

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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| In the Matter of |) | |
| |) | |
| Amendment of Part 2 of the Commission's |) | ET Docket No. 00-258 |
| 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 |) | |
| |) | |
| Amendment of Section 2.106 of the |) | ET Docket No. 95-18 |
| Commission's Rules to Allocate Spectrum |) | |
| at 2 GHz for Use By the Mobile |) | |
| Satellite Service |) | |
| |) | |
| The Establishment of Policies and |) | IB Docket No. 99-81 |
| Service Rules for the Mobile Satellite |) | |
| Service in the 2 GHz Band |) | |
| |) | |
| Petition for Rule Making of the |) | RM-9498 |
| Wireless Information Networks Forum |) | |
| Concerning the Unlicensed Personal |) | |
| Communications Service |) | |
| |) | |
| Petition for Rule Making of UTStarcom, |) | RM-10024 |
| Inc., Concerning the Unlicensed |) | |
| Personal Communications Service |) | |

To: The Commission

**COMMENTS OF ARRL, THE NATIONAL ASSOCIATION
FOR AMATEUR RADIO, IN RESPONSE TO
FURTHER NOTICE OF PROPOSED RULE MAKING**

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), by counsel and pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. §1.415) hereby respectfully submits its comments in

response to the *Further Notice of Proposed Rule Making* (the Further Notice), FCC 01-224, released August 20, 2001.¹ The Further Notice is an incorporated part of the *Memorandum Opinion and Order and Further Notice of Proposed Rule Making*, by which the Commission explores possible use of frequency bands below 3 GHz to support the introduction of new advanced mobile and fixed terrestrial wireless services. The Further Notice explores, but does not specifically propose, the use of certain bands in the vicinity of 2 GHz for either: (a) advanced wireless services, including third generation and future generations of wireless services, or (b) relocation spectrum to accommodate incumbent users displaced from other bands to make room for new advanced wireless services. Relative to the proposed use of the 2390-2400 MHz band for either application, ARRL states as follows:

I. Introduction

1. ARRL is concerned in this proceeding with only one portion of the Further Notice: the consideration of possible additional allocations in the 2390-2400 MHz band. The Further Notice combines consideration of the 1910-1930 MHz band and the 2390-2400 MHz band as candidate bands for advanced wireless systems, noting that those bands are currently available for unlicensed PCS. The 2390 MHz band is presently used domestically for asynchronous PCS, though ARRL is aware of the interest expressed by WINForum in its January 8, 1999 Petition for Rule Making (considered in this proceeding), to broaden the nature of asynchronous U-PCS operation in the band. The 2390-2400 MHz segment is allocated to and used by the Amateur Service on a primary basis. While ARRL is not

¹ The comment period in this proceeding was extended by *Order Extending Comment Period*, DA 01-2313, released October 4, 2001.

opposed to additional compatible users in the 2390-2400 MHz band, it is very much concerned about the addition of incompatible uses that would adversely affect the increasing, and planned future Amateur use of the band.

II. Background

2. The Further Notice correctly states that the 2390-2400 MHz band is allocated internationally in ITU Region 2 on a co-primary basis to the Fixed, Mobile, and Radiolocation Services, and on a secondary basis to the Amateur Service. Initially, the Amateur Service had secondary allocation status domestically in the band as well, and Government radiolocation was primary. The Federal government used the band for military radar testing systems, such as target scattering and enemy radar simulators.² Reallocation of the band to private sector use was completed on August 9, 1994 pursuant to Title IV of the Omnibus Budget Reconciliation Act of 1993 (OBRA-93).³

III. Commercial Use of 2390-2400 MHz Would Preclude Incumbent and Future Amateur Operation

3. In implementing the reallocated spectrum pursuant to OBRA-93, the Commission issued a series of Orders in ET Docket No. 94-32. The first of these, the *First Report and Order and Second Notice of Proposed Rule Making*, 10 FCC Rcd. 4769 (1995), addressed the immediate reallocations made by NTIA, including 2390-2400 MHz. The Commission noted therein that non-government use of the band was circumscribed in the view of the Department of Commerce by virtue of the National Astronomy and Ionospheric Center

² See, NTIA, Spectrum Reallocation Final Report, NTIA Special Publication 95-32, February, 1995, at p. 5-4.

