From: marcus@marcus-spectrum.com
To: BOCrfc2015
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attached

Before the
DEPARTMENT OF AGRICULTURE
Rural Utilities Service

DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration

In the Matter of	)	
	)	
Broadband Opportunity Council Notice and Request for Comment	)	Docket No. 1540414365–5365–01
	)	

COMMENTS OF MARCUS SPECTRUM SOLUTIONS LLC

I. SUMMARY

Marcus Spectrum Solutions LLC ("MSS") applauds the goals of RUS and NTIA in this proceeding. We use this opportunity to point out that coordination problems between FCC and NTIA on experimental licenses, particularly in the millimeterwave region capable of supporting wide bandwidths, are having a chilling effect on capital formation for this technology. This not only threatens national competitiveness in telecom technologies, but decreases the technical options available for broadband implementation. The US is a large country with many different local circumstances in both urban areas and rural areas and a variety of technical options are needed for efficient implementation of broadband across the country. We urge NTIA to examine the root cause of these

coordination problems and take action to improve coordination speed and transparency while protecting spectrum incumbents from actual interference and adverse impacts.

II. INTRODUCTION

A. Introduction to MSS

Marcus Spectrum Solutions ("MSS"), LLC, is the consulting practice of Michael J. Marcus, Sc.D., F-IEEE. Dr. Marcus is a retired FCC senior executive who was responsible for several key spectrum policy changes to stimulate innovation including the Docket 81-413 rulemaking that he proposed and directed resulting in the rules for Wi-Fi, Bluetooth, and ZigBee.[1] He also proposed and managed the rulemakings in FCC Dockets 94-124 and 02-246 that resulted in the FCC rules in the 60, 70, 80, and 90 GHz bands. As all these bands were G/NG shared bands, he frequently worked with the NTIA staff and IRAC members on coordination issues and continues to work on G/NG sharing issues on behalf of clients with innovative technology, much of which is applicable to the broadband objectives of this proceeding.

He was recognized by the Institute of Electrical and Electronics Engineers as a Fellow[2] in 2004 for "For leadership in the development of spectrum management policies" and was awarded the IEEE Communications Society Award for Public Service in the Field of Telecommunications[3] in 2013. He is also an adjunct professor in the Department of Electrical and Computer Engineering at Virginia Tech where he teaches a

[1] http://www.marcus-spectrum.com/page4/SSHist.html
[2] http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243463A1.pdf
[3] http://www.comsoc.org/about/memberprograms/comsoc-awards/telecom

course on "Advanced Topics in Communications: Spectrum Policy and Wireless Innovation"[4].

MSS has been an active participant in recent FCC spectrum policy rulemakings filing both *pro se* and on behalf of clients as well as helping clients file FCC experimental license applications for new technologies. Some of the issues in these comments result from both this hands-on experience filing experimental licenses at FCC that needed NTIA coordination as well as his earlier role while at FCC on the Commission's Spectrum Policy Task Force as chair of its Unlicensed Devices and Experimental Licenses Working Group ("UEWG").

B. The Federal Register Notice

The Federal Register notice[5] for this proceeding identifies in the summary as one of its four objectives:

> "(to) identify regulatory barriers unduly impeding broadband deployment, adoption, or competition;"

It goes on to add

> "To assist these communities and partnerships, support economic growth, and promote a level playing field for all competitors, President Obama called on the Executive Branch agencies to remove all unnecessary regulatory and policy barriers to broadband build-out, adoption, and competition."?

Our comments focus solely on Question 3:

> "What regulatory barriers exist within the agencies of the Executive Branch to the deployment of broadband infrastructure."

Our comments do not address the specific issue of deployment, rather the development of technologies to implement broadband – a topic oddly missing from the

[4] http://www.ece.vt.edu/news/articles/ece6604marcus.html
[5] 80 Fed. Reg. 23785 (April 29,2015)

Request for Comments. Technology for broadband does not arrive from "spontaneous generation"[6], rather it arrives as the fruit of research and development which in turn needs investment. Policies of federal agencies that discourage R&D in broadband related technologies thus discourage capital formation for such R&D and decrease technical options for implementing broadband.

