

## A PROTOTYPE “TAXONOMY” FOR ENFORCEMENT OF SPECTRUM USAGE RIGHTS

DRAFT v. 1.0 (September 2011)

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Introduction. Appendix A to this document represents an attempt to identify three broad categories of typical regulatory conflicts (in the U.S.) involving spectrum usage rights (“SURs”), especially disputes alleging potential or actual “harmful interference” related to the “concurrent operations” or “coexistence of multiple systems.”<sup>2</sup> The primary purpose of this “taxonomy” is to foster development of a more consistent analytical approach by evaluating the procedural options (or lack thereof) for resolving spectrum access or interference disputes. The taxonomy lists potential case studies falling under a variety of procedural situations that have come before the U.S. Federal Communications Commission (“FCC”).<sup>3</sup> The ability of parties to obtain “redress of their grievances” depends on whether there are fair, open and expedient processes – along with adequate institution(s) to implement them – to resolve all disputes over spectrum rights, not just the big, high-profile ones that tend to grab the headlines and everyone’s attention.

Enforcement/Adjudication of SURs. Notwithstanding the continuous clamor to clearly define radio operating rights (especially those related to – drum roll please – “harmful interference”) among disparate, neighboring and competing spectrum users, “enforcement” or “adjudication” of those rights is equally, if not more, important. If Coasian bargaining through private negotiations among disputing parties is generally preferred over time-consuming regulatory intervention (*i.e.*, “delegate interference management to the parties who are coexisting with each other”)<sup>4</sup>, equitable, transparent and efficient procedural mechanisms along with – potentially – alternative institutions and venues should be readily available if and when negotiations fail or are otherwise futile.<sup>5</sup> This is especially the case in a post command-and-control spectrum world that relies primarily on market-based mechanisms and flexible

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<sup>2</sup> Appendix B attempts to break down the elements of the long-used definition of “harmful interference” and related terms. I have attempted to use the terms “concurrent operation” and “coexistence” of multiple systems interchangeably, but may have run afoul of the nomenclature guidance in *J.P. De Vries, “How I Learned to Stop Worrying and Love Interference: Using Well-Defined Radio Rights to Boost Concurrent Operation”* (September 5, 2010), available at SSRN: <http://ssrn.com/abstract=1672375>.

<sup>3</sup> So far, the suggested use cases come out of actual disputes before the FCC, but cases from other countries and agencies could be assessed as well.

<sup>4</sup> J.P. De Vries, *supra* note 2, at 2.

<sup>5</sup> Ronald H. Coase, *The Federal Communications Commission*, J.L. Econ. vol. 2 at 14 (Oct. 1959) (“a legal system to define property rights and to arbitrate disputes is, of course, necessary.”) (emphasis added).

usage regulations in the context of both exclusive licensing and non-exclusive rights (e.g., unlicensed and light licensing approaches).<sup>6</sup>

Categories of SUR Disputes. To help frame relevant case studies around the broad issue of spectrum rights enforcement the proposed process-focused analytical approach would assess the following three main categories of disputes involving SURs of parties who coexist with each other in the same or neighboring spectrum band and/or geographic area:

- Dispute Category 1: Establishment of new rights
- Dispute Category 2: Modification of existing rights
- Dispute Category 3: Enforcing existing rights

*Type 1.* The first dispute category typically involves attempts by new entrants<sup>7</sup> seeking to establish new rights to gain access to a certain spectrum bands that are already allocated and assigned to other services and users. Or, these sought-after bands are adjacent to other services, areas and users. The opponents in these cases are the incumbents in the same or adjacent band/area who argue that granting the new rights would cause harmful interference to existing (or planned) operations. While most of these disputes are ultimately resolved (or not) in the context of rulemaking proceedings to promulgate *ex ante* allocation and service rules, they sometimes begin with adjudicatory type processes.

*Type 2.* The second category is where parties seek to modify their existing SURs, which typically involve efforts by incumbent spectrum users to change or expand their rights.<sup>8</sup> The opponents in these cases are the other incumbents in the same or adjacent band/area who argue that modifying the other party's rights would cause harmful interference to existing (or planned) operations. These disputes are like getting a zoning variance in a particular situation (adjudicatory) or will arise as rulemaking situations where the zoning regulations would be changed for all similarly situated parties.

