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

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AUG 19 2011
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In the Matter of	)	
	)	
Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees	)	WT Docket No. 10-153
	)	
Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications	)	RM-11602
	)	

REPORT AND ORDER, FURTHER NOTICE OF PROPOSED RULEMAKING, AND MEMORANDUM OPINION AND ORDER

Adopted: August 9, 2011 **Released: August 9, 2011**

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

Comment Date: **October 4, 2011**
Reply Comment Date: **October 25, 2011**

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I. INTRODUCTION

1. Broadband is indispensable to our digital economy, and wireless technology is an increasingly important source of broadband connectivity. A leading example of the role of wireless technology in connecting the nation to broadband is the impact and potential of point-to-point microwave systems. An essential component of many broadband networks – particularly in mobile wireless networks – microwave backhaul facilities are often used to transmit data between cell sites, or between

cell sites and network backbones. Service providers' use of microwave links as a cost-effective alternative to traditional copper circuits and fiber optic links has been increasing.[1] In certain rural and remote locations, microwave is the only practical high-capacity backhaul solution available.

2. A robust broadband ecosystem therefore relies, at least in part, on access to adequate and cost-efficient backhaul. In this *Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order*, we continue our efforts to increase flexibility in the use of microwave services licensed under our Part 101 rules. The steps we take will remove regulatory barriers that today limit the use of spectrum for wireless backhaul and other point-to-point and point-to-multipoint communications. We also make additional spectrum available for wireless backhaul – as much as 650 megahertz – especially in rural areas, where wireless backhaul is the only practical middle mile solution. By enabling more flexible and cost-effective microwave services, the Commission can help accelerate deployment of fourth-generation (4G) mobile broadband infrastructure across America.

II. EXECUTIVE SUMMARY

3. In this *Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order*, we remove regulatory barriers to make additional spectrum available for Fixed Service (FS) use and provide additional flexibility to enable FS licensees to reduce operational costs, increase reliability, and facilitate the use of wireless backhaul in rural areas. We also seek comment on additional ways to increase the flexibility, capacity, and cost-effectiveness of the microwave bands, while protecting incumbent licensees in these bands. Specifically, we take the following actions:

Report and Order:

- *Permits FS Operations in Certain BAS and CARS Frequencies*: We allow FS operators to share the 6875-7125 MHz and 12700-13100 MHz bands currently used for Fixed and Mobile Broadcast Auxiliary Service (BAS) and Cable TV Relay Service (CARS). We eliminate regulatory impediments to permit FS operations in rural areas where the band is not currently licensed to TV mobile pickup stations used in newsgathering operations and adopt rules to protect BAS and CARS operations.

- *Eliminates Final Link Rule:* We grant broadcasters greater access to microwave spectrum by eliminating the "final link" rule that prohibits broadcasters from using FS stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.

- *Permits Adaptive Modulation:* The Part 101 rules contain a minimum payload capacity rule, 47 CFR § 101.141(a)(3), intended to ensure that FS links are operated efficiently. We permit temporary operations below the minimum capacity under certain circumstances, which will enable FS links to maintain critical communications during periods of fading.

- *Declines to Permit "Auxiliary" Fixed Stations*: We decline to permit FS licensees to coordinate and deploy "auxiliary" links, which would effectively allow point-to-multipoint operations under the point-to-point rules.

[1] In 2005, 8.7 percent of backhaul traffic was sent by fixed wireless. *See 14th CMRS Competition Report* at 160 ¶ 294. By 2009, that figure increased to 12.3 percent. *Id.*

Further Notice of Proposed Rulemaking:

- *Allowing Smaller Antennas in Certain Part 101 Antenna Standards:* The Part 101 rules establish directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators. Based on the record received in response to the *NOI*, the *FNPRM* seeks comment on whether we may liberalize our rules to allow smaller antennas in the 6, 18, and 23 GHz bands without materially increasing interference.

- *Exempting Licensees in Non-Congested Areas from Efficiency Standards:* Currently, FS links are subject to the same capacity requirements whether they are in rural or more densely populated urban areas. Lower traffic volumes on rural networks and greater distances between microwave links often make meeting these minimum capacity requirements much more costly in rural areas. Based on engineering analysis showing that allowing lower efficiency standards in rural areas could allow operators to substantially increase link length, the *FNPRM* proposes to exempt licensees in non-congested areas from the efficiency standards and to allow licensees in other areas to seek relief from the standards upon making a special showing.

- *Allowing Wider Channels in 6 and 11 GHz Bands:* The *FNPRM* seeks comment on allowing microwave operators to create higher capacity links by licensing 60 and 80 megahertz channels in the 6 and 11 GHz microwave bands, respectively.

- *Revising Waiver Standard for Microwave Stations Near the Geostationary Arc:* To prevent interference to geostationary satellites, the Commission's Rules require microwave stations that point near the geostationary arc to obtain a waiver. We propose to revise the rule to limit the circumstances where a waiver is necessary by conforming our rule to International Telecommunications Union (ITU) regulations.

- *Updating Definition of Payload Capacity:* We propose to modify the definition of payload capacity in our Part 101 rules to account for Internet protocol radio systems.

Memorandum Opinion and Order:

- We address various proposals offered in response to the *NOI* that either lack specificity, are outside the scope of this proceeding, or are not yet ripe for consideration.

III. BACKGROUND

4. The Commission has licensed spectrum for microwave uses for most of its history.[2] In 1996, the Commission consolidated its rules for most microwave point-to-point and point-to-multipoint services into a new Part 101 of the Commission's Rules.[3] Two specialized microwave services in particular – the Broadcast Auxiliary Service (BAS) and the Cable TV Relay Service (CARS) – have not

[2] For an extensive discussion of issues the Commission faced in allotting microwave spectrum, see Allocation of Frequencies in the Bands Above 890 Mc., Docket No. 11866, *Report and Order*, 27 FCC 359 (1959).

[3] Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, WT Docket No. 94-148, *Report and Order*, 11 FCC Rcd 13449 (1996).

been consolidated into Part 101. Part 101 includes the point-to-point Private Operational Fixed Service (POFS)[4] and the Common Carrier Operational Fixed Service.[5] The Commission's licensing regime for these two services requires frequency coordination and the filing of an application for each microwave link or path containing detailed information concerning the proposed operation.[6]

5. In order to complete frequency coordination, an applicant must give prior notice to nearby licensees and other applicants for licenses of the proposed applicant's operations, make reasonable efforts to avoid interference and resolve conflicts, and certify to the Commission that the proposed operation has been coordinated.[7] Once the applicant has completed frequency coordination, the applicant must file an application for authorization with the Commission, specifying the latitude and longitude of the transmitter to be used to an accuracy of one second.[8] The applicant must coordinate each operation[9] and modify the license and coordinate any change in the location of the transmitter of more than five seconds in latitude or longitude or both.[10] Thus, if the applicant adds additional transmitters, the Commission's current rules require additional coordination and modification of the license.[11]

6. In general, spectrum below 13 GHz is preferred for long-link backhaul because signals can overcome the rain fading effects that limit transmission distances at higher frequencies. Over time, a considerable amount of spectrum in this range that had been allotted for microwave use has been reallotted for mobile wireless services.[12] Microwave operations have an extensive history of sharing spectrum with other services.[13]

7. On August 5, 2010, the Commission commenced this proceeding "to remove regulatory barriers to the use of spectrum for wireless backhaul and other point-to-point and point-to-multipoint communications."[14] In the *NPRM*, the Commission sought comment on allowing FS to share the 6875-

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[4] *See* Part 101, Subpart H.

[5] *See* Part 101, Subpart I. Part 101 also includes services licensed on a geographic area basis that allow both point-to-point and point-to-multipoint operations. *See* Part 101, Subparts G (24 GHz Service and Digital Electronic Messaging Service); L (Local Multipoint Distribution Service), and M (38.6-40.0 GHz Band). Part 101 also includes the Local Television Transmission Service (Part 101, Subpart J), the Multiple Address Service (Part 101, Subpart O), the Multichannel Video Distribution and Data Service (Part 101, Subpart P), and service rules for the 70/80/90 GHz Bands (Part 101, Subpart Q).

[6] *See* 47 C.F.R. §§ 101.21(f), 101.103.

[7] *See* 47 C.F.R. § 101.21(f).

[8] 47 C.F.R. § 101.103(d)(2)(ii).

[9] *Id.*

[10] 47 C.F.R. § 1.929(d)(1)(i).

[11] 47 C.F.R. §§ 1.929(d)(1)(i), 1.947(a).

[12] *See* 47 C.F.R. §§ 101.69-101.83, 101.85-101.97. Bands formerly used by microwave include the 1850-1990 MHz, 2110-2150 MHz, and 2160-2200 MHz bands.

[13] A chart showing FS bands and the services that share spectrum with FS is in the *NPRM*, 25 FCC Rcd at 11253.

[14] Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees, *et al.*, WT Docket No. 10-153, *et al.*, *Notice of Proposed Rulemaking and Notice of Inquiry*, 25 FCC Rcd 11246, 11247 ¶ 1 (2010) (*Wireless Backhaul NPRM/NOI*). When referring specifically to the *Notice of Proposed* (continued....)

