Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	
Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands	WT Docket No. 02-146
Loea Communications Corporation Petition for Rulemaking	RM-10288

COMMENTS OF THE
FIXED WIRELESS COMMUNICATIONS COALITION

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The Fixed Wireless Communications Coalition (FWCC) hereby comments on the Notice of Proposed Rulemaking in this proceeding.[1]

A. Summary

The FWCC supports allocating and authorizing the 71-76, 81-86, and 92-95 GHz bands for Fixed Service (FS) operations. We accept the proposed allocations for radio astronomy, and suggest specific measures for the speedy coordination of FS operations in the vicinity of radio astronomy instruments. Although we take no position on allocations for mobile or satellite operations, we strongly oppose *authorizations* for mobile or satellite use in these bands. Sharing between mobile and fixed users is very likely to cause interference, because it is generally impossible to keep mobile devices out FS receiver antenna patterns. And, where sharing between satellite and fixed users has been tried in other bands, it has worked either to the marked detriment of the FS, or else not at all. We see no reason to expect a different result here.

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[1] *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, 17 FCC Rcd 12182 (2002) (FCC 2-180) (Notice of Proposed Rulemaking) ("Notice").

The FWCC is concerned about proposals to allow unlicensed operation as an "underlay" on licensed FS frequencies. Elsewhere in the spectrum, unlicensed operation under critical, carrier-grade communications is subject to a power limit fully *81 dB* below that proposed here. The proliferation of non-coordinated unlicensed devices at extremely high power levels (by unlicensed standards) is not compatible with the "five nines" reliability some FS users will require. Without some highly dependable mechanism for preventing interference, we urge segmenting the spectrum between licensed and unlicensed uses. Otherwise, however, the band should not be segmented or channelized.

Auctioning this spectrum is both unlawful and unnecessary, both for the same reason: Narrow beamwidths will preclude mutually exclusive applications, which are a prerequisite for auctions. And narrow beamwidths will allow multiple links to operate in close proximity without interference, even in crowded urban areas. Low spectrum costs will free individual users to build links where needed (subject to coordination), yielding the economic benefits that flow from rapid and efficient telecommunications deployment.

The Commission's concerns about the administrative burdens of licensing multiple individual links are best addressed simply by not licensing the links individually. We propose a mechanism whereby applicants will coordinate links automatically, over the Internet, and thereupon be licensed "by rule." With all links maintained and updated in the coordination data bases, there will be no need for individual site licenses, call signs, or Commission records of link data. This regime eliminates most of the administrative burden, and shifts the rest to the private sector.

In addition, the FWCC comments below on a few individual technical proposals.

B. Introduction

The FWCC is a coalition of equipment manufacturers and users interested in terrestrial microwave communications. Its membership includes manufacturers of microwave equipment, licensees of terrestrial fixed microwave systems and their associations, and communication service providers and their associations. The FWCC's membership also includes railroads, public utilities, petroleum and pipeline entities, public safety agencies, telecommunications carriers, and others. The FWCC comprises a broad variety of spectrum users, using many different frequency bands of the Fixed Service (FS). It has a direct interest in the outcome of this proceeding.[2]

At the outset, the FWCC commends the Commission for proposing allocations and rules that will provide additional spectrum for the FS. Despite steadily growing demand for service, the FS has seen its available spectrum steadily whittled away by transfers to other services, such as Personal Communications Service, Mobile Satellite Service, and Fixed Satellite Service. FS manufacturers have made up part of the shortfall through technological innovations that transmit more data on less radio-frequency bandwidth. Eventually, however, that approach runs up against the fundamental limits set by information theory.

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[2] Some FWCC members are also filing their own comments, including the Wireless Communications Association International, Inc. ("WCA"). Although the extensive comments of the WCA (filed Nov. 1, 2002) reflect substantial agreement with the FWCC, the two organizations' positions differ on a few matters. The Commission should consult WCA's comments directly for WCA's views on the various legal and technical issues raised in the proceeding.

The only long-term solution to the FS spectrum shortage is the allocation of more spectrum, together with the adoption of rules that encourage its maximum use. The following comments are directed to that outcome.

