attachment, Interference to the SDARS Service from WCS Transmitters, at 34 (noting that SDARS receivers' susceptibility to overload interference from adjacent bands WCS signals could be reduced by using either a surface acoustic wave or bulk acoustic wave filter after the receiver's low noise amplifier (LNA) and before the RF tuner, along with a new state-of the-art LNA with increased biasing (supply voltage and current)) (filed March 29, 2006).

[228] 47 C.F.R. § 2.106. Under Section 2.105(c)(2)(ii) of the Commission's rules, stations of a secondary service "[c]annot claim interference protection from harmful interference from stations of a primary service to which frequencies are already assigned or to which frequencies may be assigned at a later date." 47 C.F.R. § 2.105(c)(2)(ii).

[229] *See 1997 WCS R&O* 12 FCC Rcd at 10849 para. 124.

[230] *See 2010 WCS R&O*, 25 FCC Rcd at 11754 para. 100; 11766 para. 135.

limit of -70 dBW. Both of these OOBE limits are lower in magnitude than the OOBE limit of -43 dBW that is applicable for WCS based, fixed, and mobile stations in the 2300-2305 MHz band.[231]

105. *Petition*. ARRL, the national association for Amateur Radio (ARRL), requests that the Commission address a "single aspect" of the *2010 WCS R&O* – amateur operations at 2300-2305 MHz.[232] ARRL asks us to clarify that the OOBE limit set forth in Section 27.53(a)(4) at 2305 MHz for WCS mobile devices applies across the entire 2300-2305 MHz band. It also asks us to specify that WCS licensees would be responsible for mitigating harmful interference to ARS operations in the 2300-2305 MHz band through operation of Section 2.102(f) of our rules.[233] ARRL asserts that although the text of the *2010 WCS R&O* clearly specifies that the OOBE from WCS fixed and mobile devices must be attenuated below the transmitter power P by a factor of not less than 43 + 10 log (P) dB in the 2300-2305 MHz band, the text of the modified rules adopted in the *2010 WCS R&O* does not clearly require that this OOBE limit be achieved over the entire 2300-2305 MHz band. Instead, ARRL claims that the text only establishes that WCS fixed and mobile devices' OOBE be attenuated by a factor of 43 + 10 log (P) dB at the discrete frequency of 2305 MHz.[234]

106. Thus, ARRL recommends revising Sections 27.53(a)(1)(ii), (a)(2)(ii), (a)(3)(ii), and (a)(4)(ii) so they clearly specify that the OOBE of the respective WCS devices must be attenuated below the transmitter power (P) by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300-2305 MHz, as measured over a 1-megahertz resolution bandwidth. ARRL also asserts that since Section 2.102(f) states that "[t]he stations of a service shall use frequencies so separated from the limits of a band allocated to that service as not to cause harmful interference to allocated services in immediately adjoining frequency bands," the Commission should clarify that WCS licensees are obligated to resolve instances of harmful interference that they cause to ARS stations operating in the 2300-2305 MHz band.[235]

107. *Oppositions and Reply*. In their separate oppositions to ARRL's petition for clarification regarding WCS mobile stations' OOBE in the 2300-2305 MHz band, neither AT&T nor the WCS Coalition oppose ARRL's request for clarification that the OOBE limits for WCS devices set forth in Section 27.53(a)(3) continue to apply to mobile, portable, and fixed facilities across the entirety of the 2300-2305 MHz band.[236] However, both parties oppose ARRL's request for clarification that WCS licensees are responsible for eliminating harmful interference to ARS stations in the 2300-2305 MHz band, and note the secondary status of ARS stations in the 2300-2305 MHz band.[237] In its reply, ARRL argues that the ARS is not secondary to any primary service in the 2300-2305 MHz band and asserts that

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[231] *See 2010 WCS R&O*, 25 FCC Rcd at 11758 para. 111.

[232] *See* ARRL Petition at 1.

[233] *Id*. Under Section 2.102(f), "[t]he stations of a service shall use frequencies so separated from the limits of a band allocated to that service as not to cause harmful interference to allocated services in immediately adjoining frequency bands." 47 C.F.R. § 2.102(f).

[234] *See* ARRL Petition at 7-8.

[235] *See id.* at 5-6.

[236] *See* Opposition of the WCS Coalition to the ARRL Petition for Clarification or Partial Reconsideration (WCS Coalition Opposition to ARRL Petition) at 9, n.29. AT&T endorses the WCS Coalition's opposition to ARRL's petition. *See* AT&T Opposition at 8.

[237] *See* WCS Coalition Opposition to ARRL Petition at 5-6 (noting that "*inter alia*, under Section 2.105(c)(2)(ii), stations of a secondary service "[c]annot claim interference protection from harmful interference from stations of a primary service to which frequencies are already assigned or to which frequencies may be assigned at a later date"); *see also* AT&T Opposition at 8.

ARS operators are entitled to interference protection from primary WCS licensees in the immediately adjacent band.[238] AT&T and Sirius XM did not address this issue in their June 15, 2012 joint submission.

108. *Discussion*. As a general matter, we note that the technical and operating rules that the Commission adopts for a particular service are designed to prevent harmful interference (*i.e.*, interference which seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service) to other services that operate in adjacent bands and to establish the RF environment for adjacent band services to coexist.[239] In the case of the WCS, the Commission initially determined that an attenuation factor of 43 + 10 log (P) dB (*i.e.*, a fixed limit of -43 dBW) below the transmitter output power P in Watts for WCS fixed and mobile devices' OOBE in the 2300-2305 MHz band would prevent interference to ARS operations in that band.[240] As noted above, the *2010 WCS R&O* did not alter WCS fixed and mobile devices' OOBE limit of -43 dBW in the 2300-2305 MHz band and thus did not reduce or otherwise modify the interference protection that the Commission previously established for ARS operations in that band. We see no reason to address the specific arguments ARRL, AT&T, and the WCS Coalition make regarding the operation of Section 2.102(f) because our existing service and technical rules are already designed to account for WCS users operating adjacent to the ARS band.[241] To the extent that ARRL is asking that we revisit the attenuation factor originally established for the WCS and that was left unmodified in the Commission's most recent decision, we conclude that such a request for reconsideration is not timely filed and is not appropriate for reconsideration.

109. However, to eliminate any confusion in our rules about where the OOBE limits for WCS base and fixed stations, mobile devices, and fixed WCS CPE must be met, as adopted in the *2010 WCS R&O*, we clarify the bands in which the 43 + 10 log (P) dB and other OOBE attenuation factors below the transmitter output power P in Watts are applicable, as shown below.[242] We also clarify that WCS mobile devices operating in WCS Blocks A and B must attenuate their OOBE below the transmitter output power P in Watts by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and 2345-2360 MHz that are outside of the licensed band(s) of operation:

> WCS mobile and portable devices operating in the WCS A and B Blocks and fixed WCS CPE transmitting with an average EIRP of 2 Watts or less must attenuate their OOBE below the transmitter power P as measured over a 1-megahertz bandwidth, by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB in the 2320-2324/2341-2345 MHz bands, not less than 61 + 10 log (P) dB in the 2324-2328/2337-2341 MHz bands, and not less than 67 + 10 log (P) dB in the 2328-2337 MHz band. WCS mobile and portable devices' OOBE must also be attenuated by a factor of not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2365 MHz bands, not less than 55 + 10 log (P) dB in the 2296-2300 MHz band, not less than 61 + 10 log (P) dB in the

[238] *See* ARRL Reply Comments at 3-4.

[239] *See, e.g.*, Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, WT Docket 02-8, *Report and Order*, 17 FCC Rcd. 9980 (2002) at para. 138; Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands, WT Docket No. 12-70, *Notice of Proposed Rulemaking and Notice of Inquiry*, 27 FCC Rcd. 3561 (2012) at para. 34. *See also* 47 U.S.C. § 303(f).

[240] *See 1997 WCS R&O*, 12 FCC Rcd at 10797-98 para. 25; 10856-57 para. 142.

[241] *See also* ARRL Petition at 3 (noting that "WCS fixed operations, though at high power, have not proven a significant noise source in the past at 2300-2305 MHz," and speculating about a negative effect caused by additional devices operating in a variety of geographic locations).

[242] See Section 27.53 in Appendix A for the revised rules.

2292-2296 MHz band, not less than 67 + 10 log (P) dB in the 2288-2292 MHz band, and not less than 70 + 10 log (P) dB below 2288 MHz and above 2365 MHz.

WCS base and fixed stations and fixed WCS CPE transmitting with an average EIRP greater than 2 Watts must attenuate their OOBE below the transmitter power P, as measured over a 1-megahertz resolution bandwidth, by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305-2320 MHz and between 2345-2360 MHz that are outside the licensed band(s) of operation, not less than 75 + 10 log (P) dB in the 2320-2345 MHz band, not less than 43 + 10 log (P) dB in the 2300-2305 and 2360-2362.5 MHz bands, not less than 55 + 10 log (P) dB in the 2362.5-2365 MHz band, not less than 70 + 10 log (P) dB in the 2287.5-2300 MHz and 2365-2367.5 MHz bands, not less than 72 + 10 log (P) dB in the 2285-2287.5 and 2367.5-2370 MHz bands, and not less than 75 + 10 log (P) dB below 2285 MHz and above 2370 MHz.

110. In addition, to clarify in our rules that OOBE measurements made over a narrower resolution bandwidth than 1 megahertz (*e.g.*, 1 percent of the emission bandwidth) must be integrated over the full measurement bandwidth of 1 megahertz to determine compliance with the relevant OOBE limits, as adopted in the *2010 WCS R&O*,[243] we modify the language of Section 27.53(a)(5) to read as follows:

Measurement Procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.*, 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

F. WCS Performance Requirements

111. *Background.* In the *2010 WCS R&O*, the Commission adopted several changes to the performance requirements that apply to WCS licensees, creating "much needed certainty regarding their construction obligations," to help "ensure widespread system deployments."[244] Primarily, the Commission revised the applicable performance requirements away from a legacy substantial service standard, to geographic coverage based upon population benchmarks or fixed links. Specifically, for mobile/point-to-multipoint services, the Commission mandated 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.[245] For point-to-point fixed services, the Commission mandated 15 point-to-point links per million persons in a license area within 42 months, and 30 point-to-point links per million persons in a

[243] *Id.*, 25 FCC Rcd at 11758 para. 112.

[244] *See 2010 WCS R&O*, 25 FCC Rcd at 11790 para. 195, citing 47 U.S.C. § 309(j)(4)(B) (instructs Commission to 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").

[245] *Id.* at 11791 para. 197. As a result, the deadlines became March 4, 2014 for 40 percent population coverage, and September 1, 2016 for 75 percent population coverage.

license area within 72 months.[246] The Commission imposed the more stringent requirements to ensure that "underutilized spectrum will be used intensively in the near future,"[247] and noted that the performance requirements appropriately balanced the goal of timely, appreciable service to the public while making accommodations for licensees with respect to securing financing and acquiring equipment.[248]

112. In their Petitions, the WCS licensees request more time to meet their construction obligations, primarily arguing that they have had difficulty securing equipment for the 2.3 GHz Band. The WCS licensees also challenge the Commission's decision to impose quantitative performance requirements for the WCS C and D Blocks, stating that technical limitations on these blocks warrant a return to substantial service requirements.

1. Extension of Construction Deadlines

113. *Petitions.* AT&T and the WCS Coalition allege that the Commission hastily enacted the new WCS performance rules, in that the Commission adopted the *Report and Order* less than eight weeks after seeking comment regarding performance criteria,[249] making the action "arbitrary and capricious" because the Commission lacked support for rule changes, and ignored the record.[250] According to AT&T, there is no evidence "to show that it is reasonable, and thus lawful, to conclude that standards can be developed, equipment designed, network sites built, and equipment designed in the timeframes the Commission selected."[251]

114. AT&T also argues that any performance requirement should be postponed to facilitate the use of LTE technology, despite the Commission's adoption of rules that, as originally requested by Petitioners, facilitate WiMAX technology.[252] The WCS Coalition argues that WCS licenses are hindered in complying with existing performance rules because equipment manufacturers are moving away from developing WiMAX mobile products for the 2.3 GHz band in favor of LTE.[253] AT&T and the WCS Coalition contend that LTE will be difficult to deploy within the existing timeframes because there is not an LTE standard specific to the WCS rules, which must be established through a 3G Partnership Project (3GPP) band class adoption process.[254] The WCS Coalition states that while an existing band class, Band Class 40, covers the 2.3 GHz band and LTE equipment is being developed and deployed internationally,

[246] *Id.* at 11793 para. 206. The deadlines for fixed deployment also became March 4, 2014, and September 1, 2016.

[247] *Id*. at 11790 para. 195.

[248] *Id.* at 11793 para. 205.

[249] The Commission issued a March 29, 2010 public notice requesting comment on possible revision of the performance requirements. *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*, 25 FCC Rcd 3449 (2010).

[250] *See* AT&T Petition at 2-4; WCS Coalition Petition at 1, 2; Green Flag Petition at 1, 2. The WCS Coalition endorses and incorporates by reference AT&T's Petition. WCS Coalition Petition at 2.

[251] AT&T Petition at 3, 4.

[252] *Id.* at 6, 7.

[253] *See, e.g.,* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1 (filed March 18, 2011) ("WCS Coalition Mar. 18, 2011 *Ex Parte*").

[254] AT&T Petition at 8. 3GPP is the standards body responsible for developing LTE specifications. The 3GPP LTE standards development process includes the development of applicable band classes, which define specific RF standards, specifications, and conformance testing for a specific frequency band. An existing band class, Band Class 40, covers the 2.3-2.4 GHz band, but does not incorporate U.S. WCS technical rules.

Band Class 40 standards and existing 2.3 GHz-band equipment are not compatible with the WCS technical rules.[255] They maintain that, while manufacturers could adapt existing LTE equipment, manufacturers are reluctant to expend the resources to develop equipment without an established 3GPP LTE standard specific to WCS technical rules.[256] Therefore, states the WCS Coalition, a new or modified 3GPP LTE standard must be established before WCS licensees can begin construction of their networks.[257]

115. The WCS Coalition's petition provides that, as a result of the 3GPP standards process, network and device equipment design for deploying LTE, tailored to the WCS, cannot begin until at least mid-2012 and equipment will not become available until at least December 2013.[258] If LTE equipment does become available at such time, AT&T estimates, it would be able to cover 40 percent of the population in licensed areas by June 2017, and 75 percent by June 2020.[259] In their petitions, AT&T and the WCS Coalition request that the deadlines be extended to July 2017 for 40 percent coverage, and to June 2020 for 75 percent coverage, to apply to both mobile services and point-to-point links.[260]

116. More recently, AT&T proposed a revised construction timeline in June 2012.[261] AT&T reiterates the necessity of developing a U.S.-specific LTE band class for the 2.3 GHz band, and argues that in light of the standards adoption process as well as the subsequent equipment design and testing phase, it requires at least four years to satisfy the interim construction requirement of 40 percent population coverage and ten years to meet the final population coverage benchmark of 75 percent.[262]

117. Other WCS licensees argue that challenges of securing equipment for mobile services that are able to operate on the WCS spectrum also support extending the deadlines. According to NextWave, equipment manufacturers have focused 2.3 GHz LTE deployments abroad in markets such as China and India, where there are less challenging technical requirements.[263] Horizon contends that its size and purchasing power, significantly smaller than most other WCS licensees, add difficulty obtaining access to equipment.[264] Comcast adds that the opportunity for making its WCS spectrum available through secondary markets, such as for "smart grid" applications, is being hampered by regulatory

[255] *See, e.g.,* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, in WT Docket No. 07-293, Schaubach Attachment at 4, 5 (filed May 31, 2011) ("WCS Coalition May 31, 2011 *Ex Parte*"). Band Class 40 specifications do not account for interference protection criteria specific to WCS such as the more stringent OOBE specifications, and adjacent channel selection (ACS) protection required to protect adjacent SDARS repeater operations. *Id.*, Schaubach Attachment at 4.

[256] *Id.*

[257] *Id.* at 5.

[258] *Id.*

[259] *Id.* at 9.

[260] AT&T Petition at 10; WCS Coalition Petition at 1, 2 n.2.

[261] Letter from Joan Marsh, Vice President-Federal Regulatory, AT&T, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 (filed June 15, 2012) ("AT&T June 15, 2012 *Ex Parte*").

[262] *Id.* at 3-6.

[263] Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, in WT Docket No. 07-293 at 1 (filed Mar. 18, 2011).

[264] Letter from Thomas Gutierrez, Counsel to Horizon Wi-Com, LLC, to Linda Chang, Associate Chief, Wireless Telecommunications Bureau, Mobility Division, FCC, in WT Docket No. 07-293 at 1 (filed Aug. 5, 2011).

uncertainty in the band, which also serves to preclude the Commission's envisioned mobile operations in favor of traditional fixed backhaul links.[265]

118. *Opposition.* Sirius XM initially supported the proposed extensions,[266] but withdrew its support for further extensions in a subsequent *Ex Parte* filing.[267] In its September 7, 2011 *Ex Parte*, Sirius XM argues that the WCS licensees have not, during the intervening time after the *2010 WCS R&O*, made any substantial effort at procuring equipment, and have not coordinated any new spectrum usage with Sirius XM in good faith.[268] Sirius XM also disagrees that the creation of a domestic band class specifically for LTE is a necessary step before securing and deploying equipment on the WCS spectrum using LTE technology.[269] The emphasis on 3GPP certification, it contends, is a further unnecessary tactic to receive more time for construction.[270]

119. *Discussion.* After thorough review of these arguments, we continue to believe that the public interest is served by WCS rules that facilitate the rapid and intensive deployment of valuable broadband service, but find it appropriate to provide limited relief. As an initial matter, we note that most of the WCS licenses have gone unused for approximately 15 years. It is within this context that the Commission sought to balance the challenges confronting the WCS licensees, against the public interest in putting this spectrum to its highest and best use without further delay. While the construction requirements imposed in the *2010 WCS R&O* may arguably be considered stringent as compared with other services,[271] the goal underlying the performance requirements for this service is to facilitate rapid and significant service deployment in a band that has been underutilized since WCS licenses were first auctioned in 1997. In the *2010 WCS R&O*, the Commission explained that the revised performance rules, in conjunction with revised technical requirements, serve the public interest by facilitating a prompt deployment of new broadband services, and emphasized that the revised requirements will help to ensure that the spectrum is used intensively in the near term.[272] To accomplish the goal of facilitating timely provision of innovative services to the public, the Commission sought to establish rules that are ambitious yet reasonably achievable.[273] In that regard, the Commission considered information regarding currently available equipment and the timelines within which such equipment could be adapted for use in the WCS band, including the WCS Coalition's own estimates regarding timing of deployments.[274] The Commission evaluated difficulties licensees may face in constructing their systems, and determined that the 42- and 72-month construction periods would accommodate the development and deployment of new WCS systems.[275]

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[265] Letter from David M. Don, Comcast Corporation, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1, 2 (filed Sept. 9, 2011) ("Comcast *Ex Parte*").

[266] Sirius XM Opposition at 21.

[267] Letter from James S. Blitz, Vice President, Regulatory Counsel, Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 (filed Sept. 7, 2011) ("Sirius Sept. 7, 2011 XM *Ex Parte*").

[268] *Id.* at 4, 5.

[269] *Id.* at 14, 15.

[270] *Id.* at 14.

[271] *See*, *e.g.*, AT&T June 15, 2012 *Ex Parte* at 7-8 (asserting that the current coverage requirements are stricter than those of other services).

[272] *2010 WCS R&O*, 25 FCC Rcd at 11790 para. 195.

[273] *Id.* at 11791 para. 197.

[274] *See id*. at 11791-11792 paras. 199-201.