Of particular interest to the Commerce Department should be the fact that many of our national competitors are using national government funding to support broadband R&D for products that they can use both domestically and export.[7]

The basic ways we feel that present Executive branch policies inhibit R&D in broadband technologies fall into three categories

- Experimental licensing problems involving NTIA coordination
- ITAR issues that discourage development of commercial products using advanced technologies
- DoD policies that discourage major DoD contractors from engaging in commercial markets

These inhibition in turn decrease technical options for broadband implementation in both urbanized and rural area resulting in increased costs and in some cases a lack of feasible options to serve unserved communities. Such policies also threaten US technical leadership and adversely affect employment in the ICT supply chain.

[6] http://en.wikipedia.org/wiki/Spontaneous_generation
[7] Comments of NYU WIRELESS, FCC Docket 14-177,January 13, 2015, at p. 8 – 14 (http://apps.fcc.gov/ecfs/document/view?id=60001013322)

III. FCC EXPERIMENTAL LICENSING REQUESTS THAT REQUIRE NTIA COORDINATION

A. Legislation and the FCC/NTIA MOU

The FCC is mandated by §303(g) of the Communications Act of 1934, as amended, ("the Act")

> "(To) study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest;"[8]

The President has independent and parallel authority pursuant to §305 of the Act to regulate "radio stations belonging to and operated by the United States", referring to federal government or "G" users. This authority is in turn delegated through the Secretary of Commerce to NTIA pursuant to §902 of the Act. Since the two authorities are parallel and independent, FCC and NTIA (and NTIA's predecessors) have had agreements dating back over 70 years on how to cooperate to try to avoid interference and to share available spectrum. The current agreement[9] dates from January 2003 and repeats most provisions of earlier ones. The agreement requires each agency to notify the other at least 15 days in advance of "all proposed actions that could potentially cause interference to" stations authorized by the other under its jurisdiction. While FCC and NTIA can not formally veto each others' actions, a lack of concurrence on a coordination between the agencies slows down and may prevent action by the other.

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[8] 47 U.S.C. §303(g)

[9] MEMORANDUM OF UNDERSTANDING BETWEEN THE FEDERAL COMMUNICATIONS COMMISSION AND THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, January 31, 2003 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-230835A2.pdf)

§7 of the Act[10] states that

> It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this chapter shall have the burden to demonstrate that such proposal is inconsistent with the public interest.

Traditional NTIA interprets this as not applying to its federal spectrum management jurisdiction. However, a careful reading of §305 of the Act shows that the first sentence clearly states "Radio stations belonging to and operated by the United States shall not be subject to the provisions of sections 301 and 303 of this title." Hence federal spectrum management is not subject to the two enumerated sections (which deal with FCC's jurisdiction and mandates) but is subject to other sections of the Act including §7. Since the second sentence deals with "(a)ny person or party (other than the Commission)" that burden of demonstrating harm of a possible new technology would appear to apply to NTIA even in its §305 role. As is shown below, NTIA actions have been slowing or blocking new technology without consideration to the provisions of §7.

B. Experimental Coordination Problems

The vast majority of the FCC/NTIA coordinations on new assignments/licenses are routine actions in bands with well established criteria for sharing and are noncontroversial. However, for innovative technologies there can be problems and particularly in the upper spectrum of most interest for broadband systems (because of the large bandwidths available above 30 GHz) there have been problems that urgently need to be addressed at the senior leadership levels in NTIA and DoC.

All spectrum above 48.2 GHz are shared between federal ("G") users regulated by NTIA and nonfederal government ('NG") users regulated by FCC as is much of the

[10] 47 U.S.C. §157

spectrum at lower bands. FCC at present has no rules for either licensed on unlicensed use above 95 GHz – with the minor exceptions of some small slivers of spectrum for amateur radio and ISM (*e.g.* microwave oven) use. In order to develop technology in this virgin spectrum above 95 GHz and test what might be commercially practical, private sector entities have been applying to FCC for experimental licenses under the provisions of Part 5 of the FCC Rules.[11] All such applications are then coordinated with NTIA pursuant to the 2003 agreement.

