Telecommunications Policy, Regulation, & Enforcement
A Retrospective of FCC Adjudication

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Given their authority by Congress, the Federal Communications Commission (FCC) is charged with regulating telecommunications in the United States. When we consider telecommunications, we often discuss the policies, management, and challenges of adapting the existing regulatory framework to meet the needs of emerging innovative technologies. More often than not, specific areas of telecommunications are more widely debated than others (i.e., radio spectrum and the availability of broadband). However, the FCC's regulatory authority covers various facets of equipment, authorizations/licensures, services, and infrastructure.

This research investigates the FCC's Enforcement Bureau's processes for resolving all telecommunications matters. Violations within telecommunications can range from antenna outages which compromise Federal Aviation Administration (FAA) operations, spectrum interference which can disrupt radio operations, obscenities/indecency over broadcasts that can possibly morally corrupt or offend our society, defrauding the Universal Service Fund, E-RATE, and Lifeline programs which hinders the affordability of services in underrepresented and underserved areas, and robocalls – an over burdensome nuisance- are just a few of the violations that fall under the FCC's purview. Much of the literature concerning the perspectives on how the FCC should regulate or de-regulate delves into the aspects of how the policy affects industry but does not explicitly identify how enforcement occurs or what telecommunications adjudication entails – the primary consensus being the FCC's adjudications are often in the form of *ex-post*

enforcement mechanisms. Our work examines the FCC's Enforcement Bureau's mechanisms for telecommunications violations. By curating a dataset from EB proceedings and employing mixed methods approaches to analyze our data, we further developed a taxonomy that provides insight into what kinds of violators, what types of violations, and how these violations impact the telecommunications landscape.

Furthermore, we leverage predictive modeling to forecast how the FCC's adjudication of these violations may adapt in the future when modeled with the obtained governmental data. When violations can range from life-threatening to administrative, will the FCC's current enforcement mechanisms sufficiently handle the emerging technologies purported to enter the telecommunications landscape during the fourth industrial revolution (4IR)? Our research findings indicate that we may not be ready.

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PREFACE

As a first-generation student, I never imagined that I would have the opportunity to pursue a doctoral degree. In a family that highly values education, both my maternal and paternal grandmothers, born in the early 1900's, did not have an opportunity to pursue their education in this manner. Born to parents serving in the United States Air Force, they would go on to pursue their education later in life once they finished doing an amazing job of rearing their children. I am honored to be of a proud heritage and the first to accomplish this journey. I have been extremely fortunate the have the support of my family, friends, my advisor, and committee while pursuing my academic, professional, personal, and philanthropic goals during this chapter of my life.

The research conducted in this dissertation is a broader application and refinement of methods of an investigation that was conducted while working with my advisor, Dr. Martin Weiss, on Automated Wireless Enforcement under National Science Foundation (NSF) grant 1642949. Although this iteration of work does not focus specifically on radio spectrum, the research I conducted in collaboration with my advisor made the gap in scholarly knowledge within this area of telecommunications poignant. Throughout my time at the School of Computing and Information (SCI), and at the University of Pittsburgh, I have had the pleasure of working, collaborating, and networking with the Graduate and Professional Student Government (GPSG), Pitt Community Engagement Centers located in Homewood and in the Hill District through SCI's Outreach initiative, and Pitt CIRTL. These connections have helped guide, support, and empower me throughout this journey, in addition to showing the importance of how we can all come together as a community to fill the gaps that exist in the frameworks of our society.

It is with the support of my family, friends, and fellow colleagues (my tribe), along with the many mentors, co-workers, SCI personnel and strangers with kind words of encouragement - and prayers - that I have been able to complete this chapter of my life. I am eternally grateful and in awe of each and every one of you. THANK YOU. THANK YOU. THANK YOU! You didn't let me stray. You refused to let me falter. And you always encouraged me to succeed.

1.0 EXECUTIVE SUMMARY

Several telecommunications challenges within the 21st century are emerging due to the expansive increase of innovative technologies. New devices and services that have entered the market are redefining the telecommunications industry, and by extension, the policy that governs it – along with the enforcement required to ensure its stability. In the United States, commercial (non-federal) telecommunications are regulated by the Federal Communication's Commission (FCC). The FCC's original organizational structure is based on the industry of a previous era and iteration of technology (i.e., radio, telephone, and the telegraph) which later led to the formulation of the respective bureaus for regulatory oversight. Although these industries continue to remain in one facet or another, the convergence of technologies over time and the innovative approaches to services now offered no longer adhere directly to the technologies of the past. This format, creating policies, establishing regulations, and carrying out enforcement- and subsequent adjudication, may no longer be sustainable for oversight as technology continues to converge and skew the lines between traditional industries, equipment, and services that allow for interchangeability as it pertains to the telecommunications industry.

Substantial changes to telecommunications regulation have not occurred since the Telecommunications Act of 1996. And even then, arguably, the 1996 Act only broadened the Federal Communications Commission's purview to include challenges that emerged due to the internet; and even more so, these revisions were based on the 1934 Communications Act which established the FCC. In recent years, there has been discussion to revise the regulatory telecommunications landscape. These solutions although policy-focused, do not seek to update the procedural and administrative functions of the FCC in order to provide timely and evenly

distributed oversight or enforcement. More recently, this year, President Biden has announced an increase in the FCC's budget for enforcement. However, this enforcement will focus on unauthorized "pirate radio" broadcast. Although important, our findings indicate that pirate radio, although one of the most pervasive violations under the primary category of broadcast issues, often results in unsanctioned operations more so than interference. Out of the 65 sub-categories of violations developed to accomplish our research, we find that only expanding the FCC's enforcement workforce to combat pirate radio an effort that will result in other violations continuing to remain as low hanging fruit that can have much more damaging effects on society, commerce, the implementation of emerging technologies, and lastly, the telecommunications landscape itself. Furthermore, other new ventures regarding telecommunications policy, such as the Bipartisan Infrastructure Law to rebuild "America's crumbling infrastructure" focuses on telecommunications challenges such as broadband access & deployment along with broadband affordability, but overlooks what we have found in the data which is rampant fraud schemes that are syphoning money from these initiatives and never resulting in their original intent, which is to provide access and affordable services to underrepresented and underserved communities. Lastly, another telecommunications challenge that has received recent attention is that regarding the pervasive and persistent robocalls. In the Anti-Robocall Agenda from Acting Chairwoman Rosenworcel, the FCC has issued one of the largest fines in history along with demanding that providers cease-and-desist from illegal robocalls. However, from our research, we find that many of the fines the FCC imposes often go unpaid.

As we enter the 4th industrial revolution (4IR), which Gartner predicts will increase the telecommunications landscape by 75.44 billion devices by 2025, we consider the affects this may have on a policy, regulation, and enforcement structure that has yet to adopt and adapt to an

innovative society. Furthermore, we posit how relevant it is for certain violation types to remain under the jurisdiction of the FCC. In order to determine what kind of violations are prevalent within the existing telecommunications landscape – from the FCC's perspective, we review and analyze the administrative data from the FCC's Enforcement Bureau (EB). To analyze this data, we develop a taxonomy of categorization types based on both information from the FCC EB website (and the Code of Federal Regulations), and iteratively expand the ontologies based on what we have observed within the data.

By investigating FCC EB adjudication, we contribute to the scholarly knowledge on how enforcement, rather adjudication, occurs within the telecommunications, the "state of adjudication". We initially begin with an exploratory approach answering foundational questions regarding the dataset.

1. What violations are occurring within the dataset?
    a. Who are the main violators?
    b. How are these violations adjudicated?
    c. How many are repeat offenders?
2. What is the impact of some of the violations over the other violation types?
    a. How do the violation penalties change?
3. Does policy or new technologies affect the veracity of enforcement?
4. Who is being affected by these violations?

After developing our foundation, we further posit how the state of adjudication may impact the telecommunications landscape in the future. And further consider how policy may adapt and adopt innovative approaches to combat not only a steadily declining workforce at the FCC, but

also how they may leverage new approaches and standards to impose enforcement mechanisms and thusly automating their adjudication processes.

Once we have obtained the relevant information and analyzed the corpus of violations in its entirety, we propose policy mechanisms that will provide wide dissemination of policies at the right knowledge base for general user consumption, evenly applied regulation, and consistent enforcement mechanisms. By using the FCC EB data, this work identifies and analyzes the common violations, timeliness of response, primary actors/stakeholders, and other important attributes. Moreover, we then use this information to create a baseline for requirements towards automation. Finally, we also use a regression model to forecast how current enforcement and adjudication practices may change in the future.

As innovative technologies continue to emerge and telephone, radio, internet services – along with everyday devices continue to converge further, this research serves as a recommendation to incite changes within the FCC in hopes that the regulatory authority in its current iteration – or any other future organizations- are equipped with the tools to provide standard, consistent, and timely oversight within the telecommunications landscape that focus on the holistic realm of violations to employ ex-ante mechanisms that allow for the continuation of innovating technologies and services in the market, but ensure that their disruption of the telecommunications landscape remains minimal.

Enforcement is an often-overlooked aspect of the telecommunications infrastructure; this dissertation delves into the Federal Communications Commission's adjudication process with an emphasis on enforcement mechanisms. Using online ethnographic approaches to curate this dataset, this research leverages a mixed methods approach to investigate how U.S. telecommunications violations are reconciled and how these decisions may be a bellwether for

how standards may be further applied, established, maintained, and carried out during the fourth industrial revolution(4IR) - and beyond. Along with recommendations on how we may innovate future policies, regulations, and enforcements to accommodate the future that is to come.

After conducting this iteration of the research, findings suggest that although spectrum interference is one of the primary violations observed within the dataset, robocalls & junk faxes, equipment marketing, and unauthorized operations are also prevalent within the proceedings analyzed – along with many other types of infractions. Whether or not the FCC's enforcement coverage is adequate remains uncertain from our findings (as we are unable to ascertain what the permissible threshold should be), however, on average, it takes a year or more to adjudicate the aforementioned proceedings. How adjudications are asserted towards different entity types and their authorization/licensee status appears to have minor to no statistically significant difference - however, textually, we can observe that individuals and/or businesses proving their inability to pay a financial penalty imposed by the FCC is often the deciding factor. In terms of how the FCC approaches innovative technologies, the data suggests that actors often prematurely create, establish, and/or provide service for their innovation without FCC authorization - to which they are later cited or fined for (*ex-post* enforcement). Additional data will need to be obtained and organized in order to better understand the volume of repeat violators. Within the excerpts, a single violation can be occurring for a decade or more before the FCC begins an investigation - this suggests little to no deterrence to violate existing policies and regulations. Our overall findings suggest that the telecommunications enforcement mechanisms employed by the FCC are scare tactics at best – yet our data also suggests, this method may actually be working for some of the violations observed.

2.0 INTRODUCTION

This chapter discusses the Federal Communications Commission (FCC), their organizational structure, and the challenges they face as an independent federal agency. In addition, the evolution of the telecommunications landscape is also briefly discussed. Furthermore, we posit some of the challenges that may be faced by the FCC due to emerging innovative technologies and how they may disrupt the landscape and exacerbate challenges from an enforcement perspective.

"Telecommunications technologies and their associated infrastructure play a critical role in shaping regions. From economic development and competitiveness to shaping how citizens participate in a digital society, broadband and wireless telecommunications systems are key general-purpose technologies that will continue to influence regions for many years to come" (Grubesic 2017). As we enter the 4th industrial revolution (4IR), which Gartner predicts will "increase the telecommunications landscape by 75.44 billion devices by 2025" (Statista Research Department 2019), the expectation is that technologies will continue to converge at such a rate that this will "usher in a new era of economic disruption with uncertain socio-economic consequences" (Brookings 2020). How the influx of these technologies will impact our society, economically developmentally, and competitively will be important, especially if we are unable to respond with regulations, policies, and enforcement mechanisms that limit their disruption while also allowing them to thrive. At the beginning of 2022, executives from U.S. passenger and cargo aircraft lines gave attention to the possible "catastrophic" impacts of the deployment of both AT&T and Verizon's 5G service. The conjecture from the carriers was that the use of the C-Band 5G service could render some of the planes "unusable" (Shepardson 2022). This is but one example of a near

missed crisis from the deployment of emerging technologies and services. Throughout the years, incidents such as the LightSquared GPS interference case, the Uber and Tesla Model X autonomous vehicle (AV) fiascos, and the ancient case of John Jacob Astor getting lost at sea on his vessel the Nourmahal serve as cautionary tales to the importance for proactive, ex-ante policies, regulations, and enforcement mechanisms. The incident of LightSquared (rebranded as Ligado), a cellular provider hopeful to deploy 4G in 2011, is very reminiscent to the current challenge AT&T and Verizon faced with their deployment of 5G earlier this year. The difference with LightSquared however, is that although they originally had the approval from the FCC to test, the prospect of interference to GPS (and more specifically the disruption of military and Federal Aviation Administration (FAA) operations) is what caused the National Telecommunications and Information Administration (NTIA) to decide that it was best not to move forward – resulting in the FCC revoking LightSquared's authorization (Goldman 2012). However, the tragedies that occurred with the autonomous vehicles (AV) is an ongoing challenge, one that has yet to garner telecommunications policy and regulations conversations despite the developments to eventually deploy a vehicle to infrastructure landscape – which would require some coordination with telecommunications. Lastly, the tale of John Jacob Astor's yacht going missing was a bellwether for what would eventually result in his demise aboard the Titanic. When Astor's yacht went missing it was proposed in Congress to increase communications aboard seafaring vessels. This suggested bill would ruminate in Congress well before and several months after the fateful tragedy of the Titanic. One way in which nations can attempt to corral the tentative chaos that can ensue when emerging innovative technologies enter – and disrupt the existing telecommunications landscape - is through policy.

Policy is a "high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body." For telecommunications matters for the United States, the governmental body, an independent federal agency, that establishes our policies, is the Federal Communications Commission (FCC). Federal telecommunications matters (i.e., Department of Defense and other governmental agencies) fall under the purview of the National Telecommunications and Information Administration (NTIA). Despite having slightly separate purviews, interagency coordination does exist between the two entities along with others in concerted efforts to resolve telecommunications matters. Their most recent endeavor, the Spectrum Coordination Initiative, where they also plan to update their Memorandum of Understanding (MOU) from 2003. As stated by Senator Wicker, "The FCC has made significant progress in identifying and making available more spectrum for commercial purposes, but there have been challenges. As the ever-increasing demand for spectrum continues to exceed supply of readily available frequencies, it is important that the FCC and NTIA work collaboratively to ensure the U.S. maintains a pipeline of spectrum for innovative commercial use and federal agencies have the mission-critical spectrum resources they require" (U.S. Senate Committee on Commerce, Science, & Transportation 2022). This push to make spectrum available vice using data from the FCC- or NTIA – to better understand the telecommunications challenges and regulatory needs may indicate why other more pervasive – and sometimes more harmful violations go unenforced.

Given their authority from Congress and being established as an independent federal agency under the Communications Act of 1934, the FCC is charged with establishing telecommunications policy, regulating their rules, and carrying out enforcement actions for their violations – resulting in a final adjudication. This is no menial task as the FCC's authority includes but is not limited to, 1) frequency allocations and radio treaty matters, general rules, and regulation;

2) authorization and administration of accounting authorities in maritime and maritime mobile-satellite radio services; 3) disruptions to communications; 4) experimental radio services; 5) access to telecommunications equipment and customer premises equipment for persons with disabilities; 6) access to voicemail and interactive menu services and equipment for people with disabilities; 7) internet freedom; 8) 911 requirements; 9) wireless emergency alerts; 10) commercial radio operators; 11) access to advanced communications services and equipment by people with disabilities; 12) radiofrequency devices; 13) construction, marking, and lighting of antenna structures; and 14) industrial scientific and medical equipment.

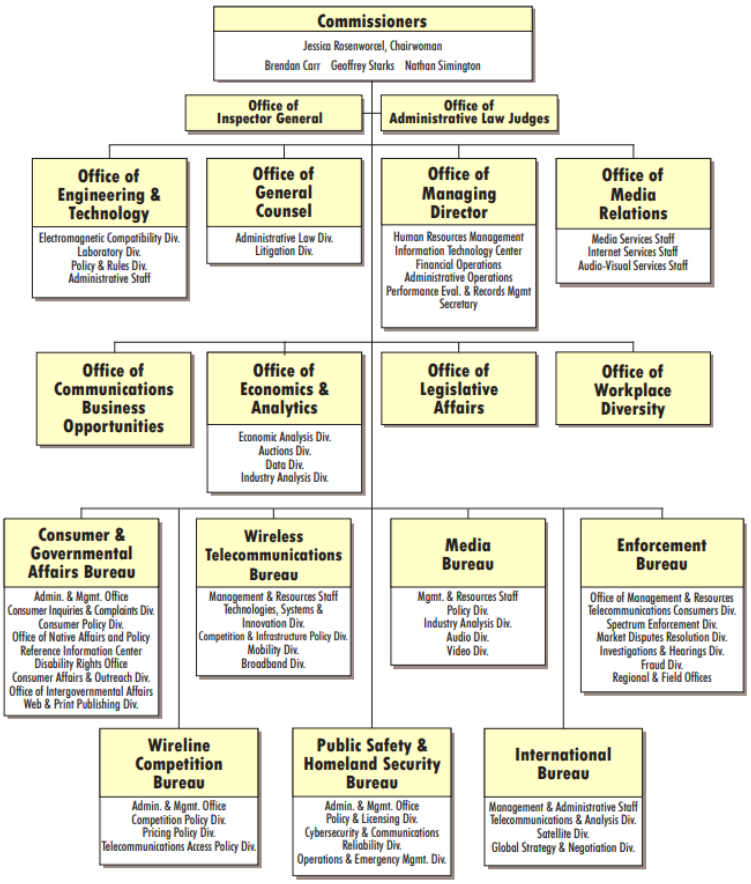


Figure 1 Federal Communications Commission Organizational Chart 2021

In addition to the designated rules that fall under their purview, the FCC is also responsible for resolving disputes that arise within the telecommunications marketplace as well as field complaints from consumers and government users, in addition to subsequently investigating and adjudicating them. However, the mentioned responsibilities still only scratch the surface as to the full breadth of duties the FCC is charged with accomplishing. Yet, to support the complex nature of their responsibilities as granted by Congress, the FCC is organizationally comprised of 18 units, 11 of which are offices and seven bureaus who directly aid the Commission in resolving some of the various issues that arise. The bureaus of the Commission were created to meet the specific needs of the telecommunications industry where the Industry, Media, Wireless Telecommunications, Consumer and Governmental Affairs, Wireline Competition, Public Safety, and Homeland Security bureaus may no longer be best suited for the telecommunications landscape that exists today – although they may have once made sense based on the landscape of the telecommunications industry that existed previously. This disconnect, or lack of "changing with the times", may serve as the basis as to why some scholars within the telecommunications field feel as though it is time once again to reinvestigate the role, responsibilities, and/or organizational structure of the FCC to better respond to the burgeoning telecommunications challenges the marketplace is experiencing. Yet, conversely, if the primary focus will only remain siloed at one to two challenges within telecommunications, one may posit why the remainder of the responsibilities are not offloaded on to a separate entity all-together. The bureau that would be an exception to this sentiment is the seventh bureau – the Enforcement Bureau (EB). And even then, changes to their enforcement mechanisms may prove beneficial for future innovations and challenges. The FCC’s role as a regulator for telecommunications requires interagency coordination and cooperation with other governmental bodies (i.e., NTIA, the Department of

Justice (DOJ), the Federal Aviation Administration (FAA), and more). There is often overlap regarding the various authorities of the agencies working together on various telecommunications matters – often violations. In some regards, this overlap would appear to be beneficial, and for some violations, it very well may be. Though, based on our research the overlap between agencies has sometimes results in mismanagement and confusion rather than a strengthened and diverse team resolving the telecommunications challenges of the day. Additionally, more often than not, the FCC is the primary contact for telecommunications violations across the board as even governmental stakeholders submit their complaints to the FCC directly.

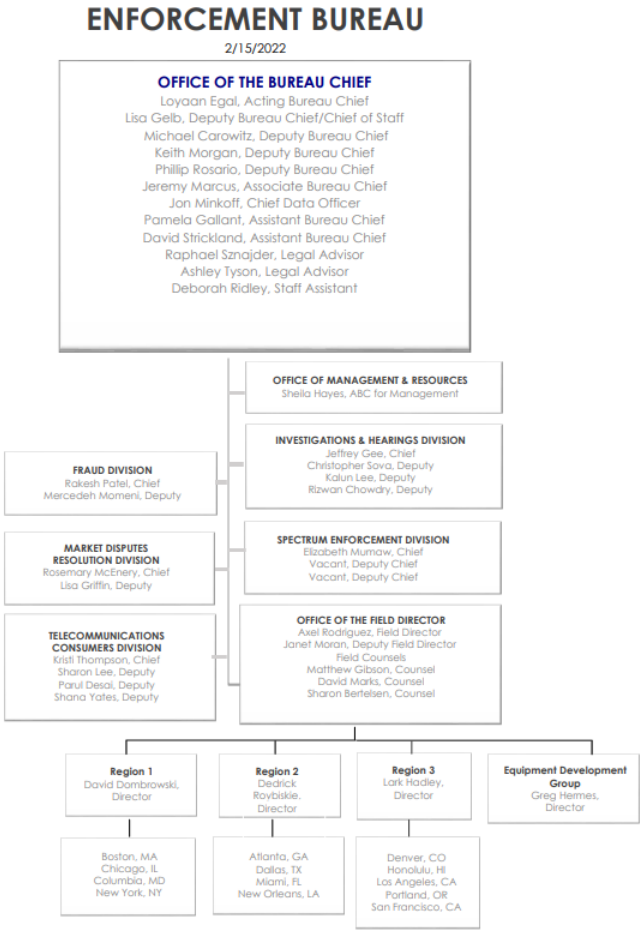


Figure 2 Federal Communications Commission Enforcement Bureau Organizational Chart 2022

Regulation is "an authoritative rule while dealing with a procedure", and it is the EB that accomplishes the enforcement mechanisms as they pertain to the regulations of the FCC. As previously discussed, policy, in general, is typically a "high-level overall plan", while the regulation, especially telecommunications regulation, is much more concise and involved. The EB is "the primary unit responsible for enforcing the provisions of the Communications Act, the Commission rules, orders, and various licensing terms and conditions." The Code of Federal Regulations (CFR) is "a codification of the general and permanent rules published in the Federal Register by Executive departments and agencies of the [US] Federal Government" - like the FCC, serve as a basis for what the EB actually enforces. Furthermore, the CFR "is considered prima facie, accepted as correct until proven otherwise, of the text of the original documents." Title 47 of the CFR specifically focuses on the rules for telecommunications for the United States.

Title 47, in its entirety, encompasses 101 parts that pertain to various facets of the rules and regulations for telecommunications. Structurally, the FCC is organized, from the top-down perspective, consisting of a Chairman/Chairwoman (appointed by the President) and four other Commissioners. The Commission is composed in such a way that no one political party can hold all five of the Commission appointments. Per Title 47 of the CFR section 0.111, Functions of the Bureau, specifically, the Enforcement Bureau, detail that they are tasked with "serving as the primary Commission entity responsible for enforcement of the Communications Act and other communications statutes, the Commission's rules, Commission orders, and Commission authorizations." The section outlines 27 key tasks of the EB. To simplify, the EB primarily resolves complaints that fall under section 208 of the Communications Act, accessibility to communications services and equipment for persons with disabilities, radio frequency interference, Emergency Alert System (EAS) compliance rules, lighting and marking of radio transmitting towers

(antennas), obscenity and indecency compliance, cable television children's programming commercial limits, unauthorized construction and operation of communications facilities, false distress signals, Title III licenses and permits, pole attachments, multichannel video and cable television, violations of the open internet rules, and other complaint matters assigned to the EB by the Commission. In addition to resolving complaint-based investigations, administratively, the EB, per the CFR, is responsible for resolving universal service suspension and debarment, imposing sanctions for violations of the Commission's *ex-parte* rules, identifying and analyzing complaint information – and conducting investigations, external audits, and collecting information, issue or draft orders taking or recommending appropriate actions in response to complaints or investigations, encourage cooperative compliance efforts, mediate and settle disputes, provide information regarding pending complaints, exercise responsibility for proceedings regarding enforcement policies and procedures, advising the Commission on the enforcement implications regarding existing and/or proposed rules, serve as the primary point of contact for coordinating enforcement matters, conduct audits and investigations regarding compliance, identify suspected illegal calls, serve as a party in hearing proceedings, participate in international conferences dealing with monitoring and measurement, work with technical standards bodies, inspect privatized ship radios, provide field support for the Commission and its bureaus, handle congressional and other correspondence pertaining to enforcement actions, issue non-hearing related subpoenas for attendance and testimony of witnesses, conduct the annual registration and select a single consortium to conduct a private-led effort to trace illegal robocalls, and perform any other such tasks as delegated by the Commission.

Table 1 Functions of the EB Title 47 → Chapter I → Subchapter A → Part 0 → Subpart A → §0.111

1	Resolve complaints, including complaints filed under section 208 of the Communications Act, regarding acts or omissions of common carriers (wireline, wireless and international).
2	Resolve complaints regarding acts or omissions of non-common carriers subject to the Commission's jurisdiction under Title II of the Communications Act and related provisions, including complaints against aggregators under section 226 of the Communications Act and entities subject to the requirements of section 227 of the Communications Act.
3	Resolve formal complaints regarding accessibility to communications services and equipment for persons with disabilities, including complaints filed pursuant to sections 225 and 255 of the Communications Act.
4	Resolve complaints regarding radiofrequency interference and complaints regarding radiofrequency equipment and devices, including complaints of violations of sections 302 and 333 of the Communications Act.
5	Resolve complaints regarding radiofrequency interference and complaints regarding radiofrequency equipment and devices, including complaints of violations of sections 302 and 333 of the Communications Act.
6	Resolve complaints regarding compliance with the Commission's Emergency Alert System rules.
7	Resolve complaints regarding the lighting and marking of radio transmitting towers under section 303(q) of the Communications Act.
8	Resolve complaints regarding compliance with statutory and regulatory provisions regarding indecent communications subject to the Commission's jurisdiction.
9	Resolve complaints regarding the broadcast and cable television children's television programming commercial limits contained in section 102 of the Children's Television Act.
10	Resolve complaints regarding unauthorized construction and operation of communications facilities, including complaints of violations of section 301 of the Communications Act.
11	Resolve complaints regarding false distress signals under section 325(a) of the Communications Act.
12	Resolves other complaints against Title III licensees and permittees (Title III of the Communications Act of 1934, as amended), including complaints under §20.12(e) of this chapter, except that the Media Bureau has primary responsibility for complaints regarding children's television programming requirements, and for political and related programming matters involving broadcasters, cable operators and other multichannel video programming distributors. The relevant licensing Bureau has primary responsibility for complaints involving tower siting and the Commission's environmental rules. The Media Bureau has primary responsibility for complaints regarding compliance with conditions imposed on transfers of control and assignments of licenses of Cable Television Relay Service authorizations.
13	Resolve complaints regarding pole attachments filed under section 224 of the Communications Act.
14	Resolve complaints regarding multichannel video and cable television service under part 76 of this chapter, except that the Media Bureau has primary responsibility for complaints regarding the following: Subpart A (general), with the exception of §76.11; subpart B (Registration Statements); subpart C (Cable Franchise Applications); subpart D (carriage of television broadcast signals); subpart F (nonduplication protection and syndicated exclusivity); subpart G, §§76.205 and 76.206 (political broadcasting); subpart I ([Reserved]); subpart J (ownership); subpart L (cable television access); subpart N, §76.944 (basic cable rate appeals), and §§76.970, 76.971, and 76.977 (cable leased access rates); subpart O (competitive access to cable programming); subpart P (competitive availability of navigation devices); subpart Q (regulation of carriage agreements); subpart S (Open Video Systems); and subparts T, U, and V to the extent related to the matters listed in this paragraph (a)(13).
15	Resolve universal service suspension and debarment proceedings pursuant to §54.521 of this chapter.
16	Upon referral from the General Counsel pursuant to §0.251(g), impose sanctions for violations of the Commission's ex parte rules including, but not limited to, the imposition of monetary forfeitures, consistent with §0.311.
17	Resolve complaints regarding other matters assigned to it by the Commission, matters that do not fall within the responsibility of another Bureau or Office, or matters that are determined by mutual agreement with another Bureau or Office to be appropriately handled by the Enforcement Bureau.

Table 1 Functions of the EB Title 47 → Chapter I → Subchapter A → Part 0 → Subpart A → §0.111

(continued)

18	Identify and analyze complaint information, conduct investigations, conduct external audits and collect information, including pursuant to sections 218, 220, 308(b), 403 and 409(e) through (k) of the Communications Act, in connection with complaints, on its own initiative or upon request of another Bureau or Office.
19	Issue or draft orders taking or recommending appropriate action in response to complaints or investigations, including, but not limited to, admonishments, damage awards where authorized by law or other affirmative relief, notices of violation, notices of apparent liability and related orders, notices of opportunity for hearing regarding a potential forfeiture, hearing designation orders, orders designating licenses or other authorizations for a revocation hearing and consent decrees. Issue or draft appropriate orders after a hearing has been terminated by an Administrative Law Judge on the basis of waiver. Issue or draft appropriate interlocutory orders and take or recommend appropriate action in the exercise of its responsibilities.
21	Encourage cooperative compliance efforts.
22	Mediate and settle disputes.
23	Provide information regarding pending complaints, compliance with relevant requirements and the complaint process, where appropriate, and to the extent, the information is not available from the Consumer and Governmental Affairs Bureau or other Bureaus and Offices.
24	Exercise responsibility for rulemaking proceedings regarding general enforcement policies and procedures.
25	Advise the Commission or responsible Bureau or Office regarding the enforcement implications of existing and proposed rules.
26	Serve as the primary point of contact for coordinating enforcement matters, including market and consumer enforcement matters, with other federal, state, and local government agencies, as well as with foreign governments after appropriate consultation, and provide assistance to such entities. Refer matters to such entities, as well as to private sector entities, as appropriate
27	Resolve complaints alleging violations of the open Internet rules.
28	Conduct audits and investigations and resolve issues of compliance concerning equal employment opportunity requirements involving Title III licensees and permittees or multichannel video programming distributors, including cable service providers, under part 76 of this chapter.

Additional Authorities delegated to the Enforcement Bureau –chief- include:

1. Notices of proposed rulemaking and of inquiry and final orders in such proceedings.

2. Applications for review of actions taken pursuant to delegated authority.

3. Matters that present novel questions of law, fact or policy that cannot be resolved under existing precedents and guidelines.

4. Forfeiture notices and forfeiture orders if the amount is more than $100,000 in the case of common carriers or more than $25,000 in the case of all other persons or entities.

5. Orders concluding an investigation under section 208(b) of the Communications Act and orders addressing petitions for reconsideration of such orders.

6. Release of information pursuant to section 220(f) of the Communications Act, except for release of such information to a state public utility commission or in response to a Freedom of Information Act Request.

According to the FCC Strategic Human Capital Plan 2007-2011 (the most current publication of this plan publicly available), the FCC's EB had, at the time, employed 290 personnel, 17% of the FCC's workforce population, to resolve the complex and geographically disparate responsibilities as outlined by the CFR. Furthermore, a review of the FCC EEO annual filings suggests a steady declining trend in their available workforce – which we can theorize has also resulted in a decrease in the EB workforce. The issues that the EB resolves are extended past the domestic borders of the United States as international violations that occur fall under their purview. Former FCC Chairman Kevin Martin stated in the Human Capital Plan report that "factors such as rapidly developing technology, the convergence of delivery systems, demands for increased interoperability, marketplace consolidation, and changes to the legal landscape present exciting challenges for the Commission's workforce." One may argue that many of the challenges highlighted in Former Commissioner Martin's plan still exist today in one facet or another.

Often when we consider telecommunications regulation, we discuss the policies, management, and challenges on how to adapt the existing regulatory framework to meet the needs of emerging innovative technologies – with the marquee topics typically focusing on either spectrum or broadband accessibility and affordability. Policy sets the expectation and standards of the marketplace. Regulation is the tangible action(s) on how to achieve the goals that policy sets forth through rules and how those rules are enforced. Enforcement is a key proponent to ensuring

that those that reside in the marketplace adhere to the policy and rules and that violators are deterred from violating again – however, academic and public knowledge in this area are missing. As previously stated, the purview of telecommunications matters that falls under the FCC's is vast and practically covers a "cradle to grave" responsibility on all facets of telecommunications. Violations that fall under the FCC's responsibility in terms of impact can range from administrative to harmful/deadly. Some examples include but are not limited to, antenna outages that affect Federal Aviation Administration (FAA) operations that can cause pilots to crash into a radio transmitting tower, spectrum interference which can compromise radio operations (and harmfully impact public safety operations), obscenities, and indecency over broadcast that can offend and/or morally corrupt our society, defrauding the E-Rate, Telephone Relay Service (TRS), and/or Lifeline programs which robs communities of technology and services, non-payment into the Universal Service Fund (USF) that hinders the affordability of phone services in rural and underserved areas that have yet to see the benefit of competition among providers, and robocalls – an over burdensome nuisance – are just a few of the more visible violations that fall under the FCC's purview. Some of the less highlighted violations include infractions for broadcast radio competitions, jammer enforcement, illegal equipment marketing, unsolicited faxes, the “slamming” and “cramming” of consumer telephone services – along with other less politicized contraventions. Much of the literature concerning the perspectives on how the FCC should regulate – or de-regulate – delves into the aspects of how policy affects the industry but does not specifically identify how to make sure that stakeholders within the marketplace are abiding by the rules or how enforcement occurs – or even what it entails. It has also been purported by some scholars within the field that the FCC's approach to regulation may be outdated and inefficient due to the creation of bureaus based on an industry that has since changed vastly in the last 20 years. Furthermore,

aside from spectrum, there has been very little, if any, discussion on how to bring the FCC's approaches into the 21st century through automation and other means.

The research conducted in this study investigates the FCC's EB adjudication process, a topic that is not often discussed within the telecommunications field, and reviews key violations in-depth to better understand the existing challenges as they pertain to the telecommunications landscape. Regulation in its most basic sense is a construct that encompasses a set of policies and rules (regulations), a mechanism for monitoring and ensuring they are being followed, and a process to deal with the violations of the rules (Rose et al. 2019). By investigating the EB proceedings regarding telecommunications violations, we can better understand some of the challenges that have plagued the telecommunications landscape since the EB's inception (1999).

Enforcement, which can be perceived as an attempt to foster obedience of the rules to "constrain or compel" a specific set of behaviors is used in various industries and services. And the goal of this research is to not only better understand the challenges within telecommunications but also strive to fill a gap in scholarly knowledge as to what enforcement means regarding telecommunications matters and provide data-driven theory as to how the FCC may be able to adapt in the future to not only accommodate the influx of emerging technologies, but also modernize their own approaches to leverage new technologies and practices to better respond to the future needs of the landscape.

To accomplish the goals of this research, data were collected from the FCC EB transitional website (the iteration previous to the website's refresh in 2019). The proceedings for each year were obtained, and each of the 8,666 electronic documents was read and key information was obtained yielding our first dataset of ~9,660 observations (proceedings). We then completed subsequent passthroughs of the data later omitting erratum proceedings, and finally decidedly

focused on the 2009 – 2019 proceedings for further analysis. The time panel data analyzed spans 10 years based on the "adopted" date of FCC adjudication (it is important to make this distinction as the FCC has a "published" date which does not always directly correlate to when they adopted their decision). In addition to collecting, cleaning, and curating a database from the FCC proceedings, both quantitative and qualitative analyses methods were employed for numerical and string data respectively. In addition, a brief geographical information system (GIS) analysis for the geospatial data that was also collected was accomplished. Lastly, we forecast how enforcement mechanisms may be employed in the future by using a regression model for our prediction.

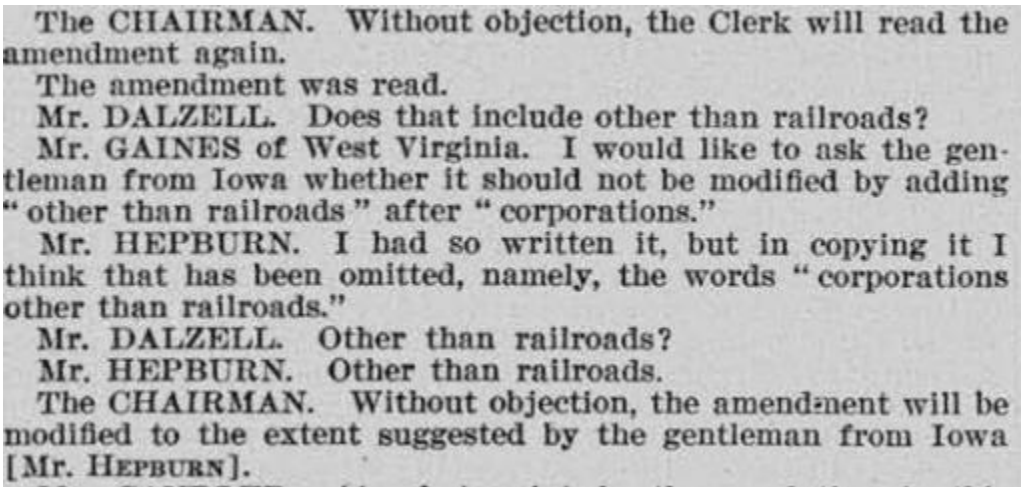
3.0 BACKGROUND

This chapter explores the history of telecommunications policy – primarily through the lens of Congress, discusses regulation through the development of Federal Communications Commission's (FCC's) predecessors, and examines enforcement (both historically in terms of telecommunications and traditionally through non-telecommunications related industries). In terms of the creation of policies, regulation, and enforcement as it pertains to telecommunications, we specifically focus on how policy mechanisms are created as a reactionary response (*ex-post*) to challenges that arise throughout the telecommunications landscape.

3.1 INHERITED RESPONSIBILITIES & CHALLENGES

The Interstate Commerce Act of 1887 set the tone for what we now know as telecommunications policy, regulation, and enforcement. Originally passed by Congress to resolve growing disputes and consternation regarding unfair railroad practices (primarily corruption, fraud, and discrimination) gouging prices for small business (i.e., famers and other matters of small business) (United States Senate 2022), this was the first time in U.S. history where Congress broadly applied their authority to create the first independent federal agency - The Interstate Commerce Commission (ICC). It is with this first implementation regarding interstate commerce that we begin to see language such as "common carrier" and concern over rates (and billing). Furthermore, we also begin to see other issues arise such as the "gambling of cotton futures" (S. 1972), "false branding of dairy products" (H.R. 6442), or even the forbiddance of the

"transmission by mail or interstate commerce of any picture or description of any prize fight or any of its accessories (H.R. 9344) – which for the FCC reign, would be akin to their regulations on broadcast of lottery information (47 CFR § 73.1211), along with their rules governing advertisements (47 CFR § 73.1212), and the FCC blackout rules on exhibition programming (47 CFR § 76.109). During this time, many of the congressional records indicate that wireless telegraphy and telephone matters were matters of interstate. In subsequent iterations of this Act, the ICC would later inherit the authority to "require telegraph companies to interconnect their lines for more extended public service." The Interstate Commerce Act was amended by the Hepburn Act (1906) and Mann-Elkins Act (1910) - and it was these amendments that would expand the concept of interstate commerce and begin to include telecommunications during that period (telegraph, telephone, cable, and wireless ship communications). While the Hepburn Act effectually provided the ICC with the power to give their ruling the "force of law" (something only the courts had the power to do), conversely, the Mann-Elkins Act within its provisions in section 7, applied these rules to "any corporation engaged in transportation"; this then included federal regulation of communication between states and territories (45 Cong. Rec. H8924 1910).



The CHAIRMAN. Without objection, the Clerk will read the amendment again.

The amendment was read.

Mr. DALZELL. Does that include other than railroads?

Mr. GAINES of West Virginia. I would like to ask the gentleman from Iowa whether it should not be modified by adding "other than railroads" after "corporations."

Mr. HEPBURN. I had so written it, but in copying it I think that has been omitted, namely, the words "corporations other than railroads."

Mr. DALZELL. Other than railroads?

Mr. HEPBURN. Other than railroads.

The CHAIRMAN. Without objection, the amendment will be modified to the extent suggested by the gentleman from Iowa [Mr. HEPBURN].

Figure 3 Interstate Commerce Commission Hepburn Bill (45 Cong. Rec. 694, 1906)

Although the Hepburn Act of 1906 provided the ICC with the enforcement of the "rule of law" and the Mann-Elkins Act of 1910 "authorized the ICC to establish uniform systems of accounts for telegraph and telephone carriers, to make valuation studies of certain wire telegraph companies, and to be informed of extensions and improvements to keep these valuations up to date", matters pertaining to radio however, fell under the purview of the Secretary of Commerce and Labor as prescribed in the "Act to require apparatus and operators for radio communication on certain streamers" approved June 24, 1910 (45 Rec. 6043 1912).

The SECRETARY. The proviso in the bill reads as follows:

Provided, That telegraph and telephone companies, except wireless, transacting interstate business, are hereby placed under the supervision and control of the Interstate Commerce Commission, subject to all of the provisions of an act to regulate commerce, approved February 4, 1887, as amended, applicable thereto.