7125 MHz and 12700-13200 MHz bands currently used by BAS and CARS.[15] The Commission also proposed to eliminate the "final link" rule that prohibits broadcasters from using FS stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.[16] The Commission further proposed to modify the Part 101 minimum payload capacity rule to allow temporary operations below the minimum capacity under certain circumstances, which would enable FS links – particularly long links in rural areas – to maintain critical communications during periods of fading.[17] In the final portion of the *NPRM*, the Commission sought comment on permitting FS licensees to coordinate and deploy multiple links – a primary link and "auxiliary" links.[18] In the *NOI*, the Commission asked about relaxing efficiency standards in rural areas,[19] permitting FS licensees to use smaller antennas,[20] and other possible modifications to the Part 101 rules, or other policies or regulations, to promote flexible, efficient and cost-effective provisions of wireless backhaul service.[21]

8. Comments on the *Wireless Backhaul NPRM/NOI* were due October 25, 2010, and reply comments were due November 22, 2010.[22] In addition, on June 7, 2011, the Wireless Telecommunications Bureau issued a Public Notice that provided additional analysis of the existing BAS and CARS operations in the 7 and 13 GHz bands and requested supplemental comment on issues relating to FS sharing in the 6875-7125 MHz and 12700-13200 MHz bands.[23] Supplemental comments were due on June 27, 2011.[24]

IV. REPORT AND ORDER

A. Making 6875-7125 MHz and 12700-13150 MHz Available for Part 101 FS Operations

9. In this Section, we permit Fixed Service (FS) operators to share the 6875-7125 MHz and 12700-13150 MHz bands currently used for Fixed and Mobile Broadcast Auxiliary Service (BAS) and Cable TV Relay Service (CARS) and adopt rules to protect BAS and CARS operations. This action will make 650 megahertz of additional backhaul spectrum available in rural areas where the band is not

(Continued from previous page)
Rulemaking portion of the document, we will refer to the *NPRM*. When referring specifically to the *Notice of Inquiry* portion of the document, we will refer to the *NOI*.

[15] *NPRM*, 25 FCC Rcd at 11251-11256 ¶¶ 11-20.

[16] *NPRM*, 25 FCC Rcd at 11256-11258 ¶¶ 21-27.

[17] *NPRM*, 25 FCC Rcd at 11260-11261 ¶¶ 36-40.

[18] *NPRM*, 25 FCC Rcd at 11265-11269 ¶¶ 50-58.

[19] *NOI*, 25 FCC Rcd at 11269-11270 ¶¶ 60-63.

[20] *NOI*, 25 FCC Rcd at 11270-11272 ¶¶ 64-67.

[21] *NOI*, 25 FCC Rcd at 11272-11273 ¶ 68.

[22] *See* Use of Microwave for Wireless Backhaul; Provision for Additional Flexibility To Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; *Proposed Rule*, 75 FR 52185 (Aug. 24, 2010). A list of commenters is attached as Attachment E.

[23] Wireless Backhaul - Further Inquiry into Fixed Service Sharing of the 6875-7125 MHz and 12700-13200 MHz Bands, WT Docket No. 10-153, *Public Notice*, 26 FCC Rcd 7953 (WTB 2011) (*7 and 13 GHz Comment Public Notice*).

[24] A list of the supplemental comments is included in Attachment E.

currently licensed to TV mobile pickup stations used in newsgathering operations.

1. Background

10. BAS stations, which are licensed under Part 74 of the Commission's rules,[25] make it possible for television and radio stations and networks to transmit program material from the sites of breaking news stories or other live events to television studios for inclusion in broadcast programs, to transmit programming material from studios to broadcasting transmitters for delivery to consumers' televisions and radios, and to transmit programs between broadcast stations.[26] CARS stations, licensed under Part 78 of the Commission's Rules, enable cable operators to distribute programming to microwave hubs where it is impossible or too expensive to run cables and to cover live events.[27]

11. In the bands shared with Part 101 fixed services,[28] licensees of fixed BAS and CARS stations are required to engage in the same frequency coordination process required of Part 101 services.[29] That includes the filing of an application for each microwave link or path containing detailed information concerning the proposed operation.[30] Additionally, in several bands, Part 101 licensees share spectrum with the Fixed Satellite Service (FSS) licensed under Part 25 of the Commission's Rules.[31] Both FSS and Part 101 licensees use frequency coordination to prevent interference.[32] By contrast, BAS and CARS mobile and temporary fixed facilities may coordinate using less formal procedures, including using local frequency coordination committees.[33] The Society of Broadcast Engineers (SBE) runs a local frequency coordination program for BAS and CARS spectrum.[34] Some Part 101 frequencies are shared by federal and non-federal users, and use of those frequencies must be coordinated with the National Telecommunications and Information Administration.[35]

12. In the *NPRM*, the Commission proposed to allow FS operations to share spectrum in two bands that are currently assigned to BAS and CARS, 6875-7125 MHz (the 7 GHz Band) and 12700-

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[25] 47 C.F.R. § 74.631(a). *See* Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules, ET Docket No. 01-75, *Notice of Proposed Rulemaking*, 16 FCC Rcd 10556, 10557 ¶ 1 (2001).

[26] *Id.*

[27] 47 C.F.R. § 78.11. *See* Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules, ET Docket No. 01-75, *Report and Order*, 17 FCC Rcd 22979, 22980 n.1 (2002) (*BAS Service Rules Update R&O*).

[28] A chart showing the various FS bands and services that share spectrum with FS is in the *NPRM*, 25 FCC Rcd at 11253.

[29] *See* 47 C.F.R. §§ 74.638, 78.36.

[30] *See supra* ¶¶ 4-5. *See also* 47 C.F.R. §§ 74.638, 78.36, 101.21(e), (f), 101.103.

[31] *See* 47 C.F.R. § 101.101.

[32] *See* 47 C.F.R. §§ 25.203(c), 101.103.

[33] *See* 47 C.F.R. § 74.638(d), 78.36(d).

[34] Comments of The Society of Broadcast Engineers, Incorporated (filed Oct. 25, 2010) (SBE Comments) at 4.

[35] *See* 47 C.F.R. § 2.106 (United States Table of Frequency Allocations).

13200 MHz (the 13 GHz Band).[36] It proposed to permit FS operations in the 7 GHz Band because it is adjacent to existing FS operations in the 6525-6875 MHz band (Upper 6 GHz Band) and is otherwise well suited for backhaul and other microwave applications.[37] In particular, the Commission sought comment on sharing between fixed mobile operations and fixed operations in the 7 GHz Band, where frequency coordination has not been as formal as it is in the Upper 6 GHz band,[38] and whether it should require BAS licensees to identify in the Universal Licensing System (ULS) the receive sites associated with their TV pickup stations, a process that is currently voluntary.[39] The Commission also proposed to introduce FS systems into the 12700-13200 MHz band (13 GHz Band) because these frequencies are well suited for short- to medium- length backhaul microwave applications.[40] Our records appeared to indicate that the 13 GHz Band was used primarily by cable systems to deliver both video and broadband services,[41] but that the band seemed to be used mostly by less urban and smaller cable systems.[42] Though records indicated that the band is not used as extensively as it was previously, the Commission acknowledged that it is still critical to those systems that employ it.[43] The Commission sought comment on whether introduction of FS operations into this band, with the additional latitude proposed in this proceeding, would have an adverse impact on existing or future cable system operations.[44]

13. In the *NPRM*, the Commission emphasized that it was not proposing to modify existing licenses and that any new licenses in the band would need to be frequency-coordinated with existing licensees.[45] The Commission expressed optimism that these uses could be made compatible with FS operations if frequency coordination were carefully implemented.[46] To the extent that any commenters might believe that relying on our existing frequency coordination processes would not adequately address all necessary requirements, the Commission asked that they propose modifications to that process or alternative processes.[47]

14. In the *NPRM*, the Commission also sought comment on the best approach to channelization for the various bands under consideration and noted that existing operations in the 7 and 13 GHz Bands use 25 megahertz bandwidth channels.[48] The Commission suggested that applying the rules currently applicable to the Upper 6 GHz Band to the 6875-7125 MHz band could facilitate

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[36] *NPRM*, 25 FCC Rcd at 11253-11254 ¶¶ 15-16.

[37] *NPRM*, 25 FCC Rcd at 11253-11254 ¶ 15.

[38] *NPRM*, 25 FCC Rcd at 11254 ¶ 15. *See* 47 C.F.R. § 74.638(d).

[39] *NPRM*, 25 FCC Rcd at 11254 ¶ 15. In this item, the term "TV pickup" shall refer collectively to BAS TV pickup stations as defined in 47 C.F.R. § 74.601(a), as well as CARS pickup station as defined in 47 C.F.R. § 78.5(d).

[40] *NPRM*, 25 FCC Rcd at 11254 ¶ 16. *See* 47 C.F.R. §101.147(a) n.22. The Commission also noted that, prior to 1988, the band was available to certain relocated FS systems. *NPRM*, 25 FCC Rcd at 11254 ¶ 16.

[41] *NPRM*, 25 FCC Rcd at 11254 ¶ 16. *See* 47 C.F.R. § 78.11 for permissible uses of CARS stations.

[42] Based on staff review of COALS Electronic Filing System data.

[43] *NPRM*, 25 FCC Rcd at 11254 ¶ 16.

[44] *NPRM*, 25 FCC Rcd at 11254 ¶ 16.

[45] *NPRM*, 25 FCC Rcd at 11254 ¶ 17.

[46] *NPRM*, 25 FCC Rcd at 11254 ¶ 17.

[47] *NPRM*, 25 FCC Rcd at 11254 ¶ 17.

