

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

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 Docket No. 00-258

The Establishment of Policies and Service Rules for the Mobile-Satellite Service in the 2 GHz Band

IB Docket No. 99-81

Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/2670-2690 MHz Frequency Bands for the Mobile-Satellite Service

RM-9911

Petition for Rule Making of the Wireless Information Networks Forum Concerning the Unlicensed Personal Communications Service

RM-9498

Petition for Rule Making of UTStarcom, Inc. Concerning the Unlicensed Personal Communications Service

RM-10024

COMMENTS OF MOTOROLA, INC.

Steve B. Sharkey
Robert D. Kubik
Motorola, Inc.
1350 I Street, N.W.
Washington, D.C. 20005
(202) 371-6900

April 14, 2003

Table of Contents

Summary.....	ii
I. THE COMMISSION SHOULD DESIGNATE THE 1910-1915 MHZ AND 1990-1995 MHZ BANDS FOR PCS AND LICENSE THEM AS TWO 5 MHZ BLOCKS OF PAIRED SPECTRUM.....	2
II. THE 1915-1920 MHZ BAND SHOULD BE RETAINED FOR UPCS OPERATIONS AND MADE AVAILABLE FOR ISOCHRONOUS DEVICES.....	7
III. THE 1920-1930 MHZ BAND SHOULD BE RETAINED FOR UNLICENSED OPERATIONS UNDER THE COMMISSION’S CURRENT RULES	10
IV. THE 1995-2000 MHZ BAND IS OF LIMITED UTILITY FOR PCS DUE TO INTERFERENCE CONSTRAINTS.....	10
V. THE 2020-2025 MHZ BAND IS OF LIMITED UTILITY FOR PAIRING WITH EXISTING PCS OR AWS SPECTRUM.....	13
VI. THE 2155-2180 MHZ BAND SHOULD BE DESIGNATED FOR AWS TO ENABLE A 2110-2180 MHZ DOWNLINK BAND, BUT LICENSING SHOULD BE DEFERRED UNTIL AFTER THE LAUNCH OF AWS	14
VII. CONCLUSION	17

Summary

Motorola welcomes this opportunity to provide comments on the frequency bands that remain under consideration for reallocation for advanced wireless services (“AWS”). The release of the *Third NPRM*, together with the reallocation of spectrum in the *Third Report and Order*, demonstrate that the Commission recognizes the importance of AWS and is committed to ensuring that sufficient additional spectrum is made available to support these new and innovative services. Motorola strongly supports the Commission’s efforts in this area.

Some of the frequency bands identified in the *Third NPRM* offer considerable potential for deployment of PCS and AWS. In particular, the 1910-1915 MHz and 1990-1995 MHz spectrum blocks offer the opportunity to create a new 2x5 MHz band pair for deployment of PCS services in the short-term and AWS in the longer term. In addition, the 2155-2180 MHz band represents enormous potential for expanding the consumer benefits of AWS by creating a 2110-2180 MHz downlink band that is harmonized with existing international allocations for third generation (“3G”) wireless services. However, some of the bands identified in the *Third NPRM* would be of lesser utility in developing AWS, due to the limited amount of spectrum available and the need to protect existing licensees in the PCS bands and future licensees in the previously allocated 90 MHz of AWS spectrum from harmful interference. Motorola recommends that the Commission give paramount consideration to the potential for interference to existing and future licensees when it designates spectrum in this proceeding.

Motorola supports re-designation of the 1910-1915 MHz and 1990-1995 MHz bands for PCS use — thus partially addressing the need for additional spectrum to accommodate the burgeoning

demand for wireless voice and data services. Although sufficient spectrum could, theoretically, be made available to re-designate 20 MHz of spectrum for PCS or AWS services (using the 1910-1920 MHz and 1990-2000 MHz bands), this option is not practicable due to constraints regarding duplexer technology and potential interference concerns with both existing PCS and MSS/ancillary terrestrial component (“ATC”) operations.

Motorola supports the proposal to retain the 1915-1920 MHz band for UPCS operations, but emphasizes that the Commission must amend its Part 15 rules to allow the use of isochronous devices in this band in order to encourage the deployment. Furthermore, Motorola also supports the Commission’s tentative conclusion to no longer consider reallocating the 1920-1930 MHz portion of the UPCS band to support AWS applications. As recognized by the Commission, UPCS equipment manufacturers, distributors, and end users have invested considerable efforts and resources in the development and deployment of isochronous devices in the 1920-1930 MHz band, and re-designation of the 1920-1930 MHz band for AWS would upset the reasonable expectations of these parties.