C. Allocations

1. 71-76 and 81-86 GHz

Fixed and mobile. The FWCC supports allocating the 71-76 and 81-86 GHz bands for fixed service, subject to the remarks below on unlicensed operation. A fixed allocation is badly needed to help alleviate the chronic and growing shortage of FS spectrum in other parts of the spectrum. We express no view on a mobile service *allocation*, although we strongly oppose mobile *licensing*, as explained below.

Satellite. The FWCC supports swapping the uplink and downlink sides of the FSS and MSS allocations, to become downlink at 71-76 GHz and uplink at 81-86 GHz, so as to protect radio astronomy operations at 81-86 GHz.[3] We have no opinion on the proposed U.S. footnote specifying that fixed, mobile, and broadcasting services at 74-76 GHz not cause interference to Federal Government stations in the fixed satellite service (FSS).[4] *We strongly oppose an allocation for non-Government FSS operations in the band*.[5] Previous attempts at sharing between the FS and FSS in other bands have proven to be impractical, inequitable, or both.[6]

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[3] Notice at paras. 20, 30-31.

[4] Notice at para. 21.

[5] Notice at paras. 22, 33.

[6] In some bands, such as 4/6 GHz, the Commission's practice of automatically licensing every earth station for the entire band, regardless of how little spectrum it actually needs, has made coordinating new FS links difficult or impossible. In other bands, such as 18

Nothing about these frequencies suggests there would be a different outcome here. Allocation issues notwithstanding, we note the Commission has not proposed to license satellite operations in these bands, and we support that position.

Amateur. The FWCC supports allowing amateur and AMSAT operations at 75.5-76 GHz to continue on a secondary (rather than primary) basis until January 1, 2006, with operations to cease thereafter.[7] Given the novel technical problems of manufacturing for the band, we think the Commission is probably correct that large-scale commercial use will mostly begin after that date.[8] By the same token, however, we oppose amateur and AMSAT operations at 81-81.5 GHz, even on a secondary basis.[9] Although secondary users must protect primary users in theory, that will be difficult to achieve in practice. Amateur stations are neither coordinated nor licensed by location, so identifying a particular amateur station that interferes with commercial operations may not be possible. Because at least some fixed services in the band will probably be common carrier services requiring "five nines" reliability,[10] a threat of any significant interference is not acceptable. One such application, for example, is likely to be base-station backhaul for the expected proliferation of 3G services. Other systems will probably handle corporate and

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GHz, the Commission itself has concluded that sharing is impracticable. *See Redesignation of the 17.7-19.7 GHz Frequency Band*, 15 FCC Rcd 13430 (2000) (Report & Order) (subsequent history omitted).

[7] Notice at paras. 23-24.

[8] Notice at para. 23.

[9] Notice at para. 32.

[10] This refers to 99.999% reliability, which limits outages to no more than about five minutes per year.

financial data. The carriers providing these services will rightly insist on highest possible levels of reliability, which preclude co-channel secondary operation.

Radio astronomy. The FWCC acknowledges radio astronomy as an important tool for the acquisition of scientific knowledge. We support allocating 81-86 GHz to radio astronomy on a primary basis,[11] subject to the protection measures discussed below.

2. 92-95 GHz

Fixed and mobile. For the same reasons discussed above in connection with 71-76 and 81-86 GHz, the FWCC supports allocating the 92-95 GHz band for fixed service; we express no views on a mobile service allocation; and we strongly oppose mobile licensing.

Other services. We do not oppose these proposed allocations:

- 92-94 GHz and 94.1-95 GHz bands to radio astronomy on a primary basis;
- 94-94.1 GHz to radio astronomy on a secondary basis; and
- 94-94.1 GHz band on a primary basis to the earth exploration satellite service and the space research service SRS for Federal Government use, limited to cloud radars.[12]

D. Protecting Radio Astronomy

The Commission asks whether radio astronomy observatories should be required to operate a website into which fixed point-to-point applicants can input link and transmitter data, and receive back a prompt indication of whether coordination is required, taking into account the observatory sensitivity, terrain shielding, and the azimuth of the path relative to the observatory.[13]

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[11] Notice at para. 30.

[12] Notice at paras. 40-41.