[48] *NPRM*, 25 FCC Rcd at 11254 ¶ 18. *See* 47 C.F.R. §§ 74.602(a), 78.18(a)(7).

equipment development and provide consistency to FS licensees.[49] Specifically, the Commission proposed to apply : (1) a maximum frequency tolerance of 0.005 percent;[50] (2) a maximum transmitter power of +55 dBw;[51] (3) the antenna standards currently applicable to Upper 6 GHz Band stations authorized after June 1, 1997 to the 6875-7125 MHz band;[52] (4) the capacity and loading requirements contained in Section 101.141(a)(3) of the Commission's Rules to this band;[53] and (5) the 17 kilometer minimum path length requirement of Section 101.143 of the Commission's Rules.[54] The Commission proposed to retain the rules that are already applicable to the 13 GHz Band,[55] with one exception.[56] Given that there is no minimum payload capacity applicable to the 13 GHz band, the Commission proposed to apply the minimum payload capacity and loading requirements that currently apply to the 11 GHz band to the 13 GHz band.[57] It sought comment on these proposals and any possible alternatives to them.[58] It also sought comment on any special technical rules that might be necessary in that band.[59]

15. As noted, on June 7, 2011, the Wireless Telecommunications Bureau (Bureau) issued a Public Notice that provided additional analysis of the existing BAS and CARS operations in the 7 and 13 GHz bands and requested supplemental comment on issues relating to FS sharing in these bands.[60] The Bureau's analysis appeared to indicate that, even if FS operations were totally excluded from the service areas of TV pickup stations and CARS facilities, there would be considerable areas where FS facilities could be licensed.[61] Therefore, the Bureau sought comment on allowing FS stations in the 7 and 13 GHz bands while prohibiting FS stations from locating paths within the service area of a co-channel TV pickup station.[62] The Bureau also noted that the Commission could require FS operators to coordinate any new fixed links with TV pickup stations within the appropriate coordination zone of any new fixed link.[63] In addition, the Bureau asked whether the Commission should continue to reserve a portion of these bands

[49] *NPRM*, 25 FCC Rcd at 11254 ¶ 20.

[50] *See* 47 C.F.R. § 101.107(a).

[51] *See* 47 C.F.R. § 101.113(a).

[52] *See* 47 C.F.R. §101.115(b)(2).

[53] 47 C.F.R. § 101.141(a)(3).

[54] 47 C.F.R. § 101.143.

[55] We note that prior to September 9, 1988, the 12700 – 13200 MHz band was available to the POFS service to accommodate stations that were licensed in the 12200 – 12700 MHz band prior to September 9, 1983. Part 101 already contains technical rules with respect to the 12700 – 13200 MHz band, and we do not propose to alter those rules. We also note that private cable operators who use FS spectrum are also eligible to obtain CARS licenses in the 12700-13200 MHz band. *See* Amendment of Eligibility Requirements in Part 78 Regarding 12 GHz Cable Television Relay Service, CS Docket No. 99-250, *Report and Order*, 17 FCC Rcd 9930 (2002).

[56] *NPRM*, 25 FCC Rcd at 11255 ¶ 20.

[57] *NPRM*, 25 FCC Rcd at 11255-11256 ¶ 20.

[58] *NPRM*, 25 FCC Rcd at 11256 ¶ 20.

[59] *NPRM*, 25 FCC Rcd at 11256 ¶ 20.

[60] *7 and 13 GHz Comment Public Notice*.

[61] *7 and 13 GHz Comment Public Notice*, 26 FCC Rcd at 7955 ¶ 5.

[62] *7 and 13 GHz Comment Public Notice*, 26 FCC Rcd at 7955 ¶ 6.

[63] *7 and 13 GHz Comment Public Notice*, 26 FCC Rcd at 7955 ¶ 6.

exclusively for BAS and CARS operations, to enhance the ability of BAS and CARS to coexist with FS and facilitate nationwide use of BAS and CARS services.[64] The Bureau also sought further comment on channelization plans, coordination procedures, and capacity and loading requirements.[65]

2. Discussion

16. After a careful review of the comments, we conclude that it is feasible to authorize Part 101 fixed stations in 650 megahertz in the 7 and 13 GHz bands, so long as we ensure that these operations do not conflict with TV pickup stations that support important electronic newsgathering functions. As we explain in further detail below, we will therefore permit FS facilities only in areas where TV pickup operations are not licensed. As discussed below, our actions will permit additional FS stations in areas covering more than half of the nation's land mass, where they may be used to provide additional service to about 10 percent of the population.

17. BAS and CARS stations fall into one of two categories: those that remain in one place (fixed) and those that move among different locations (mobile or temporary fixed). Mobile BAS and CARS include television pickup stations, which are authorized to transmit program material, orders concerning such program material and related communications from the scenes of events that occur in places other than a television studio to associated television stations.[66] Under current rules, which were adopted in 2002, all FS and fixed BAS and CARS stations above 2110 MHz use the prior coordination notice procedure described in Section 101.103(d) of the Commission's Rules,[67] but mobile and temporary fixed BAS and CARS may use faster informal coordination procedures.[68] TV pickup stations in these bands are usually licensed either for a specified radius around a set of coordinates or for a television market.

18. The record indicates that it is not feasible to allow FS to share spectrum with mobile and temporary fixed TV pickup operations in areas where mobile and temporary fixed TV pickup operations are licensed. While BAS fixed and mobile operations share spectrum in the same geographic areas, the sharing that exists today would not be practicable if it were not guided by informal agreements among local market participants. Mobile TV pick-up operations share the 7 and 13 GHz bands with fixed BAS and CARS operations under rules that accord TV pick-up operations secondary status with respect to fixed BAS stations, including studio-to-transmitter (STL) and inter-city relay (ICR) stations.[69] If STL and ICR stations had proliferated without restraint, our rules would have allowed them to preempt all of the available spectrum and crowd out TV pickup operations. STL and ICR licensees are motivated to preserve spectrum availability for TV pickup operations because the same entities use both types of facilities.[70] The Engineers for Integrity of Broadcast Auxiliary Service Spectrum (EIBASS) says that broadcasters in some markets have reserved portions of the 7 GHz TV BAS band for TV pick-up

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[64] *7 and 13 GHz Comment Public Notice*, 26 FCC Rcd at 7955 ¶ 7.

[65] *7 and 13 GHz Comment Public Notice*, 26 FCC Rcd at 7956-7959 ¶¶ 10-17.

[66] *See* 47 C.F.R. § 74.631(a).

[67] *See* 47 C.F.R. §§ 74.638(b), 78.36(b), 101.103(d).

[68] *See* 47 C.F.R. §§ 74.638(d), 78.36(d).

[69] *See* 47 C.F.R. § 74.604(c).

[70] *See, e.g.*, Comments of the Engineers for Integrity of Broadcast Auxiliary Service Spectrum (filed Oct. 25, 2010) (EIBASS Comments) at 2-4.

operations on an informal basis, by mutual agreement.[71] In addition, EIBASS asserts that, in many markets, broadcasters have informally reserved the 13 GHz band for temporary reception sites for electronic news trucks receiving transmissions from nearby mobile cameras.[72] EIBASS says that this process of informal sub-channelization has worked well among broadcasters, and can continue to work well among broadcasters, because they have an incentive to participate in mutually agreed shared coordination.[73]

19. Part 101 FS operators do not have the same incentive to accommodate the needs of TV pick-up operations, however, as few of them are involved in video newsgathering or video coverage of other live events.[74] For that reason, if they were granted the same formal priority over TV pick-up operations that broadcasters' STL and ICR stations are entitled to claim under existing rules, FS operators could apply for spectrum that is presently used by TV pick-up operations – potentially precluding new TV pick-up operations and forcing existing operations to shut down.[75]

20. The National Spectrum Management Association (NSMA) points out that in bands that are already shared by BAS, CARS, and Part 101 licensees, the bands are generally used for either fixed or mobile operations, but not both. It acknowledges that the 6425-6525 MHz band is shared among BAS, CARS, and Part 101 licensees, for example, but observes that it is reserved for mobile and temporary fixed licensees.[76] Moreover, says NSMA, in the bands where there is sharing between BAS, CARS, and FS, local coordinators for all of these bands have a limited number of fixed links to consider and are able to manage channel use informally on short notice with a small community of users.[77] It says that allowing additional Part 101 licensees to seek licenses in the 7 and 13 GHz bands would add significant complexity to this type of time-sensitive coordination and would not provide adequate protection from interference for FS operators.[78] We therefore conclude that unconstrained band-sharing between TV pickup operations and Part 101 FS would not be practicable.

21. We also conclude that it is not feasible at this time to adopt a formal band segmentation plan to separate fixed and mobile operations into designated sub-bands of the 7 and 13 GHz bands, as requested by the Fixed Wireless Communications Coalition (FWCC) and Vislink, Inc.[79] The several bands allocated for BAS and CARS today support a mix of fixed, temporary fixed, and mobile services, including airborne mobile, and comments submitted in this proceeding confirm that BAS and CARS users coordinate these services on an individual market basis, without benefit of a formal nationwide plan, to assign the different types of service (fixed, mobile, airborne) to specific band segments.[80] A portion of

[71] EIBASS Comments at 2. EIBASS implies that Chicago, Houston, Los Angeles, New York City, Phoenix, San Francisco, and Washington, DC, are examples of such markets.

[72] EIBASS Comments at 3.

[73] EIBASS Comments at 3-4.

[74] *See* EIBASS Comments at 3-4.

[75] EIBASS Comments at 3-4, *citing* 47 C.F.R. § 74.604(c).

[76] Comments of the National Spectrum Management Association (filed Oct. 25, 2010) (NSMA Comments) at 4.

[77] NSMA Comments at 4.

[78] NSMA Comments at 4.

[79] FWCC Public Notice Comments at 3, Comments of Vislink Inc., DBA Microwave Radio Communications in response to Public Notice DA 11-1011 (filed Jun. 27, 2011) (Vislink Public Notice Comments) at 1.

[80] *See, e.g.*, NSMA Comments at 3-4.

the band used in one market for fixed operation may commonly be used for mobile operation in another. Thus, to avoid disrupting those arrangements, we would need to tailor any band segmentation approach that we adopted to the needs and conditions of individual markets. Since we could not adopt a uniform band plan throughout the nation and provide the same spectrum to FS throughout the nation, the value of such band segmentation would be quite limited.