Use of the 1995-2000 MHz band presents significant challenges due to a number of potential interference concerns. If the Commission were to establish a 2x5 MHz Broadband PCS “G” Block, as Motorola recommends, the 1995-2000 MHz band would adjoin the “G” Block base transmit band and the MSS/ATC mobile transmit band at 2000-2020 MHz. Operations in the 1995-2000 MHz band would potentially receive interference from the MSS/ATC band, and could also cause interference to mobile receivers in the adjacent PCS and MSS/ATC bands. Given these interference concerns, the utility of the 1995-2000 MHz band for high-power operations is quite limited and the band is best suited as a guard band between PCS and MSS/ATC operations. As such, the

Commission's suggestion that this band might be suitable for low-power unlicensed operations appears to be appropriate.

Likewise, the 2020-2025 MHz band is of limited utility for pairing with existing PCS or AWS spectrum. The band is not suitable for use as a base station transmit band for PCS or AWS because it adjoins the resized 2000-2020 MHz MSS uplink band and PCS base station transmissions would cause interference into adjacent MSS/ATC base station receivers. Furthermore, the 2020-2025 MHz band has limited usefulness as an add-on to an existing PCS or AWS mobile transmit band because of the wide frequency separation between it and either the 1850-1910 MHz or 1710-1755 MHz band. Given these constraints, one potential use for this spectrum may be as unpaired spectrum for TDD applications with appropriate technical limitations to minimize the potential for interference to the adjacent MSS/ATC uplink band.

Finally, Motorola recommends that the 2155-2180 MHz band be re-designated for AWS to enable a 2110-2180 MHz downlink band. Designating this spectrum for AWS would create a contiguous block that coincides well with the 2110-2170 MHz downlink segment of the terrestrial component of the IMT-2000 spectrum identified at WARC-92. Extending the AWS downlink band to achieve greater overlap with international allocations would correspondingly increase the benefits that could be achieved from harmonization. Motorola recommends two possible courses of action with regard to the 2155-2180 MHz band: (1) maintain the band in reserve for later designation either once spectrum becomes available that is suitable for pairing with it or for asymmetric use; or (2) auction the spectrum as part of the 1710-1755 MHz and 2110-2155 MHz bands, creating asymmetric downlinks with the 1710-1755 MHz uplink. Due to interference constraints, Motorola opposes designating any spectrum in the 2155-2180 MHz band for TDD applications, or for

relocation of MDS incumbents. Nevertheless, Motorola continues to support relocation of MDS incumbents to comparable spectrum in another band, as well as full compensation for the incumbents' relocation costs.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

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 Docket No. 00-258

The Establishment of Policies and Service Rules for the Mobile-Satellite Service in the 2 GHz Band

IB Docket No. 99-81

Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/2670-2690 MHz Frequency Bands for the Mobile-Satellite Service

RM-9911

Petition for Rule Making of the Wireless Information Networks Forum Concerning the Unlicensed Personal Communications Service

RM-9498

Petition for Rule Making of UTStarcom, Inc. Concerning the Unlicensed Personal Communications Service

RM-10024

COMMENTS OF MOTOROLA, INC.

Motorola, Inc. ("Motorola") hereby submits these comments on the *Third Notice of Proposed Rulemaking* ("*Third NPRM*") in the above-captioned proceeding.¹ Motorola welcomes this opportunity to provide comments on the frequency bands that remain under consideration for

¹ 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 Docket No. 00-258, *Third Report and Order, Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order*, FCC 03-16 (rel. Feb. 10, 2003) ("*Third R&O*" and "*Third NPRM*").

reallocation for advanced wireless services (“AWS”). The release of the *Third NPRM*, together with the reallocation of spectrum in the *Third R&O*, demonstrate that the Commission recognizes the importance of AWS and is committed to ensuring that sufficient additional spectrum is made available to support these new and innovative services. Motorola strongly supports the Commission’s efforts in this area.

Undoubtedly, some of the frequency bands identified in the *Third NPRM* offer considerable potential for deployment of PCS and AWS. In particular, the 1910-1915 MHz and 1990-1995 MHz spectrum blocks offer the opportunity to create a new 2x5 MHz band pair for deployment of PCS services in the short-term and AWS in the longer term. In addition, the 2155-2180 MHz band represents enormous potential for expanding the consumer benefits of AWS by creating a 2110-2180 MHz downlink band that is harmonized with existing international allocations for third generation (“3G”) wireless services. However, some of the bands identified in the *Third NPRM* would be of lesser utility in developing AWS, due to the limited amount of spectrum available and the need to protect existing licensees in the PCS bands and future licensees in the previously allocated 90 MHz of AWS spectrum from harmful interference. Motorola recommends that the Commission give paramount consideration to the potential for interference to these existing and future licensees when it allocates the various bands in this proceeding.