[13] Notice at para. 45.

Our informal contacts with the radio astronomy community show support for the concept, but also found concerns that radio astronomers may not have the resources and specialized software expertise to set up and maintain such a website. Representatives of the commercial frequency coordination industry, on the other hand, which does have the software expertise, tell us they lack essential knowledge about the observatory instruments, and specifically their required protection parameters.

We therefore endorse the website concept described in the Notice, but suggest that it be established and maintained by a commercial frequency coordinator, using protection criteria supplied by the radio astronomers. Because we expect that setting up the website will require specialized software development, we think its operator should be permitted to make a reasonable charge for responding to each inquiry, so as to offset those costs.

E. Band Plans

1. Licensed and Unlicenced Operation

As a general matter, the FWCC supports unlicensed operation.[14] Unlicensed devices are ideal for a wide range of applications that require low cost or rapid installation, and which can tolerate short range and/or limited reliability. Unlicensed operation typically increases spectrum efficiency by "underlaying" other applications in the same spectrum. These advantages have helped to make the technology one of the few bright spots in an otherwise bleak telecommunications economy.

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[14] Some parties prefer the term "license-exempt," to emphasize the circumstances under which operation without a license is lawful under the Commission's Rules.

The present Notice contemplates unlicensed operation as an underlay below the licensed services.[15] This has the appeal of extracting additional use from the same spectrum. But the proposal differs importantly from conventional Part 15 underlays, as used elsewhere in the spectrum. The power levels proposed for unlicensed operation here are the same as those now applicable to 57-64 GHz -- which are fully 81 dB higher than the usual Part 15 underlay levels![16] Moreover, unlicensed devices in these bands would operate on the same frequencies as carrier services demanding extremely high reliability. Today the only bands in which remotely comparable unlicensed power levels are allowed -- 1 watt at 902-928, 2400-2483.5 and 5725-5850, along with 10.2 watts at 57-64 GHz -- do not carry any critical licensed services.[17] Conversely, the FS bands that do carry critical communications are subject to conventional Part 15 levels at most. (Some FS bands are closed to all intentional Part 15 emissions, except

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[15] Notice at para. 62.

[16] The Part 15 "general limit" applied through most of the spectrum above 1 GHz is 500 μV/meter measured at 3 meters. This is the field strength produced by an isotropic source of 75 nanowatts. The EIRP permitted at 57-64 GHz (and proposed here) is 9 $\mu W/cm^2$ at 3 meters. This is the power density produced by an isotropic source of 10.2 watts. The proposed emissions are thus higher than the general limits by $10.2/(75 \times 10^{-9})$, or 81 dB. *See* 47 C.F.R. Secs. 15.209(a) (general limit), 15.255(b)(1) (levels for 57-64 GHz).

[17] The first three of these are amateur bands. The first band is also authorized to the Location and Monitoring Service, which is not presently operational, and part of the second to Private Land Mobile Radio, although it is little used for that purpose. There are no other licensed services in these bands. Although the 57-64 GHz band is allocated to fixed and mobile operation, the Commission has not issued rules to authorize those applications, nor has it announced any interest in doing so. *See* 47 C.F.R. Secs. 2.106 (57-64 GHz), 90.353 (LMS), 97.301 (amateur).

ultra-wideband.[18]) The Notice thus proposes, for the first time, the combination of relatively high-power unlicensed service in bands also used for critical applications.

The Commission may believe that highly directional receive antennas in the licensed applications will protect against interference from unlicensed devices. Alternatively, it may be feasible to require listen-before-talk protocols that would silence unlicensed transmitters in or near the path of a fixed link. But unless some method (or combination) can be shown to provide extremely reliable protection against interference, it may be necessary to segment the spectrum between licensed and unlicensed uses.

2. No Other Segmentation

The FWCC agrees with Loea Communications Corporation, an original proponent of this rulemaking, that the Commission should authorize the maximum possible bandwidth without channelization. At lower frequencies, some sort of channelization is often necessary to maximize use of the spectrum while minimizing interference between users. The very narrow beamwidths at the frequencies of interest here, however, should make channelization unnecessary (aside from any segmentation needed to accommodate unlicensed operation, as discussed above).[19]

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[18] 47 C.F.R. Sec. 15.205.