And in lieu of those words insert the following proviso:

Provided, That the provisions of the act entitled "An act to regulate commerce," approved February 4, 1887, as heretofore amended, shall apply to any corporation or any person or persons engaged in the transmission of messages by telegraph, telephone, and cable (except wireless) from one State, Territory, or District of the United States to any other State, Territory, or District of the United States, or to any foreign country. All charges for any service rendered or to be rendered in the transmission of messages by telegraph, telephone, or cable as aforesaid in connection therewith shall be just and reasonable, and every unjust and unreasonable charge for such service or any part thereof is prohibited and declared to be unlawful: *Provided further,* That the Interstate Commerce Commission in determining what are just and reasonable charges for the transmission of messages by telegraph and telephone lines may classify such rates and permit a less rate for night than for day messages and for what is known as "press dispatches" and for newspaper service than for ordinary service: *And provided further,* That no person, association, copartnership, or corporation subject to the provisions of this act shall promise, offer, or give for any purpose to any political committee or employee thereof, or to any candidate for or incumbent of any office or position under the Constitution or laws of the United States, any free pass or frank or any privilege withheld from any person for the transmission of any message or communication, and no person, association, copartnership, or corporation shall ask for or accept from any person, association, copartnership, or corporation, or use in any manner or for any purpose any free pass or frank or any privilege withheld from any person, association, copartnership, or corporation for the transmission of any message or communication. And any person, association, copartnership, or corporation violating this provision shall be deemed guilty of a misdemeanor, and for each offense, on conviction, shall pay to the United States a penalty of not less than $100 nor more than $2,000. And any person, association, copartnership, or corporation who shall use any such free pass or frank shall be subject to a like penalty. Jurisdiction of offenses under this provision shall be the same as that provided in an act entitled "An act to regulate commerce with foreign nations and among the States," approved February 19, 1903, and any amendment thereof.

Figure 4 Proviso 45 Cong. Rec. 7264 1910

However, more amendments and new Acts would follow as more challenges arose and new technologies emerged within the communications landscape. The Wireless Ship Act of 1910, the government's first concerted attempt to regulate radio communications (Tullai 2021), was legislated after a shipping accident in 1909 as concerns for safety grew and the need was identified to have more wireless operators available on vessels. To resolve this issue, the Wireless Ship Act of 1910, required cruise ships departing U.S. ports with 50 or more people traveling 200 miles or

more to have radio equipment and a skilled operator on board. Now, one may surmise from the House of Representatives transcripts from around this time, that the 1909 incident that resulted in this Act was none other than John Astor's yacht, Nourmahal, going missing (45 Cong. Rec. H372 1910). This may not be the sole incident the led to this regulatory change, however, the resolution from the chamber was such that after the incident, the Revenue-Cutter Service, maritime law enforcement, was forthwith expected to "as far as practicable, keep in close touch using wireless telegraph with other vessels of the service in coast waters and with available shore stations, to the end that you may take prompt advantage of such means in the effective discharge of your duties." (45 Cong. Rec. H374 1910).

JANUARY 3, 1910.

Memorandum in re action taken by the Revenue-Cutter Service in endeavoring to locate the yacht *Nourmahal*, belonging to John J. Astor.

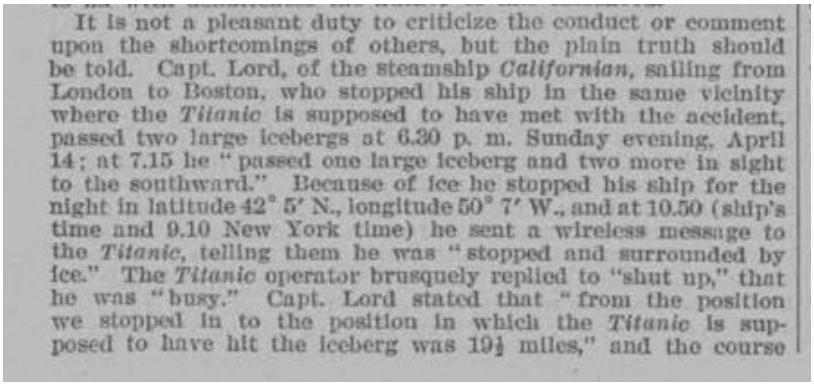
On November 17, 1909, the Treasury Department learned from the newspapers that the steam yacht *Nourmahal* had not been reported since sailing from Port Antonio, Jamaica, on November 5, and that grave fears were felt for her safety. Thereupon, on November 17, a cablegram was filed, addressed to the commanding officer of the revenue cutter *Algonquin*, at San Juan, P. R., directing him to search for and locate, if possible, the yacht *Nourmahal*. It was found that the cables to Porto Rico were out of order and it was impossible to transmit the cablegram to the *Algonquin*. The department then endeavored to reach the *Algonquin* by wireless telegraph, but without success, and it proved to be impossible to communicate with San Juan by cablegram or wireless, and no information could be received from the *Algonquin* to indicate if her commanding officer was aware of the fears felt for the safety of the *Nourmahal*. The department did not get into communication by cable with the *Algonquin* until November 26, when a cablegram was received from that vessel acknowledging the receipt that day of the department's cable order of November 17. This message stated that the *Nourmahal* had been safely anchored in the harbor of San Juan since November 14.

As it was found impossible to get into communication with the *Algonquin*, and as no definite news had been received of the safety of the *Nourmahal*, and as it was surmised that possibly other vessels might be in distress as a result of the hurricane, the department determined to take other steps to assist these possibly imperiled craft. Accordingly a telegram was sent, on November 19, to the commanding officer of the revenue cutter *Yamacraw*, which vessel is stationed with headquarters at Savannah, Ga., to proceed without delay to the waters between Jamaica and Porto Rico and search for any vessel that might have been disabled in the recent hurricane. This message was sent to the *Yamacraw* at Charleston, S. C., and she sailed from that port for West Indian waters at the earliest possible moment. On November 21 the *Yamacraw* was recalled by wireless telegraph on account of the fact that information reached the department to the effect that the *Nourmahal* was safely at anchor in the harbor of San Juan. This information relative to the safety of the *Nourmahal* was later not regarded as assuring, so, on November 23, a wireless dispatch was sent to the *Yamacraw* to proceed to the West Indies at once and search for vessels between Porto Rico, Santo Domingo, and Jamaica, and to promptly send any news of the *Nourmahal*. The *Yamacraw* arrived at San Juan on November 29 and reported the *Nourmahal* safe in that port. The *Yamacraw* was then directed by cablegram to return to her station, and she arrived at Savannah, Ga., December 6, 1909.

The above sets forth the action taken by the Treasury Department to discover the whereabouts of Mr. Astor's yacht. No unusual expenditure was occasioned by the performance of this duty. The revenue cutter *Yamacraw* was in commission, and the expenses incident to her cruise to the West Indies were practically those that would have been incurred were the vessel cruising on her regular station in the performance of her duties. It is true that upon her cruise to Porto Rico and return in search of vessels in distress a larger amount of coal was burned than would probably have been used had she not been dispatched upon this duty. The increased expenditure on account of fuel, oil, and water, which was the only additional expense incurred, may be fairly estimated at about $550.

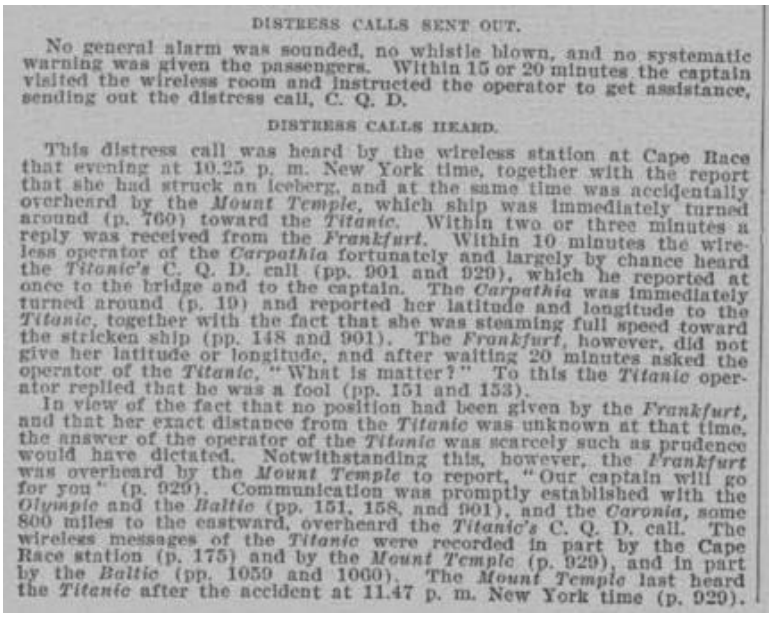
Figure 5 Inability to Contact San Juan Nourmahal 45 Cong. Rec. H373 1910

Not much longer after that, the incident of the Titanic would shake the globe and would result in the United States Congress enacting the Wireless Ship Act of 1912. Based on the Congressional investigation findings, the challenges concerning the Titanic and the wireless telegraphy used highlighted challenges of "unpreparedness" of radio operators, as ships and shore operators received the distress signal, however, response to assist was slow; and although this was not deemed to be the sole responsibility of the fateful tragedy, it was suggested that dedicated radio operators and standards could have resulted in a more expeditious result to the Titanic and thus saving even more lives. A few months after that, and with much debate, the Wireless Ship Act of 1912 was enacted – with the hope that this Act would create uniformity in practices of radiotelegraphy services for various vessels (specifically sea-going passenger and cargo).



It is not a pleasant duty to criticize the conduct or comment upon the shortcomings of others, but the plain truth should be told. Capt. Lord, of the steamship *Californian*, sailing from London to Boston, who stopped his ship in the same vicinity where the *Titanic* is supposed to have met with the accident, passed two large icebergs at 6.30 p. m. Sunday evening, April 14; at 7.15 he "passed one large iceberg and two more in sight to the southward." Because of ice he stopped his ship for the night in latitude 42° 5′ N., longitude 50° 7′ W., and at 10.50 (ship's time and 9.10 New York time) he sent a wireless message to the *Titanic*, telling them he was "stopped and surrounded by ice." The *Titanic* operator brusquely replied to "shut up," that he was "busy." Capt. Lord stated that "from the position we stopped in to the position in which the *Titanic* is supposed to have hit the iceberg was 19½ miles," and the course

Figure 6 Californian Steamship Warning to the Titanic 48 Cong. Rec. S7282 1912



DISTRESS CALLS SENT OUT.

No general alarm was sounded, no whistle blown, and no systematic warning was given the passengers. Within 15 or 20 minutes the captain visited the wireless room and instructed the operator to get assistance, sending out the distress call, C. Q. D.

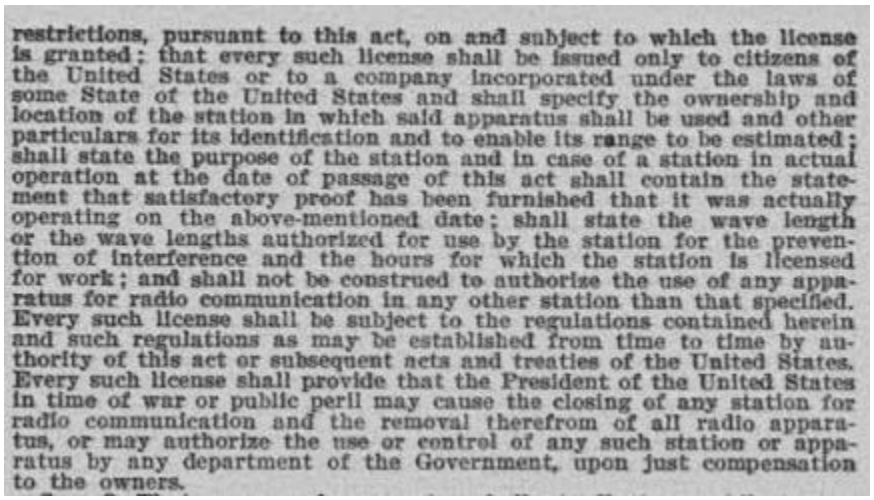
DISTRESS CALLS HEARD.

This distress call was heard by the wireless station at Cape Race that evening at 10.25 p. m. New York time, together with the report that she had struck an iceberg, and at the same time was accidentally overheard by the *Mount Temple*, which ship was immediately turned around (p. 760) toward the *Titanic*. Within two or three minutes a reply was received from the *Frankfurt*. Within 10 minutes the wireless operator of the *Carpathia* fortunately and largely by chance heard the *Titanic's* C. Q. D. call (pp. 901 and 929), which he reported at once to the bridge and to the captain. The *Carpathia* was immediately turned around (p. 19) and reported her latitude and longitude to the *Titanic*, together with the fact that she was steaming full speed toward the stricken ship (pp. 148 and 901). The *Frankfurt*, however, did not give her latitude or longitude, and after waiting 20 minutes asked the operator of the *Titanic*, "What is matter?" To this the *Titanic* operator replied that he was a fool (pp. 151 and 153).

In view of the fact that no position had been given by the *Frankfurt*, and that her exact distance from the *Titanic* was unknown at that time, the answer of the operator of the *Titanic* was scarcely such as prudence would have dictated. Notwithstanding this, however, the *Frankfurt* was overheard by the *Mount Temple* to report, "Our captain will go for you" (p. 929). Communication was promptly established with the *Olympic* and the *Baltic* (pp. 151, 158, and 901), and the *Caronia*, some 800 miles to the eastward, overheard the *Titanic's* C. Q. D. call. The wireless messages of the *Titanic* were recorded in part by the Cape Race station (p. 175) and by the *Mount Temple* (p. 929), and in part by the *Baltic* (pp. 1059 and 1060). The *Mount Temple* last heard the *Titanic* after the accident at 11.47 p. m. New York time (p. 929).

Figure 7 Titanic Distress Calls Sent Out 48 Cong. Rec. S7289 1912

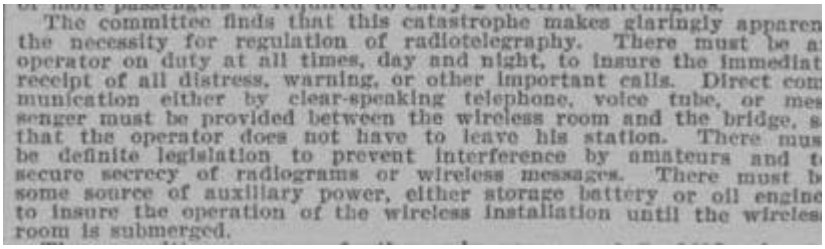
Around this same time, an increase in amateur radio operation interference was increasing and led to the adoption of the International Radio Telegraph Conference suggestion pertaining to laws controlling radio communication in general. The Radio Act of 1912 is purported to be the "first law regarding domestic control of radio communication."



restrictions, pursuant to this act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or to a company incorporated under the laws of some State of the United States and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station and in case of a station in actual operation at the date of passage of this act shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein and such regulations as may be established from time to time by authority of this act or subsequent acts and treaties of the United States. Every such license shall provide that the President of the United States in time of war or public peril may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

Figure 8 S.6412 Excerpt Pt I 48 Cong. Rec. 7572 1912

This Act specifically sought to provide guidance for licensure, emissions, the transmission of distress calls, frequency assignments designated by the Government and commercial use, and places licensing of wireless stations and operations under the purview of the Secretary of Labor. Later, the Radio Act would be amended and become the Radio Act of 1927 establishing the Federal Radio Commission (FRC) – the first independent government agency created with the concerted mission to handle radio and telecommunications matters. The FRC would have authority over radio, issuance of station licenses, allocation of frequency bands to various services, assignment of specified frequencies to individual stations, and control over station power. These responsibilities were previously divided among the Interstate Commerce Commission (ICC) and the Secretary of Labor. However, this leaves the issue of gambling of Cotton Futures that remain to fall under the purview of the ICC.



The committee finds that this catastrophe makes glaringly apparen
the necessity for regulation of radiotelegraphy. There must be a
operator on duty at all times, day and night, to insure the immediat
receipt of all distress, warning, or other important calls. Direct com
munication either by clear-speaking telephone, voice tube, or mes
senger must be provided between the wireless room and the bridge, s
that the operator does not have to leave his station. There mus
be definite legislation to prevent interference by amateurs and t
secure secrecy of radiograms or wireless messages. There must b
some source of auxiliary power, either storage battery or oil engine
to insure the operation of the wireless installation until the wireles
room is submerged.

Figure 9 Committee Recommendation for Radiotelegraphy 48 Cong. Rec. S7291 1912

Since the Radio Act of 1927 did not give the FRC the jurisdiction over telegraph and telephone carriers – as regulation remained under the responsibility of the Post Office Department – confusion ensued regarding who had the authority to regulate specific matters as the Post Office Department, Interstate Commerce Commission, the Department of State, and the newly created Federal Radio Commission – which had oversight of various telecommunications matters – however the overlap of responsibilities created issues. To resolve this challenge, the

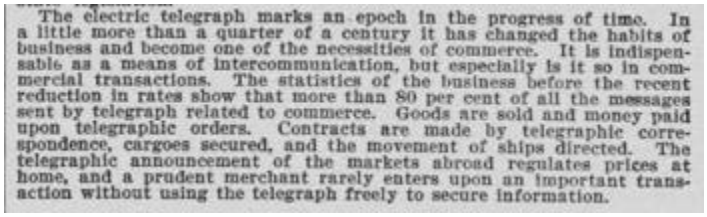
Communications Act of 1934 was enacted. This led to an interdepartmental committee commissioned by the Secretary of Commerce to investigate the confusion of authority further and they recommended that regulation needed to be a single body – a new agency to regulate all interstate and foreign communication by wire and radio including the telegraph, telephone, and broadcast. It was then that S. 3285 was passed and the Communications Act of 1934 was enacted resulting in the Federal Communications Commission (FCC) – the agency that is responsible for U.S. telecommunications today.

The FCC then inherited the broadcast regulatory functions previously vested to the short-lived Federal Radio Commission (FRC), supervision of certain telegraph and telephone operations – as well as jurisdiction over Government telegraph and telephone operations - that were previously under the authority of the Interstate Commerce Commission (ICC), jurisdiction over Government telegraph rates that were previously under the purview of the Post Office Department, and some powers of Cable Landing Licensing Act that fell under the authority of the Department of State.

This trend of challenge, public outcry or incident, and then the implementation of a solution, *ex-post* policy mechanisms, have continued throughout history and continue within today's telecommunications policy, regulation, and enforcement infrastructure. More specifically in terms of enforcement, each act continuously prescribes enforcement of communications matters under a financial forfeiture structure – very few included jail time or other types of enforcement mechanisms to ensure compliance with the rules.

As you can see from the various examples regarding all instances where there have been substantial changes to the U.S. government's regulatory approach to communications, the solutions are very much ex-post, after the fact, resolutions that have continued to increase the overlap of

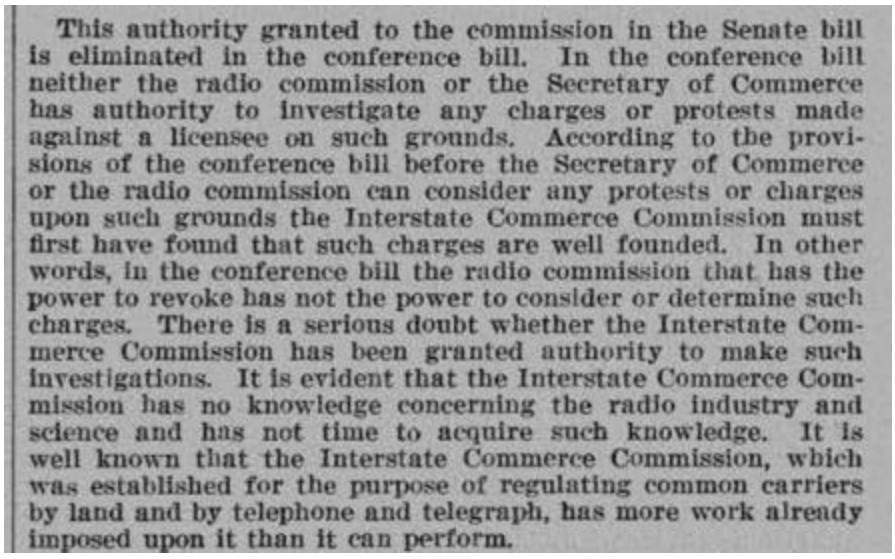
regulatory agencies, and most often the resolutions, although well-argued by both the Senate and House of Representatives, rarely include an in-depth analysis on how implementing one rule, or several over time, may render specific actions of the independent regulatory agency, in the case of this research, the FCC, lacking the power to effectually implement enforcement that is more than financial penalties that may or may not be recouped as the tangible enforcement action, outside of administrative proceedings, falls outside of the scope of the FCC. And this was inherited from the agency's predecessors and Congress's fear that an independent agency with that much power, "would be too much."



The electric telegraph marks an epoch in the progress of time. In a little more than a quarter of a century it has changed the habits of business and become one of the necessities of commerce. It is indispensable as a means of intercommunication, but especially is it so in commercial transactions. The statistics of the business before the recent reduction in rates show that more than 80 per cent of all the messages sent by telegraph related to commerce. Goods are sold and money paid upon telegraphic orders. Contracts are made by telegraphic correspondence, cargoes secured, and the movement of ships directed. The telegraphic announcement of the markets abroad regulates prices at home, and a prudent merchant rarely enters upon an important transaction without using the telegraph freely to secure information.

Figure 10 Electric Telegraph Marks an Epoch of Progress 45 Cong. Rec. H8913 1910

However, in the 1900's, Congress did realize not only the burden imposed on the Commission's there were establishing (which the sentiment is best encapsulated in the 1927 congressional report as it pertains to the ICC), they also articulated not just the regulation for the policies they imposed, but provided a framework for the penalties and ramifications for violating the imposed policies and regulations – a framework we do not see as clearly articulated in today's telecommunications regulations.



This authority granted to the commission in the Senate bill is eliminated in the conference bill. In the conference bill neither the radio commission or the Secretary of Commerce has authority to investigate any charges or protests made against a licensee on such grounds. According to the provisions of the conference bill before the Secretary of Commerce or the radio commission can consider any protests or charges upon such grounds the Interstate Commerce Commission must first have found that such charges are well founded. In other words, in the conference bill the radio commission that has the power to revoke has not the power to consider or determine such charges. There is a serious doubt whether the Interstate Commerce Commission has been granted authority to make such investigations. It is evident that the Interstate Commerce Commission has no knowledge concerning the radio industry and science and has not time to acquire such knowledge. It is well known that the Interstate Commerce Commission, which was established for the purpose of regulating common carriers by land and by telephone and telegraph, has more work already imposed upon it than it can perform.

Figure 11 Regulation of Radio Communications Excerpt 68 Cong. Rec. S4109 1927

We are once again embarking on another pivotal point in history where telecommunications will yet again drive the future for our society (i.e., commerce, connectivity, convenience – as well as the necessities required to participate in society). As an everyday life continue to go virtual (e.g., E-government, E-finance, E-Health, and E-everything else) how our telecommunications landscape is molded for participation by all will become ever more crucial and in order to shape this landscape, our telecommunications policies, regulations, and enforcement will require a new perspective to allow for the advancement of emerging innovative technologies while ensuring the existing infrastructure does not continue to crumble under the pressure of new services, technologies, and users.

3.2 ENFORCEMENT MECHANISMS

Enforcement mechanisms, approaches to encourage following a set of rules, policies, etc., are implemented in different ways pertaining on the industry. When we look at enforcement mechanisms under the common analogy used for the telecommunications industry (i.e., traffic enforcement), we can see that in 32 CFR § 634.26 - Traffic law enforcement principles there is a clear articulation of what is expected to "motivate drivers to operate vehicles safely within traffic laws and regulations." And although not every driver – licensed or otherwise – knows all of the rules pertaining to traffic law, there is arguably some public level of understanding as to what the rules and what is considered "safe behaviors". This level of clarity pertaining to rules for telecommunications is not something we readily have availability to – and one could posit that many everyday users of the telecommunications infrastructure are acutely unaware of where to even begin to obtain this knowledge.

When we consider the telecommunications infrastructure to be the critical resource it is, there is literature that provides both legal and economic examples to how enforcement can occur and considers levels of enforcement – where an independent federal agency such as the FCC is not necessarily required to be the sole entity to resolve violations and disputes. In Elinor Ostrom's work where she challenges the "Tragedy of the Commons" once proposed by Garrett Hardin, she argues in her work "Governing the Commons" that other solutions exist and that "stable institutions of self-government can be created if certain problems of supply, credibility, and monitoring are solved" (Ostrom 1990). Although the telecommunications landscape itself may not inherently be an "institutional arrangement related to the effective governance and management of common-pool resources", resources made available to all by consumption and to which access can be limited only at a high cost (Britannica 2022); the telecommunications infrastructure is

susceptible to overuse, just as much as it is fraud and barriers to its resources through exclusion by specific populations of persons (whether tangible through access or regulatory through accessibility needs). The interrelatedness of specific aspects of the telecommunications landscape makes them subject to Hardin's ideology of the "tragedy" (i.e., equipment marketing and importation, internet-related services, broadcasted content, etc.); while other components of the telecommunications landscape, such as radio spectrum licensure & use, antenna registration, and pole attachments for example, fall under Ostrom's frameworks for the commons. This duology, however, omits nuances regarding telecommunications challenges such as fraud to E-Rate, Universal Service Fund (USF), Lifeline, and Telephone Relay Services (TRS) programs – along with other aspects that fall under the FCC's purview.

Despite the Congressional records once outlining an enforcement framework pertaining to the repercussions violators would face, the FCC in its current iteration see pre-decisional information as "privileged" according to their FOIA response pertaining to records in their Enforcement Bureau Tracking System (EBATS). In an excerpt from a FOIA request response from the Deputy Bureau Chief, in figure 10 below, we receive the response that the "Commission's exercise of its enforcement discretion is protected under numerous FOIA exemptions" (FOIA Control No. 2021-000348, Appendix A). The 2021 FOIA response is in contrast not only to the precedent we see in the Congressional records that outline the penalties for regulations but is also in direct contrast to how privacy (names and addresses of violators) is addressed in the publicly available Enforce Bureau Actions on the FCC's website.

Deliberative records must be such that their disclosure "would expose an agency's decisionmaking process in such a way as to discourage candid discussion within the agency and thereby undermine the agency's ability to perform its functions."[6] Exemption 5 also encompasses the attorney-client privilege and the attorney work product privilege. The attorney-client privilege covers "confidential communications between an attorney and his client relating to a legal matter for which the client has sought professional advice."[7] The attorney work product privilege covers documents and memoranda prepared by an attorney in contemplation of litigation.[8]

Personal information contained in EBATS is protected under Exemption 6 and Exemption 7(C).[9] Exemption 6 protects "personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy." Exemption 7(C) protects "records or information compiled for law enforcement purposes [the production of which] could reasonably be expected to constitute an unwarranted invasion of personal privacy."[10] Balancing the public's right to disclosure against the individual's right to privacy, we would protect information such as individual names, personal email and telephone contact information, and other personal information, where we have determined that release of this information would constitute a clearly unwarranted invasion of personal privacy.

Figure 12 FOIA Control No. 2021-000348 Excerpt 22 APR 2021

By not providing insight as to how the FCC adjudicates telecommunications violations, it creates a barrier for knowledge and understanding for end users, stakeholders, and researchers alike. When we refer back to 32 CFR § 634.26 - Traffic law enforcement principles which requires a level of understanding from end users, stakeholders, and other interested parties, we can posit that these gaps in knowledge not only cause confusion, but also create a telecommunications landscape where everyday users and licensed individuals alike may not be fully knowledgeable as to what actions are illegal or who to contact to lodge a complaint.

4.0 LITERATURE REVIEW

Conferences have been a source of information and inspiration to enhance telecommunications policy, regulation, and enforcement within the United States for quite some time. This chapter focuses on seminal research accomplished by various experts in the telecommunications field and focuses on their sentiments, contributions, and telecommunications challenges from their perspective. In addition, this chapter also highlights the volume and topic of works most typically accomplished within telecommunications resulting in the gap of scholarly knowledge as it pertains to the Federal Communications Commission's (FCC's) enforcement and adjudication practices.

Since the turn of the 21st century, there has been consistent discourse regarding dissatisfaction regarding the FCC's regulation. Multiple stakeholders in academia, industry and government have provided sentiments regarding the FCC's need to change to maintain a level of oversight regarding the convergence of innovative technologies and services. Although each community of stakeholders has their own reasons for inciting regulatory changes from the telecommunications authority; topics ranging from spectrum management and access to considerations of decent – or indecent – media content, many of these works do not delve into the specific details of the Enforcement Bureau and the current state of affairs regarding the existing telecommunications policy landscape aside from the actual policy itself. The scholarly works explored include viewpoints from governmental agencies – including the FCC, journalistic responses, and academia. These works highlight the gap in knowledge concerning the FCC's adjudication process and make poignant the argument of enforcement is an under-researched area of interest within the telecommunications field. Additionally, these works provide insight into the

dissatisfaction regarding the FCC's regulation mechanisms and serve as a foundation for why additional contributions in this area are integral to our future success and support of emerging innovative technologies.

Literature regarding telecommunications regulations is most often centralized on the dissatisfaction of the Federal Communications Commission's procedures and/or policy. Many of the works believe that the FCC needs to downsize or offload some of its regulatory authority to remain focused on spectrum matters and other high visibility challenges. This sentiment has reverberated in the works of academic scholars, Congress, and even the new FCC Chairman Ajit Pai.

Interestingly enough, there is one work, an article from 1999 by Kennedy & Zallaps, that posits an "If It Ain't Broke" argument. Ironically, this paper discusses the non-regulation approach the FCC originally had regarding the internet whereby they distinguished in the Telecommunications Act of 1996 that "information services" and "telecommunications" would be legally distinct (Kennedy & Zallaps 1999). As traditional distinctions of telecommunications continued to converge (e.g., telephone, radio, broadcast, and internet), the regulation has thus become conflated to accommodate the change. This is directly in contrast with what the authors want as they saw non-regulation of the internet as an "un-broken" policy. Although not all scholars believe that non-regulation is best, as revealed in the literary works below, it's not that the policy is broken, it is just outdated and ill-fitting for the current technological landscape – nor does it provide adaptability for the technologies to come. More so, the amount of regulation is also questioned, as many believe that there indeed needs to be an overall intermediary or oversight to avoid a "wild west" situation.

Since 2000 and thereafter, various works have surfaced calling for the FCC to loosen their regulatory grip (light-touch regulation), most often based on the argument that regulation will stifle innovation and market competition.

The proposed agenda-setting from Lehr & Sicker in 2017 pares down the FCC's responsibility and oversight greatly. The Federal Communications Commission's Enforcement Bureau is in charge of adjudicating 20 different category topics. Additionally, there are 31 different functions that the EB is authorized to uphold based on the code of federal regulations (C.F.R.). these categories can be reviewed further in table 1 below.

Table 2 https://www.fcc.gov/eb-iaahttps://www.fcc.gov/eb-iaa

Broadcast of Obscene, Profane, and/or Indecent Material	Emergency Alert System (EAS) Enforcement Actions	Jammer Enforcement	Unauthorized Assignment/Transfer of Control of Wireless Licenses
Broadcast Issues	Equipment Marketing Violations	Public Safety Enforcement	Unauthorized Assignment/Transfer of Control of Telecom Authorizations
Consumer Telephone-Related Issues	Field Activity and Actions	Rural Call Completion	Universal Service Enforcement
Proprietary Information including Customer Proprietary Network Information (CPNI)	Amateur Radio Service Enforcement Actions	Technical Rule Violations	Wireless 911 and E911 Violations
Disabilities Issues & Answers	Hearings	Unauthorized Assignment/Transfer of Control of Broadcast Licenses	U-NII and TDWR Interference Enforcement

The vast amount of scholarly works explored include viewpoints from governmental agencies – including the FCC, journalistic responses, and academia. These works highlight the gap in knowledge concerning the FCC's adjudication process and make poignant the argument of enforcement being an under-researched area of interest within the telecommunications field. Additionally, these works provide insight into the dissatisfaction regarding the FCC's regulation mechanisms and serve as a foundation why additional contributions in this area are integral to our future success and support of emerging innovative technologies.

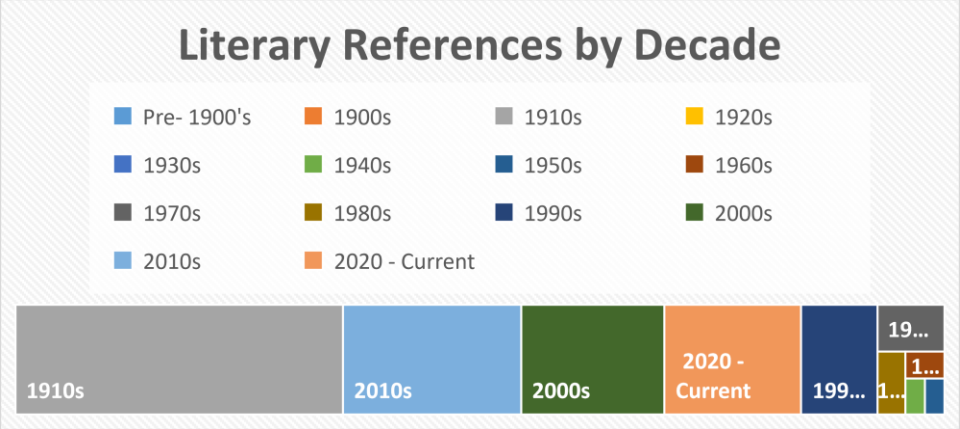


Figure 13 Literature Review References by Decade

The selected works for this proposal occur between the decades of 1950's and 2010's, as shown in the figure above. Although a vast array of technologies and services entered the market throughout the years, viewpoints on what kind of regulation – free market or active government intervention – are continuously debated, however, specific works on adjudication and enforcement remain scarce.

There has been consistent discourse regarding the dissatisfaction regarding the FCC's regulation. Multiple stakeholders in academia, industry, and government have provided sentiments regarding the FCC's need to change in order to maintain a level of useful oversight regarding the convergence of services being offered in emerging innovative technologies. Although each community of stakeholders have their own reasons for inciting regulatory changes from the telecommunications authority; topics ranging from spectrum management and access to considerations of decent – or indecent – media content, many of these works do not delve into the specific details of the enforcement bureau and the current state of affairs regarding the existing telecommunications policy landscape aside from the actual policy itself despite their variability.

Surprisingly, there are various works which discuss that the relaxed regulation approach of the FCC throughout the decades has possibly contributed to some of the most critical repercussions in the form of payola scandals of FCC commissioners and broadcast personnel, the stark economic decline at the turn of the century as a result of the two of the most notorious bankruptcies in U.S. history, and has allowed for questionable and possibly predatory corporate practices from telecommunications providers to go unchecked at the detriment to end users (the end consumer).

Calvert 2005 is one such example of possible ramifications of a deregulated telecommunications landscape as this work focuses on payola (Pay-for- "play") in broadcasting. The primary focus of this article is on the Armstrong Williams case, where he received monies from the Department of Education – which was not disclosed- to promote then President Bush's "No Child Left Behind Act". Throughout this work, Calvert posits whether or not this a problem that requires additional regulatory guidance from the FCC. Aside from the designation of whether a person is a journalist or pundit during their broadcast appearance, this expose delves into the use of government funds for the promotion of political agendas via payola – whether the recipient is a journalist, pundit, or other. Calvert argues that there is a futility of the FCC to attempt to legally resolve or circumvent the issue of conflicts of interests within broadcasting due to the pervasive nature of the practice and the imprecise nature of what this conflict specifically entails as professors- usually broadcast as experts can receive grant/award monies, speaker fees, hotel accommodations and other circumstances would need to be evaluated as well – this adds an additional layer of regulatory complications when trying to determine whose role receives what level of the applicable policy.

Furthermore, in the 2010 published article, Reed Smith recounts the 20th century scandal that cost two FCC chairmen their positions, as the commissioners are accused of receiving payola

– in the form of money, equipment, and other perks - from prospective licensees and broadcasters. Reed explains that this may be the unintended consequence of the quasi-judicial designation of the FCC where there is a grey area in terms what level of engagement should arise between the regulatory authority and the industries, they are responsible for. Following this controversy, new policies were swiftly implemented specifically outlining the ethics FCC employees should uphold.

Literature regarding telecommunications regulations is most often centralized on the dissatisfaction of the Federal Communications Commission's procedures and/or policy. Many of the works believe that the FCC needs to downsize or offload some of their regulatory authority in order to remain focused on spectrum matters and other high visibility challenges. This sentiment is reverberated in the works of academic scholars, Congress, and even the former FCC Chairman Ajit Pai. In an article, Reardon provides a report of then Chairman Pai's talk at the WSJ Tech Live Conference Fall 2019. During this speaking engagement, Pai discusses his motivations for supporting deregulation of the FCC. He stated that "[regulation] has a lot of unintended consequences, one of which is implicitly discouraging innovation, and secondly, [these actions may] ultimately direct investment elsewhere where people might perceive that there is greater ability to innovate and invest in other countries" (Reardon, CNET.com 2019). Yet, the FCC has been in existence long enough for us to bear witness to the negative externalities of both deregulation and possible over/ill-fitting regulation leaving both the Commission and stakeholders gridlocked in uncertainty for the telecommunications market.

Throughout various points within the FCC's existence, arguments have surfaced calling for the FCC to loosen their regulatory grip (light-touch regulation), most often based on the argument that regulation will stifle innovation and market competition.

Table 3 FCC Acts Based on Lehr & Sicker 2017

Title	Communications Act 1934	Telecommunications Act 1996	Communications Act 2021 (Proposed by Lehr & Sicker 2017)
I	Establishes the FCC as an independent regulatory authority	Addressed Telecom Services	Establishes the basic goals of the Act and sets forth the scope and authority for the FCC
II	Specifies the common carrier framework for regulating telecommunication services	Addressed Broadcast Services	Provides the basic framework for regulating potential bottlenecks
III	Addresses services that use the radio spectrum	Addressed Cable Services	Establishes a framework for monitoring the performance of communications markets, for addressing market failures, and for promoting industrial policy goals
IV	Relates to Procedural and Administrative Provision	Addressed Regulatory reform	Focuses on managing radio-frequency spectrum
V	Addresses Penal Provisions and Forfeitures	Addressed obscenity and violence	Focuses on public safety and critical infrastructure
VI	Focuses on services provided by cable television network providers	Addressed the effect on other laws	Addresses the transition plan
VII	Miscellaneous Provisions	Miscellaneous provisions	

While the majority of discussion and debate has centered on the ramifications for consumers and producers, little attention has been devoted to the regulators who enforce Congress' will (Coopman 1999). In order to enforce spectrum interference, the Federal Communications Commission Enforcement Bureau takes action through warnings, notices of apparent liability, and/ or penalties. Overall, there are three regions for the Enforcement Bureau that enforces spectrum for the United States. “However, the FCC has neither time nor resources to enforce current communications laws, let alone this new mandate from Congress” (Coopman 1999).

The radio spectrum enforcement process typically follows the pattern outlined in figure 12. A complaint is received, the respective Enforcement Bureau office within the regional location will investigate (sometimes they are able to interview the offender and gain additional insight as to why they chose to operate without a license or that they may be purposefully interfering with radio spectrum purposefully through other means). Next, a type of enforcement action will be imposed such as a warning, notice of apparent liability (NAL), forfeiture order, or a different category of document that may or may not impose a financial penalty (some also require a

mandatory response to the FCC by mail). Lastly, the information is updated to the Enforcement Bureaus repository which is currently housed on the FCC's transitional webpage (not the main FCC.gov URL).

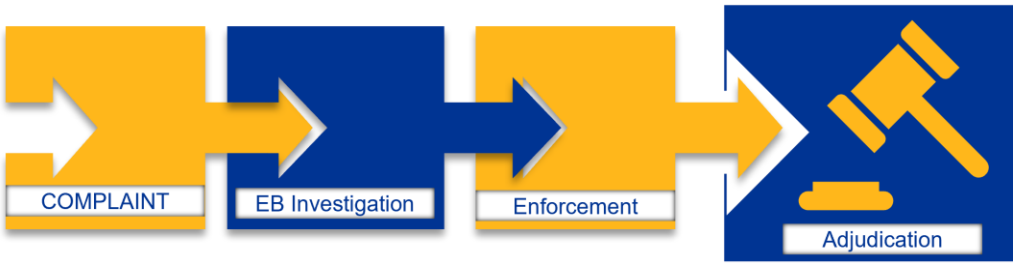


Figure 14 Current Enforcement Protocol

The current approaches don't appear to be much a deterrent for individuals operating unlicensed radio stations, as many of them are multiple offenders, however, based on the data extracted from the Enforcement Bureau repository, it doesn't appear that much is being done in order to heed would be offenders. Additionally, in some circumstances, entities are purposefully interfering with public safety frequency channels, however, again, the data does not show any deviation in the enforcement measure in order to deter tentative harmful disruptions. To this end, this is why is imperative that a more *in eventus* model for regulation and subsequent enforcement measures should be exerted by the FCC's enforcement bureau. Furthermore, additional clarity into the types of enforcement and a hierarchal structure for infractions, if adopted by the Enforcement Bureau, would allow an automated enforcement structure to be easily implemented and deployed.