22. For areas where TV pickup licenses are not authorized, however, we conclude that sharing between Part 101 FS and fixed BAS operations is feasible. WTB staff conducted additional analysis to determine whether it would be feasible for those services to share spectrum if they were separated geographically. The analysis appears to indicate that, even if FS operations were totally excluded from the service areas of TV pickup stations and CARS facilities, there would be considerable areas where FS facilities could be licensed – 54 percent of the land area in the 7 GHz band and 64 percent of the land area in the 13 GHz band – largely located in more rural areas, especially in the midwestern and western regions.[81] For each band, FS facilities could serve about 10 percent of the population.[82] Thus, opening the 7 and 13 GHz bands to FS operations could be of particular benefit in rural areas, where spectrum in the 7 and 13 GHz bands is largely vacant.

23. To avoid interference between FS operations and TV pickup operations, we prohibit FS paths from crossing the service areas of TV pickup authorizations and require FS to coordinate with all relevant licensees, including TV pickup authorizations, pursuant to the formal Part 101 coordination procedures. EIBASS, the National Association of Broadcasters (NAB), and the Wireless Internet Service Providers Association (WISPA) believe that such an arrangement would be workable.[83] We also note the presence of co-primary fixed satellite services (FSS) in these bands. FS applicants will be required to coordinate with and protect FSS licensees and applicants pursuant to the Part 101 rules.[84]

24. The FWCC and SBE remain concerned about potential interference issues, particularly given the ability of broadcasters to operate short-term without a license.[85] Under our rules, broadcasters can operate certain BAS facilities on a short-term basis without prior authorization for up to 720 hours a year subject to various limitations, including the fact that such short-term operation is secondary to regularly authorized facilities.[86] We believe that such operations can be accommodated by excluding FS from two 25-megahertz channels each in the 7 GHz band (6975-7025 MHz) and the 13 GHz band (13150-13200 MHz). Excluding FS from that spectrum nationwide will accommodate TV pickup stations covering events that occur outside the license areas of local BAS and CARS operations. For the 7 GHz Band, we choose to exclude the 6975-7025 MHz segment because excluding the middle of the

[81] *7 and 13 GHz Comment Public Notice*, Attachment A (7 GHz) and Attachment B (13 GHz).

[82] *Id.*

[83] *See* Comments of EIBASS (filed Jun. 27, 2011) (EIBASS Public Notice Comments), Comments of the National Association of Broadcasters (filed Jun. 27, 2011) (NAB Public Notice Comments), Comments of the Wireless Internet Services Providers Association (filed Jun. 27, 2011) (WISPA Public Notice Comments).

[84] *See* Comments of Sirius XM Radio, Inc. (filed Oct. 25, 2010) (Sirius XM Comments) at 2-3, Comments of Sirius XM Radio, Inc. (filed Jun. 27, 2010), Comments of the Satellite Industry Association (filed Jun. 27, 2011). *See also* 47 C.F.R. § 101.103(d).

[85] Comments of the Fixed Wireless Communications Coalition (filed Jun. 27, 2011) (FWCC Public Notice Comments) at 2-3, SBE Public Notice Comments at 4-5.

[86] *See* 47 C.F.R. § 74.24.

band will allow for greater separation between FS transmit and receive frequencies.[87] For the 13 GHz Band, we exclude 13150-13200 MHz because that spectrum is already reserved for television pickup operations in the top 100 markets.[88] Furthermore, since such short-term operation is by definition secondary to other operations, broadcasters operating pursuant to Section 74.24 have no right to claim interference protection from regularly authorized operations.[89]

25. EIBASS and NAB propose additional conditions that we do not believe are necessary or appropriate. EIBASS asks that the Commission impose a requirement that the newcomer POFS station cannot degrade the noise threshold of any existing ENG-RO site by more than 0.5 dB.[90] Although EIBASS's proposal may be an appropriate standard for evaluating a proposed FS facility,[91] we decline to adopt it as part of our rules. Generally, in lieu of mandating specific interference criteria in our rules, we expect applicants and licensees to work out interference issues in the frequency coordination process. In addition, NAB asks that the Commission impose secondary status on FS operations in the 7 and 13 GHz Bands with respect to both existing and future BAS operations.[92] We find that the rules we adopt fully protect existing BAS operations. With respect to future BAS operations, FS, BAS, and CARS will all be co-primary services required to protect pre-existing operations. We agree with NAB that there is an important public interest in broadcasters being able to report on breaking news events and emergency situations;[93] but we also find there to be important public interests in the support that FS provides to vital broadband, public safety, and critical infrastructure uses.

26. We also find that FS operations would be compatible with fixed BAS operations. In 2002, the Commission amended Parts 74 and 78 of its rules to harmonize many of the rules governing BAS and CARS with rules that already applied to FS licensees under Part 101, allowing the use of digital transmissions, and requiring all fixed station applicants, except for those proposing operations in the 1990-2110 MHz band, to provide affected licensees and contemporaneous applicants with 30-day prior notifications and an opportunity to participate in frequency coordination before filing their applications with the Commission.[94] It applied Part 101 frequency coordination procedures to fixed BAS and CARS, and it did so with wide support from the affected industries.[95] It rejected the request of one participant,

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[87] *See* FWCC Public Notice Comments at 5.

[88] *See* 47 C.F.R. § 74.602(a) n.2.

[89] *See* 47 C.F.R. § 74.24(c).

[90] EIBASS Public Notice Comments at 3.

[91] EIBASS correctly notes that the Commission used that standard in evaluating interference to BAS TV pickup facilities. *See* Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, *et al.*, ET Docket No. 00-258, *et al.*, *Seventh Report and Order*, 19 FCC Rcd 21350, 21364-21365 n.63 (2004).

[92] NAB and MSTV Comments at 7-8, NAB and MSTV Reply Comments at 6-8, NAB Public Notice Comments at 5.

[93] *See* NAB Public Notice Comments at 5.

[94] *BAS Service Rules Update R&O*, *supra*. The prior coordination procedures of Part 101 are now mirrored in Part 74 for BAS and Part 78 for CARS. *Compare* 47 C.F.R. §§ 101.103(d), 74.638 and 78.36.

[95] *BAS Service Rules Update R&O*, *supra*, at 17 FCC Rcd at 23001-23002 ¶ 55. MST, NAB, NSMA, PBS, the Association of Public Television Stations, and the Telecommunications Industry Association (TIA) supported the Commission's action.

SBE, that fixed BAS and CARS be allowed to continue relying upon informal coordination procedures.[96] The subsequent ongoing shift from analog to digital transmission has accelerated the erosion of technical distinctions between BAS, CARS, and Part 101 FS, and the use of consistent procedures for fixed stations in all of those services has played a vital role in the Commission's efforts to accommodate the increasing demand for closely-packed microwave links in urban areas.

27. We will allow mobile TV pickup licensees to continue to use informal coordination procedures within their service areas.[97] Given the urgency of electronic newsgathering operations and the long history of successful real-time frequency coordination provided by local coordinators, the Commission previously found that there was little potential that interference would result from its continued function without imposing the formality of Section 101.103(d) procedures.[98] In light of our decision not to allow FS within the service areas of mobile BAS/CARS stations, there is no reason to require those stations to use formal coordination procedures.

28. The rules we adopt today will open most of the 7 and 13 GHz bands to FS over more than half of the nation's land mass where 10 percent of the population lives, while applying geographic restrictions on FS in those bands to minimize the potential for interference between FS facilities and TV pickup stations. Specifically, as reflected in the rules in Appendix A, we will allow Part 101 FS stations to share the 7 and 13 GHz bands subject to the following conditions:

(1) We will not allow FS stations in the 7 and 13 GHz bands to locate their paths within the service areas of any previously licensed co-channel TV pickup stations.

(2) We will require FS operators to coordinate any new fixed links with TV pickup stations within the appropriate coordination zones of any new fixed links.

(3) As we require in other bands that fixed BAS and CARS share with Part 101 fixed services, we will require all fixed BAS, fixed CARS and Part 101 FS stations in the 7 and 13 GHz bands to engage in the same frequency coordination process that we require of all Part 101 services.[99]

(4) We will also reserve two 25-megahertz channels for BAS and CARS in the 7 GHz band (6975-7125 MHz) and two 25-megahertz channels in the 13 GHz band (13150-13200 MHz) nationwide to accommodate TV pickup stations covering events that occur outside the license areas of local BAS and CARS operations.[100]

29. Regarding the various alternative channelization plans proposed in the *NPRM* and the *7 and 13 GHz Public Notice*, we have decided to retain the 25 megahertz bandwidth that presently applies to the

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[96] *See BAS Service Rules Update R&O, supra*, 17 FCC Rcd at 23002 ¶ 56. We reject SBE's current attempt to relitigate that issue and allow fixed BAS to use informal coordination procedures. *See* SBE Comments at 10-14. We note that no other party supports SBE's position. *See, e.g.*, Reply Comments of the National Cable & Telecommunications Association (filed Nov. 22, 2010) at 2, Reply Comments of the National Spectrum Management Association (filed Nov. 22, 2010) (NSMA Reply Comments) at 15-16. Furthermore, informal coordination procedures work best when there are a relatively small number of parties that are familiar with each other, as is often true in bands licensed solely to broadcasters. In situations where there could be a large number of licensees with no affiliation, we continue to believe that the more formal Part 101 coordination procedures are appropriate.

[97] *BAS Service Rules Update R&O, supra*, 17 FCC Rcd at 23004 ¶ 62.

[98] *BAS Service Rules Update R&O, supra*, 17 FCC Rcd at 23004 ¶ 62.