[275] *Id.*

120. However, although the Commission found that the 42- and 72-month construction timeframe could accommodate the development and deployment of a range of technologies,[276] the Commission focused primarily on the availability of existing WiMAX equipment in establishing construction deadlines for the WCS band.[277] Noting the existence of several WiMAX systems, the current availability of WiMAX devices, as well as the many vendors offering WiMAX equipment, the Commission concluded that it would not be difficult for licensees to modify existing equipment to comply with the new WCS technical rules and coverage requirements within the 42- and 72-month construction periods.[278] Upon reconsideration, however, we find that the Commission focused too narrowly on the timeframes sufficient to accommodate the deployment of WiMAX systems, and did not fully examine whether the 42- and 72-month construction periods could also accommodate licensees that seek to apply non-WiMAX mobile broadband solutions. We note that the *2010 WCS R&O* sought to establish rules and policies that are consistent with our long-standing policies of maintaining technical and service neutrality and allowing flexible spectrum use by licensees.[279] In order to maintain technology neutrality for WCS, we find it appropriate to extend the time periods in which licensees must meet the interim and final coverage requirements to 48- and 78-months, respectively. We conclude that increasing the construction timeframes by an additional six months will further our goal of facilitating rapid and significant service deployment in the WCS band while providing licensees with timeframes that we believe will reasonably accommodate typical equipment development and manufacturing cycles, whether the technologies adopted by licensees are WiMAX or non-WiMAX.[280]

121. We also find that it is in the public interest to provide limited relief with respect to licensees' construction periods in light of the revisions we are making to technical rules in this Order on Reconsideration. We note that a primary objective behind the Commission's 2010 decision to revisit WCS service rules was to facilitate the development and provision of innovative broadband offerings, including mobile broadband in the WCS band.[281] As noted, *supra*, certain technical specifications established in the *2010 WCS R&O* may have inadvertently hindered the ability of licensees to deploy mobile broadband services.[282] Although we are taking steps to address these technical issues, we conclude that the time remaining until the revised interim (48-month) construction deadline may not be sufficient for licensees to respond to our revision of technical rules. It is not likely that licensees will have sufficient opportunity in the time period remaining to develop or adapt equipment, and deploy facilities pursuant to the revised technical requirements prior to the interim deadline.[283] Accordingly, we find that it is in the public interest to restart the construction periods to provide licensees with the full 48- and 78-month construction timeframes to enable licensees to respond to revisions we are making to

[276] *Id.* at 11791 para. 199.

[277] *Id*. at 11791-11792 paras. 199-200.

[278] *Id*.

[279] *See id.* at 11723 para. 28, and at 11798 para. 224.

[280] We emphasize that, in enlarging the construction timeframe, we are seeking to revise performance requirements that may have had an undue effect on licensees seeking to deploy non-WiMAX technologies. Our decision should not be read to mean that the Commission will provide extensions of time to licensees merely seeking to pursue a new or better technology.

[281] More specifically, the Commission sought to facilitate the provision of mobile broadband service in a manner that avoids harmful interference to SDARS operations. *See 2010 WCS R&O*, 25 FCC Rcd at 11723 para. 28, 11725 para. 36.

[282] *See, supra*, n.169 and n.222.

[283] As noted, licensees must offer mobile or point-to-multipoint services to at least 40 percent of a license area's population, or operate a minimum of 15 fixed point-to-point links per million persons (one link per 67,000 persons) by March 4, 2014.

our rules. The construction periods currently applicable to existing licensees will therefore be reset and will run from the effective date of the rule revisions adopted in this order.[284]

2. Coverage Requirements Instead of Substantial Service

122. *Petitions*. In their Petitions, the WCS licensees also challenge the Commission's decision to impose coverage-based performance requirements with respect to the C and D Blocks, arguing for a return to substantial service requirements. AT&T and the WCS Coalition again allege that the Commission hastily enacted the new WCS performance rules in an "arbitrary and capricious" manner.[285] Moreover, AT&T and the WCS Coalition argue that the new coverage requirements are especially problematic because the C and D Blocks are unpaired, and include 2.5 MHz mobile guard bands, stringent FDD duty cycles, a ban on outdoor antennas for low-power fixed CPE, and a 125 mW power limit.[286] Additionally, they argue that these encumbrances, when combined with the imminent deadlines and change from substantial service to specific coverage requirements, mean that the C and D Blocks are likely to go unused.[287] Accordingly, they argue, the C and D Blocks should revert to the prior substantial service performance requirements, in addition to having their construction deadlines extended.[288] In the alternative, the WCS Coalition proposed in a May 31, 2011 *Ex Parte* letter that, absent a reversion to substantial service for the C and D Blocks, a 50-percent reduction in quantitative benchmarks as compared to the A and B Blocks would be acceptable.[289]

123. *Discussion.* The Commission's decision in the *2010 WCS R&O* to migrate away from substantial service requirements was based upon a careful reading of the record, and a balanced consideration of the public interest. Therefore, we disagree with the Petitioners that these judgments were arbitrary and capricious. Accordingly, we decline, as we did in the *2010 WCS R&O* after a careful assessment of that record, to apply substantial service performance requirements in the 2.3 GHz band for the C and D Blocks, or to reduce their quantitative benchmarks. In the *2010 WCS R&O*, the Commission stated that its revised performance requirements would "afford WCS licensees bright-line certainty," and would "facilitate Commission review of WCS performance showings."[290] Petitioners provide little to

[284] We note that the final (78-month) construction deadline will fall beyond the current license term for existing WCS licenses, which have an expiration date of July 21, 2017. To obtain a renewal expectancy at their July 21, 2017 renewal deadline, we will require each WCS licensee to certify, for each license area, that they have maintained, or exceeded, the level of coverage demonstrated for that license area at the 48-month construction deadline. This certification requirement and standard are subject to any superseding or additional requirements that we may adopt in the Commission's ongoing rulemaking to harmonize the renewal requirements for wireless radio services in WT Docket 10-112.

[285] AT&T Petition at 2-4; WCS Coalition Petition at 1, 2. The WCS Coalition endorses and incorporates by reference AT&T's Petition. WCS Coalition Petition at 2.

[286] AT&T Petition at 21; WCS Coalition Petition at 2, 3. We note that these issues are discussed further elsewhere in this *Order on Reconsideration*. We also note that the WCS Coalition "has no objection to a quantitative performance benchmark for A and B Block WCS licensees." WCS Coalition Petition at 2.

[287] AT&T Petition at 21-22; AT&T Reply to Oppositions at 3; WCS Coalition Petition at 3, 4. *See also* AT&T June 15, 2012 *Ex Parte* at 8-9.

[288] AT&T Petition at 22; WCS Coalition Petition at 4.

[289] WCS Coalition May 31, 2011 *Ex Parte* at 2, 3. As such, for point-to-multipoint deployments, the WCS Coalition requests a reduction to 20 percent population coverage at the first benchmark, and 37.5 percent at the second benchmark; for point-to-point deployments, 1 link per 33,500 persons at the first benchmark, and 1 link per 16,750 persons at the second benchmark, for the WCS C and D Blocks. *Id.*

[290] *2010 WCS R&O*, 25 FCC Rcd at 11791 para. 198.

support their arguments that circumstances with respect to this spectrum are so difficult that we must reinstate substantial service or otherwise reduce their construction obligations.

124. We disagree with petitioners that the more stringent technical rules for C and D Blocks relegates them to "niche services" and we believe that relief that we are providing in other areas will provide licensees with additional service options.[291] We find that retaining quantitative benchmarks best supports our goals for this service; that is, that licensees will provide meaningful service in the near term and continue to use the spectrum throughout the course of their license periods. We believe that, for WCS, bright-line coverage requirements at specified thresholds serve to promote service throughout a licensed market, because they prevent licensees from "cherry picking" areas for service rather than meeting the benchmarks specified in their license requirements.

125. It should be noted that because of our action today to prohibit mobile operations in the C and D Blocks, the respective requirements for the 40 and 75 percent population coverage benchmarks will only be applicable to point-to-multi-point systems. However, we maintain that quantitative benchmarks – rather than a return to substantial service – is still the appropriate standard for all operations in the C and D Blocks spectrum. Accordingly, the service requirement for the C and D Blocks shall be: 40 and 75 percent population coverage at the 48 and 78 month deadlines, respectively, for point-to-multipoint operations, with 15 point-to-point links per million persons in a license area within 48 months, and 30 point-to-point links per million persons in a license area within 78 months for point-to-point fixed operations.

126. Finally, we note that certain entities have sought guidance as to the specific performance requirements that would be applied to current or potential operations in the C and D Blocks that do not fall within the traditional mobile, point-to-multipoint, or point-to-point fixed models. For example, Gogo, Inc. seeks clarification as to whether ground-to-air uplinks could be deployed in the C and D Blocks, and what coverage requirements would apply.[292] We note that there are hybrid or non-traditional operations that do not fit precisely in one category; for example, there may be WCS point-to-multipoint systems that could be viewed as functionally consistent with a WCS point-to-point RF network, *e.g.,* certain smart grid links to monitoring stations, maintenance instrumentation, automatic metering collection points, and video surveillance. However, given the wide range of deployments and applications possible, we find that WCS licensees should seek guidance from the Wireless Telecommunications Bureau on a case-by-case basis in determining whether their service is permissible within the C and D Blocks, and which benchmarks apply.[293]

3. Performance Penalties

127. In the *2010 WCS R&O*, the Commission concluded that it would not revise its rules to adopt a "keep-what-you-use" construction policy, but instead retain its requirement that a WCS license will automatically terminate without further Commission action if a licensee fails to meet a performance

[291] *E.g.*, for low-power fixed WCS CPE that complies with the more restrictive OOBE limits for WCS base and fixed devices, we are removing the prohibition on outdoor use and use of such equipment with outdoor antennas. See para. 63, *supra*.

[292] *See*, *e.g.*, Letter from Thomas Gutierrez, Counsel to Gogo, Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 attached presentation at 4 (filed Nov. 8, 2011).

[293] Similarly, the WCS Coalition also submitted a request that we clarify that, with respect to any of the WCS spectrum blocks, a WCS licensee operating a point-to-multipoint system may satisfy its performance requirement using the fixed link instead of the population coverage standard. *See* WCS Coalition Petition at 2 n.2. We find that WCS licensees operating in the A and B Blocks should also seek clarification from the Wireless Telecommunications Bureau regarding their individual operations.

benchmark.[294] The Commission dismissed the contention that the automatic termination policy is unfair, observing that this is the same approach used since the WCS rules were first adopted and applies to nearly all geographically-licensed wireless services, and noted that licensees could seek waivers to the extent that circumstances warranted relief.[295] The Commission rejected the argument that the automatic termination penalty would deter capital investment, noting that the wireless industry has invested billions of dollars and has flourished under this same approach.[296] Further, in declining to adopt a keep-what-you-use approach similar to that applied to certain 700 MHz band licenses, the *2010 WCS R&O* identified certain differences between 700 MHz and WCS rules, specifically the application of submarket performance requirements for 700 MHz.[297]

128. For the reasons set forth below, we affirm our decision to terminate WCS licenses without further Commission action if a licensee fails to meet a performance benchmark. We decline to adopt rules implementing a "keep-what-you-use" policy that will allow WCS licensee to keep spectrum in those areas where the performance benchmarks have been met.

129. *Petitions*. Certain petitioners reiterate their request that the Commission eliminate the license termination provision in favor of a keep-what-you-use policy, as adopted in the 700 MHz proceeding,[298] for licenses where the performance benchmarks are not met.[299] These petitioners argue that automatic license termination is appropriate for the more flexible substantial service performance requirements adopted when WCS was established in 1997, but not for the kind of performance requirements implemented in our most recent *2010 WCS R&O* because the quantitative requirements are more difficult to satisfy and increase the risk of license revocation.[300] They reiterate their previous arguments that the risk that the license will be canceled in its entirety if they do not fulfill the performance requirement, which may be for reasons outside of their control, will discourage investment and slow the deployment of broadband services.[301] Specifically, they argue that licensees and investors will be reluctant to make the substantial investment necessary given the possibility that the entire investment could be lost, a possibility made more likely in light of the more stringent performance requirements.[302]

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[294] *2010 WCS R&O*, 25 FCC Rcd at 11796-97 paras. 214-217.

[295] *Id.* at 11796 para. 214.

[296] *Id.*

[297] The 700 MHz submarket performance requirement obligates certain 700 MHz licensees to meet a construction benchmark for each underlying submarket of the licensee's authorized market area, *i.e.*, a licensee would be required to meet performance requirements for each EA of its underlying REAG license market. *See* 47 C.F.R. § 27.14(h).

[298] WCS Coalition Petition at 4-6.

[299] WCS Coalition Petition at i, 2, 4-6; AT&T Petition for Reconsideration at 11-13; WCS Coalition Opposition to Green Flag at i, 2-3; WCS Coalition Opposition at 1-3; AT&T Reply at 3.

[300] WCS Coalition Petition at 3-4, 5-6.

[301] WCS Coalition Petition at 6; AT&T Petition for Reconsideration at i, 11-13; Green Flag Petition for Reconsideration at 2, 5; WCS Coalition Opposition to Green Flag at i, 3-4; AT&T June 15, 2012 *Ex Parte* at 9-10.

[302] AT&T Petition for Reconsideration at i, 12-13; *see also* Green Flag Petition for Reconsideration at 2, 5, 6. AT&T explains that smaller licensees will find it difficult to raise capital to deploy mobile broadband wireless networks and larger licensees will have serious questions about the wisdom of expending capital to build facilities that may be found insufficient to ensure renewal causing the investment to be lost. AT&T Petition for Reconsideration at i, 12-13.

130. By contrast, the parties argue that a "keep-what-you-use" policy will encourage investment in WCS and promote the deployment of broadband to rural areas that may not be able to secure service.[303] They further assert that the Commission failed to adequately recognize the substantial public interest benefits of a "keep-what-you-use" policy of the kind adopted in the *700 MHz Order* and object to the Commission's use of submarket performance requirements as a reason for not implementing this approach with respect to WCS.[304]

131. *Discussion*. We find no basis in the record for reconsidering the rule that licenses will automatically terminate if a performance benchmark is not satisfied. The parties have reiterated many of the same arguments that were raised throughout the proceeding, which the Commission previously considered and rejected.[305] Despite the parties' arguments that applying the automatic termination policy is counter to prior Commission practice, the decision to terminate licenses if performance benchmarks are not met is consistent with our past practice in most geographically-licensed wireless services, including the 800 MHz Specialized Mobile Radio Service (800 MHz SMR), PCS, and Advanced Wireless Services (AWS), as well as in the 1997 *WCS Report and Order*.[306] Further, although Petitioners continue to claim that an automatic termination rule deters investment and construction of networks, they provide no support that licensees have been denied financing or that deployment of broadband has been slowed due to this policy. We remain unconvinced that automatic termination of a license for which the performance requirements are not met itself deters capital investment or otherwise hinders the development or deployment of service. On the contrary, several wireless services subject to this kind of performance penalty have thrived.

132. We remain unpersuaded that we should revise our WCS rules to adopt a "keep-what-you-use" policy because the Commission adopted the approach with respect to certain 700 MHz licenses. We do not find that considerations and goals with respect to WCS are so similar to the circumstances underlying the 700 MHz Service such that we are compelled to revise existing WCS requirements to mirror the 700 MHz performance penalties. While the *2010 WCS R&O* did call attention to the difference between WCS and 700 MHz rules with respect to submarket performance requirements,[307] we note that the submarket performance rule is only one distinction. Differences in the specific policy objectives behind the respective performance requirements and penalties also support the application of a different performance penalty.

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[303] AT&T Petition for Reconsideration at 2, 13; AT&T Reply at 3; WCS Coalition Petition at 4-6.

[304] WCS Coalition Petition at 5 (citing Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones, WT Docket No. 01-309, Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules, WT Docket No. 06-169, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band, PS Docket No. 06-229, Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Second Report and Order*, 22 FCC Rcd 15289, 15349 (2007) (*700 MHz Second Report and Order*)).

[305] *See 2010 WCS R&O*, 25 FCC Rcd at 11796 para. 214.

[306] *Id.*

[307] The *2010 WCS R&O* noted that WCS licensees are not required to construct each component submarket of a licensed market area (*e.g.* each EA within a REAG), and that a potential penalty for failure to construct – acceleration of the license term – could not be fairly applied to WCS licensees. *See 2010 WCS R&O*, 25 FCC Rcd at 11796 paras. 215, 216.

133. In adopting the "keep-what-you-use" approach in the 700 MHz proceeding, the Commission sought to make available additional mechanisms to enable access to spectrum by new entrants after an initial licensee either fails or chooses not to provide service in a particular area by the applicable deadline.[308] Alternatively, the focus of the performance requirements for the WCS adopted in the *2010 WCS R&O* is to ensure the rapid and meaningful provision of service throughout an entire licensed market. Given the length of time that currently licensed spectrum has remained largely unused, the Commission purposefully imposed ambitious construction criteria, including the automatic termination performance penalty, to ensure that extensive service coverage occurs in the near term.[309] We find that this goal would not be better served by implementing a "keep-what-you-use" performance penalty that may not facilitate service coverage in an area until after a current WCS licensee has returned unused spectrum to the Commission. In this context, we conclude that the automatic termination approach will be more effective in accomplishing the Commission's objective of intensive, near term WCS construction.[310]

134. Further, we disagree with the argument that the automatic termination approach is intrinsically tied to less strict performance benchmarks. The automatic termination approach has historically been applied to geographic market-based licenses generally. In adopting performance requirements for its various wireless services, the Commission has not as a practice linked substantial service and the use of the automatic termination penalty. To the contrary, the automatic termination approach has been used as a penalty for services that did not initially have a substantial service performance obligation.[311]

135. Finally, we reject arguments that the automatic termination rule is unfair to licensees because, according to petitioners, the rule requires automatic termination of a license even where failure to meet a benchmark is due to circumstances out of the control of a licensee, or even, for example, if the licensee has covered 74 percent of the population at the final deadline.[312] Petitioners argue that application of this policy would cut off service to customers and strand investment.[313] However, Section 1.946(e)(1) of the Commission's rules provides that extensions may be granted where failure to comply with construction requirements is due to causes beyond the control of the licensee,[314] and Commission staff has previously granted relief from the Commission's performance rules in cases where it was in the public interest to do so. For example, Commission staff has granted extensions where it found that a complete lack of available equipment for a service presented circumstances beyond the

[308] *700 MHz Second Report and Order*, 22 FCC Rcd at 15349 para. 156.

[309] *See 2010 WCS R&O*, 25 FCC Rcd at 11790-97 paras. 195-217.

[310] We also note there is nothing in the *700 MHz Second Report and Order* to suggest that, in adopting a "keep-what-you-use" approach for the 700 MHz Service, the Commission found that the automatic license termination paradigm is no longer appropriate generally and should not continue to be applied in other services.

[311] *See*, *e.g.*, Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, WT Docket No. 02-381, 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services, WT Docket No. 01-14, Increasing Flexibility to Promote Access to and the Efficient and Intensive Use of Spectrum and the Widespread Deployment of Wireless Services, and to Facilitate Capital Formation, WT Docket No. 03-202, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 19078, 19121-22 paras. 75-76 (2004).

[312] *See*, *e.g.*, AT&T June 15, 2012 *Ex Parte* at 9.

[313] *Id.*

[314] *See* 47 C.F.R. § 1.946(e)(1).

control of licensees,[315] or where licensees were able to show a significant level of diligence and commitment to construction of facilities.[316] As noted in the *2010 WCS R&O*, the Commission will continue to consider and evaluate requests for extension or waiver and grant relief if circumstances warrant.[317] We emphasize, however, that any relief sought must be weighed against the public interest goals underlying our construction rules, which is to ensure the efficient use of spectrum and the expeditious provision of service to the public.[318] As noted, in specifying performance rules for this service, the Commission purposefully imposed rigorous construction criteria and retained the automatic termination policy in order to ensure meaningful and rapid deployment of service in the WCS band. We will grant extension or waiver relief only if we determine that such action is not contrary to the goals underlying the WCS performance requirements, and otherwise serves the public interest.

G. WCS Information Sharing Requirements

136. *Background.* The *2010 WCS R&O* imposed measured notification requirements on WCS licensees in order to reduce the potential for harmful interference with SDARS operations, while limiting the administrative burden on licensees.[319] The Commission required WCS licensees to: 1) provide informational notifications to SDARS licensees at least 5 or 10 business days prior to deploying modified or new stations, respectively;[320] 2) provide an inventory of their deployed infrastructure in accordance with and within 30 days of the effective date of the *2010 WCS R&O*;[321] and 3) cooperate in good faith in the selection and use of station sites and frequencies to reduce interference and make the most effective

[315] *See e.g.* Multilateration Location and Monitoring Service Construction Requirements, *Order on Reconsideration and Memorandum Opinion and Order*, 22 FCC Rcd 1925 (2007) (noting that a complete lack of equipment availability for the band constituted circumstances beyond the licensee's control thereby warranting extensions of time).

[316] *See*, *e.g.*, Jamestown Manufacturing Corporation Request for Waiver and Extension of Time to Construct Part 22 Paging Licenses, *Order*, 23 FCC Rcd 764, 769-70 (Mobility Div., WTB 2008); Leap Wireless International, Inc., Request for Waiver and Extension of Broadband PCS Construction Requirements, *Memorandum Opinion and Order*, 16 FCC Rcd 19573 (Comm.Wir. Div. WTB 2001); Monet Mobile Networks, Inc., Request for Waiver and Extension of the Broadband PCS Construction Requirements, *Order*, 17 FCC Rcd 6452 (Comm. Wir. Div., WTB 2002).

[317] The Commission previously rejected this argument in the *2010 WCS R&O*, noting that the public interest requires that we review such circumstances and afford a licensee an opportunity to fulfill their performance obligations where appropriate. *2010 WCS R&O*, 25 FCC Rcd at 11796-97 para. 217.