Millimeterwave spectrum is very promising for certain broadband applications due large available bandwidths, but the emerging nature of this technology means that components are not readily available at every possible frequency at present. Components are only available at certain frequencies and commissioning new component design can easily have a multimillion dollar cost. This is why millimeterwave technology developers often seek short term access to bands that do not have proper allocations for long term use in order to verify the feasibility of new modulation techniques, systems designs, and antenna technologies. If the new technologies are promising then transferring them to nearby bands with proper allocations makes economic sense. The traditional policy for FCC has been to allow such nonallocated use for experiments if it did not impact other users. Indeed, this has been general policy at NTIA also as the NTIA ("Redbook") explicitly provides

> Experimental use of any shared federal/non-federal frequency band or exclusive federal frequency band may be authorized so that non-federal developers may advance the state of technology. Experimental usage will be authorized for the period required subject to not exceeding five years, which may be extended with appropriate justification.[12]

[11] 47 C.F.R. §§5.01,525

[12] NTIA, Manual of Regulations and Procedures for Federal Radio Frequency Management, Section 8.2.27 (http://www.ntia.doc.gov/files/ntia/publications/redbook/2014-05/8_14_5.pdf)

However, in recent years experiments in the millimeterwave region have been often blocked or delayed by NTIA actions that appear to have been made in an IRAC subcommittee without oversight by NTIA leadership.

Many experiments in millimeterwave spectrum have had issues in coordination with NTIA which have delayed or resulted in cancellation of the experiment. Consider the case of FCC File 1047-EX-ST-2014 which ultimately resulted in FCC license WI9XAT.[13] This application was not for private sector-funded R&D, rather for military R&D performed by a private entity. But if military-funded R&D has the problems discussed below*, imagine the problems faced by a private entity that does not have direct access to the inner circles of NTIA*?[14]

According to public information on the FCC website, this application was first filed on November 20, 2014. On December 1, 2014 this application was "dismissed without prejudice" by FCC with this explanation

> "You are advised that the Commission is unable to grant your application for the facilities requested. We have received an objection to your application from NSF. If you still wish to pursue this testing, you should exclude the passive band 100-102 GHz on your application to further discuss your request prior to refilling"[15]

It appears that the normal practice in NTIA is to refer such applications to the Frequency Assignment Subcommittee (FAS) of the Interdepartmental Radio Advisory Committee (IRAC) for review.[16] It further appears that if any objections are raised at the

[13] https://apps.fcc.gov/els/GetAtt.html?id=158419&x=.

[14] While several years ago there was a senior NTIA staffer who was willing to deal informally with experimental license applicants on contentious experiment license applications to try to resolve in mutually acceptable ways controversies over sharing with federal spectrum users, that person has retired and no one at NTIA appears interested in this role at present.

[15] Letter from Nnake Nweke to David W. Nippa, December 1, 2014 , File No. 1047-EX-ST-2014 (https://apps.fcc.gov/els/GetAtt.html?id=158523&x=.)

[16] The IRAC was established in 1922 before the Act. Its only statutory acknowledgement is in 47 U.S.C. §904(b) which states:

> "To the extent the Assistant Secretary deems it necessary to continue the Interdepartmental Radio Advisory Committee, such Committee shall serve as an advisory committee to the Assistant

FAS level an "objection" is communicated to FCC and this objection either delays or kills the application without the existence of a transparent approach to address the technical issues involved.

While the FCC letter quote above refers to an objection from NSF, nonpublic information indicates that it was not NSF objecting to this application, rather another agency concerned about passive spectrum involved in this experiment. (It is unclear if this error in the FCC letter was accidental or deliberate or whether it happened at FCC or NTIA. But not knowing the actual source of such a problem complicates trying to solve it.)

In trying to get to the bottom of this coordination problem the NTIA staff was of minimal assistance. Upon contacting other agencies interested in passive spectrum we discovered the depth of the problem. The representative of one such agency on the FAS sent us an e-mail stating:

> "While I would have no difficulty in speaking to you on this subject, the problem is one of policy. It is (agency X) policy to not allow ANY emissions in ANY bands allocated to exclusive passive use such as given in US246 and RR No. 5.340. For this reason I had no choice but to object to the subject application. In fact, had (military entity sponsoring research) applied for the STA through one of the MILDEPS, (agency X) would have objected to that as well."

Note that this action was based on "(agency X) policy", not a statute, not the NTIA Redbook, and not action by NTIA management. The US has the unusual arrangement of having 2 spectrum management agencies, *e.g.* FCC and NTIA, from time to time other agencies have sought to increase this number.[17] But Congress has clearly stated that 2 agencies are enough. If "agency X" wants to change the NTIA Redbook to

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> Secretary and the NTIA. As permitted by law, the Assistant Secretary may establish one or more telecommunications or information advisory committees (or both) composed of experts in the telecommunications and/or information areas outside the Government. The NTIA may also informally consult with industry as appropriate to carry out the most effective performance of its functions."