I. THE COMMISSION SHOULD DESIGNATE THE 1910-1915 MHZ AND 1990-1995 MHZ BANDS FOR PCS AND LICENSE THEM AS TWO 5 MHZ BLOCKS OF PAIRED SPECTRUM

Motorola supports re-designation of the 1910-1915 MHz and 1990-1995 MHz bands for PCS use by creating 2x5 MHz of paired spectrum. Of the various options available to the

Commission for the 1910-1920 MHz and 1990-2000 MHz bands, the creation of a 2x5 MHz PCS pairing adjacent to the existing PCS bands would provide the most beneficial and practicable solution. This option would make available additional spectrum for PCS (and later, AWS) uses—thus partially addressing the need for additional spectrum to accommodate the burgeoning demand for wireless voice and data services—while recognizing the fact that technological constraints require a duplex gap of more than 10 MHz. The pairing of the 1910-1915 MHz and 1990-1995 MHz bands thus represents the optimal, compromise licensing solution.

The *Third R&O* and *Third NPRM* acknowledge several critical points that support the establishment of a new Broadband PCS spectrum block (referred to as the “G” Block):

- First and foremost, the *Third R&O* recognizes the “[r]emarkable growth in terrestrial CMRS subscribership since 1995”² and that the Commission “need[s] to make spectrum available for terrestrial wireless services to promote the introduction of new advanced services.”³
- Second, the *Third NPRM* notes that asynchronous unlicensed PCS (“UPCS”) applications have not been developed for the 1910-1920 MHz band since the authorization of this service in 1994.⁴ Indeed, the Commission notes that “there is not any UPCS equipment authorized for this band,” even though almost ten years have now passed.⁵ Enough time has passed for the Commission to safely conclude that better uses should now be found for this spectrum.
- Third, the *Third NPRM* acknowledges that the record in this proceeding shows that developments in duplexer technology now enable a reduction in the existing 20 MHz duplex gap separating the Broadband PCS base and mobile transmit bands.⁶
- Fourth, the *Third R&O* reallocated the current Mobile Satellite Service (“MSS”) allocation at 1990-2000 MHz for Fixed and Mobile services and noted that

² *Third R&O* ¶ 30.

³ *Id.* ¶ 29.

⁴ *See Third NPRM* ¶ 46.

⁵ *Id.*

⁶ *See id.* ¶ 50.

“[b]ecause the 10 megahertz block is contiguous with the Broadband PCS band, this spectrum could provide needed growth spectrum for PCS providers, as well as facilitate new AWS equipment development and deployment.”⁷

Taken together, these factors justify re-designation of the 1910-1915 MHz and 1990-1995 MHz bands to create a 2x5 MHz Broadband PCS “G” Block. Although sufficient spectrum could, theoretically, be made available to re-designate 20 MHz of spectrum for PCS or AWS services (using the 1910-1920 MHz and 1990-2000 MHz bands), this option is not practicable due to constraints regarding duplexer technology. As Motorola has previously noted in this proceeding, advances in manufacturing and improvements in filtering performance appear to make feasible a reduction in the duplex gap of 5-6 MHz over the next several years.⁸ Achieving this reduction while maintaining compliance with industry specifications would require equipment manufacturers to overcome significant challenges. Nevertheless, Motorola believes that this is feasible and can be achieved with minimal impact on the size, performance, or cost of mobile handsets.⁹ This technological development would allow the use of mobile handsets that operate effectively with a duplex gap of only 15 MHz and the establishment of a 2x5 MHz “G” Block spectrum pairing. This new Broadband PCS block should be licensed under the Commission’s Part 24 rules to ensure parity with the regulatory treatment of existing PCS bands and to promote rapid deployment of service in this band.

Contrary to the suggestion in the *Third NPRM*, however, technology constraints preclude a 10 MHz reduction in the duplex gap, which would be necessary to implement one of the options suggested by the Commission—a 20 MHz PCS block pairing the 1910-1920 MHz and 1990-2000

⁷ *Third R&O* ¶ 35.

⁸ See Letter from Steve B. Sharkey to Marlene H. Dortch, WT Docket No. 02-353, ET Docket No. 00-258, Dec. 17, 2002, Attachment at 7 (“Motorola December 17 ex parte”).

⁹ See *id.* at 8.

MHz bands.¹⁰ The *Third NPRM* incorrectly states that “it appears possible to reduce this separation by 5 to 10 megahertz without leading to harmful interference to existing Broadband PCS systems.”¹¹ This belief appears to be founded upon a Nextel ex parte filing in this proceeding that actually supports the feasibility of only a 5 MHz reduction in the duplex gap.¹² This option would require PCS equipment to meet the industry out-of-band emission standards with a duplex gap of only 10 MHz. Such operation presently is not feasible using a single duplexer, nor does it appear to be achievable in the foreseeable future.¹³

A mobile transmitter operating at 1920 MHz would need to achieve more than 40 dB of attenuation at 1930 MHz, which would require the use of split band (*i.e.*, two) duplexers.¹⁴ This would significantly increase the size and cost of mobile handsets. Moreover, Motorola’s initial evaluations indicate that it is not feasible to manufacture handsets using split band duplexers that meet industry specifications.¹⁵ With only a 10 MHz duplex gap, mobile transmitters would not provide sufficient filtering to reduce emissions to acceptable levels. This problem would also exist for mobile receivers operating above 1930 MHz, because filters in these receivers would not be able to provide sufficient isolation from transmitters operating at frequencies as high as 1920 MHz. These

¹⁰ See *id.* ¶¶ 47-48.