³ Pub. L. 103-66, 107 Stat. 312 (August 10, 1993).

which operates a planetary research radar at Arecibo, Puerto Rico at 2380 MHz. In order to protect radioastronomy operations, the Department of Commerce stated that the 2390-2400 MHz band should not be used for airborne or space-to-Earth links, and that restrictions on terrestrial operations in the vicinity of the Puerto Rico planetary research radar facility may be necessary.⁴ The comments filed in that proceeding strongly supported retention of the Amateur allocation at 2390-2400 MHz:

Amateur service commenters contend that sharing between commercial licensees and the Amateur service is generally not possible because of the density and location of commercial users. These commenters describe the important contributions that the Amateur Service makes by providing emergency communications, educational opportunities, and radio communications research. They contend that continued access to all or most of the 13 cm band is important to the Amateur Service, because the band provides an opportunity for growth as lower bands become increasingly congested or are allocated for services other than the Amateur Service...

10 FCC Rcd. at 4774.

4. The Commission in that same Report and Order considered various commercial services that might be allowed access to the 2390-2400 MHz spectrum. These included wireless local loop service, in-flight aeronautical audio/visual service, private land mobile radio service, interactive video and data service, and non-geostationary mobile satellite service. 10 FCC Rcd. at 4774-4779. All of these commercial uses were ultimately rejected, however. Instead, the Commission accepted the negotiated proposal submitted jointly in the proceeding by ARRL and Apple Computer, Inc. which constituted a compatible sharing proposal: the 2390-2400 MHz band would be used by asynchronous unlicensed

⁴ 10 FCC Rcd. at 4773.

PCS, regulated under Part 15 of the Commission's Rules, and the band would be allocated on a primary basis to the Amateur Service.

5. As the Commission held in 1995 in the *First Report and Order and Second Notice of Proposed Rule Making, supra*, 10 FCC Rcd. at 4780:

We will regulate these unlicensed PCS devices in accordance with Part 15 of our Rules. Devices operating under Part 15 have generally proven to be effective in operating in shared environments with other services, including in frequency bands shared with the Amateur service. We recognize the value of maintaining adequate spectrum for the Amateur service and we believe that the generally robust nature of PCS devices will make it feasible for unlicensed PCS devices and Amateur operations to operate on a shared basis in this band. In addition, both Apple and the ARRL believe that shared use of this band is possible (footnote omitted). Accordingly, we are providing for the continued availability of the 2390-2400 MHz band for Amateur operations, and are increasing the status of the Amateur service in this band to primary (footnote omitted). Considering past experience of Part 15 devices and Amateur service users operating in a shared environment, we do not believe that it is necessary to adopt specific provisions for protecting either of these operations.

The Commission went on to note that, while it had considered allocating the band for Fixed and Mobile services or for a number of specific services proposed by commenters in the Docket 94-32 proceeding such as AAVS, wireless local loops, and MSS, "we believe that use by new unlicensed PCS and continued use by the Amateur service represents the greatest opportunity for using this band to benefit the public." 10 FCC Rcd. at 4780-4781.⁵

⁵ The ultimate conclusion of the Commission was that the allocation decision would benefit the public in numerous ways:

We believe that allocation of this band for unlicensed PCS will lead to the development of new and unique devices and applications that can be provided in a cost effective manner and will be available to virtually every person in the nation (footnote omitted). Such devices will increase American

IV. The Compatibility Between the Amateur Service And U-PCS at 2390-2400 MHz Was Carefully Determined

6. The compatible sharing plan developed jointly between ARRL and Apple Computer, Inc. for the 2390-2400 MHz band was not an accident; it was carefully analyzed as a technical matter by engineering staff of both entities. The principal applications of data-PCS systems are indoors, and the power and antenna gain of such systems are limited pursuant to Sections 15.319-15.231 of the Commission's Rules. Only asynchronous devices are permitted in the band now, with minimum bandwidths of 500 kHz. Devices of less than 2.5 MHz bandwidth are required to search for an available window in the band. All devices must have a mechanism for monitoring the spectrum before transmitting. Significant attenuation is required near the band edges. Peak transmit power must not exceed 100 uW multiplied by the square root of the emission bandwidth in hertz. Power spectral density must not exceed 3 milliwatts in any 3 kHz bandwidth. Peak transmitter power must be reduced by the amount in decibels that the directional gain of the antenna exceeds 3 dBi.

7. It is these constraints⁶ that make asynchronous U-PCS fundamentally compatible

productivity by allowing business to operate more efficiently and will allow more people to access information in a variety of ways from almost any location. Amateur Service use of this band will allow these users to continue to develop radio communication technologies through experimentation, provide communications during emergencies and natural disasters, and provide education in the area of radio communication.