[318] *See* Section 309(j) of the Communications Act, as revised, which provides that, for licenses acquired through competitive bidding, the Commission must apply performance requirements, including construction deadlines and penalties, to ensure the prompt delivery of service to rural areas, prevent spectrum warehousing, and to promote investment in and rapid deployment of new technologies and services. 47 U.S.C. § 309(j)(4)(B). *See also, e.g.* Warren C. Havens Skybridge Spectrum Foundation Verde Systems, LLC and Its Predecessor in Interest, Telesaurus VPC, LLC, Applications for Waiver and/or Extension of the Five and Ten Year Construction Deadlines Applications for Renewal of 220 MHz Licenses, *Order*, 27 FCC Rcd 5841 (Mobility Div., WTB 2012); Applications of Comscape Communications, Inc., FCC File Nos. 0003886129, 0003886133, 0003886165, 0003886172, 0004341633, 0004347077, 0004650021, and 0004670252, *Order*, 26 FCC Rcd 8831(Mobility Div., WTB 2011); Commnet Supply, LLC, Crossroads License Holding Sub A, and Their Successors in Interest, Request for Waiver and Extension of PCS Construction Requirements, Request for Renewal of PCS License, Call Sign WQGH652, ULS File Nos. 0003818184, 0003805569, *Order*, 27 FCC Rcd 5832 (Mobility Div., WTB 2012); Northstar Technology, LLC, Request for a Waiver and Extension of the Broadband PCS Construction Requirements Regarding BTA098 Block F Authorization, *Order on Reconsideration,* 19 FCC Rcd 22275 (2004).

[319] *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 150.

[320] *Id.* at 11772 paras. 150-51; 47 C.F.R.§ 27.72(b).

[321] *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 151; 47 C.F.R. § 27.72(c)(3).

use of the authorized facilities.[322] The Commission declined to adopt Sirius XM's proposed metrics for defining harmful interference and a comprehensive process for exchanging information among the licenses, analyzing the potential for harmful interference, and specifying steps for remedying harmful interference,[323] but referred these proposals to Commission staff for consideration in resolving interference issues as they arise.[324]

137. Both the WCS Coalition and Sirius XM approve of the adoption of rules requiring data exchanges between WCS and SDARS licensees to facilitate the coordination of facilities to prevent interference.[325] However, Sirius XM alleges that the notification and coordination standards must be revised because they are too vague and uncertain to be effective in preventing interference.[326] The WCS Coalition generally supports obligations to exchange technical information and work to mitigate harmful interference as long as they are mutual.[327] Most recently, AT&T and Sirius XM reached an agreement on June 15, 2012, indicating that an effective coordination process between SDARS and WCS licensees is essential to enabling WCS licensees to deploy mobile broadband services while protecting SDARS receivers from harmful interference.[328]

1. Notification Requirements

138. For the reasons stated below, we will permit WCS licensees to provide notifications within 24 hours of a minor modification of a WCS station,[329] other than changes in location, so long as the modification, or the aggregate effect of multiple modifications since the previous notice was provided, does not increase the predicted power flux density (PFD) at ground level by more than 1 dB. If a modification or aggregate of modifications exceeds the 1 dB threshold, the WCS licensee must provide the SDARS licensee with notice 5 days before modifying the site.

139. *Petitions*. In the *2010 WCS R&O*, we adopted rules requiring WCS licensees to provide informational notifications to SDARS licensees at least 5 or 10 business days prior to modifying facilities or deploying new stations, respectively.[330] The *2010 WCS R&O* specified that the notifications must include technical information, such as the coordinates of the location for the site; the proposed operating power, frequency band, and emissions; and specific information about the proposed antenna.[331] The *2010 WCS R&O* further required that WCS licensees must maintain an accurate and up-to-date inventory of their facilities to be provided to the Commission upon request,[332] and that WCS licensees must provide an

[322] *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 152; 47 C.F.R. § 27.72(e).

[323] *See* Sirius XM *Ex Parte* Communication, filed May 13, 2010, Attachment at 1-2.

[324] *2010 WCS R&O*, 25 FCC at 11773 para. 152

[325] WCS Coalition Petition at 18.

[326] Sirius XM Petition at 3.18; Sirius XM Opposition at 14.

[327] WCS Coalition Opposition to Sirius XM at i, 19.

[328] *See* "Coordination Agreement and Interference Resolution Between Sirius XM and AT&T," in AT&T/Sirius XM June 15, 2012 Agreement, at 2, 7.

[329] *See infra*., for discussion of facilities subject to the notification requirement.

[330] 47 C.F.R. 27.72(b); *2010 WCS R&O*, 25 FCC Rcd at 11772 paras. 150-51; 47 C.F.R. § 27.72(b).

[331] 47 C.F.R. 27.72(c)(1)-(2).

[332] 47 C.F.R. 27.72(c)(3); *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 151.

inventory of their deployed infrastructure to Sirius XM within 30 days of the effective date of the *2010 WCS R&O*.[333]

140. The WCS Coalition requests that we revisit the requirement that it provide 5-days advance notice to Sirius XM prior to the modification of any WCS base station.[334] The WCS Coalition asserts that WCS licensees should be permitted to modify facilities, other than changes in location, without prior notice so long as the change does not increase the predicted PFD at ground level by more than 2 dB and notice is given within 24 hours of the change.[335] It argues that by allowing a 2 dB predicted increase in signal strength the burden of advance notification will be reduced while allowing WCS licensees to improve service by correcting coverage gaps without significantly increasing the risk of interference.[336] It notes that such a change would not affect the parties' rights and obligations if interference occurs.[337]

141. Sirius XM agrees that certain site modifications are unlikely to have a significant interference potential and should be permitted without coordination and subject to after-the-fact notice.[338] However, it urges the Commission to reject the proposal allowing WCS licensees to notify Sirius XM within 24 hours after making any base station modification that does not increase the predicted PFD at ground level by more than 2 dB.[339] It argues that a 2 dB increase in noise could mute satellite radio signals, causing significant interference.[340] Sirius XM also argues that a licensee could also undergo multiple 2 dB modifications that, when aggregated, would cause harmful interference.[341]

142. Sirius XM proposes that minor technical changes to deployments can occur, with after-the-fact notification, provided that these changes do not result in the ground-level PFD near the WCS base station exceeding an absolute PFD limit of -44 dBm from the WCS A and B Blocks, and of -55 dBm from the WCS C and D Blocks.[342] Alternatively, Sirius XM would support maintaining a list of modifications unlikely to cause interference where "after-the-fact-notification" would apply.[343] Any and all modifications not contained on the list would continue to require 5-days prior notification.[344] Sirius

[333] *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 151.

[334] WCS Coalition Petition at i. The WCS Coalition does not challenge the Commission's decision that key data be exchanged at least 10 days before a new WCS base station is deployed. WCS Coalition Petition at 18-19.

[335] WCS Coalition Petition at i, 20; WCS Coalition Reply to Sirius XM at 7.

[336] WCS Coalition Petition at 21. WCS Coalition Petition at 19-20; WCS Coalition Reply to Sirius XM at 7.

[337] WCS Coalition Petition at 21; WCS Coalition Reply to Sirius XM at 7-8.

[338] Sirius XM Opposition at 14-15.

[339] Sirius XM Opposition at 15.

[340] *Id.*

[341] *Id*.

[342] *Id.* at 15, 18. Sirius XM appears to be implying that power limits are necessary to prevent interference and that, if the Commission declines to adopt power limits, as discussed above, interference issues should be resolved through a separate coordination agreement between Sirius XM and the WCS licenses or through a clearinghouse acting on the licensees' behalf. *Id.* at 15.

[343] *Id.* at 15-16. Although Sirius XM did not provide a list of acceptable modifications, it indicated that it would be willing to work with Commission staff and WCS licensees to develop a list of station modifications not requiring pre-coordination. *Id.* at 16.

[344] *Id.* at 16.

XM also asserts that the rules should accommodate private agreements between WCS licensees and Sirius XM that implement modified coordination and notification procedures.[345]

143. Further, both the WCS Coalition and Sirius XM agree that inventory and notification requirements should not apply to WCS (or SDARS) facilities operating under 2 W EIRP.[346] The WCS Coalition states that these facilities create negligible interference threats so the Commission should treat them equally and exclude them from the notification requirements.[347] However, the parties disagree as to whether facilities subject to these notifications requirements include fixed deployments.[348] Sirius XM states that in this context, references to "base station" includes fixed stations, arguing that the Commission has throughout this proceeding used "WCS base station" and "WCS station" interchangeably,[349] while the WCS Coalition maintains that the Commission's use of "base station" limits the notification requirement to systems providing mobile service.[350] However, in their June 15, 2012 submission, AT&T and Sirius XM agree that WCS licensees should share information regarding the location and operation of WCS base and fixed stations with SDARS licensees.[351]

144. *Discussion*. We agree that it is in the public interest to allow WCS licensees the flexibility to respond to market conditions by making minor modifications to their facilities as long as these modifications do not result in harmful interference to SDARS operations (*i.e.*, muting). While we believe that the 2 dB PFD increase notification trigger sought by the WCS Coalition may be problematic,[352] we nonetheless find it appropriate to permit WCS licensees to optimize facilities and correct coverage gaps without advance notice in circumstances where such modifications are unlikely to cause harmful interference to SDARS receivers. Therefore, WCS licensees will be allowed to modify their facilities, other than changes in location, without prior notice so long as the change does not increase the predicted PFD at ground level by more than 1 dB and notice of the modification is provided within 24 hours of deployment.[353] We see no empirical evidence in the record that demonstrates that a 1 dB increase in PFD as a result of a WCS modification is likely to cause harmful interference to nearby SDARS receivers. Rather, we anticipate that in most cases there will be sufficient margin in the SDARS link budget such that harmful interference will be avoided.

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[345] *Id.* at 16; Attachment at 2.

[346] WCS Coalition Opposition Sirius XM at ii, 24-25; Sirius XM Petition for Reconsideration at 4, 23-25.

[347] Sirius XM Petition at 4, 23-25.

[348] *See See* Letter from James S. Blitz, Regulatory, Sirius XM Radio Inc., Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 and IB Docket No. 95-91 (filed Dec. 16, 2011) ("Sirius XM Dec. 16, 2011 *Ex Parte*"); Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293; IB Docket No. 95-91 (filed Ja. 6, 2012) ("WCS Coalition Jan. 6 *Ex Parte*").

[349] *See* Sirius XM Dec. 16, 2011 *Ex Parte* at 3-4.

[350] *See* WCS Coalition Jan. 6, 2012 *Ex Parte*, *generally*.

[351] *See* AT&T/Sirius XM June 15, 2012 Agreement at Attachment: Proposed Revisions to WCS Service Rules, Section 27.72 Information sharing requirements.

[352] A review of information submitted by Sirius XM in this proceeding regarding possible link margins available to Sirius XM receivers suggests that an increase of 2 dB in signal strength could, in certain circumstances, adversely affect an SDARS signal. *See*, *e.g.*, Letter from Terence R. Smith and James S. Blitz, Sirius XM Radio Inc., to Ronald Repasi, Office of Engineering and Technology, FCC (dated January 4, 2010).

[353] Assumptions and system values used to perform calculations to predict PFD levels post-modification must be the same as those used in pre-modification calculations of PFD levels.

145. Moreover, WCS licensees are not being exempted from their obligation to provide notice regarding modifications to their stations; WCS entities must notify SDARS licensees within 24 hours of these changes to allow for monitoring of the effects of the modifications.[354] In addition, the notification exception for no more than a 1 dB increase in PFD can be distinguished from Sirius XM's prior proposal for imposition of system-wide PFD limits on WCS base station transmissions because it would only affect the trigger for notification of a modification to SDARS licensees, and is not an across the board criteria for limiting WCS base stations' ground-level power. If, after gaining experience with the 1 dB PFD increase exception to the notification procedures, there is harmful interference to SDARS receivers as a result of such modifications, we would restore the formal notification procedure that requires 5-business days notice prior to modifying WCS facilities.

146. However, Sirius XM raises a valid argument that multiple modifications to WCS stations could result in a predicted aggregate PFD increase that may negatively affect SDARS receivers. To avoid such a result, although WCS licensees may make 24-hour post-modification notifications as long as the predicted PFD increase at ground level is not greater than 1 dB, if an SDARS licensee demonstrates to the WCS licensee that the series of modifications using post-modification notification procedures may cause harmful interference to SDARS receivers, the WCS licensee must provide the SDARS licensee with 5-days notice in advance of additional modifications to WCS base and fixed stations. However, the 1 dB limit will not apply where a coordination agreement between the parties specifies otherwise.

147. In addition, in light of our decision to adopt the maximum design ground power level targets along roadways of -44 dBm for WCS Blocks A and B and -55 dBm for WCS Blocks C and D, we will also permit after-the-fact notification where modifications to WCS base and fixed stations do not exceed these limits. However, we will not adopt Sirius XM's suggestion that, if we are unwilling to adopt WCS PFD limits, interference mitigation issues must be resolved through a separate coordination agreement between Sirius XM and the WCS licenses or through a clearinghouse acting on the licensees' behalf. Requiring such agreements or a clearinghouse would unnecessarily increase administrative burdens on all licensees.

148. Further, we modify the rules to exclude WCS base and fixed stations operating under 2 W EIRP from the inventory and notification requirements and agree with Sirius XM that, to the extent that the parties can mutually agree on alternative coordination and notification procedures, the rules should accommodate private agreements between WCS licensees and Sirius XM that implement such modified procedures. Although we will not adopt a list of modifications unlikely to cause interference where "after-the-fact-notification" would apply as suggested by Sirius XM, we recognize that it would be beneficial for WCS licensees and Sirius XM to reach agreement on procedures that would streamline the notification process.[355]

149. Lastly, we clarify that the inventory and SDARS licensee notification requirements in Section 27.72 apply to both WCS base and fixed stations (except fixed WCS CPE). Sirius XM is correct that the Commission has during this proceeding used the terms "WCS base station" and "WCS station" interchangeably in the context of information sharing requirements.[356] It is discernible from a review of the *2001 Public Notice*[357] and *2007 Notice*[358] in this proceeding that the Commission's use of "base

[354] Further, we note that allowing such modifications without prior notification does not eliminate WCS licensees' duty to protect previously authorized SDARS facilities from harmful interference when modifying their stations.

[355] Sirius XM Opposition at 15-16.

[356] *See* Sirius XM Dec. 16, 2011 *Ex Parte* Communication at 3-4.

[357] *See 2001 Public Notice*, 16 FCC Rcd at 19435 para. 30.

[358] *See 2007 Notice*, 22 FCC Rcd at 22135 para. 32.

station" also encompassed fixed stations. Moreover, the 2010 WCS R&O's use of language directing WCS licensees to provide information to SDARS licensees regarding their "deployed infrastructure"[359] also demonstrates that the information sharing obligations are not limited only to base stations used in a mobile system. Accordingly, we revise Section 27.72 to make clear that WCS licensees must share fixed and base station information with SDARS licensees. However, we clarify that fixed WCS CPE (*i.e.*, fixed equipment operated by a WCS subscriber) is not subject to this requirement. Further, to the extent that WCS licensees have not yet provided notice for existing fixed stations to SDARS licensees, WCS licensees must do so no later than 30 days after the effective date of this Order. See Section 27.72 in Appendix A for the revised WCS notification rules.

2. Duty to Cooperate and Coordination

150. In the *2010 WCS R&O*, the Commission required WCS licensees to work with SDARS licensees throughout the process of deploying mobile services to reduce the potential for harmful interference, while seeking to avoid imposing undue administrative burdens.[360] The Commission anticipated that interference issues will become apparent during initial WCS deployments and market trials, and indicated that the Commission expects WCS licensees to resolve interference issues before transitioning from market trials to commercial service.[361] Further, prior to the deployment of new stations, the Commission required WCS licensees to cooperate in good faith in the selection and use of station sites and frequencies to reduce the potential for harmful interference and make the most effective use of the authorized facilities.[362] The Commission also stated that WCS licensees should provide SDARS licensees with as much lead time as practicable to provide ample time to conduct analyses and opportunity for prudent site selection prior to WCS licensees entering into real estate and tower leasing or purchasing agreements.[363] The *2010 WCS R&O* also required WCS and SDARS licensees to cooperate in good faith to resolve any occurrences of harmful interference by mutually satisfactory arrangements.[364]

151. *Petitions.* Sirius XM and the WCS Coalition both support mutual obligations to exchange technical information and cooperate in good faith to mitigate harmful interference. However, they disagree as to how this should be accomplished. Sirius XM generally urges the Commission to clarify the coordination and interference mitigation obligations and procedures by adopting objective

[359] *See 2010 WCS R&O*, 25 FCC Rcd at 11772 para. 151, 11815 para. 276, 11830 para. 327.

[360] *2010 WCS R&O*, 25 FCC Rcd at 11772 para. 150

[361] *Id.* at 11745 para. 80, stating:

> "We anticipate that any interference problems will become evident during the initial deployments and market trials of WCS mobile service. During the time when market trials begin but full commercial service has not yet been initiated, the licensees will have an opportunity to conduct further tests using actual WCS equipment in particular markets. We expect any interference issues that arise during market trials to be resolved before the transition from market trials to commercial service happens." *Id.*

[362] *Id.* at 11745, 11772 paras. 79, 150, 152.

[363] *Id.* at 11745 para. 79; 47 C.F.R. § 27.72(e). With respect to the WCS Coalition's argument that this requirement must be equally applied to SDARS licensees, we agree that this information exchange requirement should be parallel between the two services and amend the rules governing SDARS terrestrial repeaters accordingly in Part IV.C. of this Order on Reconsideration. *See infra,* paras. 196-197.

[364] *Id.* at 11745 para. 81. If licensees are unable to resolve the problem, the Wireless Telecommunications Bureau, in consultation with the Office of Engineering and Technology and International Bureau, may take actions to mitigate and remedy any alleged interference ("The Bureau may impose restrictions including specifying the transmitter power, antenna height, or other technical or operational measures to remedy the interference, and take into account previous measures by the licensees to mitigate the risk of interference."); 47 C.F.R. § 27.72(e).

interference criteria and definitions, such as those previously proposed by Sirius XM,[365] to facilitate the parties' efforts to work together to identify and resolve harmful interference and avoid disputes.[366]

152. Sirius XM states that clarification of the parties' duty to cooperate is necessary because the Commission's use of "market trial" creates uncertainty regarding how and when such cooperation is required before a WCS station provides service to the public.[367] Sirius XM states that, to remove this uncertainty, the Commission should specify that the information to be provided by WCS licensees includes the location and operational characteristics of new stations, and should require WCS licensees to facilitate station testing with Sirius XM before commencing commercial service on any new or modified facilities.[368] Further, Sirius XM asserts that WCS licensees should also provide a schedule of when network base stations will be transmitting and make pre-sale consumer devices available.[369] Sirius XM also urges the Commission to clarify that cooperation between WCS and satellite radio requires, at a minimum, that the licensees work together to ensure the site information exchanged is in a format that the parties can effectively incorporate into their engineering databases.[370] Sirius XM also requests that WCS licensees establish a single point of contact in the WCS community to provide information to Sirius XM, such as through an information clearinghouse.[371]

153. The WCS Coalition has no issue with the notifications and corresponding information regarding new and modified base stations, as discussed above, but argues that Sirius XM's proposals would allow Sirius XM to frustrate development of WCS, because it would have the opportunity to participate in testing and the site acquisition process, test pre-sale devices, and potentially veto decisions regarding site locations and network design.[372] More specifically, the WCS Coalition objects to Sirius XM's participation in base station testing before commercial service begins, because Sirius XM will already have advance notice of new and modified facilities,[373] and objects to the proposal that WCS licensees provide pre-sale WCS devices to Sirius XM for testing.[374]

154. The WCS Coalition also urges the Commission to reject Sirius XM's proposal that WCS licensees establish a single point of contact with Sirius XM since there are only 13 licensees and lessees.[375] The WCS Coalition states that this is not cost effective and inefficient because interference

[365] *See* Sirius XM *Ex Parte* Communication (filed May 13, 2010). These interference criteria include requirements for WCS licensees to provide Sirius XM with (1) information regarding proposed locations and operational parameters for each base station at least 180 days prior to the offering of service in a given market and (2) a number of user terminals within 60 days prior to initiating commercial service to test for interference. *Id*. at Attachment A.

[366] Sirius XM Petition at 3-4, 21; Sirius XM Opposition at 14, 17-19.

[367] Sirius XM Petition at 19. Sirius XM argues that the Commission's use of the term "market trial" to identify the pre-operational phase may inadvertently restrict the licensees' obligation to cooperate to only limited circumstances.

[368] *Id.* at 19-20.

[369] *Id.* at 4, 21.

[370] *Id.* at 20.

[371] *Id.*

[372] WCS Coalition Opposition to Sirius XM at i-ii, 19.