[17] http://spectrumtalk.blogspot.com/search?q=citoyens

implement their desired spectrum policy goal, they should use proper procedures to do that – not do a backdoor implementation in nontransparent IRAC subcommitees.

The primary IRAC representative of another agency similarly stated

> "I understand the use is temporary and that the 95 to 105 GHz band is not the band of eventual interest. Even so, (agency Y) cannot support use of the 100-102 GHz passive band. I have asked my FAS representative to vote accordingly in the FAS."

In a subsequent message the agency X representative acknowledged that for this proposed short term point-to-point experiment in one location "the concern is not harmful interference". The issue was a "camel's nose under the tent issue", perhaps exacerbated by FCC/NTIA/IRAC tensions over reallocations for spectrum and increased sharing at much lower frequencies.

It is clear that NTIA has at times in the recent past coordinated successfully with FCC on granting experimental licenses in bands with only passive allocations.[18] Most of these examples cited in the referenced FCC pleading deal with the aviation industry and *would seem* to pose a greater risk of interference to passive services than terrestrial point-to-point experiments with high gain/narrow beam antennas. Are NTIA or IRAC member agencies giving preferential treatment to one industry and denying comparable treatment in developers of technology in other industries that could improve broadband service options?

Thus this bickering in FAS delayed this one time military R&D experiment for almost 2 months and raised serious questions about whether such an experiment by a private party with private funding would ever have been concurred with at all by NTIA or would it need high level dialogue between FCC and NTIA to resolve with unknown

[18] Comments of Boeing Corp., FCC Docket 10-236, July 16, 2013, at fn. 6, 10, 11 (http://apps.fcc.gov/ecfs/document/view?id=7520931069)

delay and risk.

C. 2002 FCC SPTF Recommendations on Experimental Licenses

Issues about NTIA coordination of experimental licenses and their impact on capital formation for innovative R&D are not new. The 2002 FCC Spectrum Policy Task Force Report considered this topic and recommended:

> "that NTIA consider a new interface for the non-federal Government spectrum users with IRAC members to help search for workable compromises for experimental applications and suggest that NTIA or DOC to appoint an advocate/ombudsman for the private sector."[19]

NTIA may wish to revisit this recommendation and consider this as a possible approach to improve the transparency of coordination on emerging technologies and compliance with the applicable parts of §7 of the Act.

IV. ITAR

The International Traffic in Arms Regulations[20] ("ITAR") apply to dual use technologies that are useful in both civil and military applications. The US is clearly in a world with many national security threats and ITAR has a key role in promoting national security. But in rapidly emerging technologies such as those used for broadband implementation careful attention to needed to the definition of technologies subject to ITAR controls to confirm that the cost/benefit ratio of continue restrictions is still appropriate. Lack of timely updates to such definitions can inhibit capital formation for R&D in the US and overly favor foreign competitors.

[19] FCC Spectrum Policy Task Force, Report of the Unlicensed Devices and Experimental Licenses Working Group. November 15, 2002, at p. 23 (https://transition.fcc.gov/sptf/files/E&UWGFinalReport.pdf)
[20] 22 C.F.R. §§120,130

V. INDUSTRY STRUCTURE FOR MAJOR DOD CONTRACTORS

Since the end of the Cold War, there has been major restructuring of large DoD contractors. Under pressure from DoD firms such as Lockheed Martin. Raytheon, and Northrop Grumman have basically left nonmilitary markets and have acquired the defense contracting divisions of other firms such as RCA and Motorola. While we do not question that such restructuring has some real benefits, we wish to point out that this bifurcation of the US technology industry area hurts technology transfer between the military and nonmilitary sectors, ultimately slowing the availability of technology that is promising for broadband implementation.

VI. CONCLUSIONS

In these comments we have described federal policies that appear to inhibit the development of broadband technologies and hence adversely affect implementation of broadband in both urbanized and rural areas.

We welcome the opportunity to participate here and would be glad to discuss these issues further with both NTIA and RUS staff.

/s/

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