

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

In the Matter of)	
)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services)	GN Docket No. 14-177
)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band)	RM-11664
)	
Petition for Declaratory Ruling Regarding Treatment of Rulemakings and Waivers Related to new services at Frequencies Above 95 GHz)	ET Docket 13-259
)	
Battelle Memorial Institute, Inc. Petition for Rulemaking to Adopt Service Rules for the 102 – 109.5 GHz Band)	RM-11713
)	
)	

COMMENTS OF MARCUS SPECTRUM SOLUTIONS LLC

INTRODUCTION

Marcus Spectrum Solutions LLC (MSS) is the consulting practice of Michael J. Marcus, Sc.D., F-IEEE, a retired FCC senior executive who worked at the Commission nearly 25 years in both the spectrum policy and enforcement areas. His qualifications are well know to the Commission¹. While working at FCC he initiated the proceedings

¹ FCC Press Release “FCC Engineering Michael J. Marcus Honored by Institute of Electrical and Electronics Engineers (IEEE)” February 3, 2004, (http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243463A1.pdf)

that resulted in the ISM band², home of Wi-Fi, Bluetooth, ZigBee and many other systems, as well as the 60 GHz, 70 GHz, 80 GHz and 90 GHz³ bands. He was awarded the 2013 IEEE Communications Society Award for Award for Public Service in the Field of Telecommunications.⁴

These comments do not necessarily represent the view of any client and are being submitted purely in the public interest.

OPEN UP SPECTRUM ABOVE 95 GHz TO STIMULATE INNOVATION

The main caption of this proceeding is “Use of Spectrum Bands Above 24 GHz For Mobile Radio Services”, but at several places it alludes to use of spectrum for Fixed Service applications including backhaul for CMRS carriers. The bands specifically mentioned in the *Notice* are in the 24 – 86 GHz region.

While FCC has allocations up to 275 GHz, **today it has no service rules above 95 GHz for any licensed or unlicensed use** – with the narrow exception of a few small bands for ISM/Part 18 use and Amateur Radio Service/Part 97 use.

On July 1, 2013, more than 18 months ago, IEEE-USA – a professional society representing the interests of electronics specialists in the US – filed a petition for a declaratory ruling⁵ about the applicability of Section 7 of the Communications Act of 1934, as amended⁶, to new uses for this near virgin spectrum. Comments were requested in Docket 13-259. There was no opposition, but also no further FCC action.

There is also a pending *Petition for Rulemaking* from Battelle Memorial Institute

² <http://www.marcus-spectrum.com/page4/SSHist.html>

³ <http://www.marcus-spectrum.com/page5/index.html>

⁴ <http://www.comsoc.org/about/memberprograms/comsoc-awards/telecom/bios>

⁵ *Petition for a Declaratory Ruling*, IEEE-USA, July 1, 2013
(<http://www.ieeeusa.org/policy/documents/FCCPetitionJuly2013.pdf>)

⁶ 47 U.S.C. § 157

for Fixed Service use above 95 GHz.⁷ Comments were requested on this petition and also no opposition was received.

In the *Notice* in Docket 14-177 there is a comment in fn. 64 that seeks to rationalize this inaction:

We note that the TAC examined the use of bands above 95 GHz, and, unlike other mmW bands where it suggested issuing this *Notice of Inquiry*, suggested instead that the Commission should carefully balance the benefits and risks of adopting service rules in these bands and take an active role to establish a framework for coexistence with passive services. See *TAC September 23, 2013 Meeting Presentation*.

This rationalization is invalid! While there are many exclusive passive bands above 95 GHz, most of the spectrum above 95 GHz has *both* active service and coprimary passive allocations - not exclusive primary allocations. While the Commission has never formally codified the details of how such coprimary spectrum can be used, it is well understood that coprimary users do not have the unconditioned right to exclude all other users. They have the right of protection from later entrants. Indeed a filing⁸ in RM-11713 from the National Academy of Science's Committee on Radio Frequencies, the main spokesman for passive spectrum use in the US, makes clear that they do not oppose use of coprimary bands but only ask for coordination of specific licenses to prevent adverse impact to actual scientific observations which are performed only in a few places in the US as described in the comments.