[373] WCS Coalition Opposition to Sirius XM at 20. Specifically, the WCS Coalition states that the rules afford ample opportunity to use RF modeling tools to ascertain the impact of new or modified facilities on its operations and that Sirius XM does not explain what legitimate purpose is served by testing before the commercial launch of service from a new or modified facility.

[374] WCS Coalition Opposition to Sirius XM at 20-21.

[375] WCS Coalition Opposition to Sirius XM at 21-22.

issues are specific to a base station operated by 1 of the 13 licensees or lessees and are best addressed without the involvement of a third party.[376]

155. Finally, the WCS Coalition and Sirius XM disagree about whether the licensee or lessee is responsible for compliance with the information sharing rules when *de facto* spectrum transfer lease agreement is effective.[377] The WCS Coalition argues that, under the Commission's secondary market policies, *de facto* spectrum transfer lessees have primary responsibility for complying with the Communications Act and the Commission's rules, so notification and coordination requirements imposed under Sections 27.72 and 27.73 of the Commission's rules are transferred from the licensee to *de facto* spectrum transfer lessees.[378] Sirius XM, however, requests that we clarify that interference coordination and mitigation is a licensee responsibility that cannot be delegated to lessees.[379] Sirius XM argues that this would be a huge burden because it would have to coordinate with indeterminate licensees and lessees and monitor leasing arrangements.[380] Sirius XM's states that if this is the case, it is a further argument for the need of its proposed single clearinghouse of interference coordination information.[381] As described earlier, AT&T and Sirius XM have recently arrived at a coordination agreement to resolve interference concerns between themselves and facilitate efficient deployment of and coexistence between their services. They request that the Commission require WCS licensees to enter into a coordination agreement similar to their agreement included with their June 15, 2012 joint submission.[382]

156. *Discussion*. Upon review, we find no basis to revise our requirements regarding WCS licensees' duty to cooperate.[383] First, we decline to adopt the proposals submitted by Sirius XM as they were considered when they were initially proposed in this proceeding and explicitly rejected by the Commission in the *2010 WCS R&O*. We find that no further evidence has been introduced into the record to cause us to reconsider this decision. Specifically, we reject as unnecessary the proposals that WCS licensees provide a schedule of when network facilities will be transmitting, or make pre-sale devices available to Sirius XM for inspection. Although we expect the parties to cooperate and take good faith measures to prevent harmful interference, we must balance the need for an exchange of useful information against requiring the disclosure of market sensitive information that is not reasonably necessary to prevent harmful interference, such as licensees' proprietary equipment information and business or operating plans.[384]

157. For these reasons, we also decline to require WCS licensees to enter into a coordination agreement with Sirius XM with provisions similar to the June 15, 2012 AT&T/Sirius XM agreement. We emphasize, however, that cooperation between WCS and SDARS licensees is critical to the successful

[376] *Id.*

[377] WCS Coalition Petition at 24-25; Sirius XM Opposition at 17.

[378] WCS Coalition Petition at 25.

[379] Sirius XM Opposition at 17.

[380] *Id*.

[381] *Id.*.

[382] *See* AT&T/Sirius XM June 15, 2012 Agreement at 7.

[383] See paras. 195-198, *infra*, for the discussion regarding SDARS licensees' obligation to share information on new deployments, including cooperation with respect to base station site selection.

[384] Although Sirius XM expresses concerns that the Commission's requirements regarding the duty to cooperate may be construed to apply only to limited circumstances, the *2010 WCS R&O* provides that the information sharing and cooperation process put in place to mitigate interference will occur at various stages of the deployment process. *See 2010 WCS R&O*, 25 FCC Rcd 11745 paras. 78-81.

coexistence between WCS and SDARS systems, and we encourage WCS licensees to develop and enter into separate coordination agreements with SDARS licensees for interference mitigation. We therefore revise Section 27.72 to incorporate the AT&T/Sirius XM proposed language encouraging the adoption of coordination agreements by WCS and SDARS.[385] To the extent any provision of a coordination agreement between parties to mutually resolve harmful interference conflicts with other information sharing requirements adopted in this proceeding, the parties are obligated to follow the procedures established under the agreement.

158. We also will not require that a clearinghouse or single point of contact be created to provide information from WCS licensees to Sirius XM. We agree with the WCS Coalition that interference issues are best handled directly by the entities operating the networks and that an obligatory intermediary will add an unnecessary step into the process. Similarly, we conclude that *de facto* spectrum transfer lessees already assume the notification and interference obligations pursuant to our secondary markets rules and policies. However, if the number of WCS providers increases dramatically, we may reevaluate whether the burden to SDARS of coordinating with multiple providers offsets the inefficiency of introducing a third party into the process.

159. Although we will not mandate how information should be exchanged between WCS and SDARS licensees, we expect that licensees will coordinate to ensure the seamless and successful exchange of information.[386] WCS and SDARS licensees are able to enter into agreements, as discussed above, regarding the logistics of information exchanges, and we encourage parties to implement measures to streamline the process to the extent possible.[387]

H. Aeronautical Mobile Telemetry and Deep Space Network Coordination

160. *Background*. Adjacent to the upper WCS band edge at 2360-2395 MHz is the Aeronautical Mobile Telemetry (AMT) band,[388] allocated on a primary basis for use by Federal and non-Federal aviation entities in numerous areas throughout the country. These entities use the AMT band to collect real-time data generated during flight testing of aircraft and missiles, including data regarding stresses on control surfaces, engine temperatures, fluid pressures, and many other measurement points.[389] Flight testing operations in the AMT band involves the use of highly sensitive receivers and high gain antennas to detect and receive very weak signals. Five megahertz below the 2305-2320 MHz WCS band, in the 2290-2300 MHz band, the National Aeronautics and Space Administration (NASA) operates its Deep Space Network (DSN), which is vital for communications supporting space exploration.[390]

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[385] *See* Appendix A.

[386] We note that Sirius XM's request that we clarify that information exchanges must include location and operational characteristics of new base stations is already covered under Section 27.72(c).

[387] In this regard, we encourage parties to reach agreement regarding the format in which site information should be exchanged.

[388] The 2360-2390 MHz band is the part of the 2310-2390 MHz band that remained allocated for AMT after the 1992 World Administrative Radio Conference allocated spectrum to satellite audio broadcasting. The Commission allocated the spectrum 2320-2345 MHz on a primary basis to the SDARS and the 2305-2320 MHz and 2345-2360 MHz bands to the WCS, thereby reducing the available spectrum for AMT in the United States in this band from 80 megahertz to 30 megahertz. In 2004, as a partial replacement for the spectrum that the Commission allocated for the WCS and SDARS, the Commission allocated the 2390-2395 MHz band for AMT use, thereby increasing to 35 megahertz the amount of spectrum available for AMT.

[389] *See 2010 WCS R&O*, 25 FCC Rcd at 11779 para. 168.

[390] 47 C.F.R § 2.106; *2010 WCS R&O*, 25 FCC Rcd at 11777 paras. 162-63.

161. In the *2010 WCS R&O*, the Commission noted that, in allowing WCS licensees additional technical flexibility to facilitate the operation of mobile services, it must consider potential effects on nearby spectrum users such as AMT entities (*i.e.*, FCC licensees and/or Federal operators) and DSN operations.[391] The Commission found that reasonable WCS OOBE limits would allow for the provision of mobile broadband services while also protecting AMT and DSN operations from harmful interference. The Commission determined that an appropriate balance could be achieved by establishing reasonable OOBE attenuation for WCS transmissions in conjunction with a coordination requirement for WCS base stations. Thus, the Commission adopted OOBE attenuation requirements above 2360 MHz that must be met by WCS base, fixed, and mobile station operations in the 2345-2360 MHz band that were not as stringent as AFTRCC had proposed,[392] but imposed a conservative coordination distance for WCS base stations of 45 km or line of sight of an AMT receiver, whichever distance is greater. The Commission concluded that the 45 km or line-of-sight coordination requirement for WCS base stations would enable AMT entities and WCS licensees to apply technical and operational techniques that take into account the local conditions of specific AMT sites and to tailor their operations accordingly. The Commission also adopted OOBE attenuation requirements below 2300 MHz that must be met by WCS base, fixed, and mobile station operations in the 2305-2320 MHz band, and imposed a WCS base station coordination distance of 145 km for the DSN earth station receiving facility in Goldstone, California.[393]

162. The *2010 WCS R&O* directed AMT and WCS entities to use accepted engineering practices and standards to evaluate each AMT and WCS deployment based on applicable local conditions and operating characteristics of the systems to reach a mutually acceptable agreement.[394] In adopting the coordination requirement, the *2010 WCS R&O* did not specify the use of the interference protection mechanism set out in the International Telecommunication Union's Recommendation ITU-R M.1459 (ITU-R M.1459 or Recommendation)[395] as requested by AMT entities, but the Commission did reference ITU-R M.1459 in Section 27.73(a) of the Commission's rules.

163. *Petition*. In its petition for reconsideration, the WCS Coalition requests that the Commission modify Section 27.73(a) to clarify the role of ITU-R M.1459 in the coordination process.[396]

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[391] *See id.* at 11777 para. 162.

[392] Specifically, WCS base and fixed stations' OOBE must be attenuated by a factor of not less than 43 + 10 log (P) dB in the 2360-2362.5 MHz band, 55 + 10 log (P) dB at 2362.5-2365 MHz band, 70 + 10 log (P) dB at 2365- 2367.5 MHz band, 72 + 10 log (P) dB at 2367.5-2370 MHz band, and 75 + 10 log (P) dB above 2370 MHz. WCS mobile and portable devices' OOBE must be attenuated by a factor of not less than 43 + 10 log (P) dB at 2360-2365 MHz, and 70 + 10 log (P) dB above 2365 MHz. *See 2010 WCS R&O*, 25 FCC Rcd at 11766 para. 135, 11785 para. 182; 47 C.F.R. §§ 27.53(a)(1)(iii) and (4)(iii).

[393] Specifically, WCS base and fixed stations must meet an OOBE attenuation of 43 + 10 log (P) dB in the 2300-2305 MHz band, 70 + 10 log (P) dB in the 2287.5-2300 MHz band , 72 + 10 log (P) dB in the 2285-2287.5 MHz band, and 75 + 10 log (P) dB below 2285 MHz. WCS mobile devices' OOBE must be attenuated by a factor of not less than 43 + 10 log (P) dB in the 2300-2305 MHz band, 55 + 10 log (P) dB in the 2296-2300 MHz band, 61 + 10 log (P) dB in the 2292-2296 MHz band, 67 + 10 log (P) dB in the 2288-2292 MHz, and 70 + 10 log (P) dB below 2288 MHz. *See 2010 WCS R&O*, 25 FCC Rcd at 11766 para. 135, 11778 paras. 165-166; 47 C.F.R. §§ 27.53 (a)(1)(ii) and (4)(ii).

[394] *2010 WCS R&O*, 25 FCC Rcd at 11786 para. 184.

[395] *See* International Telecommunications Union, Radiocommunications Sector, 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." (2000) ITU-R M.1459 provides the framework for conducting sharing studies between AMT entities and Mobile Satellite Service (MSS) operations.

[396] WCS Coalition Petition at 15.

The WCS Coalition states that there is a discrepancy between the text of the *2010 WCS R&O* which did not require WCS and AMT entities to utilize the recommended protection values found in ITU-R M.1459, and Section 27.73(a) which does reference ITU-R M.1459.[397] The WCS Coalition objects to the application of ITU-R M.1459, arguing that it is not an appropriate tool for predicting whether a WCS base station will cause interference to a given AMT receiver.[398] The WCS Coalition asserts that the interference protection criteria identified in ITU-R M.1459 may be greater than necessary to protect an AMT receiver,[399] and notes that ITU-R M.1459's purpose is to protect AMT systems from satellite interference, and does not include the appropriate mechanism for protecting AMT systems from WCS or other terrestrial operations.[400] The WCS Coalition requests that, to avoid confusion, the Commission remove the reference to ITU-R M.1459 from Section 27.73(a).[401]

164. *Oppositions*. AFTRCC and Boeing, however, oppose removal of the reference to ITU-R M.1459 in Section 27.73(a). AFTRCC and Boeing dispute the Coalition's assertion that the Recommendation is not a suitable mechanism to evaluate WCS interference potential to AMT receivers. AFTRCC argues that ITU-R M.1459 provides an appropriate method to derive the protection level for AMT operations, and that any concerns that the recommended interference criteria are overly-protective are mitigated because ITU-R M.1459 provides the flexibility and methodology to permit WCS licensees and AMT entities to take into account local conditions and relevant operating characteristics of both types of systems.[402]

165. *Discussion.* Upon further review, we find it necessary to reconsider and clarify the role of ITU-R M.1459 in the coordination of WCS and AMT facilities to promote and bring certainty to the coordination process. We will require WCS and AMT entities, using accepted engineering practices, to apply ITU-R M.1459, as adapted to local conditions and operating characteristics of both WCS and AMT systems, in coordinating their stations, and thus modify rule Section 27.73(a) accordingly.

166. Recommendation ITU-R M.1459 sets forth the recommended framework for co-channel sharing between AMT and mobile satellite services operations, but is not specific to WCS terrestrial operations. As noted above, although the *2010 WCS R&O* did not specifically require that the parties use the interference protection mechanism set forth in the Recommendation in coordinating AMT and WCS facilities, Section 27.73(a) provides that coordination within 45 km or line of sight of an AMT facility is necessary to protect AMT receivers "consistent with Recommendation ITU-R M.1459."[403]

167. In referencing the Recommendation in Section 27.73(a), the Commission did not require parties to apply the recommended protection values found in the Recommendation. The reference to

[397] *Id.*

[398] *Id.* at 15-16.

[399] *Id.* at 16-17.

[400] *Id.* at 17.

[401] *Id.* at 15, 18.

[402] AFTRCC Opposition at 5; Boeing Opposition at 5-6.

[403] Specifically, Section 27.73(a) states: "Wireless Communications Service (WCS) licensees operating base stations in the 2345-2360 MHz band shall, prior to operation of such base stations, achieve a mutually satisfactory coordination agreement with the Aerospace and Flight Test Radio Coordinating Council (AFTRCC) for any AMT receiver facility within 45 km or the radio line of sight, whichever distance is larger, of the intended WCS base station location. This coordination is necessary to protect AMT receive systems consistent with Recommendation ITU-R M.1459. The locations of the current and planned Federal and non-Federal AMT receiver sites may be obtained from AFTRCC." 47 C.F.R. § 27.73(a).

ITU-R M.1459 instead serves as a reference point that WCS licensees and AMT entities may consider in the course of determining how to coordinate their systems. In setting out general guidelines in the *2010 WCS R&O* and Section 27.73(a), the Commission sought to provide parties with flexibility to reach agreement on an appropriate mechanism that provides both adequate protection to AMT facilities while permitting WCS licensees to operate around such facilities to the greatest extent possible.

168. We continue to believe that the appropriate approach to reducing potential interference between WCS base stations and AMT installations is for the entities, when engaged in a coordination process, to take into account the local conditions around applicable AMT sites and specific operating characteristics of the AMT and WCS facilities. However, given the continued differences in how the parties view the basis of such coordination, we are concerned that the parties will be unable to reach a mutually satisfactory agreement regarding the WCS deployment in a timely manner – an outcome which could lead to unacceptable delays in the deployment of WCS networks. We therefore find it necessary to provide additional clarity regarding the WCS/AMT coordination process.

169. Specifically, we will require that WCS and AMT entities take into account interference protection considerations identified in ITU-R M.1459 as part of the required coordination process. The Recommendation sets forth extremely conservative baseline protection, or PFD levels, intended to protect AMT receivers. We believe that in many cases, the recommended protection criteria would provide more protection than required, unnecessarily restricting areas where WCS licensees may provide service. The Recommendation itself notes that AMT stations have a wide range of characteristics, and that some facilities may require less stringent protection criteria values than those contained in ITU-R M.1459.[404] Also, ITU-R M.1459 notes that, even in the context of co-channel sharing, the calculation used to derive the protection values represents a worst case scenario.[405] This notwithstanding, the ITU-R M.1459 PFD levels are based on general telemetry system characteristics that are applicable in helping to determine AMT facilities' vulnerability to interference. Moreover, given the conditions of testing and types of deployments in the AMT band, there may be circumstances where an AMT facility may require the level of protection contemplated by ITU-R M.1459. Accordingly, we will require the parties to use the ITU-R M.1459 PFD levels as a baseline from which to conduct negotiations and interference studies.

170. In doing so, however, we do not intend for parties to strictly apply the recommended PFD level found in ITU-R M.1459. As noted, we find that strict application of the Recommendation could, in many cases, lead to over-protection of the AMT receiver, thereby unnecessarily restricting the ability of the WCS licensee to operate. Therefore, to determine the appropriate protection level for an AMT facility, the parties must, using accepted engineering practices, evaluate local conditions surrounding an AMT receiver as well as the specific operating characteristics of the applicable AMT and WCS systems, and determine how the baseline PFD should be adapted and made less restrictive in light of these factors. We specify that the local conditions and operating characteristics that the parties must consider in their analysis include (but are not limited to): line of sight obstructions (*e.g.* topography), actual performance characteristics of the AMT receiver (*e.g.* antenna gain, power level, and modulation), types of AMT antennas used, field of view of the AMT receiver, as well as area of operation of the AMT receiver and the manner in which telemetry testing is being performed. We require parties to adapt the baseline protection criteria for AMT, *i.e.* the applicable PFD level, in light of these and other factors applicable to the facility in question. We find that these requirements will bring greater certainty to the coordination process, and better enable AMT and WCS entities to reach agreement on measures that will protect AMT receivers and enable WCS licensees to operate in the surrounding area to the greatest extent possible.

[404] ITU-R M.1459 at 2.

[405] *Id.*

171. Thus, we decline to remove the reference to ITU-R M.1459 in Section 27.73(a), as the WCS Coalition requests, but clarify that WCS and AMT entities, using accepted engineering practices, are required to apply ITU-R M.1459, as adapted to local conditions and operating characteristics of both WCS and AMT systems, in coordinating their stations. In addition, as determined in the *2010 WCS R&O*, we clarify in Section 27.73(a) that a coordination agreement to protect existing AMT receivers from WCS base station operations is between the WCS licensee and AMT entity(ies);[406] AFTRCC will facilitate achievement of a mutually satisfactory coordination agreement between the WCS licensee and AMT entity(ies) for AMT receiver sites in existence at the time of the coordination.[407] See Appendix A for the revised text of Section 27.73(a).

172. AFTRCC has also requested, by way of a February 7, 2012 *Ex Parte* submission, that we expand Section 27.73 to require WCS licensees to coordinate their fixed stations with AMT entities and NASA's DSN facility at Goldstone, California.[408] Although the WCS Coalition opposes AFTRCC's request with respect to coordination with AMT entities, AT&T does not object to AFTRCC's request to include WCS fixed stations with WCS base stations in the AMT coordination regime.[409] The WCS Coalition argues that coordination with AMT entities of WCS fixed stations should not be required since there have not been any reports of harmful interference to AMT receivers due to WCS fixed stations' operations,[410] while AT&T has committed to coordinate with AMT entities WCS fixed stations that operate in the upper WCS bands at 2345-2360 MHz.[411] The National Telecommunications and Information Administration (NTIA) supports coordination of WCS fixed stations that operate in the 2305-2320 MHz and 2345-2360 MHz bands with NASA and AMT entities, respectively.[412]

173. To alert AMT entities and NASA to the location and operation of WCS fixed stations that will be deployed within 45 km of AMT receivers and 145 km of the Goldstone, California DSN facility, we clarify that the AMT and DSN coordination requirements for WCS licensees apply to both WCS base and fixed stations (*i.e.*, except fixed WCS CPE). As discussed above, it is discernable from a review of the *2001 Public Notice*[413] and *2007 Notice*[414] in this proceeding that the Commission's use of "base station" also encompassed fixed stations. Moreover, the *2010 WCS R&O*'s use of language directing WCS licensees to provide information to SDARS licensees regarding their "deployed infrastructure"[415] also demonstrates that WCS licensees' information sharing obligations with respect to SDARS licensees are not limited only to base stations used in a mobile system. Accordingly, we revise Section 27.73 to make clear that WCS licensees must coordinate 2.3 GHz WCS base and fixed stations with AMT entities

[406] *See 2010 WCS R&O*, 25 FCC Rcd at 11786 para. 185.

[407] *See 2010 WCS R&O*, 25 FCC Rcd at 11785 para. 183; 11787 para. 186.

[408] *See* Letter from William K. Keane, Counsel to AFTRCC, to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1 (filed Feb. 7, 2012) ("AFTRCC Feb. 7, 2012 *Ex Parte*").

[409] *See* Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC in WT Docket No. 07-293 at 1 (filed Feb. 15, 2012) (WCS Coalition Feb. 15, 2012 *Ex Parte* Letter); Letter from Joan Marsh, Vice President – Federal Regulatory, AT&T Inc., to Marlene H. Dortch, Secretary, FCC in WT Docket No. 07-293; IB Docket No. 95-91 at 1 (filed Aug. 28, 2012) ("AT&T Aug. 28, 2012 *Ex Parte*").