Literary works where we do see enforcement discussed in terms of telecommunications are vastly centered on how to best utilize enforcement mechanisms for the dense spectrum environment.

Considerations for enforcement for radio spectrum is not a new concept. Many others have posited solutions to spectrum interference and how regulatory agencies should respond accordingly. In 1989, Vicanni posited a spectrum enforcement measure where an automated monitoring system would surveil unassigned frequencies in an attempt to make spectrum enforcement more manageable. Furthermore, in 2009, Coopman analyzed the FCC's regulatory and enforcement strategies. Moreover, in Markovic et al 2009, they developed a tool that "supports formal specification of policies and rules and their automated enforcement on process models". During 2012, Tenhula's work sought to find an expedient resolution for harmful interference. In Altamaimi et al 2013, they examined "three enforcement approaches, exclusion zones, protection zones and pure *ex post* and consider their implications in terms of cost elements, opportunity cost, and their adaptability". Additionally, Cui et al 2014 discussed "rational choices about enforcement approaches and costs require analysis of rights, objectives, precision, etc." Conversely, Littman and Revare convened a roundtable in 2014 with a myriad of subject matter experts to collectively map the changing spectrum landscape. Furthermore, Park et al 2014 discuss the spectrum enforcement issue only in the *ex-ante* and *ex-post* approach. More recently, Miettinen et al 2017 approached enforcement through an IoT Sentinel.

Many of the scholarly works reviewed in relation to spectrum enforcement focus on enforcement from the perspective of access and restriction. "There are two distinct, but closely related problems with [spectrum usage rights] SURs today: the boundaries and the enforcement of the rights" (Tenhula 2012). However, when we consider enforcement for telecommunications matters in their totality, the narrative often becomes divided into regulatory oversight versus self-enforcement among stakeholders. One notable scholar on these subject states, "institutions are rarely either private or public - "the market" or ... the state." Many successful CPR institutions are

rich mixture of "private-like" and "public-like- institutions defying classification in a sterile dichotomy"(Ostrom 1990). In Elinor Ostrom's work *"Governing the Commons"*, she discusses in great detail various aspects of common pool resources (CPR) such as self-organization & self-governance, analyzing long-endearing self-organized & self-governed CPRs, institutional failures & fragilities, as well as a framework for analysis of self-organizing & self-governing CPRs. In Fennell's work, she discusses how models matter, specifically stating that "a third variety of attentiveness is necessary to guard against the undue influence of dichotomies, absolutes, and other forms of rigid classification" (Fennell 2011). "Just as imperfect markets fail to produce efficient allocations, the imperfect processes of collective choice (another name for government) can also result in inefficiency"(Gerber & Patashnik 2006).

		Market failure?	
		No	*Yes*
Government failure?	*No*	Market works; leave it alone	Intervention appropriate; preserve it
	Yes	Any intervention inappropriate; return to market	Particular intervention inappropriate; redesign policy

Figure 15 Market Failure and Government Failure (Gerber & Patashnik 2006)

Another scholar, whose work is not focused on spectrum enforcement, does however, provide valuable insights regarding enforcement. In Steven Shavell's work on optimizing enforcement, he provides various at details and timing of enforcement. Within this article he discusses figure 16 below.

Dimensions of Enforcement			
	Stage of Intervention	Form of Sanction	Private versus Public
Tort Law Safety Regulation	Harm-based Prevention & Act-based	Monetary Monetary	Private Public
Injunction Criminal Law	Prevention Prevention, act-based, and harm-based	Monetary & Non-monetary	Private Public
Corrective Taxation	Act-based	Monetary	Public

Figure 16 Dimensions of Enforcement by Method Shavell

This table of dimensions, although not directly aligned with the enforcement power of the FCC, provides a good roadmap on how to best apply a hierarchal enforcement approach to the regulatory enforcement measures that the FCC currently deploys. Shavell explains how the enforcement actions are missing from the table above, however, in the methodology section, I provide a separate table which includes enforcement measures readily available at the FCC's disposal.

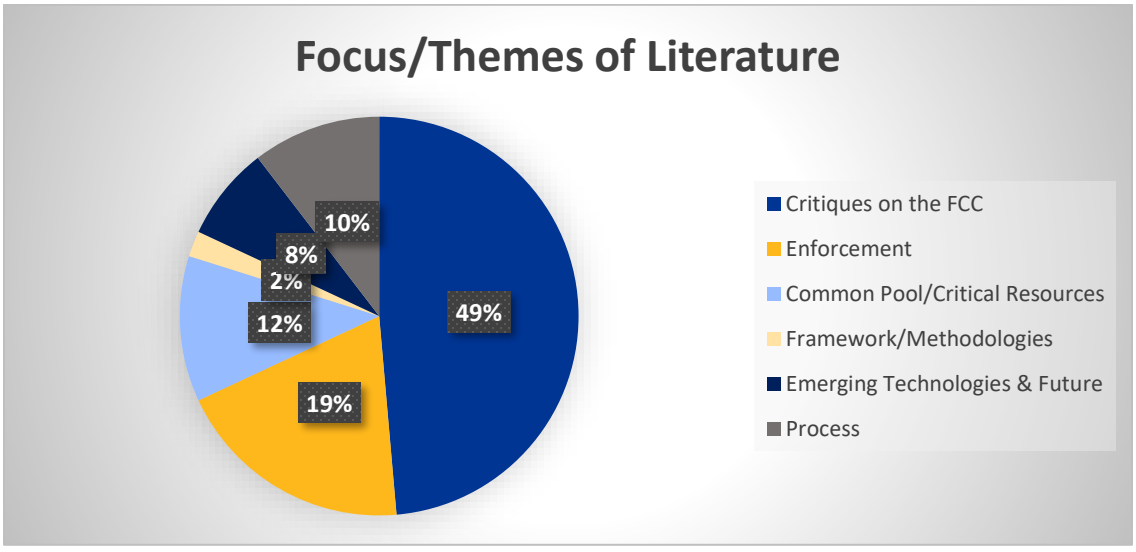


Figure 17 Focus/Themes of Literature Reviewed

There has been consistent discourse regarding dissatisfaction with the FCC's regulation. Multiple stakeholders in academia, industry, and government have provided sentiments regarding the FCC's need to change to maintain a level of useful oversight regarding the convergence of services being offered in emerging innovative technologies. Although each community of stakeholders has its own reasons for inciting regulatory changes from the telecommunications authority; topics ranging from spectrum management and access to considerations of decent – or indecent – media content, many of these works do not delve into the specific details of the enforcement bureau and the current state of affairs regarding the existing telecommunications policy landscape aside from the actual policy itself, despite their variability.

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Furthermore, in the 2010 published article, Reed Smith recounts the 20th-century scandal that cost two FCC chairmen their positions, as commissioners are accused of receiving payola – in the form of money, equipment, and other perks - from prospective licensees and broadcasters. Reed explains that this may be the unintended consequence of the quasi-judicial designation of the FCC where there is a grey area in terms of what level of engagement should arise between the regulatory authority and the industries, they are responsible for. Following this controversy, new policies were swiftly implemented specifically outlining the ethics FCC employees should uphold.

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secondly, [these actions may] ultimately direct investment elsewhere where people might perceive that there is greater ability to innovate and invest in other countries" (Reardon, CNET.com 2019). Yet, the FCC has been in existence long enough for us to bear witness to the negative externalities of both deregulation and possible over/ill-fitting regulation leaving both the Commission and stakeholders gridlocked in uncertainty for the telecommunications market. Furthermore, Chairman Pai is not the first Chairman champion for deregulation. In 1992, then Chairmen Sikes (R, MO) sent a memo to his bureau and office chiefs to begin a review of lesser-known regulations and their objective was to "eliminate or consolidate many rules" (Communications Daily 1992). The article also states that Chairman Sikes reportedly stated, "The need to address regulation more broadly has been precipitated not only by President Bush's interest . . . but replies we have all received in formal comments and informal talks with licensees" (Communications Daily 1992). Although the article does not provide a specific list of the 14 items the Sikes-led Commission agreed to deregulate, it was also reported that "one FCC official pointed out to us that Commission has some regulatory proposals pending, including rulemaking on fraudulent broadcasts" (Communications Daily 1992).

Throughout various points within the FCC's existence, arguments have surfaced calling for the FCC to loosen its regulatory grip (light-touch regulation), most often based on the argument that regulation will stifle innovation and market competition. Areas, where deregulation is excitedly espoused, include Title II, spectrum, broadcast/media, and the internet. However, the FCC's jurisdiction is far more reaching than these industries. The scope of research being proposed is not necessarily focused on the "how much regulation should the FCC impose problem", but is more interested in the mechanism of how they enforce the existing rules when they are violated.

None of the previous works discussed in this chapter identified, introduced, or provided an explication as to how the FCC enforces their rules to make sure all participants follow them – if they are imposed. There are some literary works, however, that do discuss enforcement specifically, however, the literary works where we do see enforcement discussed in terms of telecommunications are vastly centered on how to best utilize enforcement mechanisms for the dense spectrum environment. And while the majority of discussion and debate has centered on the ramifications for consumers and producers, little attention has been devoted to the regulators who enforce Congress' will (Coopman 1999). The FCC has the authority to make adjudication decisions for some of the most pivotal components of our modern social infrastructure. If and when militant violators disrupt any of the industries that fall under the FCC's purview, what repercussions are imposed? And how are these determinations made?

The literary works that do discuss the enforcement aspects of the FCC typically focus on the topic of spectrum. To enforce spectrum interference, the Federal Communications Commission's Enforcement Bureau takes action through warnings, notices of apparent liability, and/ or penalties. However, a preliminary review of the dataset suggests that these specific enforcement mechanisms do not necessarily deter the offender from violating again. Additionally, the dataset when imported into a geospatial analysis tool such as Tableau, indicates that the geographical coverage for enforcement may also be an uneven fit to ensure that the rules are being upheld and that complainants can get a resolution for their problem within a timely manner. There are three regions for the enforcement bureau that enforces the FCC rules for the United States which causes us to infer that there may be a gap in existing enforcement coverage.

The current approaches don't appear to be much of a deterrent for individuals operating unlicensed radio stations, as many of them are multiple offenders, however, based on the data

extracted from the enforcement bureau database, it doesn't appear that much is being done to deter would-be offenders. Additionally, in some circumstances, entities are purposefully interfering with public safety frequency channels, however, again, the data does not show any deviation in the enforcement measure to deter tentative harmful disruptions. To this end, this is why is imperative that an updated enforcement mechanism for regulation and subsequent enforcement measures should be exerted by the FCC's enforcement bureau. Furthermore, additional clarity into the types of enforcement and a hierarchal structure for infractions, if adopted by the enforcement bureau, would allow an automated enforcement structure to be easily implemented and deployed.

Figure 18 Example of "Harmful" Spectrum Interference. Jay Parelta v FCC

Considerations for enforcement for radio spectrum are not a new concept. Many others have posited solutions to spectrum interference and how regulatory agencies should respond accordingly. In 1989, Vicanni posited a spectrum enforcement measure where an automated monitoring system would surveil unassigned frequencies in an attempt to make spectrum enforcement more manageable. Furthermore, in 1999, Coopman analyzed the FCC's regulatory and enforcement strategies as it pertained to micro broadcasting stations and noted that the agency was overwhelmed with enforcement. Moreover, Markovic et al 2009, developed a tool that

"supports formal specification of policies and rules and their automated enforcement on process models". During 2012, Tenhula's work sought to find an expedient resolution for harmful interference. In Altamaimi et al 2013, they examined "three enforcement approaches, exclusion zones, protection zones, and pure ex-post and consider their implications in terms of cost elements, opportunity cost, and their adaptability". Additionally, Cui et al 2014 discussed "rational choices about enforcement approaches and costs require analysis of rights, objectives, precision, etc." Conversely, Littman, and Revare convened a roundtable in 2014 with a myriad of subject matter experts to collectively map the changing spectrum landscape. Furthermore, Park et al 2014 discuss the spectrum enforcement issue only in the ex-ante and ex-post approaches. More recently, Miettinen et al 2017 approached enforcement through an IoT Sentinel. Many of the scholarly works reviewed concerning spectrum enforcement focus on enforcement from the perspective of access and restriction. "There are two distinct, but closely related problems with [spectrum usage rights] SURs today: the boundaries and the enforcement of the rights" (Tenhula 2012). The research proposed for this dissertation extends the work accomplished within this area. Additionally, to better understand the enforcement mechanisms in place for spectrum, we review the entire corpus of violations to ascertain how enforcement overall is accomplished at the FCC EB level.

Another scholar, whose work is not focused on spectrum enforcement, does, however, provide valuable insights regarding enforcement. In Steven Shavell's work on optimizing enforcement, he provides various details and timing of enforcement. Within this article, he discusses Table 3, which has been recreated below.

The proposed dissertation research will focus on contributing to the gaps in knowledge within the telecommunications field concerning the Federal Communications Commission’s

adjudication processes and subsequent enforcement mechanisms. To answer key questions about this process, we curate and will subsequently analyze the dataset obtained from the FCC EB. Furthermore, we propose a predictive model utilizing the predictive modeling to forecast how enforcement within the telecommunications landscape may change over time and how no change in enforcement may affect their operations. Lastly, we will conduct a viewshed analysis to ascertain if there are geographical gaps within the existing enforcement coverage. A more in-depth explication regarding the scope and objectives of our research will be discussed in the following chapter.

Since 2000 and thereafter, various works have surfaced calling for the FCC to loosen their regulatory grip (light-touch regulation), most often based on the argument that regulation will stifle innovation and market competition.

5.0 RESEARCH FRAMEWORK

In this chapter, we discuss our scope of work, reiterate the research questions, introduce the hypotheses, and provide a correlation between the two and how the methods employed enable us to answer them. Starting with the curation of the dataset, and then followed by our analyses, we then formulate the predictive model.

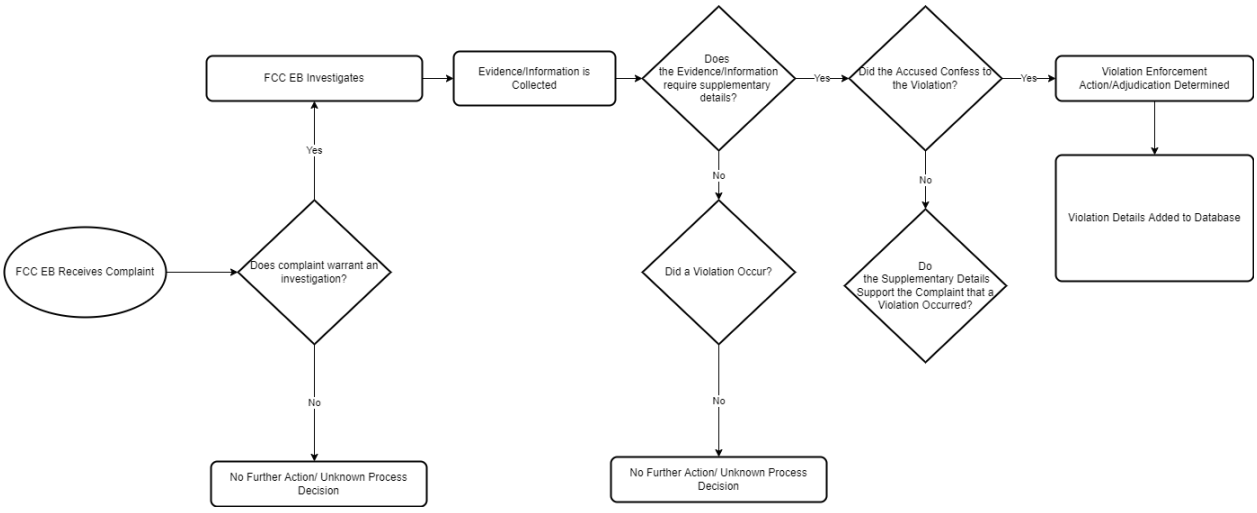


Figure 19 FCC EB Process

The core research for this dissertation will occur in six phases. The first phase, data collection, where our original collection of data contained 8611 records from the Federal Communications Commission's (FCC's) Enforcement Bureau (EB) were obtained and subsequently cleaned, categorized, and assessed. During the first iteration of this process, our dataset increased to 9643, and we accomplished an upward adjustment of the categories to better capture the violation themes that existed outside of the original categories obtained from the FCC EB website (as referred to) based This information will be analyzed further in phase two, where

statistical analysis will be used to better understand trends, timeline, and frequency of violations. Additionally, geographical attributes will be converted and cleaned. The third phase, informal interviews will occur within the coming months to better ascertain the FCC's organizational structure and obtain ethnographical information about the processes and policies that are disseminated and how the FCC is conducting oversight amidst the emergence of innovative technologies. Once this information is obtained, a comparative analysis will be conducted in the fourth phase to see if there are any trends between shifts in policy and the volume of violations that are adjudicated. In the fifth phase, we run the models for the predictive modeling and the viewshed analysis. Finally, in the sixth phase, we evaluate our findings further.

Research Questions

1. What violations are occurring in the dataset?
    a. Who are the main violators?
    b. How many of these violations are adjudicated at the FCC level?
    c. How many violators are repeat offenders?
2. What impact do these violations have?
    a. How many are considered harmful?
    b. How do the financial penalties vary?
    c. Does the adjudication change per region/field office?
3. Does policy or new technologies affect the veracity of enforcement?
4. Who is being affected by these violations?

Hypotheses

H1: Spectrum interference is a pervasive problem within the telecommunications landscape.

H2: Spectrum violations occur equally among pirate radio operators and licensed incumbents.

H3: There are geographical gaps in enforcement coverage to resolve/adjudicate violations.

H4: Adjudications and enforcement are unequally asserted towards violators and vary per region/field office.

H5: If another mass influx of emerging innovative technologies were to enter the telecommunications landscape, it will overwhelm/exhaust existing enforcement measures and increase the time-to-enforcement between the violation and the FCC's adjudication.

H6: The current enforcement structure does not deter violators from violating.

Table 4 Correspondence of Research Questions, Hypotheses, and Methods

RESEARCH QUESTIONS	HYPOTHESES	METHODS
RQ1	H1 & H2	M1
RQ2	H3	M1
RQ3, RQ4	H4	M1
--	H5	M2
RQ1, RQ2	H5 & H6	M3

Data Curation

The 8611 were retrieved from the FCC's transitional website. Once review, this grew to ~9, 600+ observations, for which we then focused on 4342 (proceedings occurring between 2009 and 2019). The attributes within the data that we focus on in this work include:

Table 5 FCC EB Data Collection Attributes 2019

▪ Name of the business or entity ▪ Record/file number ▪ Date of violation ▪ Date of adjudication ▪ Lapse of Enforcement ▪ Violation Type ▪ Disposition ▪ Category	▪ Publication Type ▪ City ▪ State ▪ EB Department ▪ Licensee Status ▪ Other Violations ▪ Applicable Code of Federal Regulations ▪ Additional Information, if applicable

Quantitative Analysis

Statistical analysis will be conducted to determine the frequency/rate of violations and determine if there is a statistical significance regarding the adjudication of specific attribute types. Furthermore, we will also calculate the standard deviation which will serve as an input for our proposed predictive model. Lastly, we will also covert the geographical inputs into latitudinal and longitudinal coordinates to conduct the neighborhood/viewshed analysis.

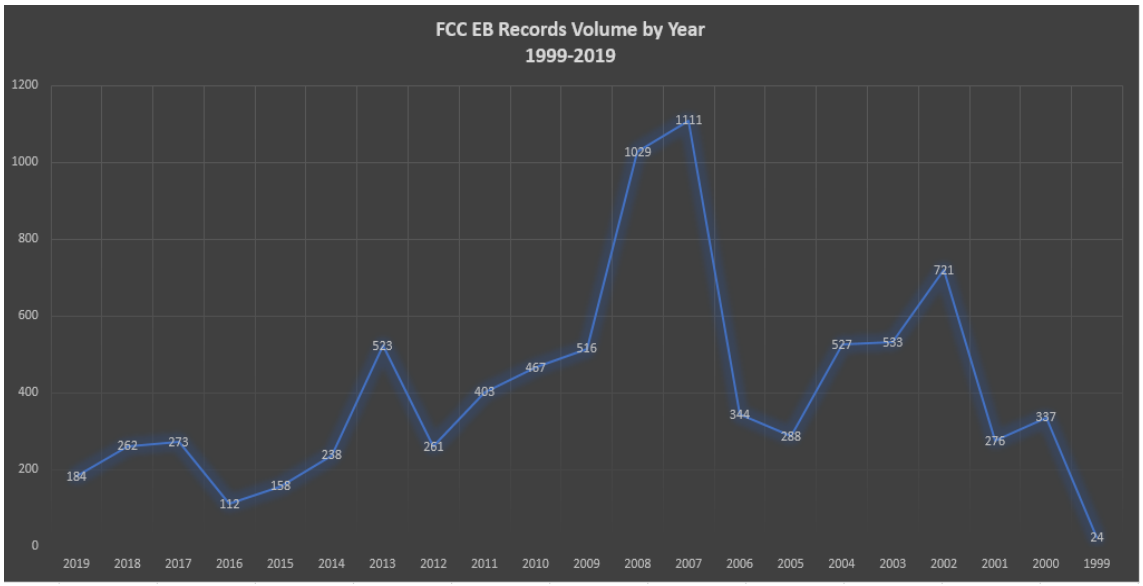


Figure 20 FCC Raw Data Count by the Year 1999-2019

Qualitative Analysis

Qualitative analysis can encompass many things. However, for the purposes of this research, we employ qualitative approaches such as content analysis, word tree, word frequency, and a grounded theory approach as it pertains to how the FCC adjudicates.

Predictive Modelling

Predictive modeling of enforcement scenarios will allow us to better prepare for the diverse and expected densely populated telecommunications landscape that is purported to exist in the near future. One way we may be able to accomplish this is by implementing a predictive modeling experiment. Predictive modeling is most often used in sectors such as business, finance, marketing, and consumer-related areas where being able to forecast and/or project a predicted market can aid in planning and other integral resources to ensure success. However, what if we applied this same reasoning to enforcement and adjudication within the telecommunications sector? Where we treat violations as a cost mechanism – considering the financial penalties as a financial deterrent to violators?

GIS Analysis

A viewshed analysis "refers to the process of identifying locations that are visible from one or more observer points". We will use the viewshed analysis to visualize the enforcement coverage region of the FCC. To implement this method of analysis, we will use attributes within the data such as city, state, and the responding EB office to create the baseline. This will then be paired with the corpus of violations to better ascertain where gaps exist in terms of resolving complaints and serve as a recommendation for future telecommunications planning.

Through the data curation, data analysis, predictive modeling, and the viewshed analysis, we hope to provide an in-depth assessment of the FCC's adjudication measures that have occurred over the past 20 years and how we may better plan for the future. In the methodology section, we will continue this explication further and provide examples of how we plan to accomplish our research goals.

6.0 METHODOLOGIES

In this chapter, we provide a full explication of the methodologies being proposed for this research. Although these methods are subject to change should we find a more adequate method to best obtain our results, we hope that the methods below will serve as a blueprint as to how we plan to answer our research questions and test our hypotheses. To begin, we delve into the curation of the dataset and provide some of the considerations made to ensure data fidelity and maximum relevance of the data captured for each violation. Next, we discuss the tentative predictive model on how we plan to implement the predictive modeling and provide the inputs being considered to predict future violations amid a mass influx of technologies. Lastly, we outline the parameters for the neighborhood/viewshed analysis and discuss what applications we are considering conducting. By starting our exploration of the data using Microsoft Excel, we are able to begin with a dataset that flexible and importable with various software applications. Due to the nature of our research and the questions we are striving to answer, Excel allows us a fungible dataset that can be transformed multiple times and the data explored in a myriad of ways. Based on the variety of questions we are asking of our data; a one method approach was not sufficient to answer all the questions we are querying. We approach our data using five distinct methodological approaches. The first approach, curating the dataset, begins with observing and extracting the raw data from the FCC EB transitional website – which is no longer accessible as the proceedings are now parsed based on violation type and are housed on multiple webpages. In this initial phase, the proceedings on the transitional website are collected and added to a worksheet within a Microsoft Excel workbook. Using the code of federal regulations (C.F.R) title 47 as framework, we then establish variables to help us answer our research questions and thus create a de facto, although simplified,

database. The second phase uses a quantitative approach to then observe and question the numerical data collected. The third phase, our qualitative analysis, further explores the string data that is not able to be statistically tested. Next, in the fourth phase – GIS analysis – we observe our data geographically and find more refined observations through themes and layers that further enrich our insights and results from the previous methods used. Our final phase, predicative modelling, leverages the results and insights from the previous four phases even further and allows us to create projections of a future telecommunications landscape and how enforcement may or may not continue to be a challenge in the future – and what kinds of violations may be more prominent if these challenges persist.

6.1 CURATING THE DATASET

To better understand enforcement mechanisms and ultimate adjudication practices of the Federal Communications Commission (FCC) through their Enforcement Bureau (EB), proceedings were collected from the previous iteration of the FCC EB website (www.fcc.gov/eb). The information regarding each proceeding, beginning with the annual 1999 records – the implementation of the EB, were collected before the FCC transitioned to the newer implementation of the website. Despite the change of the front end of the website, the functionality and access to the proceedings are primarily the same. One change of note is that these proceedings are no longer able to be accessed by year, but rather, they are now "organized" by the manner of oversight (i.e., technical rule violations). The concluding chapter will discuss the limitation of the data curation more.

Figure 21 Transitional Website

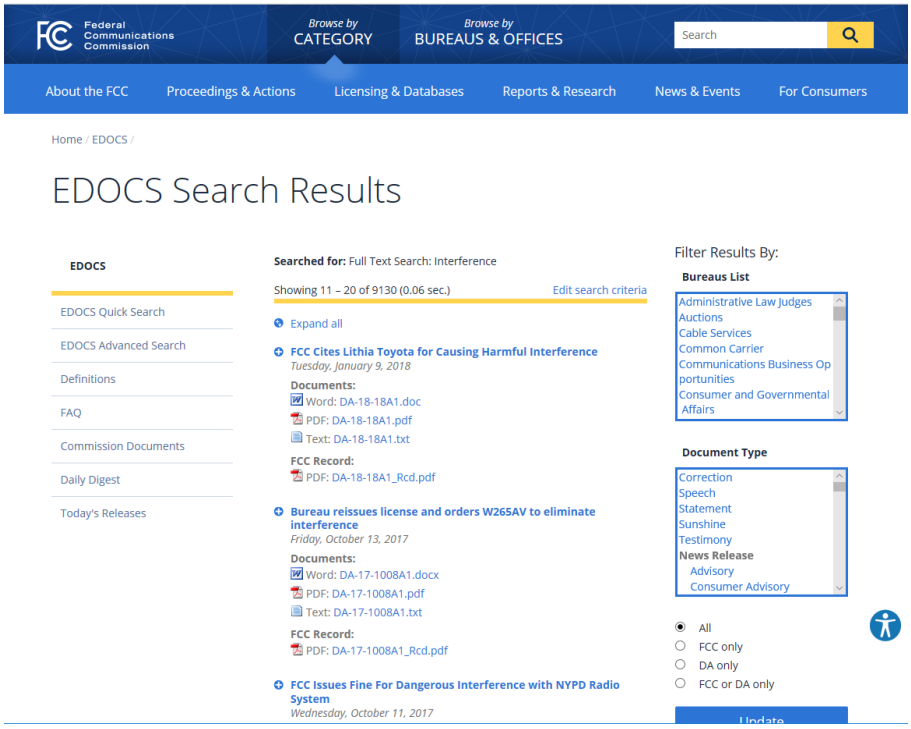


Figure 22 FCC Updated Website [Update from Transitional Website]

For this research, the data curation process began with the initial copying and pasting of the annual records on the former iteration of the FCC EB website into a Microsoft Excel spreadsheet. After each batch was collected (beginning with the 1999 proceedings and culminating with the 2019 proceedings), a separate excel spreadsheet was created to extract specific attributes from each proceeding. The records/proceedings contained in the original batch of files included complaints, disputes, a notice of proposed rulemakings, letters, and violation proceedings. In addition to noting the different proceeding/record types, data from each record (aside from the policymaking records) included:

1. Name (i.e., business/company, individual, etc.)
2. Entity Type (i.e., business, medical service, religious institution, individual actor, etc.)
3. Record number (i.e., EB case number, EB docket number, or document number from URL)
4. Date of Record (date adopted)
5. Date of Violation (if available, this is the date of the first instance of the issue and does not include subsequent dates for subsequent violations)
6. Amount (days) between the violation and the record (adjudication)
7. Complainant (i.e., business/company, individual, or general moniker (consumer))
8. Issue (excerpt of information on the event that led to the violation or complaint – or cancellation of proceeding)
9. Financial Penalty (if imposed)
10. Financial Penalty Type (i.e., forfeiture order, voluntary contribution, restitution, etc.)
11. Publication Type (i.e., Forfeiture Order, Order, Unlicensed Operation, etc.)
12. City (region for international violators)
13. State (country for international violators)

14. Responding EB Office (initial office to investigate or adjudicate the proceeding)
15. Licensee designation (i.e., licensed (y), unlicensed (u), applicant (a), non-licensable operation (n)
16. License Type (if licensed)

Based on the quality and consistency of the FCC documentation, not all proceedings contained all 17 of the attributes collected. During specific secondary analysis actions, quantitative, qualitative, and Geographic Information System analyses, records where null values existed were dropped from the dataset for analysis purposes. However, for the initial analysis with all approaches, the null values were maintained to investigate if there were any trends where null values existed (e.g., is this based on the proceeding type, whether the complaint was a true violation, etc.).

In addition, multiple data collections were made to ensure data integrity (i.e., if there was truly no data that could be obtained for the null values). Moreover, the subsequent data checks were accomplished to make sure the collection process for each record was maintained the same and was consistent for all 8611 proceedings reviewed. Evermore, although the initial record set was 8611, this increased as there were several omnibus proceedings within the record set, and therefore proceedings, where there were separate entities, business or otherwise, that maintained their enforcement number, was treated as a separate proceeding. This culminated with the final recordset being 9660.

6.1.1 Variable Categories

Based on the FCC's website and the code of federal regulations, variable categories were established in the initial data collection phase. Subsequent data cleaning led to an increase in

variable categories such as violation and sub-category violations increasing 76.9% and 77.4% respectively.

6.1.1.1 Entities

To better understand "who" the violators and respondents are within the dataset, nine entity categories were developed to normalize the population in order to investigate and answer research question one. The categories include individual, business, municipality, government, religious institution, educational institution, medical, public safety, and service/event. The categories were devised based on the initial and subsequent reviews of the corpus of data.

Entity
1 - Individual
2 - Business
3 - Municipality
4 - Government
5 - Religious Institution
6 - Educational Institution
7 - Medical
8 - Public Safety
9 - Service/Event

Figure 23 FCC EB Data Entity Category

Complainant
0 - Individual
1 - Self-Reported
2 - Customer/Consumer
3 - Business
4 - Fed/Gov Agency/Municipality
5 - Insider Complaint
6 - Anonymous/Unnamed Individuals(s)
7 - Inspection/Administrative
8 - Other

Figure 24 FCC EB Data Complainant Category

FCC Violation Category
1 - Broadcast of Obscene, Profane and/or Indecent Material
2 - Broadcast Issues
3 - Consumer Telephone Related Issues
4 - Proprietary Information Including Customer Proprietary Network Information (CP
5 - Disabilities Issues & Answers
6 - Emergency Alert System (EAS)
7 - Equipment Marketing
8 - Field Activity and Actions
9 - Amateur Radio Service
10 - Hearings
11 - Jammer Enforcement
12 - Public Safety Enforcement
13 - Rural Call Completion
14 - Technical Rule Violations
15 - Unauthorized Assignment/Transfer of Control of Broadcast Licenses
16 - Unauthorized Assignment/Transfer of Control of Wireless Licenses
17 - Unauthorized Assignment/Transfer of Control of Telecom Authorizations
18 - Universal Service Enforcement
19 - Wireless 911 and E911
20 - U-NII and TDWR Interference
21 - Market Dispute
22 - Auction Violation
23 - Illegal Receipt of Funds/Fraud
24 - Unauthorized Deployment and Operation
25 - Internet Services and Access
26 - Services

Figure 25 FCC Violation Category

Broadcast of Obscene, Profane and/or Indecent Material – "Federal law prohibits obscene, indecent and profane content from being broadcast on the radio or TV. That may seem clear enough, but determining what obscene, indecent, and profane mean can be difficult, depending on who you talk to.

In the Supreme Court's 1964 landmark case on obscenity and pornography, Justice Potter Stewart famously wrote: "I know it when I see it." That case still influences FCC rules today, and complaints from the public about broadcasting objectionable content drive the enforcement of those rules" (FCC.gov 2022).

Broadcast Issues – "The Investigations and Hearing Division handles complaints and other enforcement matters involving non-technical broadcast issues such as broadcast of obscene and/or indecent material, hoaxes, licensee-conducted contests, and broadcast of telephone conversations" (FCC.gov 2022). "The Spectrum Enforcement Division handles complaints involving technical broadcast rules such as interference, excessive power, construction and/or operation outside of the scope of station authorization, and unlicensed operation of a broadcast station" (FCC.gov 2022).

Consumer Telephone Related Issues – The FCC EB purports that it takes action "behalf of consumers involves using a wide range of tools to ensure that the actions of companies are lawful and reasonable", actions that the FCC enforces under this category include billing issues, accessibility, do not call, slamming, unsolicited faxes, marketing, telephone solicitation, other – telephone consumer protection act, operator service provider/operator service disclosures, lifeline/link up outreach, emergency information access, telephone privacy issues, and failure to respond.

Proprietary Information Including Customer Proprietary Network Information (CPNI) – "Both the Communications Act and the Commission's rules require telecommunications carriers, and interconnected providers of Voice over Internet Protocol (VoIP) services, to protect "customer proprietary network information," or CPNI. CPNI includes some of the most sensitive personal information that carriers and providers have about their customers as a result of their business relationship (e.g., phone numbers called; the frequency, duration, and timing of such calls; and any services purchased by the consumer, such as call waiting). To protect consumer privacy, the Commission's rules require carriers/providers to file reports, annually, to certify their compliance with the CPNI rules" (FCC.gov 2022).

Disabilities Issues & Answers – "The FCC ensures that the communications revolution is accessible and usable to the 54 million Americans with disabilities" (FCC.gov 2022). "FCC rules under

Section 255 of the Communications Act require telecommunications equipment manufacturers and service providers to make their products and services accessible to people with disabilities if such access is readily achievable. Where access is not readily achievable, manufacturers and service providers must make their devices and services compatible with peripheral devices and specialized customer premises equipment that are commonly used by people with disabilities if such compatibility is readily achievable" (FCC.gov 2022).

Emergency Alert System (EAS) - "The EAS is a national public warning system that requires broadcasters, cable television operators, wireless cable operators, wireline video service providers, satellite digital audio radio service providers, and direct broadcast satellite providers to supply communications capability to the President of the United States to address the American public during a national emergency." "To preserve and protect the unique purpose of the EAS Tones, the Commission enforces laws prohibiting the use of the tones, or simulations of them, except in actual emergencies, authorized tests of the EAS, or qualified PSAs" (47 CFR § 11.45).

Equipment Marketing – "The Enforcement Bureau's Spectrum Enforcement Division handles complaints relating to the importation and marketing of radio frequency devices in violation of the equipment authorization and technical requirements set forth in Part 2 and other sections of the FCC Rules" (FCC.gov 2022).

Field Activity and Actions – "The Enforcement Bureau's Regional and Field Offices are responsible for handling a variety of on-scene investigations and inspections in response to complaints and in support of the Commission's operations. For example, field agents conduct routine on-site inspections of radio facilities, cable systems and antenna structures to determine compliance with applicable FCC rules. Field agents also investigate unauthorized operation in violation of Section 301 of the Communications Act. In conjunction with the Enforcement Bureau's Spectrum Enforcement Division and the FCC's Office of General Counsel, field agents assist the Department of Justice within rem seizures of equipment used by unauthorized operators" (FCC.gov 2022).

Amateur Radio Service – "Operation of an amateur station requires an amateur operator license grant from the FCC. For individuals entering the amateur service, or upgrading their license operator class,

there are three classes of license, each authorizing privileges corresponding to the qualifications required. The classes of license, from highest to lowest are: Amateur Extra Class, General Class, and Technician Class (FCC.gov 2022).

Before receiving a license grant, you must pass an examination administered by a team of volunteer examiners (VEs). The VEs determine the operator class for which you are qualified by testing your knowledge in operating an amateur station. Most new amateur radio operators start with the "no-code" Technician Class operator license. Some newcomers, however, begin at the General Class. A few even begin at the Amateur Extra Class" (FCC.gov 2022).

Hearings – "Under the Communications Act of 1934, as amended, the Commission may, in appropriate circumstances, decide to revoke (47 U.S.C. § 312) or not to renew (47 U.S.C. § 309(k)) a license or other authorization. In both cases, the Commission issues a preliminary decision describing the facts of the case and setting the matter for hearing before an administrative law judge (ALJ). During the hearing, the licensee and the Enforcement Bureau may present evidence on the licensee's fitness to retain its license. Following conclusion of the hearing, the ALJ issues a decision on the merits, which may be appealed to the full Commission" (FCC.gov 2022).

Jammer Enforcement – "Federal law prohibits the operation, marketing, or sale of any type of jamming equipment that interferes with authorized radio communications, including cellular and Personal Communication Services (PCS), police radar, and Global Positioning Systems (GPS)" (FCC.gov 2022). "Signal jamming devices can prevent you and others from making 9-1-1 and other emergency calls and pose serious risks to public safety communications, as well as interfere with other forms of day-to-day communications. The use of a phone jammer, GPS blocker, or other signal jamming device designed to intentionally block, jam, or interfere with authorized radio communications is a violation of federal law. There are no exemptions for use within a business, classroom, residence, or vehicle. Local law enforcement agencies do not have independent authority to use jamming equipment; in certain limited exceptions use by Federal law

enforcement agencies is authorized in accordance with applicable statutes. It is also unlawful to advertise, sell, distribute, import, or otherwise market jamming devices to consumers in the United States"(FCC.gov 2022)."In order to protect the public and preserve unfettered access to emergency and other communications services, the Communications Act and Commission regulations broadly prohibit the importation, use, manufacture, marketing, and sale of jamming devices" (FCC EB rcd EB-FIELDNER-18-00028232, 2019).

Public Safety Enforcement – "The Spectrum Enforcement Division, in conjunction with the Regional and Field Offices, is responsible for handling issues regarding public safety enforcement such as antenna structure registration, lighting and marking, wireless 911 and Enhanced 911, Radiofrequency (RF) Safety enforcement, and public safety interference" (FCC.gov 2022).

Rural Call Completion – "Consumers across the country continue to report problems placing and receiving long distance or wireless calls to and from rural areas on their landline telephones. If you live anywhere in the country and are having problems calling people or businesses in rural areas, you may also be experiencing the same problems" (FCC.gov 2022).

Technical Rule Violation – "The Spectrum Enforcement Division, in conjunction with the Regional and Field Offices, is responsible for handling issues regarding unlicensed operations and violations of the Commission's technical rules such as operation at unauthorized location or frequency, interference caused by operations in violation of Commission rules or terms of station authorizations, operations at excessive power, and antenna structure violations" (FCC.gov 2022).

Unauthorized Assignment/Transfer of Control of Broadcast Licenses – "Licensees that are considering merger, reorganization or other ownership transactions should take steps to ensure that they are in compliance with Section 310(d) of the Communications Act and the Commission's rules regarding assignments and transfers of control of FCC licenses and permits" (FCC.gov 2022).

Unauthorized Assignment/Transfer of Control of Wireless Licenses – "Licensees that are considering merger, reorganization or other ownership transactions should take steps to ensure that they are

in compliance with Section 310(d) of the Communications Act and the Commission's rules regarding assignments and transfers of control of FCC licenses and permits" (FCC.gov 2022). "The specific requirements implementing Section 310(d) and the process for obtaining any necessary FCC authority are explained in the Commission's rules for each radio service. Licensees are encouraged to consult these rules before closing on transactions. Failure to obtain FCC authority prior to consummating assignments and transfers of control may result in enforcement action" (FCC.gov 2022).

Unauthorized Assignment/Transfer of Control of Telecom Authorizations – "The consent of the Commission is required prior to any transfer of control of a Commission permit or license. In this regard, section 310(d) of the Act provides that: No construction permit or station license, or any rights thereunder, shall be transferred, assigned, or disposed of in any manner, voluntarily or involuntarily, directly or indirectly, or by transfer of control of any corporation holding such permit or license, to any person except upon application to the Commission and upon finding by the Commission that the public interest, convenience, and necessity will be served thereby" (47 U.S.C. § 310(d)).

Universal Service Enforcement – "The universal service provisions of the Communications Act and the Commission's rules are intended to: (1) increase access to advanced telecommunications services throughout the nation; (2) advance the availability of such services to all consumers, including those in low income, rural, insular, and high cost areas at rates that are reasonably comparable to those charged in urban areas; and (3) promote the availability of quality services at just, reasonable, and affordable rates" (FCC.gov 2022).

Wireless 911 and E911 – "911 service is a vital part of our nation's emergency response and disaster preparedness system. In October 1999, the Wireless Communications and Public Safety Act of 1999 (911 Act) took effect with the purpose of improving public safety by encouraging and facilitating the prompt deployment of a nationwide, seamless communications infrastructure for emergency services. One

provision of the 911 Act directs the FCC to make 911 the universal emergency number for all telephone services" (FCC.gov 2022).