¹¹ *Id.* ¶ 50.

¹² See *id.* n.138 (citing a Letter from Regina M. Keeney to Marlene H. Dortch, WT Docket No. 02-55, ET Docket No. 00-258, Jan. 23, 2003, Attachment at 3 (“Nextel January 23 ex parte”). Motorola notes that this Nextel filing refers indirectly to the Motorola December 17 ex parte, which asserted only that a 15 MHz duplex gap is feasible. See Nextel January 23 ex parte, Attachment at 3 (“Motorola: implementation of 15 MHz duplexer for PCS band is feasible with minimal cost/size/performance impact.”).

¹³ See Motorola December 17 ex parte, Attachment at 7-8.

¹⁴ See *id.* at 7.

¹⁵ See *id.* Motorola presently is investigating this matter further.

technological considerations preclude equipment availability and thus weigh heavily against re-designating more than 10 MHz of additional spectrum for Broadband PCS.

Adding a “G” Block would reduce the band gap between the edge of the PCS base transmit band and the MSS/ATC transmit band to 5 MHz. This would raise additional interference issues for both “G” block mobile receivers and MSS/ancillary terrestrial component (“ATC”) base stations. Since the duplex gap between a MSS/ATC mobile transmitter and a “G” Block mobile receiver is only 5 MHz, a potential for interference exists into the “G” mobile receivers when operating near to a MSS/ATC mobile transmitter. Another potential interference concern is that of “G” Block base station transmitters interfering with MSS/ATC base station receivers.

In the case of a MSS/ATC mobile handset interfering with a “G” Block mobile receiver the present FCC specification for out of band emissions from a MSS/ATC handset is -40 dBm/MHz at 1995 MHz and below. Absent additional attenuation by MSS/ATC licensees, “G” block and PCS licensees would likely have to take actions to mitigate this level of interference. For example, “G” Block licensees may need to deploy additional base stations to increase signal coverage. It should be noted that, although deploying additional base stations would help mitigate interference and enable licensees to maintain a level of reliability comparable to current PCS systems, it would significantly increase the cost of system deployment. Furthermore, the number of base stations required would increase as the level of interference permitted increases.

There is also a potential for interference from PCS and “G” block base stations into MSS/ATC base station receivers. This situation is somewhat more manageable because base stations would be at fixed locations, which provides an opportunity to avoid interference through system design and/or coordination techniques when new MSS/ATC base stations are deployed. Compatibility can

be achieved through physical separation between “G” Block and MSS/ATC base stations and/or by providing additional interference rejection in the MSS/ATC base station system design to account for signals at frequencies below 1995 MHz. Whichever approach is used, Motorola believes that there are workable solutions to provide the necessary interference mitigation between PCS and MSS/ATC systems. Therefore, no additional technical rules are necessary to address potential interference between MSS/ATC and PCS/“G” Block base stations.

The record, therefore, supports re-designation of the 1910-1915 MHz and 1990-1995 MHz bands to create a 2x5 MHz PCS “G” Block. While such a pairing will require advances in handset and filter design, Motorola agrees with the Commission that these technological improvements appear to be feasible. Moreover, Motorola agrees with the Commission’s conclusion that the proximity of the “G” Block to the existing PCS band will enable significant economies of scale and, therefore, “it would serve the public interest to adopt” this proposed pairing.¹⁶ Given the present high level of demand for PCS services and the expected continued growth in PCS subscribers, this re-designation would put this spectrum to its highest and most efficient use. Furthermore, Motorola supports application of the Commission’s Part 24 rules to this new “G” Block.

II. THE 1915-1920 MHZ BAND SHOULD BE RETAINED FOR UPCS OPERATIONS AND MADE AVAILABLE FOR ISOCHRONOUS DEVICES

The *Third NPRM* seeks comment on “whether we should retain the 1915-1920 MHz band for UPCS use, but allow for greater flexibility of UPCS use within the entire 1915-1930 MHz band.”¹⁷ It notes that, “[b]y leaving the 1915-1920 MHz band segment unlicensed in this manner, we

¹⁶ *Third NPRM* ¶ 48.