[410] *See* WCS Coalition Feb. 15, 2012 *Ex Parte* Letter at 2-3.

[411] *See* AT&T Aug. 28, 2012 *Ex Parte* at 1.

[412] *See* Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC at 1 (filed Sept. 12, 2012).

[413] *See 2001 Public Notice*, 16 FCC Rcd at 19435 para. 30.

[414] *See 2007 Notice*, 22 FCC Rcd at 22135 para. 32.

[415] *See 2010 WCS R&O*, 25 FCC Rcd at 11772 para. 151, 11815 para. 276, 11830 para. 327.

and NASA's DSN facility in Goldstone, CA. However, we clarify that fixed WCS CPE (*i.e.*, fixed equipment operated by a WCS subscriber) is not subject to this coordination requirement. See Section 27.73 in Appendix A for the revised WCS coordination rules.

IV. ORDER ON RECONSIDERATION IN IB DOCKET NO. 95-91

174. On May 20, 2010, the Commission adopted a *Second Report and Order* in IB Docket No. 95-91 ("*SDARS 2nd R&O*").[416] The *SDARS 2nd R&O* established rules for the operation of SDARS terrestrial repeaters in the 2320-2345 MHz frequency band. Although SDARS is primarily a satellite-delivered service, satellites cannot provide an adequate signal in some areas. In these areas, ground-based terrestrial repeaters re-transmit the same signals that SDARS satellites provide directly to subscribers so that subscribers can receive service.[417]

175. The *SDARS 2nd R&O* adopted a regulatory framework for SDARS terrestrial repeaters that would not unduly constrain their deployment, but would also limit their potential for harmful interference to WCS licensees that operate in bands immediately above and below the 2320-2345 MHz band allocated to SDARS. Principal aspects of this framework include:

- limiting terrestrial repeaters operating under blanket licensing to 12 kW or less average EIRP;[418]
- requiring the majority of repeaters to attenuate their OOBE by a factor of not less than 90 +10 log (P) dB;[419]
- requiring SDARS licensees to notify potentially affected WCS licensees prior to deploying new or modified terrestrial repeaters;[420] and
- permitting site-by-site licensing of terrestrial repeaters that operate above the adopted power and OOBE limits, provided WCS licensees do not notify SDARS licensees that there are existing or planned WCS deployments that are potentially affected by such operations.[421]

176. Parties seek reconsideration or clarification of certain aspects of this framework. In particular, WCS licensees, principally through an association – the WCS Coalition – seek reconsideration of aspects of the site-by-site licensing provisions for terrestrial repeaters operating above 12 kW average EIRP.[422] They also ask us to clarify the notification requirements prior to deploying new or modified repeaters.[423] Sirius XM – the sole SDARS licensee – seeks reconsideration of the methodology used to determine which WCS licensees could be "potentially affected" by a repeater operating at power levels greater than 12 kW average EIRP.[424] Sirius XM also requests clarification of the notice requirements for

[416] *See 2010 WCS R&O and SDARS 2nd R&O*, 25 FCC Rcd 11710.

[417] *SDARS 2nd R&O,* 25 FCC Rcd at 11715 para. 7. Areas where terrestrial repeaters may operate include "urban canyons" between tall buildings, heavily foliaged areas, tunnels, and other places where objects obstruct a clear line of sight to the satellite, or cause multipath interference from reflected signals. *Id.*

[418] *SDARS 2nd R&O,* 25 FCC Rcd at 11803, 11812-13 paras. 240 and 270.

[419] *Id.* at 11806 para. 249.

[420] *Id.* at 11815 para. 277.

[421] *Id.* at 11809-10 paras. 259-261.

[422] Petition for Partial Reconsideration at 21 (filed Sept. 1, 2010) (WCS Coalition Petition).

[423] *Id.* at 18.

[424] Petition for Partial Reconsideration and Clarification at 21 (filed Sept. 1, 2010) (Sirius XM Petition).

very low-power repeaters operating at less than 2 W EIRP.[425] We discuss these requests for reconsideration or clarification below.

A. Operation of SDARS Terrestrial Repeaters Above 12 Kilowatts Average EIRP

177. Both the WCS Coalition and Sirius XM seek reconsideration of the Commission's rules governing the operation of SDARS terrestrial repeaters at power levels above 12 kW average EIRP.[426] In the *SDARS 2nd R&O*, the Commission established a power limit of 12 kW average EIRP for SDARS repeaters.[427] The Commission found that a power limit of 12 kW average EIRP would protect WCS operations in adjacent spectrum bands from harmful interference, but at the same time would avoid unnecessary and costly re-configuring of existing SDARS repeater networks.[428] The Commission also determined that SDARS licensees could operate repeaters at power levels greater than 12 kW average EIRP without undermining the purpose of power limit, if licensees confined such operations to areas where they would not potentially affect WCS commercial operations.[429]

178. Accordingly, the *SDARS 2nd R&O* established two distinct licensing regimes for SDARS repeaters. For terrestrial repeaters operating at or below 12 kW average EIRP, the *SDARS 2nd R&O* established a "blanket licensing" regime.[430] Under blanket licensing, an SDARS licensee can operate a large number of terrestrial repeaters under a single authorization, without specifying the technical characteristics or the geographic location of each individual repeater. Repeaters are eligible for blanket licensing only if the applicant certifies that the repeaters comply with the rules established by the Commission for repeater operations, including the 12 kW average EIRP power limit.[431] No party has sought reconsideration of these blanket licensing provisions.

179. For repeaters that are not eligible for blanket licensing, including repeaters operating above 12 kW EIRP, the *SDARS 2nd R&O* established a "site-by-site" licensing regime, which requires the applicant to provide the technical characteristics and geographic location of each individual repeater as part of the application process.[432] In addition, the rules require an SDARS licensee to reduce the power of these repeaters to 12 kW average EIRP, or less, within 180 days of receiving written notice from a "potentially affected" WCS licensee that the WCS licensee intends to commence commercial service

[425] *Id.* at 23.

[426] The Commission also established a maximum peak-to-average power ratio (PAPR) of 13 dB for all SDARS terrestrial repeaters. No party has sought reconsideration of this requirement.

[427] *SDARS 2nd R&O,* 25 FCC Rcd at 11803 para. 240.

[428] *Id*.

[429] *SDARS 2nd R&O,* 25 FCC Rcd at 11809 para. 259. The Commission stated that the adoption of power limits on SDARS repeaters facilitates introduction of WCS services in areas where both SDARS and WCS licensees seek to provide service to the public. The Commission found that there was no public interest in prohibiting the operation of SDARS repeaters at power levels greater than 12 kW average EIRP in areas in which no WCS licensee provides commercial service. *Id.*

[430] *SDARS 2nd R&O,* 25 FCC Rcd at 11812-13 para. 270; 47 C.F.R. § 25.144(e)(8).

[431] To be eligible for blanket licensing, repeaters must also comply with Commission's rules concerning compliance with applicable international agreements (47 C.F.R. § 25.144(e)(2)(iii)), origination of local programming (47 C.F.R. § 25.144(e)(4)(5)), radiofrequency safety (47 C.F.R. § 25.144(e)(6)), antenna lighting requirements (47 C.F.R. § 25.144(e)(6)), and equipment certification obligations (47 C.F.R. § 25.144(e)(7)). No party has sought reconsideration in connection with these other requirements.

[432] *SDARS 2nd R&O,* 25 FCC Rcd at 11813 para. 273; 47 C.F.R. § 25.144(e)(8).

within 365 days.[433] For purposes of this rule, the Commission defined a WCS licensee as "potentially affected" if the WCS licensee operates a base station in the same Major Economic Area (MEA) or Regional Economic Area Grouping (REAG) as the SDARS repeater, or if the repeater is within 5 km of the boundary of an MEA or REAG in which the WCS licensee is authorized to operate a base station.[434]

1. Site-by-Site Licensing

180. The WCS Coalition requests that the Commission clarify the rules governing site-by-site licensing of terrestrial repeaters by requiring that SDARS licensees seeking to operate a repeater at a power level greater than 12 kW average EIRP must request a waiver of the power limit rule and must serve such applications on all potentially affected WCS licensees.[435] The WCS Coalition states that the Commission's intent supports its requests. First, the WCS Coalition notes that the Commission adopted a 12 kW average EIRP limit and stated that "appropriate waiver of the Commission's rules must be requested for non-compliant operations."[436] Second, the WCS Coalition contends that operating repeaters above 12 kW average EIRP, without first requesting a waiver of the power limit rules adopted in the *SDARS 2nd R&O*, undermines the time and effort that the Commission has spent developing appropriate power limits for terrestrial repeaters.[437]

181. Sirius XM counters that the Commission should neither require waiver requests as part of any application for a site-by-site license to operate a repeater above the 12 kW average EIRP power limit, nor require applicants to serve such requests on potentially affected WCS licensees.[438] It contends that the waiver and service requirements requested by the WCS Coalition are unnecessarily cumbersome and time consuming. In support of this contention, it points out that the Commission will place any site-by-site applications on public notice prior to grant, and that "potentially affected" WCS licensees have broad opportunities to require repeaters to reduce power to 12 kW average EIRP or less at any time, prior to the WCS licensee commencing operations in a market, even if the potentially affected WCS licensee did not receive notice of the repeater operation above 12 kW average EIRP.[439]

182. *Discussion.* We decline to adopt the WCS Coalition's suggestions. In the *SDARS 2nd R&O*, we found that operation of SDARS repeaters above 12 kW average EIRP serves the public interest in areas where WCS facilities are not providing commercial service or such commercial service is not imminent. The Commission rules explicitly allow repeater operations at power levels greater than 12 kW average EIRP on a site-by-site licensing basis, until a potentially affected WCS licensee notifies the SDARS licensee of the imminent commencement of commercial operations.[440] Thus, there is no need for an SDARS applicant to seek a waiver of the Commission's rules to operate repeaters at power levels greater than 12 kW average EIRP, because the Commission's rules already explicitly allow such

[433] *SDARS 2nd R&O,* 25 FCC Rcd at 11809 para. 260; 47 C.F.R. § 25.214(d)(2). Intuitively, the potentially affected WCS licensee could also provide notice that it has already commenced commercial service.

[434] 47 C.F.R. § 25.214(d)(3).

[435] WCS Coalition Petition at 21-22.

[436] WCS Coalition Petition at 21 (citing *SDARS 2nd R&O,* 25 FCC Rcd at 11813 para. 273).

[437] WCS Coalition Reply at 8-9.

[438] Sirius XM Opposition at 19.

[439] *Id*.

[440] *See* 47 C.F.R. § 25.214(d)(2). Put another way, there is no need to seek a waiver of rules when the rules already explicitly permit the requested actions. Consequently, the WCS Coalition is incorrect that Sirius XM's objection to the WCS Coalition's waiver requirement proposal constitutes an untimely reconsideration petition. WCS Coalition Reply at 8-9.

operations.[441] The Satellite Division has authorized the operations of a small number of SDARS repeaters at power levels above 12 kW average EIRP on delegated authority under a site-by-site licensing regime, without waiving the 12 kW average EIRP power limit set forth in Section 25.214(d). We find no error in the authorization.[442]

183. We also found in the *SDARS 2nd R&O* that the public interest supports authorizing as many SDARS repeaters as possible at levels of 12 kW average EIRP or less through a blanket licensing process, rather than at higher power levels through site-by-site licensing.[443] We reiterate our intent to authorize the vast majority of SDARS repeaters at power levels at or below 12 kW average EIRP under a blanket license. In addition, however, we anticipate authorizing repeaters *above* 12 kW average EIRP mainly in areas where WCS licensees do not provide commercial service and do not provide notice to SDARS licensees of imminent commercial service.

184. We also find that it is unnecessary to require SDARS applicants to serve applications for site-by-site repeater authorization on WCS licensees. The Communications Act of 1934, as amended, and Commission rules generally require 30-days notice to the public before the Commission can act on any license application.[444] Thus, parties potentially affected by the proposed operations already have an adequate opportunity to file comments or petitions to deny in response to any application to operate SDARS repeaters. The WCS Coalition provides no evidence why additional notice of proposed SDARS repeaters operations is necessary, particularly as there is only one SDARS licensee – Sirius XM – for WCS licensees to monitor.[445]

2. Definition of "Potentially Affected" WCS Licensee

185. Sirius XM requests the Commission to define more narrowly which WCS licensees would be "potentially affected" by the operations of repeaters at power levels greater than 12 kW average EIRP (or with OOBE attenuation levels less than those specified in Sections 25.202(h)(1) and (h)(2)). It

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[441] The Commission previously identified a single instance of where a waiver would be required for the operation of a terrestrial repeater at more than 12 kW average EIRP. *See SDARS 2nd R&O,* 25 FCC Rcd at 11810 para. 263. If an SDARS licensee receives notice that a WCS licensee is potentially affected, but the WCS licensee either does not commence commercial service or ceases to provide commercial service, the SDARS licensee may seek a waiver to operate a specific repeater at a higher power (or with lower OOBE attenuation levels) than the rules would otherwise allow.

[442] *See* IBFS File No. SES-LIC-20111121-01384 (granted Feb., 15, 2012). We note that Sirius XM asked for a waiver of the 12 kW average EIRP power limit as part of its application "to the extent necessary." See Application, IBFS File No. SES-LIC-20111121-01384, at 7, n.12. The grant conditions, however, do not include a waiver of Section 25.214(d) of the Commission's rules.

[443] *SDARS 2nd R&O,* 25 FCC Rcd at 11810 para. 262 (observing that the adopted definition of "potentially affected WCS licensee" for purposes of the notification

[444] *See* 47 U.S.C. § 309(b) and 47 C.F.R. § 25.151 (generally requiring a 30-day public notice before the Commission can grant satellite space or earth station applications). None of the exceptions to the 30-day public notice requirement applies to SDARS terrestrial repeater blanket licensing or site-by-site applications.

[445] In addition, we agree with Sirius XM that "potentially affected" WCS licensees have broad opportunities to require nonconforming repeaters to power down regardless of whether or not they received notice of the proposed repeater deployments. In the event a potentially affected WCS licensee does not receive notice of the proposed repeater operation prior to deployment, the WCS licensee may notify the SDARS licensee at any time, and the SDARS licensee must reduce the power of that repeater to 12 kW average EIRP or less within 180 days of receipt of the notice. The obligation of an SDARS licensee to power down repeaters operating above 12 kW average EIRP – regardless of when the repeater was authorized – further reduces the need for special notice provisions to WCS licensees as part of the repeater licensing process.

argues that the use of MEAs and REAGs in Sections 25.202(h) and 25.214(d) of the Commission's rules to determine whether a WCS licensee is potentially affected by an SDARS repeater is overbroad. Sirius XM argues that using MEAs and REAGs could require Sirius XM to modify a repeater in a situation where a WCS licensee is operating hundreds or thousands of miles from that repeater, even though no interference could conceivably occur due to the distances involved.[446]

186. Sirius XM initially proposed the use of a smaller separation distance of 5 km to determine the distance between a repeater and a "potentially affected" WCS licensee.[447] Sirius XM claimed this distance was sufficient to protect WCS licensees and would be consistent with existing Commission's rules that require protection of WCS base stations located up to 5 km beyond the edge of a MEA or REAG. It asks us to adopt this distance again on reconsideration. It also asks us to clarify that WCS licensees must limit notifications to base station sites that the WCS licensee can predict will potentially receive overload interference from terrestrial repeaters and that issuing a blanket notification for all locations would by itself constitute bad faith in violation of WCS licensees' duty to cooperate with SDARS licensees regarding the deployment of WCS base stations.[448]

187. The WCS Coalition agrees that MEAs and REAGs may define too broadly which WCS licensees would be "potentially affected" by operations of a repeater operating over 12 kW EIRP, but disagrees that a 5 km separation distance is sufficient to protect WCS base stations.[449] The WCS Coalition states that Sirius XM has presented no engineering evidence to support its 5 km proposal. Alternatively, the WCS Coalition suggests an alternative that provides that, upon notice from any WCS licensee preparing to deploy a fixed or base station within 25 km of a non-compliant repeater, Sirius XM must bring that repeater into compliance with the new power and OOBE limits for SDARS repeaters within 180 days. Sirius XM supports this compromise proposal.[450]

188. *Discussion.* We adopt the alternative definition of a "potentially affected WCS licensee" in Sections 25.202(h) and 25.214(d) of the Commission's rules, which Sirius XM and WCS licensees both support. Accordingly, we amend Sections 25.202(h)(4) and 25.214(d)(3) to incorporate the 25 km metric for determining whether a WCS licensee is "potentially affected" by a repeater operating above 12 kW EIRP (average) or with an OOBE attenuation level less than those specified in Sections 25.202(h)(1) and (h)(2)).[451] The Commission recognized in the *SDARS 2nd R&O* that the use of MEAs and REAGs may be overbroad in determining which WCS licensees would be potentially affected

[446] Sirius XM Petition at 22. Sirius XM provides the example that the current definition of "potentially affected WCS licensee" would allow a WCS licensee planning to commence service in San Diego, California, to require that Sirius XM modify a repeater outside Seattle, Washington, well over 1,000 miles away. *See id.* at n.58.

[447] Sirius XM Petition at 22-23. We note that the Commission previously considered and explicitly rejected Sirius XM's 5 km proximity-based metric. *See SDARS 2nd R&O*, 25 FCC Rcd at 11810 para. 262.

[448] Sirius XM Petition at 23. *See also* 47 C.F.R. § 27.72(e) ("WCS licensees must cooperate in good faith in the selection and use of new station sites and new frequencies to reduce interference and make the most effective use of the authorized facilities.")

[449] WCS Opposition at 22-24.

[450] Sirius XM Reply at 9.

[451] We limit the change to the definition of "potentially affected WCS licensee" to Sections 25.202(h)(3) and 25.214(d). We make no change to the use of MEAs and REAGs to define a "potentially affected WCS licensee" for purposes of the notification requirements of Section 25.263(b)(1). The notification requirements of Section 25.263(b)(1) are broader than the power-down requirements of Section 25.214(d), and we find no reason to alter the definition of "potentially affected WCS licensee" to a narrower proximity-based metric for notification requirements.

by a particular SDARS repeater for the purposes of Sections 25.202(h) and 25.214(d).[452] There was no basis at the time, however, to find that the proximity-based approach favored by Sirius XM would adequately protect WCS licensees from harm.[453] The record established since the release of the *SDARS 2nd R&O*, as well as the support of both the WCS Coalition and Sirius XM, now provides a basis for adopting a 25 km proximity-based definition of a "potentially affected WCS licensee" for purposes of Sections 25.202(h) and 25.214(d) of the Commission's rules.

189. We will not, however, determine that a blanket notification issued by a WCS licensee for all locations "potentially affected" by repeater deployments – regardless of the actual predicted risk of interference – would constitute bad faith. An SDARS licensee is required to change the operating parameters of repeaters under Sections 25.202 and 25.214 only when a "potentially affected WCS licensee" notifies it that the WCS licensee intends to commence commercial service within 365 days. Thus, SDARS repeater operations will be impacted only if a WCS licensee has either already commenced commercial service, or when such service is imminent. The Commission previously stated that this discourages a WCS licensee from sending notices for all areas in which it has licenses to operate, regardless of when the licensee actually contemplates service.[454] Although there may be instances where the WCS licensee provides notice of imminent commercial service but does not commence service within the 365-day period, the Commission stated that it did not expect bad faith to be the reason for the delay.[455] We see no reason to find differently. To the extent that a WCS licensee may overstate the potential for interference from a particular SDARS repeater, we do not have reason to find that bad faith would necessarily be the motivating factor.

B. Operation of Low-Power SDARS Terrestrial Repeaters

190. Sirius XM asks us to clarify that SDARS terrestrial repeaters operating at levels below 2 W EIRP are exempt from the notice requirements in Section 25.263(b) of the rules, since such low-power repeaters are unlikely to cause interference to WCS operations in adjacent spectrum.[456] The WCS Coalition agrees to this clarification, provided the Commission makes a parallel modification to Sections 27.72(b) and (c) to exempt WCS mobile base stations operating at less than 2 W EIRP from the notice requirements.[457] Sirius XM agrees with this further proposal.[458]

191. *Discussion.* We agree that SDARS terrestrial repeaters operating below 2 W EIRP are unlikely to be sources of interference, and therefore it is unnecessary to include these low-power devices in the inventory and notification requirements adopted in the *SDARS 2nd R&O* for higher-power devices. Accordingly, we modify Section 25.263 to exempt such devices from the inventory and notification requirements for SDARS terrestrial repeaters.[459]

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[452] *SDARS 2nd R&O,* 25 FCC Rcd at 11810 para. 262.

[453] *Id*.

[454] *SDARS 2nd R&O,* 25 FCC Rcd at 11809 para. 260.