U-NII and TDWR Interference – The FCC takes actions against "companies operating devices that caused interference to primary services operating within the Unlicensed National Information Infrastructure (U-NII) spectrum. Primary services operating within this spectrum include the Terminal Doppler Weather Radar (TDWR) systems operated by the Federal Aviation Administration (FAA), US Armed Forces and TV broadcast stations. TDWR systems serve the critical function of providing quantitative measurements for gust fronts, wind shear, microbursts, and other weather-related hazards" (FCC.gov 2022).

Auction Violation – Under title 47, sections 1.2203 (competitive bidding mechanisms), 7.5002 (application and certification procedures), 1451 (deadlines for auction of certain spectrum), along with communications and line placement are items the FCC takes action against in terms of auctions. This category, however, is not included on the FCC website, yet it shows up in our dataset.

Illegal Receipt of Funds/Fraud – As previously listed, the FCC acts against Universal Service Fund (USF) and Lifeline program issues. However, we felt it pertinent to give fraud its own specific category to better capture all instances of fraud for all programs meant to benefit underserved and underrepresented communities.

6.1.1.2 Sub-Category

Because the violation categories originally obtained from the FCC documentation are generalized in such a way that they do not always describe the violation that occurred, violation sub-categories were also used in order to further detail what violations are occurring within the dataset.

FCC Violation Sub-Category
1 - Broadcast of Obscene, Profane and/or Indecent Material
2 - Broadcast Issues – Hoaxes
3 - Broadcast Issues – Contests
4 - Broadcast Issues – Broadcast of Telephone Conversations
5 - Broadcast Issues – Public File Requirements
6 - Broadcast Issues – Payola and Sponsorship Identification
7 - Broadcast Issues – Unauthorized Broadcast "Pirate" Stations
8 - Broadcast Issues – Other Unauthorized Operation
9 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Broadcast Licenses
10 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Wireless Licenses
11 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Telecom Authorizations
12 - Broadcast Issues – Emergency Alert System Information
13 - Broadcast Issues – Antenna Structure Information
14 - Broadcast Issues – Broadcast Interference
15 - Broadcast Issues – Enhanced Underwriting for Non-commercial Broadcast Stations
16 - Consumer Telephone Related Issues – Accessibility
17 - Consumer Telephone Related Issues – Billing Issues
18 - Consumer Telephone Related Issues – Cramming
19 - Consumer Telephone Related Issues – Do Not Call
20 - Consumer Telephone Related Issues – Emergency Information Access
21 - Consumer Telephone Related Issues – Failure to Respond
22 - Consumer Telephone Related Issues – Lifeline/Link-Up Outreach
23 - Consumer Telephone Related Issues – Marketing
24 - Consumer Telephone Related Issues – Operator Service Providers/Operator Service Disclosures
25 - Consumer Telephone Related Issues – Robocall
26 - Consumer Telephone Related Issues – Slamming
27 - Consumer Telephone Related Issues – Telephone Privacy Issues
28 - Consumer Telephone Related Issues – Telephone Solicitation
29 - Consumer Telephone Related Issues – Toll Free
30 - Consumer Telephone Related Issues – Unsolicited Faxes

Figure 26 FCC Violation Sub-Category PT I

31 - Proprietary Information including Consumer Proprietary Network Information (CPNI)
32 - Disabilities Issues – Closed Captioning of Video Programming on Television
33 - Disabilities Issues – Hearing Aid Compatibility and Volume Control for Telephones
34 - Disabilities Issues – Telecommunications Relay Services
35 - Emergency Alert System (EAS)
36 - Equipment Marketing Violations
37 - Jammer Enforcement
38 - Public Safety Enforcement – Antenna Structure Registration, Lighting, and Marking
39 - Public Safety Enforcement – Wireless 911 and E-911
40 - Public Safety Enforcement – Cable Signal Leakage
41 - Public Safety Enforcement –Ship Inspection
42 - Public Safety Enforcement – Network Outage
43 - Public Safety Enforcement – Public Safety Interference
44 - Rural Call Completion
45 - Technical Rule – Interference Complaints
46 - Unauthorized Assignment/Transfer of Broadcast Licenses
47 - Universal Service Fund
48 - U-NII and TDWR Interference
49 - Auction Violation - Unable to fulfill post auction actions
50 - Auction Violation - Prohibited Communications
51 - Illegal Receipt of Lifeline Support
52 - Defraud the USF, ERATE Program, ETC
53 - EAS Tone Misuse
54 - EAS Documentation
55 - Uncertified Equipment Operation
56 - Non-Payment to Universal Service Funds
57 - Falsification of Application to Obtain Commission License
58 - Auction Violation - Failing to Submit Acurate Gross Revenue Information
59 - Internet Services and Access - WiFi- Blocking
60 - Internet Services and Access - Network Outage
61 -Change of Service without Customer Consent
62 - Brokering Toll Free Numbers

Figure 27 FCC Violation Sub-Category PT II

6.1.1.3 Document Type

To better understand the FCC EB's exact approach to enforcement, the documentation type (FCC action) was used to observe how violations are adjudicated.

Document Type
1 - Letter/ Correspondence
2 - Letter of Inquiry
3 - Warning
4 - Correspondence
5 - Citation
6 - Omnibus Citation
7 - Illegal Marketing
8 - Notice of Unlicensed Operation (NOUO)
9 - Notice of Violation (NOV)
10 - Notice of Apparent Liability (NAL)
11 - Notice of Debarment
12 - Omnibus Forfeiture
13 - Forfeiture Order
14 - Financial Penalty
15 - Order
16 - Adopting Order
17 - Memorandum Order
18 - Memorandum Order & Opinion
19 - Hearing Designation
20 - Reconsideration
21 - Section 271 Compliance Review
22 - Amendment/Erratum
23 - Consent Decree
24 - Decision
25 - Request for Dismissal
26 - Dismissal
27 - Misc./Other
28 - WARNING FOR UNLICENSED RADIO OPERATION
29 - NOTIFICATION OF HARMFUL INTERFERENCE
30 - Order of Revocation
31 - Debarment
32 - Order to Pay or Show Cause

Figure 28 Document Type Category for Data Collection

6.1.1.4 Location

Locations leveraged the native applications geodata to observe where violations, or perceived violations may be occurring. This helps us observe whether there are patterns on where specific violations are occurring. In addition, once layered with other geodata, we can further

observe if there are other patterns such as the correlation between responding enforcement bureau offices and where violations are observed.

6.1.1.5 EB Department

Office Name
1 - FCC EB Headquarters
2 - Boston Field Office
3 - Chicago Field Office
4 - Columbia Field Office
5 - Detroit Field Office
6 - New York Field Office
7 - Philadelphia Field Office
8 - Atlanta Field Office
9 - Dallas Field Office
10 - Kansas City Field Office
11 - New Orleans Field Office
12 - Tampa Field Office
13 - Denver Field Office
14 - Los Angeles Field Office
15 - San Diego Field Office
16 - San Francisco Field Office
17 - Seattle Field Office
18 - Houston - Resident Agent Office
19 - Miami - Resident Agent Office
20 - Norfolk - Resident Agent Office
21 - San Juan Resident Agent Office

Figure 29 EB Responding Office for Data Collection

6.1.1.6 License/Authorization Status

Licensee/Authorization
1 -Yes
2 - No
3 - Expired
4 - Revoked
5 - Registrant / Auc Participant
6 - Former
7 - Unlicensable

Figure 30 Licensee/Authorization Status Category for Data Collection

Violation Level (VioL)
1 - Deadly
2 - Compromising/Threat
3 - Harmful
4 -Damaging
5 - Operational Risk/ Financial Impact
6 - Communal Harm
7 – End User Disruption
8 – Undue Hardship
9 – Disruption of Operations
10– Administrative
11 – Unclear

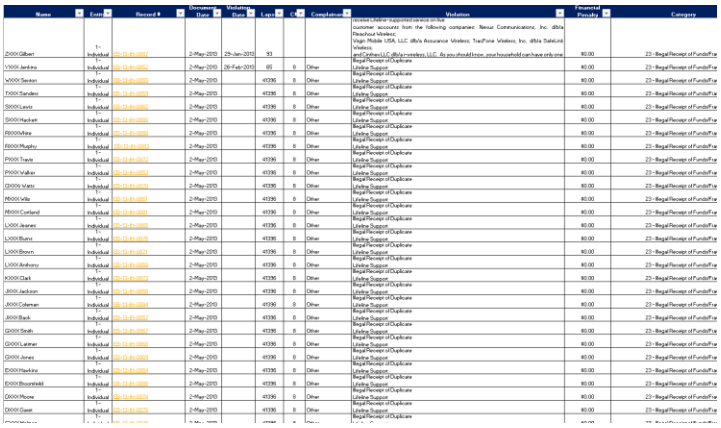
Figure 31 Violation Level (VioL) Category for Data Collection

6.1.2 Other Variables Collected

In addition to the devised variable categories, information obtained from each of the FCC EB proceedings include the record number (EB Field number), document date (date of adoption), violation date (date listed in the proceeding of the first violation or when the FCC EB inspected the complaint), lapse (calculated by subtracting the violation date from the document date (FCC action/adjudication)), violation (an excerpt of information describing the violation or cause for FCC EB investigation), financial penalty (final resulting financial penalty), additional information (any additional details describing the violation further and/or additional violations), and FOIA reference (linked reference to the data obtained from FCC EB FOIA requests pertaining to notice of apparent liabilities (NALs) and civil monetary penalties (CMPs) that have or have not been paid as of March 2020).

6.1.3 Summary

Furthermore, categories that will be used for analysis have been provided a numerical value to better assess for the other methods used (i.e., SPSS (quantitative analysis). Other data transformation that occurred includes adding the latitudinal and longitudinal coordinates for each state and geographical area that occurs within the dataset.



Name	Entity	Record #	Discovery Date	Violation Date	Lapse	CMP	Complainant	Violation	Financial Penalty	Category
Z000 Gilbert	Individual	20-21-IH-0001	2-May-2019	29-Jan-2013	93			Review Lifeline-supported service on the customer accounts from the following companies: Nexus Communications, Inc. d/b/a Reachout Wireless; Virgin Mobile USA, LLC d/b/a Assurance Wireless; TracFone Wireless, Inc. d/b/a SafeLink Wireless; and Cricket LLC d/b/a i-wireless, LLC. As you should know, one household can have only one	$0.00	23--Illegal Receipt of Funds/Fra
V000 Jenkins	Individual	20-21-IH-0002	2-May-2019	26-Feb-2013	65	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
W000 Sexton	Individual	20-21-IH-0003	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
T000 Sanders	Individual	20-21-IH-0004	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
S000 Levin	Individual	20-21-IH-0005	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
S000 Hacken	Individual	20-21-IH-0006	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
R000 Mike	Individual	20-21-IH-0007	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
R000 Murphy	Individual	20-21-IH-0008	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
P000 Travis	Individual	20-21-IH-0009	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
P000 Walker	Individual	20-21-IH-0010	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
Q000 Watts	Individual	20-21-IH-0011	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
M000 Wills	Individual	20-21-IH-0012	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
M000 Cortland	Individual	20-21-IH-0013	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
L000 Jeanes	Individual	20-21-IH-0014	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
L000 Bunz	Individual	20-21-IH-0015	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
L000 Brown	Individual	20-21-IH-0016	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
L000 Anthony	Individual	20-21-IH-0017	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
K000 Clark	Individual	20-21-IH-0018	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
J000 Jackson	Individual	20-21-IH-0019	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
J000 Coleman	Individual	20-21-IH-0020	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
J000 Black	Individual	20-21-IH-0021	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
G000 Smith	Individual	20-21-IH-0022	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
G000 Latimer	Individual	20-21-IH-0023	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
G000 Jones	Individual	20-21-IH-0024	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
E000 Hawkins	Individual	20-21-IH-0025	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
E000 Bloomfield	Individual	20-21-IH-0026	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
D000 Moore	Individual	20-21-IH-0027	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra
D000 Dawn	Individual	20-21-IH-0028	2-May-2019		41096	0	Other	Illegal Receipt of Duplicate Lifeline Support	$0.00	23--Illegal Receipt of Funds/Fra

Figure 32 FCC EB Data 2009 - 2019 Snippet

6.2 QUANTITATIVE ANALYSIS

By definition, quantitative analysis is "the use of mathematical analysis, especially computerized, to better understand variable components in a system, as in business forecasts or investment recommendations." For the purposes of this research, a quantitative analysis approach is used to understand the volume of specific violation types (i.e. technical rule violations, administrative infractions, etc.), measure the quantity in terms of entities (i.e. business, individual actors, etc.), and better understand the frequency of our categories of data, along with trends and correlations that may be occurring within our dataset.

Using the IBM SPSS Statistics version 28.0.0 application (SPSS), the data originally collected and organized in Microsoft Excel is imported into the SPSS application. Each of the 26+ attributes extrapolated to create the dataset were then sorted, reviewed, for this method, these collected attributes will be our variables. Once the data is imported, we review the variable tab to transform our data characteristics for SPSS analysis. Taking note of the amount of numerical and

string variables, we can then determine with variable categories are best suited for each analysis that needs to be conducted.

Beginning with simple descriptive statistics pertaining to the volume of each of the attributes, total forfeiture penalty amount for the entire corpus of data, and other baseline information regarding the dataset, more refined questions to aid in answering the primary research questions were posed and also investigated. In addition, the hypotheses for this research were also tested statistically to see if the data collected prove or disprove the assertions made based on information available within the telecommunications field.

Research Questions:

1. What violations are occurring within the dataset?
    a. Who are the main violators?
    b. How are these violations adjudicated?
    c. How many violators are repeat offenders?
2. What is the impact of some violations over other violation types?
    a. How do the violation penalties change? Over time? Per office?
3. Does policy or new technologies affect the veracity of enforcement?
4. Who is being affected by these violations?

Based on the dataset, questions 1a, 1c and 2a are able to be answered quantitatively based on available information. However, from these questions, we are able to refine the original questions further to include:

5. How often do violations result in a financial penalty? Decrease in financial penalty? Revocation of license or authorization?
6. Are there significant differences in financial penalties based on the entity type (i.e., business, individual actor, etc.)? Based on location? Responding Enforcement Bureau (EB) office?
7. What is the likelihood that a financial penalty will be reduced? Cancelled?

Furthermore, when familiarizing ourselves with the hypotheses made, we can quantitatively analyze H1, H3, and to some extent H5. The limitations with mathematically

proving or disproving H5include that correlation, if any if found, does not necessarily prove causation as there are many uncertain factors that may impact a violator or offender from offending in the future.

Hypotheses

H1: Spectrum interference is a pervasive problem within the telecommunications landscape and these violations occur equally among pirate radio operators and licensed incumbents.
H2: There is not adequate enforcement coverage to resolve/adjudicate violations in a timely manner.
H3: Adjudications and enforcement are unequally asserted towards violators and vary per region/field office.
H4: If another mass influx of emerging innovative technologies were to enter the telecommunications landscape, it will overwhelm/exhaust existing enforcement measures and increase the time-to-enforcement between the violation and the FCC's adjudication.
H5: The current enforcement structure does not deter violators from violating.

The quantitative analysis conducted on the curated dataset include both a data analysis (focusing on subthemes such as description, inference, and relationships) and decision making (highlighting optimization, decision analysis with uncertainty, and sensitivity analysis). In the predictive modelling methods subsection, the uncertainty is investigated further focusing on elements of measuring as well as modelling. Beginning with a spreadsheet model, the collected data is organized in a rectangular array where variables such as entity name, record/file number, date of document, date of violation or violation in question, complainant, violation description, along with other variables have been collected.

Subsequent variables collected included:

1. Violation Category – based on Title 47, expanded based on violations observed during collection
2. Sub-Category – based on descriptives within the proceedings
3. Additional details

In total, 21 variables were captured for each proceeding – or observation. Because much of the data collected is categorical or non-numerical (i.e., data types that are dates and/or

geographical), the quantitative analysis focused on descriptive statistics pertaining to variables such as name, complainant, violation, publication type, license status, frequency (for spectrum related proceedings), disposition, violation categories and sub-categories, and other details that cannot be used for meaningful arithmetic. To further benefit from this dataset, categorical data that aids in answering the research questions have been converted to a numerical coding scheme (e.g. technical rule violation = 0, defrauding the ERATE program = 1, nonpayment to the Universal Service Fund (USF) = 2, etc.).

Importing data into SPSS, Worksheet Data Collection v1 [A1:S4343].

Dropped Variables

Name (Note: the name variable will be used to determine the entity type (e.g., individual(s), business, municipality, hotel/hospitality, medical facility, air transportation facility, etc.).

Record Number

Date of Document (FCC EB Enforcement Action/Measure)

Date of Violation

Complainant

Violation (Note: The original input for this variable is/was an excerpt from the proceeding describing the violation. For the purposes of this research, the excerpt details were simplified to reflect the EB category/theme that best suits the initial nature of the proceeding).

City

License

The remaining six (seven once the violations are simplified) variables will be used to answer the following research questions.

What violations are occurring in the dataset?

Using descriptive statistics, we select violation category to first determine which violations are occurring within our corpus of data, and at what frequency each of the violation categories are occurring. Next, we accomplish the same approach for the violation sub-categories, entities, and document type variables. For this initial stage, we assume the document type variable is the adjudication or result from the investigation pertaining to the violation proceeding.

6.3 QUALITATIVE ANALYSIS

Qualitative analysis, unlike quantitative analysis, is the "collecting and analyzing of non-numerical data such as text, video or audio." For the purposes of this research, qualitative approaches such as content analysis, thematic analysis, textual analysis, and online/cyber ethnography are utilized to better ascertain the narrative components of the data collected. By investigating the data in this way, we are able to draw inferences regarding the research questions that may not have a numerical element to answer some of the questions. In addition, the non-numerical data collected will allow for insights to be concluded regarding the hypotheses that also may not be resolved by numerical means.

To accomplish analyzing the text-based, string, data collected during the data curation phase, we use the qualitative data analysis software (QDAS) application, NVivo. It is important to note, the FCC EB's enforcement proceeding documents are semi-structured; this means that although there are overall consistencies, these documents vary in regard to the information they contain, the number of violations or possible violations that the entity is being accused of, financial

penalty amount etc. Furthermore, the excerpts extrapolated from the proceeding documentation also varies in its conciseness and cogency as it pertains to the exact evidence and violation details. By applying qualitative methodical approaches, we are able to explore the data further and determine if the results are able to answer the remaining research questions.

Using Nvivo,

To reiterate the research questions:

8. What violations are occurring within the dataset?
    a. Who are the main violators?
    b. How are these violations adjudicated?
    c. How many violators are repeat offenders?
9. What is the impact of some violations over other violation types?
    a. How do the violation penalties change? Over time? Per office?
10. Does policy or new technologies affect the veracity of enforcement?
11. Who is being affected by these violations?

Through qualitative means, we are better situated to respond to questions 3 and 4. In regard the hypotheses:

> **H1:** Spectrum interference is a pervasive problem within the telecommunications landscape and these violations occur equally among pirate radio operators and licensed incumbents.
> **H2:** There is not adequate enforcement coverage to resolve/adjudicate violations in a timely manner.
> **H3**: Adjudications and enforcement are unequally asserted towards violators and vary per region/field office.
> **H4**: If another mass influx of emerging innovative technologies were to enter the telecommunications landscape, it will overwhelm/exhaust existing enforcement measures and increase the time-to-enforcement between the violation and the FCC's adjudication.
> **H5**: The current enforcement structure does not deter violators from violating.

We are more enabled to answer H1, H3, and H5 by investigating the excerpts collected on each proceeding and then analyzing them under a qualitative lens.

Taking a grounded theory (GT) approach and following the Five-Level qualitative data analysis (QDA) method, we first develop the objective (research questions) and then create an

analytic plan (identifying a series of specific tasks to be accomplished) for our textual data – the first two levels of the five-level QDA are strategy.

Table 6 Five-Level Qualitative Data Analysis (QDA) (Woolf and Silver 2017)

Two Levels of Strategy >>>>> Translated To >>>>> Two Levels of Tactics				
Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*
Objectives	Analytic plan	Translation	Selected tools	Constructed tools
The purpose and context of a project, usually expressed as research questions and a methodology	The conceptual framework and resulting analytic tasks	Translating from analytic tasks to software tools and translating the results back again	Straightforward choice of individual software operations	Sophisticated use of software by combining operations or performing them in a custom way

Once the FCC EB dataset is imported into Nvivo, we first run a word frequency query. Similar to starting with the descriptive statistics in used in SPSS, the word frequency query provides us with an output pertaining to the word, length of the word, count of how many instances the word is used in the dataset, and a weighted percentage. This output can be shown visually (without numerical count) in the form of a word cloud where the word that shows up the most is largest and words that show up the least are smaller in terms of visual representation. The top five words in the dataset include “commission”, “inc”, “section”, “communications”, and “act”. The lowest five words include “fraudulent”, “effect”, “defraud”, “consumers’”, and “Charles”.

After conducting a word frequency query, we then conduct a group query on the violation category. This specific query reviews each observation (enforcement proceeding) within the dataset and attributes percentage to each excerpt when compared to other narratives within the dataset. Next, we conduct a search for duplicate entries . Because the data is hand-coded, we know that each observation is a “unique” observation where duplicate, pertains to the number of

instances a violation occurrence took place rather than duplication in a redundancy sense. We can search for these duplicates by using the matrix coding query in Nvivo that finds patterns within the data.

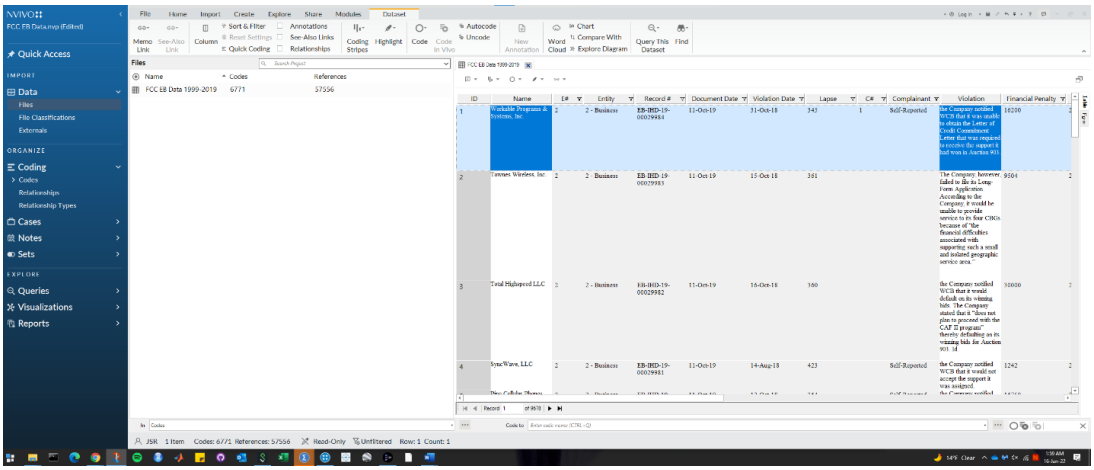


Figure 33 FCC EB Data NVIVO

6.4 GIS ANALYSIS

Geographic Information System (GIS) analysis is used to investigate and/or observe trends geographically. Within the context of this research, GIS is leveraged in terms of observing the "hot spot" of enforceable violations. Selecting the city/state (for U.S. violations), municipality/country (for U.S. territories), and region/country (for international violations) these offenses are then mapped using both Tableau and Google Maps. Table is used to initially review and investigate the volume of enforcement actions by geographic location. Google Maps however, is utilized specifically for future user review and layering of information (i.e. geographical location layered with violation data).

By utilizing GIS to analyze the dataset, we are better able to answer research question 4 (who is being affected by these violations) in terms of areas of impact. It is important to note however, that the geographical information obtained during the data curation phase (method 1) does not always correlate violations to those impacted, but at times highlights the origin of the violation. To this end, it is important to keep in mind this limitation/disparity in data to understand that the results of the GIS analysis is not guaranteed proof that violations have negatively impacted the population in which the violation is observed. However, it can be surmised, that the geographical areas identified within the GIS analysis are where we can observe enforcement occurring whether the violation affects the surrounding population or a contained "originating" violation has occurred.

The geospatial visualizations from this analysis are then layered/compared with population and income data obtained from the U.S. Census Bureau. This allows us to better investigate if there are disparities in financial penalties imposed on specific populations within a geographical area. Furthermore, we are also able to better assess any location-based gaps in enforcement due to location/amount of Enforcement Bureau (EB) field offices and how this may impact enforcement of telecommunications violations within the United States.

As stated in the introduction chapter, telecommunications whether by service or infrastructure are inherently spatial. To this end, we then analyze the more spatial aspects of the FCC EB proceedings that make up our dataset. First, we begin by creating a dashboard for our data. Through this process, the data is also summarized and reintroduce insights and results obtained from the previous two methods (quantitative and qualitative). This data in then transformed further into visual models, the poignant being the geographical or more cartographical representation of where these violations are occurring. This enables us to answer our fifth research

question, who is affected by these violations? This information is paired with data collected from the U.S. Census Bureau and the results from their surveys as they pertain to populations within a given area within the United States, in addition to some additional data about technology usage. Furthermore, through the use of the Tableau dashboard, we are able to add layers and themes to our data and explore it further. Moreover, Tableau dashboards are able to aid in the decision-making process to aid in making data-driven strategic decisions.

Using Tableau version 8.1, we begin by preparing our dashboard. Focusing on the location variable, we create a layered map containing both domestic and international instances of violation/enforcement actions. This provides us with an initial observation pertaining to the density of how many violations are occurring within each geographic area. We can observe these locations and how violation proceedings are occurring more by leveraging Google Earth where we can then layer this data further by adding narratives/categorical data to each location point.

6.5 PREDICTIVE MODELING

In many fields and industries, predictive modeling is used to forecast a set of circumstances. In this research, violations have been coded in such a way that we can apply predictive modeling techniques to forecast what the next future challenge, from an enforcement perspective, may be. When analyzing the results from the quantitative, qualitative, and Geographic Information System (GIS) analyses, we can derive a set of circumstances that lend themselves to the focus of the Federal Communications Commission's (FCC's) Enforcement Bureau (EB) for rampant telecommunications violations that require remediation.

Traditional law enforcement has learned that "predictive methods allow police to work more proactively with limited resources (Perry et al. 2013). For the FCC, based on their Equal Employment Opportunity annual reports, their workforce has been steadily declining for some time to which we may posit that the resources maintained for enforcement actions from the FCC are also steadily decreasing. If this is the case, leveraging predictive approaches may aid the independent federal agency by accomplishing their work with their own limited resources. Furthermore, they may even begin to accomplish ex-ante strategic planning for their future enforcement mechanisms rather than continuing with ex-post enforcement proceedings.

As discussed earlier in this research, the FCC's approach to enforcement is purported to be complaint-based. This means that a complaint is lodged with the FCC or one of its Bureaus, evidence is then gathered, and an adjudication is rendered – this is a simplistic review of the overall process. However, following this chain of events and leveraging the data collected, we can then summarize the enforcement mechanisms employed over the 10-year time period of the dataset and match them according to specific violation types. This approach is similar to the approach used by Perry et al. in their work for predicting crimes.

Law Enforcement Use of Predictive Technologies: Predicting Crimes

Problem	Conventional Crime Analysis (low to moderate data demand and complexity)	Predictive Analytics (large data demand and high complexity)
Identify areas at increased risk		
Using historical crime data	Crime mapping (hot spot identification)	Advanced hot spot identification models; risk terrain analysis
Using a range of additional data (e.g., 911 call records, economics)	Basic regression models created in a spreadsheet program	Regression, classification, clustering models
Accounting for increased risk from a recent crime	Assumption of increased risk in areas immediately surrounding a recent crime	Near-repeat modeling
Determine when areas will be most at risk of crime	Graphing/mapping the frequency of crimes in a given area by time/date (or specific events)	Spatiotemporal analysis methods
Identify geographic features that increase the risk of crime	Finding locations with the greatest frequency of crime incidents and drawing inferences	Risk terrain analysis

Figure 34 Perry et al. Table S.1 Law Enforcement Use of Predictive Techonologies: Predicting Crimes

In the work of Perry et al. they caution that "making "predictions" is only half of the prediction-led policing; the other half is carrying out interventions, acting on the predictions that lead to reduced crime (or at least solve crimes)." Because we have categorized the FCC EB data, we are able to determine how many of the proceedings are self-reported versus customer/consumer-based – or even complaints lodged from businesses and other governmental agencies. This aids in the capacity to determine possible intervention approaches that may be leveraged by the FCC should they ever determine they would like to leverage predictive modeling or forecasting for future telecommunications violation matters.

Beginning with a regression to model the relationship between enforcement – financial penalty (the dependent variable) and violation categories (independent variables), we use the following equation:

$$Y = C_1X_1 + C_2X_2 + C_3X_3 + \ldots + C_nX_n$$

Where Y is the enforcement mechanism - financial penalty, X are the violation categories, and C are the coefficient weights assigned per violation category.

Financial Penalty = $Violation_1$

Performing an Ordinary Least Squares (OLS) method for our regression, we …

Using Microsoft Power Apps to get additional insights from the dataset and forecast, "predict", what may be a prominent violation in the future. As the EEO reports from the FCC suggest, the independent federal agency's workforce has been on a steady decline for the past 10 years or more. The benefits of leveraging a predictive model to help forecast the likelihood of future events may help in adjusting resources (in terms of enforcement) towards the most egregious and harmful events while giving consideration to alternative enforcement mechanisms for violations that may have shared jurisdiction with a different agency – like the Federal Trade

Commission and consumer matters, or ponder new approaches such as enhanced automation and/or third-party mediation/reconciliation efforts to alleviate the myriad of violations the FCC currently adjudicates.

6.6 SUMMARY

Lastly, we leverage Power BI to further visualize our findings and consider additional insights that would be beneficial for future scholarship. Much of the output we received from our quantitative and qualitative analyses resulted in larger figures and tables become illegible due to their size. To offset this limitation with such a rich dataset, we enable the use of business solution software to provide more legible visualizations of our findings.

7.0 RESULTS

By analyzing our dataset using various methods (i.e., statistical, content, and geographical), we are able to gain a more robust perspective of what is occurring in our dataset vice if we had used any of these approaches solely. Where our output for our quantitative approach yields various tables and figures, our qualitative approach affords us an additional contextual perspective serving as a narrative to the numbers. Furthermore, leveraging GIS, allows us to then spatially observe both domestic and international telecommunications proceedings which allow us to glean additional insights despite the GIS approaches constraints where we do not get the full range of frequencies or descriptives of our data nor the full "story" of what is happening in each case that occurs within a geographical region. Because none of these approaches can provide us a full circle view of violations and adjudication, we also employ a dashboard, Power BI, which allows us to leverage the dataset further in order to obtain a more "well rounded" perspective of telecommunications policy, regulation, and enforcement under the Federal Communications Commission. It is important to note that the predictive aspects of this research are not included in the dashboard summary of our findings, nor the insights gleaned from the curation of the dataset.

7.1 DATA CURATION RESULTS

What was originally collected as a set of links that pointed to pdfs located on the Federal Communications Commission's transitional website that has in recent years fully transitioned to the new website. Our original collection, the raw data, encompassed three columns of information

– name, date, and document type. Through our work, we developed additional columns that included the entity type (derived from the name and information within the proceeding), collected the ”date of violation” and “date of adjudication” as the date from the FCC website is based on the date the document was posted, using an Excel formula, we dynamically calculated for “lapse” between these dates which then gave us an idea of how long it takes for an enforcement action or adjudication to occur. Additionally, we collected the complainant – or type of complainant (where an entity was named (i.e., FAA, police department, or person) we provided the information – for proceedings where this information was absent or vague, we then created complainant types to allow for analysis within this category. After the complainant category, we then extracted excerpts (specific information pertaining to the violation or perceived violation). This is then followed by the financial penalty category which indicates whether the proceeding resulted in a financial penalty – or not. We then explored the violation categories (a list originally composed of violations as described by the FCC EB’s website, which was later expanded based on subsequent reviews of the proceedings to validate and reduce the null values within our data. To further explore the kinds of violations, as the primary violation category resulted in observations that were still too vague for the scope of our research, we subsequently developed a violation sub-category to further distinguish the types of violations that were occurring). We additionally observed the responding FCC offices, locations of the entity – or actual location of the violation, the status of licensure and/or authorization – taking note of proceedings and violations that are unable to be licensed or authorized – “Unlicensable”. Lastly, we developed our own standard pertaining to the impact or prospective impact of the violation (i.e., would the violation result in a death, threat to national security, negatively impact an entire community, disrupt and/or negatively impact individual customers or consumers, etc.).

The resulting dataset documentation includes a Microsoft Excel (.xlsx) workbook composed of a Raw Data worksheet (data obtained from the FCC EB transitional website prior to their website refresh in 2020), FCC EB Dataset 1999-2019 worksheet (information curated from each of the 8,433 FC EB proceedings – the first iteration of collection), FOIA NALs (data obtained through FCC FOIA request), FOIA CMPs (data obtained through FCC FOIA request), and the 2009 – 2019 subset of fully cleaned and thrice reviewed data used for our more traditional methodologies.

The categories we specifically developed that are not overtly used or considered in the FCC proceedings include the entity, category, sub-category, and VioLs. All the other categories used for the curation of our dataset are attributes or themes that is based on information the FCC included in their violation proceedings. The exception to this of course is the lapse of time measurement where we used the Excel formula to calculate the time between the "violation" and the "FCC response" (also referred to as adjudication or enforcement mechanism).

For our dataset findings, we observe that by refining the violation categories and sub-categories, which increased by 30% and 35.5% respectively, we were able to observe lesser-known and not often publicized violations. In the figure below, we can observe the original categories based on the FCC EB website (white and red rows), and the expanded categories that were used based on violation proceedings that occurred within the 2009 – 2019 dataset. The rows highlighted in red indicate categories that were not used in our collection of the data. Although some of the violations may have been appropriate for these categories, we determined that they would be better suited for some of the existing categories. For example, an overwhelming amount of the hearing aid compatibility violations technically belong to the Disabilities Issues and Answers category, however, based on our observations of these proceedings, they were often a violation that occurred

as a Consumer Telephone – Related Issue where we observed providers inability to offer the requisite number of compatible devices. Moreover, we found the Field Activity and Actions category to be too vague as it pertained to the proceedings, and many of the proceedings did not use the language stating that the occurrence was due to a field activity or action – nor is this category specifically defined.

FCC Violation Category
1 - Broadcast of Obscene, Profane and/or Indecent Material
2 - Broadcast Issues
3 - Consumer Telephone Related Issues
4 - Proprietary Information Including Customer Proprietary Ne
5 - Disabilities Issues & Answers
6 - Emergency Alert System (EAS)
7 - Equipment Marketing
8 - Field Activity and Actions
9 - Amateur Radio Service
10 - Hearings
11 - Jammer Enforcement
12 - Public Safety Enforcement
13 - Rural Call Completion
14 - Technical Rule Violations
15 - Unauthorized Assignment/Transfer of Control of Broadcast
16 - Unauthorized Assignment/Transfer of Control of Wireless
17 - Unauthorized Assignment/Transfer of Control of Telecom
18 - Universal Service Enforcement
19 - Wireless 911 and E911
20 - U-NII and TDWR Interference
21 - Market Dispute
22 - Auction Violation
23 - Illegal Receipt of Funds/Fraud
24 - Unauthorized Deployment and Operation
25 - Internet Services and Access
26 - Services

Figure 35 Violation Category FCC EB Data 2009 - 2019

Similarly, we accomplish the same approach for the violation sub-categories. We first use the FCC EB determinations and continuously refined based on the information observed within our dataset. By iteratively developing the sub-categories, we are able to capture the uniqueness of

each of the violations while still maintaining a level or normalization to conduct further analysis. In Figure 18 above, there are again some categories that we determined as unsuitable for our collection purposes as those violation types did not appear, or if they did appear may not have exclusively belonged to Consumer Telephone Related Issues. Additionally, we expanded on some of the categories that were developed previously such as Auction Violations to capture the subset of Auction Violations that we observed in multiple passthroughs of our data collection and subsequent cleaning and validation.

FCC Violation Sub-Category
1 - Broadcast of Obscene, Profane and/or Indecent Material
2 - Broadcast Issues – Hoaxes
3 - Broadcast Issues – Contests
4 - Broadcast Issues – Broadcast of Telephone Conversations
5 - Broadcast Issues – Public File Requirements
6 - Broadcast Issues – Payola and Sponsorship Identification
7 - Broadcast Issues – Unauthorized Broadcast "Pirate" Stations
8 - Broadcast Issues – Other Unauthorized Operation
9 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Broadcast Licenses
10 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Wireless Licenses
11 - Broadcast Issues – Unauthorized Assignment/Transfer of Control of Telecom Authorizations
12 - Broadcast Issues – Emergency Alert System Information
13 - Broadcast Issues – Antenna Structure Information
14 - Broadcast Issues – Broadcast Interference
15 - Broadcast Issues – Enhanced Underwriting for Non-commercial Broadcast Stations
16 - Consumer Telephone Related Issues – Accessibility
17 - Consumer Telephone Related Issues – Billing Issues
18 - Consumer Telephone Related Issues – Cramming
19 - Consumer Telephone Related Issues – Do Not Call
20 - Consumer Telephone Related Issues – Emergency Information Access
21 - Consumer Telephone Related Issues – Failure to Respond
22 - Consumer Telephone Related Issues – Lifeline/Link-Up Outreach
23 - Consumer Telephone Related Issues – Marketing
24 - Consumer Telephone Related Issues – Operator Service Providers/Operator Service Disclosures
25 - Consumer Telephone Related Issues – Robocall
26 - Consumer Telephone Related Issues – Slamming
27 - Consumer Telephone Related Issues – Telephone Privacy Issues
28 - Consumer Telephone Related Issues – Telephone Solicitation
29 - Consumer Telephone Related Issues – Toll Free
30 - Consumer Telephone Related Issues – Unsolicited Faxes
31 - Proprietary Information including Consumer Proprietary Network Information (CPNI)
32 - Disabilities Issues – Closed Captioning of Video Programming on Television
33 - Disabilities Issues – Hearing Aid Compatibility and Volume Control for Telephones
34 - Disabilities Issues – Telecommunications Relay Services
35 - Emergency Alert System (EAS)
36 - Equipment Marketing Violations
37 - Jammer Enforcement
38 - Public Safety Enforcement – Antenna Structure Registration, Lighting, and Marking
39 - Public Safety Enforcement – Wireless 911 and E-911
40 - Public Safety Enforcement – Cable Signal Leakage
41 - Public Safety Enforcement –Ship Inspection
42 - Public Safety Enforcement – Network Outage
43 - Public Safety Enforcement – Public Safety Interference
44 - Rural Call Completion
45 - Technical Rule – Interference Complaints
46 - Unauthorized Assignment/Transfer of Broadcast Licenses
47 - Universal Service Fund
48 - U-NII and TDWR Interference
49 - Auction Violation - Unable to fulfill post auction actions
50 - Auction Violation - Prohibited Communications
51 - Illegal Receipt of Lifeline Support
52 - Defraud the USF, ERATE Program, TRS, etc.
53 - EAS Tone Misuse
54 - EAS Documentation
55 - Uncertified Equipment Operation
56 - Failure/Non-Payment of Regulatory Fees
57 - Falsification of Application to Obtain Commission License
58 - Auction Violation - Failing to Submit Acurate Gross Revenue Information
59 - Internet Services and Access - WiFi- Blocking
60 - Internet Services and Access - Network Outage
61 -Change of Service without Customer Consent
62 - Brokering Toll Free Numbers
63 - Market Dispute
64 - Unauthorized Deployment and Operation
65 - Lacks Requisite Character

Figure 36 Violation Sub-Category FCC EB Data 2009 - 2019

Because we curated our data by collecting and organizing information regarding the lifecycle of the proceeding (excluding collating multiple violations, continuing proceedings, erratum, etc. – which will be discussed in the limitation section of our Analysis chapter), we were able to create a relatively "rich" dataset to which we could then accomplish our analyses to derive insights for the purposes of our research.

7.2 QUANTITATIVE RESULTS

Our quantitative analysis served us two purposes. First, we accomplished inferential statistics to observe quantitively with error and validity in mind, what was occurring in our dataset. Second, we were able to leverage our results from our correlations to determine our approach for the predictive model. After we imported the data, we ran the variable statistics where we observe the number of valid and missing variables. To translate the findings in Figure 19, we created the below table.

