

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:)
)
Technological Advisory Council) ET Docket No. 13-101
White Paper and Recommendations)
For Improving Receiver Performance)

To the Chief, Office of Engineering and Technology:

COMMENTS OF JULIAN GEHMAN

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DATED: June 21, 2013

SUMMARY

The Commission has statutory authority to implement the TAC White Paper's main recommendation of developing interference policy limits because such policy is predicated on Commission adjudication of harmful interference claims. The Commission clearly has authority to adjudicate these types of claims. However, it is not clear that the Commission has authority to impose receiver performance standards. The Commission should proceed to do the many things that it clearly is authorized to do, which will indirectly impact receiver design and manufacture.

The Commission's rule on harmful interference already incorporates receiver standards via the rule's incorporation of ITU Radio Regulations. Consistent with these ITU standards, the Commission should introduce the concept of *cognizable* harmful interference, and apply it to the LightSquared proceeding in asserting Commission authority over allocation of that spectrum.

Any interference limits policy would need to translate receiver protection into transmitter specifications in order to give certainty to licensees. The specific calculations proposed by the TAC White Paper appear to make proving a violation to be prohibitively expensive. The calculations should be simplified and adapted to specific services.

The Commission should provide simple, clear liability standards so that spectrum users can better negotiate among themselves. The Commission should announce in advance potential spectrum re-allocations, and enforce its allocation decisions in order to incentivize the sale of appropriate receivers.

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Julian Gehman respectfully submits Comments in the captioned proceeding.¹ Gehman is a lawyer representing FCC licensees who use the radio spectrum and will be impacted by the outcome of this proceeding.

The Office of Engineering and Technology is to be complimented for taking ownership of the receiver performance issue, for conducting a two-day workshop and other sessions, and for circulating the Request for Comments. The FCC Technological Advisory Council (TAC) similarly is to be complimented for researching and collecting information about receiver performance. Finally, the TAC’s Receivers and Spectrum Working Group Committee should be complimented for writing the TAC White Paper,² which includes a novel approach to settling interference disputes, as well as extensive technical information.

¹ OFFICE OF ENGINEERING AND TECHNOLOGY INVITES COMMENTS ON TECHNOLOGICAL ADVISORY COUNCIL (TAC) WHITE PAPER AND RECOMMENDATIONS FOR IMPROVING RECEIVER PERFORMANCE, ET Docket No. 13-101 (Apr 22, 2013) (“Request for Comments”).

² Interference Limits Policy – the use of harm claim thresholds to improve the interference tolerance of wireless systems, *White Paper*, by Receivers and Spectrum Working Group of the FCC Technological Advisory Council (Feb 6, 2013) (the “TAC White Paper”).

The Request for Comments seeks comments on the TAC White Paper. Briefly summarized, the TAC White Paper recommends introducing an interference limits policy where *harm claim thresholds* are specified for in-band and out-of-band interfering signals that must be exceeded before a radio system can claim that it is experiencing harmful interference. TAC White Paper 3. Enforcement of the harm claim thresholds would occur primarily through FCC adjudication of harmful interference complaints. However, where receivers are not controlled by a license holder (decoupled devices) or for life-safety systems, the TAC White Paper notes that alternative measures may be required. TAC White Paper 3-4. In these cases, according to the TAC White Paper, it may be desirable to augment harm claim thresholds with explicit receiver performance specifications. TAC White Paper 34.

These Comments are organized in two parts, with General Comments On Statutory Authority in the first part, and Response To Request For Comments in the second part.

I. GENERAL COMMENTS ON STATUTORY AUTHORITY

a. The Commission Has Ample Statutory Authority To Implement Much Of The TAC White Paper's Recommendation.