[19] *See* Notice at paras. 59-60, 97.

F. Service Rules

1. Fixed Services

The FWCC strongly supports the Loea proposal for site-by-site licensing in these bands.[20] The auctioning of geographic licenses is lawful only to resolve mutually exclusive applications.[21] But narrow beamwidths are easy to achieve at these frequencies, so that mutual exclusivity can easily be resolved. Auctioning is therefore unnecessary to decide among competing applications, and hence not permitted under the law.

Moreover, auctioning would be a highly inefficient way to distribute this particular spectrum. Keeping spectrum costs low will help to promote rapid, widescale deployment, and will yield all the economic benefits that flow from efficient telecommunications. Left to themselves, users will achieve high installation densities where demand is greatest. To be sure, geographic licensing can be a reasonable solution in services where a very few users need exclusive spectrum over a substantial area, as in the case of PCS, paging, and certain others. But in a point-to-point environment, where unrelated users can operate in close proximity with no interference, geographic licensing would only get in the way. Among other disadvantages, it shifts licensees' motivation from providing service to recovering investment, which in turn can produce artificial scarcities. At these frequencies, site-by-site licensing is by far the most efficient means of allocating resources.

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[20] Notice at paras. 65-73, 79-81. Winstar Communications LLC, an FWCC member, disagrees with the position set out here. Winstar believes at last part of each band should be auctioned on a geographic basis.

[21] 47 U.S.C. Sec. 309(j)(1).

The Commission's main reservation about site-by-site licensing is a concern that large numbers of links may create administrative burdens for the Commission and the applicants alike.[22] We think the Notice has it backwards. In our view, large numbers of links would signal not the failure of a site-by-site regime, but its success.

In any event, the Notice proceeds as though geographic licensing is the only remaining option, if the administration of site-by-site licensing proved too onerous. We propose a third possibility: *frequency-coordinated licensing by rule* under Part 101. Using a commercially operated website, an applicant would enter the proposed link data (coordinates, power, center frequency, bandwidth, etc.), together with a fee payment to cover the costs of coordination. The website software and its associated database, which contains all earlier-coordinated links, would either clear the requested link immediately, or else email the data automatically to potentially affected users, who would have a short time in which to object. (Users can be invited to delegate approval decisions to the website operator, which would speed coordination even more.) Once coordination is complete, the applicant can begin transmission immediately under a license-by-rule regime. Individual sites would not be licensed; users would not have a call sign; and the Commission would keep no record of the link data. In lieu of license renewal, we suggest a requirement that the coordinator contact each user periodically by automatic email to seek confirmation that the link is still operating. Users that do not respond, after follow-ups, would have their links dropped from the coordination database.

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[22] Notice at para. 68.

We believe such an arrangement would preserve the advantages of site-by-site licensing, while automating much of the administrative overhead and shifting what remains to the private sector.

2. Other Services

As noted above, the FWCC opposes the authorization of satellite services in the 71-76 and 81-86 GHz bands. Same-spectrum sharing between the FS and satellite services has consistently disadvantaged the FS in the past, and we see no reason to expect better results in the future.

We also oppose the authorization of mobile and portable devices in these bands. It is generally impossible to keep mobile devices out of the antenna patterns of FS receivers, where they would cause disabling interference. Some users who seek mobile service at these frequencies may find that unlicensed operation meets their needs.

G. Technical Rules

The FWCC supports these technical proposals in the Notice:

- Loea proposal for 0.03 percent frequency tolerance;[23]
- Loea proposal for max. EIRP of +55 dBW;[24] and
- Endwave Corporation proposal for antenna gain of minimum 50 dBi at full EIRP, or EIRP reduced by twice the number of dB by which antenna gain is reduced below 50 dBi.[25]

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[23] Notice at para. 99.

[24] Notice at para. 100.

[25] Notice at para. 101.

CONCLUSION

To meet growing demand, the Fixed Service badly needs access to the spectrum at 71-76, 81-86, and 92-95 GHz, under rules that will promote fast and efficient deployment. The proposals outlined above will help to address those goals.

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