Table 7 SPSS Output & Translation for Variables

SPSS Output	Translation (Variable Categories -Excel Columns)
V1	**Name** – the name of the business, individual or other actor that is the defendant or violator in the proceeding
V2	**E# -** The numerical code for the Entity category
V3	Entity Category – the generalized category for the defendant and/or violator (i.e., business, individual, etc.)
V4	Record Number – Used as a reference to refer back to proceeding on the FCC website
V5	Date of Enforcement and/or Adjudication
V6	Date of Violation
V7	Lapse – The length of time between the violation and FCC response
V8	C# - The numerical code for the Complainant category
V9	Complainant – the name or general entity of the complainant
V10	Violation – an excerpt of the proceeding that serves as an account of what took place
V11	Financial penalty – the forfeiture, civil penalty, voluntary payment, or other type of monetary disgorgement that occurred as a result of the violation
V12	Cat# - Numeric code for violation categories
V13	Category – Violation Category
V14	Scat# - Numeric code for sub-category violations
V15	Sub-Category – Sub-Violation Category based on the primary violation categories, but refined to actions
V16	DocType – FCC publication of the violation proceeding
V17	Location – the state the violation took place or headquarters (or one of the areas served for businesses operating)
V18	EB Dept – responding and/or adjudicating FCC office
V19	Licensee – the status of authorization (this category also accounts for violations that cannot be licensed or authorized as they are outright illegal)
V20	Additional Info – additional details pertaining to the proceeding
V21	FOIA Reference – this category is not explicitly used for any of our methods; however, it serves as a link between proceedings that have made some payment to the FCC
V22	VioL – this category determines the impact of the violation

Statistics

		Entity	Laspe of Enforcement	Financial Penalty	Category	Sub Category	Document Type	Location	EB Dept	Licensee (Y,N,E, R, U)	VioL	Complainant Number
N	Valid	4342	4340	4141	4342	4342	4342	4342	4342	4342	4342	3747
	Missing	0	2	201	0	0	0	0	0	0	0	595

Figure 37 SPSS Statistics for Variables

In figure 32, we can observe that some of the variables are missing data. For example, V19, the category indicating the licensee status is missing 1505 (34%) of our observations. Additionally, V10, our complainant category is missing 193 (4.4%) of our observations from our dataset. Other variable categories (i.e., V1 (name), V3 (entity), and V4 (record number)) for example are not shown in the figure, this is because those variable categories are string (textual) inputs.

Entity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - Individual	999	23.0	23.0	23.0
	2 - Business	3241	74.6	74.6	97.7
	3 - Municipality	13	.3	.3	98.0
	4 - Government	1	.0	.0	98.0
	5 - Religious Institution	39	.9	.9	98.9
	6 - Educational Institution	17	.4	.4	99.3
	7 - Medical	3	.1	.1	99.3
	8 - Public Safety	5	.1	.1	99.4
	9 - Service/Event	24	.6	.6	100.0
	Total	4342	100.0	100.0	

Figure 38 Entity Frequency FCC EB Data 2009 - 2019

The actual percentage, for the two top frequencies, is 92.8% for business and 6.4% for individual. The valid percent column is used for missing data, however, as we can observe in figure 33, there are no null data points for this variable category.

Our frequency results for V11, our primary category, show us that Consumer Telephone-Related Issues, Illegal Receipt of Funds, Broadcast Issues, Equipment Marketing, and Market Disputes are some the highest occurring violations that we can observe in our dataset.

In figure 35, where we see the results for the frequencies of our sub-category violation data, we observe that Proprietary Information including Consumer Proprietary Network Information (CPNI), Defraud the USF, Consumer Telephone Related Issues – Unsolicited Faxes , ERATE Program, etc., and Disabilities Issues – Hearing Aid Compatibility and Volume Control for Telephones are the primary sub-category violations occurring.

Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 - Consumer Telephone Related Issues	1965	45.3	45.3	93.7
	2 - Broadcast Issues	1127	26.0	26.0	33.3
	23 - Illegal Receipt of Funds/Fraud	378	8.7	8.7	45.0
	7 - Equipment Marketing	196	4.5	4.5	99.9
	12 - Public Safety Enforcement	160	3.7	3.7	4.2
	24 - Unauthorized Deployment and Operation	116	2.7	2.7	47.7
	21 - Market Dispute	93	2.1	2.1	35.7
	6 - Emergency Alert System (EAS)	59	1.4	1.4	95.4
	14 - Technical Rule Violations	50	1.2	1.2	5.4
	18 - Universal Service Enforcement	31	.7	.7	7.3
	26 - Services	29	.7	.7	48.4
	22 - Auction Violation	28	.6	.6	36.3
	17 - Unauthorized Assignment/Transfer of Control of Telecom Authorizations	21	.5	.5	6.6
	15 - Unauthorized Assignment/Transfer of Control of Broadcast Licenses	18	.4	.4	5.8
	11 - Jammer Enforcement	17	.4	.4	.6
	4 - Proprietary Information Including Customer Proprietary Network Information (CPNI)	17	.4	.4	94.1
	16 - Unauthorized Assignment/Transfer of Control of Wireless Licenses	13	.3	.3	6.1
	20 - U-NII and TDWR Interference	9	.2	.2	33.5
	1 - Broadcast of Obscene, Profane and/or Indecent Material	7	.2	.2	.2
	25 - Internet Services and Access	3	.1	.1	47.7
	9 - Amateur Radio Service	3	.1	.1	100.0
	13 - Rural Call Completion	2	.0	.0	4.3
	Total	4342	100.0	100.0	

Figure 39 Violation Category Frequency FCC EB Data 2009 - 2019

Sub Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		79	1.8	1.8	1.8
	31 - Proprietary Information including Consumer Proprietary Network Information (CPNI)	1241	28.6	28.6	48.3
	7 - Broadcast Issues – Unauthorized Broadcast "Pirate" Stations	635	14.6	14.6	94.9
	52 - Defraud the USF, ERATE Program, TRS, etc.	364	8.4	8.4	73.3
	30 - Consumer Telephone Related Issues – Unsolicited Faxes	321	7.4	7.4	19.7
	8 - Broadcast Issues – Other Unauthorized Operation	207	4.8	4.8	99.7
	36 - Equipment Marketing Violations	192	4.4	4.4	56.2
	38 - Public Safety Enforcement – Antenna Structure Registration, Lighting, and Marking	135	3.1	3.1	59.8
	33 - Disabilities Issues – Hearing Aid Compatibility and Volume Control for Telephones	94	2.2	2.2	50.5
	64 - Unauthorized Deployment and Operation	94	2.2	2.2	80.2
	63 - Market Dispute	93	2.1	2.1	78.0
	14 - Broadcast Issues – Broadcast Interference	78	1.8	1.8	5.1
	5 - Broadcast Issues – Public File Requirements	70	1.6	1.6	64.5
	19 - Consumer Telephone Related Issues – Do Not Call	64	1.5	1.5	8.0

Figure 40 Sub-Category Frequency Exerpt Descending Order FCC EB Data 2009 - 2019

Document Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		3	.1	.1	.1
	OMNIBUS NOTICE OF APPARENT LIABILITY FOR FORFEITURE	678	15.6	15.6	87.4
	ORDER	470	10.8	10.8	98.6
	8 - Notice of Unlicensed Operation (NOUO)	436	10.0	10.0	50.9
	5 - Citation	401	9.2	9.2	40.9
	15 - Order	368	8.5	8.5	23.7
	10 - Notice of Apparent Liability (NAL)	337	7.8	7.8	10.2
	23 - Consent Decree	225	5.2	5.2	30.8
	FORFEITURE ORDER	199	4.6	4.6	63.0
	13 - Forfeiture Order	191	4.4	4.4	15.2
	NOTICE OF APPARENT LIABILITY FOR FORFEITURE	184	4.2	4.2	68.9
	CITATION	155	3.6	3.6	57.0
	9 - Notice of Violation (NOV)	101	2.3	2.3	53.3
	NOTICE OF APPARENT LIABILITY FOR FORFEITURE AND ORDER	91	2.1	2.1	71.0
	18 - Memorandum Order & Opinion	70	1.6	1.6	25.4

Figure 41 SPSS Document Type Frequency Excerpt FCC EB Data 2009 - 2019

Licensee (Y,N,E, R, U)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		27	.6	.6	.6
	1 -Yes	2823	65.0	65.0	65.6
	2 - No	900	20.7	20.7	86.4
	7 - Unlicensable	507	11.7	11.7	100.0
	3 - Expired	30	.7	.7	87.1
	6 - Former	20	.5	.5	88.3
	5 - Registrant / Auc Participant	18	.4	.4	87.6
	5 - Unlicensable	13	.3	.3	87.9
	4 - Revoked	2	.0	.0	87.1
	5 - Registrant	2	.0	.0	87.1
	Total	4342	100.0	100.0	

Figure 42 License/Authorization Status Frequency FCC EB Data 2009 – 2019

VioL

		Frequency	Percent
Valid	10	3044	70.1
	7	458	10.5
	6	328	7.6
	3	263	6.1
	9	92	2.1
	5	60	1.4
	1	51	1.2
	4	34	.8
	11	9	.2
	2	3	.1
	Total	4342	100.0

Figure 43 Violation Impact FCC EB Data 2009 - 2019

Complainant Number

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8	2749	63.3	73.4	100.0
	6	426	9.8	11.4	22.8
	4	142	3.3	3.8	11.4
	7	142	3.3	3.8	26.6
	3	112	2.6	3.0	7.6
	2	106	2.4	2.8	4.6
	1	53	1.2	1.4	1.8
	0	14	.3	.4	.4
	5	2	.0	.1	11.4
	9	1	.0	.0	100.0
	Total	3747	86.3	100.0	
Missing	System	595	13.7		
Total		4342	100.0		

Figure 44 Complainant Frequency FCC EB Data 2009 – 2019

Population Descriptive Statistics

	N	Mean	Std. Deviation	Variance
Entity Number	4342	1.865	.830	.689
Complainant Number	3747	7.134	1.747	3.052
Financial Penalty	4141	536112.987	5507620.824	3.033E+13
VioL	4342	8.711	2.261	5.111
Valid N (listwise)	3691			

Std. Deviation and Variance use N rather than N-1 in denominators.

Figure 45 Population Descriptives Select Variables FCC EV Data 2009 - 2019

Indicator of each last matching case as Primary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Duplicate Case	805	18.5	18.5	18.5
	Primary Case	3537	81.5	81.5	100.0
	Total	4342	100.0	100.0	

Figure 46 Duplicate Cases FCC EB Data 2009 - 2019

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Financial Penalty * Complainant Number	3691	85.0%	651	15.0%	4342	100.0%

Figure 47 Financial Penalty and Complainant Case Processing FCC EB Data 2009 – 2019

Report

Financial Penalty

Complainant Number	Mean	N	Std. Deviation
0	1212051.385	13	2794432.160
1	1424158.170	53	4420039.873
2	6096219.467	105	22095311.93
3	3218917.973	104	16611474.68
4	930442.9246	136	4821155.815
5	37525000.00	2	.00000
6	504935.4550	422	5343820.304
7	72020.5634	142	586764.6644
8	254449.1460	2713	2906690.603
9	20000.0000	1	.
Total	590991.0639	3691	5830993.814

Figure 48 Financial Penalty and Complainant Case Processing Report FCC EB Data 2009 – 2019

Entity * Licensee (Y,N,E, R, U) Crosstabulation

Count

			Licensee (Y,N,E, R, U)									
			1 -Yes	2 - No	3 - Expired	4 - Revoked	5 - Registrant	5 - Registrant / Auc Participant	5 - Unlicensable	6 - Former	7 - Unlicensable	Total
Entity	1 - Individual	1	254	516	3	1	0	3	0	2	219	999
	2 - Business	19	2522	338	27	1	2	15	13	17	287	3241
	3 - Municipality	1	10	2	0	0	0	0	0	0	0	13
	4 - Government	0	0	1	0	0	0	0	0	0	0	1
	5 - Religious Institution	0	17	21	0	0	0	0	0	0	1	39
	6 - Educational Institution	0	14	3	0	0	0	0	0	0	0	17
	7 - Medical	0	2	1	0	0	0	0	0	0	0	3
	8 - Public Safety	0	4	0	0	0	0	0	0	1	0	5
	9 - Service/Event	6	0	18	0	0	0	0	0	0	0	24
Total		27	2823	900	30	2	2	18	13	20	507	4342

Figure 49 Licensee Status and Entity Type Crosstabulation FCC EB Data 2009 – 2019

Sub Category * Entity Crosstabulation

Count

		Entity									
		1 - Individual	2 - Business	3 - Municipality	4 - Government	5 - Religious Institution	6 - Educational Institution	7 - Medical	8 - Public Safety	9 - Service/Event	Total
Sub Category	31 - Proprietary Information including Consumer Proprietary Network Information (CPNI)	12	1222	4	0	0	3	0	0	0	1241
	30 - Consumer Telephone Related Issues – Unsolicited Faxes	7	313	1	0	0	0	0	0	0	321
	36 - Equipment Marketing Violations	8	184	0	0	0	0	0	0	0	192
	8 - Broadcast Issues – Other Unauthorized Operation	21	174	0	0	7	2	1	2	0	207
	7 - Broadcast Issues – Unauthorized Broadcast "Pirate" Stations	477	131	2	1	21	2	0	1	0	635
	38 - Public Safety Enforcement – Antenna Structure Registration, Lighting, and Marking	14	119	0	0	2	0	0	0	0	135
	33 - Disabilities Issues – Hearing Aid Compatibility and Volume Control for Telephones	0	93	1	0	0	0	0	0	0	94
	63 - Market Dispute	0	93	0	0	0	0	0	0	0	93
		3	73	1	0	0	0	0	0	2	79
	64 - Unauthorized Deployment and Operation	4	69	0	0	0	0	0	0	21	94
	19 - Consumer Telephone Related Issues – Do Not Call	0	64	0	0	0	0	0	0	0	64
	5 - Broadcast Issues – Public File Requirements	11	58	0	0	0	1	0	0	0	70
	28 - Consumer Telephone Related Issues – Telephone Solicitation	3	49	0	0	0	0	0	0	0	52

Figure 50 Violation Sub-Category and Entity Type Crosstabubulation - Emphasis on Business FCC EB Data 2009 - 2019

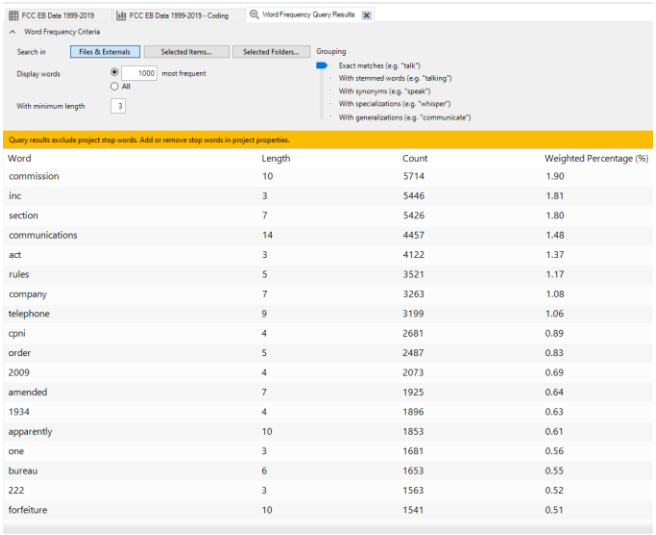
7.3 QUALITATIVE RESULTS

Where our quantitative results yield our numerical findings, our qualitative results provide us with the context of what is occurring within our dataset. The following results are based on the queries conducted on the string variables that we were unable to quantitatively investigate using our statistical approach. Moreover, our qualitative analysis method allows us to gain an alternative perspective of our data and begin to ruminate on the narrative behind both the violations we are observing in the proceedings and the adjudication of those violations. Similar to our statistical approach, we first begin with the frequency/distribution output from NVIVO.

Figure 51 Word Cloud FCC EB Data 2009 - 2019

In the resulting word cloud, Figure 27, we can observe a mixture of words pertaining to the FCC itself as the regulator, along with popular words from the violation proceedings. Note for this type of distribution, our output does not distinguish the information as valid or invalid like our results from SPSS, however, from the font size and understanding that decreased visibility of specific words, we can visually observe which words occur more frequently in our dataset. For example, the use of the word "rules" without our dataset is slightly larger than the word "enforcement" and the words "consumer" and "broadcast" relatively appear to be of similar size. However, the more prominent words in our word cloud appear to be related to the FCC and service types (however frequency of these words do not distinguish between if the word is used to explain the violation, explain the Commission's rules pertaining the violation, etc.).

To accompany the results of our word cloud, we can also review its summary data. This information results in a table giving us additional information such as the length of the word, the count of how many times this word occurs, and the weighted percentage.



Word	Length	Count	Weighted Percentage (%)
commission	10	5714	1.90
inc	3	5446	1.81
section	7	5426	1.80
communications	14	4457	1.48
act	3	4122	1.37
rules	5	3521	1.17
company	7	3263	1.08
telephone	9	3199	1.06
cpni	4	2681	0.89
order	5	2487	0.83
2009	4	2073	0.69
amended	7	1925	0.64
1934	4	1896	0.63
apparently	10	1853	0.61
one	3	1681	0.56
bureau	6	1653	0.55
222	3	1563	0.52
forfeiture	10	1541	0.51

Figure 52 Word Cloud Summary FCC EB Data 2009 - 2019

Next, we can observe the results for the recurring "violators" within our dataset. By conducting a query as it pertains to the duplicative name category, we obtain the following output.

However, our results also yield iterations for certain names such as Verizon as shown in Figure51 below.

	A : FCCEBData19992019
586 : AT&T Corp.	58
778 : BellSouth Telecommunications, Inc.	15
1051 : Cablevision Systems Corp.	15
1503 : COMCAST CORPORATION	16
2826 : Gray Television Licensee, Inc.	12
4419 : Mt. Rushmore Broadcasting, Inc.	12
4537 : NBC TELEMUNDO LICENSE CO.	12
5319 : Qwest Communications International, Inc.	12
5734 : SBC Communications, Inc.	11
6887 : Verizon	11
6896 : Verizon Communications, Inc.	26

Figure 53 Top Duplicates [Repeat Violators] NVIVO

Additionally, we employ a word tree approach, which, as described as "keyword-in-context" is purported to be a method that enables rapid querying and exploration of bodies of text (Wattenberg and Viégas 2008), we can observe words and phrases that "branch" from a root word such as "enforcement" and "telecommunications". We can see in Figure 30 below that this query allows us to visibly see which phrases in our dataset directly correlate to the word "enforcement". A review of this output allows us to see that words and phrases such as "initiated", "entered into", and "facilitate ongoing settlement discussions" are among the top correlations to "enforcement" on the left-hand side. Conversely, we observe on the right-hand side that the names of companies are mostly associated with the word enforcement. What we do not observe in this figure, noting that the figure needed to be reduced due its original size making the text illegible, is that words like "revocation", "restitution", "imprisonment" and other related enforcement mechanisms are

not included in the words that are closely associated with or correlating to the word “enforcement” for our dataset.

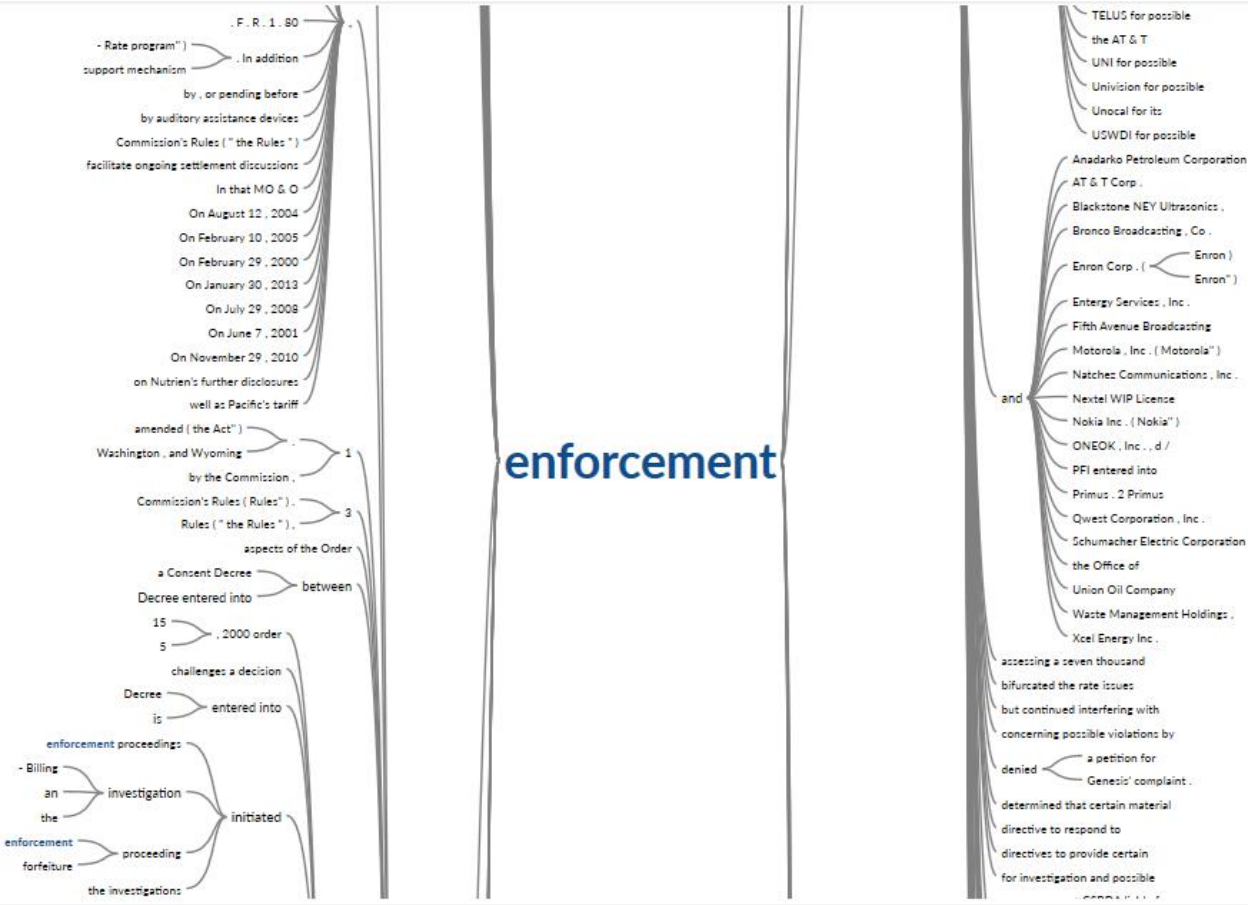


Figure 54 Enforcement Word Tree Query NVIVO

7.4 GEOGRAPHICAL INFORMATION SYSTEM RESULTS

Our results for our GIS analysis show that violations that the FCC has adjudicated has occurred both domestically and internationally. Although majority of the violations fall within the

United States' boarders, it is important to note that the international violations often pertain to the equipment marketing violations which, according to the data, has had proliferation due to internet sales. Aside from this, in our GIS, we first observe where the violations are occurring and when we focus on the U.S. specifically, at first blush, violations occur to appear throughout the U.S. However, when we switch from a choropleth type of output to bubbles based on frequency of violation by state, we then observe a more dispersed patter of violations occurring across the U.S.

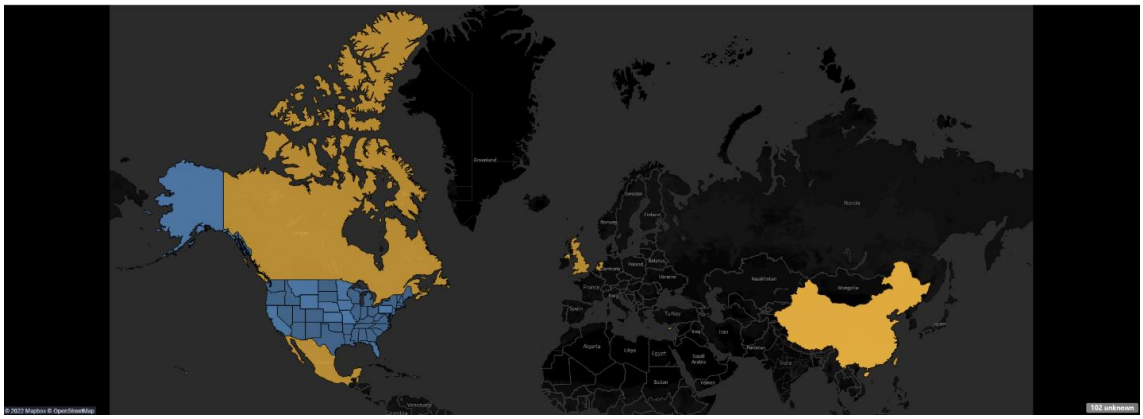


Figure 55 Tableau GIS Output for Domestic and International Violations 1999-2019

It is also important to note that in our results, locations that were omitted in the FCC EB proceedings were tagged in our dataset as "No Location Available" and those results happen to converge in Norway. Disregarding the erroneous location of our "no location available" observations, we observe that the U.S. violations are occurring mainly along our coastal lines, and when compared to figure 55 where we have also geographically situated the FCC EB field offices, we see that most often the violations are being adjudicated within the vicinity of a nearby FCC office.

Figure 56 Power BI GIS Output for Domestic and International Violations 2009 - 2019

We do not have sufficient data to posit further as to if there is a specific correlation between the location of FCC EB offices located in the United States, the District of Columbia, and throughout U.S. territories, however, our observation of these results may indicate that there is a relationship.

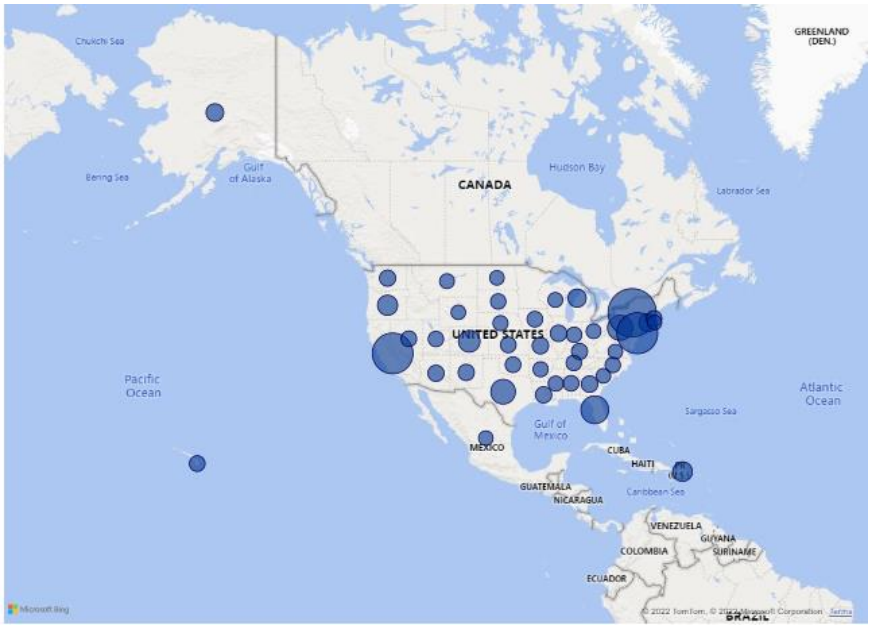


Figure 57 FCC EB Offices

7.5 PREDICTIVE MODELING RESULTS

The output of our ANOVA analysis shows that our regression between financial penalty and the primary and sub-category violations have statistical significance ($p = 0.00$), which is below 0.05. This gives us confidence that we have selected the appropriate variables for our predictive model. Initially, we ran the predictive model without normalizing the data so observe, if any, insight the predictive model may yield. Due to the disparities of the results, we then ran the model again after normalizing the data.

Model Description

		Model Type
Model ID	Financial Penalty	Model_1	ARIMA(3,0,9)

Figure 58 Financial Penalty Model Description

Model Fit

					Percentile						
Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25	50	75	90	95
Stationary R-squared	.039	.	.039	.039	.039	.039	.039	.039	.039	.039	.039
R-squared	.039	.	.039	.039	.039	.039	.039	.039	.039	.039	.039
RMSE	5509278.669	.	5509278.669	5509278.669	5509278.669	5509278.669	5509278.669	5509278.669	5509278.669	5509278.669	5509278.669
MAPE	59970.972	.	59970.972	59970.972	59970.972	59970.972	59970.972	59970.972	59970.972	59970.972	59970.972
MaxAPE	150818100.6	.	150818100.6	150818100.6	150818100.6	150818100.6	150818100.6	150818100.6	150818100.6	150818100.6	150818100.6
MAE	892804.020	.	892804.020	892804.020	892804.020	892804.020	892804.020	892804.020	892804.020	892804.020	892804.020
MaxAE	119450933.1	.	119450933.1	119450933.1	119450933.1	119450933.1	119450933.1	119450933.1	119450933.1	119450933.1	119450933.1
Normalized BIC	31.061	.	31.061	31.061	31.061	31.061	31.061	31.061	31.061	31.061	31.061

Figure 59 Model Fit Financial Penalty Not Normalized

The residual statistics in figure 62, are the output we received once we normalized the financial penalty for our model. Based on the correlations we accomplished in our quantitative analysis, we know that the violation categories have a strong correlation to our financial penalty. Our minimum predictive value for financial penalty is .0014 with a maximum of .0370.

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.0014	.0370	.0058	.00815	2927
Residual	-.03702	.97632	.00000	.05362	2927
Std. Predicted Value	-.539	3.825	.000	1.000	2927
Std. Residual	-.690	18.206	.000	1.000	2927

a. Dependent Variable: normalize_s2r

Figure 60 Normalized Residual Statistics

By looking at the residual values, we can observe the differences between the predicted financial penalty and the actual financial penalty imposed. We then run another correlation, however, this time, we look at the financial penalty and the predicted value as shown in figure 63.

Correlations

		Financial Penalty	Predictive_Value
Financial Penalty	Pearson Correlation	1	-.150**
	Sig. (2-tailed)		<.001
	N	3981	2927
Predictive_Value	Pearson Correlation	-.150**	1
	Sig. (2-tailed)	<.001	
	N	2927	2982

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 61 Correlation of Normalized Financial Penalty and Predicted Value

Our results from our predictive model show that some of the predicted enforcement will results in high financial penalties, however, over time, that will decline resulting in much lower-, or zero-dollar financial penalty and the enforcement mechanism.

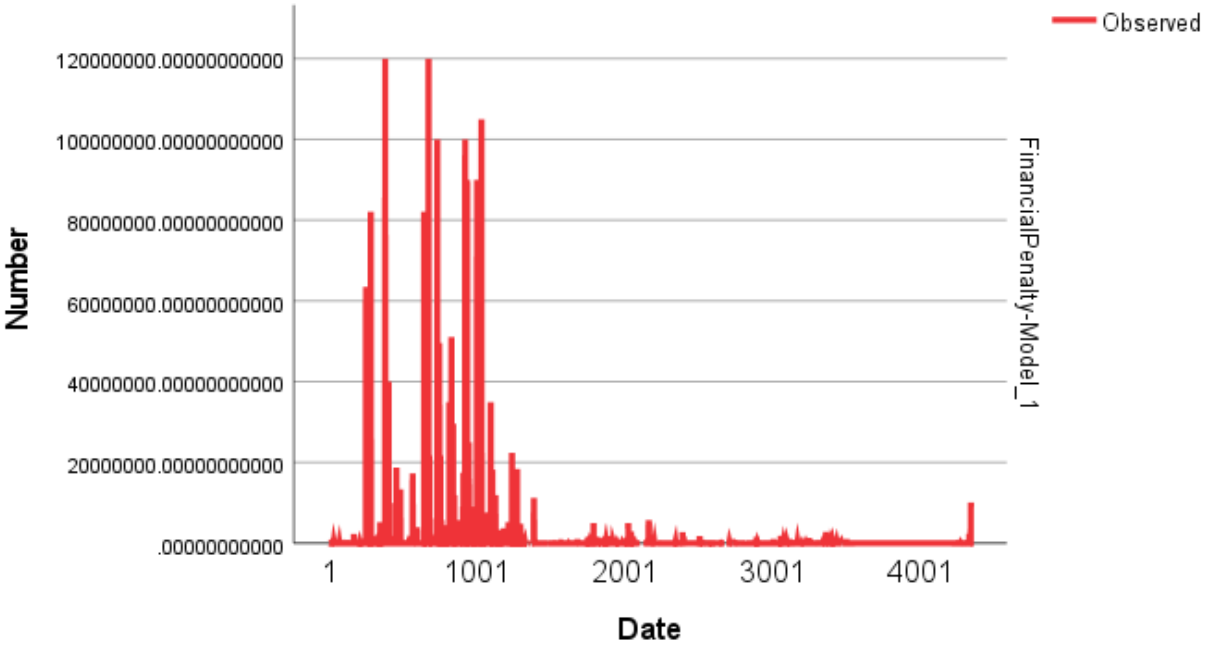


Figure 62 Predictive Model Projections

As we understand the predictive model is not "full proof" we can glean some insight from how the violations we observed within our dataset may be adjudicated as future violations overtime based on the ten years' worth of data analyzed.

7.6 SUMMARY OF RESULTS

Our results show that when we create a dataset based on the FCC EB pdf repository, there is much information that can be gleaned and we have exhibited ample findings quantitatively, qualitatively, geographically, and are able to forecast how the future state of telecommunications enforcement may end up when we take 10-years' worth of FCC adjudication decisions and model them to predict what the future enforcement mechanisms may be for our observed violations. Although not all of our results yielded statistically significant findings, we have sufficiently exhibited that by curating a dedicated dataset with attributes that are more refined the telecommunications landscape that the FCC is enforcing, we find that there is more diversity in our themes of enforcement than what has been purported previously.

8.0 ANALYSES

In this chapter, we analyze and draw additional inferences to the results of our work. Traversing through each of our methods, we further posit the importance of approaching research in this manner has allowed us to contribute to the field of telecommunication by adding additional perspective to how policy, regulation, and enforcements result in FCC adjudication. Towards the beginning of this body of work, we described that the extent of what knowledge is available from the U.S. telecommunications regulator, that they operate on a complaint-based process where they field and further investigate requests for adjudication. However, based on our results, we find that although there are complaint-based proceedings, we also observe regular investigations where the Federal Communications Commission's (FCC's) Enforcement Bureau (EB) also conducts investigations, along with interagency cooperation and can administratively take actions for annual reports and other tasks that occur. From our methodological approaches and subsequent results, we are able to answer the majority of our research questions and find areas for opportunity to further refine our hypotheses for future testing. As a first of its kind research endeavor, we believe we have successfully demonstrated the importance of a dedicated dataset versus a repository

8.1 DATA CURATION ANALYSIS

The curation of the FCC pdf repository into an organized dataset provided us with the foundation to normalize while maintaining enough heterogeneity within our dataset to analyze our information through various means. From the inconsistencies in EB proceeding information, to

outdated taxonomies to categorize their information, we have proven in our dataset that collecting entity types, complainants, distinguishing the lapse of enforcement (the time taken between a violation and when the FCC adjudicates), along with both primary and secondary violation categories, and other elements, we are able to investigate violations occurring within the telecommunications landscape as well as better understand how the FCC EB is approaching adjudication. While our findings support that topic such as unauthorized "pirate" radio is pervasive under the primary category of broadcast issues, our developed ontologies for telecommunication allow us to "bird's eye view" of some of the most pervasive challenges that the FCC is adjudicating – most predominantly consumer telephone related issues. This is not something that we would have been able to ascertain from the FCC websites (transitional or the refreshed website). Moreover, by collecting the financial penalty amounts within our corpus of information, we are further able to observe what kinds of violations result in financial penalties and review how frequently they do not.

Although the creation of the dataset manually proved labor intensive, by investigating the FCC proceedings in this manner allowed us to expand upon the violation categories and include themes that are not captured by the FCC's bureau structure, nor is it truly encapsulated in the purported purview from the FCC's website or code of federal regulations (CFR). Moreover, we also examine that this "as is" categorization for the FCC EB does not lend itself to include the development, deployment, operations, or services of new or emerging technologies. Furthermore, we also observed that simple items such as florescent lighting can cause interference to licensed operators, yet the expectation that the everyday person understands not only what the FCC does but is treated as an unauthorized user for a good they purchased. This highlights a failing of providing public knowledge and the presence of the FCC for users of normal household goods to

be held accountable for rules that they may not know exist and a knowledge of the CFR for which the average person may not go seeking. Evermore, this is an interesting finding as to how the FCC will approach even more innovative technological approaches that may cause unintentional interference in the future – as individuals may, in the near future, upcycle their homes for the internet of things (IoT), enhance their person with embeddable technologies, purchase a fully autonomous vehicle, or even want to engage in commercial space travel and call home from the galaxy. These concepts may now seem farfetched but have already been exhibited as a possible near future emergence within our telecommunications landscape.

8.2 QUANTITATIVE ANALYSIS

Our initial findings from our quantitative analysis investigated the descriptive and frequency aspects of our data using our numerical values. This first step measure to our inference statistics gave us a foundation for identifying which variables would be of benefit to conduct our correlations to see, if at all, there are any relationships between our collected attributes such as entity type and financial penalty, violation category and financial penalty, or even our newly developed category specifically for our research where we gauge the impact of a specific violation (VioL) and financial penalty. We primarily focused on the financial penalty as our dependent variable due to our observations when collecting our data that the imposed financial action is in itself the FCC's "go to" enforcement mechanism. Other independent federal agencies describe this as disgorgement to the U.S. Treasury. This is common among agencies such as the Federal Trade Commission (FTC).

Aside from our literary foundation of our research indicating that “pirate radio” operators are a pervasive challenge to be resolved within the telecommunications landscape, our quantitative analysis has yielded those businesses, more specifically, businesses engaging in consumer telephone by way of proprietary network information (CPNI) are indeed the most pervasive challenge that the FCC adjudicates.

8.3 QUALITATIVE ANALYSIS

The FCC EB website is essentially a repository, a location where the FCC stores and manages its enforcement actions. For the purposes of research, the format of their proceedings is insufficient to conduct an involved content analysis. Our approach for organizing, validating, and cleaning the data from the proceedings housed on the FCC’s website provided us numerical and textual perspectives as to how enforcement within telecommunications occurs, while also making poignant some of the violations that may now need attention instead of some of the marquee items that continue to persist, but only account for ~3.8% of the violations occurring.

The practice of curating our dataset in an iterative process afforded us the opportunity to familiarize ourselves with the information, develop our taxonomy for a more concerted data analysis effort, and through the extraction of excerpts, allowed us to further explore the contextual aspects of our information. Like our initial approach with our quantitative method, we were able to textually observe the frequency of common words used within our dataset. Due to the nature/perspective in which these proceedings were created, the primary words that show up as the most frequent are words that are closely related to the FCC or their policies and/or regulations more so than words more closely related to the violations themselves. As the legalize jargon heavy

documentation ultimately shaped our approach to manually code each proceeding vice more innovative approaches such as machine learning, we expected that the excerpts when paired with the additional information attributes might offset the legal language to where more of the text more closely tied to the actions of the violations themselves would become more prevalent – however this was not the case. If we infer further however, we can posit that the FCC espouses it's authority and legal framework, however, based on the investigation of their primary enforcement mechanism, financial penalties, the fines are typically not paid (based on our FOIA requests pertaining to the civil monetary penalties and forfeiture orders) where graphically, we observe some semblance of this.

For our approach to the word tree, using a pre-selected word to see how it is textually connected – correlates – to other words within data, we find connections to business and again the regulations, but similarly to our word cloud, we do not observe the majority of words like enforcement, telecommunications, or even pirate radio actually connecting to instances of violations.

8.4 GEOGRAPHICAL INFORMATION SYSTEMS ANALYSIS

Our analysis of our GIS results is that violations appear to be converging around locations of FCC EB field offices. We especially notice in instances where there is more than one FCC EB field office (i.e., Florida and California), the violations adjudicated are almost doubled than in instances where there is one or no immediate FCC EB field office. We do take note however that there are some proceedings where multiple FCC EB field offices responded. However, most often, the FCC headquarters in the District of Columbia adjudicates, or is the final adjudication in many

of our proceedings. From a geographic perspective, we also observe that rural areas typically result in little to no violations adjudicated by the FCC. This could be resulting from a number of externalities such as resolutions among users without FCC intervention, that these areas are low hanging fruit, or quite possibly, because rural areas typically tend to be underserved, there is no "competitor" or service provider to lodge a complaint to the FCC due to either unauthorized operation nor interference.

8.5 PREDICTIVE MODELING ANALYSIS

Violations will result in most little no financial penalties which is the primary enforcement mechanism used by the FCC over time. This has been observed through our predictive model using a linear regression where we postulate how the violation category may be adjudicated based on the financial penalties imposed. Changes in policy, such as the more recent PIRATE act that now allows for the maximum penalty of $2 million may shift the predictive model as we did not account for a fixed maximum penalty for the pirate radio violation, however, contextually, we observe that most often the financial penalties imposed on this type of violation are later decreased, eliminated, or unpaid overall.

8.6 LIMITATIONS

One of the primary limitations was the continued availability of the FCC's data. During the course of our research, the FCC transitioned their website that hosted Enforcement Bureau

actions. Furthermore, when we investigated the updated website, we noticed disparities within the available proceedings. Additionally, almost all of our originally collected links became broken where we needed to rely on documentation that may have been changed during the course of our investigation. Data reuse and data reliability are important here because we are depending on the details contained within documentation that is not easily extracted.