[455] *SDARS 2nd R&O,* 25 FCC Rcd at 11810 para. 263.

[456] Sirius XM Petition at 25.

[457] WCS Coalition Opposition at 24.

[458] Sirius XM Reply at 9 n.27.

[459] *See also supra*, para. 148 (modifying the notification and inventory requirements of Section 27.72 for WCS base and fixed stations operating at power levels below 2 W EIRP).

C. Notification and Cooperation Requirements

192. In the *SDARS 2nd R&O*, the Commission required WCS and SDARS licensees to work together throughout the process of deploying station sites to avoid harmful interference to each other, and to cooperate in good faith to resolve any occurrences of harmful interference by mutually satisfactory arrangements.[460] To implement these requirements, the Commission adopted a rule that requires SDARS licensees to notify potentially affected WCS licensees prior to the deployment of new or modified SDARS terrestrial repeaters and to cooperate in good faith with WCS licensees in the selection and use of SDARS repeater sites.[461] The Commission stated that notification and duty to cooperate obligations imposed on SDARS licensees were intended to be parallel to those imposed on WCS licensees.[462]

193. The WCS Coalition expresses concern that the adopted rules do not contain parallel information exchange requirements for WCS and SDARS licensees.[463] In particular, it objects to the language in Section 27.72(e) that requires WCS licensees to provide SDARS licensees with "as much lead time as practicable to provide ample time to conduct analyses and opportunity for prudent base station site selection prior to WCS licensees entering into real estate and tower leasing or purchasing agreements."[464] It argues that the obligation for SDARS licensees to cooperate with WCS licensees in good faith contained in Section 25.263(e) contains no equivalent provision and requests that the Commission should conform the two rules by removing the specified language from Section 27.72(e). It argues that requiring consultation with Sirius XM in all cases, even when the potential for interference is small, will unnecessarily delay WCS deployments and harm consumers.[465] Sirius XM opposes removing the additional language in Section 27.72(e), arguing that it is appropriate to impose greater obligations on WCS licensees because the risks of interference from WCS stations to SDARS operations are higher than the risks of interference from SDARS repeaters to WCS operations.[466]

194. In addition, the WCS Coalition also urges the Commission to require Sirius XM to provide WCS licensees with information regarding its existing repeater infrastructure.[467] The Commission ordered WCS licensees to provide such information regarding their deployed infrastructure to Sirius XM within 30 days of the effective date of the new Section 27.72 of the Commission's rules.[468] The WCS Coalition notes, however, that there is no parallel ordering clause for Sirius XM to provide information about its existing infrastructure to WCS licensees,[469] even though the Commission stated in the *SDARS 2nd R&O* that SDARS licensees must provide potentially affected WCS licensees with an inventory of their terrestrial repeater infrastructure.[470]

195. *Discussion*. We decline to revisit the requirement in Section 27.72(e) and maintain the

[460] *SDARS 2nd R&O,* 25 FCC Rcd at 11815-16 para. 279.

[461] *Id.* at 11815 para. 277; 47 C.F.R. § 25.263(b) & (e).

[462] Id. at 11815 para. 277.

[463] WCS Coalition Petition at 22-23.

[464] *Id.* at 24.

[465] *Id.* See also WCS Coalition Opposition at 19.

[466] Sirius XM Opposition at 16.

[467] WCS Coalition Petition at 22 n.48.

[468] *SDARS 2nd R&O,* 25 FCC Rcd at 11830. para. 327.

[469] WCS Coalition Petition at 22 n.48.

[470] WCS Coalition Petition at 22-23 n.48, citing *SDARS 2nd R&O*, 25 FCC Rcd at 11815 para. 278.

existing language of the rule. Although the WCS Coalition argues that the additional language is unnecessary where the risk of interference is small, the purpose of the rule itself is to allow licensees to determine the risk of interference as early as practicable in the site selection process so that changes can be made if potential harmful interference is found. Thus, it does not serve the purpose of the rule to remove requirements that allow sufficient time to conduct interference analyses and allow time to modify the site selection, if necessary.[471]

196. We agree with the WCS Coalition, however, that the obligations between SDARS and WCS licensees should be parallel. To make the obligations parallel, we will modify the duty to cooperate obligations for SDARS licensees to match the obligation for WCS licensees. We disagree with Sirius XM that the record in this proceeding demonstrates that risks of interference from WCS stations to SDARS operations are higher than the risks of interference from SDARS repeaters to WCS operations, and thus impose a greater duty to cooperate on WCS licensees than on SDARS licensees. Accordingly, we amend Section 25.263(e) to add a requirement that SDARS licensees should provide WCS licensees as much lead time as practicable to provide ample time to conduct analyses and opportunity for prudent repeater site selection prior to SDARS licensees entering into real estate and tower leasing or purchasing agreements.[472]

197. Because we agree that the notice and duty to cooperate obligations between SDARS and WCS licensees should be parallel, we modify the notice requirements for SDARS repeaters to permit SDARS licensees to modify existing facilities, other than changes in location, without prior notice so long as the change does not increase the predicted PFD at ground level by more than 1 dB and notice of the modification is provided within 24 hours of deployment. At the request of WCS licensees, we also adopt this revision to the notice obligations for WCS licensees.[473] We see no reason why a parallel revision should not be made for SDARS repeaters and amend the notice requirements of Section 25.263(b) accordingly. However, multiple modifications to SDARS terrestrial repeaters could result in a predicted aggregate PFD increase that may negatively affect WCS receivers. To avoid such a result, although an SDARS licensee may make 24-hour post-modification notifications as long as the predicted PFD increase at ground level is not greater than 1 dB, if a WCS licensee demonstrates to the SDARS licensee that the series of modifications using post-modification notification procedures may cause harmful interference to WCS receivers, the SDARS licensee must provide the WCS licensee with 5-business days notice in advance of additional modifications to SDARS terrestrial repeaters. However, the 1 dB limit will not apply where a coordination agreement between the parties specifies otherwise.

198. In addition, we order Sirius XM to provide potentially affected WCS licensees an inventory of its terrestrial repeater infrastructure, including the information set forth in Section 25.263 for each repeater currently deployed, within 30 days of the publication of a summary of this Order in the Federal Register. We agree with the WCS Coalition that such a requirement is consistent with the intent of the *SDARS 2nd R&O*. For the purpose of this requirement, the definition of "potentially affected WCS licensee" is the same as that used in Section 25.263(b)(1) of the Commission's rules.[474]

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[471] We note that WCS and SDARS licensees may mutually agree in advance to situations where interference is highly unlikely and where no lead time is necessary to conduct interference analyses or to modify site selections.

[472] We also make other conforming edits so that the duty-to-cooperate provisions of Section 25.263(e) parallel the duty-to-cooperate provisions placed on WCS licensees by Section 27.72(e).

[473] *See supra* at paras. 144-146.

[474] We note, however, that Sirius XM has stated that it has already provided potentially affected WCS licensees an inventory of its terrestrial repeater infrastructure. *See* Letter from James S. Blitz, Vice President, Regulatory Counsel, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, in WT Docket No. 07-293 at 1(filed March 8, 2012).

199. Finally, we emphasize that cooperation between SDARS and WCS licensees is critical to the successful coexistence between SDARS and WCS systems, and we encourage SDARS licensees to develop and enter into separate coordination agreements with WCS licensees for interference mitigation. We therefore revise Section 25.263(b)(3) to incorporate the AT&T/Sirius XM proposed language encouraging the adoption of coordination agreements by WCS and SDARS.[475] To the extent any provision of a coordination agreement between parties to mutually resolve harmful interference conflicts with other information sharing requirements adopted in this proceeding, the parties are obligated to follow the procedures established under the agreement. We also add a provision to Section 25.263(b) to make clear that SDARS and WCS are able to enter into agreements regarding the logistics of information exchanges, and we encourage parties to implement measures to streamline the process to the extent possible.[476]

V. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Analysis

200. As required by the Regulatory Flexibility Act (RFA),[477] Initial Regulatory Flexibility Analyses (IRFA) for WT Docket No. 07-293 and IB Docket No. 95-91 were incorporated into the *2007 Notice*.[478] The Commission sought written public comments on the possible significant economic impact of the proposed policies and rules on small entities in the *2007 Notice*, including comments on the IRFAs. No one commented specifically on the IRFAs. Pursuant to the RFA,[479] a Final Regulatory Flexibility Analyses and a Final Regulatory Flexibility Certification are contained in Appendices B and C, respectively.

B. Paperwork Reduction Analysis

201. This Order on Reconsideration contains new and modified information collections subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. The Commission will publish a separate notice in the Federal Register inviting comment on the new or revised information collection requirements adopted herein. The requirements will not go into effect until OMB has approved it and the FCC has published a notice announcing the effective date of the information collection requirements. In addition, we note that pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4), we previously sought specific comment on how the Commission might "further reduce the information collection burden for small business concerns with fewer than 25 employees." In this present document, we have assessed the potential effects of the various policy changes with regard to information collection burdens on small business concerns, and find that these requirements will benefit WCS licensees with fewer than 25 employees. In addition, we have described impacts that might affect small businesses, including most businesses with fewer than 25 employees, in the Final Regulatory Flexibility Analyses in Appendices B and C, *infra*.

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[475] *See* Appendix A.

[476] *See supra*, para. 157 (allowing similar flexibility to WCS licensees to enter into agreements with SDARS licensees regarding the logistics of information exchanges) and Appendix A.

[477] *See* 5 U.S.C. § 603.

[478] *2007 Notice*, 12 FCC Rcd at 22146-50 (Appendix A and Appendix B).

[479] *See* 5 U.S.C. § 604.

C. Congressional Review Act

202. The Commission will send a copy of this Order on Reconsideration in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

VI. ORDERING CLAUSES

203. Accordingly, IT IS ORDERED, pursuant to Sections 4(i), 7(a), 303(c), 303(f), 303(g), and 303(r), and 307 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 157(a), 303(c), 303(f), 303(g), 303(r), 307, that this Order on Reconsideration in WT Docket No. 07-293 and IB Docket No. 95-91 is hereby ADOPTED.

204. IT IS FURTHER ORDERED that Parts 25 and 27 of the Commission's rules ARE AMENDED as set forth in Appendix A. The rule revisions adopted herein WILL BECOME EFFECTIVE 30 days after the date of publication of a summary of this Order on Reconsideration in the Federal Register, except for the revisions to Sections 25.263(b), 27.72(b), 27.72(c), and 27.73(a), which contain new or modified information collection requirements that require approval by the OMB under the PRA and WILL BECOME EFFECTIVE after the Commission publishes a notice in the Federal Register announcing such approval and the relevant effective date.

205. IT IS FURTHER ORDERED that ARRL's Petition for Clarification or Partial Reconsideration, filed September 1, 2010, IS GRANTED IN PART and DENIED IN PART, to the extent provided herein.

206. IT IS FURTHER ORDERED that AT&T, Inc.'s Petition for Partial Reconsideration, filed September 1, 2010, IS GRANTED IN PART and DENIED IN PART, to the extent provided herein.

207. IT IS FURTHER ORDERED that Sirius XM's Petition for Partial Reconsideration and Clarification, filed September 1, 2010, IS GRANTED IN PART and DENIED IN PART, to the extent provided herein.

208. IT IS FURTHER ORDERED that Stratos' Petition for Clarification, filed September 1, 2010, IS GRANTED, to the extent provided herein.

209. IT IS FURTHER ORDERED that the WCS Coalition's Petition for Partial Reconsideration, filed September 1, 2010, IS GRANTED IN PART and DENIED IN PART, to the extent provided herein.

210. IT IS FURTHER ORDERED that WCS licensees are HEREBY DIRECTED to provide Sirius XM with an inventory of their fixed (except fixed Customer Premises Equipment) station infrastructure within 30 days of the publication of a summary of this Order on Reconsideration in the Federal Register.

211. IT IS FURTHER ORDERED that Sirius XM is HEREBY DIRECTED to provide potentially affected WCS licensees with an inventory of its terrestrial repeater infrastructure, including the information set forth in Section 25.263(c)(2) for each repeater currently deployed, within 30 days of the publication of a summary of this Order on Reconsideration in the Federal Register.

212. IT IS FURTHER ORDERED that the performance periods for licensees in the Wireless Communications Service are HEREBY RESET and will recommence beginning 30 days after a summary of the Order on Reconsideration is published in the *Federal Register*.

213. IT IS FURTHER ORDERED, pursuant to Sections 4(i) and 308 of the Communications Act of 1934, 47 U.S.C. §§ 154, 308, and Section 1.946 of the Commission's rules, 47 C.F.R. § 1.946, that to obtain a renewal expectancy at their July 21, 2017 renewal deadline, each 2.3 GHz Wireless Communications Service licensee must certify, for each license area, that they have maintained, or exceeded, the level of coverage demonstrated for that license area at the 48-month construction deadline. This certification requirement and renewal standard are subject to any superseding or additional requirements or standards that the Commission may adopt in its ongoing rulemaking proceeding to harmonize the renewal requirements and standards for Wireless Radio Services, WT Docket No. 10-112.[480]

214. IT IS FURTHER ORDERED that the Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Order on Reconsideration, including the Supplemental Final Regulatory Flexibility Analysis and the Supplemental Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

215. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this Order on Reconsideration, including the Supplemental Final Regulatory Flexibility Analysis and Supplemental Final Regulatory Flexibility Certification, in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

[480] *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 Rules and Policies for Certain Wireless Radio Services, *Notice of Proposed Rulemaking and Order*, 25 FCC Rcd 6996 (2010).

Appendix A

Final Rules

For the reasons discussed above, the Federal Communications Commission amends Title 47 of the Code of Federal Regulations, Part 25 and Part 27, as follows:

PART 25 – SATELLITE COMMUNICATIONS

1. The authority citation for Part 25 continues to read as follows:

Authority: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302, 303, 307, 309, and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302a, 303, 307, 309, and 332, unless otherwise noted.

2. Amend Section 25.202 by revising paragraph (h)(4) to read as follows:

§ 25.202 Frequencies, frequency tolerance, and emission limitations.

* * * * *

(h) Out-of-band emission limitations for SDARS terrestrial repeaters.

* * * * *

(4) For the purpose of this section, a WCS licensee is potentially affected if it is authorized to operate a base station in the 2305-2315 MHz or 2350-2360 MHz bands within 25 kilometers of a repeater seeking to operate with an out of band emission attenuation factor less than those prescribed in paragraphs (1) or (2) above.

3. Amend Section 25.214 by revising paragraph (d)(3) to read as follows

§ 25.214 Technical requirements for space stations in the satellite digital audio radio service and associated terrestrial repeaters.

* * * * *

(d) Power limit for SDARS terrestrial repeaters

* * * * *

(3) For the purpose of this section, a WCS licensee is potentially affected if it is authorized to operate a base station in the 2305-2315 MHz or 2350-2360 MHz bands within 25 kilometers of a repeater seeking to operate with a power level greater than that prescribed in paragraph (1) above.

4. Amend Section 25.263 by revising paragraph (b) and (e) to read as follows:

* * * * *

§ 25.263 Information sharing requirements for SDARS terrestrial repeater operators.

* * * * *

(b) Notice Requirements. SDARS licensees that intend to operate a new terrestrial repeater must, before commencing such operation, provide 10 business days prior notice to all potentially affected Wireless Communications Service (WCS) licensees. SDARS licensees that intend to modify an existing repeater must, before commencing such modified operation, provide 5 business days prior notice to all potentially affected WCS licensees.

(1) For the purposes of this section, a "potentially affected WCS licensee" is a WCS licensee that:

(i) 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 to be located;

(ii) Is authorized to operate 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 to be located.

(iii) In addition to the WCS licensees identified in paragraphs (b)(1)(i) and (ii) of this section, in cases in which the SDARS licensee plans to deploy or modify a terrestrial repeater within 5 kilometers of the boundary of an MEA or REAG in which the terrestrial repeater is to be located, a potentially affected WCS licensee is one that is authorized to operate a WCS base station in that neighboring MEA or REAG within 5 kilometers of the location of the terrestrial repeater.

(2) For the purposes of this section, a business day is defined by § 1.4(e)(2) of this chapter.

(3) For modifications other than changes in location, a licensee may provide notice within 24 hours after the modified operation if the modification does not result in a predicted increase of the power flux density (PFD) at ground level by more than 1 dB since the last advance notice was given. If a demonstration is made by the WCS licensee that such modifications may cause harmful interference to WCS receivers, SDARS licensees will be required to provide notice 5 business days in advance of additional repeater modifications.

(4) SDARS repeaters operating below 2 watts equivalent isotropically radiated power (EIRP) are exempt from the notice requirements set forth in this paragraph.

(5) SDARS licensees are encouraged to develop separate coordination agreements with WCS licensees to facilitate efficient deployment of and coexistence between each service. To the extent the provisions of any such coordination agreement conflict with the requirements set forth herein, the procedures established under a coordination agreement will control. SDARS licensees must maintain a copy of any coordination agreement with a WCS license in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

(6) SDARS and WCS licensees may enter into agreements regarding alternative notification procedures.

* * * * *

(e) Duty to Cooperate. SDARS licensees must cooperate in good faith in the selection and use of new repeater sites to reduce interference and make the most effective use of the authorized facilities. SDARS licensees should provide WCS licensees as much lead time as practicable to provide ample time to conduct analyses and opportunity for prudent repeater site selection prior to SDARS licensees entering into real estate and tower leasing or purchasing agreements. Licensees of stations suffering or causing harmful interference must cooperate in good faith and resolve such problems by mutually satisfactory arrangements. If the licensees are unable to do so, the International Bureau, in consultation with the Office of Engineering and Technology and the Wireless Telecommunications Bureau, will consider the actions taken by the parties to mitigate the risk of and remedy any alleged interference. In determining

the appropriate action, the Bureau will take into account the nature and extent of the interference and act promptly to remedy the interference. The Bureau may impose restrictions on SDARS licensees, including specifying the transmitter power, antenna height, or other technical or operational measures to remedy the interference, and will take into account previous measures by the licensees to mitigate the risk of interference.

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

1. The authority citation for Part 27 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302a, 303, 307, 309, 332, 336, and 337 unless otherwise noted.

2. Amend Section 27.14 by revising paragraphs (p)(1), (2), (3), and (5) to read as follows:

§ 27.14 Construction requirements; Criteria for renewal.

* * * * *

(p) * * *

(1) For mobile and point-to-multipoint systems in Blocks A and B, and point-to-multipoint systems in Blocks C and D, a licensee must provide reliable signal coverage and offer service to at least 40 percent of the license area's population by **[INSERT DATE 48 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**, and to at least 75 percent of the license area's population by **[INSERT DATE 78 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**. If, when filing the construction notification required under §1.946(d) of this chapter, a WCS licensee demonstrates that 25 percent or more of the license area's population for Block A, B or D is within a coordination zone as defined by §27.73(a) of the rules, the foregoing population benchmarks are reduced to 25 and 50 percent, respectively. The percentage of a license area's population within a coordination zone equals the sum of the Census Block Centroid Populations within the area, divided by the license area's total population.

(2) For point-to-point fixed systems, except those deployed in the Gulf of Mexico license area, a licensee must construct and operate a minimum of 15 point-to-point links per million persons (one link per 67,000 persons) in a license area by **[INSERT DATE 48 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**, and 30 point-to-point links per million persons (one link per 33,500 persons) in a licensed area by **[INSERT DATE 78 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**. The exact link requirement is calculated by dividing a license area's total population by 67,000 and 33,500 for the respective milestones, and then rounding upwards to the next whole number. For a link to be counted towards these benchmarks, both of its endpoints must be located in the license area. If only one endpoint of a link is located in a license area, it can be counted as a one- half link towards the benchmarks.

(3) For point-to-point fixed systems deployed on any spectrum block in the Gulf of Mexico license area, a licensee must construct and operate a minimum of 15 point-to-point links by **[INSERT DATE 48 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**, and a minimum of 15 point-to-point links by **[INSERT DATE 78 MONTHS AFTER THE EFFECTIVE DATE OF ORDER]**.

(4) * * *

(5) If an initial authorization for a license area is granted after **[INSERT EFFECTIVE DATE OF ORDER]**, then the applicable benchmarks in paragraphs (p)(1), (p)(2) and (p)(3) of this section must be met within 48 and 78 months, respectively, of the initial authorization grant date.
* * * * *

3. Amend Section 27.50 by removing paragraph (a)(1)(iii) and revising paragraphs (a)(2) and (a)(3)(i)-(iv) to read as follows:

* * * * *

§ 27.50 Power limits and duty cycle.

(a) The following power limits and related requirements apply to stations transmitting in the 2305-2320 MHz band or the 2345-2360 MHz band.

(1) Base and fixed stations. (i) For base and fixed stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band:

(A) The average equivalent isotropically radiated power (EIRP) must not exceed 2,000 watts within any 5 megahertz of authorized bandwidth and must not exceed 400 watts within any 1 megahertz of authorized bandwidth.