10 FCC Rcd. at 4781.

⁶ Not all of the operating limitations on asynchronous U-PCS devices are necessary to

with primary Amateur operations in the band. Those carefully crafted operating parameters are not duplicated by most other commercial services, and the Commission so found in Docket 94-32. The Commission specifically held, relative to 2390-2400 MHz that "an allocation for Fixed and Mobile use would be incompatible with continued use of this band by the Amateur Service." 10 FCC Rcd. at 4781. With respect to wireless local loop service, the Commission found it to be "incompatible with continued use of this band by the Amateur Service." *Id.*

8. The Commission has repeatedly noted its obligations under the 1993 Omnibus Budget Reconciliation Act [47 U.S.C. §§923(c)(1)(C)(iii)] to avoid disruption of existing use

avoid adverse interaction with Amateur stations in the 2390-2400 MHz band. ARRL filed comments April 9, 1999 essentially supporting the deregulation requested by WINForum relative to U-PCS devices in that band. ARRL stated as follows:

(ARRL) was, and remains, satisfied that the rules set forth in Sections 15.319 and 15.321 of the Commission's Rules are and have been sufficient to enable compatible use of the 2390-2400 MHz segment by asynchronous U-PCS devices, without interference to primary amateur operations. Neither does (ARRL) oppose the proposed rule changes set forth in the WINForum petition relative to the 2390-2400 MHz band, with certain conditions. The most important of these is that there be no power increase permitted for asynchronous U-PCS devices at 2390-2400 MHz. There must additionally be no change in the maximum power spectral density (3 mW in any 3 kHz bandwidth) set forth in Section 15.319(d) of the Rules. These provisions were each essential portions of the understanding reached between the League and Apple Computer during the Docket 94-32 proceeding that resulted in League support of the U-PCS authorization at 2390-2400 MHz.

ARRL also supported elimination of the listen-before-transmit protocol, since it provided no interference protection to sensitive amateur receivers seeking weak signal reception. ARRL did oppose, however, the proposal to permit an increase in antenna gain from 3 dBi to 6 dBi, the maximum permitted antenna gain for asynchronous U-PCS devices before requiring reduction of power by 1 dB for each additional dB by which the antenna gain exceeds the maximum.

of Federal government frequencies by Amateur Radio licensees. While it has not always complied with that obligation, it is at least cognizant of it. In the "*Report From the Federal Communications Commission to Ronald H. Brown, Secretary, U.S. Department of Commerce, Regarding The Preliminary Spectrum Allocation Report*", FCC 94-213, released August 9, 1994, the Commission stated, with respect to both the 2300-2310 MHz and the 2390-2400 MHz segments:

The largest factor affecting use of these bands is their existing availability for use by the Amateur Service (footnote omitted). Congress specifically sought to avoid disruption of existing use of Federal government frequencies by amateur radio licensees (footnote omitted). We agree with commenters that there is a substantial likelihood that reallocation of the 2300-2310 MHz and 2390-2400 MHz band to commercial or local government use could cause serious disruption to Amateur service use of these bands.

Id., at 17.

The same essential holding was included in Docket 94-32 in the *Notice of Proposed Rule Making*, FCC 94-272, released November 8, 1994, when the decisions regarding allocation of the 2390-2400 MHz band were being made:

Both the 2390-2400 MHz and 2402-2417 MHz bands are currently available for secondary use by the amateur service. The Reconciliation Act directed the Department of Commerce to seek to avoid excessive disruption of the amateur service and to determine the extent to which, in general, commercial users could share the frequency (sic) with amateur radio licensees (citation omitted)...We recognize the importance of the amateur service and, in making our allocation decisions, we will take into account existing use of the spectrum by the amateur service...

Id., at paragraph 20.

V. There Remains Incompatibility Between Commercial Uses

**And Amateur Uses at 2390-2400 MHz, But Some Displaced Federal
Government Facilities Could be Accommodated if Necessary**

9. Given as a preface all of the foregoing, the Commission asks in the instant Further Notice, at paragraph 12, whether the need to preserve adequate spectrum for the Amateur Service and the incompatibility between Amateur operations at 2390-2400 MHz and wide-area, high power Fixed and Mobile services in the same band remain "valid concerns" sufficient to preclude allocation of this band for advanced wireless services. It is readily apparent to ARRL, and it should be apparent to the Commission from the foregoing, that indeed they do remain valid concerns, and they are sufficient to preclude allocation of the band for advanced wireless services.