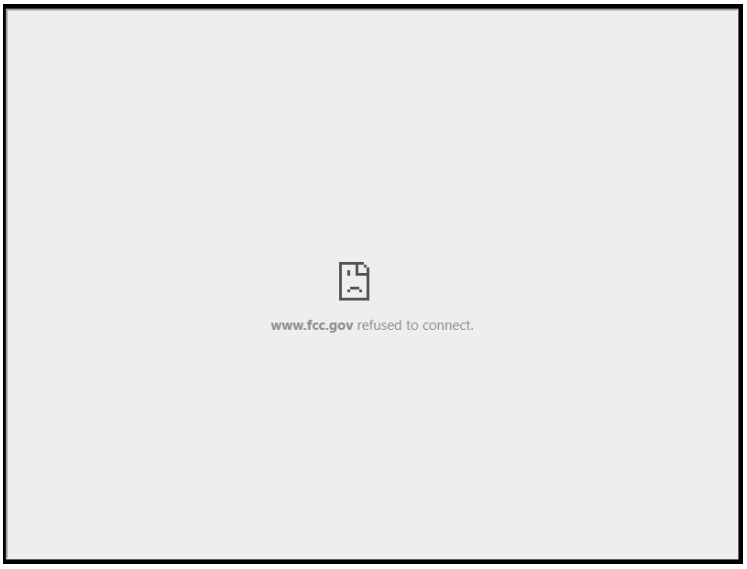


Figure 63 FCC Transitional Website No Longer Available

Originally when preparing for this research, we hoped to provide not only an overview of enforcement as it pertains to violations that fall under the FCC's purview, we had also hoped to provide a more in-depth perspective to how the FCC's approach to enforcement and the NTIA's approach differ. Along with drilling down specifically into category violations based on data availability. To obtain this additional data, we submitted a series of Freedom of Information Act (FOIA) requests. Many of these requests did not result in the information we were attempting to obtain, and others were denied. In Appendix B, you can review the documentation related to our

FOIA requests along with select correspondence (names and email addresses of the correspondents have been omitted to for their privacy.

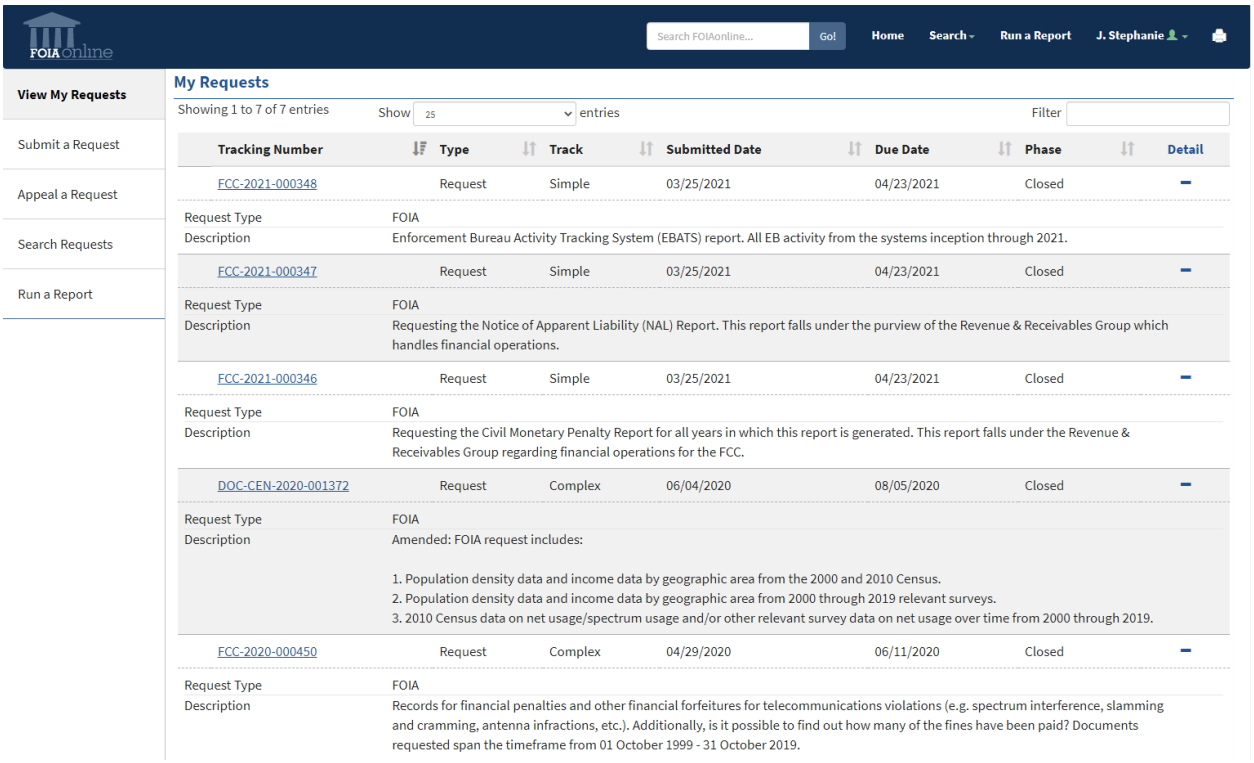


Figure 64 Snippet of FOIA Requests from the FOIA Online System

Additionally, in 2019, I attempted to directly engage with the Federal Communications Commission directly to learn about their enforcement mechanisms. I received the following response.

Hello, Ms. Rose – As the FCC's law enforcement arm, EB generally does not engage directly with outside researchers because most of what we do is confidential. I'm willing to consider answering some of your questions, however, if you want to exchange information via email. I'm tied up through the end of December but could respond sometime in January.

Figure 65 Re: Enforcement Bureau Research Inquiry 18 DEC 2019

Key limitations during this research include but are not limited to heterogenous format of the FCC EB proceeding documentation, redacted (or unmentioned) details regarding the violation -or perceived violation, obtaining the full list of financial penalties paid to the U.S. Treasury (requested through Freedom of Information Act), additional EBATES database information (requested through Freedom of Information Act), additional background on the FCC EB (requested through correspondence from Rosemary Harold Chief, Enforcement Bureau), and license expirations for specialized software (i.e., Tableau).

Attempting to use the FCC website as a data source for modernized approaches to data collection proved unfruitful. Web scraping and computationally attempting to link to the FCC EB enforcement actions resulted in errors. This hindered us from being able to dynamically access and pull the most current information concerning the violations and subsequent enforcement mechanisms and adjudication employed by the FCC.

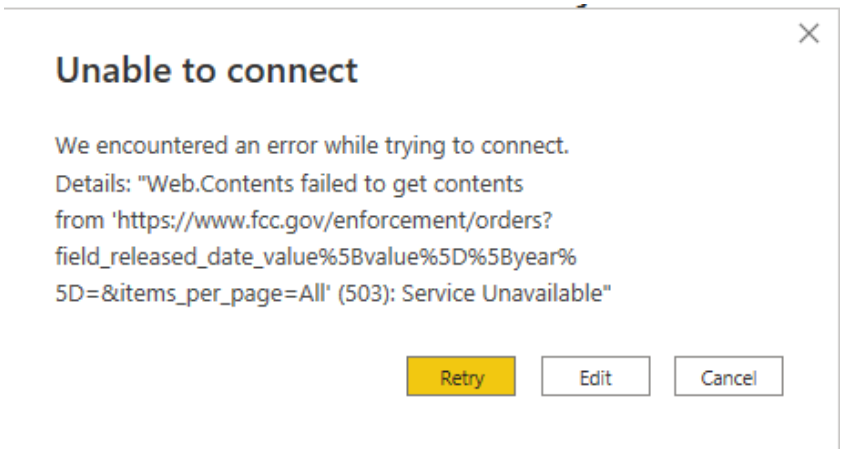


Figure 66 Power BI Error 503 - Unable to Connect to the FCC EB Enforcement Action Documents

Additionally, the format of the FCC EB proceedings are heterogeneous and do not always appear to follow a standard structure. Where some proceedings include details such as the background, information on the complainant, location of the violation and/or headquarters location for the defendant and/or violator, other documents lacked these details – and some did not discuss the actual violation at all. Furthermore, these documents can range between one page to hundreds of pages. And in some cases, a few proceedings were Omnibus where multiple violators were addressed within the same document. Other limitations with the FCC documentation included redacted details. As exhibited in Figures 35 and 36 below, redacted documentation often stripped many of the assumed requisite details needed for the scope of our research.

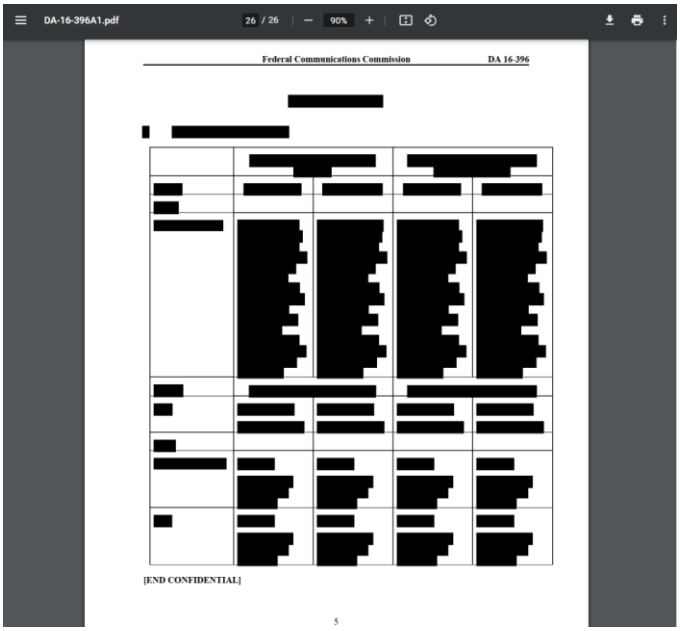


Figure 67 FCC Rcd EB-14-MD-011 Redacted Example.png

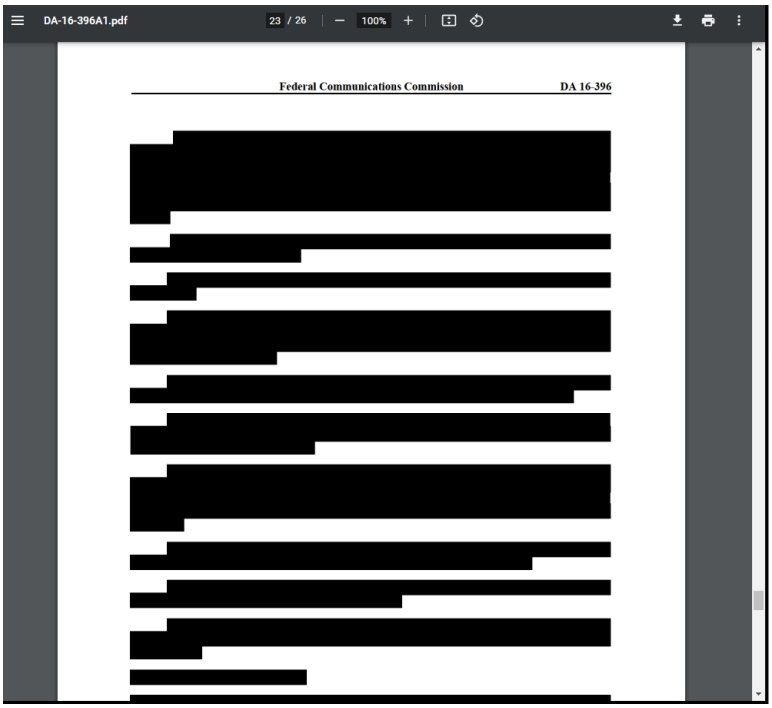


Figure 68 FCC Rcd EB-14-MD-011 Redacted Example.png

In addition to restricting the access to information within specific proceedings by redacting the details, the way this method is implemented disallows of the use of copy and paste for any text that may remain on the page. Therefore, in addition to hard coding, collecting the information by "hand", for proceedings where details were redacted, but left information within the scope of our research on the page, we needed to then retype the entire account of what occurred.

Another limitation and/or concern with our data collection includes human error. Although we may not be able to refer to this as a "big data" dataset, personally reviewing what was originally 8, 611 proceedings and subsequently 9, 666 proceedings, and then finally completing our data by validating 4,343 proceedings, we can concede there may be human error within some of the collected details of the data. When we consider fatigue and mistyping, we understand that this creates a limitation on our collected data as it may contain errors due to this approach.

Another limitation of note is the availability of software. University licensed software that was available for a portion of our research and analysis was no longer supported part of the way through. This required us to pivot in order to accomplish our research goals.

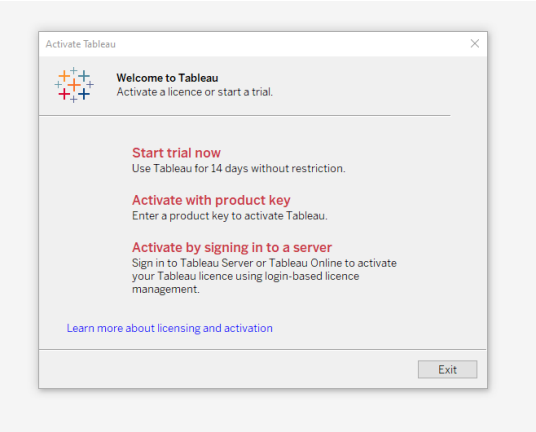


Figure 69 University Tableau License Expired

Data reusability also became a concern during the course of this research. Despite attempting to curate a fungible dataset that could be reused in multiple ways and a variety of commercial of the shelf software applications, we did at times experience errors where some of the data may have not been fully loaded in the applications we were ale to consistently use. These errors within our applications may have been due to the null values that exist within our dataset, or caused from human error during the collection process.

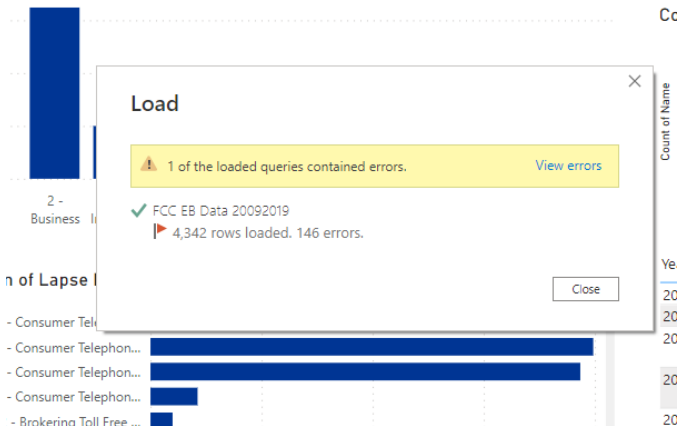


Figure 70 Power BI Loading Error FCC EB Data 2009 - 2019

However, when we investigate the errors further, as shown in Figure 69 below, we can observe that the null values are accounted for within our dataset and the formatting of some of the time panel data is causing the error.

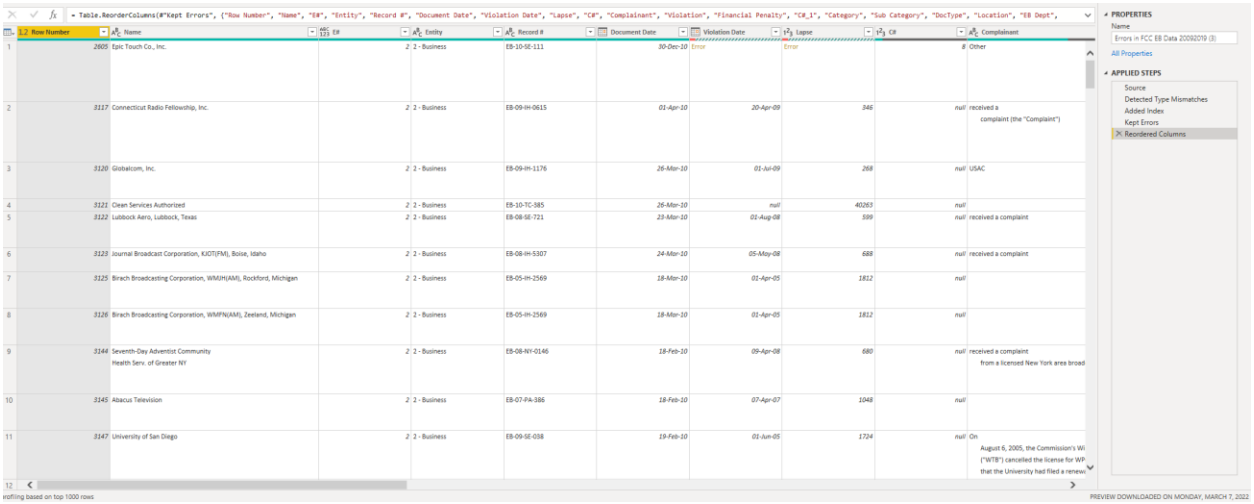


Figure 71 A Closer Review of Data Errors in Power BI

In many of the cases concerning our limitations, we attempted to resolve or find an alternative accordingly. Furthermore, we hope this research continues to further refine both the dataset and the approaches used to accomplish our research.

8.7 SUMMARY OF ANALYSES

Our overall insights suggest that our findings are as follows.

Research Question 1: What are violations are occurring within the dataset. As we have observed, through the data curation phase, as many as, 26 violation categories and 65 sub-categories of violations. Through both our quantitative and qualitative analyses, we observe that Broadcast Issues, Consumer Telephone Related Issues, Equipment Marketing, Public Safety Enforcement, Illegal Receipt of Funds/Fraud, and Unauthorized Deployment and Operation are our highest primary violations. For the violation sub-category, we c

Research Question 2: What is the impact of some of the violations over other violation types? To answer this question, we developed scale to ascertain the impact factor of each violation proceeding. In the quantitative analysis method, we correlated that

Research Question 3: Does policy or new technologies affect the veracity of enforcement? Although there are many new policies that arise, as the FCC holds numerous Notice of Proposed Rulemaking Sessions, we are unable to better investigate this question due to the data collected for this research. There are many of the proceedings that discuss the importance as to why the FCC specifically targets certain violations, however, their basis is usually engrained in their

responsibilities as codified in the Code of Federal Regulations (CFR), where the violation proceedings themselves do not specifically point to a policy measure or data as the driving force. The closest response we can provide to this research question is that the data does suggest that the veracity in which the FCC prioritizes which violations to adjudicate are the result of customer/consumer complaints along with violations that impact public safety.

Research Question 4: Who is being affected by this violation? For our research in this area, we focus on the complainant category we developed. Although we maintained the unique names and complainants for this category, we can investigate these complainants based on their numeric code that was developed for further study. Despite 82.27% of the proceedings leading to an unclear origin of why the FCC investigated the violator, the results of this suggest that categories 6, 7, and 4 (which account for 15.4%) of the other types of complainants. Furthermore, when we accomplished a correlation between the complainant and VioL categories, we can find that…

Our hypotheses resulted in the following findings.

Hypothesis 1: Spectrum interference is a pervasive problem within the telecommunications landscape and these violations occur equally among both pirate radio operators and licensed incumbents. As we observed previously, our hypothesis was dispelled by a couple of our methods.

Hypothesis 2: There is not adequate enforcement coverage to resolve/adjudicate violations in a timely manner. Although we have no clear threshold to establish what a sufficient "timely"

response from the FCC would be, the data suggests that on average it takes the FCC xx years to respond to a violation. Some violations, such as xx, are typically adjudicated within xx days. However, other violations such as xx can take several years. From the excerpt data collected for each of the violation proceedings, we can additionally observe, contextually, that some of the violators were continuing their activities for decades – some of these individuals had previously received communications from the FCC and others may have been once licensed or authorized but failed to renew their license or authorization.

Hypothesis 3: Adjudications and enforcement are unequally asserted towards violators and vary per region/field office. This hypothesis was tested quantitatively, qualitatively, and geographically. All three results inform us that the FCC headquarters accounts for most of the adjudication we observe in the dataset – 62.54%. This is followed by actions adjudicated by the New York (6.49%), Miami(4.01%), and Los Angeles offices (2.02%).

Hypothesis 4: If another mass influx of emerging innovative technologies were to enter the telecommunications landscape, it would overwhelm/exhaust existing enforcement measures and increase the time-to-enforcement. Our response to this hypothesis is anecdotal at best as we were unable to determine concrete examples to analyze or measure this hypothesis. We can, however, glean some insights from our violation category "Unauthorized Deployment and Operation" along with the "Equipment Marketing" and "Jammer Enforcement" violation categories. From these events, we can observe contextually, that the FCC adjudicated violations for technologies that fell outside the scope of their own categorization. However, instead of the FCC expanding or refining their technologies as they were discovered, they maintained the

broadcast and telephone taxonomy. This kind of approach, along with not using their Office of Engineering Technology as a resource for new technologies, provides a gap in being able to be aware, understand, and adjust their enforcement measures for newer technologies entering the telecommunications landscape.

Hypothesis 5: The current enforcement structure does not deter violators from violating. Similar to our insights for Hypothesis 4, we cannot concretely conclude this hypothesis. Yet, we can infer that due to the 7.8% result for repeat violators may suggest that repeat violators is not a top issue for the FCC. However, it is important to note that within the excerpt data, we found that some of these violators had been doing so for decades or have repeated offenses. It is also important to note here that the FCC's new repository for Enforcement Bureau actions appears to have omitted some of the offenses we were able to obtain through our original data collection. This leads us to posit that more investigation in this area would be beneficial to ascertain how and if the FCC's current approach deters violators, or simply has no effect on their actions. Additionally, we found within the data that many of the proceedings question the FCC's jurisdiction. Especially when it pertained to more obscure violations such as florescent lighting unintentionally causing interference to licensed users.

9.0 CONCLUSION

The landscape of telecommunications is changing yet again. A landscape where Congress and stakeholders only needed to consider three means of communications in the early 1900's is now a landscape constrained by the limitations of yesteryear as emerging and innovative technologies continue to enter the market and hence exacerbating challenges that have existed in telecommunications for decades. Furthermore, the inherited responsibilities of the Federal Communications Commission along with the overlapping responsibilities of other independent federal agencies only further promulgates these challenges further as the FCC will continue to maintain oversight for activities that may no longer make sense for the organizations mission and the kind of telecommunications landscape that is on the verge of emerging.

The primary focus of our research is to better understand how telecommunications enforcement mechanisms ensure a level of stability and "harmony" within the landscape to allow our society to benefit from the future innovations that have yet to come. As discussed in the beginning of this dissertation, policy is a "high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body." Regulation is "an authoritative rule while dealing with a procedure." Enforcement, which can be perceived as an attempt to foster obedience of the rules to "constrain or compel" a specific set of behaviors is used in various industries and services. This research has uncovered that some of the top violations that have occurred within our dataset, data collected directly from the FCC, has resulted in decreased and no financial penalty – the primary enforcement mechanism used by the FCC. And although this may be commendable in some sense as it dispels some of the assumptions that the FCC overregulates, these actions raise the question of what is the true benefit of this approach, and does

it support the goals of the policy? Or does this undermine the FCC's regulatory responsibilities? In the 10-year timespan of data analyzed, roughly $2.2 billion in financial penalties were imposed on violators. However, based on the information obtained through FOIA requests, ~218 (5%) of those adjudication decisions are being "repaid". If these financial penalties had been paid as imposed, this may have resulted in additional funding that could have been reinvested into the telecommunications infrastructure, or perhaps aided in the ongoing battle to combat the digital divide. As the 2022 Bipartisan Infrastructure Bill states "more than 30 million Americans live in areas where there is no broadband infrastructure that provides minimally acceptable speeds – a particular problem in rural communities throughout the country." Yet, it is unclear where collected financial penalties get allocated – from the data, many of the proceedings suggest that the money is disgorged to the U.S. Treasury with no indication if any portion of the restitution payments ordered are reinvested into the communities that we're frauded, or consumers who were "slammed" and "crammed" were refunded – among other uses that these penalties could be used for regarding telecommunications matters and challenges.

Another insight we have gathered from our research is the FCC's approach to setting up funds and/or using competition in all facets of communications matters to combat the ongoing challenges may be a sunk cost. Our category for Illegal Receipt of Funds/Fraud accounted for 13.7% of the violation proceedings. The total sum attached to the defrauding of programs that are supposed to provide access and services to underrepresented and underserved communities amount to more than $1.6 billion – this calculation does not account for several of the violations where the financial details regarding the fraudulent funds obtained by violators is undisclosed or vague. Additionally, any restitution these actors are ordered to pay is typically imposed by the court in the home state and not the FCC. The FCC's enforcement mechanism in these cases is to impose

disbarment on these individuals (usually stating that they cannot participate in the program for a designated number of years).

Other violations such a jammer enforcement, broadcast issues - unauthorized operations from both pirate radio and licensed operators operating outside of the scope of their license/authorization, market disputes, broadcast interference, public safety interference, telephone solicitations, EAS information, unauthorized deployment and operation (for services and/or equipment not covered under the FCC's category structure), and equipment marketing (for devices not approved by the FCC) also are among the top violations that result in a $0 financial penalty from the FCC. Which when we reconsider that the FCC's primary enforcement mechanism is to use financial penalties to ensure that stakeholders within the telecommunications landscape are abiding by the policies and regulation – or at least to deter them from violating again in the future, we can infer that a $0 fine from the FCC may not necessarily be the most convincing deterrent.

One could interpret this to be a level of what scholar Sheila Foster would call "regulatory slippage." In her work, *Collective Action and the Urban Commons*, she pens "regulatory slippage," occurs when the level of local government control or oversight of the resource significantly declines, for whatever reason" (Foster 2011). Although she was specifically describing how individuals may take advantage of public good during times of "regulatory slippage", we have an excludability factor when it comes to specific telecommunications services where not just anyone can take advantage of decreased or lack of regulatory oversight – weather real or perceived based on the collected data.

Despite this, only 7.8% (340) of our entities appear to be repeat violators. However, this does not account for parent companies, variations in company or a person's name, etc. as our

model is not case or spelling insensitive. However, one key insight from this approach is the number of violators who constructed, deployed, and operated telecommunications equipment and services such as an earth stations – like very small aperture terminals (VSATs) or terminal doppler weather radars (TDWRs).

An additional interesting finding in our data was that Consumer Telephone-Related Issues is the top violation that occurs within our dataset. This dispels our assumption that broadcast (or spectrum related violations) would be the primary violation occurring. As we inherently assume that telephone related issues are pervasive among all mobile phone users, we did not expect it to be the most observed violation. Additionally, when we specifically investigate our assumed highest violation, spectrum interference, they only accounted for 2.9% of our dataset as shown below. Yet despite this, proceedings against pirate radio operators accounted for 14.6% of the violations the FCC focused on adjudicating.

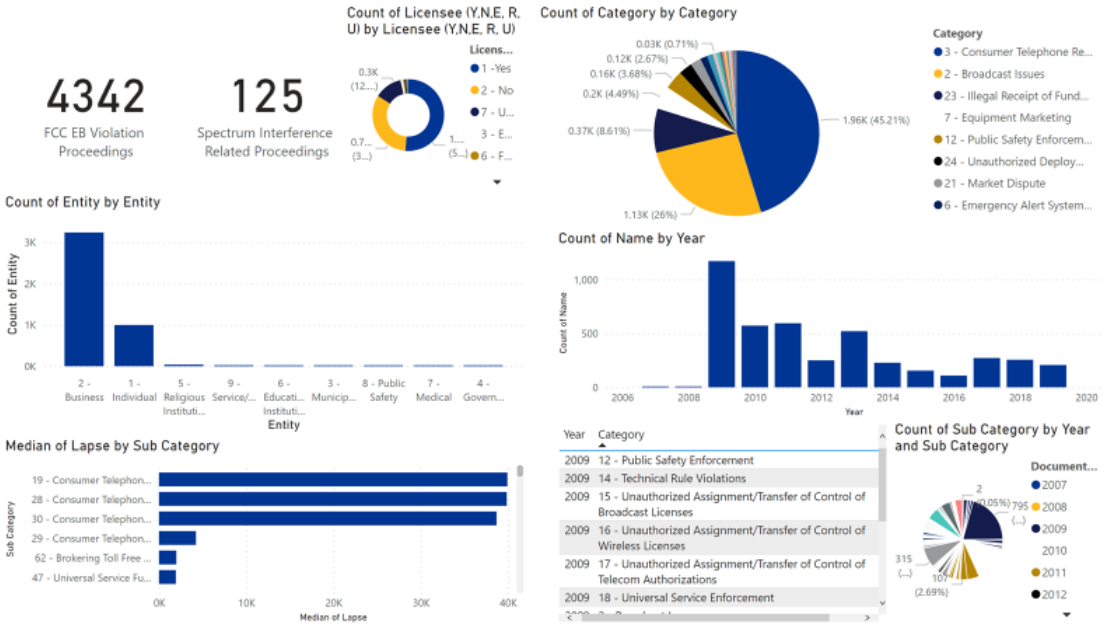


Figure 72 Overview of FCC EB Data 2009 - 2019

When investigated more closely, violations pertaining to do not call (23.8%) , solicitations (19.33%) , robocalls (17.84%) , and slamming (11.15%) account for the top violations in the Consumer Telephone Related Issues category.

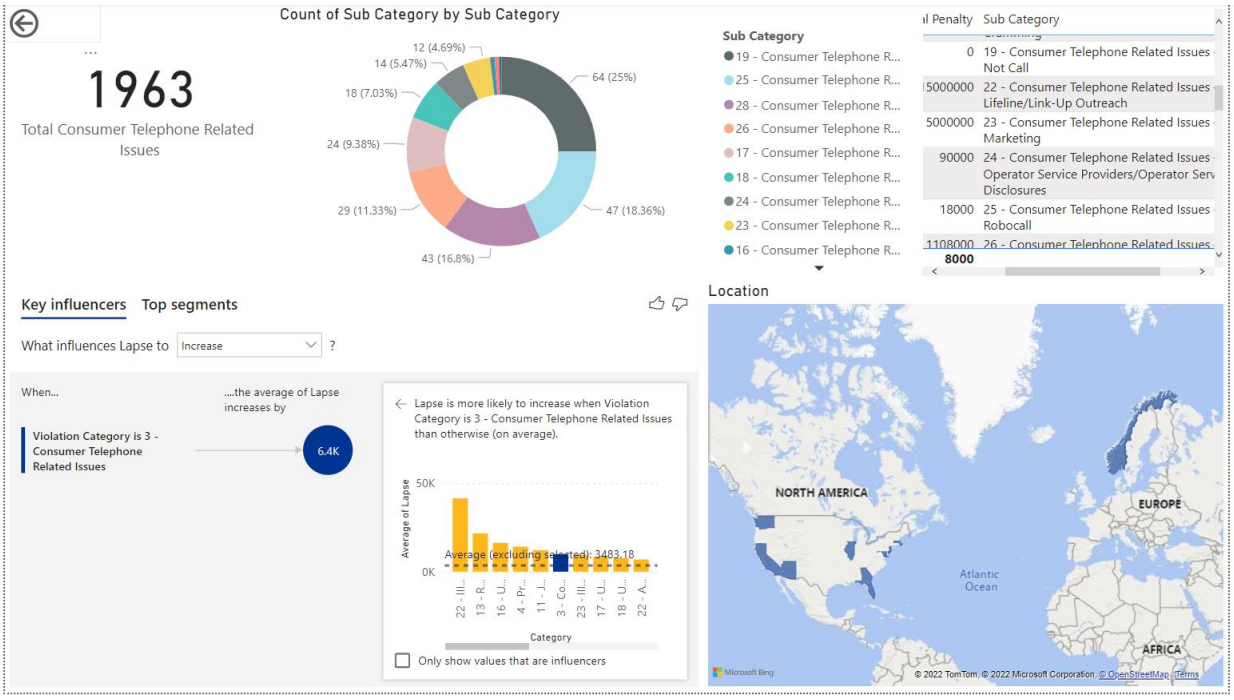


Figure 73 Overview of Consumer Telephone -Related Issues 2009 - 2019

Conversely, when we investigate the Broadcast Issues category in more detail, unauthorized operations do account for many of the violations in this category. However, our findings dispel our hypothesis that it pirate radio is the most pervasive violation occurring in the spectrum landscape. According to the data, it appears that although Broadcast Issues, and more specifically, Unauthorized “Pirate” Stations is included in the top violations of note. In the below series of graphs, Figure 43, we observed that pirate stations account for 56.6% of the violations under the Broadcast Issues violation category. Moreover, we also see other types of unauthorized operations occurring.

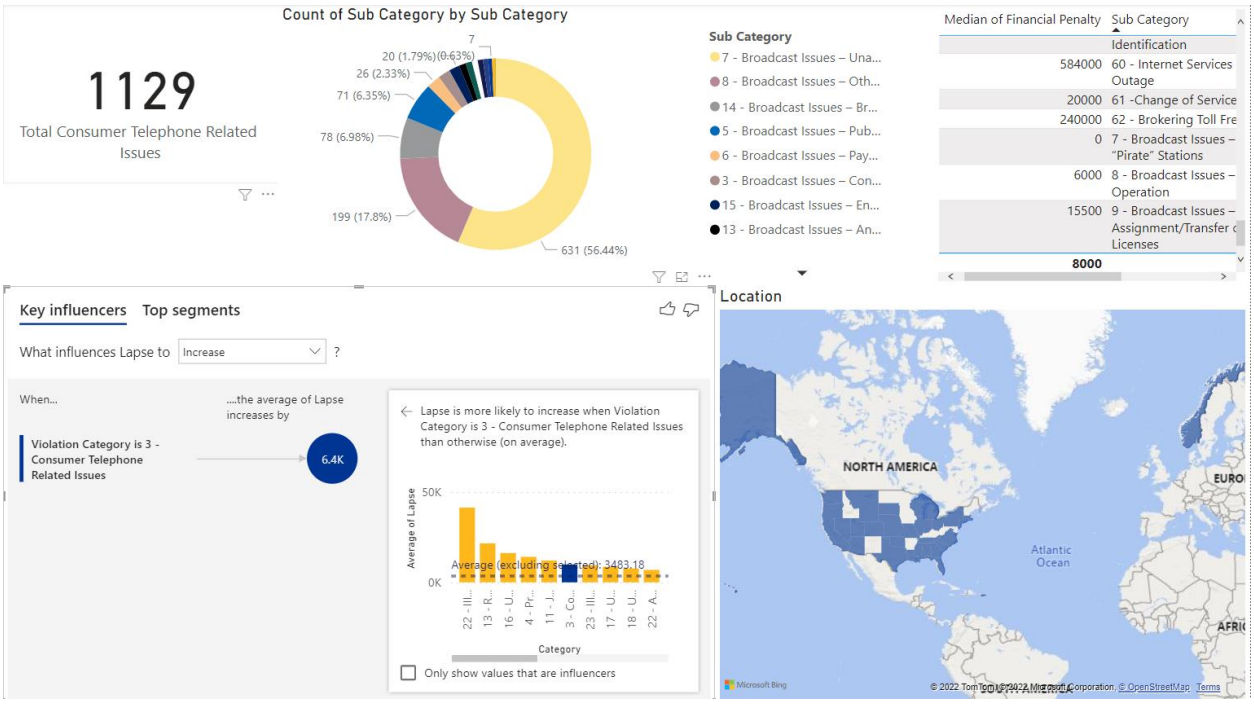


Figure 74 Overview of Broadcast Related Issues 2009 - 2019

As discussed previously, for the purposes of this research we discern between unauthorized operations of any kind and acts that resulted in interference. Due to distinguishing the violations in this way, we are then able to posit that actual interference, spectrum or otherwise, only account for 3.15% of the violations (broadcast interference (1.83%), general interference complaints (0.49%), public safety interference (0.38%), and U-NII and TDWR interference (0.45%)).

Table 8 Interference Sub-Catagory FCC EB Data 2009 – 2019

Sub Category	Count of Sub Category
14 - Broadcast Issues – Broadcast Interference	78
45 - Technical Rule – Interference Complaints	21
48 - U-NII and TDWR Interference	19
43 - Public Safety Enforcement – Public Safety Interference	16
Total	**134**

Furthermore, when we review our collected data spatially using the geodata collected during the curation phase, we can see that the violations are occurring both domestically and internationally. We can discount the violations showing in Norway as those violations have been coded as “no location available” which for some reason points to Dovre National Park in Norway.

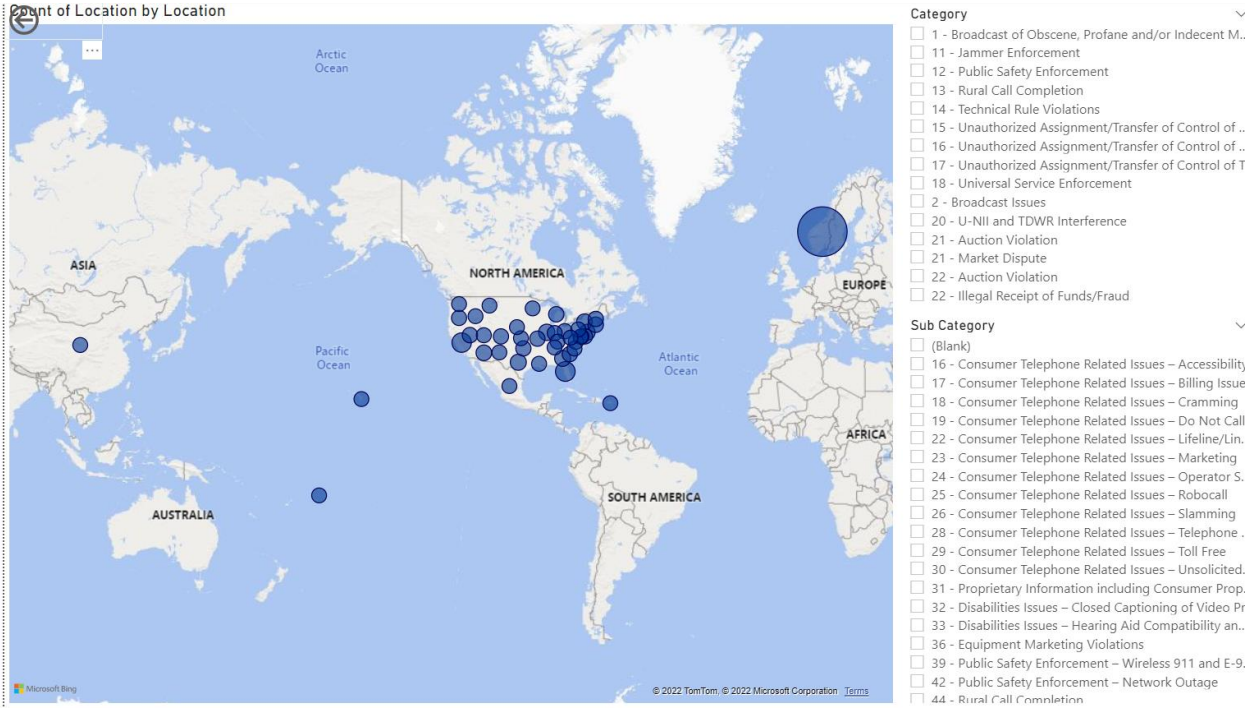


Figure 75 GIS Dashboard FCC EB Data 2009 – 2019

Our findings as they pertain to repeat violators uncovered interesting results, however, additional research would be beneficial to determine whether the named violator indeed violated multiple times or if they had multiple proceedings pertaining to the same violation. As shown in Figure 45, roughly 7.8% of the entities within our data appear to be repeat or recurring violators.

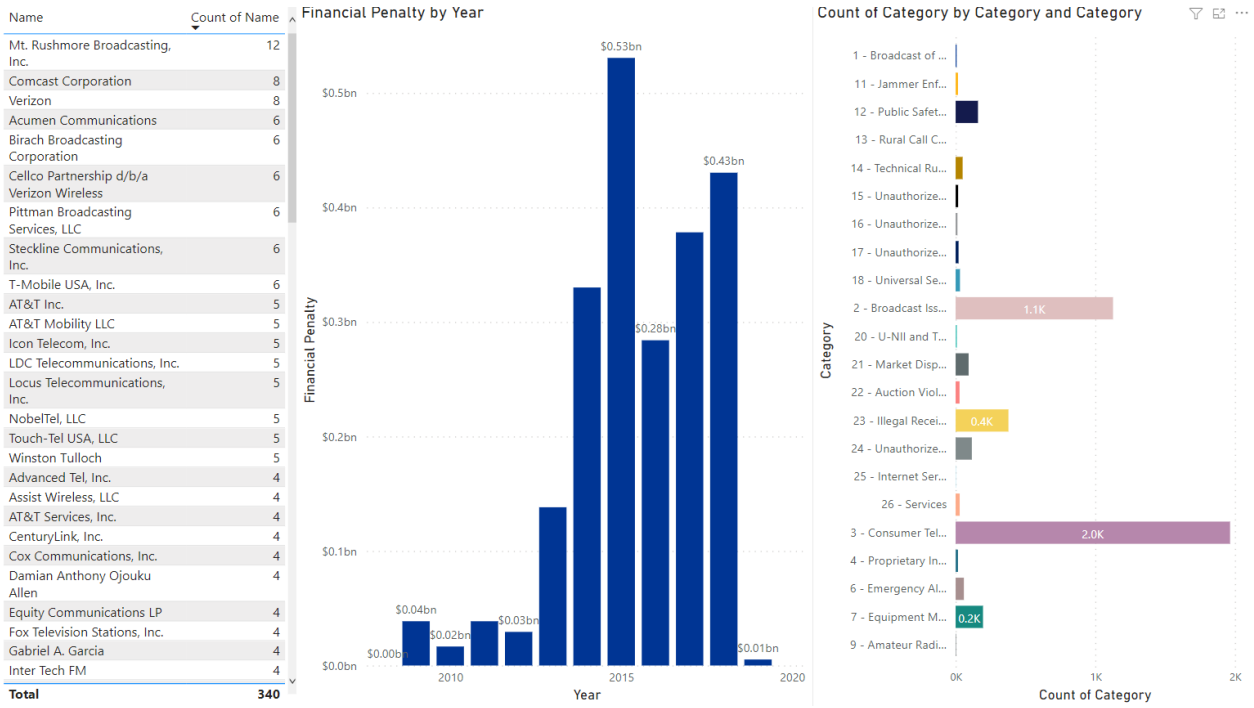


Figure 76 Possible Repeat Violators FCC EB Data 2009 - 2019

9.1 EFFECTIVENESS OF ENFORCEMENT

Based on the findings of our research, we observed that the FCC's primary means for enforcement is using financial penalties, civil monetary forfeitures, and voluntary fines – monetary sanctions. However, information obtained through our FOIA request (FCC-2021-000347) highlighted that 2% of notice of apparent liabilities (NALs) – which are often financial penalties, and 3% of civil monetary penalties were actively being paid as of 2021 when compared to our data. Furthermore, according to the government accountability office (GAO) "some authorities collect fees, fines and penalties specify that the funds will be deposited to the Treasury as miscellaneous receipts. These funds are not dedicated to the agency or program under which they were collected; they are used for the general support of federal government activities" (GAO 2016)

to which FCC fees are mentioned as an example of this; however, the fines and penalties are not clearly articulated to which our data suggests that if in the event the money is collected is also to be deposited to the U.S. Treasury. A non-criminal alternative, enforcement by way of monetary sanctions can yield benefits for the American economy and infrastructure as well as serve as a flexible approach to the FCC as an alternative to imprisonment (to which our research did not appear to render any cases where the FCC imposed such an enforcement action). Yet is important to note that despite the benefits and flexibility of the FCC's non-criminal approach, their enforcement would require more than ~5% of the financial penalties imposed to be recouped, which our research does not indicate often happens.