(B) The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

(ii) For base and fixed stations transmitting in the 2315-2320 MHz band or the 2345-2350 MHz band, the peak EIRP must not exceed 2,000 watts.

(2) Fixed customer premises equipment stations. For fixed customer premises equipment (CPE) stations transmitting in the 2305-2320 MHz band or in the 2345-2360 MHz band, the peak EIRP must not exceed 20 watts within any 5 megahertz of authorized bandwidth. Fixed CPE stations transmitting in the 2305-2320 MHz band or in the 2345-2360 MHz band must employ automatic transmit power control when operating so the stations operate with the minimum power necessary for successful communications. The use of outdoor antennas for CPE stations or outdoor CPE station installations operating with 2 watts per 5 megahertz or less average EIRP using the stepped emissions mask prescribed in § 27.53(a)(3) of this chapter is prohibited except if professionally installed in locations removed by 20 meters from roadways or in locations where it can be shown that the ground power level of -44 dBm in the A or B blocks or -55 dBm in the C or D blocks will not be exceeded at the nearest road location. The use of outdoor antennas for fixed CPE stations operating with 2 watts per 5 megahertz or less average EIRP and the emissions mask prescribed in § 27.53(a)(1)(i)-(iii) is permitted in all locations. For fixed WCS CPE using TDD technology, the duty cycle must not exceed 38 percent;

(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

(ii) Mobile and portable stations are not permitted to transmit in the 2315-2320 MHz and 2345-2350 MHz bands.

(iii) Automatic transmit power control. Mobile and portable stations transmitting in the 2305-2315 MHz band or in the 2350-2360 MHz band must employ automatic transmit power control when operating so the stations operate with the minimum power necessary for successful communications.

(iv) Prohibition on external vehicle-mounted antennas. The use of external vehicle-mounted antennas for mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band is prohibited

4. Amend Section 27.53 by revising paragraphs (a), (a)(1)(i)-(iii), (a)(2)(i)-(iii), (a)(3)(i)-(iii), (a)(4)(i)-(iii), and (a)(5) to read as follows:

§ 27.53 Emission limits.

(a) For operations in the 2305-2320 MHz band and 2345-2360 MHz band, the power of any emissions outside of a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(1) For base and fixed stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2267.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with more than 2 watts per 5 megahertz average EIRP:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2267.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz EIRP or less:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

(5) Measurement Procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.*, 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(6) [Reserved]

* * * * *

5. Amend Section 27.64 by adding paragraph (d) to read as follows:

§ 27.64 Protection from interference.

* * *

(d) *Harmful Interference to SDARS Operations Requiring Resolution.* The following conditions will be presumed to constitute harmful interference to SDARS operations from WCS operations in the

2305-2320 MHz and 2345-2360 MHz bands and require WCS operators to work cooperatively with SDARS operators to address areas where such power levels are exceeded and harmful interference occurs:

(1) A WCS ground signal level greater than -44 dBm in the upper or lower A or B block, or -55 dBm in the C or D block, present at a location on a roadway, where a test demonstrates that SDARS service would be muted over a road distance of greater than 50 meters; or

(2) A WCS ground signal level exceeding -44 dBm in the upper or lower A or B block, or -55 dBm in the C or D block on a test drive route, which is mutually agreed upon by the WCS licensee and the SDARS licensee, for more than 1 percent of the cumulative surface road distance on that drive route, where a test demonstrates that SDARS service would be muted over a cumulative road distance of greater than 0.5 percent (incremental to any muting present prior to use of WCS frequencies in the area of that drive test).

6. Amend Section 27.72 by revising the introductory paragraph, paragraphs (a), (b), (c)(2)(i), (c)(3), and (e) to read as follows:

§ 27.72 Information sharing requirements.

This section requires WCS licensees in the 2305-2320 MHz and 2345-2360 MHz bands to share information regarding the location and operation of base and fixed stations (except fixed customer premises equipment) with Satellite Digital Audio Radio Service (SDARS) licensees in the 2320-2345 MHz band. Section 25.263 of this chapter requires SDARS licensees in the 2320-2345 MHz band to share information regarding the location and operation of terrestrial repeaters with WCS licensees in the 2305-2320 MHz and 2345-2360 MHz bands. WCS licensees are encouraged to develop separate coordination agreements with SDARS licensees to facilitate efficient deployment of and coexistence between each service. To the extent the provisions of any such coordination agreement conflict with the requirements set forth herein, the procedures established under a coordination agreement will control. WCS licensees must maintain a copy of any coordination agreement with an SDARS licensee in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

(a) *Sites and frequency selections*. WCS licensees must select base and fixed station sites and frequencies, to the extent practicable, to minimize the possibility of harmful interference to operations in the SDARS 2320-2345 MHz band.

(b) *Prior notice periods.* WCS licensees that intend to operate a base or fixed station must, before commencing such operation, provide 10 business days prior notice to all SDARS licensees. WCS licensees that intend to modify an existing station must, before commencing such modified operation, provide 5 business days prior notice to all SDARS licensees. For the purposes of this section, a business day is defined by §1.4(e)(2) of this chapter.

(1) For modifications other than changes in location, a licensee may provide notice within 24 hours after the modified operation if the modification does not result in a predicted increase of the power flux density (PFD) at ground level by more than 1 dB since the last advance notice was given. If a demonstration is made by the SDARS licensee that such modifications may cause harmful interference to SDARS receivers, WCS licensees will be required to provide notice 5 business days in advance of additional station modifications.

(2) WCS base and fixed stations operating below 2 watts equivalent isotropically radiated power (EIRP) are exempt from the notice requirements set forth in this paragraph.

(3) WCS and SDARS licensees may enter into agreements regarding alternative notification procedures.

(c) * * *

(2) * * *

(i) The coordinates of the proposed station to an accuracy of no less than ±1 second latitude and longitude;

* * * * *

(3) A WCS licensee operating base or fixed stations must maintain an accurate and up-to-date inventory of its stations, including the information set forth in §27.72(c)(2), which shall be available upon request by the Commission.

* * * * *

(e) *Duty to cooperate.* WCS licensees must cooperate in good faith in the selection and use of new station sites and new frequencies to reduce interference and make the most effective use of the authorized facilities. WCS licensees should provide SDARS licensees as much lead time as practicable to provide ample time to conduct analyses and opportunity for prudent base station site selection prior to WCS licensees entering into real estate and tower leasing or purchasing agreements. WCS licensees must have sufficient operational flexibility in their network design to implement one or more technical solutions to remedy harmful interference. Licensees of stations suffering or causing harmful interference, as defined in § 27.64(d) of these rules, must cooperate in good faith and resolve such problems by mutually satisfactory arrangements. If the licensees are unable to do so, the Wireless Telecommunications Bureau, in consultation with the Office of Engineering and Technology and the International Bureau, will consider the actions taken by the parties to mitigate the risk of and remedy any alleged interference. In determining the appropriate action, the Bureau will take into account the nature and extent of the interference and act promptly to remedy the interference. The Bureau may impose restrictions on WCS licensees, including specifying the transmitter power, antenna height, or other technical or operational measures to remedy the interference, and will take into account previous measures by the licensees to mitigate the risk of interference.

7. Amend Section 27.73 by revising the introductory paragraph and paragraphs (a), (b), and (c) to read as follows:

§ 27.73 WCS, AMT, and Goldstone coordination requirements.

This section requires Wireless Communications Services (WCS) licensees in the 2305-2320 MHz and 2345-2360 MHz bands, respectively, to coordinate the deployment of base and fixed stations (except fixed customer premises equipment) with the Goldstone, CA Deep Space Network (DSN) facility in the 2290-2300 MHz band and with Aeronautical Mobile Telemetry (AMT) facilities in the 2360-2395 MHz band; and to take all practicable steps necessary to minimize the risk of harmful interference to AMT and DSN facilities.

* * * * *

(a) WCS licensees operating base and fixed stations in the 2345-2360 MHz band must, prior to operation of such stations, achieve a mutually satisfactory coordination agreement with the AMT entity(ies) (*i.e.*, FCC licensee(s) and/or Federal operator(s)) for any AMT receiver facility within 45 kilometers or radio

line of sight, whichever distance is larger, of the intended WCS base or fixed station location. The coordinator for the assignment of flight test frequencies in the 2360-2390 MHz band, Aerospace and Flight Test Radio Coordination Council (AFTRCC) or successors of AFTRCC, will facilitate a mutually satisfactory coordination agreement between the WCS licensee(s) and AMT entity(ies) for existing AMT receiver sites. The locations of current Federal and non-Federal AMT receiver sites may be obtained from AFTRCC at Post Office Box 12822 Wichita, KS 67277-2822, (316) 946-8826, or successor frequency coordinators of AFTRCC. Such coordination agreement shall provide protection to existing AMT receiver stations consistent with International Telecommunication Union (ITU) 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 1452-1525 and 2310-2360 MHz," adopted May 2000, as adjusted using generally accepted engineering practices and standards to take into account the local conditions and operating characteristics of the applicable AMT and WCS facilities. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the recommendation may be obtained from ITU, Place des Nations, 1211 Geneva 20, Switzerland, or online at <http://www.itu.int/en/publications/Pages/default.aspx>. Copies are available for inspection during normal business hours at the following locations: Federal Communications Commission, 445 12th Street, SW, Washington, DC 20554, or Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, DC.

(b) WCS licensees operating base and fixed stations in the 2305-2320 MHz band must, prior to operation of such stations, achieve a mutually satisfactory coordination agreement with the National Aeronautics and Space Administration (NASA) within 145 kilometers of the Goldstone, CA earth station site (35°25'33" N, 116°53'23" W).

(c) After base or fixed station operations commence, upon receipt of a complaint of harmful interference, the WCS licensee(s) receiving the complaint, no matter the distance from the NASA Goldstone, CA earth station or from an AMT site, operating in the 2305-2320 or 2345-2360 MHz bands, respectively, shall take all practicable steps to immediately eliminate the interference.

* * * * *

Appendix B

Supplemental Final Regulatory Flexibility Analysis

Order on Reconsideration in WT Docket No. 07-293

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] Initial Regulatory Flexibility Analyses (IRFAs) were incorporated in the Notice of Proposed Rulemaking (2007 Notice)[2] and the WCS Performance Public Notice[3] in WT Docket No. 07-293. The Commission sought written public comment on the proposals in the 2007 Notice and WCS Performance Public Notice, including comment on the IRFAs. In addition, a Final Regulatory Flexibility Analysis (FRFA) was incorporated in the Report and Order in WT Docket No. 07-293 (2010 WCS R&O).[4] This present Supplemental Final Regulatory Flexibility Analysis (Supplemental FRFA) for the Order on Reconsideration conforms to the RFA.[5]

A. Need for, and Objectives of, the Order on Reconsideration

2. The Order on Reconsideration responds to petitions for reconsideration of the Report and Order adopting service rules for the Wireless Communications Service (WCS) in the 2305-2320 MHz and 2345-2360 MHz bands (2.3 GHz WCS bands). The need for and objectives of the rules adopted in this Order on Reconsideration are the same as those discussed in the FRFA for the Report and Order. In the Report and Order, the Commission took a number of steps to facilitate deployment of mobile broadband products and services in the 2305-2320 MHz and 2345-2360 MHz Wireless Communications Service (WCS) bands, while safeguarding from harmful interference satellite radio services, which are provided in the interstitial 2320-2345 MHz Satellite Digital Radio Service (SDARS) band. In the 2010 WCS R&O, the Commission adopted provisions to establish a permanent regulatory framework for the co-existence of WCS and SDARS operations in the 2305-2360 MHz band while limiting the WCS's potential to cause harmful interference (*i.e.*, interference which seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service)[6] to other adjacent bands services. Specifically, the Commission revised certain power and out-of-band emissions (OOBE) rules applicable to WCS licensees.

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[1] See 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 – 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] See Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band and Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, Notice of Proposed Rulemaking and Second Further Notice of Proposed Rulemaking, WT Docket No. 07-293 and IB Docket No. 95-91, 22 FCC Rcd 22123, 22156-22159 (2007) ("2007 Notice").

[3] 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").

[4] See Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, WT Docket No. 07-293, Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Band, IB Docket No. 95-91, GEN Docket No. 90-357, RM-8610, Report and Order and Second Report and Order, 25 FCC Rcd 11710, 11849 Appendix C (2010) ("2010 WCS R&O and SDARS 2nd R&O").

[5] See 5 U.S.C. § 604. A Supplemental Final Regulatory Flexibility Certification of the Order on Reconsideration of the Second Report and Order in IB Docket No. 95-91 is contained in a separate appendix.

[6] See 47 C.F.R. § 2.1(c).

3. On reconsideration, we take the following actions: 1) establish maximum design ground power level targets for WCS base and fixed station operations to define harmful interference on roadways and serve as triggers for interference resolution if exceeded and harmful interference (i.e., muting) to SDARS operations occurs; 2) eliminate the frequency band restrictions on WCS frequency division duplexing (FDD)[7] base station operations; 3) relax the restrictions on low-power fixed WCS customer premises equipment (CPE) (average equivalent isotropically radiated power (EIRP) less than 2 Watts) outdoor and outdoor antenna use under certain circumstances; 3) eliminate the duty cycle limits for WCS mobile and portable devices and fixed WCS CPE using FDD technology; 4) eliminate the power spectral density (PSD) limit for WCS mobile and portable devices using appropriate uplink protocols (e.g., 3rd Generation Partnership Project (3GPP) Long Term Evolution (LTE)); 5) restrict WCS mobile and portable device transmissions in all portions of WCS Blocks C and D; 6) encourage WCS licensees to enter into coordination agreements with SDARS licensees to facilitate efficient deployment of and coexistence between each service; 7) require notification of WCS fixed stations to SDARS licensees; 8) require coordination of WCS fixed stations with aeronautical mobile telemetry (AMT) entities and NASA's Deep Space Network facility in Goldstone, California; 9) allow post notification to SDARS licensees within 24 hours for minor WCS station modifications (other than location changes) so long as the ground level power flux density is not increased by more than 1 dB; 10) exclude WCS stations operating under 2 Watts EIRP from the WCS inventory and notification requirements. The Commission affirmed its decisions in the 2010 WCS R&O to not establish guard bands near the SDARS band for fixed WCS CPE. It also affirmed its decision to prohibit FDD WCS mobile and portable devices from transmitting in the 2345-2360 MHz band, and affirmed the OOBE limits for WCS mobile and portable devices and duty cycle limit for WCS mobile and portable devices and fixed WCS CPE using time division duplexing (TDD) technology adopted in the 2010 WCS R&O. Finally, the Commission restarted and extended, by six months, the period within which licensees must satisfy the WCS performance requirements.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

4. No comments were received in response to the IRFAs in the 2007 Notice and the WCS Performance Public Notice.

C. Description and Estimate of the Number of Small Entities to Which the Rules Will Apply

5. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted. The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[8] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[9] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any

[7] FDD allows simultaneous radio transmission and reception between a subscriber's device and a base station by providing two simultaneous but separate frequencies (aka channels). In a time division duplexing (TDD) system, a common channel is shared between the uplink (subscriber to base station transmission) and downlink (base station to subscriber transmission), with the resource being switched in time.

[8] See 5 U.S.C. § 601(6).

[9] See 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.

additional criteria established by the Small Business Administration (SBA).[10] A small organization is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[11] Below, the Commission further describes and estimates the number of small entity licensees and regulatees that may be affected by the rules changes adopted in the Order on Reconsideration.

6. Wireless Telecommunications Carriers (except satellite). This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging services, wireless Internet access, and wireless video services.[12] The appropriate size standard under SBA rules is for the category Wireless Telecommunications Carriers. The size standard for that category is that a business is small if it has 1,500 or fewer employees.[13] Under the present and prior categories, the SBA has deemed a wireless business to be small if it has 1,500 or fewer employees.[14] For this category, census data for 2007 show that there were 11,163 firms that operated for the entire year.[15] Of this total, 10,791 firms had employment of 999 or fewer employees and 372 had employment of 1000 employees or more.[16] Thus under this category and the associated small business size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities that may be affected by our proposed action.[17]

7. WCS Licensees. The Wireless Communication Service in the 2305-2320 MHz and 2345-2360 MHz frequency bands has flexible rules that permit licensees in this service to provide fixed, mobile, portable, and radiolocation services. Licensees are also permitted to provide satellite digital audio radio services. The SBA rules establish a size standard for "Wireless Telecommunications Carriers," which encompasses business entities engaged in radiotelephone communications employing no more than 1,500 persons.[18] There are currently 155 active WCS licenses held by 10 licensees. Of these, 7 licensees qualify as small entities and hold a total of 50 licenses.

8. Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: "This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile

[10] See Small Business Act, 5 U.S.C. § 632 (1996).

[11] See 5 U.S.C. § 601(4).

[12] See http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2007%20NAICS%20Search.

[13] 13 C.F.R. § 121.201, NAICS code 517210.

[14] 13 C.F.R. § 121.201, NAICS code 517210. The now-superseded, pre-2007 C.F.R. citations were 13 C.F.R. § 121.201, NAICS codes 517211 and 517212 (referring to the 2002 NAICS).

[15] U.S. Census Bureau, Subject Series: Information, Table 5, "Establishment and Firm Size: Employment Size of Firms for the United States: 2007 NAICS Code 517210" (issued Nov. 2010).

[16] Id. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "100 employees or more."

[17] See http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_51SSSZ2&prodType=table.

[18] See 13 C.F.R. § 121.201, NAICS code 517110

communications equipment, and radio and television studio and broadcasting equipment."[19] The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees. According to Census Bureau data for 2007, there were a total of 939 establishments in this category that operated for part or all of the entire year. According to Census bureau data for 2007, there were a total of 939 firms in this category that operated for the entire year. Of this total, 912 had less than 500 employees and 17 had more than 1,000 employees.[20] Thus, under that size standard, the majority of firms can be considered small.

9. Audio and Video Equipment Manufacturing. The SBA has classified the manufacturing of audio and video equipment under in NAICS Codes classification scheme as an industry in which a manufacturer is small if it has less than 750 employees.[21] Data contained in the 2007 U.S. Census indicate that 491 establishments operated in that industry for all or part of that year. In that year, 456 establishments had 99 employees or less; and 35 had more than 100 employees.[22] Thus, under the applicable size standard, a majority of manufacturers of audio and video equipment may be considered small.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

10. The Order on Reconsideration imposes certain changes in projected reporting, record keeping, and other compliance requirements. These changes affect small and large companies equally. With respect to coordination requirements in circumstances where WCS licensees are within certain distances from aeronautical mobile telemetry (AMT) and the Deep Space Network (DSN) operations in Goldstone, CA, the Order on Reconsideration clarifies that WCS licensees are required to coordinate WCS base and fixed stations (except fixed WCS CPE) with AMT and DSN entities. WCS, AMT, and DSN entities are required to cooperate in good faith in order to minimize the likelihood of harmful interference, make the most effective use of facilities, as well as to resolve actual instances of harmful interference. Coordinating parties are also required to share accurate and relevant information in a timely and efficient manner. Parties unable to reach a mutually acceptable coordination agreement may approach the Wireless Telecommunications Bureau, which, in cooperation with the Office of Engineering and Technology and the National Telecommunications and Information Administration (NTIA), may impose restrictions on operating parameters such as the transmitter power, antenna height, or area or hours of operation of the stations. Deadlines may also be imposed if it appears that parties are unable to reach a mutually acceptable arrangement within a reasonable time period.

11. In the 2010 WCS R&O, the Commission also required WCS and SDARS licensees to share certain technical information at least 10 business days before operating a new base station or repeater, and at least five business days before modifying an existing facility. The Order on Reconsideration excludes WCS stations operating under 2 Watts equivalent isotropically radiated power

[19] The NAICS Code for this service 334220. *See* 13 C.F.R 121/201. *See also* http://factfinder.census.gov/servlet/IBQTable?_bm=y&-fds_name=EC0700A1&-geo_id=&-_skip=300&-ds_name=EC0731SG2&-_lang=en.

[20] See http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SA11&prodType=table.

[21] See 13 CFR § 121.201, NAICS Code 334310.

[22] See http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31I1&prodType=table.

(EIRP) from the inventory and notification requirements. It also requires WCS licensees to notify SDARS licensees within 24 hours of station modifications that would not increase the predicted ground level power flux density by more than 1 dB. To avoid multiple modifications to WCS stations that could result in a predicted aggregate PFD increase that may negatively affect SDARS receivers, although WCS licensees may make 24-hour post-modification notifications as long as the predicted PFD increase at ground level is not greater than 1 dB, if an SDARS licensee demonstrates to the WCS licensee that the series of modifications using post-modification notification procedures may cause harmful interference to SDARS receivers, the WCS licensee must provide the SDARS licensee with 5 days notice in advance of additional modifications to WCS base and fixed stations. However, the 1 dB limit will not apply where a coordination agreement between the parties specifies otherwise. The Order on Reconsideration also clarifies that the WCS licensee inventory and SDARS licensee notification requirements apply to both WCS base and fixed stations (except fixed WCS CPE).