The Commission cannot act except pursuant to authority delegated by Congress. The primary method of Congressional delegation is enactment and amendment of the Communications Act of 1934. The question has been raised whether the Commission has statutory authority to act on the recommendations of the TAC White Paper. Viewing the TAC White Paper's recommendations through the lens of statutory authority, the Commission clearly is authorized to adjudicate claims of harmful interference. After all, the party complaining of harmful interference is asking the Commission to order the

operator of the offending transmitter to cease and desist or to take some other action, and the Commission clearly has statutory authority to regulate transmitters.³

The Commission enjoys considerable discretion in handling harmful interference complaints. The Commission has authority to refuse to take action on a particular claim of harmful interference,⁴ or to proceed by rulemaking⁵ to impose a standard of review on interference disputes, including one that incorporates harm claim thresholds, or, finally, to proceed by adjudication⁶ to implement a previously announced policy. The Commission has substantial discretion whether to proceed by rule making or adjudication.⁷ Thus, the Commission clearly has statutory authority to implement the first part of the TAC White Paper's recommendation.

However, authority is murky for the second part of the TAC White Paper's recommendation – imposition of mandatory receiver performance standards. These Comments take no position on whether the grants of authority of Section 302a and 303(s) of the Communications Act⁸ constituted new grants of authority because the Commission previously lacked authority over radio receivers and still lacks authority over receivers not covered in these sections. Alternatively, these Comments take no position on whether Sections 302a and 303(s) constituted Congress' clarification and urging that the

³ 47 U.S.C. § 301.

⁴ *Heckler v. Chaney*, 470 U.S. 821, 831 (1985) ("an agency's decision not to prosecute or enforce, whether through civil or criminal process, is a decision generally committed to an agency's absolute discretion").

⁵ 47 U.S.C. § 154(i).

⁶ *See, e.g.*, 47 U.S.C. § 554.

⁷ *SEC v. Chenery Corp.*, 332 U.S. 194, 201-202 (1947)

⁸ 47 USC §§ 302a(a)(2), 303(s).

Commission tackle pressing problems that the agency could have resolved with its then existing authority. Those questions of statutory construction are beyond the scope of this proceeding.

Nevertheless, ambiguity in the grant of authority over receivers should not deter the Commission from taking action where it clearly has authority over transmitters⁹ and spectrum allocation.¹⁰ By exercising the authority it clearly has, the Commission can accomplish much of what needs to be done with receivers.

Analogizing to driving a car, perhaps the Commission may not be authorized to turn left, but the Commission clearly is authorized to make right turns. The Commission can make three or four right turns and get to approximately the same place as if it had turned left. The right turns that the Commission could make include: (1) publishing a spectrum inventory and plan; (2) setting market expectations by publishing in advance potential spectrum re-allocations from quiet band to high power; (3) updating the Commission's Part 15 rules to move from analog to digital, and rationalizing existing out of band limits between current spectrum allocations,¹¹ (4) establishing harm claim thresholds or other emissions standards at the boundary of each spectrum band and, for shared bands, within the band; (5) establishing harmful interference standards and

⁹ 47 U.S.C. § 301.

¹⁰ 47 U.S.C. § 303(c).

¹¹ As the TAC White Paper points out, Part 15 out of band emission limits for unlicensed devices are predicated on an analog device creating a few narrowband spurs on distinct frequencies that approach the limit. But, modern digital devices in use today tend to create broadband noise over large bands close to the limit. TAC White Paper 21 n.21. Part 15 out of band emission limits for unlicensed devices at UHF exceed the protected noise limited contour level for DTV reception. TAC White Paper 9 n.11. Although both of these items relate to the same out of band emission standard, the more general point is that Part 15 should be updated to reflect modern technology and practices.

adjudicating harmful interference claims; (6) researching and posting a receiver dashboard to educate developers and consumers on the viability of individual receivers; (7) utilizing other consumer outreach techniques to educate the public about the consumer benefits of receivers with interference immunity; and (8) enforcing spectrum allocations with a phased in approach that permits manufacturers and users of non-compliant receivers (that look into adjacent channels for signals) time to retrofit or migrate to compliant receivers. These actions, taken together, should get the Commission close to where it would be if it were to regulate receivers directly, but with reduced litigation risk from potentially *ultra vires* action.

b. FCC Rule On Harmful Interference Incorporates Receiver Standards.