*Type 3.* In the third main category of disputes, these cases involve allegations of harmful interference raised by another party who is the victim of the interference. These victims usually are not

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<sup>6</sup> See, e.g., P.J. Weiser & D. Hatfield, "Spectrum Policy Reform and the Next Frontier of Property Rights," 15 Geo. Mason L. Rev. 549, 590 (2008) ("[I]n a more diverse environment (both in a technological and a business sense), the FCC's inability to enforce property rights could (1) effectively undermine investment incentives and the development of new services, and (2) encourage self-help behavior whereby parties seek to make life difficult for one another to achieve a business advantage.")

<sup>7</sup> These "new entrants" may include incumbent spectrum users in other bands that are seeking access to additional frequencies.

<sup>8</sup> Theoretically, this category could also include a prospective new entrant's attempt to modify the SURs of the incumbents in a particular band (e.g., by relocating its operations to another band or channel) to prevent harmful interference to or from the requesting party's operations. However, it would be an unlikely scenario where the opponent would argue that coexistence with the requesting party is possible.

actual “parties” to these disputes, but often lodge complaints with the regulator who then, subject to its broad discretion to do nothing,<sup>9</sup> may investigate the allegations and, if such harmful interference (or some other violation) is discovered, take appropriate enforcement action by requiring the interfering party to cease the offending operations, pay a fine, or both. In some rare cases, informal procedures are used where, for example, Federal government operations are involved. A rulemaking or waiver proceeding (depending on the scope of the parties involved) may result in a type 3 dispute becoming a type 1 or type 2 dispute.

*Assumptions.* A key assumption underlying all three categories is that the core of these disputes centers around factual determinations that harmful interference has occurred or will occur unless remedial or enforcement action is taken by the regulator. It is assumed that the actual SURs of the respective parties are not in dispute (to the extent such rights exist). Rather, the case studies under each category should evaluate whether and how such SURs are established, modified or enforced so that any gaps, inconsistencies, uncertainties and trends in taking remedial actions can be readily identified by researchers and practitioners.

Case Studies and Questions. For each category, actual case studies from the FCC (or other regulatory bodies) would be used to identify certain procedural tracks, elements and factors that led or would lead to the actual or likely resolution of the dispute (*i.e.*, a “final” decision or outcome) as well as the responsible organization(s) (*i.e.*, the venue(s)) for resolving “questions of fact” and “questions of law.” To evaluate whether the process/resolution was generally satisfactory or successful, the following types of questions would be explored about each case:

- What was the procedural context (rulemaking/consultation, waiver, licensing, *etc.*)?
- What was the lead organization/sub-organization (and what other organizations were/were not involved) (*e.g.*, the various groups and decision makers within and outside the traditional regulatory body)?
- What was the band/service orientation (*e.g.*, inter-/intra-service, in-band/adjacent band, *etc.*)?
- What were the technical characteristics involved (*e.g.*, high-power/low-power, narrowband/broadband, low/high duty cycle, *etc.*)
- What were the service characteristics (*e.g.*, Federal/non-Federal, public safety, commercial-industrial, commercial-consumer, *etc.*)
- What was the geographic scope/orientation (*e.g.*, national/regional/localized, service and protection contours, geographic service areas, space-based/terrestrial, rural/urban, international boundaries) ?
- How long did it take to resolve?

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<sup>9</sup> See *Heckler v. Chaney*, 470 U.S. 821, 830-832 (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.”); see also *New York State Dept. of Law v. F.C.C.*, 984 F.2d 1209, 1213 (D.C. Cir. 1993) (upholding the FCC’s exercise of its enforcement discretion).

- Who were the parties (and what were their perceived/stated motivations) (*e.g.* new entrant, dominant or competing incumbent, trade associations, individual entities, *etc.*)?
- How would the outcome been different/similar if another procedural track or venue was taken or available?

The detailed analysis of the “substantive” interference/coexistence issues at the heart of such disputes would be left to another day,<sup>10</sup> except to the extent that they affected the process and result. One way to flush this affect out would be to also evaluate in each case whether and, if so, how the decision makers:

- (a) applied the definition of “harmful interference”;<sup>11</sup>
- (b) included *ex post* procedures or requirements in *ex ante* rules in anticipation of disputes;
- (c) assigned the burden of presenting/rebutting or proving/disproving the “facts” or elements surrounding harmful interference claims/defenses;
- (d) defined/redefined SURs; and
- (e) imposed certain mitigation obligations or responsibilities on one or more of the parties.