10. Sharing between the Amateur Service and commercial services, especially mobile commercial services, is extremely difficult generally, due to the shared frequencies within Amateur bands; the essentially mobile or itinerant character of Amateur stations; relatively high Amateur transmitter power levels, and extremely sensitive receivers. As noted (relative to the 2300-2310 MHz band) in the NTIA Final Spectrum Allocation Report, NTIA Special Publication 95-32, February, 1995, at Appendix B:

Sharing between Federal Government users and the amateur service has been successful largely because Federal operations are generally located outside of highly populated areas (citation omitted). It is very unlikely that the Amateur Service will enjoy an analogous situation with a commercial or other private sector service. If commercial services are to share with the weak signal operations located at 2303.75 - 2304.75 MHz, they must be able to withstand potential interference from the high-powered transmitters used for those operations, but not create interference to the sensitive receivers used. This is something of a contradiction that tends to point to relatively low powered devices that operate over short distances, such as devices authorized under Part 15 of the Commission's Rules, or to operations with a lower density of use that may be located in relatively remote areas. Similar

operations should also be compatible with amateur service fixed operations, as would commercial fixed operations that can be coordinated with amateur systems.

While some types of fixed, point-to-point amateur operation can be coordinated with other, lower powered, licensed, fixed commercial facilities, amateur television and mobile data communications, both of which are conducted in and well-suited to the 2390-2400 MHz band, cannot be coordinated with non-Amateur fixed or mobile facilities, and therefore are fundamentally incompatible.

11. The Further Notice also seeks comment on possible relocation to 2390-2400 MHz of Federal Government users displaced from 1755-1850 MHz, which is to be used for advanced wireless services. Motorola specifically proposed to the Commission in July of this year in an *ex parte* submission, the coupling of the 2385-2390 MHz segment with the 2390-2400 MHz segment as relocation spectrum for displaced Federal Government uses. As a general matter, the Amateur Service and the Federal Government are, and have been, compatible sharing partners. While ARRL would urge the Commission in the strongest possible terms not to make any allocation of the 2390-2400 MHz band for commercial purposes, it is not necessarily opposed to the addition of some types of displaced Federal Government uses at 2390-2400 MHz. If it is necessary to relocate displaced government uses, and if the alternative is to make a commercial allocation at 2390-2400 MHz, ARRL would be willing to participate in sharing studies to determine the compatibility of the particular government uses under consideration for placement at 2390-2400 MHz with Amateur uses. Of course, ARRL takes no position as to whether that band is suitable from the Federal Government's perspective, or whether Federal Government uses can be

displaced without adverse effect on Government, and especially defense, operations.

VI. The Suitability of 2390-2400 MHz as an IMT-2000 Band

12. WARC-92 identified 230 MHz of spectrum for IMT-2000, Third-Generation cellular systems in the bands 1885-2025 MHz and 2110-2200 MHz, including the bands 1980-2010 MHz and 2170-2200 MHz for the satellite component. ITU-R studies forecast the need for an additional 160 MHz of spectrum for IMT-2000. By virtue of Resolution 223 at WRC-2000, the ITU-R was invited to study the bands 1710-1885 MHz and 2500-2690 MHz for that application. Resolution 225 at WRC-2000 identified the bands 1525-1544 MHz, 1545-1559 MHz, 1610-1626.5 MHz, 1626.5-1645.5 MHz, and 2483-2500 MHz as well as 2500-2520 MHz and 2670-2690 MHz for IMT-2000.

13. Although it was recognized that 2390-2400 MHz may be used by some countries for IMT-2000, in practice such use is likely to be extremely isolated if not non-existent. The band is narrow relative to the overall spectrum requirement for IMT-2000 and is an unsuitable candidate for international roaming, as its use would not be consistent with the allocations of the vast majority of administrations. It is clearly unsuitable for such use in the United States.

VII. The WINForum Petition

14. Finally, the Further Notice asks for comment on the WINForum Petition for Rule Making, RM-9498, which seeks certain modifications discussed above in the technical rules for operations in the 2390-2400 MHz band, including peak power, frequency stability, and spectrum etiquette rules. ARRL would reiterate the position taken in its April 9, 1999 comments filed in response to the Petition. These comments, discussed briefly

hereinabove, generally support the WINForum petition as it relates to the 2390-2400 MHz band (ARRL took no position on the portion of the Petition that related to the 1910-1930 MHz U-PCS band), with certain caveats. ARRL would oppose a power increase for asynchronous U-PCS devices at 2390-2400 MHz, and there can be no change in the maximum power spectral density (3 mW in any 3 kHz bandwidth). These two provisions are critical to the compatible sharing plan that resulted in ARRL support of the U-PCS authorization at 2390-2400 MHz. The listen-before-transmit protocol is not critical to interference avoidance, and its elimination is not opposed by ARRL. There is no justification for the proposed doubling of permitted antenna gain, however, without reduction of transmit power by 1 dB for each dB of additional gain. With those caveats, and especially the urgency of retaining the power spectral density limitation, ARRL interposes no objection to the relief requested in the WINForum Petition.