¹⁷ *Id.* ¶ 52.

could further encourage the deployment – in both urban high-density and rural areas – of low power innovative Part 15 devices in this band.”¹⁸ Motorola supports the proposal to retain the 1915-1920 MHz band for UPCS operations, but emphasizes that the Commission must amend its Part 15 rules to allow the use of isochronous devices in this band in order to encourage the deployment. As explained in the previous section, while additional Broadband PCS spectrum would be highly desirable, it is not feasible to build equipment that would meet industry out-of-band emissions standards with only a 10 MHz duplex gap. Accordingly, the 1915-1920 MHz band should not be re-designated for licensed PCS use and should instead remain designated for low power UPCS operations. Motorola urges the Commission, however, to amend its Part 15 rules to allow users to operate isochronous devices in the 1915-1920 MHz band.

There is already an extensive record supporting allowing isochronous devices to operate in the 1915-1920 MHz frequency band. As the *Third NPRM* notes, a January 1999 petition for rulemaking filed by the Wireless Information Networks Forum (“WINForum”) requested rule changes that would allow isochronous UPCS devices to operate in the entire 1910-1930 MHz UPCS band.¹⁹ This petition received almost universal support from commenters, including Motorola, and the few minor concerns raised in a small handful of comments subsequently were addressed adequately by WINForum’s reply.²⁰

Although the Commission has not acted upon the WINForum petition to date, it sought comment on potential alternative uses for some or all of the 1910-1930 MHz band in the *Further*

¹⁸ *Id.*

¹⁹ *See id.* ¶ 42.

Notice released in August 2001.²¹ Comments submitted in response to the *Further Notice* overwhelmingly supported allowing crossover use of isochronous devices in the 1910-1920 MHz band.²² Motorola's comments explained that more than 400,000 users, including educational, medical, local government and commercial interests depend upon isochronous devices that operate in the 1920-1930 MHz band, supported by numerous device manufacturers.²³ Motorola noted that the demand for isochronous devices has far outstripped that for asynchronous devices in the neighboring 1910-1920 MHz band and, in some areas, the demand for UPCS has reached saturation point.²⁴ Numerous commenters echoed Motorola's comments, noting the widespread uses of isochronous devices and growing demand for UPCS.²⁵

The record developed by the Commission over the past four years therefore clearly reflects that there has been widespread deployment of isochronous UPCS devices in the 1920-1930 MHz band and that the rapidly growing demand for these devices justifies making an additional 5 MHz of spectrum available for their use in the UPCS band. As the *Third NPRM* notes, the record reflects "continuing growth in the deployment of isochronous devices . . . and that there is a need for more

²⁰ See Reply Comments of Motorola, Inc., RM-9498, Apr. 26, 1999, at 1-2 (noting that the rule changes sought by WINForum "were nearly universally supported in the comments" and that the few minor issues raised were subsequently addressed in WINForum's reply comments).

²¹ 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 Docket No. 00-258, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 16 FCC Rcd 16043, ¶ 11 (2001) ("*Further Notice*").

²² See Reply Comments of Motorola, Inc., ET Docket No. 00-258, Nov. 8, 2001, at 10 & n.37 ("Motorola FNPRM Reply Comments") (citing a selection of the supporting comments).

²³ See Comments of Motorola, Inc., ET Docket No. 00-258, Oct. 22, 2001, at 20 ("Motorola FNPRM Comments").

²⁴ See *id.* at 20; see also *Third NPRM* ¶ 52.

²⁵ See, e.g., Comments of Avaya, ET Docket No. 00-258, Oct. 19, 2001, at 5-6; Comments of UTAM, Inc. ET Docket No. 00-258, Oct. 19, 2001, at 8-11.

spectrum for such uses in certain locations.”²⁶ Accordingly, Motorola urges the Commission to retain the 1915-1920 MHz band for UPCS operations and to amend Part 15 to give users the flexibility to operate isochronous devices in this band.

III. THE 1920-1930 MHZ BAND SHOULD BE RETAINED FOR UNLICENSED OPERATIONS UNDER THE COMMISSION’S CURRENT RULES

The *Third NPRM* “recognize[s] that UPCS equipment manufacturers, distributors, and end users have invested considerable efforts and resources in the development and deployment of isochronous devices in the 1920-1930 MHz band, and that re-designation of the 1920-1930 MHz band for AWS would upset the reasonable expectations of these parties.”²⁷ Accordingly, the Commission states that “we are no longer proposing to reallocate the 1920-1930 MHz portion of the UPCS band to support AWS applications.”²⁸ For the reasons explained in the preceding section, Motorola agrees with these Commission’s findings. Consistent with its comments on the *Further Notice*, Motorola supports the Commission’s proposal to retain the 1920-1930 MHz band for UPCS.²⁹ The growing demand for UPCS devices amplify justifies retaining this band under its current designation.