Expected Outcome. What I expect the analysis to show is probably what most everyone assumes, including the following:

- There is generally no predictable or fair process for resolving complex interference disputes, and even simple disputes (*e.g.*, where the substantive rights of the parties are crystal clear) are often subject to mysterious paths.
- The vast majority of these disputes (at least the major ones) are resolved through *ex ante* rulemaking procedures.
- Resolution of such disputes take a very long time (*i.e.*, several years).
- The procedural rights, obligations and burdens of proof are usually undefined or unclear, but in most cases “harmful interference” to incumbents is implicitly presumed and those urging co-existence (new entrants) typically bear the burden of rebutting this presumption or implementing remedial provisions to protect incumbents from interference.
- There are no apparent “elements” to make or defend a case of “harmful interference”.

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<sup>10</sup> The structured framework described in the IEEE 1900.2 recommended practice could be used to analyze each interference/coexistence scenario. See IEEE, Recommended Practice for the Analysis of In-Band and Adjacent Band Interference and Coexistence Between Radio Systems, 1900.2-2008.

<sup>11</sup> See Appendix B. From a lawyer's point of view and in light of similarly vague constitutional and statutory provisions and common law concepts, the FCC's definition of “harmful interference” (and other related definitions) are really not that bad so long as disputants know how to plead and present evidence on each of the elements of the definition similar to how lawyers must plead/argue/prove/defend negligence, trespass, nuisance or similar civil causes of action.

This or some other outcome may depend on the number and types of cases that are evaluated under the taxonomy, but may nevertheless present a strong quantifiable basis for developing key features of a new spectrum regulatory framework.

Implications for a New Spectrum Regulatory Framework. So, my overall working premise behind the development of this taxonomy and call for more systematic analysis of procedural issues is that, post command-and-control under which flexible operational rules are preferred, all (or maybe most) of the substantive “operating” rights need not be well defined or even established *ex ante* by spectrum regulators before negotiations among interested parties can take place. Rather, it is more important to have “fair” processes (and incentives) for any aggrieved party or parties (whether they be new entrants or incumbents) to get help (on either an *ex ante* or *ex post* basis) from the spectrum regulator or some other adjudicator, mediator, arbitrator, *etc.* to establish, modify, interpret or adjudicate undefined, current or ambiguous rights if and when negotiations fail or are otherwise futile. This process issue could be addressed through the establishment of specific procedures by, for example, for the receipt and review of interference complaints or declaratory rulings on an expedited basis. An alternative or supplemental approach to consider is for Congress to modify or take away the FCC's *de facto* exclusive/primary jurisdiction over these disputes. A key component will also be a good reporting/digest system so that precedents and trends can be more easily researched, understood and tracked.

However, part of having clear procedural rights available may be a set of default substantive rights (*i.e.*, if the parties cannot agree to a solution, here is the one that will most likely be imposed on you by the regulator/adjudicator).<sup>12</sup> These “baseline” substantive rights (and responsibilities) also can aid in identifying which party or parties will have the respective burden(s) of pleading, proof and remedy in each case. This substantive clarity could, for example, be enabled by system-wide (including at the receiver) performance standards or criteria, which would be imposed in the first instance through industry standards organization. To foster delegation of interference management to the parties who are coexisting with each other, the regulators role would be limited to (1) resolving disputes that cannot be negotiated, using the standard as the baseline for establishing rebuttable presumptions and (2) adopting or modifying standards or criteria only in cases where the private sector fails to do so. In either case, such standards would no longer be centered around a general policy objective of minimizing interference, but around principles of “peaceful” coexistence, concurrent operation, spectral efficiency, technical innovation, *etc.*

Finally, in light of modern radio technology, particular attention should be paid to developing a wide range of potential and reasonable remedies and reject any notions of simple “injunctive” relief being imposed. Alternative remedies or interference mitigation approaches (temporary and permanent)

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<sup>12</sup> Unless an assessment of the various proposed case studies can present a clear “restatement” of the law of harmful interference disputes, which I doubt, a baseline facilitates negotiations since it would represent to the disputants the “best alternative to a negotiated agreement” or “BATNA.” See R. Fisher & W. Ury, “Getting to Yes” Ch. 6 (Penguin, 1981).

would be based on the relevant facts and circumstances (*i.e.*, empirical evidence) presented and proven to the impartial adjudicator using an objective and uniform analytical and procedural framework for assessing and analyzing future interference and coexistence disputes.