12. The 2010 WCS R&O requires that WCS licensees demonstrate compliance with any revised performance requirements by filing a construction notification within 15 days of the relevant benchmark and certifying that they have met the applicable performance requirements. The 2010 WCS R&O requires that each construction notification should 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. Further, the electronic coverage maps must clearly and accurately depict the boundaries of each license area (Regional Economic Area Grouping, REAG, or Major Economic Area, MEA) in the licensee's service territory, with REAG maps depicting MEA boundaries, and MEA maps depicting Economic Area boundaries. The 2010 WCS R&O provides that if the licensee's signal does not provide service to the entire license area, the map must clearly and accurately depict the boundaries of the area or areas within each license area not being served. These procedures direct each licensee to file supporting documentation certifying the type of service it is providing for each REAG or MEA within its license service territory and the type of technology it is utilizing to provide such service. Further, the compliance procedures require the supporting documentation to provide the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide service with the licensee's technology. The Order on Reconsideration did not modify any of these requirements.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

13. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives: 1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; 2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; 3) the use of performance, rather than design standards; and 4) an exemption from coverage of the rule, or any part thereof, for small entities.[23]

14. The Commission's principal objective in this proceeding is to enable the provision of promising mobile broadband services to the public in the WCS spectrum to the maximum extent practicable, while ensuring that satellite radio operations are not unreasonably impacted by the Commission's actions. Adopting overly stringent technical rules for WCS to protect SDARS operations from interference will preclude WCS mobile operation, while liberalizing the WCS rules too much will result in harmful interference and disruption to SDARS service. Such results would cause significant adverse economic impact on either WCS licensees, which include small entities, or on SDARS

[23] See 5 U.S.C. § 603(c).

operations.[24] Accordingly, the Commission has considered various alternatives, as described below, in order to best provide WCS licensees, including small-entity WCS licensees, with the flexibility to provide mobile service, while also protecting against disruptions to SDARS operations due to harmful interference.

15. The Order on Reconsideration adopted a package of compromise proposals from WCS licensee AT&T Inc. and SDARS operator Sirius XM Radio Inc. that were designed to facilitate the efficient deployment and coexistence of the WCS and SDARS and protect adjacent SDARS operator Sirius XM Radio Inc. and AMT users, and nearby DSN operations, from harmful interference.

16. WCS Mobile and Portable (Handheld) Device Power Spectral Density (PSD) Limits. The Order on Reconsideration eliminates the 50 millliwatt per megahertz PSD limit for WCS mobile and portable devices that operate with bandwidths greater than or equal to 5 megahertz and using appropriate uplink (user device to base station) transmission technologies. Because the uplink (user device to base station) transmission technologies being considered for mobile broadband service in the WCS spectrum spread the signal power across the available bandwidth, eliminating the PSD limit for these devices will not increase the potential for harmful interference to SDARS receivers. In addition, without a PSD limit for WCS mobile devices, WCS licensees will not be forced to increase the number of cell sites (*i.e.*, base stations installed) to ensure adequate service, which would make it economically unfeasible to deploy a WCS mobile network.

17. WCS Performance Requirements. Further, in the 2010 WCS R&O, the Commission adopted revised performance requirements for WCS. The Commission adopted enhanced construction rules that replaced the substantial service requirement previously placed on WCS licensees with specific population-based benchmarks. In recognition of difficulties that may arise in license areas where WCS licensees must coordinate their facilities with AMT receive sites, the 2010 WCS R&O reduced the level of construction required in such markets. The Commission sought to establish a buildout requirement that is reasonable and achievable for WCS licensees, including small entities, but which encourages rapid and meaningful deployment of mobile broadband services. The Commission considered alternative performance benchmarks, including requirements using shorter timeframes, and lower percentages of required construction. However, the Commission concluded that other alternatives would not strike the appropriate balance. Further, with respect to the performance rules, all WCS entities are required to file construction notifications to inform the Commission that they have successfully met the performance requirements described above. The Order on Reconsideration extended the time period within which licensees must meet the WCS interim and final performance requirements to 48- and 72-months, respectively. Further, because certain technical specifications established in the 2010 WCS R&O may have inadvertently hindered the ability of licensees to deploy mobile broadband services, the Order on Reconsideration restarted the construction periods to provide WCS licensees with the full 48- and 78-month construction timeframes to enable licensees to respond to the revisions the Commission made to the 2.3 GHz WCS rules.

Report to Congress: The Commission will send a copy of the Order on Reconsideration, including this Supplemental FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.[25] In addition, the Commission will send a copy of the Order on Reconsideration, including this Supplemental FRFA, to the Chief Counsel for Advocacy of the SBA. A summary of the Order on Reconsideration and Supplemental FRFA will also be published in the Federal Register.

[24] There are no satellite radio licensees that are considered small entities for the purposes of the RFA.

[25] See 5 U.S.C. § 801(a)(1)(A).

Appendix C

Supplemental Final Regulatory Flexibility Certification

Order on Reconsideration in IB Docket No. 95-91

1. The Regulatory Flexibility Act of 1980, as amended (RFA)[1] requires that a regulatory flexibility analysis be prepared for rulemaking proceedings, unless the agency certifies that "the rule will not have a significant economic impact on a substantial number of small entities."[2] The RFA generally defines "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[3] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[4] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[5]

2. The rules adopted in this Order on Reconsideration affect providers of Satellite Digital Audio Radio Service (SDARS). With respect to providers of SDARS, *i.e.* providers of a nationally distributed subscription radio service, no small entities are affected by the rules adopted in this Order on Reconsideration. SDARS is a satellite service. The SBA has established a size standard for "Satellite Telecommunications," which is that any large satellite services provider must have an annual revenue of $15.0 million.[6] Currently, only a single operator, Sirius XM Radio Inc. ("Sirius XM"), holds licenses to provide SDARS, which requires a great investment of capital for operation. Sirius XM has annual revenues in excess of $15.0 million.[7] Because SDARS requires significant capital, we believe it is unlikely that a small entity as defined by the Small Business Administration would have the financial wherewithal to become an SDARS licensee.

Therefore, since only one large entity is affected by the rules adopted in this Order on Reconsideration, we certify that the requirements of the Order on Reconsideration will not have a significant economic impact on a substantial number of small entities. The Commission will send a copy of the Order on Reconsideration, including a copy of this final certification, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, see 5 U.S.C. § 801(a)(1)(A). In addition, the Order on Reconsideration and this certification will be sent to the Chief Counsel for Advocacy of the Small Business Administration, and will be published in the Federal Register. See 5 U.S.C. § 605(b).

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[1] The RFA, 5 U.S.C. S 601 et seq., has been amended by the Contract With America Advancement Act of 1996, Public Law No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[2] 5 U.S.C. 605(b).

[3] 5 U.S.C. 601(6).

[4] 5 U.S.C. 601(3) (incorporating by reference the definition of "small business concern" in Small Business Act, 15 U.S.C. S 632). Pursuant to 5 U.S.C. 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[5] Small Business Act, 15 U.S.C. S 632.

[6] See 13 CFR 121.201, NAICS code 517410.

[7] Sirius XM reported total annual revenue over $3.01 billion in 2011. See Sirius XM Radio Inc., SEC Form 10-K at F-4 (filed Feb. 9, 2012).

STATEMENT OF
CHAIRMAN JULIUS GENACHOWSKI

Re: *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, *Order on Reconsideration, WT Docket No. 07-293 and IB Docket No. 95-91*

Over the past four years, the U.S. has regained global leadership in mobile innovation – setting the pace in key areas like the apps economy, mobile operating systems, and the rollout of 4G LTE networks at scale. The U.S. has become the world's test bed for 4G LTE services and applications, which is vital for U.S. innovation leadership and for sustainable job creation.

To maintain our leadership and spur future innovation, we need to ensure the U.S. has a strategic bandwidth advantage – fast, high-capacity, and ubiquitous broadband. That requires maximizing the value of the airwaves, and ensuring that the spectrum crunch doesn't slow growth in the mobile economy.

With this order, we are freeing up 30 megahertz of WCS spectrum for broadband, which will help maintain our global leadership in 4G LTE and fuel U.S. competitiveness in the global bandwidth race.

Three important points about today's Order:

First, making this particular spectrum available for broadband will help sustain U.S. mobile leadership in part because the U.S. is leading the way in developing LTE standards for the WCS band. This is the spectrum at 2.3 Ghz.

Second, today's order frees up spectrum by removing regulatory barriers to flexible use of spectrum for broadband, an approach that can be as valuable as clearing and reallocating new bands of spectrum.

Removing regulatory barriers is just one of the approaches we are using as part of our comprehensive strategy to free up spectrum and increase the efficiency of spectrum use. The Commission is also reallocating underutilized spectrum, as with the historic incentive auction; moving forward with traditional auctions; working with our partner agencies to clear and reallocate government spectrum; enabling dynamic spectrum sharing; and facilitating secondary market transactions.

This comprehensive strategy is delivering on the National Broadband Plan's goal of freeing up 300 megahertz of spectrum for broadband by 2015 and 500 megahertz by 2020. Thanks in part to today's order, we are on track to exceed that goal.

Third, this order is a great example of Commission staff working with stakeholders to maximize the value of spectrum, by facilitating pragmatic solutions to spectrum challenges.

The WCS band is a long-troubled band that has evaded easy answers for 15 years. I am pleased that we are now solving it.

At the beginning of the year, we decided enough is enough. Commission staff engaged stakeholders and helped drive a resolution to thorny and long-standing interference issues, facilitating coexistence between their services and the availability of this spectrum for mobile broadband.

Thank you to the Commissioners for working together to free up spectrum, and to the Office of Engineering and Technology, the Wireless Bureau, and the International Bureau for your work on this item.

STATEMENT OF
COMMISSIONER ROBERT M. McDOWELL

Re: *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, *Order on Reconsideration, WT Docket No. 07-293 and IB Docket No. 95-91*

In the original *Star Trek* TV series, as they flew across the galaxy at warp speed, the crew of the starship *Enterprise* had to live under what the Federation called the "Prime Directive." In a nutshell, the directive prohibited the crew from interfering with the affairs of the planets they visited.

So now, back to Earth. The FCC's version of the "Prime Directive" is preventing harmful interference among wireless licensees. And that is precisely what our Order does today. In FCC parlance, we are modifying old rules and adopting some new ones to create an interference paradigm that balances the ability for Wireless Communications Service (WCS) licensees to deploy wireless broadband networks while protecting Satellite Digital Audio Radio Service (SDARS) systems, along with other adjacent bands, from harmful interference. Saying all of that while using the *Star Trek* universal translator, in English that means we are acting to ensure that consumers receive the reliable and high-quality wireless broadband communications services they demand and deserve.

As a consequence of resolving the long-standing interference issue, we are putting to use valuable slices of the airwaves which have been wasted for years. In short, today we finally provide the certainty communications companies sought to pave the way for new 4G wireless networks while avoiding interference with the terrestrial transmissions of satellite radio services.

Many of the rules adopted in this Order are based on a coordination agreement entered into by Sirius XM, the holder of SDARS spectrum, and AT&T.[1] The WCS licenses were awarded through an auction in 1997 and soon thereafter they faced interference conflicts with terrestrial SDARS repeaters. In the ensuing 15 years, the parties and the Commission have endured countless hours of negotiations, drafted and revised several formal proposals and multiple rounds of comments, and issued and reviewed a 2010 Order and petitions for reconsideration on how to resolve these interference issues. Our action today is built upon the foundation of a private sector solution and, as a result, should bring an end to fifteen years of discord that prevented putting the power of this spectrum into the hands of American consumers.

Most importantly, these rules will allow up to 30 megahertz of WCS spectrum to be deployed for wireless broadband, including on LTE networks, which were not heavily considered when formulating the 2010 rules. The use of certain frequencies within this band, however, is restricted in order to reduce the potential for harmful interference (*e.g.,* some blocks of spectrum will be used only for fixed wireless or mobile downlinks). The order, however, acknowledges that, in years to come, more flexibility may be possible as there are advances in SDARS receiver technology. We must continue to innovate on all fronts to ensure that spectrum is used as efficiently and effectively as possible.

[1] AT&T currently has a significant number of WCS licenses, but has filed a series of assignment applications which will result in AT&T holding the vast majority of these licenses. I hope that these applications will be processed as expeditiously as possible.

To ensure that this spectrum is rapidly deployed, we retain the stringent buildout requirements adopted in 2010, but with some modifications.[2] Failure to meet these benchmarks will likely result in the loss of the license. Although we restart and add six months to the construction period, this additional time will allow WCS licensees the flexibility to decide what technology to deploy based on what best suits their needs, as opposed to what can be constructed during a shortened buildout period. The prior construction benchmarks were based on a presumed schedule for WiMAX deployment. To allow licensees with the option to construct LTE networks, the modified buildout rules provide time to develop, manufacture and test LTE equipment tailored to the WCS band.

I would like to thank the Office of Engineering and Technology, the International Bureau and the Wireless Telecommunications Bureau for their dedication. I know this proceeding has not always been easy. Hopefully, you are in the final stretch. Thank you for all of your hard work on this order and over the years.

[2] Licensees will be required to cover 40 percent and 75 percent of the license area's population in 48 and 78 months, respectively. If point-to-point fixed operations are being offered, a licensee will have to provide 15 point-to-point links per million persons in a license area within 48 months, and 30 point-to-point links per million persons in a license area within 78 months.

STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN

Re: *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, *Order on Reconsideration, WT Docket No. 07-293 and IB Docket No. 95-91*

This agency's commitment to helping mobile wireless providers find solutions to the looming spectrum crunch is clear. Sometimes, this means embarking on unprecedented regulatory actions, as we did last month, to open a proceeding on the world's first ever reverse incentive auctions. Other times, it may mean taking new, creative approaches, such as changing our Part 101 rules, to enable more wireless backhaul services. Then there are times, when we must resolve technically difficult, contentious, disputes that have prevented the use of spectrum already allocated for wireless service.

This proceeding has been especially challenging for this Commission, because the technical rules requested by WCS licensees, were vigorously opposed by some members of the aviation industry, and satellite radio operators. In May of 2010, we thought we solved these problems. But, as the parties pointed out, there was more work to be done.

Fortunately, WCS licensees and satellite radio providers, found a way, to move from focusing on litigation, to working toward consensus. They reached agreement on technical service rules for the WCS spectrum that help to resolve potential interference concerns, and facilitate efficient deployment of their services.

Similarly, with regard to the other outstanding issues, our talented Commission staff was able to address those technical challenges, in a manner that accounts for the interests of all stakeholders, including members of the aviation industry. This Order finds solutions, to allow WCS licensees to provide fixed and flexible mobile broadband service. It adopts technical and operating rules, to enable LTE deployment, in 20 megahertz of WCS spectrum. In addition, it makes another 10 megahertz of spectrum available for fixed broadband with possible future downlink use of spectrum to serve mobile broadband devices. The Order also provides greater certainty to satellite radio providers by requiring WCS licensees to coordinate and resolve any interference issues.

I applaud the efforts of the staff of the International Bureau, Office of Engineering and Technology, and the Wireless Telecommunications Bureau, for approaching these tough issues, with an open mind, and working through each one, to arrive at a conclusion that best serves the American public. I appreciate Ron Repasi and Patrick Forster taking time to brief me on these issues. I also want to give special thanks to the Bureau Chiefs Julius Knapp, Mindel De La Torre, and Ruth Milkman, for their leadership and cooperation with industry, to solve these very complicated issues.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, *Order on Reconsideration, WT Docket No. 07-293 and IB Docket No. 95-91*

Today we move closer to achieving President Obama's goal of freeing 500 megahertz of spectrum for mobile broadband use. By modifying technical rules in the Wireless Communications Service (WCS) band, we free up to 30 megahertz of spectrum for mobile broadband—without causing interference to satellite radio or flight testing. This is good news. But it is part of a wireless tale a long time in the making. So as we look forward for opportunities to free additional spectrum for mobile broadband use, I think it is prudent to look back and examine the history of the WCS band. There are lessons to be learned.

The story starts in 1996, when Congress directed the Commission to make the 2.3 GHz band available for wireless services. The agency completed the auction of this spectrum the very next year. It raised more than $13.6 million in revenue. Though the WCS licenses were flexible, auction winners were required to provide substantial service within ten years regardless of what service they deployed.

At the same time, the Commission auctioned the adjacent spectrum to be used for satellite radio. While satellite radio became a successful business over the next decade, things did not go as well for the WCS licensees. They could not find a profitable service that did not interfere with their neighbors.

Nine years hence, the WCS spectrum was still mostly sitting fallow and the licensees asked the Commission to extend their build-out deadlines. Although the substantial service obligations were not met, the deadlines were extended. But just a handful of years later, in 2010, the Commission stepped in to update the technical rules and impose specific build-out requirements.

So for many years, we had a large swath of spectrum frozen and unused. But this year things began to thaw. The ice began to break with a number of secondary market applications for WCS licenses—deals reportedly worth hundreds of millions of dollars. With these applications, we received a proposal—the one that led to the Order we are adopting today—for new rules that the parties agree will finally put these airwaves to use. Now, as a result, we can see our way toward new mobile broadband services for consumers in the near term.

So what can we learn from this experience?

First, spectrum is only growing more valuable with time. That means priority on putting it to use, getting our build-out requirements right the first time, and holding licensees to the commitments they make.

There is a second lesson here, too. Secondary markets are a powerful way to address demand and improve the efficient use of spectrum. Although the applications for the WCS license transfers have not yet been resolved, we should keep in mind that secondary market negotiations have led to this innovative fix for a longstanding conflict.

Going forward, then, here is what we can take with us as we push toward President Obama's goal of freeing 500 megahertz for mobile broadband use. Strong build-out requirements combined with a vigorous secondary market can be a potent way to speed the delivery of new spectrum for wireless broadband services.

Thank you to the Chairman for bringing us this item today. Thank you also to the Office of Engineering and Technology, the Wireless Telecommunications Bureau, and the International Bureau for their years of work on the WCS band and their unwavering commitment to see this spectrum put to use.

STATEMENT OF
COMMISSIONER AJIT PAI

Re: *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, *Order on Reconsideration, WT Docket No. 07-293 and IB Docket No. 95-91*

In the wireless world, getting along with neighbors can take effort—sometimes, *a lot* of effort—but there are enormous benefits to forging a successful relationship with the licensees next door.

This is especially true in the 21st century mobile economy. Demand for mobile broadband is skyrocketing. Wireless service providers are strapped for spectrum. And more neighbors are crowding into less-than-ideal spectrum saddled with legacy band plans. All of this is leading to challenges, not the least of which is interference. Technological advances can help resolve these concerns, but good old-fashioned negotiation and cooperation is also vital. Although federal regulations serve as an important backstop for mitigating interference, we can and should encourage voluntary resolution of concerns about interference and make sure our regulations do not inadvertently impede licensees from making the best use of spectrum.

Such is the case with the Wireless Communications Service (WCS) spectrum. This spectrum has been woefully underused since 1997 mainly because operating a terrestrial network in this band could disrupt reception to satellite radio customers in neighboring bands. Even two years after we amended our regulations in an attempt to facilitate mobile broadband service in the WCS spectrum, it largely has remained fallow. This is why I proposed in July that the Commission act on pending petitions for reconsideration in order to get this spectrum fully integrated into the commercial marketplace.

What has broken the logjam at long last is a private, mutually beneficial agreement reached this summer between the largest WCS licensee, AT&T, and the SDARS licensee, SiriusXM. Today's order generally memorializes that agreement in Part 27 of the Commission's rules, enabling WCS licensees to put to use 20 MHz for nationwide 4G LTE deployment and an additional 10 MHz for fixed wireless broadband, with the potential to use this spectrum for mobile downlink in the future. These regulatory modifications also will protect adjacent satellite radio services, aeronautical mobile telemetry, and deep space network services from harmful interference. Put simply, today's order is a win for consumers, a pathway for future wireless innovation, and an invaluable step toward meeting the Commission's spectrum goals.

Of course, there is no rest for the weary; several secondary market transactions involving WCS spectrum remain pending. Now we have to take action on these applications so that we can realize the full promise of the WCS band. I hope we can resolve these matters by Thanksgiving so that this spectrum can begin serving the needs of our mobile economy as soon as possible.

I would like to thank our expert staff for helping to shepherd this agreement and implementing all of the technical details. In particular, I would like to commend Julie Knapp, Ron Repasi, and Patrick Forster of the Office of Engineering Technology; Mindel de la Torre, Gardner Foster, Robert Nelson, and Stephen Duall of the International Bureau; and Ruth Milkman, John Leibovitz, and Linda Chang of the Wireless Telecommunications Bureau. Your hard work and perseverance on this important item is much appreciated.