VII. Conclusions

15. ARRL has asked the Commission in recent proceedings dealing with Amateur allocations in the band 2300-2450 MHz to take a broad look at the history of amateur allocations at 2 GHz. What becomes obvious from any such review is the extent to which those allocations have been steadily eroded. Until approximately fifteen years ago, the Amateur Service had secondary access domestically to the entire 2300-2450 MHz band. Internationally, the Amateur Service is secondary in the entire 2300-2450 MHz band in all three ITU regions, subject to certain footnotes to the Table of Allocations. In the United States, the 2400-2483.5 MHz segment is available for Industrial, Scientific and Medical devices operating pursuant to Part 18 of the Commission's rules and for unlicensed Part 15

devices using relatively high power. The domestic allocation for amateurs at 2300-2450 MHz provided essentially unlimited use of the 2300-2400 MHz band prior to 1984, due to the relatively light use by Government Radiolocation, away from populated areas. Most amateur operation below 2400 MHz, however, has historically concentrated most densely around 2304 MHz. The portion of the band above 2400 MHz has been used for amateur television and satellite operation, and more recently, the 2390-2450 MHz segment has been used for broadband amateur applications.

16. The Amateur Service was excluded from the 2310-2390 MHz band domestically in 1984, in order to accommodate aeronautical flight test telemetry in that band in certain areas.⁷ Amateur use of the 2400-2450 MHz band has always been limited by noise from Part 18 operation above 2400 MHz, and more recently, to a far greater extent, by noise from Part 15 high-power unlicensed devices. The Commission's plan for rulemaking (in Docket 94-32) to determine the allocation of the 2300-2310 MHz band, and the utility of amateur use of the upper half of that band, was altered by the passage, on October 4, 1996, of Public Law 104-208, the Omnibus Consolidated Appropriations Act, for FY 1997. That legislation, in part, ordered the Commission to auction the 2305-2320 MHz, and 2345-2360 MHz bands to wireless services, and to assign the use of those frequencies by competitive bidding. The MWCS was the result, and the Amateur Service has little residual access to 2305-2310 MHz.

17. Therefore, in a band originally comprising 150 MHz, 80 MHz thereof was

⁷ See the *Second Report and Order*, General Docket 80-739, FCC 83-511, released December 8, 1983; and the *Report and Order*, FCC 84-446, 56 RR 2d 1413 (1984) in Docket 84-186.

reallocated completely for Flight Test Telemetry; 5 MHz has been effectively reallocated due to the varied MWCS auctioned service; and another 50 MHz is subject to limited and diminishing utility to the Amateur Service due to steadily increasing noise levels from Part 15 and Part 18 devices. The Amateur allocation at 2390-2400 MHz is also used by asynchronous U-PCS. The allocation at 2300-2305 MHz, though currently heavily used by Amateurs, is subject to a petition to reallocate the band for satellite data uplinks and for location monitoring services. *Of the original 150 MHz, the only primary Amateur allocation that is actually available for a variety of Amateur uses is the 10 MHz at 2390-2400 MHz.* Therefore, the Commission's statement at Footnote 27 of the instant Further Notice, to the effect that "(a)pproximately 200 megahertz of spectrum below 3 GHz is now allocated to amateur services for either primary or secondary use" is extremely misleading and unfair. One might conclude therefrom, (absent greater elaboration) that the quantity of allocated spectrum equates to available, useful spectrum. In the vicinity of 2 GHz, that is hardly the case for the Amateur Service.

18. Nothing has changed since 1995 relative to the Commission's findings of incompatibility between the Amateur Service and commercial uses in the 2390-2400 MHz band, except that the Amateur Service has made increasing use of the band. ARRL urges the Commission not to make any allocation of that band for advanced wireless services. Such are fundamentally incompatible with continued Amateur access to the band. If it is absolutely necessary to reaccommodate some displaced users at 2390-2400 MHz, the Federal Government (principally government radiolocation) has historically been a compatible sharing partner with the Amateur Service. Subject to the outcome of

compatibility studies, Government uses would constitute the least disruptive opportunities for sharing with Amateurs at 2390-2400 MHz.

Therefore, the foregoing considered, ARRL, The National Association For Amateur Radio, respectfully requests that the Commission make no commercial allocation at 2390-2400 MHz, or to add any other use to that band, unless it is necessary (1) to accommodate some displaced licensees in that band, and (2) if Federal Government uses can be successfully reaccommodated there. ARRL further requests that the Commission retain the non-Government primary allocation for the Amateur Service at 2390-2400 MHz.

Respectfully submitted,

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