[99] *See* 47 C.F.R. §§ 74.638, 78.36, 101.103(d). FS licensees will be required to coordinate with co-primary Fixed Satellite Service licensees operating in those bands.

[100] *See* 47 C.F.R. § 74.602(a) n.2.

7 and 13 GHz bands, as this channel-width best conforms to existing operations in the band. We recognize that FWCC recommends a mix of 10, 20, and 30 megahertz channels similar to those available in other FS bands and asserts that such alignment will result in more readily available equipment.[101] As FWCC and others have recognized, however, allowing 10 and 30 megahertz channels in a band with many pre-existing 25 megahertz channels would preclude operation on multiple 25 megahertz channels, resulting in wasted spectrum.[102] Many commenters recommend retaining a band plan based on the 25 megahertz channel bandwidth in order to prevent such wasted spectrum.[103] To provide for a mix of larger and smaller channel-widths, we adopt an alternative proposal suggested by FWCC[104] and permit FS to utilize 5, 8.33, and 12.5 megahertz channels.[105]

30. We also adopt WISPA's proposal to allow 50 megahertz channels in the 13 GHz Band.[106] Since the 50 megahertz channels will be created from two 25 megahertz channels, we do not see any inefficiency that would result from 50 megahertz channels. We do not authorize 50 megahertz channels in the 7 GHz Band because of the limited amount of spectrum available in that band. Finally, we agree with FWCC that, for FS operations, the specific channels for each bandwidth should be listed, consistent with our normal practice for FS operations.[107]

31. In addition, as proposed in the *NPRM,* we apply the existing FS minimum capacity and loading requirements to FS operators in the 6875-7125 and 12700-13200 bands.[108] We do not propose to apply those requirements to operations that are authorized under Parts 74 and 78, and we maintain the existing exemption from the capacity and loading requirements of Part 101 for transmitters carrying digital video motion material.[109] With respect to the remaining proposed technical rules for FS operation, we shall apply the same technical parameters that currently apply in the Upper 6 GHz band to the adjacent 6875-7125 MHz band, as proposed in the *NPRM*, because those bands are contiguous and should be able to use similar equipment. As noted above, we believe that applying the rules currently applicable in the Upper 6 GHz band to the 6875-7125 MHz band will facilitate equipment development and provide consistency to FS licensees. Specifically, we will apply: (1) a maximum frequency tolerance of 0.005

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[101] FWCC Public Notice Comments at 5.

[102] *See* FWCC Comments at 6, Comsearch Comments at 22.

[103] *See* EIBASS Public Notice Comments at 3-4, NAB Public Notice Comments at 3-4, WISPA Public Notice Comments at 4, Vislink Public Notice Comments at 2.

[104] FWCC Public Notice Comments at 6.

[105] The National Translator Association asks that the Commission incorporate into its rules its members' typical practice of operating television translator relay facilities with bandwidths of six, 12, and 18 megahertz. *See* Statement of the National Translator Association Regarding TV Translators using BAS Frequencies (filed Nov. 16, 2010). We decline to make this rule change because we are not modifying our rules to formally recognize operation at different bandwidths for other BAS licensees.

[106] WISPA Public Notice Comments at 4.

[107] *See* FWCC Public Notice Comments at 4.

[108] *NPRM*, 25 FCC Rcd at 11255-11256 ¶ 20.

[109] 47 C.F.R. § 101.141(a)(5) of the Commission's Rules exempts transmitters carrying digital video motion material from the capacity and loading requirements of 47 C.F.R. §§ 101.141(a)(2) and (3), provided that at least 50 percent of the payload is digital video motion material and the minimum bit rate specified in 47 C.F.R. § 101.141(a)(1) is met, i.e., that the bit rate, in bits per second, is equal to or greater than the bandwidth measured in Hertz.

percent;[110] (2) a maximum transmitter power of +55 dBw;[111] (3) the antenna standards currently applicable to Upper 6 GHz Band stations authorized after June 1, 1997, to the 6875-7125 MHz band;[112] (4) the capacity and loading requirements contained in Section 101.141(a)(3) of the Commission's Rules;[113] and (5) the 17 kilometer minimum path length requirement of Section 101.143.[114] We retain the rules that are already applicable to the 12700 - 13000 MHz band, with the exception of applying the minimum payload capacity and loading requirements that currently apply in the 11 GHz band to the 12700-13150 MHz band.[115] Finally, with the addition of Part 101 fixed services in the BAS bands, we believe it is necessary for our ULS database to include all fixed receive locations. We therefore will require BAS TV pickup licensees to record their stationary receive-only sites in ULS.[116]

32. Allowing FS to operate in the 7 and 13 GHz bands will not impair existing BAS and CARS operations because we are adopting rules designed to fully protect those operations. Moreover, we do not believe that allowing FS sharing in these bands will inhibit geographic expansion of BAS and CARS operations because, as a practical matter, these services have not been expanding geographically in recent years. Only one new BAS TV pickup license has been granted in the 7 GHz and 13 GHz bands in the past two years.[117] Moreover, FWCC reports that BAS and CARS path and channel licensing, respectively, in the 13 GHz band have dropped sharply in the last decade.[118] Furthermore, 50 megahertz of spectrum in each band will remain exclusively for BAS and CARS use, and BAS and CARS applicants will have co-primary status and the ability to apply for new facilities in the shared portions of the bands. We also note that development of new technologies could provide broadcasters with new mechanisms to

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[110] *See* 47 C.F.R. § 101.107(a).

[111] *See* 47 C.F.R. § 101.113(a).

[112] *See* 47 C.F.R. § 101.115(b)(2).

[113] 47 C.F.R. § 101.141(a)(3). We will not apply the capacity and loading requirements to BAS licensed under Part 74. EIBASS suggests that those requirements could apply to BAS, except for BAS involved in the transmission of digital video programming, intercity relay links providing backhauls from ENG-RO sites, and studio-to-transmitter links. EIBASS Public Notice Comments at 4. FWCC also supports that idea. FWCC Public Notice Comments at 3-4. Given the proposed exceptions, however, it is not clear how much applicability the rule would have to BAS operations. Furthermore, since we are seeking comment on limiting the applicability of the capacity and loading requirements in the *FNPRM*, we are not convinced it is appropriate at this time to expand those requirements by applying them to a subset of BAS facilities.

[114] 47 C.F.R. § 101.143.

[115] Our efficiency rules usually were not imposed on frequency bands above 12 GHz because of the higher amounts of fading on these frequencies compared to the lower bands, mostly due to oxygen and water vapor. However, in other parts of this rulemaking, we are allowing flexible modulation schemes during anomalous weather events. We believe that the relaxation of the efficiency standards we are proposing due to anomalous weather events, such as rain fade, therefore, make it reasonable to impose the same efficiency standards for the 12.7-13.2 GHz band that we have for the 11 GHz frequency bands.

[116] *See* Wireless Telecommunications Bureau Announces ULS Upgrade, Licensees of Television Pick-Up Stations Now Have the Option of Identifying Their Stationary, Receive-Only Sites on ULS to Aid Coordination with Other Services, *Public Notice*, RM-11308, 23 FCC Rcd 6521 (WTB 2008).

[117] *See* License for Station WQLG694 (granted Jan. 14, 2010).

[118] *See* Letter from Mitchell Lazarus and Christine E. Goepp, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 10-153 (filed Apr. 29, 2011) (*FWCC April 29 Ex Parte*) at 4. According to FWCC, in 2000, there were 131,761 operational channels on 3,686 paths. By 2010, there were 35,849 operational channels on 2,638 paths. *Id.*

support of their electronic newsgathering functions in the future.[119] In light of this record, we reject SBE's argument that FS should not be allowed in the 7 and 13 GHz Bands because of a need to preserve spectrum for geographic expansion of BAS and CARS.[120]

33. We find that permitting fixed microwave operations in the 7 and 13 GHz bands will benefit operators and consumers alike and that these benefits outweigh any potential costs, which our rules have been designed to eliminate. Our actions today will enable these spectrum bands to be used more intensively for wireless backhaul, public safety, and other critical uses supported by microwave without limiting their use for BAS or CARS. With this additional spectrum available for their use, fixed microwave operators can establish more links in a given geographic area and increase the capacity of existing links, which in turn will facilitate deployment of wireless broadband services. Although it would be difficult to quantify with precision the benefits of opening the 7 and 13 GHz bands to FS, we find that those benefits outweigh the at most minimal cost of our actions.

34. As a final matter, we reject SBE's allegation that we prejudged the decision to allow FS operations in these bands.[121] We have carefully considered the issues raised concerning sharing between FS and mobile and temporary fixed BAS and CARS, analyzing the record received in response to the NPRM, as well as the record received in response to the Bureau's *7 and 13 GHz Comment Public Notice*. As discussed in detail above, the rules we adopt today are clearly responsive to issues and concerns raised in this record.

B. Elimination of Final Link Rule

35. In this section, we grant broadcasters greater access to microwave spectrum by eliminating the "final link" rule that prohibits broadcasters from using FS stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.

1. Background

36. In the *NPRM*, the Commission sought comment on eliminating the "final link" rule, which prohibits broadcasters from using Part 101 stations as the final radiofrequency (RF) link in the chain of distribution of program material to broadcast stations.[122] In other words, the rule prevents private FS stations from transmitting one type of content (program material) to one type of business (broadcasters) at one particular point in the transmission chain (the final RF link). The Commission questioned the sense of maintaining regulatory restrictions based on content as broadcasters and other microwave users move to digital-based systems.[123] It expressed the belief that other existing rules would ensure productive use of spectrum and prevent broadcasters from crowding other FS licensees out of the

[119] *See, e.g.*, Nomad Innovations, LLC *Ex Parte* (filed May 24, 2011) (describing technology that would support reliable broadcast-quality video newsgathering for live news using Verizon Wireless's 4G LTE network).