IV. THE 1995-2000 MHZ BAND IS OF LIMITED UTILITY FOR PCS DUE TO INTERFERENCE CONSTRAINTS

The *Third R&O* reallocated the entire 1990-2000 MHz band for Fixed and Mobile services. The *Third NPRM* seeks comments on the best use of the 1995-2000 MHz band if, as Motorola

²⁶ *Third NPRM* ¶ 52.

²⁷ *Third NPRM* ¶ 46.

²⁸ *Id.*

²⁹ See Motorola FNPRM Comments at 14-19; Motorola FNPRM Reply Comments at 12-16.

recommends, the Commission elects to pair the 1910-1915 MHz and 1990-1995 MHz bands to create a 2x5 MHz “G” Block. In particular, the *Third NPRM* asks whether this 5 MHz band could be used to support low-power unlicensed devices or point-to-point licensed services.³⁰

The 1995-2000 MHz band presents significant challenges due to a number of potential interference concerns. If the Commission were to establish a 2x5 MHz Broadband PCS “G” Block, as Motorola recommends, the 1995-2000 MHz band would adjoin the “G” Block base transmit band³¹ and the MSS/ATC mobile transmit band at 2000-2020 MHz. As discussed further below, operations in the 1995-2000 MHz band would potentially receive interference from the MSS/ATC band, and could also cause interference to mobile receivers in the adjacent PCS and MSS/ATC bands.

Operations in the 1995-2000 MHz band would be subject to interference from mobile transmitters operating in the 2000-2020 MHz MSS/ATC band. A recent industry presentation to the Commission showed that ATC mobile transmitters will interfere with operations in adjacent bands and therefore recommended establishment of a guard band between the upper PCS band and the MSS/ATC band.³² In the *Third R&O*, the Commission expressly acknowledged that it shares these industry concerns regarding potential interference.³³ Accordingly, in the recent *MSS Flexibility Order* it adopted out-of-band emissions limits for ATC handsets that linearly transition from an attenuation requirement of $43 + 10 \log(P)$ dB at 2000 MHz to a more stringent attenuation of $70 + 10 \log(P)$ dB

³⁰ See *Third NPRM* ¶ 53.

³¹ The *Third NPRM* notes that the Commission expects that PCS operations in the “G” Block would follow the conventional duplex configuration, *i.e.*, with the 1910-1915 MHz as the mobile transmit band and 1990-1995 MHz as the base transmit band. See *id.* ¶ 51.

³² See Letter from Diane Cornell, Cellular Telecommunications and Internet Association, to Marlene Dortch, ET Docket No. 00-258, Jan. 14, 2003, Attachment at 2, 8 (“CTIA January 14 letter”).

at 1995 MHz.³⁴ While these limits reduce the potential for interference to operations in the Broadband PCS spectrum, they remain significantly above limits that the PCS industry imposes and will impact PCS operations. Furthermore, they provide only very limited benefit for operations in the immediately adjacent 1995-2000 MHz band, and thus the potential for interference into this band remains unacceptably high for PCS operations.

High-power operations in the 1995-2000 MHz band could produce significant interference to PCS handsets, particularly in the proposed adjacent “G” Block band. In addition, high-power base station transmitters operating in the 1995-2000 MHz band would likely cause interference into MSS/ATC base station receivers. For example, industry calculations show that a guard band of at least 5 MHz would be required between a PCS base station transmit band and the MSS/ATC band to prevent interference into ATC base station receivers.³⁵ This guard band requirement effectively precludes designation of the 1995-2000 MHz band for high-power operations.

Given these interference concerns, the utility of the 1995-2000 MHz band for high-power operations is quite limited and the band is therefore best suited as a guard band between PCS and MSS/ATC operations. As such, the Commission’s suggestion that this band might be suitable for low-power unlicensed operations appears to be appropriate. Although Motorola generally supports restricting designations of spectrum for unlicensed use to spectrum above 10 GHz,³⁶ given the

³³ See *Third R&O* ¶ 35.

³⁴ Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band, IB Docket No. 01-185, Report and Order and Notice of Proposed Rulemaking, FCC 03-15 (rel. Feb. 10, 2003) (“*MSS Flexibility Order*” and “*MSS Flexibility NPRM*”).

³⁵ See CTIA January 14 letter, Attachment at 7.

³⁶ See Comments of Motorola, Inc., ET Docket No. 02-135, Jan. 27, 2003, at 23.

limitations imposed by operations in adjacent bands, such a designation appears to be appropriate in this instance.