Conclusion. Subject to the lessons learned from the appropriate case studies (and maybe some experimental trials), focusing on improving the procedural methods for resolving spectrum access or interference disputes may, in turn improve the substantive legal or technical issues that require definition or clarity. Under fair, open and expedient processes implemented by competent institutions, such issues, such as what is “harmful interference” and how it can be proven and remedied, will be developed and refined through such processes and institutions using the prior cases as potential precedents.<sup>13</sup> These lingering issues are apparently not being resolved under the current regulatory framework.

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<sup>13</sup> On the other hand, an argument could be made that having no reliable process or venue available for resolving such disputes would more likely encourage a negotiated solution. This, however, raises questions of (a) fairness, (*e.g.*, if the interests of the incumbents always trump those of new entrants); (b) efficiency (*e.g.*, incentives to delay an outcome indefinitely); and (c) certainty (*e.g.*, how things may be different from one administration/Chairman to the next). The case studies analyzed under the proposed “taxonomy” may yield this outcome as well. For example, there are plenty of cases/disputes that have never even crossed the FCC’s threshold but were nevertheless resolved. These include the coexistence arrangements among licenses in the Cellular Service and Personal Communications Service (“PCS”) and in the international satellite context, which involved coordination of orbital slots and frequencies where there is apparently no organization charged with refereeing conflicts. See Weiser & Hatfield, *supra* note 6, at 588-90; R. Frieden, “Balancing Equity and Efficiency Issues in the Management of Shared Global Radiocommunication Resources,” 24 U. Pa. J. Int’l Econ. L. 289, 296, 303 (2003) (noting the lack of enforcement mechanisms at the International Telecommunications Union governing the spectrum and orbital slot management for international satellite systems).

## Appendix A – DRAFT Taxonomy

The rough taxonomy<sup>1</sup> below sets forth various contexts, elements, factors and variables that could be analyzed under each category of spectrum access/interference disputes. First, potential case studies are identified under each category under various procedural contexts. Then, the range of potential elements from the questions above are identified (with references, where available). Remember, this is notional and just a draft. Comments and feedback appreciated!

### (1) Case Studies

#### a. Category 1: Establishment of New Rights

##### i. Rulemakings

1. MVDDS (aka “Northpoint”)<sup>2</sup>
2. AWS-3 (aka “M2Z”) (tried application, waiver and petition for forbearance first)<sup>3</sup>
3. Additional Spectrum for Medical Device Radiocommunication Service in the 413-457 MHz Band (aka “medical micropower networks” or “MMNs”)<sup>4</sup>
4. Ultrawideband (“UWB”) (coexistence “underlay” in many bands)
5. Unlicensed Operation in the TV Broadcast Bands (aka “TV White Spaces”)<sup>5</sup>
6. 3650-3700 MHz Band (coexistence with in-band satellite earth stations, adjacent band radar operations and other new entrants through a “contention based protocol” in half of the band)<sup>6</sup>
7. Intelligent Transportation Services (“ITS” aka “dedicated short range communications” or “DSRC”) (coexistence with adjacent-band fixed satellite service, in-band radars, and earlier-registered ITS systems -- see 47 CFR Sec. 90.377(e)-(f)).<sup>7</sup>

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<sup>1</sup> tax-on-ō-my /tak-son-uh-mee/ noun, 2. a classification into ordered categories.  
<http://dictionary.reference.com/browse/taxonomy>.

<sup>2</sup> [get references, including DC Circuit case] (note extension of buildout rules granted to 10 licensees at [http://www.fcc.gov/Daily\\_Releases/Daily\\_Business/2010/db0728/DA-10-1378A1.pdf](http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0728/DA-10-1378A1.pdf)).

<sup>3</sup> [get references, including DC Circuit case].