There are even a few bands above 95 GHz that have *no passive allocations at all*, e.g. 122.25-123 GHz, 158.5-164 GHz, 167-174.5 GHz, etc. In these bands the

⁷ *Petition for Rulemaking*, Battelle Memorial Institute, RM-11713 (<http://apps.fcc.gov/ecfs/document/view?id=7521071923>)

⁸ *Comments* of National Academy of Science's Committee on Radio Frequencies, RM-11713, Nov. 3, 2014 (<http://apps.fcc.gov/ecfs/document/view?id=60000978719>)

protection of passive services has no basis at all as they have no allocations at all. Yet there are no present FCC service rules in these bands.

We urge the Commission to stop using the rationalization of coprimary passive allocation protection as an *excuse* to delay further action above 95 GHz. The 2008 Beijing Olympics used a 120 GHz terrestrial link⁹ from a Japanese firm for moving HDTV imagery from various stadiums to the Olympic Broadcast Center -- this technology is not new. FCC inaction jeopardizes US technical leadership in wireless technology and appears to violate the basic mandate of § 7 that “(i)t shall be the policy of the United States to encourage the provision of new technologies and services to the public”¹⁰ as well as the longstanding mandate of § 303(g) to “generally encourage the larger and more effective use of radio in the public interest.”¹¹

Some may argue that there is little commercial interest above 95 GHz today. *Perhaps.* But when the 1981-85 proceeding for authorization of the ISM bands, Docket 81-413, had little support and indeed a great deal of opposition from users and manufacturers. But the Wi-Fi and Bluetooth that resulted from this rulemaking has changed our society in many ways. Similarly, the 60 GHz NPRM in Docket 94-124 had little support at the time. The rules adopted in that proceeding have not yet resulted in billions of dollars of equipment sales, but the very millimeterwave MIMO technology that is the core of the mobile technology being considered above 24 GHz was greatly influenced by technology developed for the 60 GHz rules adopted in Docket 94-124.

⁹ Akihiko Hirata, Hiroyuki Takahashi, Naoya Kukutsu, Yuichi Kado, Hidehiko Ikegawa, Hiroshi Nishikawa, Toshihiro Nakayama, and Tomonori Inada, “Transmission Trial of Television Broadcast Materials Using 120-GHz-band Wireless Link”, *NTT Technical Journal* (<https://www.ntt-review.jp/archive/ntttechnical.php?contents=ntr200903sf3.html>)

¹⁰ 47 U.S.C. § 157(a)

¹¹ 47 U.S.C. 303(g)

Letting spectrum lie fallow serves not public purpose. Our national competitors are funding industrial research into new technology not limited by the FCC's present 95 GHz limit. A recent German experiment at 237 GHz that achieved speeds of 100 Gbps that was supported with partial funding from that government¹² is a good example of what is going on in other countries that is being discouraged here by the lack of service rules in the US, the apparent indifference of FCC in this area and difficulties in NTIA coordination of experimental licenses. (The German researchers have not disclosed the exact frequency and bandwidth of this test and it is likely that it included spectrum with passive primary allocations. But the nature of millimeterwave technology is such that preventing harmful interference is much easier than at lower bands.)

ENGAGE NTIA FOR A COMMITMENT TO OPEN mmW FOR NG USE

All spectrum above 42 GHz is shared G/NG spectrum and subject to coordination with NTIA. Despite repeated statements from NTIA leadership that "sharing is the new normal", repeated rejections by NTIA of FCC Part 5 experimental license applications in mmW spectrum that pose no realistic interference threat to federal users indicate a fundamental lack of interest at NTIA in supporting private sector development in these bands. IRAC members may feel threatened by reallocations of federal spectrum for CMRS at lower bands, but this should not be an excuse for them to block technical innovation that is clearly supported by Sections 7(a) and 303(g). **mmW is not VHF with a few extra zeros.** Applying VHF-like logic for sharing at mmW bands ignores the basic fact that sharing is much easier in mmW bands due to high path losses and the ability to build small antennas that are very directional.

¹² <http://spectrum.ieee.org/telecom/wireless/a-new-record-for-terahertz-transmission>

CONCLUSIONS

While we support the goal of mobile use above 24 GHz, we also urge the Commission to act in a timely way in removing the artificial limit of nearly all spectrum use above 95 GHz. Action on the IEEE-USA and Battelle petitions would be a good way to start and action on them is overdue.

/s/

Michael J. Marcus. Sc.D., F-IEEE
Director
Marcus Spectrum Solutions LLC
Cabin John MD 20818

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cc: Ruth Milkman
Renee Gregory
Louis Peraetz
David Goldman
Brendan Carr
Erin McGrath
Julius Knapp
John Leibovitz