An apparently unnoticed aspect of Commission rules is that they already include receiver performance specifications. The term “harmful interference” is not defined in the Communications Act of 1934, as amended. FCC definition of this key term would be given deference by the courts. FCC rule 2.1 defines *Harmful Interference* as “Interference which endangers the functioning of a radionavigation service or other safety services or seriously degrades, obstructs or interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations.”¹² Under FCC rules, in order for a service to claim to have experienced harmful interference, it must be operating in accordance with ITU Radio Regulations. Depending on how the language of this rule is construed (with deference given to FCC construction of its own rule), the requirement of operating in accordance with ITU Radio Regulations applies to radionavigation and other safety services where they claim harmful interference.

¹² 47 C.F.R. § 2.1.

According to NTIA's report on Receiver Spectrum Standards, ITU Radio Regulations "are ratified to have treaty status by most countries of the world, including the United States."¹³ Further quoting from the NTIA report:

Paragraph 3.3 of the *Radio Regulations* requires that transmitting and receiving equipment be designed to take into account the technical characteristics of transmitting and receiving equipment likely to be employed in neighboring and other parts of the spectrum, provided that all technically and economically justifiable measures have been taken to reduce the level of unwanted emissions from the latter transmitting equipment and to reduce the susceptibility to interference of the latter receiving equipment.

Paragraph 3.12 of the *Radio Regulations* contains a requirement for receivers. This paragraph requires that receiving stations should use equipment with technical characteristics for the class of emission concerned and selectivity should be appropriate for the bandwidth of the transmitting signal.

Paragraph 3.13 of the *Radio Regulations* makes a specific point regarding interference into receivers. This paragraph requires that performance characteristics of receivers should be adequate to ensure that they do not suffer from interference from transmitters situated at a reasonable distance and which operate in accordance with these regulations. *Id.*

The NTIA report goes on to detail specific standards of the ITU Radio Regulations that apply to receivers in various services. Thus, the ITU Radio Regulations, as reported by NTIA, sensibly include a reasonableness component to harmful interference claims. ITU's concept of reasonableness includes whether the receiver has appropriate selectivity and takes into account the technical characteristics of the transmitter equipment "likely to be employed" nearby. A receiver that looks into adjacent spectrum to receive signals presumably would not be operating in accordance with ITU Radio Regulations, and should not be permitted to claim harmful interference. This is so because the adjacent spectrum was allocated to another service with

¹³ Receiver Spectrum Standards, Phase 1 - Summary of Research into Existing Standards, *NTIA Report 03-404* (Nov 2003), 26. NTIA submitted this report as part of the agency's comments in response to the FCC's 2003 Notice of Inquiry on receiver performance specifications. In the Matter of Interference Immunity Performance Specifications for Radio Receivers, ET Docket No. 03-65, MM Docket No. 00-39, *Notice of Inquiry* (Mar 2003).

transmitters “likely to be employed” nearby (Paragraph 3.3), and the receiver does not have selectivity appropriate for the authorized bandwidth of the transmitting signal (Paragraph 3.12).

By treaty and by the explicit language of FCC Rule 2.1, these ITU receiver standards already are incorporated into FCC rules. To the extent that the Radio Regulations standards are vague, the Commission’s job is to interpret them in order to clarify the Commission’s rule on harmful interference. In summary, Commission rules do not contemplate that *any* harmful interference would be adjudicated. Rather, it’s harmful interference that is *cognizable* under ITU Radio Regulations that deserves Commission attention.

c. FCC Should Apply Its Rule To The LightSquared Proceeding.