<sup>4</sup> [get references].

<sup>5</sup> [get references].

<sup>6</sup> [get references].

<sup>7</sup> [get references].

ii. Adjudications

1. M2Z (tried application, waiver and petition for forbearance first)<sup>8</sup>
2. HyeCrest/Cellularvision (Experimental License/Waiver, led to LMDS & FSS negotiated rulemaking)<sup>9</sup>
3. Aircell (Experimental license, then rulemaking to share cellular bands)<sup>10</sup>

b. Category 2: Modification of existing rights

i. Rulemakings

1. MSS/ATC<sup>11</sup>
2. DARS/WCS (2010)<sup>12</sup>
3. EBS/BRS (rebanding) (new WCAI petition for rulemaking)<sup>13</sup>
4. 800 MHz (Nextel vs. Public Safety rebanding in 2000s) (Fleetcall/Nextel conversion of SMR to enhanced SMR – any interference issues?)<sup>14</sup>
5. Ultrawideband (could also be considered a category 1 case too from the new entrant perspective, but incumbents alleged that their rights were being modified) (see Mitchell Lazarus overview at <http://www.commlawblog.com/2010/08/articles/unlicensed-operations-and-emer/fcc-wraps-up-ultralong-ultrawideband-proceeding/>).<sup>15</sup>

ii. Adjudications

1. DARS Terrestrial Repeater STAs<sup>16</sup> (also a rulemaking)
2. Aircell (Experimental License led to rulemaking for airborne access to cellular bands) (could also be considered a category 1 case too from the new entrant perspective)<sup>17</sup>

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<sup>8</sup> [x-ref].

<sup>9</sup> [get references].

<sup>10</sup> [get references].

<sup>11</sup> [get references].

<sup>12</sup> [get references].

<sup>13</sup> [get references].

<sup>14</sup> [get references].

<sup>15</sup> [get references].

<sup>16</sup> [get references].

<sup>17</sup> [x-ref Note 10].

3. Qualcomm/MediaFlo Petition for Declaratory Ruling<sup>18</sup>
4. Fleetcall Waiver (Nextel)<sup>19</sup> (SMR to ESMR – interference issues?)
5. Alvarion Waiver for 3650-3700 MHz equipment, unopposed but may not have been subject to public notice<sup>20</sup>

c. Category 3: Enforcing existing rights

i. Adjudications

1. 5.8 GHz UNII vs. FAA Radars<sup>21</sup> (informal database approach also)
2. Cellular Boosters – CTIA Declaratory Ruling Request (also a rulemaking)<sup>22</sup>
3. Puerto Rico WISPS: Islanet vs. Neptuno<sup>23</sup>

ii. Informal Procedures

1. 5.8 GHz UNII vs. FAA Radars<sup>24</sup>
2. DoD vs. Unlicensed Garage Door Openers<sup>25</sup>

(2) Contexts, elements, factors and variables

a. Procedural Context(s) (Initial Venue(s)) [procedures]

i. FCC Rulemaking

1. Spectrum Allocation (full Commission) [APA Notice and Comment]

<sup>18</sup> 21 FCCR 11683 (10/13/06).

<sup>19</sup> [get references].

<sup>20</sup> [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DA-10-676A1\\_Rcd.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-10-676A1_Rcd.pdf).

<sup>21</sup> See [http://www.wi-fi.org/files/FCC\\_Memorandum\\_on\\_UNII\\_Device\\_Operation\\_2010\\_07\\_27-M.pdf](http://www.wi-fi.org/files/FCC_Memorandum_on_UNII_Device_Operation_2010_07_27-M.pdf).

<sup>22</sup> *Petition for Declaratory Ruling Regarding the Unlawful Sale and Use of Wireless Jammers And Wireless Boosters and Repeaters*, filed by CTIA with the FCC's Wireless Telecommunications Bureau on November 2, 2007; CTIA, *White Paper On The Harmful Impacts Of Unauthorized Wireless Repeaters*, at 12-13, May 1, 2006 (still pending) [WT Docket No. 10-4 (ECFS)]; See also Complaint Against Digital Antenna, Inc., filed by AT&T, Inc. with the FCC Enforcement Bureau on April 30, 2009 . [See also related Trademark infringement action at <http://www.rfcexpress.com/lawsuit.asp?id=46580>].