When we consider the work of Shavell, mentioned previously in terms of the *Dimensions of Enforcement* figure in Chapter 4, he further devised three basic dimensions of enforcement: 1) a stage of legal intervention (timing), 2) form of sanctions (monetary and non-monetary), and 3) private versus public enforcement (FCC complainants or EB field agents generated activities). When we compare against our research, where we deviate from Shavell's taxonomy of what is considered "harmful", we observe from our findings that the FCC's approach to enforcement, when abuts against Shavell's framework, we observe that legal intervention from the FCC often takes a year or more, sanctions are mostly monetary in nature – which are not often paid, and that private actors are usually the cause for FCC intervention and subsequent resolution. Furthermore, our refinement to better assess harm, not based on "indirect effects" has allowed us to also observe that enforcement of majority of these violations are administrative in nature (i.e., required reports to the FCC), where what we deem as harmful (resulting in loss of life and/or limb) occurs sporadically in our dataset and are typically indicators of a violation regarding the Federal Aviation Administration (FAA) due to unlit antennas. Yet, based on our findings, can we deem the FCC's

enforcement approach as "effective"? Based on Shavell's *Determinants of the Optimal Stage of Intervention*, we surmise it is not. This is due to several factors, but we will focus primarily on three. First, despite the magnitude of sanctions available at the FCC's disposal, monetary sanctions are rarely recouped therefore rendering the financial hardship/threat lowered as a deterrent for undesirable behaviors - violations. Where Shavell considers wealth and a monetary sanction equal to that wealth will less likely be a deterrent for undesirable behavior, we have learned through our research that the FCC considers "lack of wealth" – or the ability to show the financial inability to pay - which often results in a significant decrease in the financial penalty – and even sometimes results in the dismissal of the monetary sanction altogether. Therefore, we then consider if the threat of enforcement is enough to deter undesirable behaviors (i.e., violations), and interestingly the data analyzed suggests the need for additional research. Our initial findings suggests that the threat alone may be sufficient due to the lack of "repeat offenders" (~7%), however, additional study on the content to ascertain what duration some of the violators were engaging in these undesirable behaviors may be of future benefit. Second, we consider the *Expected Acts of Harmfulness*. Based on our schema where we categorize the "impact" of a violation based on whether it is deadly (possible loss of life and/or limb), compromises/ is a threat to national security, harmful (diminishes capacity for public safety operations), damaging (can tentatively cause financial ruin), operational risk, communal harm, end user disruption, undue hardship, disruption of operations, and administrative, we observed that our expected level of "harmfulness" is most often administrative in nature. Thirdly, and lastly, we consider the *Probability of Prevention or of Application of Sanctions*. Our predictive model has indicated that although some financial penalties may be imposed when we observe the correlation between financial penalties and violation categories, the monetary sanctions – financial penalties – ultimately result in a zero-dollar

amount over time providing that there is an increased likelihood that most violation categories will result in no financial penalty in the future.

9.2 NEW POLICIES FORESHADOWING THE FUTURE OF REGULATION AND ENFORCEMENT

Recently adopted policies such as the PIRATE Act and "new" initiatives of the FCC (i.e., Digital Discrimination, Broadband Accountability, Homework Gap and Connectivity Divide, Broadband Data Collection, 5G, Robocalls and Spoofing, and Telehealth) are more of the same marquee telecommunications challenges that have been broached my FCC Chairpersons past. As our research has indicated, "pirate" radio operations do not often result in interference, which is typically hypothesized as the driver to "crack down" on these operations. The new $2M maximum fine is ill-advised for these types of violations for two reasons. Firstly, the FCC often decreases the fines for this violation type to $0 due to "pirate" operator's inability to pay. Secondly, most unlicensed operations in broadcast pose a threat to operational risk more so than it does any "true harm" based on our taxonomy. Actual harmful activities, such as unlit antenna structures, illegal deployment, and operation of satellites, etc. are more severe violations that with the new law and FCC initiatives have the likelihood of continuing to benefit from "regulatory slippage".

Emphasis on "marquee" telecommunications challenges such as unauthorized "pirate radio" operations, access to broadband, and robocalls, rarely get at the "heart" of the real issue. If the concern with "pirate" radio is interference, then why does the FCC not apply the same verve and gusto with florescent lighting and other equipment that the FCC data proves is more likely to cause interference. For broadband, the FCC EB data suggests that issue to broadband connectivity

-and the digital divide at large – is the fraudulent actors who are syphoning the funds for personal gain rather than spending the money obtained by the FCC on the communities that desperately require affordable, accessible, and accelerated speeds of access. Lastly, the issue concerning robocalls has relied on service providers to respond and combat and with each "new initiative" to combat this issue, there is very rarely an alternative that places a solution or more readily available complainant method in the hands of the end-users who are receiving the nuisance calls.

10.0 FUTURE WORK

The research accomplished for this dissertation is a first of its kind exploration into the Federal Communications Commission's Enforcement Bureau and how the independent federal agency adjudicates telecommunications violations. When we consider one of the motivations of this research, automated enforcement, under the perspective of the research we accomplished within this work, we feel as though it would be beneficial that the approaches and taxonomies developed would lend themselves to some sort of systems requirement for an automated approach that would connect the FCC (as a receiver of complaints) to end users instead of relying on service providers to report the gaps and challenges within the telecommunications landscape (for example form 477 where providers report what areas are lacking in broadband instead of connecting directly with the communities that have continued to be without broadband). We understand that a solely automated approach would not be wholly sufficient as it pertains to individuals without connectivity/access. To that end, future work may include strengthened partnerships and interagency coordination among the FCC and the United States Postal Service – if there are even still locations that have not been shut down due to lack of agency funds. However, an alternative to enhance both public knowledge and access to lodge complaints for those lacking sufficient connectivity may be a campaign and/or ongoing partnerships with libraries within local communities to provide access, affordability, knowledge, and an avenue to provide complaints to the FCC about any of the violations that impact whether it be fraud, unsolicited communications, or access.

For the automated component, an app-based approach may prove beneficial to forward robocalls that the FCC has continuously attempted to combat but has mostly relied on

telecommunications providers to triage with no actual success. One such example of a possible app is that shown in figure 76.

1. Refine the dataset further and expand using application programming interfaces (APIs)
2. Provide visibility and updated resources for public knowledge and reporting
3. Automate this process using machine learning or an alternative approach to reduce hardcoding
4. Compare U.S. violation proceedings with similar international telecommunication agencies

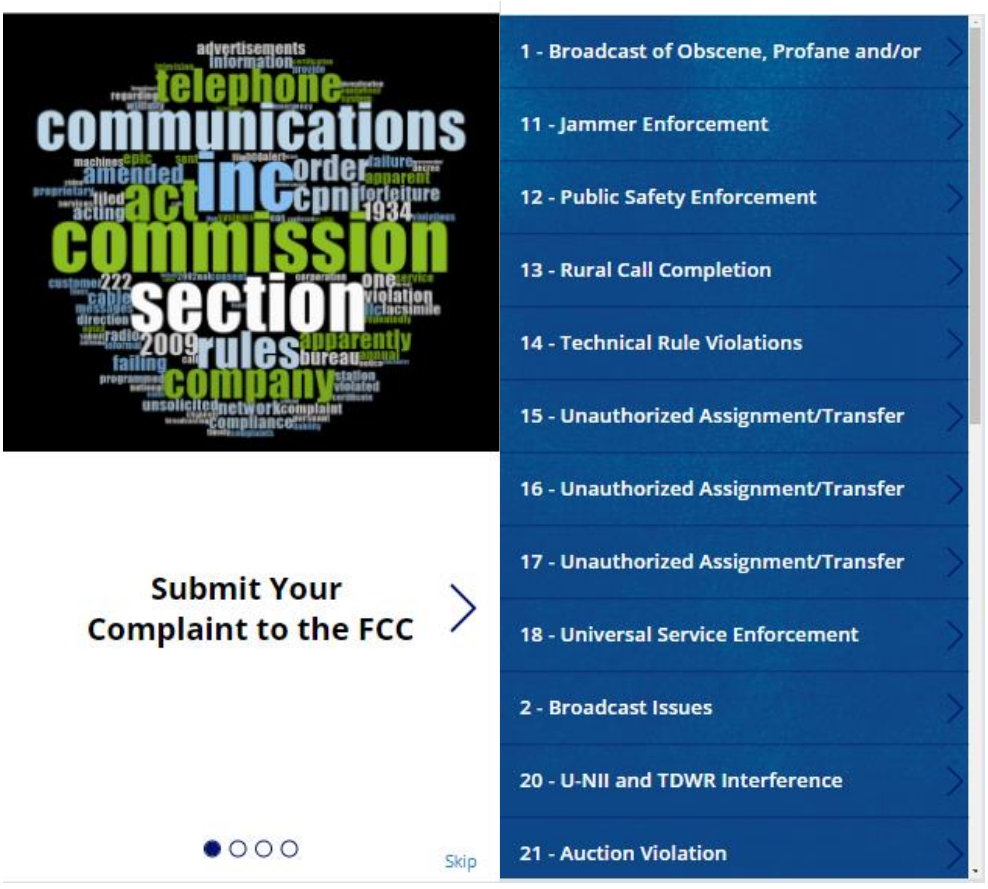


Figure 77 Complaint Submission Recommendation

Additionally, the dataset for our research can also be refined and analyzed further. For the purposes of our research, we approached a high-level view to better understand the current state of how the FCC adjudicates violations that fall within their purview, however, it would be of additional benefit sub-set, or review each of the 62 identified subcategories further to "drill down" on if there is any variability or common themes pertaining to enforcement within each sub-category violation. Originally, our work focused on 20 years of FCC adjudication, yet, to further refine our study based on the newly developed taxonomies, we recategorized and then focused on the last 10 years' worth of data in our curated dataset to accomplish our analysis. A similar study encompassing the entire 20-year corpus of data and expanding to more of the present-day violations could glean additional insights to if the findings we observed within our research are held constant or shift over time, based on the availability of FCC EB field agents, or even by geographical location.

Our findings yielded that majority of the violations observed can be considered "administrative" violations. We then consider if there are other external factors we need to consider if these kinds of violations are "low hanging fruit" and simpler to adjudicate due to the FCC EB 's declining workforce, or if they are simply faster to adjudicate because they are a more frequent type of violation that the FCC "comes across in the field." As previously mentioned, it can often take a year or more for the FCC adjudicate a single violation proceeding. With this in mind, additional research focusing more on the causality to why the FCC investigates certain complaints over others may be beneficial.

APPENDIX A FCC CORRESPONDENCE & FOIA REQUESTS

In 2018 I submitted Freedom of Information Act (FOIA) requests to obtain additional information that was not readily available (or searchable) from the FCC website. One request was submitted to obtain additional enforcement bureau record information prior to 1999, this request is still unfulfilled. The second request was for the organizational charts, shown below, to better ascertain the increase – or decrease – of the FCC enforcement bureau throughout the years.

Thu 1/18/2018 9:59 AM
To: Rose, J. Stephanie

This message is to confirm your request submission to the FOIAonline application: View Request. Request information is as follows:

- Tracking Number: DOC-NTIA-2018-000594
- Requester Name: J. Stephanie Rose
- Date Submitted: 01/18/2018
- Request Status: Submitted
- Description: Researching radio spectrum regulation and enforcement for commercial and federal users. Requesting declassified information pertaining to regulation, allocation, and enforcement from 1912 - 2017. This information can include, but is not limited to white papers, senior leadership decisions/ allocation, and/or charts. Any guidance or information you can provide will be greatly appreciated. Thank you in advance for your time and assistance.

Reply | Forward

Figure 78 FOIA Request DOC-NTIA-2018-000594 Submitted 18 JAN 18

Subject: RE: Freedom of Information Act Request - Federal Spectrum Regulation

Ms. Rose:

The National Telecommunications and Information Administration (NTIA) is in receipt of this FOIA request. NTIA has assigned the request the following number for tracking purposes: NTIA FOIA 18-019.

Before NTIA can proceed with the request, we are required to obtain a current mailing address or PO box. 15 CFR 4.4.(a). It looks like the mailing address in your email signature is incomplete because it is missing at least a street address and zip code. Please provide a complete mailing address. We need your mailing address before we can consider your request perfected.

In your request, you are seeking the following records:

> Declassified information pertaining to regulation, allocation, and enforcement from 1912 - 2017. This information can include, but is not limited to white papers, senior leadership decisions/ allocation, and/or charts.

NTIA notes that certain information is publicly available regarding federal radio frequency management. For example, NTIA makes available on its website the Manual of Regulations and Procedures for Federal Radio Frequency Management (Redbook). See https://www.ntia.doc.gov/page/2011/manual-regulations-and-procedures-federal-radio-frequency-management-redbook. NTIA makes available on its website links to federal spectrum usage summaries and the U.S. Table of Allocations. See https://www.ntia.doc.gov/other-publication/2017/federal-government-spectrum-compendium. In addition, NTIA's Institute for Telecommunication Sciences publishes technical reports and other papers that might be helpful to your research. Many of these publications have been digitized and made available as far back as 1939. See https://www.its.bldrdoc.gov/publications/browse-publications.aspx. Other resources that may help your research are available on the NTIA website at https://www.ntia.doc.gov/category/spectrum-management. The National Archives and Records Administration (NARA) may have some of the historical information you are seeking; consider searching for the Interdepartment Radio Advisory Committee (IRAC) on the NARA website at https://www.archives.gov/. NTIA has, according to its records retention responsibilities, provided certain IRAC records to NARA, which includes many unclassified historical records, meeting minutes, etc., dating back prior to NTIA's formation in 1978.

Please review this information that is available free of charge on the Internet as it may satisfy your request. If it does not, please consider modifying your request based on the information you find from this publicly available information to ask for specific NTIA records. For example, if you cannot find a document that is cited in one of the publicly available records, you can request that specific record from NTIA.

While we await your response, NTIA will hold further processing of this FOIA request. At this stage, NTIA has deemed the request as unperfected to await your address and clarification. If NTIA does not hear from you within 30 days of this email, NTIA will close the request administratively.

Figure 79 RE: Freedom of Information Act Request - Federal Spectrum Regulation 18 Feb 18

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

February 13, 2018

Ms. J. Stephanie Rose
PhD Student, Informatics and Networked Systems
School of Computing & Information
University of Pittsburgh
Rm 601 A
JSR67@Pitt.edu

Re: OSTP-FOIA-18-045

This letter acknowledges a Freedom of Information Act (FOIA)[1] request submitted to the Office of Science and Technology Policy (OSTP) on January 18, 2018. Specifically, the request sought "documents pertaining to federal [spectrum] interference enforcement" and "spectrum allocation charts from 1912 – 2017."

In accordance with the FOIA, OSTP uses a multitrack processing system when reviewing FOIA requests.[2] Requests within each track are processed on a "first-in, first-out" basis.[3] Track one is for "requests of simple to moderate complexity that are expected to be completed within 20 working days."[4] Track two "is for requests involving 'unusual circumstances,' . . . that are expected to take more than 20 working days to complete."[5] Requests that seek and receive expedited processing are prioritized above each of the aforementioned tracks and "OSTP may take [such] requests out of order" to process them more quickly.[6] To qualify for expedited processing, one of the following compelling needs must be met:

1) That failure to obtain requested records on an expedited basis could reasonably be expected to pose an imminent threat to the life or physical safety of any individual; or

2) That a request is made by a person primarily engaged in disseminating information, and the person establishes that there is an urgency to inform the public concerning actual or alleged Federal Government activity.[7]

This request is designated as a track one request. At this time, however, there are several pending requests that were received prior to the instant request. Accordingly, it is anticipated that

[1] 5 U.S.C. § 552.
[2] 5 U.S.C. § 552(a)(6)(D); 32 C.F.R. § 2402.5(c).
[3] 32 C.F.R. § 2402.5(c).
[4] *Id.* at § 2402.5(c)(1).
[5] *Id.* at § 2402.5(c)(2).
[6] *Id.* at § 2402.5(d).
[7] *Id.* at § 2402.5(d)(i)-(ii).

Federal Communications Commission
Washington, D.C. 20554

February 27, 2018

Via email to jsr67@pitt.edu
Ms. J. Stephanie Rose
University of Pittsburgh
135 N. Bellefield Ave., Suite 601A
Pittsburgh, PA 15213

Re: FOIA Control No. 2018-000402

Ms. Rose:

This letter responds to your Freedom of Information Act (FOIA) request for:

> The FCC EB database only shows actions as far back as 1999. I am requesting any and all enforcement bureau adjudication actions (e.g. NOVs, NOUO, NALs, etc.) from 1912-1999.

Your request has been assigned FOIA Control No. 2018-000402.

The Enforcement Bureau searched for responsive records. The search produced no records responsive to your request. The Enforcement Bureau was established in 1999, so there are no responsive records prior to the establishment date. *See In the matter of Establishment of the Enforcement Bureau and the Consumer Information Bureau,* Order, 14 FCC Rcd 17924 (1999) (attached).

We are required by both the FOIA and the Commission's own rules to charge requesters certain fees associated with the costs of searching for, reviewing, and duplicating the sought-after information.[1] To calculate the appropriate fee, requesters are classified as: (1) commercial use requesters; (2) educational requesters, non-commercial scientific organizations, or representatives of the news media; or (3) all other requesters.[2]

Pursuant to section 0.466(a)(8) of the Commission's rules, you have been classified for fee purposes as category (3), "all other requesters."[3] As an "all other requester," the Commission assesses charges to recover the full, reasonable direct cost of searching for and reproducing records that are responsive to the request; however, you are entitled to be furnished with the first 100 pages of reproduction and the first two hours of search time without charge under section 0.470(a)(3)(i) of the Commission's rules.[4] The production did not involve more than 100 pages of duplication and took less than two hours of search time. Therefore, you will not be charged any fees.

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[1] *See* 5 U.S.C. § 552(a)(4)(A), 47 C.F.R. § 0.470.
[2] 47 C.F.R. § 0.470.
[3] 47 C.F.R. § 0.466(a)(8).
[4] 47 C.F.R. § 0.470(a)(3)(i).

Federal Communications Commission
Washington, D.C. 20554
Enforcement Bureau

April 10, 2018

Via E-mail to: jsr67@pitt.edu
Ms. J. Stephanie Rose
University of Pittsburgh
135 N. Bellefield Ave., Suite 601A
Pittsburgh, PA. 15213

In re: FOIA Control No.: 2018-494

Dear Ms. Rose:

This letter responded to your Freedom of Information Act (FOIA) request for FCC Enforcement Bureau organizational charts from 1999 - 2016. The Office of Management and Resources (OMAR) searched for responsive records. We located and have produced 13 pages responsive to your request (copy attached). For future reference this information is publicly available on FCC.gov at the following link: https:transition.fcc.gov/eb/orgchasrt18.pdf.

Pursuant to section 0.466(a)(5) - (7) of the Commission's rules, you have been classified as category (2), "educational requesters, non-commercial scientific organizations, or representative of the news media," the Commission assessed charges to recover the cost of reproducing the records requested, excluding the cost of reproducing the first 100 pages. The production in response to your request did not involve more than 100 pages of duplication. Therefore, you will not be charged any fees.

If you consider this to be a denial of your FOIA request, you may seek review by filing an application for review with the Office of General Counsel. An application for review must be received by the Commission within 90 calendar days of the date of this letter You may file an application for review by mailing the application to Federal Communications Commission, Office of General Counsel, 445 12th At. SW., Washington, DC 20554, or you may file your application for review electronically by e-mailing it to FOIA-Appeal@fcc.gov. Please caption the envelope (or subject line, if via e-mail) and the application itself as "review of Freedom of Information Action."

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

December 2, 2019

Stephanie Rose
PhD Student, Informatics and Networked Systems
School of Computing & Information
University of Pittsburgh
Room 601 A
JSR67@Pitt.edu

Re: OSTP-FOIA-18-045

Dear Ms. Rose:

This letter is in response to a Freedom of Information Act (henceforth "FOIA")[1] request submitted to the Office of Science and Technology Policy (hereinafter "OSTP") on January 18, 2018. The request specifically sought:

- "[D]ocuments pertaining to federal [spectrum] interference enforcement" and "spectrum allocation charts from 1912-2017."

OSTP FOIA is currently reviewing our backlog FOIA requests and would like to know if you are still interested in obtaining the information requested above. Please respond within 30 days from the date of this letter, so we can add your request to the list of backlog requests scheduled for processing. If we have not heard from you by the deadline, we will proceed on the basis that you are no longer interested in the request and will administratively close the request. If the request is administratively closed, you can ask for the request to be re-opened in writing either: 1) via e-mail to OSTPFOIA@ostp.eop.gov; or 2) by mail to the Chief FOIA Officer, Office of Science and Technology Policy, Eisenhower Executive Office Building, 1650 Pennsylvania Ave., NW., Washington, DC 20504. In your letter, please specify OSTP Control No. **18-045.** Additionally, you can submit a new FOIA request for the information above.

Finally, requesters also have the right to seek dispute resolution services from OSTP's FOIA Public Liaison or the Office of Government Information Services (hereinafter "OGIS"). To employ these services, please contact Nicholas Wittenberg via telephone at (202) 456-4444 or by e-mail at OSTPFOIA@ostp.eop.gov. If you would prefer to contact OGIS, you may do so in any of the following ways:

Office of Government Information Services
National Archives and Records Administration

[1] 5 U.S.C. § 552.

Subject: FOIA 2020-000450

Ms. J. Stephanie Rose
University of Pittsburgh
135 North Bellefield Ave.
Suite 601A
Pittsburg, PA 15213

Dear Ms. Rose:

The above-referenced request, filed under the Freedom of Information Act ("FOIA"), was received by our FOIA Control Office on April 29, 2020. In your request, you seek "records for financial penalties and other financial forfeitures for telecommunications violations (e.g. spectrum interference, slamming and cramming antenna infractions, etc.)." You also seek information about "how many of the fines have been paid" and seek documents from October 1, 1999 to October 31, 2019.

We are in the process of locating the documents responsive to your request. As required, we endeavor to respond to FOIA requests within 20 working days. However, where a request involves either a large number of documents or requires coordination with other components of the agency, we occasionally require the ten working day extension provided for in 5 U.S.C. § 552(a)(6)(b)(I). Because your request requires consultation with other components of the Commission, we are extending the deadline for our response by ten working days, *i.e.*, to June 11, 2020. *Id.*

If you have any questions regarding this matter please contact me at 202-418-0977. Thank you.

Sincerely,

Figure 80 Re: FOIA 2020-000450 27 May 2020

Federal Communications Commission
Washington, D.C. 20554

June 15, 2020

Via email to: jsr67@pitt.edu
Ms. J. Stephanie Rose
135 N Bellefield Ave
Suite 601A
Pittsburgh, PA 15213

Re: FOIA Control No. 2020-450

Ms. Rose:

This letter responds to your Freedom of Information Act (FOIA) request which seeks:

> Records for financial penalties and other financial forfeitures for telecommunications violations (e.g. spectrum interference, slamming and cramming, antenna infractions, etc.). Additionally, is it possible to find out how many of the fines have been paid? Documents requested span the timeframe from 01 October 1999 - 31 October 2019.

Your request has been assigned FOIA Control No. 2020-450.

As we discussed, records for financial penalties and other financial forfeitures are publicly available on the Commission's website. The Enforcement Bureau also searched for records of the fines that have been paid. We do not track payments for "telecommunications violations." The Commission records payments that it receives, but does not correlate payment to a specific type of violation. Therefore, the search produced no additional records responsive to your request.

We are required by both the FOIA and the Commission's own rules to charge requesters certain fees associated with the costs of searching for, reviewing, and duplicating the sought after information.[1] To calculate the appropriate fee, requesters are classified as: (1) commercial use requesters; (2) educational requesters, non-commercial scientific organizations, or representatives of the news media; or (3) all other requesters.[2]

Pursuant to section 0.466(a)(8) of the Commission's rules, you have been classified for fee purposes as category (3), "all other requesters."[3] As an "all other requester," the Commission assesses charges to recover the full, reasonable direct cost of searching for and reproducing records that are responsive to the request; however, you are entitled to be furnished with the first 100 pages of reproduction and the first two hours of search time without charge under section 0.470(a)(3)(i) of the Commission's rules.[4] The production did not involve more than

[1] *See* 5 U.S.C. § 552(a)(4)(A), 47 CFR § 0.470.

[2] 47 CFR § 0.470.

[3] 47 CFR § 0.466(a)(8).

[4] 47 CFR § 0.470(a)(3)(i).

Federal Communications Commission
Washington, D.C. 20554
April 09, 2021

VIA ELECTRONIC MAIL
J. Stephanie Rose
135 N Bellefield Ave., Suite 601A
Pittsburgh, PA 15213
jsr67@pitt.edu

Re: FOIA 2021-000346 and FOIA 2021-000347

Dear Ms. Rose:

This letter responds to your Freedom of Information Act (FOIA) requests, each filed on March 26, 2021. In FOIA 2021-000346 you requested "the Notice of Apparent Liability (NAL) Report,"[1] and in FOIA 2021-000347 you requested the "the Civil Monetary Penalty Report for all years in which this report is generated."[2] Your requests were aggregated for fee purposes because of the similarity of the information requested,[3] and assigned to the Office of the Managing Director (OMD).

Per your requests, OMD Financial Operations searched for responsive records. We disclose two reports in full without redaction.

We are required by both the FOIA and the Commission's own rules to charge requesters certain fees associated with the costs of searching for, reviewing, and duplicating the sought after information.[4] To calculate the appropriate fee, requesters are classified as: (1) commercial use requesters; (2) educational requesters, non-commercial scientific organizations, or representatives of the news media; or (3) all other requesters.[5]

Pursuant to section 0.466(a)(8) of the Commission's rules, you have been classified for fee purposes under category (3) as an "all other requester."[6] As an "all other requester," the Commission assesses charges to recover the full, reasonable direct cost of searching for and reproducing records that are responsive to the request; however, you are entitled to be furnished with the first 100 pages of reproduction and the first two hours of search time without charge under section 0.470(a)(3)(i) of the Commission's rules.[7] The production in response to your request required less than two hours of search time, and is provided in electronic form. Therefore, you will not be charged any fees.

If you consider this to be a denial of your FOIA request, you may seek review by filing an application for review with the Office of General Counsel. An application for review must be *received* by the Commission

[1] FOIA 2021-000346 (filed March 26, 2021).

[2] FOIA 2021-000347 (filed March 26, 2021).

[3] 47 CFR § 0.470(b)(2).

[4] *See* 5 U.S.C. § 552(a)(4)(A); 47 CFR § 0.470.

[5] 47 CFR § 0.470.

[6] 47 CFR § 0.466(a)(8).

[7] 47 CFR § 0.470(a)(3)(i).

Federal Communications Commission
Enforcement Bureau
Washington, D.C. 20554

April 22, 2021

Via E-mail to: jsr67@pitt.edu
J. Stephanie Rose
University of Pittsburgh
135 N. Bellefield Ave., Suite 601A,
Pittsburgh, PA 15213

Re: FOIA Control No. 2021-000348

Dear Ms. Rose:

This letter responds to your Freedom of Information Act (FOIA or Act) to the Federal Communications Commission, FOIA Control No. 2021-000348. Your request seeks:

> "Enforcement Bureau Tracking System (EBATS) report. All EB activity from the systems inception through present 2021."[1]

Your request was assigned to the Enforcement Bureau (Bureau) for response. In a subsequent conversation with Bureau staff, you indicated that you seek information and internal documents that explain how the Bureau selects which substantive areas to investigate.

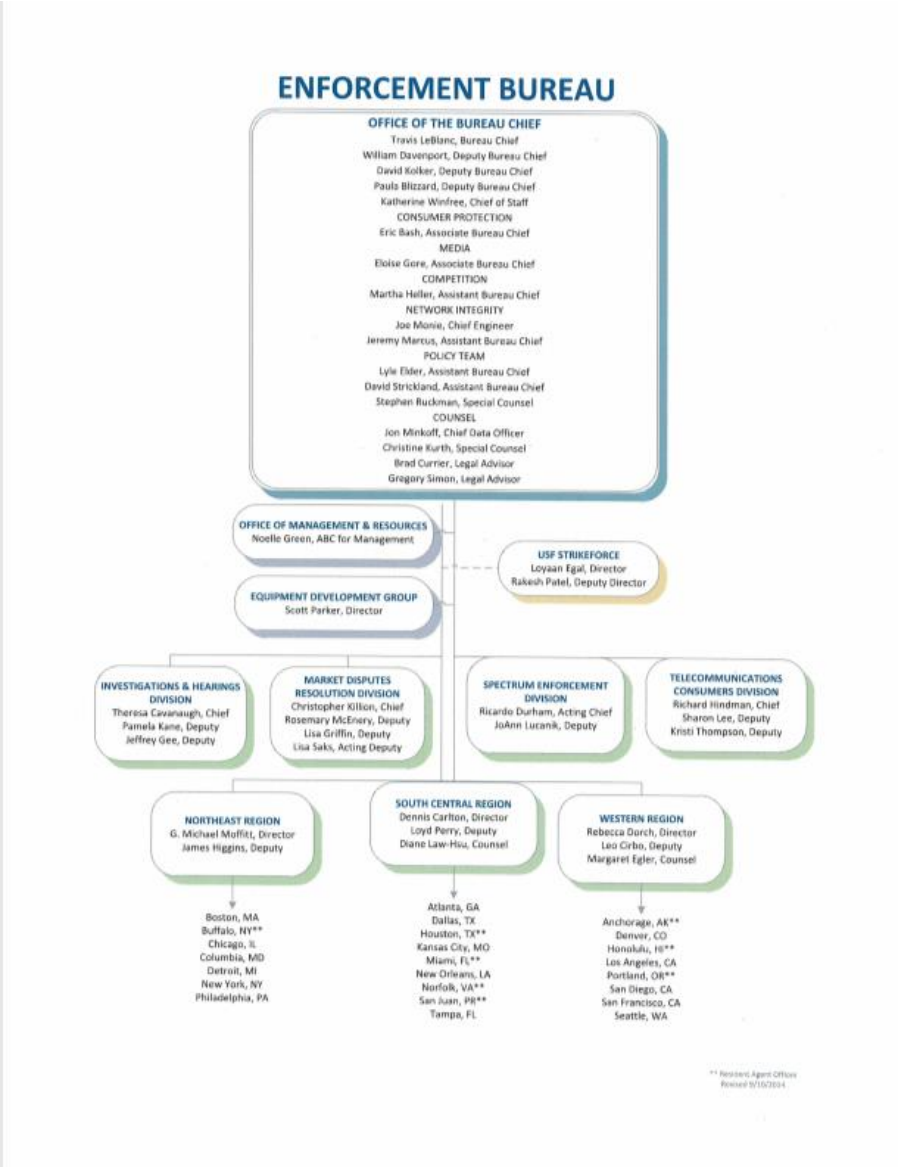
For the reasons set forth below, we deny your request. The Bureau maintains no "Enforcement Bureau Tracking System (EBATS) report" and, upon conducting a search, we located no records that would be so described. To the extent that you seek the entire EBATS database, information related to the Commission's exercise of its enforcement discretion is protected under numerous FOIA exemptions, as explained briefly below. Producing all non-exempt information contained in EBATS, by definition would disclose only information unrelated to that which you seek and, moreover, would be unduly burdensome to the agency. Should you be interested in a more limited subset of information contained in EBATS or elsewhere in our records, you may file another request at any time. Any such requests would be evaluated independently with respect to the material being requested and the applicability of any FOIA exemptions.

As a general matter, and with respect to your current request, internal records contained in EBATS are protected under FOIA Exemption 5.[2] Exemption 5 protects certain inter-agency and intra-agency records that are normally considered privileged in the civil discovery context. Exemption 5 encompasses a deliberative process privilege intended to "prevent

[1] FOIA 2021-000348 (filed March 25, 2021).
[2] 5 U.S.C. § 552(b)(5).

APPENDIX B FCC ORGANIZATIONAL CHARTS

The following charts we obtained through Freedom of Information Act (FOIA) request 2018 – 494. The original goal was to obtain Federal Communications Commission (FCC) Enforcement Bureau (EB) organizational charts from 1999 through 2016 to ascertain how the organization has changed over time and what regions within the United States had FCC presence. The FOIA request resulted 13 organizational charts being provided between the 2009 and 2018 timeframe. No explanation or resource was provided for the FCC EB's organizational structure prior to 2009.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Travis LeBlanc, Bureau Chief
William Davenport, Deputy Bureau Chief
David Kolker, Deputy Bureau Chief
Pauls Blizzard, Deputy Bureau Chief
Katherine Winfree, Chief of Staff
CONSUMER PROTECTION
Eric Bash, Associate Bureau Chief
MEDIA
Eloise Gore, Associate Bureau Chief
COMPETITION
Martha Heller, Assistant Bureau Chief
NETWORK INTEGRITY
Joe Monie, Chief Engineer
Jeremy Marcus, Assistant Bureau Chief
POLICY TEAM
Lyle Elder, Assistant Bureau Chief
David Strickland, Assistant Bureau Chief
Stephen Buckman, Special Counsel
COUNSEL
Jon Minkoff, Chief Data Officer
Christine Kurth, Special Counsel
Brad Currier, Legal Advisor
Gregory Simon, Legal Advisor
OFFICE OF MANAGEMENT & RESOURCES
Noelle Green, ABC for Management
USF STRIKEFORCE
Loyaan Egal, Director
Rakesh Patel, Deputy Director
EQUIPMENT DEVELOPMENT GROUP
Scott Parker, Director
INVESTIGATIONS & HEARINGS DIVISION
Theresa Cavanaugh, Chief
Pamela Kane, Deputy
Jeffrey Gee, Deputy
MARKET DISPUTES RESOLUTION DIVISION
Christopher Killion, Chief
Rosemary McEnery, Deputy
Lisa Griffin, Deputy
Lisa Saks, Acting Deputy
SPECTRUM ENFORCEMENT DIVISION
Ricardo Durham, Acting Chief
JoAnn Lucanik, Deputy
TELECOMMUNICATIONS CONSUMERS DIVISION
Richard Hindman, Chief
Sharon Lee, Deputy
Kristi Thompson, Deputy
NORTHEAST REGION
G. Michael Moffitt, Director
James Higgins, Deputy
SOUTH CENTRAL REGION
Dennis Carlton, Director
Loyd Perry, Deputy
Diane Law-Hsu, Counsel
WESTERN REGION
Rebecca Dorch, Director
Leo Cirbo, Deputy
Margaret Egler, Counsel
Boston, MA
Buffalo, NY**
Chicago, IL
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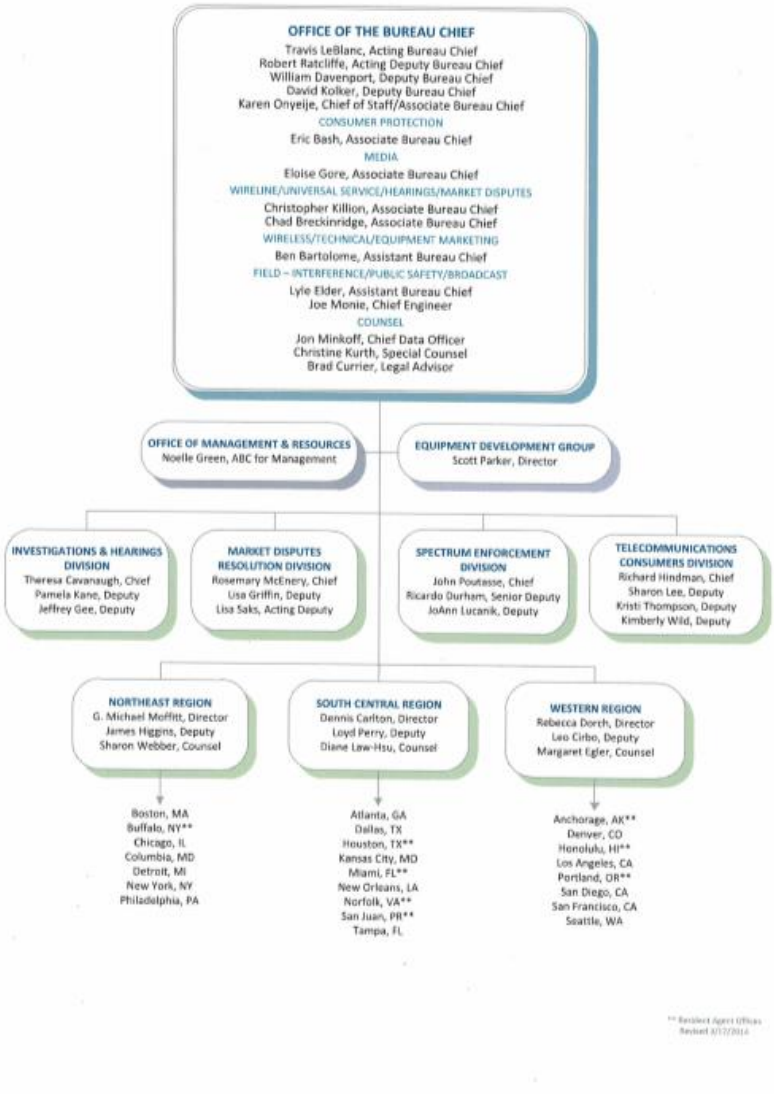

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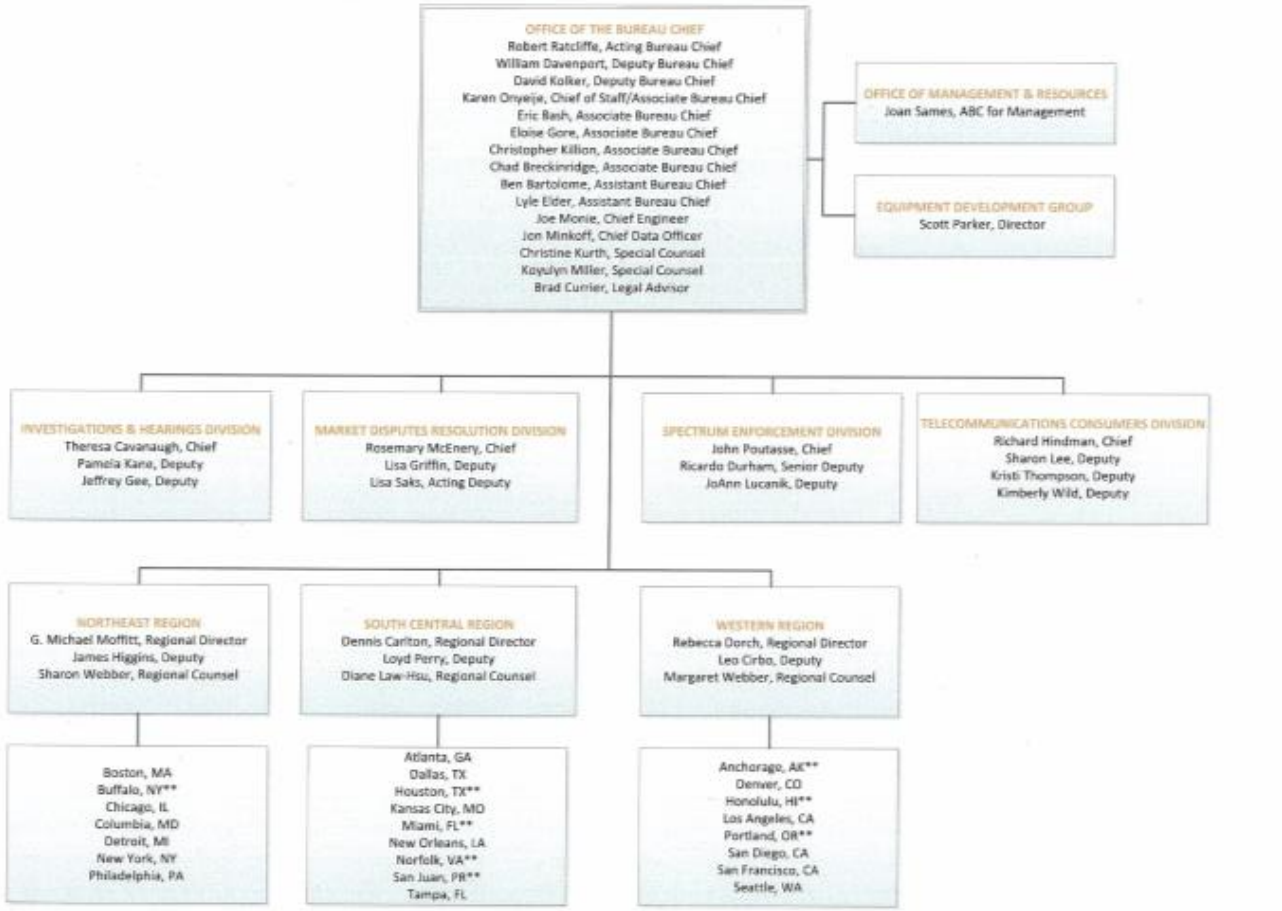