[120] SBE Public Notice Comments at 3-4.

[121] Comments of the Society of Broadcast Engineers, Inc. in Response to the Further Inquiry Public Notice (filed Jun. 27, 2011) (SBE Public Notice Comments) at 3.

[122] *NPRM*, 25 FCC Rcd at 11256-11258 ¶¶ 21-27. *See* 47 C.F.R. § 101.603(a)(7).

[123] *NPRM*, 25 FCC Rcd at 11257 ¶ 24.

band.[124] The Commission also asked whether there were alternatives that could facilitate broadcaster access to FS spectrum while retaining the prohibition under certain circumstances.[125]

2. Discussion

37. As proposed in the *NPRM*, we herein eliminate the "final link" rule. Our action removes from our rules an artificial distinction based solely on the type of content provided and directed solely at one type of business and is consistent with our decision to allow FS to share in the 7 and 13 GHz BAS and CARS bands.[126] We believe it makes little sense to maintain restrictions based on content as both FS licensees and broadcasters move to digital technologies. Furthermore, FS licensees do not object to elimination of the rule so long as FS is granted access to BAS and CARS spectrum in the 7 and 13 GHz bands,[127] an action we are also taking in this *Report and Order*.[128] Although AT&T expresses concern about the effect of eliminating the rule on spectrum availability, it does not object to legitimate broadcaster use of FS spectrum that is compatible with existing uses.[129] While broadcasters have different opinions about the value of eliminating the rule, they support doing so.[130]

38. We find that there are significant benefits, and no costs, to eliminating the final link rule. We note that no commenter has identified any cognizable harm that would result from eliminating the rule. With increasing adoption of digital technologies, the final link rule has become an outdated regulation that imposes unnecessary costs on broadcasters. In some instances, it may have required broadcasters to build two different, largely redundant, systems: one system to carry program material to the transmitter site and a separate system to handle other data. Eliminating the rule will provide tangible benefits to broadcasters by reducing unnecessary duplication of systems and facilities and enabling them to operate more efficiently. We therefore find the benefits of eliminating the final link rule to be significant.

C. Adaptive Modulation

39. The Commission's Part 101 rules contain a minimum payload capacity rule intended to ensure that FS links are operated efficiently. In this section, we permit temporary operations below the

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[124] *NPRM*, 25 FCC Rcd at 11257 ¶ 26.

[125] *NPRM*, 25 FCC Rcd at 11258 ¶ 27.

[126] In response to EIBASS's request, we confirm that broadcasters would be able to access the 932.5–935 MHz and 941.5–944 MHz FS bands. *See* EIBASS Comments at 5. Broadcasters would apply for Part 101 authorizations and would be subject to the applicable Part 101 technical rules.

[127] Comments of AT&T Inc. (filed Oct. 25, 2010) (AT&T Comments) at 9, Comments of Aviat Networks (filed Oct. 25, 2010) (Aviat Networks Comments) at 2, Comments of Ceragon Networks (filed Oct. 25, 2010) (Ceragon Comments) at 3-4, Comments of Fixed Wireless Communications Coalition (filed Oct. 25, 2010) (FWCC Comments) at 7-8, NSMA Comments at 5-6, SBE Comments at 3, Comments of T-Mobile USA, Inc. (filed Oct. 25, 2010) (T-Mobile Comments) at 7-8, Comments of United States Cellular Corporation (filed Oct. 25, 2010) (U.S. Cellular Comments) at 4; Comments of Wireless Strategies, Inc. (filed Oct. 25, 2010) (WSI Comments) at 2-3.

[128] *See supra* at Section I.A.2, *supra*.

[129] AT&T Comments at 9.

[130] *Compare* EIBASS Comments at 1 (eliminating final link rule would be a reasonable *quid pro quo* for allowing sharing in the 7 and 13 GHz bands) and SBE Comments at 3 (taking contrary position).

minimum capacity under certain circumstances, which will enable FS links to maintain critical communications during periods of fading.

1. Background

40. Section 101.141(a)(3) of the Commission's Rules establishes minimum payload capacities (in terms of megabits per second) for various channel sizes in certain Part 101 bands.[131] The underlying purpose of the rule is to promote efficient frequency use.[132] Requiring links to carry a set amount of traffic (expressed in megabits/second) ensures that licensees will actually use facilities they apply for. Although the Commission has never quantified the time period over which licensees must comply with those standards, the industry has generally construed the payload requirements as applying whenever the link is in service.[133]

41. On May 8, 2009, Alcatel-Lucent; Dragonwave, Inc.; Ericsson, Inc.; Exalt Communications; FWCC; Harris Stratex Networks; and Motorola (Petitioners) filed a request for interpretation of the Commission's Rules.[134] Petitioners asked the Bureau to interpret Section 101.141(a)(3) of the Commission's Rules to permit data rates to drop for brief periods below the minimum payload capacity specified in the rules, so long as the values mandated by the rules were maintained both in normal operation and on average.[135] Petitioners asserted that fixed service links, especially long links, are subject to atmospheric fading, which is a temporary drop in received power caused by changes in propagation conditions.[136] According to Petitioners, one way to combat fading is by briefly reducing the data rate, which requires a temporary change in the type of modulation, a process called "adaptive modulation."[137] Petitioners argued that a reduced transmission rate is better than having no transmission at all, because many systems require a resynchronization that would interrupt communications for several minutes during a fade.[138] Petitioners further alleged that, in a properly designed system, fading conditions occur less than one percent of the time, so that, even under pessimistic assumptions, a system employing adaptive modulation will comfortably achieve the minimum payload capacity on average.[139] They asserted that this interpretation of the rule would fully maintain the rule's

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[131] 47 C.F.R. § 101.141(a)(3).

[132] *See* Reorganization and Revision if Parts 1, 2, 21 and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Service, *Report and Order*, WT Docket No. 94-148, 11 FCC Rcd 13449, 13476 ¶ 77 (1996).

[133] *See* Request of Alcatel-Lucent, et al. for Interpretation of 47 C.F.R. §101.141(a)(3) To Permit Use of Adaptive Modulation Systems, WT Docket No. 09-106 (May 8, 2009) (FWCC Request) at 2.

[134] *Id.*

[135] *Id. at* 2.

[136] *Id.* at 3. Because water vapor is one of the primary causes of atmospheric fading, the fading is often referred to as "rain fading."

[137] *Id.*

[138] *Id.*

[139] *Id.*

purpose by enhancing spectrum efficiency.[140] Finally, Petitioners also stated that the interpretation would allow for the continued handling of critical traffic when the link would otherwise be inoperative.[141]

42. In the *NPRM*, the Commission determined that a rule change was needed to implement the policy interpretation sought in the FWCC Request because the policy interpretation was inconsistent with the plain language of the current rule, which has been interpreted to require compliance with the minimum payload capacity at all times when a system is in operation.[142] The Commission concluded that it would be in the public interest to commence a rulemaking proceeding to facilitate the use of adaptive modulation.[143] It noted that "[a]llowing carriers to operate below the current efficiency standards for short periods when it is necessary to maintain an operational link, without a need for waiver, could enable carriers to save on costs and enhance reliability of microwave links."[144] The Commission also recognized the benefits of allowing carriers to maintain communications during adverse propagation conditions.[145]

43. The Commission expressed a concern that the standard proposed in the FWCC Request, *i.e.*, requiring compliance with the efficiency standards "on average" and "during normal operation," would give licensees too much latitude to deploy inefficient systems.[146] It tentatively rejected a proposal by Verizon to require restrictions on equipment in order to enforce the limitations on adaptive modulation because of the potential to increase equipment prices.[147] The Commission proposed a rule under which "the minimum payload capacity requirements must be met at all times, except during anomalous signal fading, when lower capacities may be utilized in order to maintain communications."[148] Finally, the Commission asked whether it should specify a minimum amount of time a link should be operational or a minimum efficiency standard below which an FS station may not fall.[149]

2. Discussion

44. We conclude that it is in the public interest to amend our rules to facilitate the use of adaptive modulation. Most commenters agree that allowing the use of adaptive modulation will have significant benefits, including: (1) maintaining data throughput better than the zero rate that would otherwise be caused by a fade; (2) continuing to handle critical traffic when the link would otherwise cease to operate; and (3) maintaining network synchronization without the need for a time-consuming reboot.[150] EIBASS, the only party that opposes allowing adaptive modulation, argues that any attempt to

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[140] *Id.* at 4.

[141] *Id.*

[142] *NPRM*, 25 FCC Rcd at 11260 ¶ 35.

[143] *NPRM*, 25 FCC Rcd at 11260 ¶ 36.

[144] *NPRM*, 25 FCC Rcd at 11260 ¶ 36.

[145] *NPRM*, 25 FCC Rcd at 11260 ¶ 37.

[146] *NPRM*, 25 FCC Rcd at 11261 ¶ 38.

[147] *NPRM*, 25 FCC Rcd at 11261 ¶ 38.

[148] *NPRM*, 25 FCC Rcd at 11261 ¶ 39. The Commission also sought comment on requiring applicants who propose to use modulations below the minimum payload capacity to state that fact in their prior coordination notices. *Id.*

[149] *NPRM*, 25 FCC Rcd at 11261 ¶ 39.