These Comments take no position on whether, in view of the ten-year old¹⁴ announcement of a high power, terrestrial system “likely to be employed” in the LightSquared spectrum, the GPS and radar systems in question in the LightSquared/GPS controversy operate in accordance with the above quoted ITU Radio Regulations.

¹⁴ In 2003, the Commission generally approved mobile satellite service providers (MSS) to integrate ancillary terrestrial components (ATC) into the MSS network. Flexibility by Mobile Satellite Service Providers, *Report and Order and Notice of Proposed Rulemaking*, 18 FCC Rcd 1962 (2003). The Commission specifically contemplated higher power terrestrial transmissions: “As a conceptual matter, MSS ATC will generally operate by using certain MSS channels or spectrum on a terrestrial basis over a limited geographic area, such as an urban market. Since the satellite signal generally would be very weak as compared to signals from nearby terrestrial base stations on the same channel, the channel can be used to provide terrestrial service in place of the satellite service in this geographic area.” *Id.*, 18 FCC Rcd at 1970-71. If the terrestrial base stations were expected to drown out weaker signals from the satellite licensed for the MSS channel in question, they certainly would also drown out signals from the adjacent channel satellite licensee, i.e., GPS, where GPS receivers look into the MSS band for signals.

In 2004, the Commission approved LightSquared’s application to provide ATC. Mobile Satellite Ventures Subsidiary LLC, Application for Minor Modification of Space Station License for AMSC-1, *Order and Authorization*, 19 FCC Rcd 22144 (Int’l Bur. 2004).

Similarly, these Comments take no position on whether LightSquared's proposed system takes into account neighboring systems and would comply with ITU Radio Regulations.

Rather, process is the important consideration. More accurately, the absence of Commission process is the important consideration. The spectrum licensed to LightSquared is non-federal spectrum that the Commission has exclusive authority to allocate and assign. The Commission has allocated that spectrum to MSS and assigned it to LightSquared. The Commission's most recent LightSquared authorization required the company to work with the GPS industry and other interested parties to identify measures to mitigate potential harmful interference.¹⁵ The phrase "harmful interference" is a term of art defined by Commission rule 2.1 and incorporating the ITU Radio Regulations requiring reasonableness of both transmitter and receiver technology. As required by the FCC authorization, the LightSquared parties apparently proceeded to conduct tests. Then, on the same day it received NTIA's letter on the subject,¹⁶ the Commission abruptly and informally scuttled LightSquared's multi-billion-dollar investment. Where was the Commission's inquiry and findings of fact that cognizable harmful interference would exist in the LightSquared proceeding? Based on the information in the public record, the Commission made no inquiry, made no findings and exercised no authority. The Commission gave the appearance of automatically accepting NTIA's assessment and preference without exercising the authority Congress delegated to the Commission to review and make the spectrum allocation decision.

¹⁵ In the Matter of LightSquared Subsidiary, LLC, 26 FCC Rcd 566, 585-88 (Int'l Bur. 2011).

¹⁶ Letter from NTIA Administrator Lawrence Strickling to FCC Chairman Julius Genachowski, Feb 14, 2012.

The FCC should follow its harmful interference rule and make the spectrum allocation decision. The Commission should determine, on its own, the extent to which cognizable “harmful interference” (as defined by Commission rule which incorporates ITU Radio Regulations) potentially exists in the LightSquared proceeding. The Commission should determine whether further conditions or other action such as a phased-in approach would resolve any legitimate concern. The Commission does not need additional authority over receivers to address the LightSquared situation. Rather, the Commission should exercise its existing authority over spectrum allocation and transmitters.

II. RESPONSE TO REQUEST FOR COMMENTS

Comments are requested on the viability of the overall interference limits policy approach presented in the TAC white paper. In particular, we invite parties to comment on the viability of the use of an interference limits policy approach among services operating in adjacent frequency bands. What are the costs and benefits associated with this approach? (Request for Comments 2.)