<sup>23</sup> (NAL, File No. EB-06-SJ-022 (Jan. 23, 2007), available at <http://www.fcc.gov/eb/FieldNotices/2003/DOC-269874A1.html>]; In Re Neptuno Media, Memorandum Opinion and Order (“MO&O”), (Apr 23, 2007) available at, [http://fjallfoss.fcc.gov/edocs\\_public/attachmatch/DA-07-1808A1.pdf](http://fjallfoss.fcc.gov/edocs_public/attachmatch/DA-07-1808A1.pdf), denying Islanet’s Petition to Deny Neptuno’s application to modify its common carrier fixed point-to-point microwave stations. Id. ¶ 1. Therein, Islanet submits the violations disclosed in the NAL as prima facie evidence that Neptuno’s petition to modify its stations is not in the public interest. Id. ¶¶ 6–9. Neptuno Petition to Deny against World Data (*In Re World Data PR, Inc.*, Memorandum & Opinion Order (MO&O), ¶ 1 (Dec. 29, 2009), [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DA-09-2626A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-09-2626A1.pdf)). See also CU Law Comments in ET 10-253

<sup>24</sup> See [http://www.wi-fi.org/files/FCC\\_Memorandum\\_on\\_UNII\\_Device\\_Operation\\_2010\\_07\\_27-M.pdf](http://www.wi-fi.org/files/FCC_Memorandum_on_UNII_Device_Operation_2010_07_27-M.pdf).

<sup>25</sup> see GAO, (Dec. 1, 2005), <http://www.gao.gov/new.items/d06172r.pdf>.

2. Service Rules (full Commission) [APA Notice and Comment]

Note: No delegation of authority to Bureaus/Offices to make/change rules except in limited circumstances (e.g., Hearing Aid Compatibility, 47 CFR 20.19(k)).

ii. FCC Adjudicatory Processes

1. Licensing (WTB, MB, IB) [FCA Title III; APA]
2. Equipment Certification/Approval (OET) [FCA Sec. 302; APA]
3. Rule Waivers (WTB, MB, IB, OET)
4. Complaints/Enforcement/Declaratory Rulings (EB, WTB, MB, IB, OET)

Note: Broad delegation of authority to FCC Bureaus and Offices.

iii. Other Venues

1. Other Federal Agencies
  - NTIA
  - FAA, DoD, etc.
  - State Department
  - EOP: OSTP, OMB, NEC, etc.
2. International
  - International Telecommunications Union (ITU-R)
  - Bi-Lateral Agreements
3. Judicial
  - Review of FCC actions (APA standard of review)
    1. Adjudications
    2. Rulemakings
  - Forfeiture Collection (47 USC 504)
  - Civil Disputes (e.g., tort, contract, bankruptcy, etc.)<sup>26</sup>
  - Criminal Cases (e.g., 47 U.S.C. 333, 501; 18 USC 1367)<sup>27</sup>
4. Congress
5. States (e.g., Hearing Aid Compatibility Rules)<sup>28</sup>
6. Industry
  - Federal Advisory Committees (FACA)
  - Frequency Coordinators<sup>29</sup>

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<sup>26</sup> Civil Lawsuits: AT&T v. Digital Antenna (see above) re boosters; Computer Systems of America, Inc. v. Data General Corp., 921 F.2d 386 (C.A.1 (Mass.), 1990)  
Hypothetical Spectrum Leasing Disputes where preventing/avoiding harmful interference is a contractual term (not aware of any actual cases yet).

<sup>27</sup> Prosecution for willful interference (US Attorneys):  
Cellular Jammers: [http://www.fcc.gov/eb/Public\\_Notices/DA-05-1776A1.html](http://www.fcc.gov/eb/Public_Notices/DA-05-1776A1.html); Captain Midnight (HBO) Criminal Prosecution.

<sup>28</sup> 47 CFR 20.19(j).