V. THE 2020-2025 MHZ BAND IS OF LIMITED UTILITY FOR PAIRING WITH EXISTING PCS OR AWS SPECTRUM

The Commission has reallocated the 2020-2025 MHz band for Fixed and Mobile services and is seeking comment on the best use of this band.³⁷ This spectrum formerly was part of the MSS 1990-2025 MHz uplink band. The *Third NPRM* suggests that this spectrum could be used to support frequency division duplex (“FDD”) to time division duplex (“TDD”) applications.³⁸

Because this band provides only 5 MHz of spectrum, its utility is somewhat limited. Moreover, the band is not suitable for use as a base station transmit band for PCS or AWS because it adjoins the resized 2000-2020 MHz MSS uplink band. As discussed in the preceding section, PCS base station transmissions would cause interference into adjacent MSS/ATC base station receivers, necessitating a guard band of at least 5 MHz, and likely greater. This consideration precludes any use of the 2020-2025 MHz spectrum as a base station transmit band.

Furthermore, the 2020-2025 MHz band has limited utility as an add-on to an existing PCS or AWS mobile transmit band because of the wide frequency separation between it and either the 1850-1910 MHz or 1710-1755 MHz band. Even if the band could be paired with 5 MHz of spectrum in another band, such a pairing would not be competitive with other AWS paired spectrum blocks, which may be 20 MHz or 30 MHz in size.³⁹

³⁷ See *Third NPRM* ¶ 62.

³⁸ See *id.* ¶ 68.

³⁹ See Reply Comments of Motorola, Inc., WT Docket No. 02-353, Mar. 14, 2003, at 2 (observing that “the majority of commenters support the use of licensed spectrum blocks of at least 20 MHz”).

Given these various constraints, one potential use for this spectrum may be as unpaired spectrum for TDD applications. However, the Commission would need to impose technical requirements that appropriately limit the potential for interference between operations in this band and the adjacent MSS/ATC uplink band, and these emission limits would significantly impact the usefulness of this spectrum. Given the limited commercial viability of this spectrum, the Commission should also consider whether it might be better used to facilitate relocation of Government operations from the 1710-1755 MHz band into the 2025-2110 MHz band. This additional 5 MHz may provide greater public benefit in this capacity.

VI. THE 2155-2180 MHZ BAND SHOULD BE DESIGNATED FOR AWS TO ENABLE A 2110-2180 MHZ DOWNLINK BAND, BUT LICENSING SHOULD BE DEFERRED UNTIL AFTER THE LAUNCH OF AWS

The *Third NPRM* tentatively concludes that the 2155-2180 MHz band should be made available for new fixed and mobile services, including AWS.⁴⁰ This band offers enormous potential as additional AWS downlink spectrum that would harmonize with existing international AWS spectrum allocations. Motorola therefore recommends two possible courses of action with regard to the 2155-2180 MHz band: (1) maintain the band in reserve for later designation either once spectrum becomes available that is suitable for pairing with it or for asymmetric use; or (2) auction the spectrum as part of the 1710-1755 MHz and 2110-2155 MHz bands, creating asymmetric downlinks with the 1710-1755 MHz uplink.

Designating this band for AWS would create a contiguous 2110-2180 MHz band that coincides with the 2110-2170 MHz downlink segment of the terrestrial component of the International

⁴⁰ See *Third NPRM* ¶ 68.

Mobile Telecommunications-2000 (“IMT-2000”) spectrum identified at the World Administrative Radio Conference (“WARC-92”).⁴¹ This spectrum has been widely allocated as the terrestrial component of the “core band” of the Universal Mobile Telecommunications System (“UMTS”) spectrum designated for 3G services,⁴² and specifically the base station transmit portion of this UMTS spectrum.⁴³ It would also harmonize with international allocations in Brazil, Japan, Korea and other countries.⁴⁴

As Motorola has noted in previous comments, achieving harmony with existing international IMT-2000 allocations at 2110-2170 MHz would produce numerous significant benefits: it would reduce equipment design issues and facilitate the development of multi-mode equipment; it would enable manufacturers to achieve economies of scale and thus lower equipment costs for consumers; and it would greatly facilitate the prospect of global roaming.⁴⁵ The Commission explicitly recognized these benefits when it allocated the 1710-1755 MHz and 2110-2155 MHz bands for AWS.⁴⁶

⁴¹ See *Final Acts of the World Administrative Radio Conference*, Res. 212 (Istanbul, WARC-92); see also 47 C.F.R. § 2.106 notes S5.388, S5.389A. WARC-92 identified the 2110-2200 MHz band for IMT-2000 (*i.e.*, 3G) services. The 2110-2170 MHz portion of this band is identified for terrestrial use; the remainder is the satellite component. See *id.*

⁴² See *UMTS/IMT-2000 Spectrum*, UMTS Forum Report No. 6, June 1999, §§ 1.5, 3.4.1, at 18, 44, available at http://www.umts-forum.org/reports_r.html (“UMTS Report”).