There are two issues with interference limits: (1) translation from receiver-centric to transmitter-centric to provide predictability to licensees; and (2) complexity of the proposed measurements.

First, the TAC White Paper’s interference limits would need to be translated into transmitter regulation. Imagine a situation where a licensee has three adjacent channel operators, each with a different interference limit. The licensee potentially would have four different standards to adhere to: the terms of its FCC license and each of the separate interference limits. Most licensees would find that to be untenable. The safest approach would be for the licensee to choose the most restrictive of the adjacent-channel interference limits as the lowest common denominator for its operation. This could result in poor spectrum allocation because it would make superfluous the interference limits of

the other two operators and the FCC license, and it probably would defeat the licensee's business model.

Receiver interference protection needs to get translated into transmitter specifications. The Institute of Electrical and Electronics Engineers – United States of America (IEEE-USA) reviewed efforts in this area, concluding that there is much work to be done.¹⁷ The FCC currently regulates a transmitter's height, power, emission types, out of band emissions, permissible signal strength at the border, and other transmitter characteristics. Although this is command-and-control regulation, it nevertheless is predictable for the operators of both transmitters and receivers. The TAC White Paper properly focuses attention on adjudication of harmful interference claims. However, the TAC White Paper does not describe how interference limits get translated into unified, coherent and predictable instructions to transmitter operators.

Second, the measurements proposed on pages 8-12 of the TAC White Paper are complex, time consuming and resource intensive, making it difficult for a licensee to prove that an interference limit has been violated. Apparently, to prove that an interference limit is being violated, a licensee would have to deploy one hundred or so temporary receivers spread throughout a given geographic territory (or take measurements with a similar number of existing base stations), and measure over some period of time such as a week or a month. Even a well-funded licensee would find this task daunting. The TAC White Paper calculations apparently were developed from a DTV contour standard (TAC White Paper 8 n.6). Television broadcasting, with a single, fixed, high-tower transmitter, is different from the more fluid small cell design utilized

¹⁷ Clarifying Harmful Interference Will Facilitate Wireless Innovation, *White Paper*, IEEE-USA Committee on Communications Policy 11-17.

for mobile broadband. The specific measure of an interference limit would need to be adapted to the service in question.

The TAC white paper makes note that an interference limits policy approach may not be appropriate in all cases. Are there other policy approaches that should be considered? (Request for Comments 2.)

The gating item for policy approaches is the Commission's delegated authority. As described above, on pages 4-5 of these Comments, the Commission can do a lot with the undisputed statutory authority it has right now. Admittedly, the actions described above, on pages 4-5, do not directly regulate receiver performance standards, but they would get the Commission to approximately the same place.

Moreover, the GAO report identifies the lack of incentives for manufacturers or spectrum users to incur costs associated with using more robust receivers, and the difficulty of accommodating a changing spectrum environment, such as when spectrum is repurposed for a new use. Are the incentives in the TAC white paper recommendations for improving receiver robustness to interference sufficient? Are there other incentives not mentioned in the TAC white paper recommendations that should be considered? (Request for Comments 2.)

The Commission needs to send signals to the market. Currently, there is no penalty for an equipment manufacturer to continue to manufacture cheap receivers in disregard for the Commission's published spectrum allocations. As described above, at pages 6-7 of these Comments, the Commission should introduce the concept of *cognizable* harmful interference and enforce spectrum allocations to let receiver manufacturers know that a penalty will be paid for disregarding the Commission's published spectrum allocations.

Should the Commission consider circumstances unique to each service, such as the diversity of devices available, the cost of replacement devices, typical replacement times, or sophistication of users that may impact the practicality, necessity, or sufficiency of such an approach? (Request for Comments 2.)