- Standards Bodies
- Trade Associations
- Telecommunications Certification Bodies (other “independent professional organization”)

b. FCC Rulemaking Processes (Responsible Organization(s))

i. Spectrum Allocation (OET)

1. Service/Use/Rights Designations
  - Satellite/Terrestrial, Fixed/Mobile, etc.
  - Exclusive/Non-Exclusive; Primary/Secondary
2. Federal/Non-Federal
3. Footnotes
4. International/Border Issues

ii. Service Rules, including channel allotments, band plans, technical rules, etc. (OET or WTB/IB/MB)

1. Licensing processes (auctions, unlicensed, licensed light)
2. Definition of rights and obligations;
3. Technical Rules
4. Establishment of dispute resolution procedures (e.g., relocation, coordination, etc.)
5. Implementation: Licensing/IT systems; appointment of frequency coordinators, database managers & relocation clearinghouse(s), equipment certification, etc.

c. FCC Adjudicatory Processes (Responsible Organization(s))

i. Licensing (WTB/MB/IB)

1. Mutually Exclusive License/Construction Permit Applications
2. Non-Mutually Exclusive License Applications/site registrations
3. Rule Waivers
4. License Modifications (47 USC 316)
5. License Conditions
6. Coordination with Mexico/Canada
7. Coordination with other licensees (adjacent band/market)
8. Relocation of incumbent operations
9. Petitions to Deny/Enlarge Issues (47 USC 309(d)-(e))

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<sup>29</sup> Memoranda of Understanding with three FACs: To ensure faster processing of such complaints, the Commission has entered into a number of Memoranda of Understanding with certain FCC-certified frequency advisory committees (“FACs”) or frequency coordinators pursuant to which frequency coordinators will receive, investigate and, if possible, resolve private land mobile interference complaints in the first instance. Complaints that cannot be resolved after a specified time period will be referred to the Enforcement Bureau. (<http://www.fcc.gov/eb/interference/plmic.html>)

- 10. License Revocation (47 USC 312)
- 11. License Renewal (47 USC 307(c) & 309(k))
- 12. Leasing/Assignments/Transfers (47 USC 310(d))
- 13. Informal Requests (47 CFR 1.41)
  - ii. Unlicensed devices (Part 15)
  - iii. Special Temporary Authority (47 USC 309(f))
  - iv. Experimental/Developmental Licenses (OET; WTB/MB)
  - v. Equipment Certification (OET/TCBs)
  - vi. Formal Complaints (EB)
  - vii. Informal Complaints (EB)
  - viii. Declaratory Ruling Requests
  - ix. Investigations/Inquiry on own Motion (47 USC Sec. 403/404)
  - x. Forbearance Requests (?)
- d. Parties
  - i. Proponent(s) (Potential/Alleged Interferer)
    - 1. New Entrant(s)
    - 2. Incumbent(s)
  - ii. Opponent(s) (Potential/Alleged Interferer)
    - 1. New Entrant(s)
    - 2. Incumbent(s)
  - iii. Other Interested Parties
- e. Frequency Band(s), Emission Orientation, Services
  - i. In-band/overlapping band
  - ii. Adjacent band/out-of-band
  - iii. Interservice/Intraservice
  - iv. Spurious emissions
  - v. Underlays/Overlays
  - vi. Device/system electromagnetic compatibility (e.g., hearing aids and cell phones, home electronics and computers, broadband over powerline and amateur radio)
- f. Geographic Orientation
  - i. Overlapping/Adjacent Areas
  - ii. Exclusion/Protection Areas/Regions/Zones
  - iii. License Service Areas
  - iv. Protected Service Contours
- g. Other technical characteristics
  - i. high-power/low-power
  - ii. narrowband/broadband

- iii. low/high duty cycle
  - iv. digital/analog
- h. Service characteristics
- i. Federal/non-Federal
  - ii. public safety
  - iii. commercial-industrial
  - iv. commercial-consumer
- i. Burdens of production of evidence/Burden of Proof
- i. APA, 5 USC 556
  - ii. Section 7(a) of the Communications Act<sup>30</sup>
  - iii. Applications/Petitions to Deny<sup>31</sup>
  - iv. License Modifications (47 USC 316)

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<sup>30</sup> 47 USC 157. establishes that it is the policy of the United States “to encourage the provision of new technologies and services to the public” and that anyone who opposes a new technology or service will have the burden of demonstrating that the proposal is inconsistent with the public interest. *But, see* M2Z v. FCC ([Slip. Op.](#) at 11-14) (D.C. Cir. March 2009) (Even assuming that M2Z proposed a new technology or service, affirming Commission’s public-interest decision as not “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”)

<sup>31</sup> 47 USC 309(d); *Astroline v. FCC*, 857 F.2d 1556 (DC Cir. 1988).