[150] FWCC Comments at 8. *See also* AT&T Comments at 10, Aviat Networks Comments at 2, Ceragon Comments at 4-5, Comments of Cielo Networks, Inc. (filed Oct. 25, 2010) (Cielo Comments) at 1, Comments of Clearwire (continued....)

define by rule the conditions that justify adaptive modulation would open "a Pandora's box."[151] As discussed below, however, we believe that it is possible to craft rules that allow use of adaptive modulation while maintaining spectrum efficiency.[152]

45. Parties disagree about the protections that will be necessary to ensure that adaptive modulation will not be abused by operators that might seek to save money by operating inefficient links. Supporters of adaptive modulation recognize that there is a potential for abuse and offer a variety of proposals to address that problem. Several of them support the Commission's proposed rule language.[153] FWCC opposes specifying a minimum percentage availability as a prerequisite for adaptive modulation because writing a minimum number into the rules will allegedly limit the freedom of link designers to specify parameters appropriate to a particular objective.[154] It asks the Commission to impose one of several general conditions designed to maximize licensee flexibility.[155] On the other hand, Aviat Networks, Comsearch, Motorola, Sprint, and Verizon argue that the rules should specify a minimum percentage of time when the link would be available, in order to allow use of modulations below the minimum payload capacity.[156] Several parties propose a requirement that paths using adaptive modulation be designed to be available 99.995% or 99.999% of the time while complying with the minimum payload capacity,[157] while FWCC and Motorola propose using a 99.95% standard.[158]

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Corporation (filed Oct. 25, 2010) (Clearwire Comments) at 9, Comments of Comsearch (filed Oct. 25, 2010) (Comsearch Comments) at 17, Comments of FiberTower Corporation (filed Oct. 25, 2010) (FiberTower Comments) at 7, Comments of Kasian Franks, Chief Executive & Visionary Officer, Mimvi, Inc. (filed Sep. 15, 2010) (Mimvi Comments) at 6-7, NSMA Comments at 6-8, Comments of OEM Comments, LLC (filed Oct. 13, 2010) (OEM Comments) at 2, Comments of Sierra Telecom, Inc. (filed Oct. 25, 2010) (Sierra Telecom Comments) at 1-2, Comments of Sprint Nextel Corporation (filed Oct. 25, 2010) (Sprint Comments) at 5, Comments of the Telecommunications Industry Association (filed Oct. 25, 2010) (TIA Comments) at 3-5, U.S. Cellular Comments at 5, Comments of Verizon and Verizon Wireless on the Notice of Proposed Rulemaking and Notice of Inquiry (filed Oct. 25, 2010) (Verizon Comments) at 4-5 (explaining that Verizon's support is contingent on the adoption of appropriate enforceable safeguards designed to prevent misuse of adaptive modulation and minimize the amount of operation below the minimum payload capacity), Comments of Agape Church Inc, dba VTN (filed Oct. 20, 2010) (VTN Comments) at 1, WSI Comments at 3, Comments of The Wireless Internet Service Providers Association (filed Oct. 25, 2010) (WISPA Comments) at 3-4.

[151] EIBASS Comments at 7.

[152] The Satellite Industry Association (SIA) does not oppose adaptive modulation in principle but suggests that adaptive modulation might be limited to bands without other co-primary services, such as the Fixed Satellite Service. Comments of the Satellite Industry Association (filed Oct. 25, 2010) (SIA Comments) at 12-14.

[153] AT&T Comments at 10-13, Ceragon Comments at 4-5, Clearwire Comments at 9, OEM Comments at 2, TIA Comments at 5, U.S. Cellular Comments at 4-6.

[154] FWCC April 29 *Ex Parte* at 1-2.

[155] The conditions FWCC proposes, in order of decreasing preference, are: (1) links may operate below the minimum specified payload for short periods of time in order to maintain link continuity when the microwave link is experiencing a deep fade condition; (2) the average payload must be maintained at or above the minimum specified in the rules; and (3) links designed to operate temporarily below the minimum specified payload must be designed to high availability in accordance with good engineering practice. *See* FWCC April 29 *Ex Parte* at 2.

[156] Aviat Networks Comments at 2-3, Comsearch Comments at 19, Comments of Motorola, Inc. (filed Oct. 25, 2010) (Motorola Comments) at 7-8, Sprint Comments at 5, Verizon Comments at 9-10.

[157] Aviat Networks Comments at 2-3 (99.999%), Comsearch Comments at 19 (99.999%, except 99.995% for links using Category A antennas), EIBASS Reply at 8 (supports Comsearch proposal), Verizon Comments at 9-10 (99.999%).

46. In an *ex parte* filing, Verizon argues that a 99.95% standard would undermine the Commission's goal in this proceeding to maximize the opportunity for fixed services to share existing bands.[159] In particular, Verizon asserts that a 99.95% standard would create improper incentives to use smaller and lower performance antennas, which would significantly decrease spectral efficiency and increase the deployment costs and interference to future microwave licensees.[160] Verizon also contends that a lower standard would "increase the potential for interference conflicts among wireless backhaul licensees."[161]

47. We determine that applying a 99.95% standard strikes the appropriate balance between providing operators with the flexibility to address anomalous fading conditions while maintaining spectral efficiency. Specifically, we will require applicants seeking permission to use modulations below the minimums established in Section 101.141(a)(3) of the Commission's Rules to design their paths to be available at modulations compliant with the minimum payload capacity at least 99.95% of the time. In other words, applicants will have to design their paths to operate in full compliance with the capacity and loading requirements for all but 4.38 hours out of the year. A quantitative standard will provide an objective means for determining compliance with the rules and eliminate some disputes. We are concerned that under FWCC's proposal, as well as the Commission's proposal in the *NPRM*, there would be insufficient safeguards to prevent the deployment of inefficient systems. While we understand FWCC's concern about providing sufficient flexibility to applicants, we do not believe that a 99.95% standard would be overly restrictive, because most paths are designed to a standard of at least 99.95% availability.[162]

48. We decline to apply the 99.999% standard, as Verizon and others advocate, because it would not provide meaningful relief, as it would only anticipate 5.26 minutes a year of impaired operations for a link. With a 99.999% standard, an applicant would be required to build a more expensive system designed to operate through severe weather, which could make deployment cost-prohibitive in some instances. By way of hypothetical, consider a single link in the 6 GHz band that would require 10-foot antennas with a 99.999% standard instead of 6-foot antennas under the 99.95% standard. The total cost increase over a ten-year period in this hypothetical example could exceed $100,000.[163] Furthermore, most systems use multiple links. We believe that the increased reliability and cost savings adaptive modulation will make possible under a 99.95% standard outweigh the marginal costs of a small temporary reduction in spectral efficiency. Therefore, we find the 99.95% standard to be in the public interest.

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[158] Motorola Comments at 7-8, FWCC April 29 *Ex Parte* at 2. While FWCC does not support a quantitative standard, it would recommend the 99.95% standard if the Commission decides to adopt such a standard. *Id.*

[159] Letter from Leora Hochstein, Executive Director, Federal Regulatory, Verizon to Ms. Marlene H. Dortch, Secretary, Federal Communications Commission (filed Aug. 2, 2011) (Verizon August 2 *Ex Parte*) at 2.

[160] *Id.* at 3.

[161] *Id.*

[162] *See* Motorola Comments at 7.

[163] Aviat Networks explains that the typical cost of renting space for an antenna on a tower is $400 + $100 per foot (diameter) each month. Aviat Networks Comments at 3. Increasing antenna size at each end of a link from 6 feet to 10 feet would increase site rental expenses by $800/month (2 links X 4 feet X $100/foot), or $9,600 each year, which equals $96,000 over a ten year period. When the increased cost of the larger, higher performance antenna is taken into account, the increased expenses could be over $100,000.

49. We reject Verizon's arguments that a 99.95% design standard will lead to increased interference or provide improper incentives to deploy inefficient systems. A temporary drop in a data rate, by itself, does not increase interference to other operators. Furthermore, we adopt a series of safeguards designed to protect existing systems. We adopt the *NPRM*'s proposal to require licensees that plan to use adaptive modulation to indicate their intent in prior coordination notices. We agree with FWCC and AT&T that such a requirement will help the industry catch possible abuses[164] and address any potential issues through the coordination process before the facilities are authorized. We will also require applicants to apply for all modulations they intend to use as part of their authorizations. Under the rule we adopt today, adaptive modulation can only be used during periods of anomalous signal fading, and the use must be necessary to allow licensees to maintain communications. Furthermore, systems must be designed to operate in full compliance with our existing capacity and loading requirements for all but 4.38 hours out of the year. Finally, we require applicants to use good engineering practice in determining the percentage of time a system can operate in compliance with the capacity and loading requirements. As suggested by FWCC, we will not dictate the use of a specific engineering model to determine availability but presume that use of Telecommunications Industry Association Bulletin TSB 10-F to determine availability is consistent with good engineering practice.[165]

50. To the extent Verizon is concerned about the increased use of smaller antennas,[166] we note that our rules already contain protections designed to minimize interference from smaller antennas. Section 101.115(b) of the Commission's Rules establishes directional antenna standards designed to maximize the use of microwave spectrum while avoiding interference between operators.[167] More specifically, the Commission's Rules set forth certain requirements, specifications, and conditions pursuant to which FS stations may use antennas that comply with either the more stringent performance standard in Category A (also known as Standard A) or the less stringent performance standard in Category B (also known as Standard B).[168] In general, the Commission's Rules require a fixed microwave operator using a Category B antenna to upgrade if its antenna causes interference problems that would be resolved by the use of a Category A antenna.[169] Thus, if adaptive modulation allows a licensee to use a Category B antenna, but that antenna would cause interference to (or receive interference from) another operation, the other operator can require the licensee to upgrade to a Category A antenna if the upgrade would resolve the interference issue. This rule applies even when the use of the Category B antenna precedes use by the other licensee.

51. Further, we decline to grant Verizon's request that we establish additional equipment-based restrictions on adaptive modulation – including requiring all licensees to operate at no less than two-thirds of the minimum payload capacity values established in Section 101.141(a)(3).[170] We believe that the time-based design standard for link availability, along with the other safeguards in the rule we adopt today, will adequately prevent the proliferation of inefficient systems and find that imposing additional requirements would limit licensee flexibility and place undue regulatory burdens on licensees.