The Commission certainly should pay attention to technical and cost considerations but should not “over engineer” its rules. If the Commission paints simple, bright lines, the market will work out technical and cost details. Ronald Coase responded to claims that the chaos in broadcasting that arose prior to formation of the Federal Radio Commission was due to a failure of private enterprise and the competitive system. Coase said “the real cause of the trouble was that no property rights were created in these scarce frequencies.”¹⁸ Coase explained that “[o]ne of the purposes of the legal system is to establish clear delimitation of rights on the basis of which the transfer and recombination of rights can take place through the market.” *Id* 25. “Once the legal rights of the parties are established, negotiation is possible to modify the arrangements envisaged in the legal ruling.” *Ibid* 26-27.

The Commission’s current practices in spectrum allocation and adjudication of harmful interference claims often fail to establish a clear delimitation of rights. Consequently, the Commission is not getting an orderly recombination of rights taking place through the market. Instead, as predicted by Coase, the Commission is getting fights worthy of the Hatfields and the McCoys, where competing claimants battle over poorly defined spectrum rights.

Coase made an important point that the Commission’s goal should be to maximize output, not to minimize interference. *Ibid* 27. A simple rule of decision for liability is more effective than extensive technical regulation to minimize interference. The market will accommodate the rule and allocate accordingly. As the TAC White Paper put it, “the responsibility to mitigate harms from interference is more clearly

¹⁸ *The Federal Communications System*, *The Journal of Law and Economics* (Oct 1959) 14.

assigned, that is, [] lines are more clearly drawn between the rights of transmitters and receivers” (TAC White Paper 7).

The TAC recommends that the FCC implement a web accessible repository (e.g., through the FCC spectrum dashboard) of existing receiver standards, and a voluntary repository of receiver specifications for existing receivers. This, the TAC contends, would facilitate technical information sharing among diverse stakeholder groups of wireless system developers who need to know and understand the specifications of systems other than their own. How effective would this method of information sharing be for product developers? (Request for Comments 3.)

A receiver dashboard is an excellent idea, particularly for uncoupled devices. In addition to informing developers, a properly structured receiver dashboard would also inform consumers. The goal would be to plant interference immunity into consumer electronics reviews so that interference immunity is a consumer benefit that reviewers pay attention to. This needs to be coupled with a published plan to move currently quiet spectrum to higher power, mobile uses. Reviewers and consumers need to see the benefit of receivers that have incorporated interference immunity. The Commission’s receiver dashboard could start with the most popular uncoupled receivers such as WiFi. Manufacturers’ specifications could be solicited. Where the manufacturer refuses to submit specifications, OET’s Laboratory could reverse engineer the device and make its own assessment, with opportunity by the manufacturer to correct inaccuracies. The Commission performs this procedure regularly in enforcement actions against manufacturers of non-conforming devices. There is no reason it could not be done for consumer education.

The TAC recommends that the Commission encourage the formation of one or more multi-stakeholder groups to investigate interference limits policy at suitable high-value inter-service boundaries. We seek comment on such a multi-stakeholder process and solicit interest from candidate participants. (Request for Comments 3.)

The Commission should convene multi-stakeholder groups to set policy where

possible. However, if there is a lack of consensus or it takes too long to reach consensus, the Commission should step in, establish the policy and then let the market sort it out.

Role of the Commission - We seek general comment on whether and how the Commission should implement a policy that incentivizes improved interference tolerance of wireless systems. (Request for Comments 3.)

This question has already been addressed in the above comments. To recap: The gating item for policy is the Commission's statutory authority. The Commission can accomplish a lot with existing undisputed authority, including taking the actions set out, above, on pages 4-5 of these Comments. The simplest way to introduce the proper incentives is to enforce spectrum allocation with negative consequences for receiver manufacturers that sell receivers not in compliance with published spectrum allocations.

In conclusion, the Commission can bring receivers into spectrum allocations by using the agency's traditional tools of spectrum allocation and regulation of transmitters. The problems with receivers occurred not because the Commission lacked authority to regulate receivers but because the Commission did not exercise the authority it has.

Respectfully submitted,

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