## Appendix B: “Harmful Interference” Elements (WIP)

### Elements of Interference, Harmful Interference and other Interference Definitions:

From 47 CFR Sec. 2.1 ([link](#))

*Interference.* The effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy. (RR)

[BREAKDOWN] (emphasis added) (terms in *italics* also defined in Sec. 2.1)

The effect of [result]

unwanted energy

i. due to [cause]

one or a combination of

a. *emissions*,

b. *radiations*, or

c. inductions

ii. upon reception in a *radiocommunication* system [cause/timing]

iii. manifested by [harm]

1. any performance degradation,

2. misinterpretation, or

3. loss of information which could be extracted in the absence of such unwanted energy.

*Harmful Interference.* Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations. (CS)

[BREAKDOWN] (emphasis added) (terms in *italics* also defined in Sec. 2.1)

1. *Interference* which [cause]

endangers the functioning [harm]

i. of a *radionavigation service* or [victim]

ii. of other *safety services*; or [victim]

2. *Interference* which [cause]

a. seriously degrades, [harm]

b. obstructs, or [harm]

c. repeatedly interrupts [harm]

i. a *radiocommunication* service [victim]

operating in accordance with [the ITU] Radio Regulations. [condition]

## **Exceptions?**

*Accepted Interference.* <sup>1</sup> Interference at a higher level than defined as *permissible interference* and which has been agreed upon between two or more administrations without prejudice to other administrations. (RR)

### *Interference*

- a. at a higher level than defined as *permissible interference* and
- b. which has been agreed upon between two or more administrations without prejudice to other administrations.

*Permissible Interference.* <sup>1</sup> Observed or predicted interference which complies with quantitative interference and sharing criteria contained in these [ITU Radio] Regulations or in ITU–R Recommendations or in special agreements as provided for in these Regulations. (RR)

### Observed or predicted *interference* which complies with

- i. quantitative interference and sharing criteria contained
  1. in these [ITU Radio] Regulations or in ITU–R Recommendations  
or
  2. in special agreements as provided for in these Regulations. (RR)

<sup>1</sup> The terms *permissible interference* and *accepted interference* are used in the *coordination* of frequency assignments between administrations.

*Unwanted Emissions.* Consist of *spurious emissions* and *out-of-band emissions*. (RR)  
[Same or different than “unwanted energy”?]

*Spurious Emission.* Emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions. (RR)

*Spurious domain (of an emission):* The frequency range beyond the out-of-band domain in which spurious emissions generally predominate. (RR)

*Out-of-band Emission.* Emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions. (RR)

*Out-of-band domain (of an emission).* The frequency range, immediately outside the necessary bandwidth but excluding the spurious domain, in which out-of-band emissions generally predominate. Out-of-band emissions, defined based on their source, occur in the out-of-band domain and, to a lesser

extent, in the spurious domain. Spurious emissions likewise may occur in the out-of-band domain as well as in the spurious domain. (RR)

*Radiation.* The outward flow of energy from any source in the form of radio waves. (RR)

*Emission.* Radiation produced, or the production of radiation, by a radio transmitting station.

*Radiocommunication.* Telecommunication by means of radio waves. (CS) (CV)

*Radiocommunication Service.* A service as defined in this Section involving the transmission, emission and/or reception of radio waves for specific telecommunication purposes.

Note: In these [international] Radio Regulations, unless otherwise stated, any radiocommunication service relates to terrestrial radiocommunication. (RR)

*Adaptive System.* A radiocommunication system which varies its radio characteristics according to channel quality. (RR)

*Telecommunication.* Any transmission, emission or reception of signs, signals, writings, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems. (CS)

*Protection Ratio.* The minimum value of the wanted-to-unwanted signal ratio, usually expressed in decibels, at the receiver input determined under specified conditions such that a specified reception quality of the wanted signal is achieved at the receiver output. (RR)

[Check out other interference-related definitions in 47 CFR Parts 15, 90, 101, etc.]