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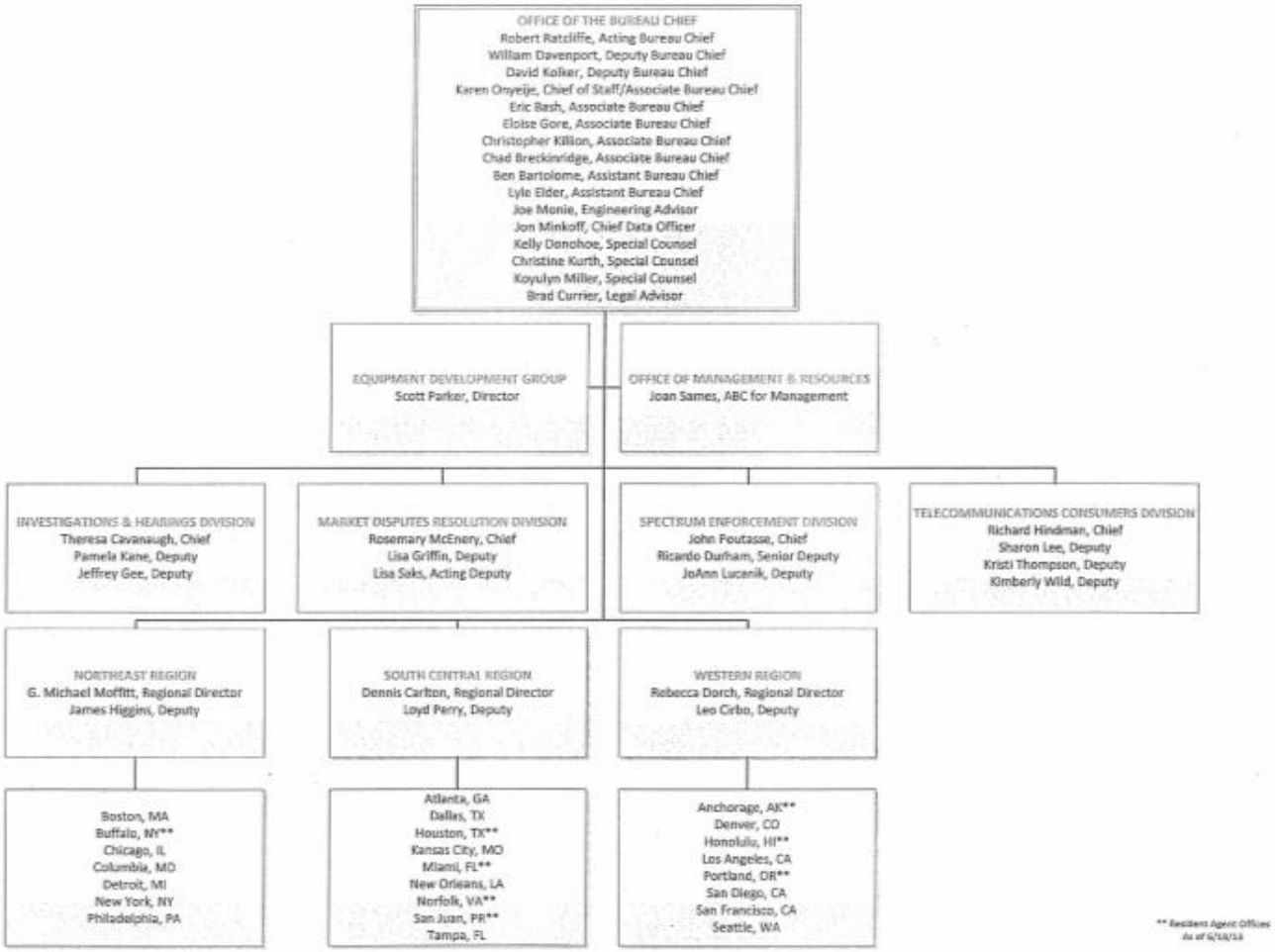

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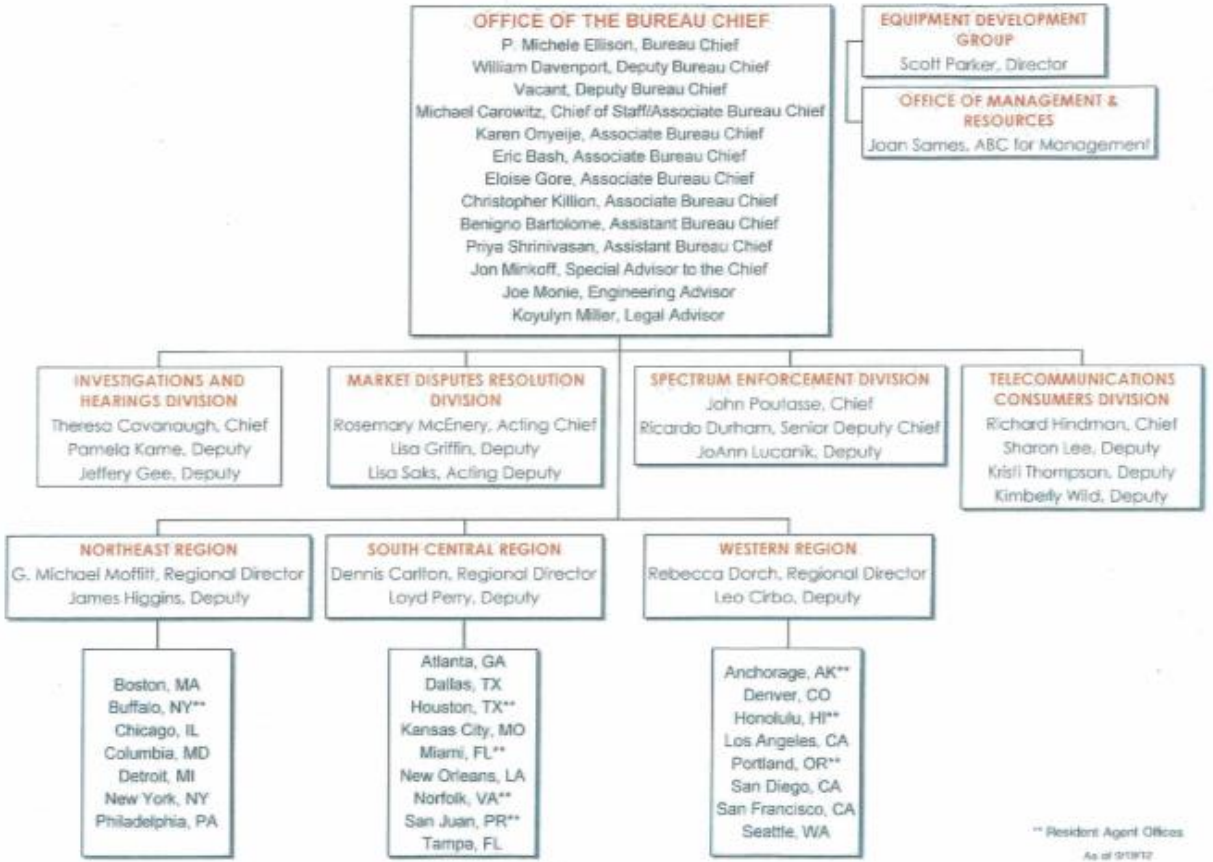

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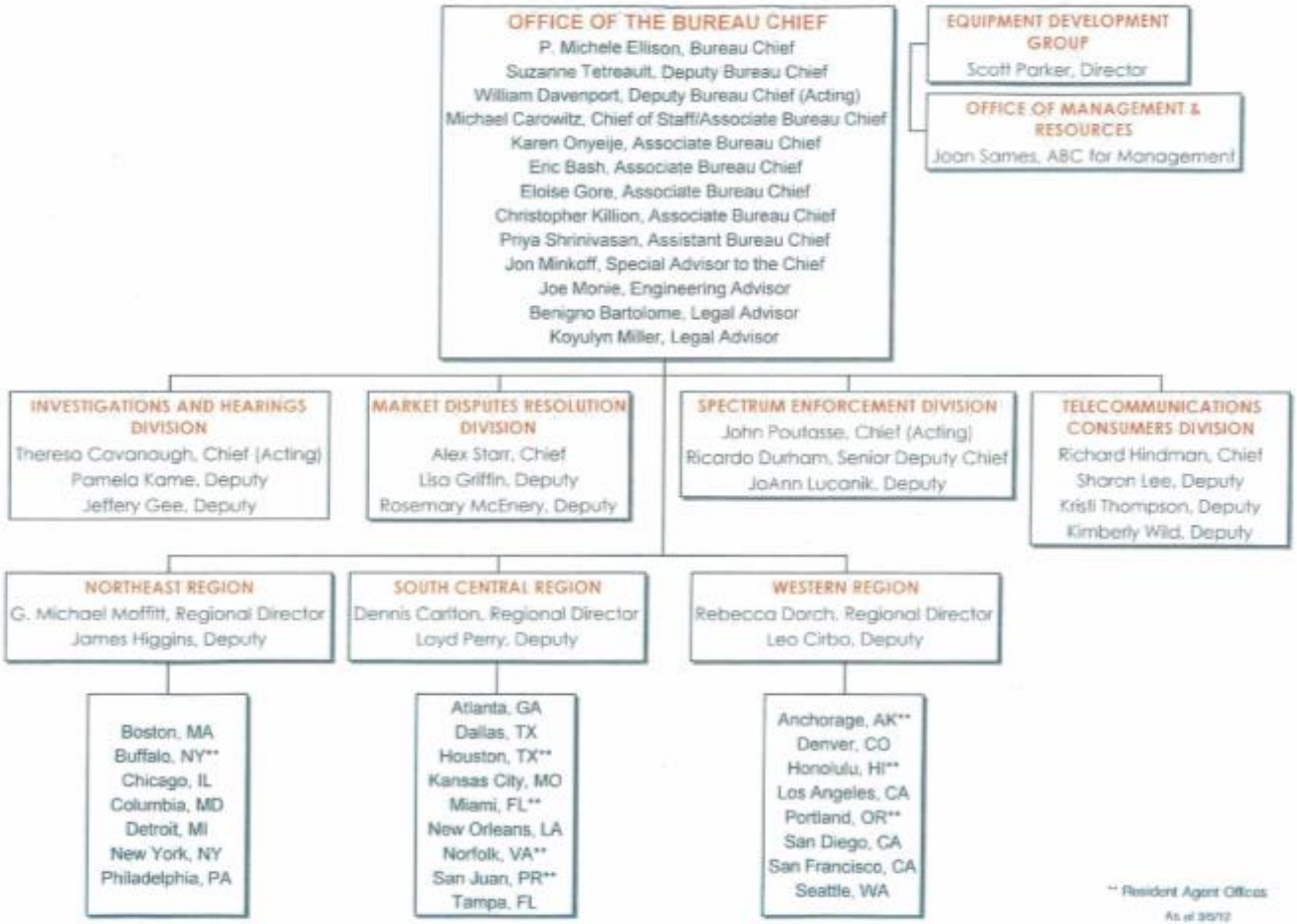

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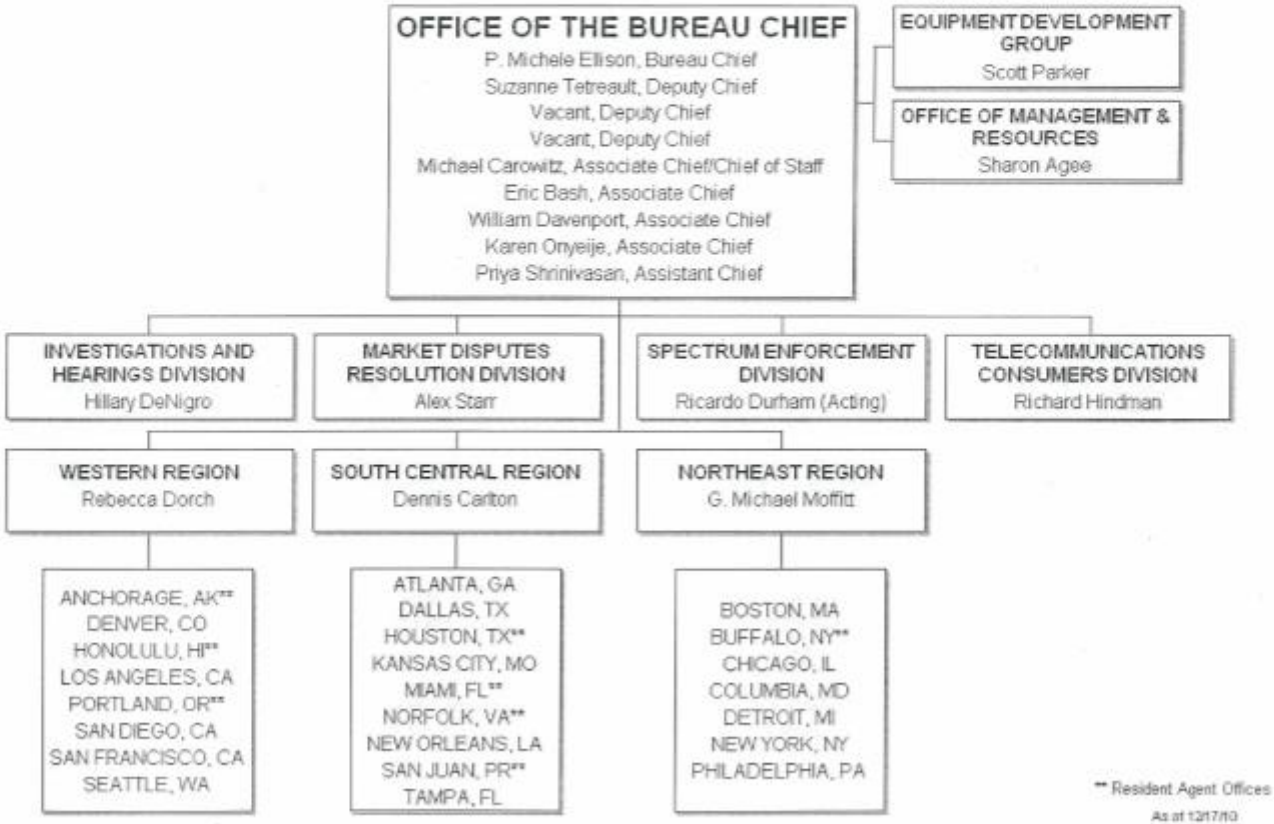

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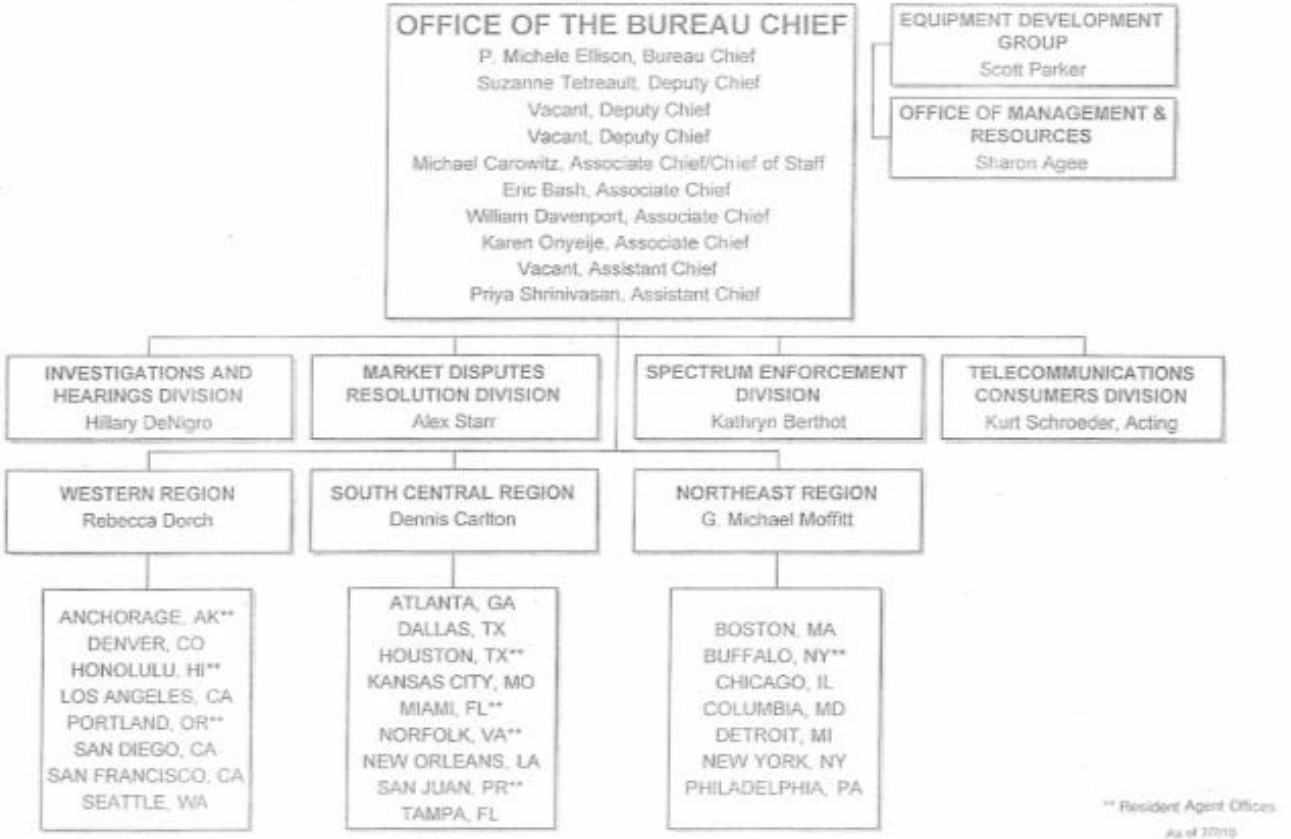

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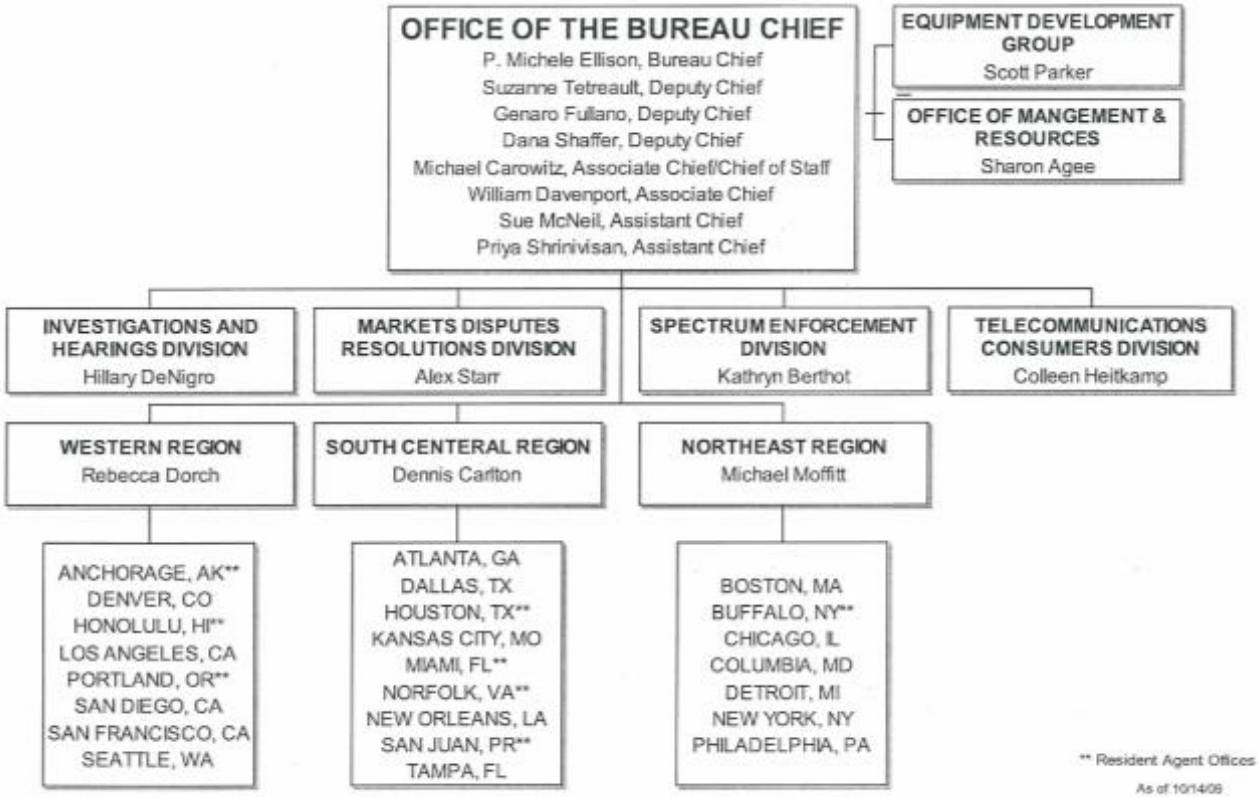

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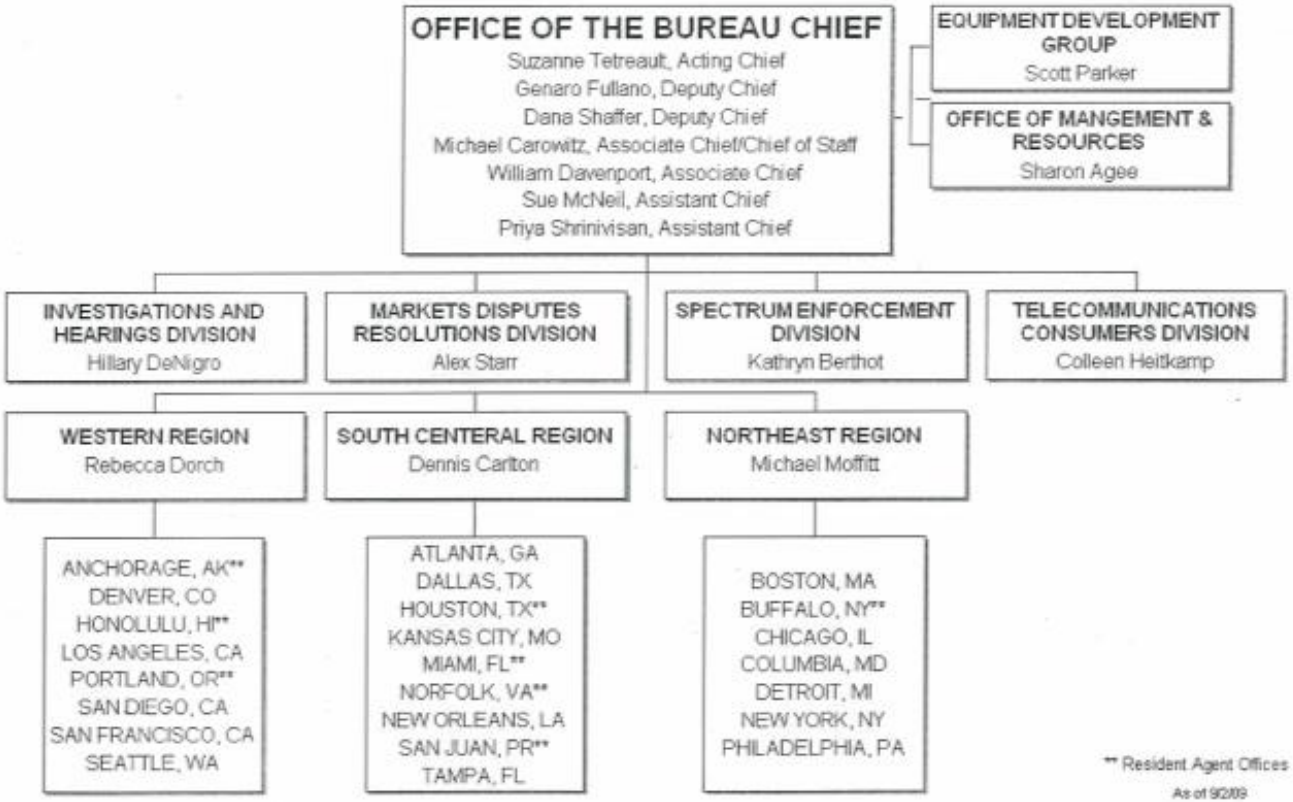

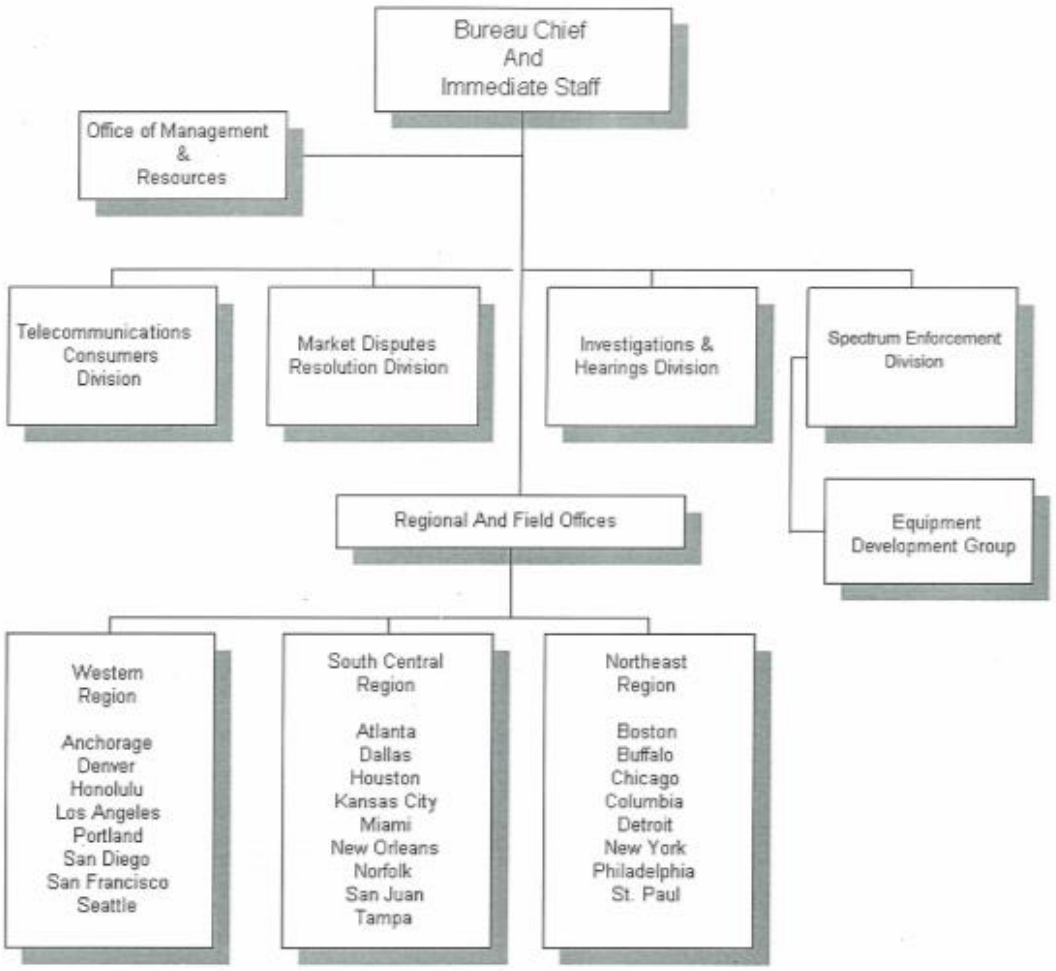
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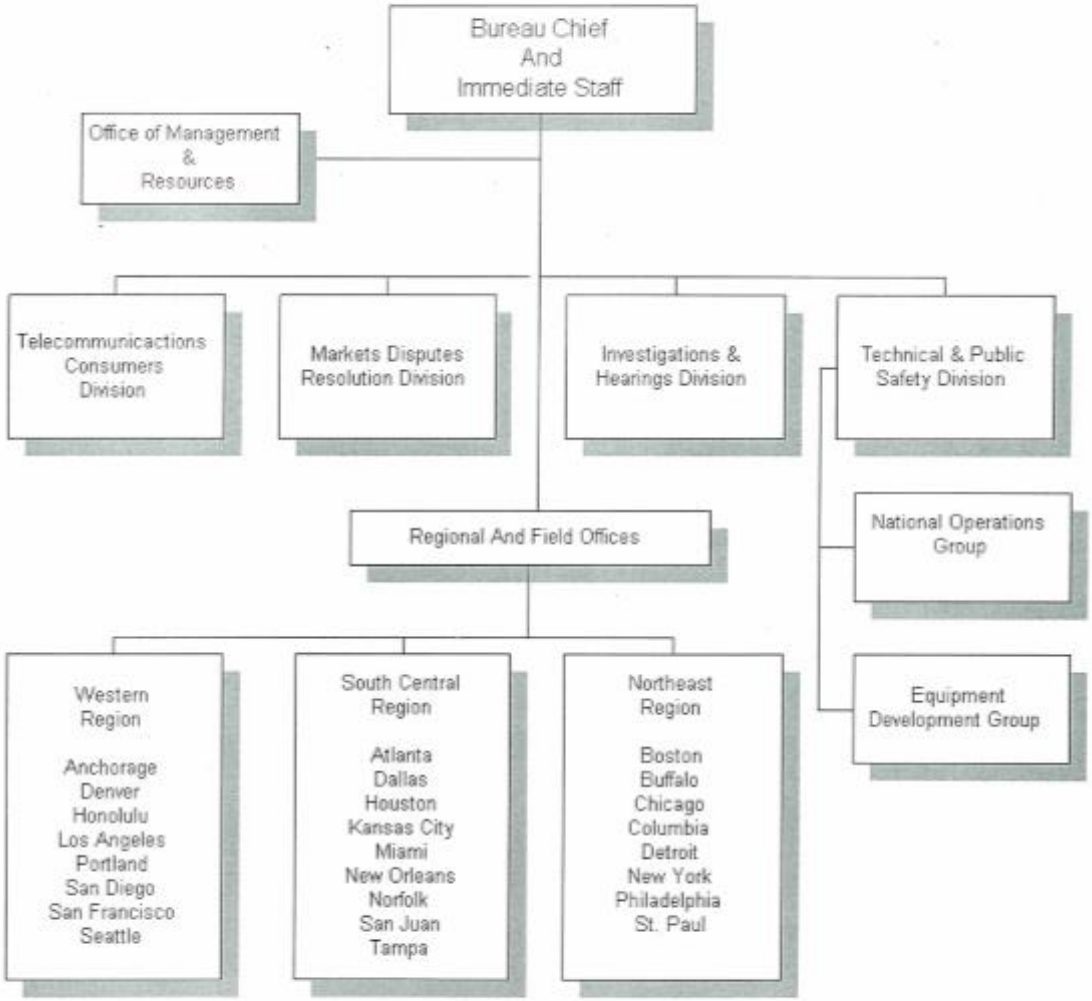
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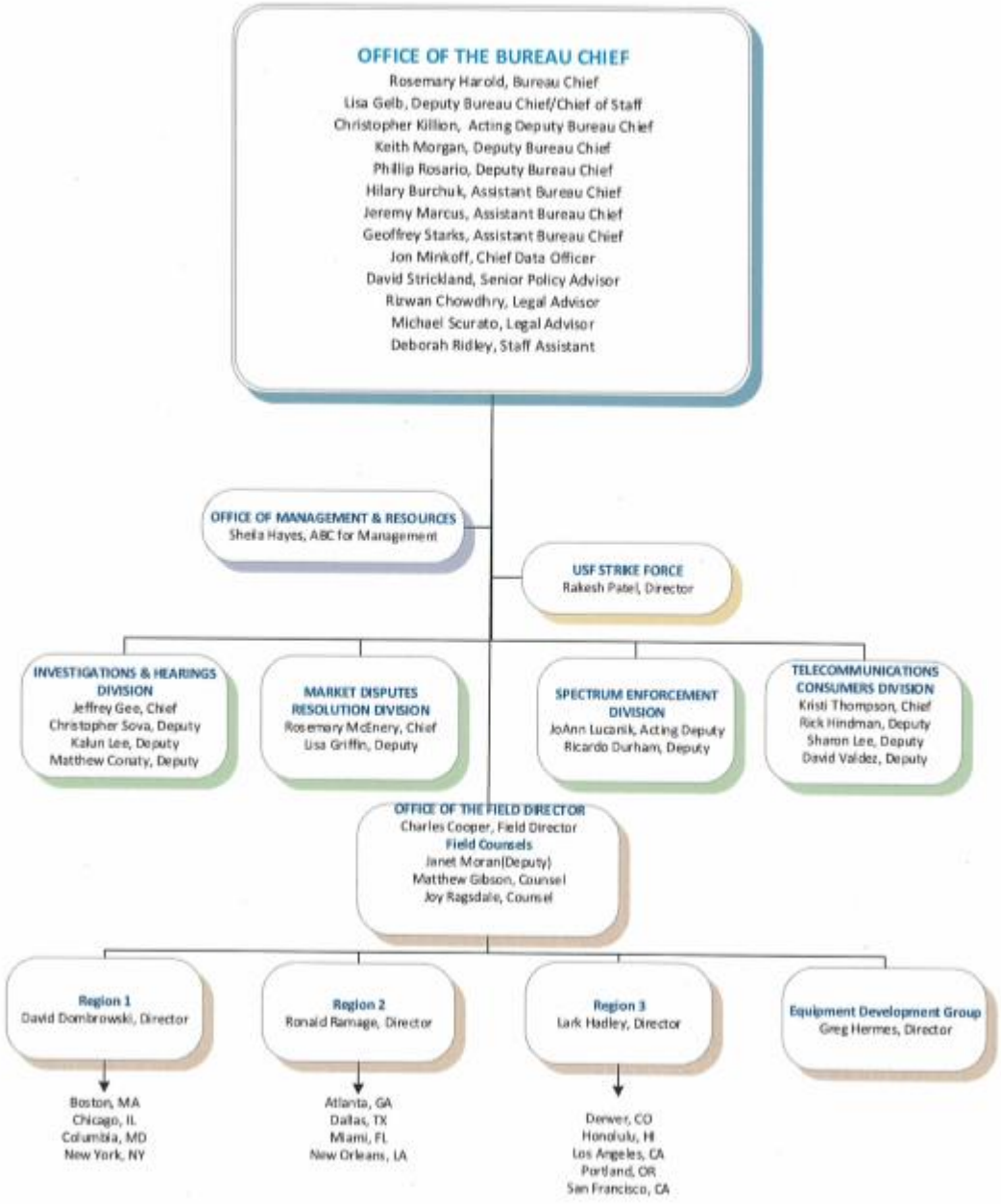
As of 3/13/2018



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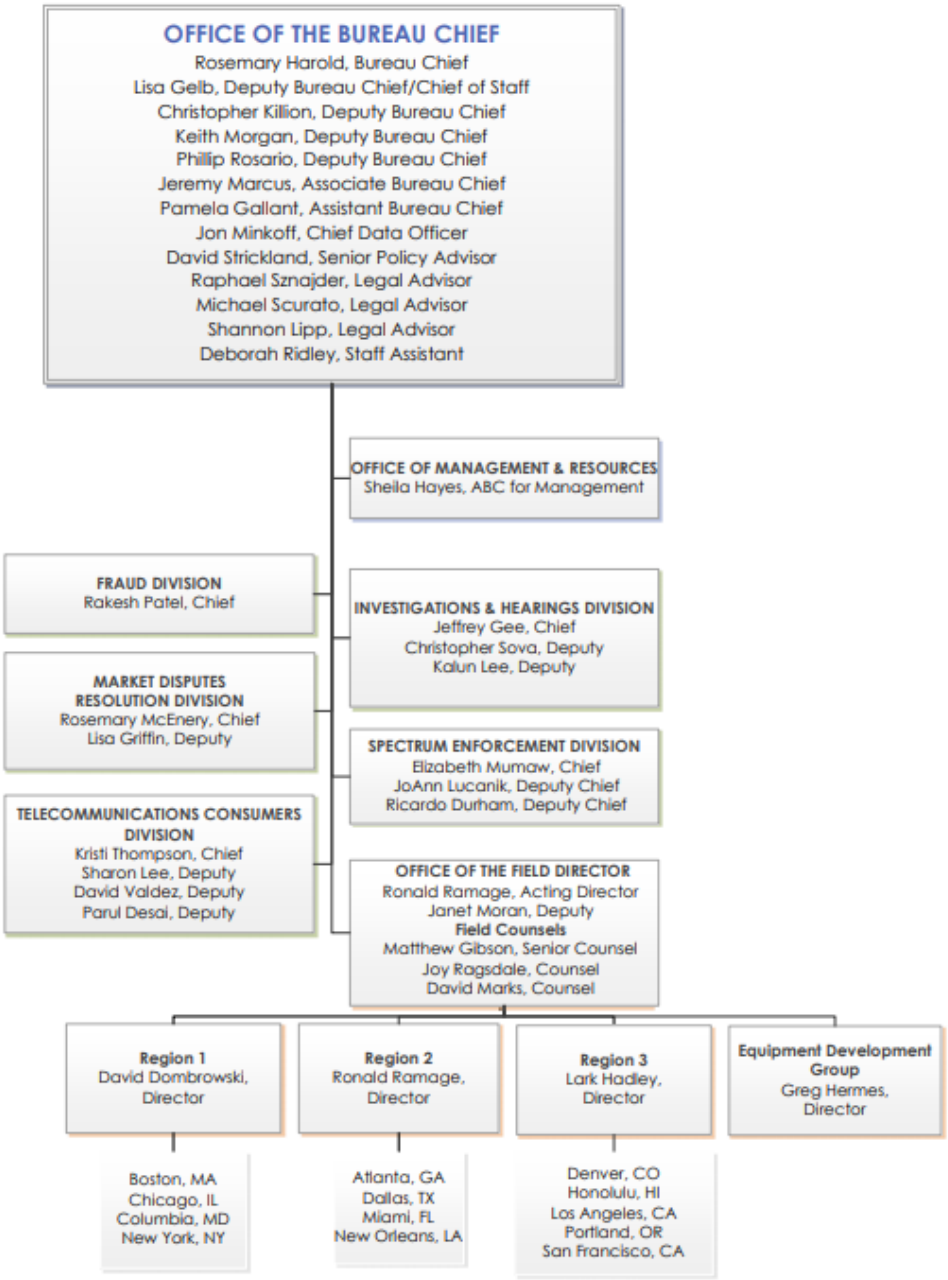

APPENDIX C CURATING THE DATASET – LINKS TO RAW DATA

The Federal Communications Commission's Enforcement Bureau database dates back to October 1999 – the inception of the Enforcement Bureau and encompasses records as present as October 2019 (the transitional site was "taken" offline as of Dec 2019 and the links will redirect you to the "updated" site). Data collection from this database is a laborious task as it is essentially a document, usually html, the name of the entity, and the publication type. This database is not searchable based on violations or any of the other attribute data discussed in the dissertation. Each document required parsing and extraction of pertinent details. Due to the concern of human error, this data was reviewed two to three times to ensure reliability. Beginning with the first record in October 1999, data collection was stopped at October 2019 for a full 20 years of data to be analyzed. Additionally, typologies were determined based on recurring themes and violations reviewed within the documentation. To view the raw data from the FCC EB website, please see the links below. A full set of the dissertation will be provided in this section upon the end of the first phase of the research framework. Main website: https://transition.fcc.gov/eb/Welcome.html

Table 9 FCC Repository Data Collected and Count by Year

1999 Data (24 records)	2005 Data (288 records)	2011 Data (403 records)	2017 Data (273 records)
2000 Data (337 records)	2006 Data (344 records)	2012 Data (261 records)	2018 Data (262 records)
2001 Data (276 records)	2007 Data (1111 records)	2013 Data (523 records)	2019 Data (184 records)
2002 Data (721 records)	2008 Data (1029 records)	2014 Data (238 records)	
2003 Data (533 records)	2009 Data (516 records)	2015 Data (158 records)	
2004 Data (527 records)	2010 Data (467 records)	2016 Data (112 records)	

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