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[164] *See* FWCC Comments at 13, AT&T Comments at 13.

[165] *See* FWCC April 29 *Ex Parte* at 3.

[166] *See* Verizon August 2 *Ex Parte* at 3.

[167] 47 C.F.R. § 101.115(b).

[168] *See* 47 C.F.R. § 101.115(b).

[169] *See* 47 C.F.R. § 101.115(c).

[170] *See* Verizon Comments at 7-9, 10-12.

Finally, we reject Verizon's proposal to limit the transmit power and power spectral density when using non-compliant modulations to no more than 3 dB greater than the values of the worst-case (highest total signal power, highest power density) values of the available compliant modulations.[171] An applicant can specify multiple emissions/modulation schemes, but they all must have the same EIRP unless they license separate paths. The gains realized from the use of adaptive modulation are related to the lower receiver threshold with lower order modulation schemes, not by using higher power with lower order modulation.

52. We will not require licensees to log instances when they use adaptive modulation or to include that information in station records.[172] We are establishing the minimum availability standard as a path design requirement, not as an operational requirement. We believe that the best time to enforce the rule is before equipment is deployed, not after. Once an operator has made the investment required to deploy adequate equipment in a well-designed link, it should have every incentive to operate that equipment consistent with the design standard. It is possible, of course, that unusual weather conditions could require some operators to use adaptive modulation for longer intervals than our design standard specifies. However, we see no reason to penalize operators for events that are beyond their control. In that context, we believe that the burden imposed by requiring the logging of adaptive modulation episodes would outweigh any potential benefit of the information.

53. We conclude that allowing licensees to use adaptive modulation will confer substantial benefits on operators and their customers, while imposing minimal, if any, cost. Adaptive modulation will allow operators to maintain critical links during fade conditions, decreasing the number of microwave service outages they experience and the detrimental impacts that these outages may cause for consumers. Furthermore, by reducing service outages, use of adaptive modulation may permit operators to avoid costs and delays associated with reinitializing service. The rules we adopt today are designed to appropriately restrict use of adaptive modulation to provide fixed microwave operators additional flexibility to deal with adverse conditions while ensuring that their systems continue to be operated efficiently.

D. Auxiliary Stations

54. In this Section, we decline to permit FS licensees to coordinate and deploy "auxiliary" links within the coordinated service contour of primary links, because we lack a sufficient basis for concluding that auxiliary stations could coexist with primary FS stations without causing interference.

1. Background

55. In the *NPRM*, the Commission sought comment on a proposal to permit greater reuse of scarce microwave resources by permitting FS licensees to coordinate and deploy multiple links – a primary link and "auxiliary" links.[173] The idea had its origin in a petition filed by Wireless Strategies, Inc. (WSI) asking the Commission to issue a declaratory ruling "confirming that a Fixed Service licensee is permitted to simultaneously coordinate multiple links whose transmitter elements collectively comply with the Commission's antenna standards and frequency coordination procedures."[174] Although the

[171] *See* Verizon Comments at 10-11.

[172] *NPRM*, 25 FCC Rcd at 11261 ¶ 39.

[173] *See NPRM*, 25 FCC Rcd at 11261-11269 ¶¶ 41-58.

[174] Request for Declaratory Ruling filed by Wireless Strategies, Inc., WT Docket No. 07-121 (filed Feb. 23, 2007) at 1. WSI describes itself as a "carrier's carrier" whose "mission is to engineer, provision, operate, lease and/or sell (continued....)

Commission denied WSI's petition for declaratory ruling, determining that WSI's requested interpretation was inconsistent with its current rules,[175] it found WSI's concept to be "worthy of further consideration."[176]

56. Generally, the concept of auxiliary stations rests on the fact that a point-to-point microwave transmitter typically radiates energy outward in a keyhole-shaped signal pattern.[177] This signal pattern precludes other stations from sharing the same spectrum in that area, if placement of the new transmitter would interfere with the original licensee's ability to receive its signal at its downlink station.[178] The auxiliary stations proposal contemplates placement of multiple smaller transmitters within the signal pattern of the main link.

57. The Commission sought to clarify debate on the merits of the proposal by proposing specific rule changes intended to capture WSI's underlying concept, while preserving existing Part 101 practices, policies, and expectations to the greatest extent possible. Accordingly, the Commission sought comment on allowing FS licensees to deploy auxiliary stations under the following conditions, among others:[179]

- Each auxiliary station would be required to operate on the same frequencies as the main licensed link.
- Auxiliary stations would not be allowed to cause any incremental interference to other primary links, *i.e.*, they would not be allowed to cause any more interference to other primary stations than the main link would cause.
- Auxiliary stations would be secondary in status and would have no right to claim protection from interference from any primary stations.
- Auxiliary stations would have to be coordinated in advance with other licensees and applicants pursuant to the frequency coordination process specified in Section 101.103 of the Commission's Rules.
- Auxiliary stations would not be subject to the loading, antenna standards, or minimum path length requirements that apply to main links.[180]

58. In seeking comment on those proposals, we asked commenters to provide: (1) estimates of how many systems they contemplated operating with auxiliary stations; (2) information on whether such systems would typically be deployed in urban or rural areas; (3) the types of uses to which such systems would be put; (4) the distances they contemplated between the auxiliary stations and their main

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Concurrently Coordinated licensed microwave networks in every city and town across the United States." *See* http://www.wirelessstrategies.net (last visited Jun. 14, 2011).

[175] *NPRM*, 25 FCC Rcd at 11264-11265 ¶¶ 48-49.

[176] *NPRM*, 25 FCC Rcd at 11265 ¶ 50.

[177] *See NPRM*, 25 FCC Rcd at 11266 ¶ 51.

[178] *Id.*

[179] *See NPRM*, 25 FCC Rcd at 11266-11267 ¶ 52.

[180] *See* 47 C.F.R. §§ 101.115, 101.141(a)(3), 101.143.

links; and (5) the relative amounts of traffic that they expected to carry on main links versus the auxiliary links.[181] We also asked commenters to discuss the possibility that services where geographic area licensing already exists – such as the Local Multipoint Distribution Service, the 24 GHz Service, or operations in the 38.6-40.0 GHz band (39 GHz band) – might provide a more reasonable way of accommodating any need for auxiliary stations.[182]

2. Discussion

59. Most commenters oppose the proposal to allow auxiliary stations. They argue that auxiliary stations will increase congestion, cause greater interference, and create opportunities for gaming/manipulation that would be detrimental to competition and efficient deployment of microwave facilities.[183] Supporters contend that auxiliary stations could result in more efficient use of spectrum and could support a variety of innovative uses.[184]

60. As explained in greater detail below, we decline to adopt at this time our proposal to allow use of auxiliary stations in FS bands. We lack a sufficient basis for concluding that auxiliary stations could coexist with FS stations without causing interference to primary FS stations. Moreover, we are concerned that adopting the auxiliary stations proposal would create a perverse incentive for applicants to propose excessive power for their primary transmitters, wasting spectrum in an effort to stake out as much territory as possible for auxiliary stations. Finally, using upper microwave bands such as LMDS, 24 GHz, and 39 GHz appears to be a viable alternative for the type of operations contemplated under the auxiliary station proposal.

61. Proponents of auxiliary stations largely operate on the premise that FS spectrum is "wasted," particularly in urban areas.[185] We disagree with this premise because there is already extensive reuse of FS spectrum. It is even possible to re-use a frequency at exactly the same location, under existing procedures. To illustrate how closely point-to-point microwave transmitters can be packed in congested areas, Comsearch submits a map that depicts the microwave links in the Los Angeles area in

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[181] *NPRM*, 25 FCC Rcd at 11268 ¶ 54.

[182] *NPRM*, 25 FCC Rcd at 11268 ¶ 55.

[183] AT&T Comments at 17-20, Comsearch Comments at 3-17, Comments of the law firm of Blooston, Mordkofsky, Dickens, Duffy & Prendergast, LLP (filed Oct. 25, 2010), Ceragon Comments at 6-14, Cielo Comments at 1, Clearwire Comments at 9-10, EIBASS Comments at 7-10, FWCC Supplemental Comments, Comments of Gary R. Gray, Radio Systems Manager, City of Fort Lauderdale (filed Oct. 22, 2010) at 1-2, Comments of Holy Cross Electric Association, Inc. (filed Oct. 21, 2010) at 1, NSMA Comments at 8-14, Comments of The Rural Telecommunications Group, Inc. (filed Oct. 25, 2010) (RTG Comments), Comments of Stratos Offshore Services Company (filed Oct. 25, 2010) (Stratos Comments), T-Mobile Comments at 10-11, U.S. Cellular Comments at 6-7, Verizon Comments at 13-20.

[184] Reply Comments of Doctors Telehealth Network Inc. (filed Nov. 8, 2010), Comments of Exalt Communications, Inc. (filed Nov. 22, 2010) (Exalt Comments), Letter from David L. Renaud, Vice President, Corporate Affairs and General Counsel, Proxim Wireless, Inc. (filed Feb. 17, 2011), Mimvi Comments at 7, New America Foundation's Open Technology Initiative *Ex Parte* (filed Mar. 16, 2011), Sprint Comments at 5-7, WISPA Comments at 4, WSI Comments.

[185] Exalt Comments at 3 (eliminating antenna standards and minimum path requirements for auxiliary stations would encourage technological innovation and make use of otherwise wasted spectrum); WSI *Ex Parte* (filed Dec. 9, 2010) at 6-7 (purporting to show that one FS link could block over one million paths).