⁴³ See *id.* § 3.5.4, at 52; see also ITU Recommendation ITU-R M.1036-1, Spectrum Considerations for Implementation of International Mobile Telecommunications-2000 (IMT-2000) in the Bands 1885-2025 MHz and 2110-2200 MHz, § 4.1 (Jan. 1999).

⁴⁴ See *id.* § 1.5, at 18; *Decision on 3G Spectrum Aligns Brazil with Global IMT-2000 Vision*, June 23, 2000, at <http://www.umts-forum.org/press/article039.html>.

⁴⁵ See, *e.g.*, Motorola FNPRM Comments at 5-6; Comments of Motorola, Inc., WT Docket No. 02-353, Feb. 7, 2003, at 7.

⁴⁶ 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 Docket No. 00-258, Second Report and Order, 17 FCC Rcd 23193, ¶¶ 24, 29, 40 (2002).

Extending the AWS downlink band to achieve greater overlap with international allocations would correspondingly increase the benefits that could be achieved from harmonization.

If the Commission were to elect the first option proposed above, it would hold the 2155-2180 MHz band in reserve at present. As the market for 3G services develops, the Commission could then consider making this band available to meet demand for additional downlink spectrum for PCS, cellular or AWS, or designating it for paired use if spectrum in a suitable band is made available in the future. If, however, the Commission prefers to license the 2155-2180 MHz band at the same time as the 1710-1755 MHz and 2110-2155 MHz bands, it could create asymmetric spectrum blocks that provide greater downlink capacity for AWS licensees.

Although the *Third NPRM* suggests that the 2155-2180 MHz band could be used to support TDD applications, Motorola notes that the record in this proceeding has established that FDD technology is better suited for wide area 3G mobile operations than TDD.⁴⁷ Moreover, if the Commission were to allow TDD applications to operate in the 2155-2180 MHz band, a guard band of at least 5 MHz would be required between FDD and TDD systems, and even then additional filtering and coordination measures would be needed to prevent harmful interference from occurring.⁴⁸

The *Third NPRM* also seeks comment on the most appropriate spectrum allocation for Multipoint Distribution Service (“MDS”) incumbents in the 2155-2160/62 MHz band and tentatively concludes that this spectrum should be made available for new fixed and mobile services, including AWS.⁴⁹ Motorola agrees with this conclusion because re-designation of the 2155-2180 MHz band

⁴⁷ See, e.g., Reply Comments of Motorola, Inc., ET Docket No. 00-258, Mar. 9, 2001, at 9 (citing the TIA’s assessment that TDD systems are useful generally in low power, lower mobility applications).

⁴⁸ See Motorola FNPRM Comments at 16.

⁴⁹ See *Third NPRM* ¶ 68.

as additional AWS downlink spectrum would represent the optimal use of this band, for all of the reasons stated above. Furthermore, even if only part of the 2155-2180 MHz band were to be re-designated for AWS, relocation of MDS incumbents within the this band would not be feasible due to the significant likelihood of interference from AWS transmitters into MDS receivers. With current MDS technology, a guard band of 3-5 MHz would be necessary between AWS and MDS spectrum.⁵⁰ Notably, MDS interests recognize that relocation of MDS incumbents within the 2155-2180 MHz band is not feasible.⁵¹

Instead, Motorola continues to support relocation of MDS incumbents to comparable spectrum in another band, as well as full compensation for the incumbents' relocation costs.⁵² More specifically, there is considerable support for the funding of relocation costs from the proceeds of the AWS auction.⁵³

VII. CONCLUSION

For the foregoing reasons, Motorola supports Commission action consistent with these comments.

⁵⁰ See Motorola December 17 ex parte at 2. Accordingly, Motorola opposes the alternative proposal raised in the *Third NPRM* – to retain MDS incumbents in the 2155-2180 MHz band and to allocate them 5 MHz of additional spectrum starting at 2160 MHz to replace spectrum reallocated from 2150-2155 MHz. See *Third NPRM* ¶ 69.

⁵¹ See Reply Comments of the Wireless Communications Association International, Inc., WT Docket No. 02-353, Mar. 14, 2003, at 4-5.

⁵² See Motorola FNPRM Comments at 13; Motorola FNPRM Reply Comments at 7.

⁵³ See Motorola FNPRM Reply Comments at 7.

Respectfully submitted,

/S/ Steve B. Sharkey

Steve B. Sharkey
Director, Spectrum and Standards Strategy
Motorola, Inc.
1350 I Street, N.W.
Washington, D.C. 20005
(202) 371-6900

/S/ Robert D. Kubik

Robert D. Kubik
Manager, Spectrum and Regulatory Policy
Motorola, Inc.
1350 I Street, N.W.
Washington, D.C. 20005
(202) 371-6900

April 14, 2003